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FINAL FIVE-YEAR REVIEW FOR OPERABLE UNITS 1, 2, 3, 4, 10, 11, 13 AND 18 REVISION 7 NAS PENSACOLA FL (PUBLIC DOCUMENT)

9/26/2013

TETRA TECH

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055

Rev.7
09/26/13

Final
Five-Year Review

Operable Units 1, 2, 3, 4, 10, 11, 13, and 18

Naval Air Station Pensacola
Pensacola, Florida

Contract Task Order 0030

September 2013

NAVFAC Naval Facilities Engineering Command NAVFAC SOUTHEAST
NAS Jacksonville
Jacksonville, Florida 32212-0030

TETRA TECH

FIVE-YEAR REVIEW

OPERABLE UNITS 1, 2, 3, 4, 11, 13, AND 18

NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command
Southeast
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Naval Air Station Jacksonville
Jacksonville, Florida 32212-0030

Submitted by:
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CONTRACT NUMBER N62467-04-D-0055
CONTRACT TASK ORDER 0030

SEPTEMBER 2013

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Five-Year Review Summary Form

The table below is for the purpose of the summary form and associated data entry and does not replace the two tables required in Section VIII and IX by the FYR guidance. Instead, data entry in this section should match information in Section VII and IX of the FYR report.

SITE IDENTIFICATION		
Site Name: Naval Air Station Pensacola		
EPA ID: *FL6 170 024 412*		
Region: 4	**State:** FL	**City/County:** Pensacola/Escambia

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the Multiple sites achieved construction completion?** No

REVIEW STATUS
Lead agency: Other Federal Agency **If "Other Federal Agency" was selected above, enter Agency name:** Department of the Navy, Naval Facilities Engineering Command Southeast
Author name (Federal or State Project Manager): Patty Marajh-Whittemore.
Author affiliation: Naval Facilities Engineering Command Southeast
Review period: 2008 - 2013
Date of site inspection: May 2-4, 2012
Type of review: Statutory
Review number: 3
Triggering action date: Navy Triggering Action Date: August 22, 2008 USEPA Triggering Action Date: September 29, 2008
Due date *(five years after triggering action date)*: Navy Due Date: August 22, 2013 USEPA Due Date: September 29, 2013

Five-Year Review Summary Form (continued)

The table below is for the purpose of the summary form and associated data entry and does not replace the two tables required in Section VIII and IX by the FYR guidance. Instead, data entry in this section should match information in Section VII and IX of the FYR report.

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU13

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU1, Site 1	**Issue Category: Monitoring**			
	Issue: The NAS Pensacola Partnering Team previously agreed that certain technical modifications to the remedy were needed including discontinuing use of the groundwater interceptor trench and relocation of the surface water Point of Compliance. The Navy is preparing a Record of Decision (ROD) Amendment to detail the remedy evaluation and formally incorporate those modifications as permanent changes to the OU1 remedy subject to any revision(s), which may result from public review/comment on that proposal.			
	Recommendation: Complete the ROD Amendment to evaluate the new proposed remedy.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Navy	USEPA/State	05/10/15

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU2, Sites 11, 12, 25, 26, 27, 30	**Issue Category: Remedy Performance**
	Issue: Asbestos and radium were not identified in the OU2 ROD; there are minor changes to the Applicable or Relevant and Appropriate Requirements (ARARs) and the ARARs did not include federal standards; there were delays in initiation of the groundwater Long-term Monitoring (LTM) Program and issues may arise from SPLP evaluations.

	Recommendation: Amend the ROD to address the change in remedy at OU2 due to discovery of Asbestos Containing Material (ACM), the presence of radiologically impacted soils, and to address changes in ARARs including the addition of Federal Standards. Initiate the groundwater LTM Program (initiated March 2013); and review all remedial activities for any issues that may arise from SPLP evaluations which will be addressed appropriately within the CERCLA process.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Navy	USEPA/State	2/27/14

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU3, Site 2	**Issue Category: Monitoring**			
	Issue: The selected "No Action" remedy for OU3 did not contemplate the need for site monitoring to confirm that natural attenuation processes are serving to reduce unacceptable risk to benthic organisms. USEPA has recently indicated it believes that some form of attenuation monitoring as well as a review of upgradient contaminated sites as potential contributors to further sediment contamination at OU3 need to be undertaken before any protectiveness determination is made. The Navy does not agree, given the basis for the previous No-Action decision, that such monitoring or upgradient site review(s) are needed.			
	Recommendation: In light of the concerns raised by USEPA during the review of the draft Five Year Review, the Navy agrees to defer the protectiveness determination for this OU. The Navy shall work with USEPA and FDEP on a path forward to resolve respective agency differences in order to achieve a satisfactory resolution of the matter during CY2014.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Navy	USEPA/State	10/01/15

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU4, Site 15	**Issue Category: Monitoring**
	Issues: The Maximum Contaminant Level (MCL) for arsenic has changed from

	50 micrograms per liter (µg/L) to 10 µg/L. Since the ROD was signed, the dieldrin standard per Florida Chapter 62-777, F.A.C. has changed from 0.1 µg/L to 0.002 µg/L. Land Use Controls (LUCs) were implemented under a Land Use Control Implementation Plan (LUCIP) developed pursuant to a Land Use Control Action Plan (LUCAP) (Memorandum of Agreement; [MOA]) executed by the USEPA, FDEP and the Navy in 1998. USEPA has raised the issue that MOA unenforceability may affect overall site protectiveness. The Navy disagrees with that premise and believes the LUCs are fully enforceable in any event via the OU4 ROD. However, the Navy is willing to discuss with USEPA and FDEP existing LUC implementation procedures intended to ensure site protectiveness so that the issue raised may be mutually resolved in CY2014. A background investigation is recommended to evaluate natural levels of arsenic since source removal was previously performed.			
	Recommendation: Complete an Explanation of Significant Difference (ESD) to address the change in the arsenic MCL; Analyze groundwater samples to determine if dieldrin exceeds regulatory criteria and should be added as a contaminant of concern (COC). Review and discuss with USEPA and FDEP existing LUC implementation procedures intended to ensure site protectiveness and complete and document an arsenic background study.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Navy	USEPA/State	12/30/14

Issues and Recommendations Identified in the Five-Year Review:

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU10 Site 32, 33, & 35	**Issue Category: Monitoring**
	Issues: Some monitoring wells are reported to be in disrepair. The arsenic MCL has changed from 50 µg/L to 10 µg/L. Although OU10 was previously transferred from the CERCLA to the RCRA program, a full transfer was not completed. A CERCLA Five-Year Review is still required even though it is managed under the RCRA program. The on-going in situ bioremediation system has showed only partial success in treating trichloroethene concentrations in the source area. Geochemical conditions in the aquifer (reduced pH and elevated sulfate concentrations) have made in situ bioremediation challenging.
	Recommendation: Repair or replace damaged monitoring wells. Complete an

	ESD for the change in arsenic MCL. Evaluate and discuss the full transfer of OU10 to RCRA and remove the Five-Year Review requirement from the ROD. Complete the ongoing Optimization Study of the in situ bioremediation system to diagnose problems and evaluate technical options to improve system performance and efficiency.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Navy	USEPA/State	09/01/14

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU11, Site 38	**Issue Category: Monitoring**			
	Issue: (1) Monitoring wells are reported to be either in disrepair or missing (2) MNA has not yet been initiated.			
	Recommendation: Repair or replace damaged or lost monitoring wells required for MNA program; (2) Implement Natural Attenuation Monitoring.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Navy	USEPA/State	12/5/13

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU13, Site 8 & 24	**Issue Category:** No Issue			
	Issue: None.			
	Recommendation: None.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	Navy	Other	NA

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU18, Site 43	**Issue Category:** Remedy Performance
	Issue: Remedy is under construction.

	Recommendation: Continue to implement the remedy.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	Navy	Other	NA

Protectiveness Statement(s)
Include each individual OU protectiveness determination and statement. If you need to add more protectiveness determinations and statements for additional OUs, copy and paste the table below as many times as necessary to complete for each OU evaluated in the FYR report.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU1, Site 1	Short-term Protective	05/10/15

Protectiveness Statement:

The remedy at OU1 currently protects human health and the environment because LUCs are in place and enforced. However, in order for the remedy to be protective in the long term, a ROD Amendment is needed to revise the surface water remedial action, to revise the surface water Remedial Action Objective (RAO), complete a LUC Remedial Design, and to address the change in the federal and state arsenic MCLs.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU2, Sites 11, 12, 25, 26, 27, 30	Short-term Protective	02/27/14

Protectiveness Statement:

The remedy at OU2 currently protects human health and the environment because it prevents residential development of the site, soil removal actions have eliminated risk due to soil contamination in excess of industrial criteria at Sites 25 and 27, and the restriction on groundwater use eliminates the exposure to contaminated groundwater. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure long-term protectiveness: amend the ROD to change the remedy at Site 11 due to discovery of ACM, change the LUC and require maintenance of the soil cover at Site 12, for excavation of radiologically impacted soils at Sites 12 and 27, and make minor changes to the standards. In addition implement the MNA program.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU3, Site 2	Protectiveness Deferred	10/01/15

Protectiveness Statement:

The protectiveness determination for OU3 is hereby deferred pending resolution of the issues and recommendations.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU4, Site 15	Short-term Protective	12/30/14

Protectiveness Statement:

The remedy at OU4 currently protects human health and the environment because it prevents residential development of the site, a soil removal action has eliminated risk due to soil contamination, and the restriction on groundwater use eliminates the exposure to contaminated groundwater. In addition, monitoring wells 15GGR1 and 15MW76 have been replaced. However, in order for the remedy to be protective in the long term, the remedy needs to be modified through an ESD to change the performance standard for arsenic from 50 µg/L to 10 µg/L. In addition the Navy needs to review and discuss with USEPA and FDEP existing LUC implementation procedures intended to ensure site protectiveness and analyzed groundwater samples for dieldrin as part of the next groundwater monitoring event.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU10, Site 32, 33 & 35	Short-term Protective	09/01/14

Protectiveness Statement:

The remedy at OU10 currently protects human health and the environment because LUCs have been implemented and are being enforced. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure long-term protectiveness: repair or replace damaged monitoring wells; complete an ESD for the change in arsenic standards and possible full site transfer to the RCRA program; and complete the ongoing Optimization Study.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU11, Site 38	Short-term Protective	12/05/13

Protectiveness Statement:

The remedy at OU11 currently protects human health and the environment because it prevents residential development of the site and the restriction on groundwater use eliminates the exposure to contaminated groundwater. However, in order for the remedy to be protective in the long term, implementation of the MNA remedy needs to be competed.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU13, Sites 8, 24	Short-term Protective	Click here to enter date.

Protectiveness Statement:

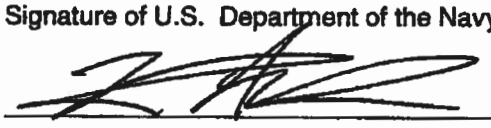
The remedy at OU13 is protective of human health and the environment because of the restriction on groundwater use eliminates the exposure to contaminated groundwater.

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU18, Site 43	Will be Protective	Click here to enter date.

Protectiveness Statement:

The remedy at OU18 will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

Signature of U.S. Department of the Navy and Date



19 AUG 13

Date

K.W. Hoskins
Captain, U. S. Navy
Commanding Officer
Naval Air Station Pensacola, Florida

TETRA TECH

This document, *Five-Year Review, Operable Units 1, 2, 3, 4, 10, 11, 13, and 18, Naval Air Station Pensacola, Florida*, has been prepared under the direction of a Florida Registered Professional Geologist. The work and professional opinions rendered in this report were developed in accordance with commonly accepted procedures consistent with applicable standards of practice and based on information by others. Should information come to light other than what was known at the time of this document preparation, the undersigned geologist reserves the right to modify his findings. This document was prepared for Naval Air Station Pensacola, Florida and should not be construed to apply to any other site.

Gerald Walker 9/26/13

DATE

Gerald Walker, P.G.
Florida License No. PG-1180

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ACRONYMS AND ABBREVIATIONS

ACM	Asbestos Containing Material
Aerostar	Aerostar Environmental Services, Inc.
ARAR	Applicable or Relevant and Appropriate Requirement
BEI	Bechtel Environmental, Inc.
BEQ	Benzo(a)pyrene equivalent
bls	Below Land Surface
CAP	Corrective Action Plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CNET	Chief of Naval Education and Training
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
cPAH	Carcinogenic Polynuclear Aromatic Hydrocarbon
CSF	Cancer Slope Factor
CTL	Cleanup Target Level
CTO	Contract Task Order
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DO	Dissolved Oxygen
DOT	Department of Transportation
DRMO	Defense Reutilization and Marketing Office
ECOPC	Ecological Contaminant of Potential Concern
E&E	Ecology and Environment, Inc.
ERD	Enhanced Reductive Dechlorination
ERM	Effects Range Medium
ESD	Explanation of Significant Differences
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FFA	Federal Facilities Agreement
FS	Feasibility Study
GCTL	Groundwater Cleanup Target Level
GSI	Groundwater/Surface Water Interface
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
HI	Hazard Index

ACRONYMS AND ABBREVIATIONS (Continued)

HSWA	Hazardous and Solid Waste Amendments of 1984
HRA	Historical Radiological Assessment
IAS	Initial Assessment Study
ILCR	Incremental Lifetime Cancer Risk
IR	Installation Restoration
IRA	Interim Remedial Action/Interim Removal Action
ISDB	Industrial Sludge Drying Bed
IWTP	Industrial Wastewater Treatment Plan
LDR	Land Disposal Restriction
LTGMP	Long-term Groundwater Monitoring Plan
LTM	Long-term Monitoring
LUC	Land Use Control
LUCAP	Land Use Control Assurance Plan
LUCIP	Land Use Control Implementation Plan
LUC RD	Land Use Control Remedial Design
LURA	Land Use Restriction Agreement
µg/L	Micrograms per Liter
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
mg/kg	Milligrams per Kilogram
mg/L	Milligrams per Liter
MNA	Monitored Natural Attenuation
MOA	Memorandum of Agreement
MSWCTL	Marine Surface Water Cleanup Target Level
mV	Millivolt
NADEP	Naval Aviation Depot
NAS	Naval Air Station
NAVFAC SE	Naval Facilities Engineering Command Southeast
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NFESC	Naval Facilities Engineering Service Center
NPDES	National Pollution Discharge Elimination System
NPL	National Priorities List
NTTC	Naval Technical Training Center
NWFWMD	Northwest Florida Water Management District

ACRONYMS AND ABBREVIATIONS (Continued)

O&M	Operation and Maintenance
ORC	Oxygen Release Compound
ORP	Oxidation Reduction Potential
OU	Operable Unit
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
POC	Point of Compliance
PPE	Personal Protective Equipment
PSC	Potential Source of Contamination
PWC	Public Works Center
RAB	Restoration Advisory Board
RAD	Radiological
RAO	Remedial Action Objective
RASO	Radiological Affairs Support Office
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Level
SAP	Sampling and Analysis Plan
SCTL	Soil Cleanup Target Level
SVOC	Semivolatile Organic Compound
SWCTL	Surface Water Cleanup Target Level
TBC	To Be Considered
TCLP	Toxicity Characteristic Leaching Procedure
Tetra Tech	Tetra Tech, Inc.
TOC	Total Organic Carbon
UCL	Upper Confidence Limit
UE	Unrestricted Exposure
UFP	Uniform Federal Policy
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
UU	Unlimited Use
VA	Veterans Administration
VOC	Volatile Organic Compound
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) has been contracted by the Department of the Navy, Naval Facilities Engineering Command Southeast (NAVFAC SE) to perform a Five-Year Review for Naval Air Station (NAS) Pensacola located in Pensacola, Florida. The Five-Year Review includes seven Operable Units (OUs) at the facility.

The purpose of this Five-Year Review is to determine whether the remedies at the seven OUs are protective of human health and the environment. The methods, findings, and conclusions of the Five-Year Review are documented in this report. In addition, this report identifies issues, if any, found during the Five-Year Review, and presents recommendations to address them.

1.1 FIVE-YEAR REVIEW PROCESS

This Five-Year Review was prepared pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) § 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA § 121 states:

> *"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environments are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."*

This requirement is further interpreted in the NCP; 40 Code of Federal Regulations (CFR) § 300.430(f)(4)(ii) states:

> *"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."*

For federal facility sites under the jurisdiction, custody, or control of the Department of Defense, Executive Order 12580 delegates the responsibility for Five Year Review Completion per CERCLA § 121 to the

Department of Defense. The Navy is the lead agency responsible for this Five-Year Review at NAS Pensacola, working with the United States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) through the Federal Facility Agreement (FFA) signed October 23, 1990.

1.1.1 Administrative Components

The first Five-Year Review was conducted because hazardous substances, pollutants, and contaminants from past storage, handling, and disposal practices at OU1 and OU10 remained at concentrations above levels that allow for unlimited use (UU) and unrestricted exposure (UE) at NAS Pensacola. The first Five-Year Review only addressed OU1 and OU10 and was prepared in February 2003. The second Five-Year Review addressed OU1, OU4, OU11, and OU13 and was completed and signed by the Navy on August 22, 2008. OU10 was not included in the second Five-Year Review because the site was transferred to the Resource Conservation and Recovery Act (RCRA) Program.

This is the third Five-Year Review for NAS Pensacola, and consists of reviews of the previous Five-Year Review; evaluation of the issues raised in the previous review, actions taken, and results; site inspections; personnel interviews; and a technical assessment of each site and the remedial actions underway. This Five-Year Review addresses OU1, OU2, OU3, OU4, OU10, OU11, OU13, and OU18; all of which now have signed Record of Decisions (RODs) in place. Based on a Regulatory Agency request OU10 was added to this Five-Year Review; although it continues to be monitored under the RCRA regulatory program. This Five-Year Review is being conducted because hazardous substances, pollutants, and contaminants from past storage, handling, and disposal practices remain at levels that do not allow for UU and UE at these specific sites.

This third Five-Year Review was initiated with a scoping teleconference on April 11, 2012 and preparation of the draft Five-Year Review document. Sections 2.0 through 8.0 of this report are the Five-Year Reviews for OU1, OU2, OU3, OU4, OU11, OU13, and OU18, respectively. Each section includes the site's chronology; background and summary of the remedial actions performed; and the Five-Year Review findings, assessment, deficiency list, recommendations, and protectiveness statements. Section 9.0 provides a general summary, conclusions, and protectiveness statement for the OUs reviewed at NAS Pensacola. Figure 1-1 shows the location of NAS Pensacola, and Figure 1-2 shows the location of the OUs included in the Five-Year Review.

Additional information related to OU10 includes: the ROD for NAS Pensacola OU10 was signed on June 16, 1997. Remedial Action Objectives (RAOs) were developed as a result of data collected during the Remedial Investigation (RI) to aid in the development and screening of remedial alternatives to be considered for the ROD. The purpose of the remedial action at OU10 was to reduce the risks to human

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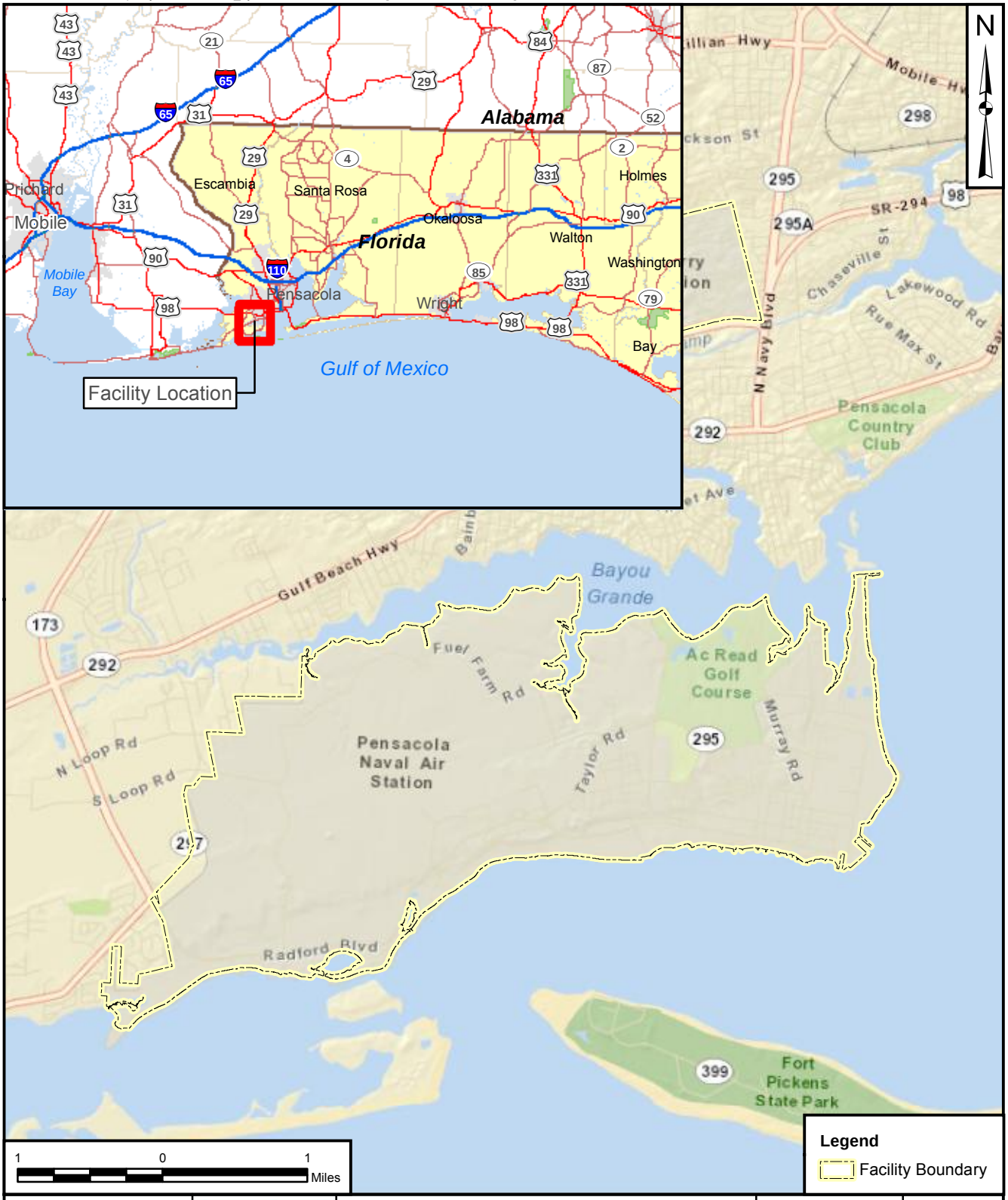

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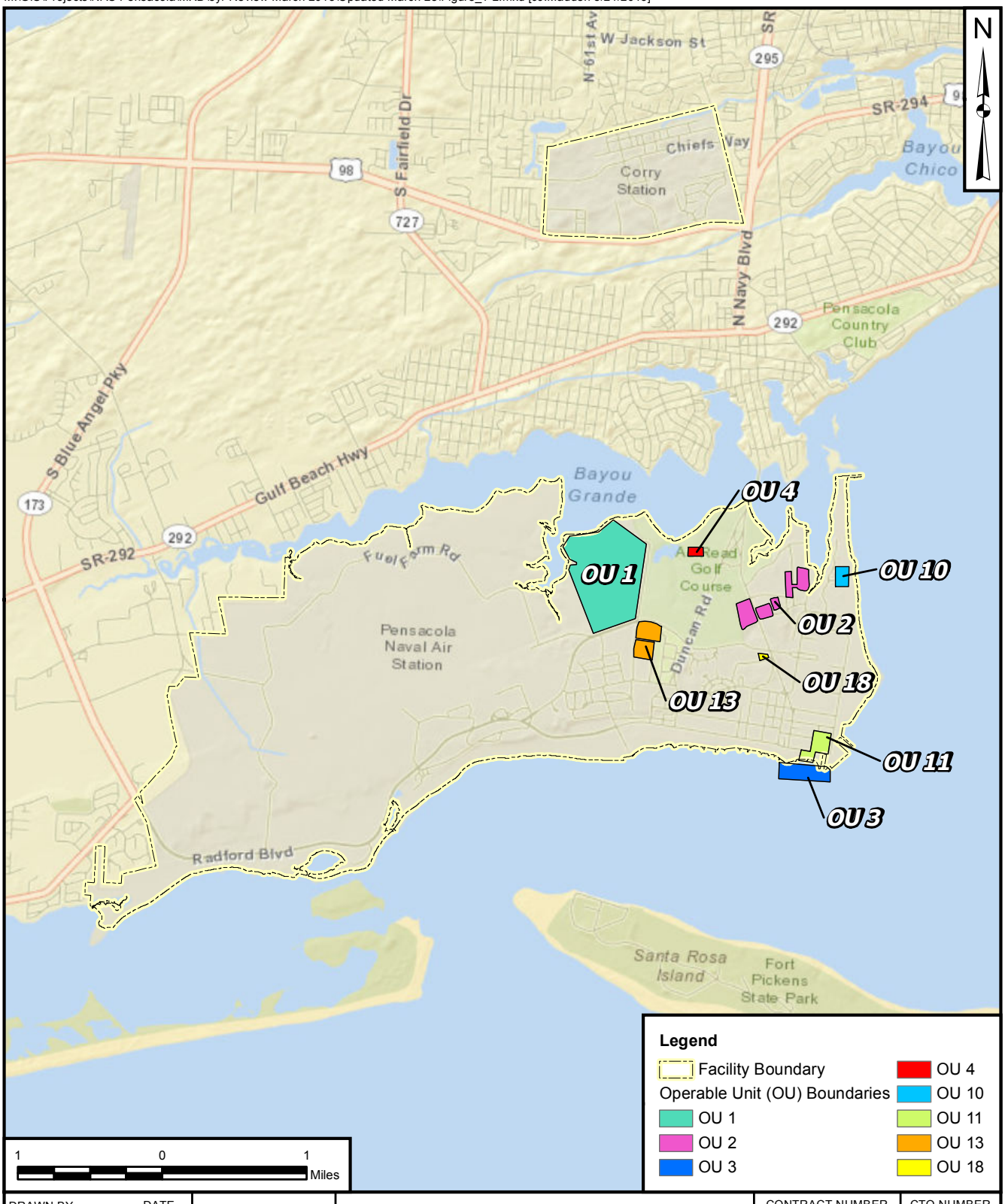

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NAVFAC

health and environment associated with exposure to soil and groundwater. To meet these goals, RAOs were identified. The RAOs for OU10 are listed below.

Medium	Contaminants Causing Unacceptable Risk	Remedial Action Objectives
Soil	Benzo(a)pyrene and dibenzo(a,h)anthracene	Eliminate human health risk above 1E-6.
Groundwater	Chlorinated benzenes and naphthalene	Protect groundwater from contaminants leaching from the soil.

Four remedial alternatives were evaluated in the FS for OU10 to address the soil RAO. Of the four alternatives evaluated, the selected remedial action for OU10 was two components of the preferred alternative and a component of Alternative 4. The major components involved:

- Complete a leachability study on Areas B, C, and D with excavation as a contingency and groundwater treatment under RCRA
- Excavation of Area A

In March 1997, soil samples were collected from Areas B, C, and D. The samples were submitted to a laboratory for Synthetic Precipitation Leaching Procedure (SPLP) analysis of SVOCs and VOCs. No compounds were detected above the groundwater cleanup criteria; therefore, soil from Areas B, C, and D does not pose a threat to the groundwater. Therefore, no further action was required at Areas B, C, and D (BEI, 1998).

The remedial contractor mobilized to the site on November 3, 1997. Initial work included removal of fencing, clearing and grubbing, and other site preparation activities. All site preparation activities were completed on November 5, 1997 and excavation of contaminated soils from Area A was initiated. Excavation of the contaminated soil was completed on November 7, 1997. Ten dump trucks transported approximately 200 cubic yards (or approximately 230 tons) of soil to a Subtitle D landfill for disposal. Backfill of the excavation with approximately 200 cubic yards of clean granular fill began on November 7, 1997 and was completed on November 10, 1997. Replacement of fencing and topsoil, placement of grass seed, and demobilization occurred on November 12, 1997. A Remedial Action Completion Report was submitted by the Navy on February 5, 1998 and approved by FDEP on April 9, 1998.

The OU10 corrective action including the groundwater MNA program is continuing under the RCRA regulatory program currently administrated by FDEP.

1.1.2 LUC Implementation

The Navy conducts annual LUC site visits and inspections and invites and encourages regulatory representatives to attend. The inspection includes a review of the Facility Base Master Plan by the NAS Pensacola Environmental Coordinator, followed by the Inspection Teams review of the site-specific LUC requirements, a comprehensive site walkover, and documentation of the inspection. Following the LUC inspection, notice of completion of the inspection and any issues identified is sent via formal correspondence to FDEP and USEPA.

Tetra Tech conducted this Five-Year Review in conjunction with the NAS Pensacola Partnering Team, which consists of the following personnel:

- Patty Marajh-Whittemore, NAVFAC SE
- Greg Campbell, NAS Pensacola Public Works Department
- Tim Woolheater, USEPA
- David Grabka, FDEP
- Gerald Walker, Tetra Tech
- Allison Harris, Resolutions
- Brian Caldwell, Resolutions
- Sam Naik, CH2M HILL

1.1.3 Community Involvement

A public notice announcing the initiation of this Five-Year Review was published in the Pensacola News Journal on March 20, 2013. At the conclusion of the review, the final Five-Year Review will be placed in the local information repository and a fact sheet is planned for production and distribution to the Restoration Advisory Board (RAB) and any other interested persons or organizations.

Historically public participation in the Navy's Installation Restoration Program has been minimal. Periodically the Navy publishes public notices and fact sheets for activities including removal actions, proposed plans, and success stories. In November 2009, the Navy published a final Community Involvement Plan for NAS Pensacola that outlined activities to inform the public of planned or ongoing actions throughout the Installation Restoration Program and established channels for the release of information. Public comments were not received on the document and a public meeting has never been requested. The Navy is scheduled to update the Community Involvement Plan in 2014.

The NAS Pensacola RAB was established by the Navy in July 1995 as a forum for communication between the community and decision-makers. The RAB members work together to monitor progress of

the Navy's investigations and review remediation activities and recommendations at NAS Pensacola. RAB meetings are held regularly, advertised with a public notice, and are open to the public.

1.2 OVERVIEW OF NAS PENSACOLA

The official mission of NAS Pensacola is to provide facilities, service, and support for the operation and maintenance of naval weapons and aircraft to operating forces of the Navy as designated by the Chief of Naval Operations. Some of the tasks required to accomplish this mission include operation of fuel storage facilities, performance of aircraft maintenance, maintenance and operation of engine repair facilities and test cells for aircraft engines, and support of weapon systems.

The Navy initiated an environmental investigation of NAS Pensacola in 1983. Because of environmental investigation activities, 29 potential sources of contamination (PSCs) were identified as needing additional investigation. In December 1989, the base was placed on the National Priorities List (NPL). The FFA, signed in October 1990, outlined the regulatory path to be followed at NAS Pensacola. NAS Pensacola must complete not only the regulatory obligations associated with its NPL listing, but it also must satisfy the ongoing requirement of an environmental Resource Conservation and Recovery Act (RCRA) permit issued in 1988.

The RCRA permit is an authorizing document issued by the FDEP, as authorized by USEPA, to implement the requirements of hazardous waste management and environmental regulation. That RCRA permit addresses the treatment, storage, and disposal of hazardous waste, and the investigation and remediation of any releases of hazardous waste and/or constituents from Solid Waste Management Units at NAS Pensacola. The RCRA permit also governs ongoing use of hazardous wastes and the operating permit rules. RCRA and CERCLA investigations and actions are coordinated through the FFA, streamlining the cleanup process. Currently, the cleanup program is being conducted under the Navy's Installation Restoration (IR) program.

A Post Closure RCRA Permit Renewal application for NAS Pensacola was submitted to the FDEP in March 2006. Amendments to the original RCRA permit application were submitted in January 2007 and the RCRA Permit Renewal (Permit Number 0154498-005-HF) was completed in September 2008.

1.2.1 Regional Hydrology

1.2.1.1 Surface Water

NAS Pensacola is bordered on the south by Big Lagoon, on the south and east by Pensacola Bay, and on the north by Bayou Grande (NEESA, 1983). Sandy surface soil in this area allows for a high proportion of rainfall to infiltrate into the ground and consequently there are few streams. The surface topography has little dissection and the natural drainage system is poorly developed. Much of the surface drainage has been constructed or modified to accommodate structures on base. Swampy areas exist at

or near the western portion of NAS Pensacola, and man-made drainage ways and storm drains feed into the short intermittent streams that empty into Pensacola Bay and Bayou Grande. Perennial streams do not enter or exit NAS Pensacola, but marshy areas and three small lakes on the golf course are persistent throughout the year.

1.2.1.2 Groundwater

Groundwater in Escambia county occurs in three major aquifers: a shallow aquifer which is both artesian and non-artesian (the sand and gravel aquifer), and two deep artesian aquifers (the upper and lower limestone of the Floridan aquifer). In the southern half of the area, the sand and gravel aquifer and the upper limestone of the Floridan aquifer are separated by a thick section of relatively impermeable clay; but, in the northern half of the area the sand and gravel aquifer and the upper limestone of the Floridan aquifer are in contact with one another. The upper limestone of the Floridan aquifer is separated from the lower limestone by a thick clay bed (NEESA, 1983).

The sand and gravel aquifer is composed of sand but has numerous lenses and layers of clay and gravel. The formation also contains lenses of hardpan where the sand has been cemented by iron oxide minerals. This aquifer lies at the surface throughout Escambia County. Boring logs from various locations at NAS Pensacola show that the surficial sands extend from ground surface to a depth of approximately 35 feet below mean sea level (approximately 50 feet bls) below which is a 15-foot thick marine clay, the continuity of which is uncertain. Underlying the clay is more sand with numerous clay lenses (Geraghty and Miller, 1986).

Groundwater levels in the shallow aquifer range from just below the land surface to approximately 30 feet bls across the NAS Pensacola area. The groundwater flow across the NAS Pensacola peninsula area has historically been found to be toward the Gulf of Mexico and the Escambia and Perdido rivers, although groundwater flow can vary locally to drainage features, water bodies and wetlands due to the effect of topography. The aquifer recharge is predominantly from precipitation (Geraghty and Miller, 1986).

The shallow saturated permeable beds in the sand and gravel aquifer contain groundwater under non-artesian (non-confined) conditions, while the deeper permeable beds contain groundwater under artesian pressure, where they are confined by lenses of clay and sandy clay (NEESA, 1983).

Below the sand and gravel aquifer, the limestone layers comprise the regionally extensive Floridan aquifer, which in this area is divided into upper and lower units separated by the Bucatunna clay. The upper Floridan aquifer is an important source of water in areas east of Escambia County; however, in the Pensacola area it is highly mineralized and not used as a water supply. The lower Floridan aquifer is also

highly mineralized and is designated for use as an injection zone for waste disposal in this area (Geraghty and Miller, 1986).

1.3 ARAR CHANGES AND SITE-SPECIFIC ACTION LEVEL CHANGES

The Applicable or Relevant and Appropriate Requirements (ARARs) identified in each of the RODs were reviewed to determine if they had been updated since the last Five-Year Review. An evaluation of chemical, action, and location specific ARARs was conducted as appropriate for each OU. These evaluations are addressed specifically in each OU review section.

1.4 NEXT REVIEW

The next Five-Year Review for NAS Pensacola will be completed no later than five years from the date of this review.

2.0 OPERABLE UNIT 1

The OU1 ROD was issued by the Navy and USEPA on September, 25, 1998. FDEP concurred with the ROD on May 22, 2000. The implementation of the remedial actions at OU1, began in 1999. The initial Five-Year Review for OU1, an inactive sanitary landfill also referred to as Site 1, was completed in 2003. This Five-Year Review consists of an approximate five-year period of data and provides a status update for OU1. This statutory review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

2.1 SITE CHRONOLOGY

Historical events and relevant dates in the OU1 chronology are summarized in Table 2-1.

TABLE 2-1
OU1 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Domestic and industrial wastes from NAS Pensacola and other outlying Navy facilities were disposed of at OU1	Prior to 1974
Discovery of landfill leachate discharge	1974
Landfill officially closed	1976
NAS Pensacola placed on NPL	1989
Contamination Assessment / Remedial Activities Investigation	1991
Final RI Report issued	January 5, 1996
Focused Feasibility Study (FS) issued	November 1997
Proposed Plan issued for public comment	December 1997
Final ROD issued	September 25,1998
EPA approval of final ROD	August 11, 1998
Final Remedial Design issued	1999
USEPA accepted the Draft Remediation Work Plan as final	February 9, 1999
Removal Action – 73 tons of material was removed	1998
Start of on-site construction of treatment system (Phase 1) (trigger date)	March 12, 1999
Completion of on-site construction of treatment system	May 7, 1999
Explanation of Significant Differences (ESD) to send groundwater remedial system water to wastewater treatment plant (WWTP) instead of wetland recharge	August 23, 1999

TABLE 2-1
OU1 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Memorandum of Agreement (MOA) signed by responsible parties	September 24,1999
Completion Report issued	March 2000
Operation and Maintenance (O&M) Manual for Groundwater Treatment and Recovery System issued	March 2000
O&M begins	March 2000
1st Annual Groundwater Monitoring Report issued	January 2001
2nd Annual Groundwater Monitoring Report issued	September 4, 2002
Initial Five-Year Review Report issued	February 2, 2003
49.83 Acre tract of land associated with OU1 transferred to the Veterans Administration (VA)	May 23, 2002
3rd Annual Groundwater Monitoring Report issued	April 30, 2003
5th Annual Groundwater Monitoring Report issued	December 2006
Final Revised Optimization Study issued	November 29, 2007
Second Five-Year Review Report issued	August 6, 2008
Reconnaissance Phase Flow Control Pilot Study	February 11, 2009
Decommission of the Groundwater Interception System	May 2010
Uniform Federal Policy Sampling and Analysis Plan (UFP-SAP) approved	November 2010

2.2 BACKGROUND

2.2.1 Physical Characteristics of OU1

OU1, also referred to as Site 1, is an inactive sanitary landfill encompassing approximately 85-acres (Figure 2-1). The landfill surface varies from 8 to 20 feet above mean sea level and is densely vegetated with 15 to 40-foot tall planted pines and natural scrub vegetation. The landfill is bordered by an inland water body (Bayou Grande) to the north, by the A.C. Read Golf Course to the east, and by areas of natural scrub vegetation and Barrancas National Cemetery to the west and south. Bayou Grande has been classified by the FDEP as a Class III Predominantly Marine water body, indicating its use for recreation and maintaining a well-balanced fish and wildlife population. Beyond the scrub vegetation, Taylor Road lies approximately 200 feet south of the site.

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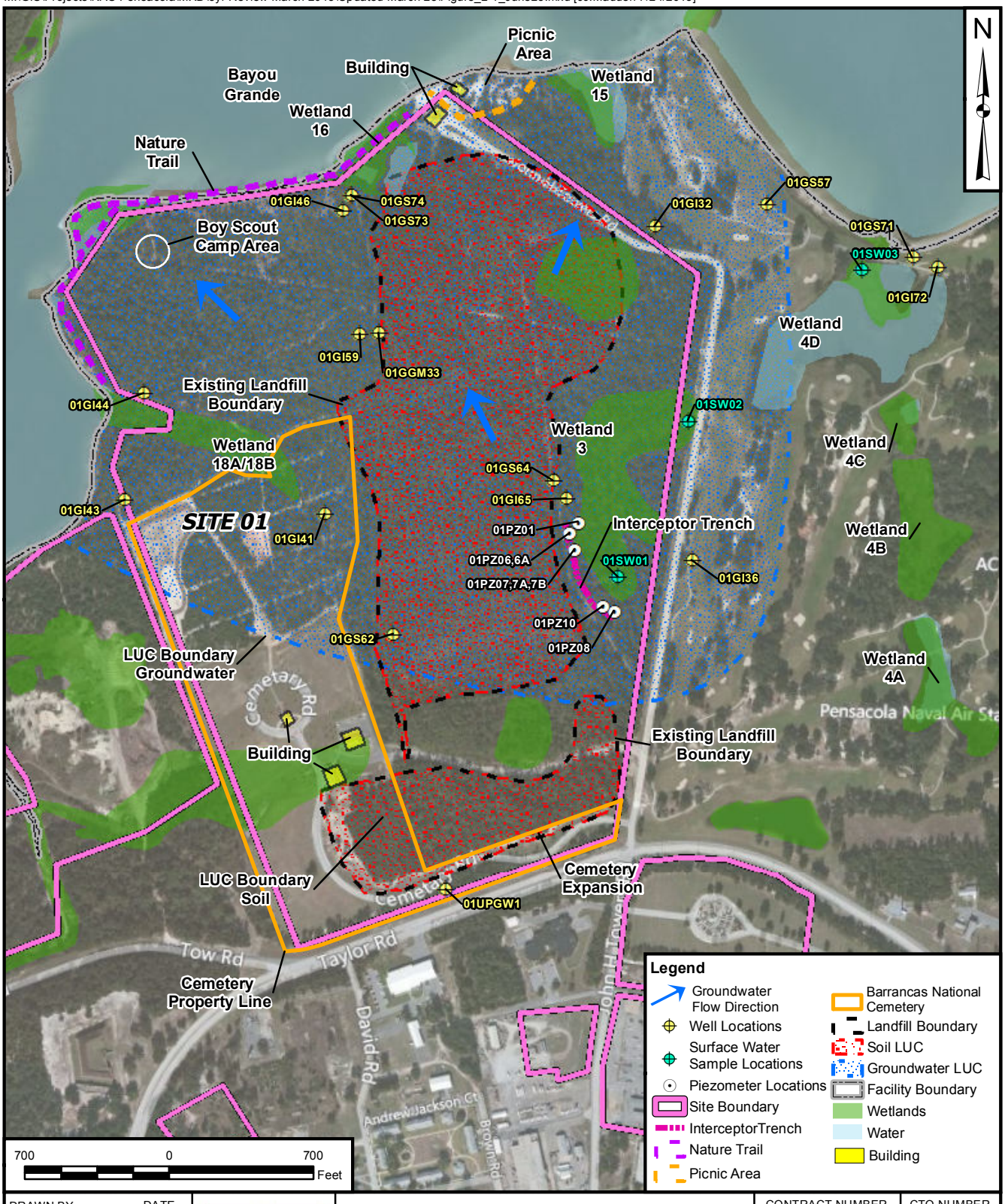

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			FIGURE NO.: 2 - 1 REV: 0

2.2.2 Land and Resource Use at OU1

From the early 1950s until 1976, domestic and industrial wastes from NAS Pensacola and other outlying Navy facilities were disposed at OU1. Industrial wastes consisted of ketone, polychlorinated biphenyl (PCB), and transformer oil-soaked rags; paint chips; paint sludge; compressed air cylinders; asbestos; and garbage. The facility was officially closed on October 1, 1976 (EnSafe, 1998).

The land use for the areas immediately north of the landfill include a Boy Scout camp, a nature trail, a picnic area, and recreational Buildings 3553 and 3487(shown on Figure 2-1). All of the indicated areas were present during completion of the OU1 RI and were evaluated in the OU1 risk assessment. The risk assessment evaluated the child trespasser as the current exposure scenario; however, conservative exposure scenarios were used to address potential exposure for Boy Scout campers. As indicated in the OU1 risk assessment "it was determined that the risk and/or hazard associated with exposure to all environmental media (and the combination thereof) did not exceed USEPA and FDEP's risk and hazard thresholds for the trespassing child and the potential future site worker." The activities were known and evaluated during the remedy selection process. Also in this general area are two tidal-inlet ponds with associated wetlands. Other wetland areas are located to the west and east of the landfill; most are associated with marshy intermittent creeks.

On May 23, 2002, 49.83 acres of uplands located immediately adjacent to the south and southwest portion of OU1 was transferred to the Veterans Administration (VA). This purpose of this transfer was to provide for expansion of the Barrancas Military Cemetery and construction of an administration building, and a facility maintenance building. This area use was not present when the RI was completed.

The nearest residential area (base housing) is approximately 1,000 feet south of OU1. Potable water for this residential area and all of NAS Pensacola is supplied from Corry Station, approximately three miles north of NAS Pensacola. Groundwater flow is generally northward, toward Bayou Grande and adjacent surface water features, with components to the northwest and northeast (EnSafe, 1998).

2.3 HISTORY OF CONTAMINATION AT OU1

Landfill leachate was discovered in 1974 to be discharging from an abandoned drainage field into a nearby golf course pond. Groundwater samples from this area were found to contain phenol and several metals. Additional groundwater investigations (Verification and Confirmation Studies) indicated the presence of volatile organic compounds (VOCs) and trace concentrations of semivolatile organic compounds (SVOCs). It was determined that groundwater contamination by VOCs, SVOCs, and metals exceeded federal and state regulatory criteria and was limited to the areas within and around the landfill perimeter. However, several metals were determined to be leaching from site soils to the shallow

groundwater and migrating to Wetland 3. Also, a tar pit was identified during the RI, which posed a physical hazard to site trespassers (EnSafe, 1998).

2.3.1 Initial Response for OU1

The physical hazard presented by the tar pit was initially addressed. Analytical results from the Toxicity Characteristic Leaching Procedure (TCLP) of samples collected from the tar pit in 1993 indicate that the tar was not considered a hazardous waste. A total of 73 tons of tar was excavated in January 1998 to remove the physical hazard and potential for release of chemicals to the environment and disposed at an off-site Subtitle D landfill.

2.3.2 Basis for Taking Action at OU1

An RI was completed for OU1 in January 1996. Contaminants were detected in groundwater at concentrations that could cause unacceptable risk for future residents at OU1. Contaminants of concern (COCs) are summarized in Table 2-2.

TABLE 2-2
OU1 CONTAMINANTS OF CONCERN
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Medium	Contaminants Causing Unacceptable Risk
Groundwater	Arsenic, barium, cadmium, manganese, nickel, vinyl chloride, benzene, chlorobenzene, and chloroform

During the human health risk assessment (HHRA) it was determined that exposure to chemicals of potential concern (COPCs) in surface and subsurface soil and groundwater was within USEPA's generally acceptable ranges for the trespassing child and the potential future site worker. However, exposure to COCs in the shallow/intermediate and deep groundwater (Table 2-2) presented an unacceptable risk via the ingestion and inhalation exposure pathways for the hypothetical future site resident. Unacceptable risk was not determined for exposure by current and future site residents, workers, and trespassers to the surface and subsurface soil (EnSafe, 1998).

Ecological risks were determined to be inconsequential for flora and fauna from the ecological contaminants of potential concern (ECOPCs) in soil. Other than Wetland 3, appreciable ecological effects were not expected from the groundwater that was discharging to wetlands. The risk to ecological receptors at Wetland 3 was evaluated by comparing the concentrations of ECOPCs detected in sediment and surface water samples to established screening values from FDEP and USEPA Region 4 guidance.

Based on the evaluation of the ECOPCs, the OU1 ecological COCs included metals and pesticides. Benthic community species and fish in downgradient sections of the wetland were determined to be potentially exposed to an unacceptable excess risk. Methods proposed to assess potential unacceptable risk to receptors for Phase IIB of the Site 41 RI were bioassays for benthic and fish species. Bayou Grande (Site 40) and NAS Pensacola wetlands were to be evaluated in the RI for Site 41. An additional evaluation of the NAS Pensacola wetlands is being completed by the Navy. Currently a draft version of the Sampling and Analysis Plan for Wetland Sediment Sampling, Operable Unit 16, Site 41 is in regulatory review. The draft document was submitted September 27, 2012 and a response to regulatory comments was submitted by the Navy on February 25, 2013. Following approval of the sampling and analysis plan and the field work an FS Addendum will be completed.

2.4 REMEDIAL ACTION

2.4.1 Remedy Selection at OU1

The ROD for NAS Pensacola OU1 was finalized on September 25, 1998. Remedial Action Objectives (RAOs) were developed as a result of data collected during the RI to aid in the development and screening of remedial alternatives to be considered for the ROD.

The purpose of the remedial action at OU1 was to reduce the unacceptable risks to human health and environment associated with exposure to COCs in groundwater and surface water and to protect groundwater from the leaching of hazardous constituents from the waste into groundwater. . To meet these goals, three RAOs were identified. Table 2-3 lists the RAOs for OU1.

TABLE 2-3
OU1 REMEDIAL ACTION OBJECTIVES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Medium	Contaminants Causing Unacceptable Risk	Remedial Action Objectives
Groundwater	Arsenic, barium, cadmium, iron, manganese, nickel, vinyl chloride, benzene, chlorobenzene, and chloroform	Restore site groundwater to MCLs and prevent further contamination of the shallow/intermediate aquifer.
Surface Water	Iron	Prevent further contamination of surface water in Wetland 3
Waste	VOCs, SVOCs, PCBs, pesticides, and inorganics	Protect groundwater from leaching compounds

In the Feasibility Study (FS) for OU1, four remedial alternatives were evaluated to address the three RAOs. Of the four alternatives evaluated, the selected remedial action for OU1 was Alternative 2C as described in the ROD for OU1. The major components of Alternative 2C are listed below:

- Institutional controls imposed to restrict groundwater use of the surficial zone of the sand and gravel aquifer within 300 feet of the site.

- Institutional controls imposed to limit intrusive activities within the landfill boundary without prior approval from the NAS Pensacola Environmental Office.

- Annual review of the institutional controls and certification that the controls should remain in place or be modified to reflect changing site conditions.

- Groundwater monitoring to ensure that the natural attenuation processes are effective.

- A review during which the Navy would determine whether groundwater performance standards continue to be appropriate and if natural attenuation processes are effective.

- Continued groundwater monitoring at regular sampling intervals after performance standards are attained. The groundwater monitoring program would continue until a Five-Year Review concludes that the alternative has achieved continued attainment of the performance standards and remains protective of human health and the environment.

- A groundwater interception system to capture the contaminated groundwater upgradient of Wetland 3. The intercepted groundwater will be treated to reduce iron levels before being reintroduced into Wetland 3.

- Concentrations of the organic compounds present in the groundwater and surface water will be reduced through natural attenuation resulting from naturally occurring biotic and abiotic processes, which take place in the groundwater and surface water systems.

2.4.2 Remedy Implementation at OU1

The remedial action was organized into two phases. The first phase included the design and construction of the treatment system. The second phase included the long-term groundwater monitoring plan. The remedial action selected for implementation at OU1 is consistent with CERCLA and the NCP.

The final Remedial Design was prepared by Bechtel Environmental, Inc. (BEI) and was included as a component of the Remediation Work Plan/Remedial Design for Phase I Groundwater Treatment and Recovery System at Operable Unit 1 (BEI, 1999a). The USEPA approved the draft remedial design document as final via a letter dated February 9, 1999. The interceptor trench measured 670 feet long and 16 inches in width. Its depth ranged from 2 feet bls at the cleanout vault to 18 feet bls at the vertical riser pipe. Six inches of limestone rock was placed in the trench and a 5 inch, high–density polyethylene, corrugated, slotted drain pipe was installed above the limestone rock. A filter sock covered the pipe and the trench was filled to within 18 inches of ground surface. Five piezometers were installed to monitor the system. The Long-term Groundwater Monitoring Plan for Phase II Remedial Action was issued by BEI in July 1999. The long-term monitoring (LTM) program included groundwater monitoring in 19 on-site monitoring wells, Monitored Natural Attenuation (MNA), and surface water sampling two times per year for years one through three, then annually until the COCs are below performance standards (BEI, 1999b).

Additional remedial construction activities were completed when the UFP-SAP was updated in July 2010 and approved in November 2010. The updated UFP-SAP provided for installation of six new groundwater monitoring wells (four replacement and two new monitoring wells), and monitoring of the new wells, eight piezometers/staff gauges, 11 existing monitoring wells, and three surface water sampling locations (Tetra Tech, 2010). Currently the Navy is sampling 17 monitoring wells, 8 piezometers and 3 surface water locations. Groundwater samples are analyzed for VOCs and metals, and surface water samples are analyzed for total iron as specified in the ROD (EnSafe, 1998).

2.4.3 Land Use Restriction Agreement

As specified in the final ROD for OU1 (EnSafe, 1998), the institutional controls for OU1 are imposed using a Land Use Restriction Agreement (LURA). The LURA was actually completed in the form of a MOA as agreed by the USEPA, FDEP, and the Navy, and signed on September 24, 1999. The LUC implementation date was October 24, 1999.

Attached as an appendix to the MOA is a Land Use Control Implementation Plan (LUCIP) for OU1, which provides the site description, site location, LUC objectives, LUC implementation to achieve objectives, and the reference decision document.

The LUCIP specified:

> "The NAS Pensacola IR Manager shall be responsible and coordinate inspections of this site. Any discrepancies will be forwarded to NAS Pensacola Facilities Officer for correction to maintain the objectives. Institutional controls shall be imposed to restrict groundwater use of the surficial zone of the sand and gravel aquifer within 300 feet of the site boundaries. No intrusive activities shall be

permitted within the site boundaries without prior approval from the NAS Pensacola Environmental Office. The NAS Pensacola IR Manager will submit an annual review of the institutional controls and certification that the controls should remain in place or be modified to reflect changing site conditions.

The OU1 LUCIP was completed in February 2000 and met the performance requirements in place at that time. The document was compared to the current USEPA LUC checklist and determined that current LUC language and details were not present. The Navy will complete a LUC Remedial Design to update the LUC component of the remedy and replace the LUCIP as part of the forthcoming OU1 ROD Amendment.

2.4.4 System Operation/Operation and Maintenance at OU1

The Navy operated the groundwater interception system from June 1999 until May 2010. The effectiveness of the groundwater interception system was evaluated during an Optimization Study, a Five-Year Review, and Reconnaissance Phase Flow Control Pilot Study as discussed below.

2007 Optimization Study: The Optimization Study found that although the groundwater interception system could contribute to reducing some iron concentrations within shallow groundwater, surface water data indicated that the groundwater interception system was not having an appreciable effect on the overall iron concentrations in surface water within Wetland 3 because of the prevalence of iron within the shallow groundwater upgradient, side-gradient, and downgradient to the groundwater interception system. Furthermore, the Optimization Study found that attenuation of iron is naturally occurring in Wetland 3. The mechanisms by which this is occurring are believed to be physical, chemical, and biological. Based upon field observations, physical processes including natural sedimentation appear to be occurring where the iron flocculent is dropping out of suspension. An additional field observation in January 2003 (Singletary, 2004) indicated iron flocculent was being transported from the upgradient seep to Wetland 3 and then to Wetland 4D.

Additionally, field observations indicated that vegetation in Wetland 3 appears to be growing with little to no stress. This is a good indication that, as identified in the ROD and documented by the Interstate Technology and Regulatory Council (2003), the native vegetation is likely contributing to the reduction of the iron via several mechanisms including sedimentation, adsorption, oxidation, biological, and phytodegradation of the iron. The vegetation also provides an unspecified amount of evapotranspiration in the wetland which aids in treatment.

2008 Five-year Review: The 2008 Five-year Review found that the concentrations of iron detected in groundwater samples collected from monitoring wells located downgradient from the interceptor trench system (ITS) continue to exceed both the maximum contaminant level (MCL) for iron of 300 micrograms per liter (µg/L) and the Florida Class III Predominantly Freshwater surface water quality criteria of

1,000 g/L pursuant to Chapter 62-550, Florida Administrative Code (F.A.C.), as well as the site-specific background concentration for freshwater wetlands of 2,360 µg/L.

The Five Year Review concurred with the 2006 Optimization Study and concluded that: performance of the groundwater interception system does not appear to be sufficient to capture and extract the iron contamination migrating to the wetland. Furthermore, even if the groundwater interception system was effectively capturing and treating the local groundwater (which it does not appear to do based upon the elevated iron concentrations in groundwater immediately downgradient of the groundwater interception system) the prevalence of iron within the shallow groundwater upgradient, side-gradient, and downgradient to the groundwater interception system would make achievement of the RAOs for surface water in Wetland 3 impractical with the existing system.

Reconnaissance Phase Flow Control Pilot Study: The Reconnaissance Phase Flow Control Pilot Study concluded that groundwater currently discharges to surface water in Wetland 3 and that the groundwater-surface water interaction pattern cannot be changed unless the surface water level is increased to 7.07 feet at the inlet of the culvert. Also, because of the high groundwater elevations southeast of the culvert, it was not clear whether a surface water infiltration area could be created by increasing the surface water elevation at Wetland 3. The study also determined that due to the relatively low elevation of John Tower Road near the culvert, blocking the culvert would result in flooding over the road and golf course. Therefore, it was recommended that no further evaluation of flow control be conducted.

Additionally, iron background concentrations were updated as part of the Reconnaissance Phase Flow Control Pilot Study because rather dissimilar “pristine” wetlands (Wetlands 27 and 33) were originally used to establish background values for all wetlands at NAS Pensacola. The iron background concentrations for freshwater and estuarine wetlands were reevaluated because: the original data set was small and non-representative, highly variable iron concentrations have been detected in the over 80 freshwater and estuarine wetlands at NAS Pensacola, and many of the wetlands contain iron at naturally occurring concentrations that exceeded the original background value. The freshwater wetland background threshold is unchanged at 2,360 µg/L and the new estuarine wetland background threshold was determined to be 5,862 µg/L.

Also, monitoring on an annual basis at a new monitoring location was implemented because surface water iron concentrations in Wetland 4D are less than or nearly equal to the new estuarine wetland background threshold of 5,862 µg/L. The new location was established in Wetland 4D because it receives water from the southwestern side of Wetland 3 and from Wetlands 4A-4B-4C at the southeastern side of Wetland 4D. The new location represents surface water quality in Wetland 4D prior

to where it drains to Bayou Grande through a culvert near the northern corner of the wetland. The point-of-compliance location is approximately midway between the mixing point of the two water sources and the culvert.

Based on the findings of the Optimization Study, the 2008 Five-Year Review, and a Reconnaissance Phase Flow Control Pilot Study for Wetland 3, operation of the groundwater interception system was subsequently discontinued in May 2010.

2.4.5 Long-Term Groundwater Monitoring at OU1

Beginning in December 1999, the Navy initiated the LTM program at OU1. The LTM program semiannual sampling events were conducted between March 2000 and November 2003, but were not conducted in 2004, 2006, 2007, and 2009. LTM and semiannual sampling events were not conducted in late 2004 and early 2005 due to extensive hurricane damage throughout the facility following Hurricane Ivan in September 2004. In addition, semiannual sampling events were also not conducted in 2006, 2007 and 2008 while the groundwater sampling plan was being evaluated and modified during the Optimization Study and Reconnaissance Phase Flow Control Pilot Study. The Optimization Study was initiated in January 2006 but was not finalized until April 2008. The Reconnaissance Phase Flow Control Pilot Study followed the Optimization Study and was completed in September 2009. Semiannual sampling was resumed after review and approval of the Data Quality Objectives and UFP-SAP submitted in July 2010 and approved in November 2010. The semiannual sampling is being conducted as directed by the OU1 ROD, Long-Term Groundwater Monitoring Plan (LTGMP), and the O&M Manual. The completed activities for LTM include:

- The first year of groundwater and surface water sampling (semiannually), natural attenuation monitoring (semiannually), and annual reporting of results (field events completed March 2000 and August 2000; report dated January 2001).

- The second year of groundwater and surface water sampling (semiannually), natural attenuation monitoring (semiannually), and annual reporting of results (field events completed May 2001 and November 2001; report dated September 2002).

- The third year of groundwater and surface water sampling (semiannually), natural attenuation monitoring (semiannually), and annual reporting of results (field events completed April 2002 and October 2002; report dated April 2003).

- The fourth year of groundwater and surface water sampling (semiannually), natural attenuation monitoring (semiannually), and annual reporting of results (field events completed June 2003 and November 2003; draft final report dated June 2004).

- The fifth year of groundwater and surface water sampling (semiannually), natural attenuation monitoring (semiannually), and annual reporting of results (field events completed June 2005 and December 2005; report dated December 2006).

- The sixth year of groundwater and surface water sampling (semiannually), natural attenuation monitoring (semiannually), and annual reporting of results (field events completed March 2008 and August 2008; draft final report dated January 2012).

- The seventh year of groundwater and surface water sampling (semiannually), natural attenuation monitoring (semiannually), and annual reporting of results (field events completed May 2010 and November 2010; final report dated April 2013; attached Appendix J).

- The eight year of groundwater and surface water sampling (semiannually), natural attenuation monitoring (semiannually), and annual reporting of results (field events completed August 2011 and January 2012; draft report September 2012.

As stated in the ROD for OU1 (EnSafe, 1998), the Navy's original 1996 cost estimate for implementation of remedial action and closure of OU1 and 30 years of LTM program (risk-reduction) was $4,542,600. The approximate cost to date for remedial actions including O&M and monitoring at OU1 is $1,754,466.

2.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

Since the last Five-Year Review, the Navy has completed an Optimization Study of the OU1 remedy (Tetra Tech, 2008) and completed a Technical Memorandum Reconnaissance Phase Flow Control Pilot Study (Tetra Tech 2009). Based on the two reports the Navy has discontinued the operation of the groundwater interceptor trench and optimized and re-established the groundwater monitoring program.

In addition, a draft ESD was issued for OU1 on March 30, 2012 to address discontinued operation of the groundwater interceptor trench and make changes to groundwater and surface water monitoring procedures. The 2007 Optimization Study, 2008 Five-Year Review, and 2009 Reconnaissance Phase Flow Control Pilot Study recommend the pumping operation of the groundwater interception system be discontinued. However, USEPA comments on the Draft ESD indicated that a ROD Amendment would be needed instead of the ESD. The Navy has agreed to complete a Feasibility Study Addendum followed by the ROD Amendment and has initiated the process.

2.5.1 Protectiveness Statements from the Last Review

Based on the results of the 2008 Five-Year Review, the remedy was expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through natural attenuation. In the interim, exposure pathways that could result in unacceptable risks were being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater.

Issues identified in the 2008 Five-Year Review, and actions taken are summarized in Table 2-4.

TABLE 2-4
OU1 ISSUES IDENTIFIED AND ACTIONS TAKEN
2008 FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Issues Identified in 2008 Five-Year Review	Actions Taken Since the 2008 Five-Year Review
Hydraulically downgradient monitoring wells were destroyed by Hurricane Ivan. The Optimization Study proposes replacement of destroyed wells.	Five monitoring wells were installed in 2009. Three of the wells were replacement wells, whereas the remaining two monitoring wells were located hydraulically downgradient.

2.5.2 Status of Recommendations and Follow-up Actions from Last Review

Table 2-5 provides a list of recommendations, recommended follow-up actions from the 2008 Five-Year Review, milestone dates, actions taken, outcomes, and dates of action.

TABLE 2-5
OU1 ACTIONS TAKEN SINCE LAST FIVE-YEAR REVIEW
2012 FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Issues From Previous Review		Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action and Outcome	Date of Action
1	Downgradient monitoring wells have been destroyed by Hurricane Ivan; the Optimization Study proposes replacement of the destroyed wells	Implement Treatment System optimization and additional remedial options	Navy	N/A	Treatment system decommissioned and Draft ESD presented to regulatory agencies	05/10
2	Downgradient monitoring wells have been destroyed by Hurricane Ivan; the Optimization Study proposes replacement of the destroyed wells	Continue the assessment of the feasibility of alternative engineering controls at Wetland 3	Navy	N/A	The Reconnaissance Phase Flow Control Pilot Study completed	02/11/09
3	Downgradient monitoring wells have been destroyed by Hurricane Ivan; the Optimization Study proposes replacement of the destroyed wells	Replace monitoring wells and implement optimization strategy	Navy	N/A	Five replacement wells installed / wells included in groundwater MNA program	5/20/00

N/A = Not available

2.5.2.1 Actions Taken and Outcome for Item 1 from Table 2-5

The groundwater interception system groundwater treatment system was decommissioned in May 2010, based on recommendations of the Optimization Study, 2008 Five-Year Review, and the Reconnaissance Phase Flow Control Pilot Study. The Optimization Study also evaluated and made recommendations for both the groundwater interceptor trench and engineering controls for Wetland 3 however a detailed remedial option evaluation was not completed as part of the Optimization Study. General remedial options were discussed and presented to the NAS Pensacola Partnering Team for decision. Currently the Navy has initiated a Feasibility Study Addendum and ROD Amendment to close these recommendations. A draft ESD was published in March 2012 to document these changes; however, based on comments received, a ROD Amendment will be required.

2.5.2.2 Actions Taken and Outcome for Item 2 from Table 2-5

Monitoring of surface water at Wetland 3 will continue at locations 01SW01 and 01SW02. Based Optimization Study and Reconnaissance Phase Flow Control Pilot Study surface water monitoring location 01SW01 was moved approximately 250 feet south of the previous location, and a new surface water monitoring location, 01SW03, has been established in Wetland 4.
The approved Optimization Study and Reconnaissance Phase Flow Control Pilot Study proposed that the surface water RAO for prevention of further contamination of surface water in Wetland 3 was no longer required because prevention of groundwater discharge from OU1 to Wetland 3 is not required for protection of human health and the environment. However USEPA comments on the Draft ESD completed to document this change indicated that a ROD Amendment would be needed instead of the ESD. Therefore, the RAO for prevention of further contamination of surface water in Wetland 3 is still applicable. The Navy has agreed to complete a Feasibility Study Addendum and the ROD Amendment and is initiating the process.

2.5.2.3 Actions Taken and Outcome for Item 3 from Table 2-5

The Optimization Study proposed replacement of monitoring wells destroyed by Hurricane Ivan. Five monitoring wells were installed in 2009. Three of the monitoring wells were replacement wells, and the other two monitoring wells were new and located hydraulically downgradient of OU1.

2.6 FIVE-YEAR REVIEW PROCESS

This is the third Five-Year Review for this site. Members of the NAS Pensacola Partnering Team were notified of the initiation of the Five-Year Review in January 2012. The Five-Year Review was led by Gerald Walker of Tetra Tech, the NAVFAC SE Navy CLEAN Contractor, and included other Tetra Tech staff. Patty Marajh-Whittemore of NAVFAC SE, Greg Campbell of NAS Pensacola Public Works

Department, Tim Woolheater of USEPA, David Grabka of FDEP, and Sam Naik of CH2M Hill assisted in the review.

The review included the following components:

- Document Review
- Data Review
- Site Inspection
- Five-Year Review Report development and review

2.6.1 Document Review

This Five-Year Review consisted of a review of relevant documents including the RI Report, the FS, the Proposed Plan, the ROD, the Construction Completion Report, the O&M Manual for Groundwater Treatment and Recovery System, the LTGMP, Annual Monitoring Reports, the Optimization Study, the draft ESD, and applicable federal and state statutes.

2.6.2 Data Review

2.6.2.1 Review of COC Data for Groundwater

Groundwater monitoring is documented in annual reports prepared by Tetra Tech in January 2001, September 2002, April 2003, June 2004, December 2006, January 2012 (draft final), April 2013, and September 2012 (Draft). Since the initial ROD was signed, eight years of semiannual monitoring and sampling have occurred; though the years are not consecutive. LTM was not conducted from late 2004 to early 2005 due to extensive hurricane damage throughout the facility. Later, groundwater monitoring was not conducted during the evaluation of the groundwater interception system by the Optimization Study (final report April 2008) and Reconnaissance Phase Flow Control Pilot Study (completed September 2009).

The Optimization Study was initiated in January 2006 but was not finalized until April 2008. Groundwater data from March 2000 through December 2005 (including sampling events 03/00, 08/00, 05/01, 11/01, 04/02, 10/02, 06/03, 11/03, 06/05, and 12/05) and surface water from June 1994 through February 2006 ((including sampling events 06/94, 12/95, 08/97, 03/00, 08/00, 05/01, 11/01, 04/02, 10/02, 06/03, 11/03, 06/05, 12/05 and 02/06) were used in the Optimization Study evaluation. The Final Optimization Study is available at http://go.usa.gov/TYMm and included in Appendix J. The Optimization will be used to support the development of the FS.

The ROD and LTM Plan (BEI, 1999b) established the groundwater COCs as benzene, chlorobenzene, vinyl chloride, nickel, naphthalene, xylene, 1,1,2,2-tetrachloroethane, aluminum, cadmium, chromium, iron, and manganese. During the first year of monitoring xylenes, cadmium, iron, manganese, benzene, vinyl chloride, and chlorobenzene were detected at concentrations exceeding the Cleanup Target Levels (CTLs) established by the ROD. During the second year of monitoring, benzene, vinyl chloride, xylene, aluminum, cadmium, iron, and manganese were detected at concentrations exceeding their CTLs. During the third year of monitoring, benzene, chlorobenzene, vinyl chloride, aluminum, iron and manganese were detected above their CTLs. During the fifth year of monitoring, hydraulic downgradient monitoring wells 01GS57 and 01GS71 were found to be destroyed and could not be sampled. The analysis of groundwater samples collected in June and December 2005 revealed the presence of seven COCs at concentrations exceeding their respective CTLs. Manganese, aluminum, and iron were the only metals from the COC list with exceedances. Iron and manganese exceedances were distributed evenly across the study area, and four VOCs (benzene, chlorobenzene, xylene, and vinyl chloride) were detected at concentrations exceeding current FDEP criteria. VOC exceedances were limited to monitoring wells located on the perimeter or adjacent to the main body of the old landfill.

The groundwater at OU1 was evaluated in light of the changes in the number of monitoring well locations with contaminants that exceed CTLs, and the changes in contaminant concentrations at individual monitoring well locations with time. The trend analysis for the COCs for groundwater at NAS Pensacola was performed using the Mann-Kendall test (ProUCL Version 4.1.00 [Lockheed Martin Environmental Services, 2010]) at a 95 percent confidence level and groundwater sample data collected from 1993 to 2011. The Mann-Kendall test is used because it does not assume any particular distributional form and accommodates values below the detection limit by assigning them a common value (½ the detection limit). Additionally, the 1993 groundwater data was collected using bailers; therefore, because the sample turbidity may have biased the analytical data, the 1993 data was not used in the Mann-Kendall test for metals.

During the May and November 2010 groundwater sampling events, 17 monitoring wells and 8 piezometers were sampled and analyzed for the 12 groundwater COCs. Only seven of the COCs were detected in groundwater samples exceeding their respective Groundwater Cleanup Target Levels (GCTLs). Manganese, aluminum, cadmium, and iron were the only metals that exceeded their CTLs. Based on the locations sampled, aluminum, iron and manganese exceedances appeared to be distributed across the OU1 area. Three VOCs (benzene, chlorobenzene, and vinyl chloride) were detected at concentrations exceeding their respective CTLs.

During the August 2011 groundwater sampling event, 15 monitoring wells and 8 piezometers were sampled and analyzed for the 12 groundwater COCs. During the January 2012 groundwater sampling

event, 16 monitoring wells and 8 piezometers were sampled and analyzed for the 12 groundwater COCs. Only six of the COCs were detected in groundwater samples exceeding their respective CTLs. Manganese, aluminum, and iron were the only metals that exceeded their CTLs. Based on the locations sampled, aluminum, iron, and manganese exceedances appeared to be distributed across the study area. Three VOCs (benzene, chlorobenzene, and vinyl chloride) were detected at concentrations exceeding their respective CTLs.

Comparison of the 2010, 2011, and 2012 groundwater sampling data with previous groundwater sampling data suggests the trends in the COCs concentrations observed from May 2010 to January 2012 are consistent with the long-term concentration trends for most of the monitoring wells.

Mann-Kendall Trend analysis results are provided in Appendix A. In general, the test results indicated that for all of the COCs, most monitoring well locations demonstrate no significant statistical trend or have a statistically significant downward trend identified, especially for benzene and vinyl chloride. A statistically significant upward trend is identified at a limited number of monitoring well locations for iron, manganese, and/or chlorobenzene. Mann-Kendall Trend analysis data sheets and graphs of the contaminant concentrations versus time are provided in the Appendix A.

Three decision rules are used to evaluate the groundwater data collected during monitoring events. The three decisions rules were developed to in the Uniform Federal Policy Sampling and Analysis Plan (UFP SAP) for Long-term Groundwater Monitoring at OU1 (Tetra Tech, 2009) to monitor changes in contaminant concentration and to determine whether immediate action is necessary or continued monitoring is appropriate. In addition, the decision rules allow the monitoring strategy to be optimized to make the most cost-effective use of resources while also being protective of human health and the environment. The results of the Mann-Kendall Test and evaluation of the decision rules are provided in the OU1 Long-term Monitoring Reports to support future groundwater monitoring optimization proposals.

Decision Rule #1: This rule was established to protect against the potential that analyte concentrations are increasing; even if the analytes concentrations are less than their applicable Performance Criteria or GCTLs. A significant increasing trend could indicate that the concentrations will eventually become greater than the applicable criteria. Therefore, monitoring should continue for the analyte(s) at any single monitoring well location that has a significant upward trend at a 10 percent significance level.

Based on the long-term monitoring data, analytes that meet the significant upward trend condition for Decision Rule #1 include: chlorobenzene (4 monitoring well locations), benzene (1 monitoring well location), vinyl chloride (1 monitoring well location), total xylenes (2 monitoring well locations), naphthalene (1 monitoring well location), aluminum (11 monitoring well locations), iron (4 monitoring well

locations), cadmium (1 monitoring well location), chromium (7 monitoring well locations), manganese (6 monitoring well locations) and nickel (2 monitoring well locations).

Decision Rule #2: This rule was established to determine if analytes in groundwater are present at concentrations that are less than or equal to their Performance Criteria for two or more consecutive rounds of sampling, and a significant increasing trend is not present as determined by a Mann-Kendall trend test at 10 percent significance. If this condition is met for an analyte at any single monitoring well location, then it is recommended that the monitoring for that analyte be stopped at that well location; otherwise, it is recommended that monitoring should continue as scheduled. This decision rule will not apply to compliance monitoring wells because concentrations in groundwater collected from compliance wells are expected to remain at concentrations less than or equal to the Performance Criteria.

Analytes that meet the condition to discontinue monitoring per Decision Rule #2 include: chlorobenzene (11 monitoring well locations), benzene (8 monitoring well locations), vinyl chloride (11 monitoring well locations), total xylenes (14 monitoring well locations), naphthalene (15 monitoring well locations), aluminum (4 monitoring well locations), iron (2 monitoring well locations), cadmium (14 monitoring well locations), chromium (8 monitoring well locations), manganese (1 monitoring well location) and nickel (13 monitoring well locations). 1,1,2,2-Tetrachloroethane has not been detected in groundwater samples from shallow and intermediate aquifer zone collected from August 2000 to January 2012.

Decision Rules #3: This rule was established to comply with 62-780.690 F.A.C., Contaminated Site Cleanup Criteria – Natural Attenuation and Monitoring. This rule determines if analytes in groundwater are present at concentrations less than or equal to the greater of its GCTL and the upgradient concentration for two or more consecutive semiannual (or less frequent) sampling rounds, and the concentration trend is not increasing as determined by a Mann-Kendall trend test at 10 percent significance. If this condition is met for an analyte at any single monitoring well location, then monitoring program for that analyte should be optimized the to reduce the frequency of monitoring; otherwise, it is recommended that monitoring should continue as scheduled.

Four of the eight parameters, total xylenes, naphthalene, nickel, and chromium, included in the expanded contaminant list in the Proposed Plan have not been detected at concentrations above their GCTLs in the four consecutive sampling events conducted from May 2010 to January 2012.

One of the eight parameters, 1,1,2,2-tetrachloroethane included in the expanded contaminant list in the Proposed Plan has not been detected in groundwater samples from shallow and intermediate aquifer zone collected from August 2000 to January 2012.

Four of the parameters, total xylenes, naphthalene, nickel, and chromium, had at least one monitoring well location with a significant upward trend (as determined by a Mann-Kendall trend test at 10 percent significance level) in at least one well.

2.6.2.2 Review of Natural Attenuation Data for Groundwater

The UFP-SAP for LTM at OU1 (Tetra Tech, 2010) indicates that: "Because contaminant monitoring is the primary goal and monitoring is expected to continue for a long time, inclusion of these parameters was not considered to be important at this time. As part of the optimization strategy, however, inclusion of natural attenuation parameters to verify or support an evaluation of why the contaminant concentrations are decreasing may be useful and should be considered during the optimization evaluations. In the meantime, groundwater monitoring well stabilization parameters will be collected to support the initial evaluations of natural attenuation. The groundwater well stabilization parameters include: dissolved oxygen (DO), ORP, pH, specific conductance, temperature, and turbidity by field instrument."

Groundwater field parameters that were measured during the August 2011 and January 2012 LTM groundwater sampling events included pH, specific conductance, turbidity, temperature, dissolved oxygen (DO), and oxidation reduction potential (ORP).

ORP values for the shallow aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from -101 to 111 millivolts (mV) and for the November 2010 sampling event ranged from -65.50 to 115.3 mV. It should be noted that ORP measurements during the May 2010 sampling event in several wells were inadvertently not collected. Corrective measures to prevent field personnel from inadvertently not collecting this parameter have been taken by adding a column for ORP onto the groundwater sample log sheets. ORP values for the piezometers sampled during the May 2010 sampling event ranged from -127 to -14 mV and for the November 2010 sampling event ranged from -150.6 to 4.10 mV. ORP values for the intermediate aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from -308 to 175 mV and for the November 2010 sampling event ranged from -202.1 to 223.7 mV.

ORP values for the shallow aquifer zone monitoring wells sampled during the August 2011 sampling event ranged from -56.5 to 132.7 millivolts (mV) and for the January 2012 sampling event ranged from -9.9 to 146.8 mV. ORP values for the piezometers sampled during the August 2011 sampling event ranged from -149.3 to 27.3 mV and for the January 2012 sampling event ranged from -125.1 to 65.6 mV. ORP values for the intermediate aquifer zone monitoring wells sampled during the August 2011 sampling event ranged from -183.9 to 154.4 mV and for the January 2012 sampling event ranged from -210.4 to 118.2 mV. The ORP values are generally within a range that suggests that reductive pathways for natural attenuation are possible or likely.

Dissolved oxygen concentrations for the shallow aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 0.00 to 7.85 milligrams per liter (mg/L) and for the November 2010 sampling event ranged from 0.16 to 6.02 mg/L. Dissolved oxygen concentrations for the piezometers sampled during the May 2010 sampling event ranged from 0.00 to 4.66 mg/L and for the November 2010 sampling event ranged from 0.27 to 1.42 mg/L. Dissolved oxygen concentrations for the intermediate aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 0.00 to 4.51 mg/L and for the November 2010 sampling event ranged from 0.01 to 0.58 mg/L.

DO concentrations for the shallow aquifer zone monitoring wells sampled during the August 2011 sampling event ranged from 0.18 to 1.44 milligrams per liter (mg/L) and for the January 2012 sampling event ranged from 0.26 to 6.73 mg/L. DO concentrations for the piezometers sampled during the August 2011 sampling event ranged from 0.14 to 0.42 mg/L and for the January 2012 sampling event ranged from 0.16 to 0.40 mg/L. DO concentrations for the intermediate aquifer zone monitoring wells sampled during the August 2011 sampling event ranged from 0.12 to 0.47 mg/L and for the January 2012 sampling event ranged from 0.18 to 1.04 mg/L. The DO values are generally within a range that suggests that reductive pathways for natural attenuation are tolerated.

Low dissolved oxygen and negative ORP values have been found to typically occur at the monitoring wells within the landfill boundary. As distance increases away from the landfill boundary disposal area, oxidizing conditions are reported in occur in monitoring wells on both the hydraulic upgradient side of the landfill and the down gradient side near Bayou Grande. Therefore, the conditions that are more amenable and favorable for the biological degradation of benzene, xylene, vinyl chloride, naphthalene under aerobic conditions occur on the down gradient side of the landfill and near Bayou Grande.

2.6.2.3 Review of Surface Water COC Data

In addition to groundwater and natural attenuation monitoring, surface water monitoring of iron concentrations has also been conducted in Wetland 3 since March 2000. During the monitoring period, surface water samples collected from Wetland 3 continued to present iron concentrations exceeding Florida surface water standards and NAS Pensacola site specific background criteria. The iron concentrations remain less than the 700,000 to 1,800,000 µg/L concentrations reported in August 2000.

Total iron concentrations reported for surface water location 01W01 during these sampling events were lower than results reported for the previous two years of monitoring. Iron concentrations reported for downgradient surface water location 01W02 have been variable, fluctuating by an order of magnitude between sampling events with no apparent trend. The fluctuation may be a result of a number of factors including differential rates of flow and solubility changes brought on by temperature variations (Tetra Tech, 2006c).

Surface water samples were collected at three locations as part of two semiannual sampling events conducted in August 2011 and January 2012. Two of the surface water sample locations are in Wetland 3, which is located adjacent to and downstream of OU1. Surface water sample 01SW01 is located at a groundwater to surface water seep area in the southwestern portion of Wetland 3 (which is approximately 250 feet south of the previous location) and 01SW02 is located prior to the culvert that connects Wetland 3 to Wetland 4. The third surface water sample location, 01SW03, is the Point of Compliance (POC) sample location in Wetland 4D for the discharge of surface water from Wetland 4 into Bayou Grande.

Surface water sample location 01SW01 contained total iron at concentration of 5,220 µg/L and surface water sample location 01SW02 contained total iron at 7,050 µg/L during the November 2010 sampling event. Both locations contained total iron at concentrations that exceed the freshwater background concentration of 2,360 µg/L. Surface water sample location 01SW03 contained total iron at a concentration of 427 µg/L.

During the August 2011 and January 2012 sampling events, surface water sample location 01SW01 could not be sampled because the seep location was dry. In August 2011, surface water sampling location 01SW02 contained total iron at a concentration of 12,900 µg/L, which exceeds the freshwater background concentration 2,360 µg/L. The concentrations of total iron for the August 2011 sampling event at surface water sample location 01SW02 at Wetland 3 exceeded the Class III Predominantly Marine surface water quality criteria of 1,000 µg/L per Chapter 62-302, F.A.C. The concentration of total iron at surface water sample location 01SW03 during the August 2011 sampling event was 265 µg/L, and 291 µg/L for the duplicate sample. Neither surface water sample contained total iron at a concentration that exceeded the estuarine wetland background threshold of 5,862 µg/L and the Class III Predominantly Marine surface water quality criteria per Chapter 62-302, F.A.C.

Surface water sampling location 01SW02 contained total iron at 6,500 µg/L, and 5,840 µg/L for the duplicate sample, which exceeds the freshwater background concentration 2,360 µg/L. The concentrations of total iron for the January 2012 sampling event at surface water sample location 01SW02 at Wetland 3 also exceeded the Class III Predominantly Marine surface water quality criteria of 1,000 µg/L per Chapter 62-302, F.A.C. The concentration of total iron at surface water sample location 01SW03 (point of compliance location) during the January 2012 sampling event was 347 µg/L, which is below the estuarine wetland background threshold of 5,862 µg/L and the Class III Predominantly Marine surface water quality criteria per Chapter 62-302, F.A.C.

Surface water samples collected from Wetland 3 during the 2011 and 2012 sampling events continued to have iron at concentrations exceeding FDEP surface water standards. However, the iron concentrations

detected in 2011 and 2012 are considerably lower than the concentrations (700,000 to 1,800,000 µg/L) detected in 2000.

Because the sources for total iron in the surface water at Wetland 3 is a seep discharging from the former OU1 landfill and from groundwater discharge, it is recommended that the surface water sample locations 01SW01, 01SW02, and 01SW03 should continue to be monitored. In addition, as agreed by EPA, FDEP, and the Navy, sediment at OU1 Wetlands (1B, 3, 4D, 15, and 18A/B) will be evaluated to assess protectiveness based on current site conditions. The sampling program will be outlined in the OU1, OU2, and OU16 Sampling and Analysis Plan. The semiannual sampling schedule should be preserved.

2.6.2.4 LUC Inspections

Following completion of the final ROD, LUCs were established for OU1 via a MOA for LUCs completed by USEPA, FDEP and the Navy. The MOA completed on September 24, 1999 and implemented on October 24, 1999 established the institutional controls that are currently in place and include: a restriction of groundwater use within 300 feet of the site and no intrusive activities within the landfill boundary without prior approval from the NAS Pensacola Environmental Office. The Base Master Plan was reviewed and the OU1 LUC documentation was present. In addition, current and historic annual LUC inspection forms for OU1 during the period of review were obtained and reviewed. The inspection forms noted no problematic observations. At the time of the inspection, institutional controls were found to be adequate, and use of groundwater was not observed. There were no apparent signs of vandalism or trespassing. In addition, because of the May 2002 land transfer of a tract of land associated with OU1 to the VA, the LUC compliance is coordinated between the Navy and the VA.

Although there is currently no indication of encroachment or trespassing by cemetery visitors, if future reports or LUC inspections indicate that visitors have encroached or trespassed upon the landfill, the installation of warning or restriction signs and/or other LUCs will be evaluated.

2.6.3 Site Inspection and Interviews

An inspection was conducted at the site on May 3, 2012 by Tetra Tech and NAS Pensacola personnel. The purpose of the inspection was to assess the protectiveness of the remedy, including the condition of the monitoring wells, and the condition of the wetlands.

During a separate regulatory site visit in 2011, an OU1 monitoring well was observed to be open and several additional monitoring wells were unlocked or in disrepair. Following the site visit, the Navy completed immediate monitoring well repair and initiated a facility wide monitoring well inventory to assess the condition of all existing monitoring wells. It was noted during the Five-Year Review inspection

that fencing and signs are in place to notice the restricted access to Barrancas National Cemetery, but not specifically for restricting access to OU1.

According to the NAS Pensacola Environmental Office, 49.83 acres was transferred to the VA on May 23, 2002 to provide additional burial plots and space for construction of administrative and maintenance building structures. A portion of the land transferred from the Navy to the VA was inadvertently located in OU1. The location of the VA transferred land located inside the OU1 boundary is depicted on Figure 2-1. As evidenced by this figure, the VA out parcel encompasses a portion of the southern soil LUC boundary for OU1.

An interview was conducted with Greg Campbell, Environmental Engineer for NAS Pensacola, on May 2, 2012. According to the interview, Mr. Campbell indicated he is well informed about the site's activities and progress, and was not aware of any community concerns regarding the site or its operation, or of any incidents such as vandalism, trespassing, or emergency responses at the site. The interview forms are presented in Appendix B.

Mr. Campbell indicated annual LUC inspections are performed. In addition, complaints, violations, or other incidents related to the site requiring a response by his office have not occurred. Mr. Campbell indicated his opinion that the closure of the iron recovery system was appropriate.

2.6.4 ARAR Level Changes

The following standards were identified as chemical-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- RCRA MCLs (40 CFR 264 Subpart F)
- Federal Safe Drinking Water Act MCLs (40 CFR 141.11 – 141.16)
- Safe Drinking Water Act Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.50 – 141.51)
- Florida Water Quality Standards, Chapter 62-3, F.A.C.
- Florida Surface Water Standards, Chapter 62-301 and 302, F.A.C.
- Florida Drinking Water Standards, Chapter 62-550, F.A.C.

Florida Water Quality Standards, Chapter 62-3, F.A.C., was repealed in 2000 and minimum groundwater quality criteria is currently provided in Ground Water Classes, Standards, and Exemptions, in Chapter 62-520, F.A.C. The action levels for triggering contingent action at OU1 are the Florida surface water standards for Class III Predominantly Marine freshwater and the Florida drinking water standards.

New surface water monitoring criteria was presented in the Reconnaissance Phase Flow Control Pilot Study completed in March 2009. The freshwater wetland background threshold for iron was not finalized however the estuarine wetland background threshold was determined to be 5,862 µg/L.

Contaminant CTLs, Chapter 62-777, F.A.C. (Amended 4/17/05) and Contaminated Site and Cleanup Criteria, Chapter 62-780, F.A.C. were promulgated by Florida after the ROD and establish cleanup levels for soil, groundwater, and surface water. These new criteria need to be considered to determine if the remedy is still protective. Chapter 62-777, F.A.C. provided GCTLs for contaminants without MCLs per Chapter 62-550, F.A.C. Additionally, Chapter 62-777, F.A.C. provided surface water cleanup target levels (SWCTLs) for contaminants that did not have surface water quality criteria listed in Chapter 62-302, F.A.C. The Chapter 62-777, F.A.C. SWCTLs are applicable for surface water and for groundwater discharging to surface water (both fresh and saline environments). As described in the previous Five-Year Review, the concentrations of four contaminants (trans-1,2-dichloroethene, 1,2-dichloroethane, 1,4-dichlorobenzene, and chlorobenzene) that are not listed in Chapter 62-302, F.A.C but are listed in Chapter 62-777, F.A.C. were not detected in Wetland 3 surface water samples. Thus, the use of the CTLs provided in Chapter 62-777, F.A.C. does not affect the protectiveness of the groundwater remedy.

Chapter 62-780, F.A.C. provides rules for the cleanup of non-petroleum sites with contaminants that have been released or discharged into the environment. To the extent rules promulgated per Chapter 62-780, F.A.C. may apply as chemical specific ARARs, they do not affect the protectiveness of the remedy.

Since the ROD for OU1 was finalized in 1998, changes to federal regulations in 2002 and 2006 and to Florida regulations in 2005 lowered the MCL for arsenic in groundwater from 50 to 10 µg/L. On January 22, 2001, the USEPA adopted a new MCL for arsenic in drinking water at 10 µg/L, replacing the old standard of 50 µg/L. The USEPA rule became effective on February 22, 2002 and became enforceable to water systems on January 23, 2006. Florida's drinking water standards are contained in Chapter 62-550, F.A.C. Florida's primary drinking water standards, which are health based, are described in Rule 62-550.310, F.A.C. Florida changed its MCL for arsenic from 50 µg/L to 10 µg/L on January 1, 2005. This change in the federal and state MCL for arsenic was included in a draft ESD for OU1 (Tetra Tech, 2012). However, based on comments received from the USEPA, The ESD will be suspended and in its place a ROD amendment will be completed. The change in the federal and state arsenic MCL will be included in a ROD amendment that is being developed to address the change in the selected remedy. There have been no other changes in Safe Drinking Water Act and Chapter 62-550, F.A.C. MCLs that may affect the protectiveness of the remedy.

The Wetlands Protection Policy, authorized under Executive Order 11990, remains unchanged and is the only location-specific ARAR for OU1.

The following standards were identified as action-specific ARARs for OU1, governing actions such as the construction of landfills:

- RCRA Groundwater Monitoring Requirements (40 CFR 264 Subpart F)
- Clean Water Act Discharge Limitations National Pollutant Discharge Elimination System (NPDES) Permit (40 CFR 122, 125, 129, 136)
- Pretreatment Standards (40 CFR 403.5)
- Safe Drinking Water Act Underground Injection Control Program (40 CFR 144)
- Florida Rules on Permits, Chapter 62-4, F.A.C. (Amended 02/16/12)
- Florida Underground Injection Control Regulations, Chapter 62-528, F.A.C. RCRA Solid Waste Groundwater Monitoring Requirements

The Florida rules on permits (F.A.C. Chapter 62-4) were amended on February 16, 2012. The amendments to this rule do not affect the protectiveness of the remedy. The groundwater interception system was decommissioned in May 2010, so NPDES, Pretreatment Standards, and 62-4, F.A.C. are no longer pertinent. There is no underground injection, so the underground injection control regulations are no longer pertinent. The remaining standards remain unchanged and are RCRA requirements.

2.7 TECHNICAL ASSESSMENT

The following conclusions support the determination that the remedy at OU1 will be protective of human health and the environment.

2.7.1 Question A: Is the remedy functioning as intended by the ROD?

Remedial Action Performance: Prior to decommissioning in May 2010, the groundwater interception system remedy was functioning, on a mechanical basis, as designed; however, the groundwater interception system was not effectively treating iron contaminated groundwater migrating from the OU1 landfill and discharging into Wetland 3, as is evidenced by the iron staining and iron flocculent observed in Wetland 3 and 4D and elevated iron concentrations present in Wetland 3 surface water. The design and subsequent performance of the trench was not sufficient to capture and extract all of the iron contamination migrating to Wetland 3 from OU1 because of the prevalence of iron within the shallow groundwater upgradient, side-gradient, and downgradient to the groundwater interception system. In summary, the groundwater interception system was not meeting, or expected to meet, the reductions necessary for cleanup. Therefore, the groundwater interception system groundwater treatment system was decommissioned in May 2010 and an ESD was initiated to document the action.

Based on the Optimization Study Reconnaissance Phase Pilot Study the Surface water point of compliance was changed and an ESD was initiated to document the action. The concentrations of iron at surface water sample locations 01SW01 and 01SW03 during the January 2012 sampling event were

below the freshwater background concentration, and the iron concentration at surface water sample location 01SW02 exceeded the freshwater background concentration.

Considering that Wetland 3 is already an integral part of the treatment process for iron, it is expected that iron concentrations in Wetland 3 will remain stable and may decrease over time. The results from the surface water samples should be monitored to confirm that the iron concentrations do not exceed the 2,360 µg/L freshwater wetland background value and the estuarine wetland background of 5,862 µg/L at the point of compliance location (01SW03). LUCs have been implemented at the site and have been effective at limiting intrusive activities into the land fill and limiting installation of wells within the LUC groundwater restriction area.

The remedy for groundwater of MNA is generally functioning as intended, however the Mann-Kendall Trend analysis results (Section 2.6.2.1 and Appendix A) indicated that although most monitoring well locations demonstrate no significant statistical trend or have a statistically significant downward trend identified, especially for benzene and vinyl chloride; there was statistically significant upward trend identified at a limited number of monitoring well locations for iron, manganese, and/or chlorobenzene.

In addition the Regulatory Agencies have promulgated new standards which qualify as ARARs for OU1 specifically changes to federal regulations in 2002 and 2006 and to Florida regulations in 2005 lowered the MCL for arsenic in groundwater from 50 to 10 µg/L.

System Operations/O&M: The groundwater interception system groundwater treatment system was decommissioned in May 2010.

Cost of System Operations/O&M: System operations and O&M cost-to-date from 1999 to 2012 for the groundwater recovery and treatment system were approximately $1,754,466.

Opportunities for Optimization: The Optimization Study was approved by the USEPA on March 29, 2007. All FDEP comments were addressed in correspondence dated November 27, 2007.

Because the groundwater interception system was not meeting the RAOs, modification of the existing remedy was necessary. The recommended necessary modifications included discontinuing active pumping of the ITS, modification of the remedial goals for the existing remedy, and continuation of long-term groundwater and surface water monitoring programs to ensure the modifications are protective of human health and the environment. It was recommended that the RAO for protection of Wetland 3 be modified to a risk based RAO, specific to the ecological protection of potential OU1 impacts to Wetland 3 surface water. The suggested RAO modification was: “Prevent unacceptable risks to ecological receptors to iron in Wetland 3 surface water attributed to OU1”. Long-term groundwater monitoring is being conducted to verify that natural attenuation processes are decreasing concentrations of organic

compounds and will eventually attain performance standards. Surface water monitoring is being conducted to verify that discharges from OU1 to Wetland 3 and Wetland 4D do not cause unacceptable impacts to Bayou Grande (a state-classified Class III Predominantly Marine water body).

The Optimization Study found that Wetland 3 is naturally treating the iron and field observations indicate healthy vegetative growth in Wetland 3. The vegetation also provides an unspecified amount of evapotranspiration in the wetland which aids in treatment.

Implementation of Institutional Controls and Other Measures: The MOA was completed on August 31, 1999, and was approved and authorized by the responsible parties including USEPA, FDEP, and the Navy. The LUCIP was included as an appendix to the MOA. OU1 is reported to have been inspected quarterly to insure the institutional controls remain in place and an Annual Review Report has been completed. No water supply wells are within the area restricted by the LUCIP.

2.7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Exposure Assumptions: There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes in Standards and To Be Considered (TBC) Criteria: ARARs and TBCs considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. The arsenic MCL per the Safe Drinking Water Act, and Chapter 62-550, F.A.C has been changed from 50 µg/L, which was the MCL at the time of the ROD, to 10 µg/L.

Florida groundwater regulations Chapter 62-550, F.A.C. and Chapter 62-777, F.A.C. have performance criteria that are equal to or lower than the Federal Safe Drinking Water Act of 1974 (amended in 1986 and 1996) and therefore are adequate to assess whether the remedies are functioning as intended because the lower of the state or federal performance criteria are used.

Changes in Exposure Pathways: No changes in the site conditions or land use that affect exposure pathways were identified as part of the Five-Year Review. However USEPA has a new guidance on how to address vapor intrusion (VI) issues that have come to light over the past few years specifically new guidance titled: “Assessing Protectiveness at Sites for Vapor Intrusion, Supplement to the “Comprehensive Five-Year Review Guidance,” OSWER Directive 9200.2-84.

The Navy evaluated the VI guidance in relation to OU1 and determined at OU1 buildings are present associated with the VA cemetery and picnic area. The VA cemetery buildings are not within the

groundwater contaminant plume, nor are the buildings within 100 feet of the groundwater plume. This is the distance that precludes buildings from consideration for vapor intrusion per EPA's Vapor Intrusion Guidance (2002) and EPA's new External Review Draft Guidance (2013).

OU1 includes two buildings at the down gradient edge of site, in close proximity to the Bayou Grande shoreline. The shallow monitoring well located closest to the buildings (01GGM04) has not been sampled since 2005 (total VOCs detected in the 2005 groundwater samples [two events] did not exceed 7 µg/L; chlorobenzene and vinyl chloride were the only VOCs detected.) VOCs were not detected in the 2010 groundwater sample collected from the shallow monitoring well 01GS73 which is the closest monitoring well to the buildings that has recently been sampled. Monitoring well 01GS73 is located approximately 500 feet up gradient or side gradient of the buildings. Thus, based on 2010 shallow groundwater data (albeit limited), the buildings may not be within the shallow groundwater contaminant plume or within 100 feet of the shallow groundwater plume. One hundred feet is the distance that typically precludes buildings from consideration for vapor intrusion per USEPA's Vapor Intrusion Guidance (2002) and EPA's new External Review Draft Guidance (2013). However, for purposes of clarity and completeness, the February 2004 version of the Johnson-Ettinger Model was used to predict indoor air concentrations based on the most recent round of shallow groundwater data (2010) (for the whole shallow zone plume) and the 2005 data reported for monitoring well 01GGM04. As summarized on attached Table 2-6, the following scenarios were evaluated:

- Maximum VOC concentrations detected at Well 01GGM04 (2005 data). Industrial/commercial exposure assumed. Site-specific building dimensions used in the analysis.
- Maximum VOC concentrations detected at Well 01GGM04 (2005 data). Industrial/commercial exposure assumed. Default building dimensions used in the analysis.
- Maximum VOC concentrations detected in the shallow groundwater zone (2010 data). Industrial/commercial exposure assumed. Default building dimensions used in analysis.
- Maximum VOC concentrations detected in the shallow groundwater zone (2010 data). Residential exposure assumed. Default building dimensions used in analysis.

TABLE 2-6
JOHNSON AND ETTINGER MODEL PREDICTED INDOOR AIR CONCENTRATIONS COMPARED TO EPA REGIONAL SCREENING LEVELS
OPERABLE UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Scenario	Benzene			Chlorobenzene			Naphthalene			Total Xylenes			Vinyl Chloride		
	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]
Industrial - Well 01GGM04[2] - Site-specific[3]	NA	NA	NA	6	0.093	220 N	NA	NA	NA	NA	NA	NA	0.4	0.066	2.8 C 440 N
Industrial - Well 01GGM04[2] - Default[4]		NA	NA		0.095	220 N		NA	NA		NA	NA		0.067	2.8 C 440 N
Industrial - Shallow Zone - Entire Plume - Default[4][5]	3.23	0.092	1.6 C 130 N	109	1.7	220 N	NA	NA	NA	6.33	0.16	440 N	0.561	0.10	2.8 C 440 N
Industrial - Intermediate Zone - Entire Plume - Default[4][5][6]	14	0.40	1.6 C 130 N	126	2.0	220 N	7.96	0.014	0.36 C 13 N	13.7	0.35	440 N	3.77	0.64	2.8 C 440 N
Residential - Shallow Zone - Entire Plume - Default[4][5]	3.23	0.74	**0.31 C** 31 N	109	13.9	52 N	NA	NA	NA	6.33	1.3	100 N	0.561	0.76	**0.16 C** 100 N
Residential - Intermediate Zone - Entire Plume - Default[4][5][6]	14	3.2	**0.31 C** 31 N	126	16.1	52 N	7.96	0.11	**0.072 C** 3.1 N	13.7	2.8	100 N	3.77	5.1	**0.16 C** 100 N

1 - USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2013. [Cancer benchmark value = 1E-06, hazard quotient (HQ) = 1].
2 - Well 01GGM04 has not been sampled since 2005; therefore, groundwater concentrations from 2005 are presented.
3 - Site-specific building dimensions of 25 feet long, 60 feet wide, and 8 feet high were assumed.
4 - Default building dimensions were assumed.
5 - The entire plume scenarios are included for purposes of completeness, as there are currently no buildings in this portion of the plume.
6 - The intermediate zone evaluations are included as a point of reference because there are relatively few shallow wells.

Shaded criteria indicate that the predicted indoor air concentration exceeds that criteria.

C = Carcinogen
N = Noncarcinogen
NA = Not Applicable/Not Available

The groundwater concentrations used in the model are specified in Table 2-6. Site-specific data, where available, served as inputs for the Johnson-Ettinger model. Those applicable to both residential and industrial exposures included:

- Average Soil/Groundwater Temperature: 22°C [User's Guide temperature for Pensacola, Florida]
- Depth below grade to bottom of enclosed space floor: 15 cm (slab-on-grade) [default]
- Depth below grade to water table: 228 cm (7.49 feet) [site-specific]
- SCS soil type: Sand (S) [site-specific]
- Soil dry bulk density: 1.66 g/cm^3 [default for sand]
- Soil total porosity: 0.375 [default for sand]
- Soil water-filled porosity: 0.054 [default for sand]

For industrial exposures, the building dimensions are:

- 25 feet (762 cm) long, 60 feet (1829 cm) wide, and 8 feet (244 cm) high. (A building located at the downgradient edge of the site).
- 1000 cm (length) x 1000 cm (width) x 224 cm (height) (equivalent to default residential dimensions to account for a hypothetical office setting within the site).

For residential exposures, the building dimensions were the default values:

- 1000 cm (length) x 1000 cm (width) x 224 cm (height)

For industrial exposures, the air exchange rate was assumed to be 2/hr (professional judgment). For residential exposure, the air exchange rate was the default value of 0.25/hr.

Table 2-6 presents a comparison of the predicted indoor air concentrations to USEPA Regional Screening Levels (RSL) (May 2013) for residential and industrial exposure (i.e., the current site building and area equivalent to a residence to represent office space). The predicted indoor air concentrations of all VOCs are less than their corresponding industrial RSLs; therefore, the risks associated with industrial exposure are expected to be less than target risk levels (1 x 10^{-6} for cancer risk and 1 for a hazard index). Conversely, for all VOCs for residential exposure, the predicted indoor air concentrations of benzene and vinyl chloride exceed their corresponding residential RSLs; therefore, the predicted risks associated with residential exposure, under the most conservative default assumptions, are expected to exceed the target risk levels. The maximum benzene concentration detected in the shallow zone exceeds the groundwater cleanup target level. However, groundwater and soil LUCs already exist for OU1 prohibiting groundwater use or residential land use.

In addition, it should be noted, that the all the VOC exceedances mentioned biodegrade aerobically and all, except vinyl chloride, are common VOCs present in petroleum products. Although vinyl chloride is not a petroleum hydrocarbon, it is equally amenable to aerobic biodegradation which is the basis for the USEPA exclusion criteria identified in USEPA guidance document "Guidance for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tanks Sites, Draft External Review Document, April 2013. This guidance recognizes that for "dissolved petroleum hydrocarbons sources that are separated from overlying buildings by more than 6 feet of clean, biologically active soil, the potential threat of petroleum vapor intrusion is negligible and further investigation for petroleum vapor intrusion is generally unnecessary". The general depth to groundwater used in the OU1 Johnson-Ettinger calculations was in excess of 7 feet, the average depth to groundwater in monitoring well 01GMM04 (closest monitoring well to the existing buildings) is 7.73 feet (accounting for an approximate 2 foot well stick-up above land surface), which exceeds the vertical separation distance; consequently, the potential for vapor intrusion to be significant is unlikely. The risk calculation worksheets are provided in Appendix K.

Changes in Toxicity and other Contaminant Characteristics: Toxicity and other factors for COCs have not changed.

Changes in Risk Assessment Methodologies: Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

2.7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information that could call into question the protectiveness of the remedy has been discovered.

2.8 ISSUES

Issues were discovered during the Five-Year Review and are noted in Table 2-7.

TABLE 2-7
OU1 ISSUES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

No.	Issues	Affects Protectiveness (Y/N)	
		Current	Future
1	The NAS Pensacola Partnering Team previously agreed that certain technical modifications to the remedy were needed including discontinuing use of the groundwater interceptor trench and relocation of the surface water Point of Compliance. The Navy is preparing a ROD Amendment to evaluate and formally incorporate those modifications as permanent changes to the OU1 remedy subject to any revision(s) which may result from public review/comment on that proposal.	N	Y

Issues to be addressed in the ROD Amendment include:

- The decommissioning of the groundwater interception system,
- The revised surface water remedial action and point of compliance,
- The groundwater and surface water RAOs,
- The discrepancy between groundwater COCs in the Proposed Plan verses the ROD,
- Completing a LUC Remedial Design to update the LUC remedy for current regulatory required language, and
- An evaluation of ARARs including the change in the federal and state arsenic MCLs.

2.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Recommendations and follow-up actions for issues discovered during the Five-Year Review are noted in Table 2-8. Complete a Feasibility Study Addendum to evaluate the proposed remedy for OU1 and complete a ROD Amendment to document the remedy. The ROD amendment will document revisions including: a revised surface water remedial action, revised the groundwater and surface water RAOs, revised the groundwater COCs based on the Proposed Plan and ROD, completion of a LUC Remedial Design for current regulatory language, and a re-evaluation of ARARs including the change in the federal and state arsenic MCLs.

The OU1 Long-term Monitoring Reports should statistically evaluate all the past and current monitoring data using the Mann-Kendall Test and use the decision rules in the UFP SAP for Long-term Groundwater Monitoring at OU1 (Tetra Tech, 2009) to evaluate the effectiveness of the MNA remedy and support future groundwater monitoring optimization proposals. In addition, the Navy has agreed that future wetlands investigation and remedial actions for OU1 will be removed from OU16, the Combined Wetlands Operable Unit and returned to the original OU1.

TABLE 2-8
OU1 RECOMMENDATIONS AND FOLLOW-UP ACTIONS
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Complete ROD Amendment	Navy	USEPA & FDEP	May 10, 2015	N	Y

2.10 PROTECTIVENESS STATEMENT

The remedy at OU1 currently protects human health and the environment because LUC are in place and enforced. However, in order for the remedy to be protective in the long term, a ROD Amendment is needed to revise the surface water remedial action, to revise the surface water RAO, complete a LUC Remedial Design for current regulatory language, and to address the change in the federal and state arsenic MCLs.

3.0 OPERABLE UNIT 2

The OU2 ROD was signed by the Navy on September 29, 2008 and signed by USEPA on September 30, 2008. FDEP concurred with the ROD on April 2, 2009. Implementation of remedial action at OU2 began in 2008. This Five-Year Review consists of an approximate five-year period of data and provides a status update for OU2 which consists of Site 11- North Chevalier Field Disposal Area, Site 12- Scrap Bins, Site 25- Radium Spill Area, Site 26- Supply Department Outside Storage Area, Site 27- Radium Dial Shop Sewer, and Site 30- Complex of Industrial Buildings and Industrial Wastewater Treatment Plant (IWTP) Sewer Line.

This Five-Year Review for OU2 is being conducted because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

3.1 SITE CHRONOLOGY

Historical events and relevant dates in the OU2 chronology are summarized in Table 3-1.

TABLE 3-1
OU2 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Garbage stored at Site 12	Early 1930s – 1940s
Waste disposal activities initiated at Site 11	Late 1930s – Mid 1940's
Aircraft and parts were painted with cellulose nitrate lacquer, zinc chromate, nitrate dope, acetate dope, "day glow," epoxy, and enamel in the Building 649 complex at Site 30. Thinners used were lacquer thinner, toluene, and MT 6096	1940
Building 709 at Site 27 constructed for several operations including carburetor repair, propeller repair, painting and maintenance, various instrument shops (including a radium paint room), and a plating shop	1941
Building 709 at Site 27 housed a large plating operation	1941 – 1970 or 1973
Benzene stripping of luminous instrument dials in Building 709 at Site 27	1941 – 1965
Tin-cadmium plating shop operated in the Building 649 complex at Site 30. Solutions of tin, cadmium, cyanide, trichloroethene, and waste oil stored on site	Mid 1940s – early 1960s
Cleaning solutions containing benzene, white pigments, phosphorus, radium, and small amounts of acidic or caustic solutions Plating wastes from former Building 709 at Site 27 and shops in Buildings 604 and 649/755 were periodically dumped through drains into the sanitary sewer	1941 – 1962
All wastes from former Building 709 at Site 27 were discharged directly into Pensacola Bay	1941 – 1948

TABLE 3-1
OU2 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Wastewater treatment plant built at Site 30. The waste stream has included paint strippers, heavy metals, pesticides, radioactive wastes, fuels, cyanide waste, and waste oil	1948
Radium spill reported at Site 25	1978
Radiological Affairs Support Office (RASO) conducted a Radiation Survey/Removal investigation of radium contamination in the sewer lines at the demolished Building 709 area (Site 27)	1976
IAS final report issued	June 1983
Confirmation Study issued	1984
Verification Study issued	July 1984
Fiberglass underground storage tank (UST) mounted in concrete stored JP-1/JP-5 (jet fuel) calibration fluid for use in Building 692 at Site 30	1986
Characterization Study Sites 11, 27, and 30	March 1986
RCRA Facility Assessment	1988
RCRA/Hazardous and Solid Waste Amendments (HSWA) Permit	August 1988
FFA signed by FDEP, USEPA, and the Navy	October 23, 1990
Phase I screening investigation conducted	1991
RI/Focused FS completed	December 1995
RI Report filed	1997
RI Report Addendum issued	September 1999
MOA issued	September 24, 1999
Focused FS issued	May 2000
Focused FS Addendum issued	September 2001
HSWA permit (0154498 004 HF) renewed	January 16, 2002
Groundwater Monitoring Plan issued	2007
Remedial Design approved	September 19, 2007
Final ROD issued	September 28, 2008
Site 12 Partial soil excavation completed	2010-2012
Site 25 Soil excavation completed	September 30, 2011
Site 27 Partial soil excavation completed	To Be determined
Site 30 Radiological (RAD) Survey of Areas A-F completed	June 2012
Site wide Long-Term Monitoring of Groundwater commenced	March 2013

3.2 BACKGROUND

3.2.1 Physical Characteristics of OU2

OU2 is comprised of six individual sites: Site 11- North Chevalier Field Disposal Area, Site 12- Scrap Bins, Site 25- Radium Spill Area, Site 26- Supply Department Outside Storage Area, Site 27- Radium Dial Shop Sewer, and Site 30- Complex of Industrial Buildings and IWTP Sewer Line. The OU is primarily paved or covered by buildings and is approximately 68 acres. The sites comprising OU2, described below, are north of Chevalier Field, near Murray Road, and west of Pensacola Bay.

Site 11

Site 11, shown in Figure 3-1, is a former landfill where industrial and municipal wastes were disposed of and burned from the late 1930s to the mid-1940s. The area occupies approximately 20 acres southwest of an extension of Bayou Grande called the Yacht Basin. Surface elevations at the site are approximately 5 feet above mean sea level, and the site surface slopes gently eastward toward Bayou Grande. Two prefabricated buildings, Buildings 3627 and 3628, were formerly located near the center of the site. Building 3445, south of the site's southeastern corner, is used to store outdated office equipment. Much of the site is covered with vegetation. Fenced areas to the north and south of Building 3445 are used for outside storage of boats, trucks, and heavy equipment. Pat Bellinger Road runs north-south through the center of Site 11.

According to the IAS conducted by the Naval Facilities Engineering Service Center (NFESC), the Site 11 landfill was used to burn refuse through the mid-1940s. During this time, it received combustibles such as fuels, solvents, and waste oil from aircraft engine overhauls. During landfill operations from the early 1930s to the 1940s, approximately 24 cubic yards of material were disposed of daily from several NAS Pensacola locations. During this time, an unknown number of 55-gallon drums of unknown contents were observed. Until the 1950s, oil slicks were observed during heavy rains in the Yacht Basin.

The source of contamination at Site 11 was identified as a former landfill, where trenching revealed evidence of a "seam" of blackened debris at the water table. This oily material contained corroded bits of metal and other debris. COCs for Site 11 are presented in Table 3-2.

Site 12

Site 12, shown in Figure 3-1, is currently referred to as the Defense Reutilization and Marketing Office (DRMO) Recyclable Materials Center and is used to store scrap metal. The site is approximately 800 feet northwest of former Chevalier Field and immediately west and upgradient of Site 26. Most of the

site area is enclosed by a chain-link fence and covered with a large concrete pad which is used as a heavy equipment storage area. Buildings 455 and 3821 are in the southern portion of the site. Building 455 includes an office, break area, and storage warehouse, and Building 3821 is a storage warehouse. From the early 1930s to the 1940s, garbage was stored at Site 12 in an area known as "Pig Sty Hill" near Building 455. Approximately 16 cubic yards (described as two truckloads) per day of wet garbage were stored here before being hauled off for livestock feed. The site has since been used for scrap metals storage.

The storage of scrap metals may continue to contribute to the metals contamination at this site. Although it was not noted during the RI field investigation, past storage of old transformers pending their disposal may have contributed to the PCB contamination at Site 12. Residual fuels and oils from scrapped aircraft and vehicles stored at the site are possible sources of SVOCs. Radium 226 was not included in the original ROD for this site; however, a Radiological Scoping Survey completed at Site 12 in 2009 indicated Radium 226 impacted soils were present. COCs for Site 12 are presented in Table 3-2.

Site 25

Site 25, shown in Figure 3-2, is an approximately 50-foot by 50-foot concrete-paved area located immediately east of Murray Road and north of Farrar Road. The site is flat with land surface elevations averaging approximately 22 to 25 feet above mean sea level. Where exposed, site surface soil is sandy and well drained. The site includes an area east of the radium decontamination building (Building 780) where a radium spill is reported to have occurred in 1978. A former helicopter scrap yard approximately 25 feet east of Building 780 is currently used as a parking area for Navy Exchange semi-trailers. Building 780 currently houses the Joint Oil Analysis Laboratory, which is used for quality assurance analysis of oil from aircraft and vehicles. Building 780 was constructed in 1951 to house oxygen and carbon dioxide shops. In approximately 1975, a radium decontamination operation was added to Building 780. Radium wastes from this operation were stored in a drum on site before being disposed of. In 1978, a spill occurred in the storage area between Building 780 and the scrap yard. Approximately 25 gallons of low-level radium paint waste spilled from a ruptured, eroded drum onto the underlying concrete floor. The waste was reportedly cleaned, placed in a secure container, and sent to a proper disposal site. The exact location of the spill, details of the cleanup operation, and whether the waste reached unpaved soil were not determined from the existing records. In 2009 and 2012, RASO radiological surveys evaluated Site 25 including the area of the indicated spill. Surveyed surfaces and characterized soils indicated no remediation was required for radiological constituents as site conditions did not indicate exceedances of natural background radiation levels.

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DRAWN BY: GIS	DATE: 9/6/2013	SITE MAP - OPERABLE UNIT 2 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00702
CHECKED BY: A.I.	DATE: 9/6/2013		CTO NUMBER: 067
REVISED BY: —	DATE: —		APPROVED BY: — DATE: —
SCALE: AS NOTED			APPROVED BY: — DATE: —
			FIGURE NO.: 3 - 1 REV: 0

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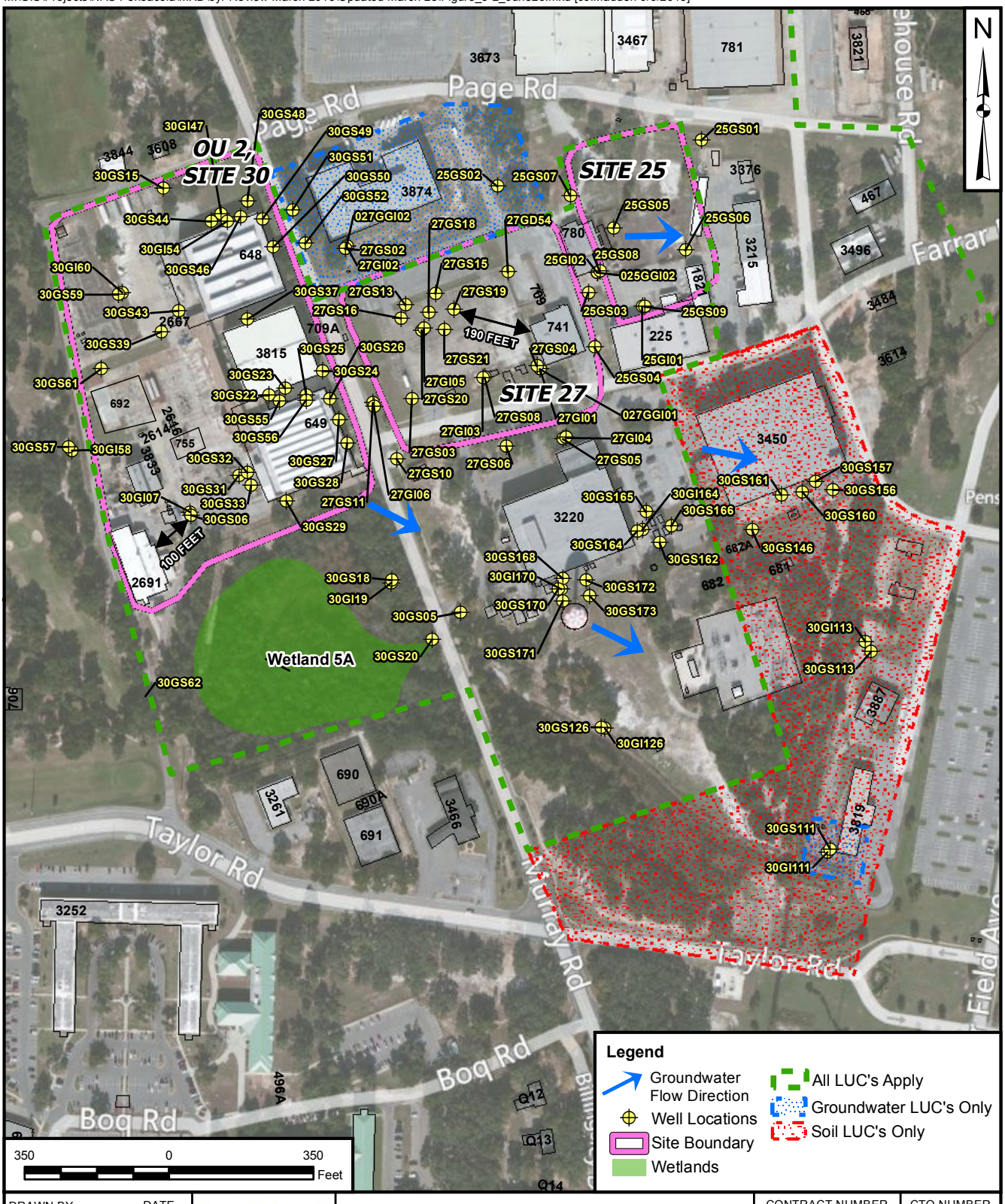

DRAWN BY	DATE		SITE MAP - OPERABLE UNIT 2 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER	CTO NUMBER
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SCALE AS NOTED		NAVFAC		FIGURE NO. 3 - 2	REV 0

Improper storage and disposal of materials at Building 780 are possible sources of soil contamination at the site. Another location of concern at Site 25 is the storage yard north of Building 225, which was used as a metal prefabricating shop by the NAS Pensacola PWC. This yard contains racks of materials such as metal sheeting and piping. COCs for Site 25 are presented in Table 3-2.

Site 26

Site 26, shown in Figure 3-1, is northwest of former Chevalier Field and immediately south of Building 684. The approximately 150-foot by 200-foot area houses an open metal shed near a former chemical storage building. DRMO uses this area to store paints, fuels, and solvents. Site access is limited by an 8-foot chain-link fence surrounding the storage area. The concrete pavement inside the fence is bordered by sandy soil and mowed grass. Site 26 is bounded on the west by a paved road and Site 12 and on the east by a wooded area (Site 11). The site gently slopes eastward to a topographic break where elevations abruptly drop to approximately 5 feet above mean sea level.

From 1956 until 1964, the supply department used Site 26 to store incoming paint strippers and acids. Containers of these materials placed outside on steel matting sometimes leaked, discharging the materials onto the ground.

Possible sources of contamination include the storage of paints, fuels, and solvents. COCs for Site 26 are presented in Table 3-2.

Site 27

Site 27, shown in Figure 3-2, extends through the concrete foundation of former Building 709. The building was demolished and the foundation is currently a parking lot. The building foundation is 2 to 4 feet above the surrounding area. Outside the foundation the ground surface is unpaved. The site is approximately 150 feet west of Building 780 and bounded by Farrar and Murray Roads on the south and west, respectively. An adjacent parking lot north of the building foundation is asphalt-paved, and a gravel and shell parking lot is northeast of the foundation. All roads within the site are paved with either concrete or asphalt.

Originally, the site consisted of a small radium dial shop in former Building 709 with a connection to the sanitary sewer. However, the results of analysis of RI soil samples collected in the vicinity of the Building 709 foundation expanded the site area to approximately 6 acres.

Building 709, constructed in 1941, was used for several operations including carburetor repair, propeller repair, painting and maintenance, various instrument shops (including a radium paint room), and a plating shop. In 1949, a small shop in Building 709 was used to rework luminous instrument dials. Worn and damaged instruments were returned to this shop to be stripped and repainted. From 1941 to 1965, the

stripping procedure required soaking the instruments in benzene, scraping them in a benzene or water bath, or dry scraping and painting them under a ventilation hood. After 1965, the procedure switched to scanning the instruments for radium and then stripping them with paint stripper and a lye-nitric acid solution. Contaminated instrument cases were soaked in another acid solution called “Turco” and then scrubbed with a wire brush.

Building 709 also housed a large plating operation from 1941 to approximately 1970. The operation involved the use of 50 solution tanks ranging from 50 to 3,865 gallons in capacity.

A routine disposal operation in former Building 709 involved washing spent cleaning solutions and luminous paint down the drains into the sanitary sewer. The disposed wastes from this location included cleaning solutions containing benzene, white pigments, phosphorus, radium, and small amounts of acidic or caustic solutions. Plating wastes from former Building 709 and shops in Buildings 604 and 649/755 were periodically dumped through drains into the sanitary sewer. Most of the building drains connected to a single line draining into the sanitary sewer line. From 1941 to 1948, all wastes from former Building 709 were discharged directly into Pensacola Bay. From 1941 to 1962, concentrated cyanide wastes from Building 709 were periodically dumped into the sanitary sewer. After 1962, the cyanide was drummed and disposed of 15 miles offshore in the Gulf of Mexico, although small quantities of cyanide continued to be discharged into the sewer. Plating operations ceased in Building 709 by 1973.

This site was originally investigated because of the sewer from the Radium Dial Shop. The sources of organic and inorganic contaminants are uncertain. The radiological survey revealed a small area of contamination south of former Building 709. From the size of the area, the contamination appeared to be from a spill adjacent to an old stairway from Building 709. Outside this limited area, significant soil radiological contamination was not found on this site. A Radiological Scoping Survey completed at Site 27 in 2009 confirmed Radium 226 impacted soils were present. COCs for Site 27 are presented in Table 3-2.

Site 30

Site 30, shown in Figure 3-2, covers approximately 35 acres and is also known as the Building 649 complex. The buildings were used by the Dynamic Component Division of the former NADEP and several aircraft component repair functions. In addition to the buildings, the Site 30 investigation included a portion of the sewer line from the Building 649 complex to the IWTP. The sewer line investigation included lines at Sites 25, 27, and 30 and their downstream segments along with the sewer extending from the Building 649 complex, the feeder line from Building 3220, and the main line running to the IWTP. Wetland 5A is located to the south of Site 30. Surface water from the wetland drains to the southeast to a ditch that flows northeastward to the Yacht Basin.

Operations in the Site 30 complex began in the 1940s and continued until NADEP closed. Aircraft and parts were painted in booths in the Building 649 complex beginning in 1940. The paints used at NAS Pensacola were cellulose nitrate lacquer, zinc chromate, nitrate dope, acetate dope, "day glow," epoxy, and enamel. Thinners used were lacquer thinner, toluene, and MT 6096.

A tin-cadmium plating shop operated in the Building 649 complex from the mid-1940s to the early 1960s. At this time, it was replaced by a magnesium treatment line, which operated until the early 1970s. Near Building 649, 15 tanks ranging in capacity from 200 to 500 gallons contained solutions of tin, cadmium, and cyanide. Additionally, a 250-gallon tank stored trichloroethene, and a 500-gallon UST, located on the northern end of Building 649, stored waste oil. The contents were drained periodically into a "ditch" east of the building. Based on current topography and historical data, this ditch was either Wetland 5A or a topographical low draining to Wetland 5A. When the tin-cadmium operation was replaced by a magnesium treatment line in the early 1970s, the 15 tanks near Building 649 were then used to store acids, caustics, degreasers, chromate solutions, and potassium permanganate.

In the summer of 1994 as part of an interim removal action (IRA), the NAS Pensacola Public Works Center (PWC) removed an aircraft engine shipping container from Wetland 5A immediately southeast of Building 649. The shipping container, referred to as the waste receiving structure, had been used as an oil-water separator. Wetland 5A was sampled under the Site 41 (NAS Pensacola Combined Wetlands) investigation. A second plating shop in Building 755 was used from the early 1960s until the early 1970s and included 50 tanks ranging in capacity from 50 to 200 gallons and containing metal plating solution including nickel, chromium, silver, lead, and tin.

Concentrated cyanide wastes generated in Buildings 649 and 755 were disposed of in the same manner as Building 709's cyanide waste. Disposal involved discharging the wastes down the sewer from 1941 to 1962 and discarding drummed waste in the Gulf of Mexico after 1962. Cyanide waste generation stopped in the early 1960s when the tin-cadmium line was replaced by the magnesium treatment line. Overflow discharged into the sewer.

An empty fiberglass UST mounted in concrete is still located near the southeastern corner of Building 692. Installed in 1986, this tank stored JP-1/JP-5 (jet fuel) calibration fluid for use in Building 692. The fiberglass tank replaced an older steel tank also used to store calibration fluid. The older tank had at least one undocumented spill. A UST along the western side of Building 692 supplied Building 755 with methyl ethyl ketone via underground pipes. Several other USTs were located along the northern side of Building 692; their exact contents are unknown. Some of the storage tanks may have contained chromium wastes.

The original WWTP, built in 1948, was replaced in 1971 at the same location with a modern plant that could accept industrial wastes. Most facilities discharging to the sewer did so without any pretreatment or waste segregation. The waste stream has included paint strippers, heavy metals, pesticides, radioactive wastes, fuels, cyanide waste, and waste oil. The IWTP sewer line consisted of vitrified clay and cast-iron piping installed both before and after 1971. The final deposition of the wastes through the sanitary sewer line was investigated at the IWTP as a single Operable Unit, OU10.

Maintenance operations such as painting, solvent use, and plating are the most likely sources of contamination at this site. COCs for Site 30 are presented in Table 3-2.

3.2.2 Land and Resource Use at OU2

OU2 is an industrial area, and because NAS Pensacola is not proposed for Base Realignment and Closure, it is reasonable to assume that the facility and OU2 will continue to be used for industrial or non-residential purposes in the foreseeable future. The groundwater at OU2 is not used at this time, and NAS Pensacola does not anticipate its future use. However, groundwater beneath OU2 is considered a potential source of drinking water (G-2) under Florida regulations.

3.3 HISTORY OF CONTAMINATION AT OU2

One soil sampling event during the RI was performed at all sites in OU2 and is summarized in the RI Report (EnSafe, 1997). Soil data identified constituents in surface and subsurface soil at concentrations greater than residential and industrial direct exposure Soil Cleanup Target Levels (SCTLs), and leachability to groundwater SCTLs per Chapter 62-777, F.A.C., and NAS Pensacola background concentrations. The estimated volume of soil that exceeds industrial SCTLs is 18,252 cubic yards.

RI groundwater sampling data were compared to Federal Safe Drinking Water Act, Florida Chapter 62-550, F.A.C. and Chapter 62-777, F.A.C. CTLs; Florida SWCTLs per Chapter 62-777, F.A.C.; and NAS Pensacola background concentrations to evaluate the nature and extent of contamination. NAS Pensacola background concentrations for aluminum, antimony, and iron exceeded their associated CTLs, indicating that these metals naturally occur at concentrations that exceed federal and state regulatory criteria at NAS Pensacola.

Based on data collected during the RI, the estimated volume of groundwater with aluminum, iron, and manganese at concentrations exceeding their CTLs is approximately 14,400,000 gallons. The estimated volume of groundwater with barium, cadmium, chromium, and lead at concentrations exceeding their CTLs is approximately 2,260,000 gallons. The estimated volume of groundwater with VOC concentrations exceeding their CTLs is approximately 13,500,000 gallons. The estimated volume of

groundwater with SVOC at concentrations exceeding their CTLs is approximately 820,000 gallons. Although contaminants were detected in soil and groundwater samples, a strong correlation between soil and groundwater contamination was not identified in the RI Report.

3.3.1 Basis For Taking Action at OU2

Concentrations of COCs in surface soil, subsurface soil, and groundwater were identified in the Human Health and Screening Level Ecological Risk Assessments that was presented in the RI Report and ROD (Tetra Tech, 2008b). The RI and ROD indicated the COCs present an unacceptable risk to human health for future site residents, future and current site workers, and adolescent trespassers, but did not result in unacceptable risks to ecological receptors (Tetra Tech, 2008b). COCs related to each medium at each site are summarized in Table 3-2.

TABLE 3-2
OU2 CONTAMINANTS OF CONCERN
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Site	Medium	Contaminants Causing Unacceptable Risk
11	Groundwater	Aldrin, Arsenic, Barium, Benzene, Beryllium, Cadmium, Chloroform, Chromium, 1,1-Dichloroethene, 1,2-Dichloroethane, cis-1,2-Dichloroethene, 1,2-Dichloroethene (total), 1,2-Dichloropropane, Dieldrin, Naphthalene, 1,1,2,2-Tetrachloroethane, Tetrachloroethene, Trichloroethene, Vanadium, Vinyl chloride
11	Soil	Aluminum, Aroclor-1254, Aroclor-1260, Arsenic, benzo(a)pyrene equivalents (BEQs), Cadmium, Chromium
12	Groundwater	Aroclor-1260, Chloroform, 1,1-Dichloroethene, Dieldrin, Heptachlor epoxide
12	Soil	Aluminum, Antimony, Aroclor-1254, Aroclor-1260, Arsenic, BEQs, Beryllium, Cadmium, Chromium, Copper, Manganese, Radium 226
25	Groundwater	Chloroform, 1,1-Dichloroethene, Mercury, Tetrachloroethene, Trichloroethene, Vinyl chloride
25	Soil	Aluminum, Aroclor-1254, Aroclor-1260, Arsenic, BEQs, Beryllium, Cadmium, Chromium, Dieldrin, Manganese, Mercury, Silver, Zinc

TABLE 3-2
OU2 CONTAMINANTS OF CONCERN
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Site	Medium	Contaminants Causing Unacceptable Risk
26	Groundwater	Arsenic, Cadmium, Dieldrin, Tetrachloroethene, Trichloroethene, Vinyl chloride
26	Soil	BEQs
27	Groundwater	Chloroform, Chromium, 1,4-Dichlorobenzene, 1,1-Dichloroethane, 1,2-Dichloroethane, 1,1-Dichloroethene, 1,2-Dichloroethene (total), Dieldrin, 4-Methylphenol, Pentachlorophenol, Tetrachloroethene, 1,1,1-Trichloroethane, Trichloroethene, Vinyl chloride
27	Soil	Aluminum, Arsenic, BEQs, Beryllium, Cadmium, Chromium, Dieldrin, Manganese, Mercury, Silver
30	Groundwater	Arsenic, Barium, Benzene, Cadmium, Chloroform, Chromium, 1,4-Dichlorobenzene, 1,2-Dichloroethane, 1,1-Dichloroethene, Tetrachloroethene, 1,1,1-Trichloroethane, Trichloroethene, Vinyl chloride
30	Soil	Aluminum, Aroclor-1242, Aroclor-1254, Aroclor-1260, Arsenic, BEQs, Beryllium, Cadmium, Chromium, Dieldrin, Manganese

3.4 REMEDIAL ACTIONS

3.4.1 Remedy Selections at OU2

The ROD for NAS Pensacola OU2 was finalized on September 29, 2008. RAOs were established in the FS to aid in the development and screening of remedial alternatives to be considered for the ROD.

The purpose of the remedial action at OU2 is to reduce the unacceptable risks to human health and the environment associated with exposure to COCs in groundwater and soil. To meet these goals, three RAOs were identified. Table 3-3 lists the RAOs for OU2.

TABLE 3-3
OU2 REMEDIAL ACTION OBJECTIVES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Medium	Contaminants Causing Unacceptable Risk	Remedial Action Objectives
Groundwater	Aldrin, Aroclor-1260, Arsenic, Barium, Benzene, Beryllium, Cadmium, Carbon tetrachloride, Chlorobenzene, Chloroform, Chromium, 1,4-Dichlorobenzene, 1,1-Dichloroethane, 1,1-Dichloroethene, 1,2-Dichloroethane, cis-1,2-Dichloroethene, 1,2-Dichloroethene (total), 1,2-Dichloropropane, Dieldrin, Heptachlor epoxide, Mercury, Methylene chloride, 4-Methylphenol, Naphthalene, Pentachlorophenol, 1,1,2,2-Tetrachloroethane, Tetrachloroethene, 1,1,1-Trichloroethane, Trichloroethene, Vanadium, Vinyl chloride	Reduce human health risk from exposure to groundwater by reducing groundwater contamination at OU2 to meet Florida GCTLs
Surface Soil	Aluminum, Antimony, Aroclor 1242, Aroclor 1254, Aroclor 1260, Arsenic, BEQs, Beryllium, Cadmium, Chromium, Copper, Dieldrin, Manganese, Mercury, Silver, Zinc, and Ra-226 (Site 12 only)	Protect human health by eliminating or preventing exposure to contamination in surface soil that exceed Florida residential and commercial/industrial SCTLs
Subsurface Soil	Aluminum, Antimony, Aroclor 1242, Aroclor 1254, Aroclor 1260, Arsenic, BEQs, Beryllium, Cadmium, Chromium, Copper, Dieldrin, Manganese, Mercury, Silver, Zinc, and Ra-226 (Sites 12 & 27 only)	Eliminate a continuing contamination source to groundwater by eliminating COCs in subsurface soil at concentrations that exceed Florida SCTLs for leachability

For OU2, five remedial alternatives for soil and seven remedial alternatives for groundwater were evaluated to address the three RAOs. Of the alternatives evaluated, the remedial actions selected for OU2 were Alternative S-5 for soil (Excavation and Off-site Disposal with LUCs) and GW-3 for groundwater (MNA and LUCs) as listed in the ROD for OU2. The major components of Alternative S-5 and GW-3 are listed below:

- Natural attenuation of contaminated groundwater primarily due to hydraulic dispersion, adsorption onto soil particles, and biodegradation.
- Excavation of soil contaminated by COC from Sites 11, 12, 25, 27, and 30, such that the average contaminant concentrations based on the 95 percent upper confidence limit meet the state of Florida industrial direct exposure SCTLs.

- Implementation of LUCs.
- Groundwater monitoring to evaluate whether migration of COCs is occurring and to assess whether natural attenuation is occurring.

The remedy was selected for the following reasons:

- After removal of soil identified for excavation, concentrations of COCs remaining in soil will no longer present an unacceptable threat to human health or the environment assuming that only non-residential uses of the sites are permitted. Surface soil areas identified as containing COCs at concentrations exceeding state of Florida industrial direct exposure SCTLs will be removed and replaced with clean fill to prevent unacceptable risks.
- Although contamination is present in groundwater at concentrations greater than federal and state CTLs, detected concentrations are relatively low and do not present an unacceptable risk to human health or the environment under the groundwater use restrictions to be implemented as part of the selected remedy.
- The contaminant plume is small and confined to the shallow aquifer.

Soil excavation for CERCLA contaminants originally planned for Site 11 will not be conducted due to a proposed change in remedy after discovery of asbestos containing material (ACM). However pre-gamma radiological surveys and a RESRAD/Micro-shield run will be completed to verify radiation levels prior to completion of the soil cover. The thickness of the existing soil cover will be evaluated and additional soil cover will be added, if necessary, in place of the hotspot soil excavation described in the ROD. Finding of ACM as a CERCLA contaminant and the change in the remedy selected in the ROD will be addressed in a ROD Amendment. In addition, the OU2 FS, Proposed Plan, and ROD did not include Radium 226 as a COC. However, the Navy Radiological Affairs Support Office (RASO) has conducted sampling and remediation of the Radium-226 contamination in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) protocol for sites 12, 25, and 27. An FS addendum and ROD amendment are currently being prepared for the Radium-226 contamination to incorporate the RASO actions into the CERCLA process. With appropriate radiological controls, additional data collection is planned to determine the thickness of the landfill cover at Site 11 where the ACM was discovered. Also, an FS Addendum and Historical Radiological Assessment (HRA) for Site 11 are planned to evaluate remedial options and to determine if the site is radiologically impacted. The presence of Radium 226 will also be addressed in a ROD Amendment.

3.4.2 Remedy Implementation at OU2

3.4.2.1 MNA and Long-Term Monitoring

The OU2 ROD specified MNA of contaminated groundwater. Natural attenuation will rely on naturally occurring processes within the surficial aquifer to reduce contaminant concentrations in groundwater. Hydraulic dispersion through aquifer movement, adsorption on soil particles, and biodegradation will be the main attenuation processes. Surficial aquifer conditions will be periodically monitored to ensure contaminant concentrations are being adequately reduced through natural processes. Implementation of this component of the remedy commenced in 2013; however, an annual monitoring report has not yet been completed.

3.4.2.2 Excavation and Off-Site Disposal of Contamination

The OU2 ROD specified removal and off-site disposal of soil impacted by the COCs to reduce the direct exposure potential at the site such that the average soil contaminant concentrations based on the 95 percent upper confidence limit meet their state of Florida industrial direct exposure SCTLs. The combined areas of contaminated soil that will be evaluated by supplemental sampling and analysis to determine the 95 percent upper confidence limit concentrations for excavation covers approximately 246,400 square feet. Excavations will be advanced to a depth of approximately 2 feet bls. In the ROD it was estimated that the maximum volume of soil to be excavated and disposed was18,250 cubic yards. The ROD also indicated that the excavation limits and estimated maximum volume of soil to be excavated and disposed of may change based on criteria for additional samples needed to determine excavation limits as part of the Remedial Design.

During remedy implementation, several contaminated soil hotspots areas at Site 12 and Site 26 that were previously slated for soil removal were found to have underground utilities that precluded their excavation, but were found to be covered with asphalt or concrete pavement. Because the pavement provided protectiveness against both direct exposure and leaching to groundwater, at these localized hotspot areas, the NAS Pensacola Partnering Team agreed that no soil removals are necessary at hotspot locations with pavement and instead a LUC will be implemented at the location. The change in remedy will be documented in the forthcoming ROD Amendment and specific language related to the maintenance of the covers as engineering controls will be included in the ROD Amendment. The decision to leave in place contaminated soil hotspot areas that are covered with asphalt and implement a LUC has further reduced the estimated volume of soil removal required at OU2.

The quantity of soils removed from OU2 to date includes 1,149 cubic yards of soil impacted with Radium-226 and 70 cubic yards of soil removed due to chemical constituents. With additional refinement and

evaluation of residual soil and groundwater contamination in the remaining soil hotspots at Site 30 and Site 12 and the proposed change in the remedy at Site 11 from soil removals to enhancement of the existing soil cover, the estimate of 2.712 cubic yards of excavated soil indicated in the Final Remedial Design for OU2 currently appears to be a good estimate.

3.4.2.3 Land Use Controls

The OU2 ROD specified that following soil excavation, LUCs will be implemented for soil and groundwater. Following soil excavation, soil and groundwater contamination will remain at OU2 at concentrations that preclude UU and UE; therefore, the remedy includes LUCs to prevent unacceptable risk due to exposure to the COCs remaining in soil above residential direct exposure criteria and groundwater. The OU2 LUC boundaries are shown on Figures 3-1 and 3-2. Consistent with the RAOs developed for the OU, the specific performance objectives for the LUCs implemented at OU2 are as follows:

- Prohibit reuse of the site for residential uses including, but not limited to, any form of housing, child-care facilities, any kind of school including preschools, elementary schools, and secondary schools, playgrounds, and adult convalescent or nursing care facilities.

- Prohibit the excavation, disturbance, and removal of soil unless prior written approval is obtained from the facility's Environmental Coordinator.

- Prohibit potable uses of groundwater from the surficial aquifer underlying the site, including, but not limited to, drinking, washing, cooking, cleaning, and turf irrigation, without prior written approval from the Navy, USEPA, and FDEP.

- Prevent unacceptable occupational exposure to contaminated groundwater in the surficial aquifer by requiring the use of personal protective equipment (PPE) and monitoring equipment for excavations that may encounter groundwater.

- Maintain the integrity of any existing or future monitoring or remediation system(s).

Any time that part of OU2 is considered for an alternative use, a site approval process will be initiated through the NAS Pensacola Environmental Office. Similarly, for any intrusive activities that are planned within OU2, the Dig Permit process will be initiated through the NAS Pensacola Environmental Coordinator. The restricted area will be delineated and the restriction will be described in the NAS Pensacola Site Management Plan. Enforcement will be achieved through NAS Pensacola's site approval and Dig Permit processes. The site use and Dig Permits must be approved by the NAS Pensacola

Environmental Office before any intrusive or construction activities are performed. Re-evaluation will be required for any change in land use.

The OU2 Final Remedial Design, which included a LUC Remedial Design, was submitted on April 1, 2010 and approved by FDEP on August 30, 2010 and by USEPA on November 1, 2010. The NAS Pensacola Base Master Plan was updated for the LUC boundaries within 14 days of the last approval date and since then annual LUC inspections have occurred.

3.4.3 System O&M at OU2

There is no remedial system at OU2; therefore, there are no costs for system O&M.

3.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

3.5.1 Protectiveness Statements from the Last Review

This is the first Five-Year Review since approval of the ROD in 2008; therefore, no previous protectiveness statement is available.

3.5.2 Status of Recommendations and Follow-up Actions from Last Review

This is the first Five-Year Review since approval of the ROD in 2008; therefore, there are no follow-up actions.

3.6 FIVE-YEAR REVIEW PROCESS

This is the first Five-Year Review for OU2. Members of the NAS Pensacola Partnering Team were notified of the initiation of the Five-Year Review in January 2012. The Five-Year Review was led by Gerald Walker of Tetra Tech, the NAVFAC SE Navy CLEAN Contractor, and included other Tetra Tech staff. Patty Marajh-Whittemore of NAVFAC SE, Greg Campbell of NAS Pensacola Public Works Department, Tim Woolheater of USEPA, David Grabka of FDEP, and Sam Naik of CH2M Hill assisted in the review.

The review included the following components:

- Document Review
- Data Review
- Site Inspection
- Five-Year Review Report development and review

3.6.1 Document Review

This Five-Year Review consisted of a review of relevant documents for OU2 including the ROD and Remedial Design, and applicable federal and state statutes. The source of ARARs for soil and groundwater cleanup at OU2 was also reviewed for changes to the applicable groundwater cleanup standards.

3.6.2 Data Review

Source removal has been implemented but not been completed at Sites 12, 27, or 30. Soil excavation for CERCLA contaminants originally planned for Site 11 will not be conducted due to the discovery of ACM. Finding of ACM as a CERCLA contaminant and the change in the remedy selected in the ROD will be addressed in a ROD Amendment. Groundwater monitoring is being developed.

3.6.3 LUC Inspection

Following completion of the final ROD, LUCs were established in the OU2 Remedial Design finalized April 1, 2010 and implemented May 1, 2010 The Remedial Design specified the institutional controls that are currently in place and include: no reuse of the site for residential uses including, but not limited to, any form of housing, child-care facilities, any kind of school including preschool, elementary schools, and secondary schools, playgrounds, and adult convalescent or nursing facilities; no excavation, disturbance, and removal of soil unless written approval is obtained from the facilities environmental coordinator; no potable uses of groundwater from the surficial aquifer underlying the site, including but limited to drinking, washing, cooking, cleaning, and turf irrigation without prior written approval from the Navy, USEPA, and FDEP; no unacceptable occupational exposure to contaminated groundwater in the surficial aquifer by requiring the use of personal protective equipment (PPE) and monitoring equipment for excavations that may encounter groundwater; and maintain the integrity of any existing or future monitoring or remediation systems.

In addition, current and historic annual LUC inspection forms for OU2 were obtained and reviewed. At the time of the inspection, institutional controls were found to be adequate, and use of groundwater was not observed. Roadways within OU2 appeared adequate and there were no apparent signs of vandalism or trespassing.

3.6.4 Site Inspection and Interviews

Inspections at the site were conducted on May 3, 2012 by Tetra Tech and NAS Pensacola personnel. The purpose of the inspection was to assess the protectiveness of the remedy and condition of the monitoring wells.

Institutional controls that are in place include the restriction of land use, restriction of all groundwater use, prohibition of the excavation of areas with soils containing COCs without prior approval from the NAS Pensacola Environmental Office, prevent occupational exposure to COCs in groundwater in the underlying aquifer by requiring use of PPE and monitoring equipment for excavations that may encounter groundwater, and maintenance of all existing or future monitoring and on-site remedy components. At the time of the inspection, institutional controls were found to be adequate, and use of groundwater was not observed. Roadways within OU2 appeared adequate, and there were no apparent signs of vandalism or trespassing. Existing monitoring wells were accessible and in good condition. During a separate regulatory site visit in 2011, several OU2 monitoring wells were observed to be unlocked or in disrepair. Following the site visit, the Navy completed an immediate inspection of all OU2 monitoring wells and document the security of each of the monitoring wells. Deficiencies were not observed during the site inspection.

An interview was conducted with Greg Campbell, Environmental Engineer for NAS Pensacola, on May 2, 2012. According to the interview, Mr. Campbell indicated he is well informed about the Sites that comprise OU2, the individual activities, and progress, and he was not aware of any community concerns regarding the site or its operation or of any incidents such as vandalism, trespassing or emergency responses at the site. The interview and inspection forms are presented in Appendix C.

Mr. Campbell indicated annual LUC inspections are performed. In addition, complaints, violations, or other incidents related to the site requiring a response by his office have not occurred.

3.6.5 ARAR Level Changes

The following standards were identified as chemical-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- Federal Safe Drinking Water Act MCLs (40 CFR 141.11 – 141.16)
- Safe Drinking Water Act MCLGs (40 CFR 141.50–141.51)
- Florida Groundwater Classes, Standard and Exemptions Chapter 62-520, F.A.C.
- Surface Water Quality Standards Chapter 62- 302.530, F.A.C.
- Drinking Water Standards, Monitoring, and Reporting Chapter 62-550.310(4)(b), F.A.C.
- Contaminant Cleanup Target Levels Chapter 62-777.170(1)(a), (1)(b), and (2)(a), F.A.C. in Tables 1 and 2.
- EPA RSLs (May 2013)

There were no changes in these requirements that affect the protectiveness of the remedy. The cleanup goals on Table 2-33 of the ROD were compared to the SCTLs for soils per Chapter 62-777, F.A.C.; CTLs

for groundwater per Federal Safe Drinking Water Act, Chapter 62-550, F.A.C.; Chapter 62-777, F.A.C.; and Marine Surface Water Cleanup Target Level (MSWCTLs) for surface water and the discharge of surface water to groundwater per Chapter 62-777, F.A.C. and to the Class III Marine Water values per Chapter 62-302, F.A.C. The following differences were noted:

For cadmium, the value for the MSWCTL on Table 2-33 is listed as 9.3 µg/L, but the current version of Table 1 in Chapter 62-777, F.A.C. refers to Chapter 62-302, F.A.C. which gives a value of 8.8 µg/L. This slight difference would not affect the protectiveness of the remedy.

For dieldrin, the SCTL for leachability to groundwater on Table 2-33 of the ROD is listed as 2 milligrams per kilogram (mg/kg); however, the current version of Table 2 in Chapter 62-777, F.A.C. gives a value of 0.002 mg/kg. The Remedial Design was reviewed, and the correct value of 0.002 mg/kg was used in the design. Therefore, this does not affect the protectiveness of the remedy.

For zinc, the leachability to groundwater SCTL on Table 2-33 of the ROD is listed as 6,000 mg/kg; however, the current version of Table 2 in Chapter 62-777, F.A.C. notes that the leachability to groundwater value may be derived using the Synthetic Precipitation Leaching Procedure (SPLP) Test to calculate a site-specific SCTL. The FS (Ensafe, 2005c) was based on the 6,000 mg/kg value and no site-specific value was calculated. Although zinc was detected in OU2 groundwater it was not identified in the RI (EnSafe, 1997a) as a COC in groundwater because it did not exceed its federal or state GCTL; therefore, it is unlikely that zinc is migrating from the soil to groundwater at sufficient concentrations to adversely affect the groundwater. Therefore, this does not affect the protectiveness of the remedy.

To the extent that there are new PCB regulations that qualify as an ARAR, then the regulations will be evaluated as part of the ROD Amendment."

There were no location-specific ARARs for this remedy.

The following standards were identified as action-specific ARARs for OU2:

- RCRA Identification of Hazardous Waste (40 CFR 261.11 and 264.13(a)(1))
- RCRA Land Disposal Restrictions (LDRs)(40 CFR 268.49)
- Florida General Pollutant Emission Limitation Standards Chapter 62-296.320, F.A.C.
- Florida Water Well Permitting and Construction Requirements Chapter 62-532.500, F.A.C.
- Florida Hazardous Waste – Requirements for Remedial Action Chapter 62-730.225 (3), F.A.C.
- Florida Natural Attenuation with Monitoring Regulation Chapter 62-780.690(8)(a) thru (c), F.A.C.

The soil removal component of the remedy has been implemented, but not been completed so construction completion reports or similar documents are not available for review. Thus, compliance with

RCRA, Florida General Pollution, Florida Well Permitting, and Florida Hazardous Waste regulations cannot be fully evaluated; however, there is no available evidence to indicate that action standards have not been complied with during the soil removal.

The LTM Plan was included in the Remedial Design and was prepared according to Florida Natural Attenuation with Monitoring Regulation Chapter 62-780.690(8)(a) thru (c), F.A.C.

The sections covering General Provisions for Water Well Permitting and Construction and Abandonment of Water Wells in 62-532, F.A.C. were repealed October 7, 2010. Monitoring well installation and abandonment are now addressed in the FDEP Monitoring Well Design and Construction Guidance Manual, 2008.

3.7 TECHNICAL ASSESSMENT

3.7.1 Question A: Is the remedy functioning as intended by the ROD?

It is recommended that the remedy at Site 11 be changed due to the discovery of ACM. A ROD Amendment is planned for completion in calendar year 2013. Soil cover will be used in place of contaminated soil excavation. LTM for groundwater has commenced. LUCs to restrict intrusive activities are in place and appear to be adequate based on the site inspection. However, as an added measure of protectiveness, a LUC specifying that the soil cover of a minimum thickness of 2 feet be maintained should be added.

The remedy at Site 12 has been partially implemented. Contaminated soil excavation for radiological constituents occurred during 2010 and 2012. LTM for groundwater has commenced during 2013. LUCs are in place and are adequate based on site inspection.

Contaminated soil excavation has been completed in unpaved areas at Site 25. LTM for groundwater has commenced during 2013. LUCs are in place and appear to be adequate based on site inspection.

No contaminated soil excavation was required at Site 26. LTM for groundwater has commenced during 2013. LUCs are in place and appear to be adequate based on site inspection.

The remedy at Site 27 has been partially implemented. Contaminated soil excavation has been completed in unpaved areas. Additional soil removal to remediate radiological contamination is dependent on results of future RASO investigations of the former Building 709 drain and sewer lines, which are ongoing as of October 2012. LTM for groundwater has commenced during 2013. LUCs are in place and appear to be adequate based on site inspection.

RASO completed a radiation survey of Site 30 excavation areas A through F in 2011. Soil excavation will be completed after RASO investigation results are evaluated for presence of radiological constituents.

LTM for groundwater has commenced during 2013. LUCs are in place and appear to be adequate based on site inspection.

Remedial Action Performance: Once fully implemented, the remedy is expected to perform as designed.

Early Indicators of Potential Remedy Failure: None, the source of the contaminants in soil will either be removed or capped and natural attenuation monitoring of groundwater contaminants is to be conducted.

Implementation of Institutional Controls and Other Measures: The Remedial Design was approved by the USEPA in August 2009. Based on the site inspection performed on May 3, 2012, institutional controls have been implemented and are adequate for the site.

The reporting and certification requirements for the LUCs are incorporated into the Land Use Control Assurance Plan (LUCAP) between the Navy, USEPA, and FDEP. In addition, the reporting and certification requirements for the LUCs were further documented by inclusion in the OU2 Remedial Design. OU2 will be available for industrial use, while residential use of the site is prohibited. The Navy performs periodic site inspections to ensure LUCs are properly maintained and administered. Groundwater use is prohibited within OU2. The Navy conducts annual reviews of the institutional controls to certify whether the LUCs should remain in place or be modified to reflect a change in site conditions.

Part of the remedy described in the ROD (2008) includes a Groundwater/Surface Water Interface (GSI) investigation. The purpose of the GSI investigation is to assess whether Sites 11 or 30 are exerting an adverse impact on surface water in the wetlands downgradient of these two sites. As per the ROD, the GSI will be completed in two phases. Phase I will be an investigation of groundwater contamination at Sites 11 and 30 and installation of nested monitoring wells. Based on Phase I results, the Phase II GSI will be conducted in areas of groundwater discharge into Wetlands 5A, 7, and 64. The information gained from this GSI investigation may be used to optimize the extent of the areas which would require LUCs and provide additional information on the selected remedial alternative. The UFP-SAP for the GSI is currently being prepared.

3.7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Exposure Assumptions:

- There have been minor changes in the physical conditions of the site; however, these will not affect the protectiveness of the remedy.
- There have been minor changes in the cleanup levels and list of COCs that will be addressed in the ROD amendment.

Changes to Standards and To Be Considered: The ARARs and TBCs considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. The cleanup goals in the ROD were compared to the current SCTLs for soil, CTLs for groundwater, and MSWCTLs for surface water and groundwater discharging to surface water. No changes in the standards were identified; however, as noted above, several differences were noted. These differences do not affect the protectiveness of the remedy.

Because the soil remedial action is not complete, the action-specific ARARs that relate to the soil remediation component could not be evaluated. The LTM Plan was prepared according to the action-specific ARAR for LTM Plans.

Florida groundwater regulations Chapter 62-550, F.A.C. and Chapter 62-777, F.A.C. have performance criteria that are equal to or lower than the Federal Safe Drinking Water Act of 1974 (amended in 1986 and 1996), and therefore are adequate to assess whether the remedies are functioning as intended because the lower of the state or federal performance criteria are used.

Changes in Exposure Pathways: No changes in the site conditions or land use that affect exposure pathways were identified as part of the five-year review. Exposure to the site groundwater is still restricted by the LUCs. However, the presence of chlorinated hydrocarbons in groundwater at OU2 renders vapor intrusion a potential migration and exposure pathway.

OU2 (comprised of Sites 11, 12, 25, 26, 27, and 30) has VOCs in groundwater greater than GCTLs. Numerous buildings exist within this highly developed area and some of those buildings are within 100 feet of the plume. Hence, the vapor intrusion pathway needs to be evaluated for OU2 in the Five-Year Review. Chlorinated VOCs and benzene were detected in the shallow wells at Site 11 (Table 3-4) at concentrations exceeding GCTLs. Chlorinated VOCs, xylene, and naphthalene were detected in the shallow wells at Sites 12, 25, 26, and 27 (evaluated as a group, these sites are located in close proximity to one another) (Table 3-5) at concentrations exceeding the GCTLs. Ethylbenzene, xylene, and naphthalene were detected in the in the shallow wells at Site 30 (Table 3-6) at concentrations exceeding the GCTLs. As summarized in Tables 3-4, 3-5, and 3-6, the February 2004 version of the Johnson-Ettinger Model was used to predict indoor air concentrations for the following scenarios:

- Maximum VOC concentrations detected in the shallow groundwater zone (2013 data). Industrial/commercial exposure assumed. Default building dimensions used in analysis.

- Maximum VOC concentrations detected in the shallow groundwater zone (2013 data). Residential exposure assumed. Default building dimensions used in analysis.

TABLE 3-4
JOHNSON AND ETTINGER MODEL PREDICTED INDOOR AIR CONCENTRATIONS COMPARED TO EPA REGIONAL SCREENING LEVELS
SITE 11 - OPERABLE UNIT 2
NAS PENSACOLA
PENSACOLA, FLORIDA

Scenario	1,1-Dichloroethene			Benzene			cis-1,2-Dichloroethene			Ethylbenzene		
	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1][2]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]
Industrial - Well 11GS52 - Site-Specific[3]	0.99	0.13	880 N	NA	NA	NA	145	2.6	260 N	NA	NA	NA
Industrial - Well 11GS52 - Default[4]		0.16	880 N	NA	NA	NA		3.1	260 N	NA	NA	NA
Industrial - Shallow Zone - Entire Plume - Default[4]	0.99	0.15	880 N	4	0.13	1.6 C	145	3.0	260 N	0.67	0.026	4.9 C
						130 N						4400 N
Residential - Shallow Zone - Entire Plume - Default[4]		1.2	210 N		1.0	**0.31 C**		23.7	63 N		0.20	0.97 C
						31 N						1000 N

Scenario	Tetrachloroethene			Trichloroethene			Total Xylenes			Vinyl Chloride		
	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]
Industrial - Well 11GS52 - Site-Specific[3]	0.69	0.053	47 C	8.8	0.41	3.0 C	NA	NA	NA	1.7	0.27	2.8 C
			180 N			8.8 N						440 N
Industrial - Well 11GS52 - Default[4]		0.063	47 C		0.49	3.0 C	NA	NA	NA		0.33	2.8 C
			180 N			8.8 N						440 N
Industrial - Shallow Zone - Entire Plume - Default[4]	0.69	0.060	47 C	8.8	0.47	3.0 C	17.2	0.49	440 N	1.7	0.32	2.8 C
			180 N			8.8 N						440 N
Residential - Shallow Zone - Entire Plume - Default[4]		0.48	9.4 C		3.8	**0.43 C**		3.9	100 N		2.5	**0.16 C**
			42 N			**2.1 N**						100 N

1 - USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2013. [Cancer benchmark value = 1E-06, hazard quotient (HQ) = 1].
2 - RSLs for trans-1,2-dichloroethene were used as surrogate criteria for cis-1,2-dichloroethene.
3 - Site-specific building dimensions of 45 feet long, 100 feet wide, and 8 feet high were assumed.
4 - Default building dimensions were assumed.

Shaded criteria indicate that the predicted indoor air concentration exceeds that criteria.

C = Carcinogen
N = Noncarcinogen
NA = Not Applicable/Not Available

TABLE 3-5
JOHNSON AND ETTINGER MODEL PREDICTED INDOOR AIR CONCENTRATIONS COMPARED TO EPA REGIONAL SCREENING LEVELS
SITES 12, 25, 26, AND 27 - OPERABLE UNIT 2
NAS PENSACOLA
PENSACOLA, FLORIDA

Scenario	1,1-Dichloroethane			1,4-Dichlorobenzene			cis-1,2-Dichloroethene			Ethylbenzene			Naphthalene		
	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1][2]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]
Industrial - Well 27GS19 - Site-Specific[3]	NA	NA	NA	NA	NA	NA	33.8	0.33	260 N	13.3	0.24	4.9 C	41.4	0.038	0.36 C
												4400 N			13 N
Industrial - Well 27GS19 - Default[4]		NA	NA		NA	NA		0.43	260 N		0.32	4.9 C		0.049	0.36 C
												4400 N			13 N
Industrial - Shallow Zone - Entire Plume - Default[4]	3.4	0.064	7.7 C	1	0.0071	1.1 C	33.8	0.46	260 N	13.3	0.34	4.9 C	41.4	0.052	0.36 C
						3500 N						4400 N			13 N
Residential - Shallow Zone - Entire Plume - Default[4]		0.52	1.5 C		0.057	0.22 C		3.7	63 N		2.7	**0.97 C**		0.41	**0.072 C**
						830 N						1000 N			3.1 N

Scenario	Tetrachloroethene			Trichloroethene			Total Xylenes			Vinyl Chloride		
	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]
Industrial - Well 27GS19 - Site-Specific[3]	0.7	0.029	47 C	NA	NA	NA	102	1.4	440 N	6.4	0.55	2.8 C
			180 N									440 N
Industrial - Well 27GS19 - Default[4]		0.038	47 C	NA	NA	NA		1.8	440 N		0.78	2.8 C
			180 N									440 N
Industrial - Shallow Zone - Entire Plume - Default[4]	0.97	0.056	47 C	0.25	0.0090	3.0 C	102	1.9	440 N	6.4	0.82	2.8 C
			180 N			8.8 N						440 N
Residential - Shallow Zone - Entire Plume - Default[4]		0.45	9.4 C		0.072	0.43 C		15.6	100 N		6.6	**0.16 C**
			42 N			2.1 N						100 N

1 - USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2013. [Cancer benchmark value = 1E-06, hazard quotient (HQ) = 1].
2 - RSLs for trans-1,2-dichloroethene were used as surrogate criteria for cis-1,2-dichloroethene.
3 - Site-specific building dimensions of 100 feet long, 120 feet wide, and 8 feet high were assumed.
4 - Default building dimensions were assumed.

Shaded criteria indicate that the predicted indoor air concentration exceeds that criteria.

C = Carcinogen
N = Noncarcinogen
NA = Not Applicable/Not Available

TABLE 3-6
JOHNSON AND ETTINGER MODEL PREDICTED INDOOR AIR CONCENTRATIONS COMPARED TO EPA REGIONAL SCREENING LEVELS
SITE 30 - OPERABLE UNIT 2
NAS PENSACOLA
PENSACOLA, FLORIDA

Scenario	1,1,1-Trichloroethane			1,1-Dichloroethane			1,4-Dichlorobenzene			Chlorobenzene			Chloroform			cis-1,2-Dichloroethene		
	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1][2]
Industrial - Well 30GS06 - Site-Specific[3]	NA	NA	NA	NA	NA	NA	8.6	0.045	1.1 C	NA	NA	NA	NA	NA	NA	NA	NA	NA
									3500 N									
Industrial - Well 30GS06 - Default[4]		NA	NA		NA	NA		0.061	1.1 C		NA	NA		NA	NA		NA	NA
									3500 N									
Industrial - Shallow Zone - Entire Plume - Default[4]	0.53	0.034	22000 N	6.3	0.13	7.7 C	8.6	0.065	1.1 C	0.53	0.0067	220 N	2	0.035	0.53 C	9	0.13	260 N
									3500 N						430 N			
Residential - Shallow Zone - Entire Plume - Default[4]		0.27	5200 N		1.0	1.5 C		0.52	**0.22 C**		0.053	52 N		0.28	**0.11 C**		1.0	63 N
									830 N						100 N			

Scenario	Ethylbenzene			Naphthalene			Tetrachloroethene			Trichloroethene			Total Xylenes		
	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]	Groundwater Concentration (µg/L)	Predicted Indoor Air Concentration (µg/m^3)	Corresponding RSL (µg/m^3)[1]
Industrial - Well 30GS06 - Site-Specific[3]	276	5.1	**4.9 C**	94.7	0.090	0.36 C	0.88	0.038	47 C	NA	NA	NA	435	5.8	440 N
			4400 N			13 N			180 N						
Industrial - Well 30GS06 - Default[4]		7.1	**4.9 C**		0.12	0.36 C		0.051	47 C		NA	NA		8.3	440 N
			4400 N			13 N			180 N						
Industrial - Shallow Zone - Entire Plume - Default[4]	276	7.5	**4.9 C**	94.7	0.13	0.36 C	1.7	0.11	47 C	0.25	0.010	3.0 C	435	8.8	440 N
			4400 N			13 N			180 N			8.8 N			
Residential - Shallow Zone - Entire Plume - Default[4]		60.1	**0.97 C**		1.0	**0.072 C**		0.84	9.4 C		0.076	0.43 C		70.6	100 N
			1000 N			3.1 N			42 N			2.1 N			

1 - USEPA Regional Screening Levels (RSLs) for Chemical Contaminants at Superfund Sites, May 2013. [Cancer benchmark value = 1E-06, hazard quotient (HQ) = 1].
2 - RSLs for trans-1,2-dichloroethene were used as surrogate criteria for cis-1,2-dichloroethene.
3 - Site-specific building dimensions of 90 feet long, 180 feet wide, and 8 feet high were assumed.
4 - Default building dimensions were assumed.

Shaded criteria indicate that the predicted indoor air concentration exceeds that criteria.

C = Carcinogen
N = Noncarcinogen
NA = Not Applicable/Not Available

- Maximum VOC concentrations detected at Wells 11GS52, 27GS19, and 30GS06 (located in the general vicinity of Buildings 467, 741, and 2691, respectively; see Figures 3-1 and 3-2) (2013 data). Industrial/commercial exposure assumed. Site-specific building dimensions used in the analysis. These wells/buildings were selected for additional analysis because they are among the smaller building with in the study areas and shallow wells (with 2013 data) are located in the general vicinity of these buildings (see Figures 3-1 and 3-2).

- Maximum VOC concentrations detected at Wells 11GS52, 27GS19, and 30GS06 (located in the general vicinity of Buildings 467, 741, and 2691, respectively) (2013 data). Industrial/commercial exposure assumed. Default building dimensions used in the analysis.

The groundwater concentrations used in the model are specified in Tables 3-4, 3-5, and 3-6. Site-specific data, where available, served as inputs for the Johnson-Ettinger model. Those applicable to both residential and industrial exposures included:

- Average Soil/Groundwater Temperature: 22°C [User's Guide temperature for Pensacola, Florida]
- Depth below grade to bottom of enclosed space floor: 15 cm (slab-on-grade) [default]
- Depth below grade to water table: 152 cm (5 feet) for Site 11; 488 cm (16 feet) for Sites 12, 25, 26, and 27; 427 cm (14 feet) for Site 30. For the well-specific analyses for Wells 11GS52, 27GS19, and 30GS06, well-specific depths to groundwater of 152 cm (5 feet), 549 cm (18 feet), and 488 cm (16 feet), respectively, were used as model input values.
- SCS soil type: Sand (S) [site-specific]
- Soil dry bulk density: 1.66 g/cm^3 [default value for sand]
- Soil total porosity: 0.375 [default value for sand]
- Soil water-filled porosity: 0.054 [default value for sand]

For industrial exposures, the building dimensions are:

- For Site 11: 45 feet (1372 cm) long, 100 feet (3048 cm) wide, and 8 feet (244 cm) high. (Building 467 located to the south of Site 11.)
- For Sites 12, 25, 26, and 27: 100 feet (3048 cm) long, 120 feet (3658 cm) wide, and 8 feet (244 cm) high. (Building 741 located in the eastern part of Site 27.)
- For Site 30: 90 feet (2743 cm) long, 180 feet (5486 cm) wide, and 8 feet (244 cm) high. (Building 2691 located in the southwestern part of Site 30.)
- 1000 cm (length) x 1000 cm (width) x 224 cm (height) (equivalent to default residential dimensions to account for a hypothetical office setting within the site).

For residential exposures, the building dimensions were the default values:

- 1,000 cm (length) x 1,000 cm (width) x 224 cm (height)

For industrial exposures, the air exchange rate was assumed to be 2/hr. (professional judgment). For residential exposure, the air exchange rate was the default value of 0.25/hr.

Tables 3-4, 3-5, and 3-6 present a comparison of the predicted indoor air concentrations to USEPA RSL for residential and industrial exposure (i.e., a current site building and area equivalent to a residence to represent office space). For residential exposure, the predicted indoor air concentrations of several VOCs exceed their corresponding residential RSLs; therefore, the risks associated with residential exposure are expected to exceed the target risk levels. The Five-Year Review should be updated to reflect these risk assessment results. However, groundwater and soil LUCs already exist for OU2 prohibiting groundwater use or residential land use.

With the exception of ethylbenzene at Site 30, the predicted indoor air concentrations of all VOCs are less than their corresponding industrial RSLs; therefore, the risks associated with industrial exposure (other than to ethylbenzene) are expected to be less than target risk levels (1×10^{-6} for cancer risk and 1 for a hazard index) for individual chemicals. The predicted indoor air concentration for ethylbenzene does exceed the industrial RSL based on the Johnson-Ettinger Model. However, ethylbenzene was only detected (276 µg/L) in one Site 30 shallow monitoring well (30GS06) (located in the general vicinity of Building 2691;see Figure 3-2). Based on the recent groundwater monitoring data, the contaminant does not appear to be distributed widely across the study area at concentrations exceeding GCTLs (in the shallow zone). Consequently, the potential for vapor intrusion to be significant is likely limited. In addition ethylbenzene biodegrades aerobically and is a common VOC present in petroleum products. USEPA guidance document “Guidance for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tanks Sites, Draft External Review Document, April 2013 indicates for “dissolved petroleum hydrocarbons sources that are separated from overlying buildings by more than 6 feet of clean, biologically active soil, the potential threat of petroleum vapor intrusion is negligible and further investigation for petroleum vapor intrusion is generally unnecessary”. The depth to groundwater for Site 30 is approximately 14 feet, which is more than 2 times the vertical separation distance; consequently, the potential for vapor intrusion to be significant is unlikely. Therefore, additional investigation of the potential for vapor intrusion in the area of monitoring well 30GS06 is not necessary. The risk calculation worksheets are provided in Appendix K.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes to the human health toxicity criteria for trichloroethene. However, these changes would not impact the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

3.7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Asbestos and radium contamination have been identified at OU2 since the completion of the ROD. In addition, the USEPA has challenged the FDEP SPLP analysis process and there is new guidance on addressing potential vapor intrusion issues. Should issues arise from the SPLP evaluation, they will be addressed appropriately within the CERCLA process.

3.8 ISSUES

Issues were discovered during the Five-Year Review and are noted in Table 3-7.

TABLE 3-7
OU2 ISSUES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

	Issues	Affects Protectiveness (Y/N)	
		Current	Future
1	Asbestos and Radium-226 were not identified in the OU2 ROD	N	Y
2	There are minor changes to the ARARs and the ARARs did not include federal standards	N	N
3	Delays in initiation of the groundwater LTM program	N	Y
4	Issues that may arise from SPLP evaluations will be addressed appropriately within the CERCLA process	N	Y

3.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

A ROD Amendment is necessary to address: the change in remedy at OU2, the discovery of ACM, and the excavation of radiologically impacted soils (Table 3-8).

TABLE 3-8
OU2 RECOMMENDATIONS AND FOLLOW-UP ACTIONS
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Complete ROD Amendment	Navy	USEPA & FDEP	January 27, 2014	N	Y
2	Initiate the groundwater LTM program	Navy	USEPA & FDEP	March 2013	N	Y
3	Review all remedial activities for any issues that may arise from SPLP evaluations	Navy	USEPA & FDEP	January 27, 2014	N	Y

In addition, the Navy has agreed that future wetlands investigation and remedial actions for OU2 will be removed from OU16, the Combined Wetlands Operable Unit and returned to the original OU2.

3.10 PROTECTIVENESS STATEMENT

The remedy at OU2 currently protects human health and the environment because it prevents residential development of the site, soil removal actions have eliminated risk due to soil contamination in excess of industrial criteria at Sites 25 and 27, and the restriction on groundwater use eliminates the exposure to contaminated groundwater. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure long-term protectiveness: amend the ROD to address the change in remedy at OU2 due to discovery of ACM, the presence of radiologically impacted soils, and to address changes in ARARs including the addition of Federal Standards; initiate the groundwater LTM Program (initiated March 2013); and review all remedial activities for any issues that may arise from SPLP evaluations which will be addressed appropriately within the CERCLA process..

4.0 OPERABLE UNIT 3

The OU3 "No Action" ROD was issued by the Navy and USEPA on September 30, 2005. FDEP concurred with the ROD on September 15, 2005. This Five-Year Review consists of an approximate five-year period of data and provides a status update for OU3, Site 2 – Waterfront Sediments.

This statutory review is required because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

4.1 SITE CHRONOLOGY

A list of important OU3 historical events and relevant dates in the site chronology is shown in Table 4-1.

TABLE 4-1
OU3 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Numerous investigations conducted in and around the Pensacola Bay System to monitor the ecological health of the bay and determine the impact of commercial, industrial, and municipal activities	Early 1950's
Early environmental studies of Site 2 were conducted under the direction of the Navy Assessment and Control of Installation Pollutants Department (NEESA, 1983). Sediment samples collected and analyzed using Extraction Procedure toxicity methods showed elevated concentrations of lead and chromium	1983
Thompson Engineering and Testing, Inc. sediments study in the area of Site 2 showed grain-size variation from sandy silt/clayey silt with sand on the northeastern side of the turning basin, to fine sands/fine sands with silts on the southwestern side	1984
Geraghty and Miller, Inc. conducted a verification and characterization study at Site 2. Six samples were collected approximately 300 feet offshore from the storm-sewer outfalls, in about 30 feet of water	1984
The Navy conducted an environmental impact statement study	1986
Collard (EnSafe, 2005b) summarized the environmental-biological history of the Pensacola Bay System, documenting published as well as previously unpublished data from numerous studies conducted from the 1950s to the present	1991
EnSafe Inc. completed an RI for Site 2	1996
FS completed	October 1997
Proposed Plan issued for public comment	December 1997
EnSafe Inc. completed an RI Addendum for Site 2	March 2004

TABLE 4-1
OU3 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Focused Feasibility Study	October 2004
Revised Proposed Plan issued for public comment	July 2005
ROD issued	September 2005

4.2 BACKGROUND

4.2.1 Physical Characteristics of OU3

Operable Unit 3 (Site 2) is on the southeastern shoreline of NAS Pensacola, along the Pensacola Bay waterfront, as shown on Figure 4-1. This site is an approximate 1,800-foot by 1,400-foot area of nearshore sediments along the southeast waterfront area, where numerous active storm water and inactive industrial waste sewer outfalls exist. The near shore sediments typically consist of fine- to medium-grained sand, silty sand and silty clays. A band of fine-grained sediment (clayey, silty sands to silty clays) extends from the shoreline to approximately 200 to 400 feet offshore. Water depths range from 3 to 27 feet. The hydrodynamic regime is characterized by tides (typically a 2 foot range), tidal currents and waves.

All industrial waste outfalls have been inactive since 1973. The southeast waterfront is dominated by a protective concrete seawall with several seaplane ramps, and is adjacent to a large paved parking apron. The approximate 3- to 4-foot high seawall rests on a concrete platform. Fifty-six outfalls, ranging in diameter from 1- inch to 42-inches, were previously identified along the seawall (E&E, 1991). The seawall also contains numerous scuppers to drain surface water runoff from the adjacent parking areas.

In the past, many of the outfalls discharged untreated industrial wastes into Pensacola Bay. This occurred from 1939 to 1973, after which NAS Pensacola's industrial waste-stream was diverted to the IWTP. Contaminants that sorbed to sediments potentially posed excess unacceptable risk to the benthic community and the predatory animals feeding upon them. Surface soils at NAS Pensacola along the shoreline of OU3 are primarily highly permeable sands, which limit stream formation. The depth to groundwater at NAS Pensacola ranges from less than 1 foot to approximately 20 feet bls, depending on land surface elevation and proximity to surface water bodies.

P:\NUS\112G02722\GIS\maps\5yrFormatted\AP_5yearReviewOU3Site2.mxd [alex.montalvo 10/30/2012]

DRAWN BY: GIS	DATE: 10/30/2012	SITE MAP - OPERABLE UNIT 3 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00390 / CTO NUMBER: 0030
CHECKED BY: A.I.	DATE: 10/30/2012		APPROVED BY: ___ / DATE: ___
REVISED BY:	DATE:		APPROVED BY: ___ / DATE: ___
SCALE: AS NOTED			FIGURE NO.: 4 - 1 / REV: 0

NAVFAC

4.2.2 Land and Resource Use at OU3

Boat maintenance, refueling services, surface water runoff, routine application of pesticides draining to the Site 2 area, and off-site bay activities (e.g., boat traffic, non-point source sediment drift) will continue to occur in the Pensacola Bay area near the NAS Pensacola shoreline.

Future land use at NAS Pensacola is expected to remain military oriented and under the control of the Navy. Homeland Security Restrictions are in place and prohibit unauthorized boat traffic within 500 feet of the shoreline.

Groundwater is not currently used as a potable water source at NAS Pensacola. The main source of potable water for NAS Pensacola is the Navy-owned well field located at Naval Technical Training Center (NTTC) Corry Station, which is located approximately three miles north of NAS Pensacola on the northern (opposite) side of Bayou Grande.

4.3 HISTORY OF CONTAMINATION AT OU3

From 1939 to 1973, untreated industrial wastes from NADEP and Naval Air Rework Facilities were discharged into the Pensacola Bay System at OU3. During that 34-year time span, an estimated 83 million gallons of the following materials were disposed of into the bay: waste-containing paint, paint solvents, thinners, ketones, trichloroethylene, Alodine®, mercury, and concentrated plating wastes (primarily chromium, cadmium, lead, nickel, and cyanide [Geraghty and Miller, 1984]). All industrial waste outfalls have been inactive since 1973, and the wastes were diverted to the IWTP. Due to the transport mechanism characteristic of Pensacola Bay, it is also possible that off-site sources may have affected the site because of the sediment transport mechanisms of an open bay system such as Pensacola Bay (NWFWMD, 2002). In addition, contaminated groundwater from adjacent OU11, Site 38 flows toward Pensacola Bay in the OU3 area.

4.3.1 Initial Investigation for OU3

Investigation at OU3 occurred from 1993 to 1996. Investigations included a Phase I sampling event to determine total organic carbon (TOC) and grain-size distribution in sediments and a Phase II sampling event to assess contamination.

TOC values ranged from less than 0.001 to 0.22 percent. There was no correlation between the TOC and fine grained sediment. Cadmium, copper, lead and zinc appeared to be elevated when compared to natural concentrations. Organic compounds included polynuclear aromatic hydrocarbons (PAHs), pesticides and PCBs that appeared to have a limited lateral distribution.

The human health risk and hazard associated with exposure to Site 2 environmental media were assessed for the hypothetical current and future (combined) child and current and future (combined) adult recreationists crabbing exclusively at Site 2. Based on the Site 2 exposure scenarios, an incremental lifetime cancer risk (ILCR) of $3x10^{-6}$, primarily due to heptachlor epoxide, was identified on site. The risk estimate is within the USEPA acceptable risk range of $1x10^{-4}$ to $1x10^{-6}$, but is slightly above the Florida acceptable risk threshold level of $1x10^{-6}$. The calculations are based on the maximum detected concentration in the edible tissue. If the arithmetic average concentration was used, the Florida $1x10^{-6}$ risk threshold would not be exceeded. Hazard indices (HIs) of 0.7 and 0.2 were calculated for child and adult exposure to Site 2 tissues. No COCs were identified.

Effects to marine biota may have occurred as a result of the contaminants present in sediment at some of the sampling locations. At these locations, benthic assemblages appeared to have been altered as a result of high chemical concentrations, but the limited spatial extent of the affects may be imperceptible when a bay-wide perspective is considered relative to hydraulic movement of sediment.

Based on results of the OU3 RI, the presence of a source for metals and organics and the physical state of the near shore environment (saline surface water, presence of humic substances, and clay minerals) provides for the accumulation of contaminants; however, only “hot spots” were identified and the extent of contamination was delineated.

An FS was completed in 1997 to evaluate four remedial alternatives (no action, monitoring, capping, and dredging). Monitoring was selected as the preferred alternative. One public comment was received, requesting a remedial action or nothing be done, rather than monitoring. After deliberation, the USEPA, FDEP, National Oceanic and Atmospheric Administration, and the Navy agreed to perform additional assessment because Hurricane Georges affected the area in the years following the initial sampling event.

An additional RI was performed in March 2000 to determine whether chemical constituents at Site 2 create adverse conditions for benthic communities. Data from the additional RI indicate that benthic communities in the near shore environment have been adversely affected by Site 2 sediments that contain metals and SVOCs similar to those found in shoreline groundwater. Bioassays indicated that toxic chemicals are probably stressing the ecological system at two 150-foot by 150-foot areas. One area (DU08) is located approximately 160 feet from the seawall and another area is adjacent to the seawall near Port Operations (DU11).

The estimated volume of contamination at the two areas, assuming a 1-foot depth, was 1,667 cubic yards. It was recommended in the Final RI Report Addendum that a FS be conducted to determine the most appropriate method for addressing the sediment.

A Focused FS Addendum that evaluated four remedial alternatives (no action, monitoring, capping, and dredging with off-site disposal) for the site was completed in October 2004. This report addressed sediment within the two 150-foot by 150-foot areas identified as having adverse effects in the 2004 RI Addendum. The Proposed Plan for the site stated that no action was the preferred alternative, and a public comment period was held from July 1, 2005 to August 14, 2005. No comments were received from the public on the Proposed Plan.

4.3.2 Basis for No Action at OU3

In 1996, an RI was conducted to identify the nature and extent of contaminants in surface waters and sediments, and the influence of groundwater, as a result of past disposal practices from the shore-based facilities (EnSafe, 1996b). The Focused FS evaluated the RI, the baseline risk assessment, and the ecological risk assessment to develop preliminary remedial goals (PRGs) for OU3. The baseline risk assessment did not identify any unacceptable risk to human health, but did identify that the sediments posed an unacceptable risk to benthic organisms at OU3.

Although the ecological risk was identified, a No Action remedy was selected because: contaminants at the two units were limited in area and sediment chemistry and toxicity test results suggesting that toxic chemicals are probably stressing the system, were not confirmed. In addition, the No Action alternative would not disturb the sediments and would allow the attenuation of contaminants through natural biotic or physical processes. If active remediation (e.g., excavation or dredging) were conducted the potential spreading of COCs would present an adverse risk to ecological receptors from the releasing of sediment-bound contaminants into the water column. The existing sediments could also be preventing contaminants in groundwater from infiltrating the surface water column because heavily reduced sediments are typically capable of removing inorganic and organic compounds through binding and reductive processes

4.4 REMEDIAL ACTIONS FOR OU3

No action was selected as the preferred remedial action alternative for OU3.

4.4.1 Remedy Selection at OU3

The ROD for NAS Pensacola OU3 was finalized on September 30, 2005. The selected remedy was no action. The selected remedy poses no risk to current workers and site trespassers, and no additional risk to the ecosystem.

During the RI, the human health risk and hazard associated with exposure to Site 2 environmental media were assessed for the hypothetical current and future (combined) child and current and future (combined) adult recreationists crabbing exclusively at Site 2. The tissue ingestion exposure pathway was selected

as an indicator of potential human health risk. Based on the Site 2 exposure scenarios, an ILCR of $3x10^{-6}$, primarily due to heptachlor epoxide, was identified onsite. The risk estimate is below USEPAs' acceptable risk threshold of $1x10^{-4}$ and is slightly above FDEP's acceptable risk level of $1x10^{-6}$. The calculations are based on the maximum detected concentration in the edible tissue (COCs were not identified from the crab tissue data used to assess excess human health risk for the tissue ingestion pathway). If the arithmetic average concentration was used, the $1x10^{-6}$ risk threshold would not be exceeded. HIs of 0.7 and 0.2 were calculated for child and adult exposure to Site 2 tissues. Therefore, based on this information human health COCs were not identified for Site 2 and a LUC would not be necessary to protect human health. However, at the facility, Homeland Security Restrictions are established for the surface water bodies surrounding NAS Pensacola. Unauthorized boat traffic is prohibited within 500 feet of the NAS Pensacola shoreline. Site 2 is administratively within the restricted area and therefore "controlled."

Data from the OU3 RI indicate that benthic communities in the nearshore environment have been affected. OU3 sediments contained metals and SVOCs similar to those found in shoreline groundwater. VOCs consistent with those found in Site 38 groundwater were not detected in any surface water or sediment samples collected during the OU3 investigation (E/A&H, 1996).

Bioassays completed during the 2000 sampling event indicate toxic chemicals are probably stressing the ecological system at only 2 of the 11 Decision Units (DU; each 150 by 100 feet); DU08 (approximately 160 feet from the seawall) and DU11 (adjacent to the seawall near Port Ops). The two 150-foot by 150-foot DUs contain 1,667 cubic yards of contaminated sediment, assuming a 1-foot depth for contaminant exposure.

The sediments at DU08 were a dark silt with shell fragments, hermit crabs were also present. The sediments are DU11 were silt on top of sand with shell and wood fragments, several worms were present. Sediment samples were collected at depths of 0- to 6-inches at DU08 and 0- to 6-inches and 6- to 36-inches at DU11.

The DUs were found to have high benthic diversity, evenness and richness. Evenness was similar to the reference station and richness exceeded the richness of the reference station. The infaunal amphipod toxicity test for survival, growth and fecundity (ability to produce abundant healthy growth or offspring) were 78% for DU11 and 73% for DU08 and there were no observed effects with epibenthic muysid for survival, growth and fecundity. In addition, DU08 and DU11 outperformed the reference stations for subleathal growth endpoint in the ampbibod test.

The Effects Range-Median (ERM) (MacDonald, 1974), concentration where adverse effects frequently occur, hazard quotient for DU08 was exceeded in the 0- to 6-inch depth sample for acenaphthene, acenaphthylene, naphthalene and 4,4'-DDT.

The ERM hazard quotient for DU11 was exceeded in the 0- to 6-inch depth sample for acenaphthene, acenaphthylene, chrysene, dibenz(a,h)anthracene, arsenic, cadmium, copper, lead, and mercury. The ERM hazard quotient for DU11 was exceeded in the 6- to 36-inch depth sample for anthracene, benzo(a)anthracene, chrysene, dibenz(a,h)anthracene, fluorene, 2-methylnaphthalene, phenanthrene, pyrene, arsenic, copper, lead, and mercury.

The remedial objective for OU3 is to protect the ecological environment where it is determined that toxic chemicals are probably stressing the system. No Action was selected as the remedy for OU3 because: contaminants at the two units were limited in area and sediment chemistry and toxicity test results suggest, but were not confirmed, that toxic chemicals are probably stressing the system. In addition this alternative would not disturb the sediments and would allow the attenuation of contaminants through natural biotic or physical processes. If active remediation (e.g., excavation or dredging) were conducted the potential spreading of COCs would present an adverse risk to ecological receptors from the releasing of sediment-bound contaminants into the water column. The existing sediments could also be preventing contaminants in groundwater from infiltrating the surface water column because heavily reduced sediments are typically capable of removing inorganic and organic compounds through binding and reductive processes.

It is expected the COCs will diminish through natural processes, since the contaminant source ended more than 40 years ago (1973) when the sewer no longer discharged to the bay and was diverted to the NAS Pensacola Industrial Wastewater Treatment Plant. Sediment would remain in place and should attenuate according to natural biotic or physical processes. Therefore, the no action remedy is functioning as intended.

4.4.2 Remedy Implementation at OU3

No action was selected as the preferred remedial action alternative for OU3; therefore, no implementation was necessary.

4.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

4.5.1 Protectiveness Statements from the Last Review

OU3 was not included in the previous Five-Year Review and no action was selected as the preferred remedial action alternative for OU3; therefore, no protectiveness statements exist from the last review.

4.5.2 Status of Recommendations and Follow-up Actions from Last Review

No action was selected as the preferred remedial action alternative for OU3; therefore, no status of recommendations and follow-up actions exist from the last review.

4.6 FIVE-YEAR REVIEW PROCESS

4.6.1 Document Review

Several documents including the RI/FS and ROD and applicable federal and state statutes were reviewed during this Five-Year Review.

4.6.2 Data Review

No remedial actions or monitoring has occurred since the last Five-Year Review.

4.6.3 Site Inspection and Interviews

No action was selected as the preferred remedial action alternative for OU3; therefore, no site inspections or interviews were conducted.

4.6.4 ARAR Level Changes

Because the ROD for OU3 is for No Action, there are no ARARs. Therefore, there were no ARARs to evaluate.

4.7 TECHNICAL ASSESSMENT

4.7.1 Question A: Is the remedy functioning as intended by the ROD?

No action was the selected remedy.

4.7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

No action was the selected remedy.

4.7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No issues have come to light that would call into question the no action remedy.

4.8 ISSUES

The selected "No Action" remedy for OU3 did not contemplate the need for site monitoring to confirm that natural attenuation processes are serving to reduce unacceptable risk to benthic organisms as was found in the aforementioned two isolated DUs. EPA has recently indicated it believes that some form of attenuation monitoring as well as a review of upgradient contaminated sites as potential contributors to further sediment contamination at OU3 need to be undertaken before any protectiveness determination is made. The Navy does not agree, given the bases for the previous No-Action decision, that such monitoring or upgradient site review(s) are needed.

4.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

In light of the concerns raised by EPA during its review of the draft of this Five Year Review, the Navy agrees to defer the protectiveness determination for this OU. The Navy shall work with EPA and FDEP on a path forward to resolve respective agency differences in order to achieve a satisfactory resolution of the matter during CY2014.

4.10 PROTECTIVENESS STATEMENT

The protectiveness determination for OU3 is hereby deferred pending resolution of the aforementioned matters.

5.0 OPERABLE UNIT 4

The OU4 ROD was issued by the Navy and USEPA on September 27, 2000. FDEP concurred with the ROD on September 29, 2000. Implementation of the remedial actions at OU4 began in 2001. This Five-Year Review consists of an approximate five-year period of data and provides a status update for OU4, Site 15 – Area Pesticide Rinsate Disposal.

This Five-Year Review for OU4 is being conducted because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

5.1 SITE CHRONOLOGY FOR OU4

A list of important OU4 historical events and relevant dates in the site chronology is shown in Table 5-1.

TABLE 5-1
OU4 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Fertilizer, Herbicides and Pesticides Stored and Mixed at Golf Course Maintenance Facility	1963 - Present
Verification Study conducted	1984
Characterization Study conducted	1986
Contamination Assessment/RI – Phase I conducted	1991
UST removed from Facility	1993
Contamination Assessment/RI – Phase II conducted	1995
Contamination Assessment/RI – Phase III conducted	1996
Baseline Risk Assessment conducted	1997
ROD issued	September 27, 2000
Baseline Sampling Event	November – December 2001
Initial Remedial Action Conducted – 754 cubic yards of soil removed/disposed	April 26, 2002 – May 6, 2002
1st Semiannual Monitoring Event	June 2002
2nd Semiannual Monitoring Event	January 2003
Groundwater Monitoring Plan	June 25, 2003
Annual Monitoring Report	January 18, 2005
Semiannual Monitoring Report	August 2005
Semiannual Monitoring Report	November 11, 2005

TABLE 5-1
OU4 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Annual Monitoring Report	December 22, 2005
Semiannual Monitoring Report	March 15, 2006
Annual Monitoring Report	November 6, 2006
Semiannual Monitoring Report – Year 2007	January 2008
Semiannual Monitoring Report	April 2008
Five-Year Review	August 2008
Semiannual Monitoring Report	September 2008
Semiannual Monitoring Report	November 2008
Semiannual Monitoring Report	September 2009
Year 2009 first Semiannual Groundwater Monitoring Report	April 2010
Year 2010 Semiannual Groundwater Monitoring Report	June 2010
Year 2010 Semiannual Groundwater Monitoring Report	December 2010
Year 2011 Semiannual Groundwater Monitoring Report	July 2011
Year 2011 Semiannual Groundwater Monitoring Report	February 2012
Year 2012 Annual Groundwater Monitoring Report	June 2012

5.2 BACKGROUND

5.2.1 Physical Characteristics of OU4

OU4, Site 15, is located in the northern portion of NAS Pensacola, as shown on Figure 1-2. Site 15 is accessible from the west by an unpaved road and includes portions of the golf course, the golf course maintenance facilities, three concrete wash-down pads, two asphalt wash-down pads, a former pesticide/drum storage building, a removed UST, equipment storage buildings, and several in-use buildings. The site is surrounded by the golf course on its southern and western sides and Bayou Grande approximately 665 feet to the north.

From 1963 to the present, fertilizer, pesticide, and herbicide materials for application at the golf course have been stored and mixed at the golf course maintenance facility. Application equipment such as tractors, sprayer tanks, and spreaders are also rinsed at the facility's wash-down pads, which are located northeast of Building 2692 and northwest of Building 3447. Prior to the construction of the wash racks,

cleaning the equipment at the asphalt wash-down pad released dilute rinsate solutions directly onto the surrounding ground surface, where the materials infiltrated the soil (Geraghty and Miller, 1984).

In the past, a sink located outside of Building 3586 and a floor drain in a concrete pad north of the building collected pesticide and herbicide residue wastes and discharged them into a UST. The contents were periodically pumped out by a contracted agent before its removal in 1993. The UST was removed in 1993 and the contents of the tank were spread across the ground surface, approximately 200 feet north-northwest of Building 3447 (EnSafe, 1999).

5.2.2 Land and Resource Use at OU4

Site 15 is located within the confines of the NAS Pensacola Golf Course. Surface cover in the vicinity of the site is dirt and/or grass (See Figure 5-1). The site is separated from the golf course by a perimeter border of oak and palm trees. Water hazards associated with the golf course are located 765 feet to the northeast and 425 west from the central part of the site. Bayou Grande is located approximately 665 feet north of the central part of the study area.

Depth to groundwater ranges from 10 to 15 feet bls, depending on precipitation, tidal influence, and ground surface elevation. Storm water management on the site is addressed through direct infiltration into the subsurface through the sandy surficial soil (EnSafe, 1997b).

Groundwater flow generally mimics the peninsular topography (with flow to the northwest, north, and northeast towards Bayou Grande). Groundwater is not currently used as a potable water source at OU4 (CH2M Hill, 2006). The main source of potable water for NAS Pensacola is the Navy-owned well field located at NTTC Corry Station, which is located approximately three miles north of NAS Pensacola on the northern (opposite) side of Bayou Grande.

5.3 HISTORY OF CONTAMINATION AT OU4

Contaminant types identified in soil samples collected at OU4 consisted of metals (particularly arsenic), total recoverable petroleum hydrocarbons (TRPH), VOCs, PAHs, and pesticides. Low concentrations of metals (particularly arsenic) and dieldrin/4,4-dichlorodiphenyldichloroethylene (DDE) were detected in groundwater samples (EnSafe, 1999).

Several inorganic and organic parameters exceeded preliminary remedial goals in soil samples. Based on the magnitude and frequency of the detection, arsenic and dieldrin remained the primary COCs in soil. Arsenic was detected across the extent of the site due to handling of various arsenic-based herbicides and pesticides, such as the common herbicide monosodium methanearsonate. The two areas of greatest surface soil arsenic concentrations were identified as the asphalt pad northwest of Building 2640 and the

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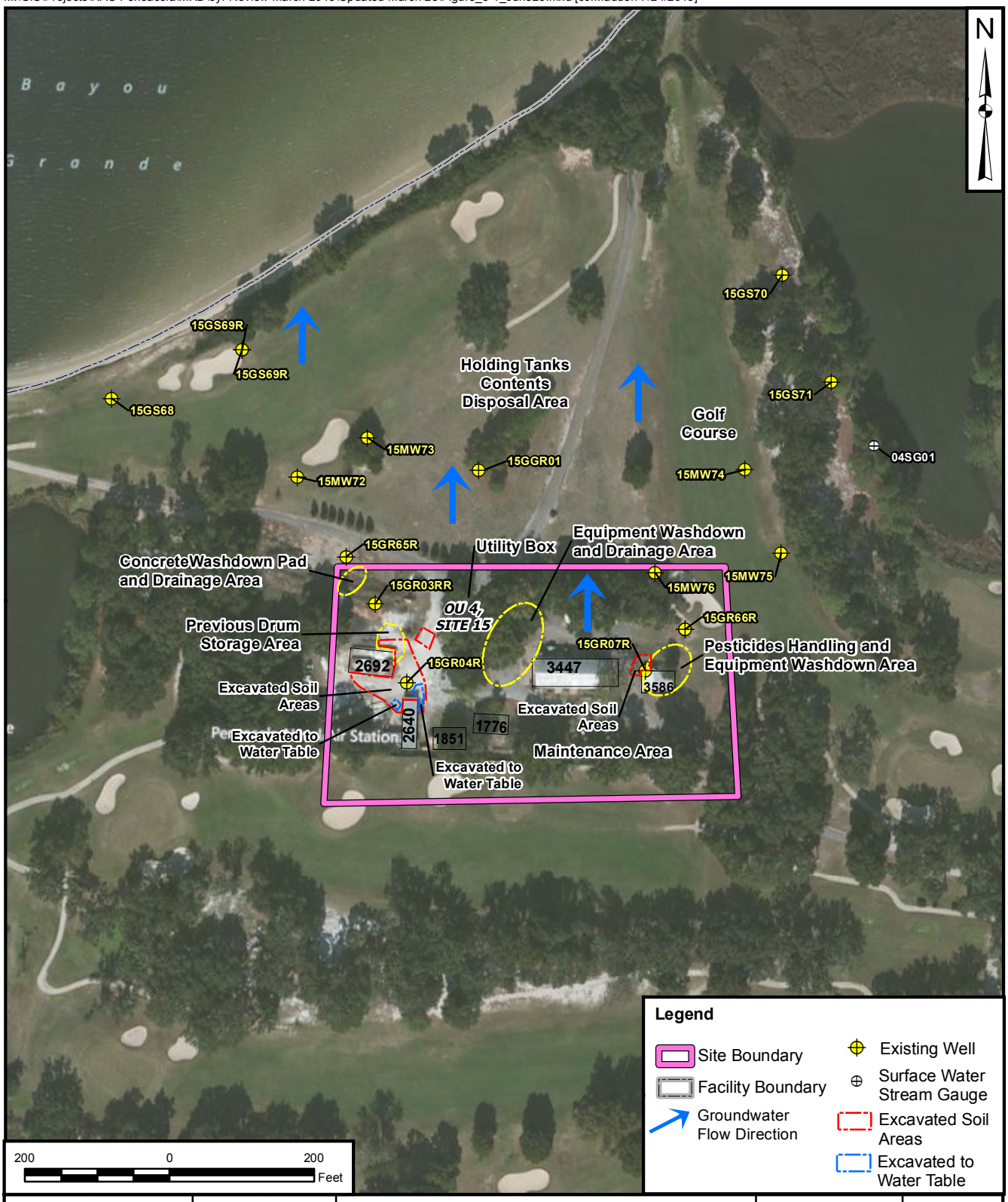


DRAWN BY: GIS	DATE: 7/24/2013	SITE MAP - OPERABLE UNIT 4 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00390
CHECKED BY: A.I.	DATE: 7/24/2013		CTO NUMBER: 067
REVISED BY: —	DATE: —		APPROVED BY: — DATE: —
SCALE: AS NOTED			APPROVED BY: — DATE: —
			FIGURE NO.: 5 - 1 REV: 0

concrete pad west-northwest of Building 3586. Contaminated soil was also noted at isolated locations throughout Site 15 and north of the road in the old disposal area (EnSafe, 1999).

5.3.1 Initial Investigation for OU4

The IAS report prepared by NEESA identified OU4, Site 15 as potentially posing a threat to human health or the environment due to contamination from past hazardous materials operations. According to the IAS report, pesticide rinsate was not sufficiently concentrated to threaten human health or the environment and further study was not recommended (NEESA, 1983). Therefore, environmental sampling and laboratory analyses were not performed, and the potential impact was not properly assessed.

In 1984, Geraghty and Miller, Inc. conducted a Verification Study of the asphalt wash-down pad and pesticide storage area at OU4, Site 15. The results of the Verification Study confirmed the presence of arsenic and organic pesticide contaminants in the soil. The presence of arsenic impacted groundwater at the site was documented by Geraghty and Miller during performance of a 1986 Characterization Study.

Phase I of a Contamination Assessment/RI was conducted in 1991 by Ecology and Environment, Inc. to identify principal areas and primary COCs, and to recommend if subsequent investigations were necessary. Investigation results indicated the presence of metals (particularly arsenic), TRPH, VOCs, PAHs, and pesticides in the soil. Low concentrations of metals (particularly arsenic) and pesticides (dieldrin/4,4-DDE) were detected in groundwater samples (EnSafe, 1999).

Surface water samples from the two golf course water hazards were not collected and analyzed as part of the OU4 RI. The RI (Ensafe 1997b) indicated: “Given the site’s relatively level topography and highly permeable soil, rainfall quickly percolates through site soil to the water table, generating little to no overland storm water flow.” Therefore, the OU4 HHRA did not evaluate exposure to surface water. However groundwater to surface water discharge was evaluated and continues to be monitored as part the ongoing groundwater monitoring program. The risk assessment evaluated potentially exposed populations including: a current site industrial worker, a future site construction worker; and a future resident. While the OU4 risk assessment did not specifically address the maintenance worker or the recreational receptor, general risk assessment principals can be used to derive the risks associated with exposure to soil by these receptors and demonstrate that the risks for these receptors would be less than that of the industrial worker. No risks associated with exposure to surface water were quantified because surface water was not sampled. However, direct contact by a maintenance worker or a recreational receptor with surface water would be considered negligible (e.g. retrieving a golf ball from the edge of the water hazard).

Risk is directly proportional to exposure; therefore, a proportional comparison of exposure parameters in concert with the intake algorithms for ingestion and dermal exposure to soil as presented in Risk Assessment Guidance for Superfund (RAGS) (EPA 1989) and the OU4 HHRA can define the risks of the maintenance worker and the recreational receptor relative to the industrial worker. The exposure assumptions and the risks for the industrial worker have been defined in the OU4 RI. The following table shows the exposure parameters that would differ among the three receptors:

Exposure Parameter	Industrial Worker	Maintenance Worker	Recreational Receptor
Exposure Frequency (EF)	250 days/year[1]	100 days/year[2]	50 days/year[2]
Exposure Duration (ED)	25 years[1]	25 years[3]	30 years[4]
Surface Area (SA)	4,100 cm^2 [5]	4,100 cm^2 [3]	904 cm^2 [6]

[1] Default industrial exposure from RAGS (used in the OU4 HHRA)

[2] Professional judgment

[3] Consistent with industrial worker ED

[4] Consistent with default residential exposure from RAGS (used in the OU4 HHRA for a resident)

[5] Used in the OU4 HHRA

[6] Based on exposure to hands (value from RAGS Part E, Appendix C, EPA 2004).

All other exposure assumptions, such an ingestion rate and body weight, are the same for the maintenance worker and the recreational receptor as those defined for the industrial worker in the OU4 HHRA.

Risk is directly proportional to intake and intake is directly proportional to EF, ED, and SA. Only EF is different between the maintenance worker and the industrial worker. Because the EF for the maintenance worker (100 days/year) is 40 percent of the industrial worker's EF, the risk of the maintenance worker would be 40 percent of the industrial worker's risk. All three of these parameters differ for the recreational receptor relative to the industrial worker. The comparison of the products of the EF and ED define the relative risks between the recreational receptor and the industrial worker for incidental ingestion of soil; the comparison of the products of EF, ED, and SA define the relative risks between these two receptors for dermal exposure to soil. The following table shows the relative risks for the ingestion and dermal exposure pathways:

Relative Risk	Industrial Worker	Maintenance Worker	Recreational Receptor
Incidental Ingestion[1]	1	0.4	0.24
Dermal Contact[2]	1	0.4	0.05

[1] Compare products of EF * ED for each receptor relative to the industrial worker

[2] Compare products of EF * ED * SA for each receptors relative to the industrial worker

These relative risks are multiplied against the industrial worker's cancer risks and hazard indices that were presented in the OU4 HHRA to define the risks associated with incidental ingestion and dermal contact with exposure to soil by the maintenance worker and the recreational receptor. The following table shows the risks for the three receptors:

Risk	Industrial Worker		Maintenance Worker		Recreational Receptor	
	ILCR	HI	ILCR	HI	ILCR	HI
Incidental Ingestion	8 x 10-6	0.05	3 x 10-6	0.02	2 x 10-6	0.01
Dermal Contact	7 x 10-6	0.05	3 x 10-6	0.02	4 x 10-7	0.001

5.3.2 Basis for Taking Action at OU4

The hazard presented by potential exposure to the identified contaminants at Site 15 resulted in the performance of a baseline risk assessment. The baseline risk assessment used the Florida risk threshold goals, which is more conservative than USEPA's acceptable risk range and associated Risk Assessment Guidance for Superfund information (EnSafe, 1997b).

The ILCR associated with the incidental ingestion of surface soil by a hypothetical future resident (7E-5) and site worker (8E-6) exceeded the Florida target risk level of 1E-6. The ILCR associated with dermal contact with surface soil by a hypothetical future resident (2E-5) and site worker (7E-6) also exceeded the Florida target risk level. Both exceedances were primarily due to the presence of arsenic at 24 sample locations, dieldrin in two of the locations, and alpha-chlordane and BEQs in one location each. In addition, the ILCR associated with the incidental ingestion of groundwater by a hypothetical future resident in Areas 1 and 2 (5E-3 and 2E-3, respectively) and site workers (1E-3 and 5E-4, respectively) exceeded FDEP's target risk level. This was primarily due to the presence of arsenic (CH2M Hill, 2006).

The HHRA identified arsenic, BEQs, dieldrin, alpha-chlordane, and gamma-chlordane as COCs for surface soil, and arsenic and dieldrin as COCs for groundwater. The HHRA determined that 15 soil samples had a cumulative non-cancer HI from potential exposures to alpha-chlordane, arsenic, BEQs, dieldrin, and gamma-chlordane in soil of less than 1. This is within the USEPA and FDEP target HI of 1 for current workers, trespassers, and future residents for industrial scenarios. Moreover, the HHRA determined that groundwater samples from 6 of 28 monitoring well locations had dieldrin or arsenic at concentrations which resulted in a cumulative HI of greater than 1, primarily due to the presence of arsenic. This is not within the USEPA and FDEP target HI of 1 for current workers, trespassers, and future residents. The HHRA determined all 15 soil samples had a cumulative non-cancer HI from potential exposures to alpha-chlordane, arsenic, BEQs, dieldrin, and gamma-chlordane in soil of less than 1. This

is less than the USEPA and FDEP target HI of 1 for current workers, trespassers, and future residents for industrial scenarios.

The ecological risk assessment selected the eastern cottontail rabbit and the American robin as endpoint wildlife species for the baseline risk assessments ecological component, as no endangered species were identified on site. Based on conservative assumptions, the risk evaluation indicates potential sub-lethal effects to these species from maximum detected concentrations of arsenic, mercury, and possibly pesticides in surface soil (EnSafe, 1999).

"Downgradient surface water, sediment, and biota (within Bayou Grande and Wetland 65) were not at risk from the site, given their distance, the shallow groundwater quality adjacent to the water bodies, and the nature and limited extent of site-impacted groundwater (EnSafe, 1999)."

Contaminants

COCs related to each medium are presented in Table 5-2.

TABLE 5-2
OU4 CONTAMINANTS OF CONCERN
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Medium	Contaminants of Concern
Soil	Arsenic, BEQs, and dieldrin
Groundwater	Arsenic and dieldrin*

* Dieldrin was eliminated in the ROD because at that time, the dieldrin Florida Groundwater Guidance Concentration [FGGC]) was 0.1 µg/L. OU4 groundwater results originally indicated only one exceedance, monitoring well 15GS68 at 0.11 µg/L. This value is considered equivalent to the FGGC when rounded to the same number of significant digits and subsequent sampling did not confirm the presence of dieldrin. Therefore, dieldrin concentrations in groundwater do not warrant further attention.

5.4 REMEDIAL ACTIONS

5.4.1 Remedy Selections at OU4

The ROD for NAS Pensacola OU4 was finalized on September 27, 2000. RAOs were developed' based on an Industrial target risk level of $1X10^{-6}$ and data collected during the RI, to aid in the development and screening of remedial alternatives to be considered for the ROD.

The purpose of the remedial action at OU4 was to reduce the unacceptable risks to human health and environment associated with exposure to the COCs in soil and groundwater. To meet these goals, two RAOs were identified. Table 5-3 lists the RAOs for OU4.

TABLE 5-3
OU4 REMEDIAL ACTION OBJECTIVES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Medium	Contaminants Causing Unacceptable Risk	Remedial Action Objectives
Soil	Arsenic, BEQs, and dieldrin	Prevent future unacceptable exposure to contaminated soil* .
Groundwater	Arsenic	Monitor groundwater to ensure COCs are not migrating off-site, compliance with the performance standard: and institutional controls

* Based on an Industrial target risk level of $1X10^{-6}$

The remedial alternative for soil was selected to prevent future unacceptable risk due to exposure to arsenic, BEQ, and dieldrin contaminated soil. The major components of the soil remedy include:

- Removing excess risk from the dermal and ingestion pathways for contaminated soil by removing contaminated soil above industrial goals through a removal action.

- Implementing institutional controls through the LUCAP, restricting site use to industrial.

- Reviewing the institutional controls and certification in order to determine if they should remain in place or be modified to reflect changing site conditions.

The following components constitute the remedial action for OU4 to address the groundwater RAOs:

- Perform groundwater monitoring to ensure COCs are not moving off-site and monitor compliance with the performance standard for arsenic of 50 parts per million. After continued attainment of the performance standard for two consecutive sampling events and concurrence with USEPA and FDEP, the monitoring program may be discontinued.

- Conducting a review to determine whether groundwater performance standards continue to be appropriate.

- Implementing institutional controls through the LUCAP to restrict use of groundwater from the surficial zone of the sand and gravel aquifer within 300 feet of the site.

- Annual review/certification of institutional controls to determine if they should remain in place or be modified to reflect changing site conditions.

5.4.2 Remedy Implementation at OU4

The ROD for Site 15 required the removal of contaminated soil in exceedance of the industrial cleanup goals to eliminate dermal and ingestion risk pathways, and the monitoring of groundwater to ensure that COCs were not moving off-site (EnSafe, 1999). The source removal activities were completed between April 26, 2002 and May 6, 2002. Five individual contaminated areas were consolidated into three excavation areas. A registered Florida land surveyor demarked the areas requiring excavation to a depth of 2 feet bls and two specific areas requiring excavation to the soil water table interface. Demarked excavation areas were based on assessment data provided by CH2M Hill.

Approximately 754 cubic yards of arsenic impacted soil was excavated and transported to the BFI Timberlands Landfill, located in Brewton, Alabama, for disposal. Prior to completion of excavation activities, representative soil samples were collected from the selected off-site backfill source at the Sand & Dirt, Inc. facility. The soil was analyzed to ensure suitability for use at the site. One sample was collected from the proposed backfill borrow pit and analyzed for VOCs, SVOCs, pesticides, herbicides, metals, PCBs, TRPH, and pH. The analytical results indicated that with the exception of metals, the targeted parameters were not detected in the sample collected from the proposed backfill borrow pit. Arsenic was detected above the Florida residential direct exposure SCTL of 0.8 mg/kg, but below the industrial direct exposure SCTL of 3.7 mg/kg that was in effect in 2002. However, the concentration of arsenic detected in the backfill is below the current Florida residential direct exposure of SCTL of 2.1 mg/kg per Chapter 62-777, F.A.C which was revised in 2005.

The ROD for Site 15 requires monitoring of groundwater to ensure that COCs are not moving off-site. The remedial goal for arsenic, established in the Site 15 ROD, is 50 µg/L. Baseline groundwater sampling was conducted in November and December 2001, and two semiannual sampling events were completed in June 2002 and January 2003. In preparation of LTM, the monitoring wells at Site 15 were evaluated to document construction deficiencies. As a result, 14 monitoring wells that were damaged or improperly constructed were abandoned. Five were replaced (15GR03R, 15GR04R, 15GR65R, 15GR66R, and

15GS69R), and one new monitoring well (15GR07R) was installed adjacent to a previously abandoned monitoring well (CH2M Hill, 2003).

5.4.3 Long-Term Groundwater Monitoring at OU4

The ROD does not specify the individual monitoring wells included in the monitoring program but does specify that groundwater samples will be collected in accordance with the monitoring plan completed during the Remedial Design and required the installation of two additional monitoring wells, one north of monitoring well 15GS70 and one east of monitoring well 15GR66 and south of monitoring well 15GS71.

The Monitoring Plan specified groundwater samples be collected from monitoring wells 15GR03, 15GR04, 15GR07, 15GR065, 15GR66, 15GS68, 15GS69, 15GS70, and 15GS71 on a semiannual basis. As indicated above, some of the monitoring wells have been abandoned; however, in each case a replacement well was installed. The results of the baseline groundwater monitoring event conducted in November through December 2001 indicated the presence of arsenic at concentrations ranging from 70 µg/L to 510 µg/L. The arsenic concentrations detected during the June 2002 and January 2003 semiannual sampling events ranged from 66 µg/L to 650 µg/L, and 53 µg/L to 630 µg/L, respectively. Arsenic concentrations detected in groundwater samples collected semiannually from January 2004 to October 2007 ranged from non-detect to 160 µg/L. However, the monitoring well with the highest previous concentrations (15GR03R) was not sampled from April 2005 to September 2008 because the well could not be located (Aerostar, 2008a). Aerostar installed a replacement monitoring well, 15GR03RR in July 2008 and reinstated groundwater sampling at this location.

Following the September 2009 sampling event, Aerostar noted in the *Year 2009 First Semi-Annual Groundwater Monitoring Report* that arsenic concentrations at monitoring well locations 15GR07R, 15GS68, 15GS69R, 15GS70, 15GS71, 15MW72, 15MW73, 15MW74, and 15MW75 were below its cleanup target level for five consecutive sampling events and below the remedial goal for more than five years. Aerostar recommended these monitor wells to be removed from future sampling events. The regulatory agencies agreed (December 31, 2009) and Aerostar continued sampling of 15GR03RR, 15GR04R, 15GR65R, and 15GR66R to monitor extent and migration of arsenic. The Year 2011 Semi-Annual Groundwater Monitoring Report for Operable Unit 04, Site 15, is included in Appendix J

Trend analysis for the COCs for groundwater at NAS Pensacola was performed using the Mann-Kendall test (ProUCL Version 4.1.00 [Lockheed Martin Environmental Services, 2010]) at a 95 percent confidence level and OU4 groundwater sample data collected from 2004 to 2011 (Appendix D). The Mann-Kendall test is used because it does not assume any particular distributional form and accommodates values below the detection limit by assigning them a common value (½ the detection limit). Mann-Kendall Trend analysis data sheets and graphs for arsenic concentrations versus time are provided in Appendix A.

The concentration of arsenic at monitoring well location 15GR03RR since September 2008 has ranged from 65 to 870 µg/L and exceed the remedial goal for arsenic of 50 µg/L, established in the Site 15 ROD and the current federal and state MCL of 10 µg/L. The Mann-Kendall trend analysis suggests no trend is present at a 95 percent confidence level.

The concentration of arsenic at monitoring well location 15GR04R, which has been sampled 10 times since September 2008, has ranged from 4.8 to 20 µg/L and did not exceed the remedial goal for arsenic of 50 µg/L, but exceeded the current federal and state MCL of 10 µg/L in 6 of the 10 groundwater samples. This monitoring well has not been sampled since March 2010. The Mann-Kendall trend analysis suggests no trend is present at a 95 percent confidence level.

The concentration of arsenic at monitoring well location 15GR65R, which has been sampled 15 times since September 2008, has ranged from less than 3.0 µg/L to 14 µg/L and did not exceed the remedial goal for arsenic of 50 µg/L, but exceeded the current federal and state MCL of 10 µg/L in 4 of the 15 groundwater samples. The Mann-Kendall trend analysis suggests no trend is present at a 95 percent confidence level.

The concentration of arsenic at monitoring well location 15GR66R, which has been sampled 15 times since September 2008, has ranged from 10 to 38 µg/L and did not exceed the remedial goal for arsenic of 50 µg/L, but equaled or exceeded the current federal and state MCL of 10 µg/L in each of the 15 groundwater samples. The Mann-Kendall trend analysis suggests a downward trend is present at a 95 percent confidence level.

Since March 2008, arsenic has been detected only one time at monitoring well location 15GS70 at a concentration that exceeds the current federal and state MCL of 10 µg/L. Also, since March 2008, arsenic has not been detected or was less than the current federal and state MCL of 10 µg/L at eight monitoring well locations (15GR07R, 15GS68, 15GS69R, 15GS71, 15MW72, 15MW73, 15MW74, and 15MW75).

Monitoring well locations 15GR07R, 15GS68, 15GS69R, 15GS70, 15GS71, 15MW73, and 15MW75 have not been sampled since September 2009. Monitoring well 15MW76 has not been located since March 2005.

Although the Mann-Kendall Test at a 95 percent confidence interval indicates no trend for arsenic at monitoring well locations 15GR03RR, 15GR04R, and 15GR65R, review of the graphs for these well locations suggest that decreasing concentrations are apparent (Appendix A). Also, arsenic was not detected or had only sporadic detection in 10 of the 15 monitoring wells sampled. The monitoring well locations with sporadic arsenic detections also have at least four consecutive events where arsenic is not detected. This suggests that MNA has effectively reduced the concentration of arsenic.

During the recent monitoring well inventory, it was documented that monitoring wells 15GGR1 and 15MW76 were no longer present on site. In accordance with the requirements of the LTM Plan, monitoring well 15MW76 needed to be replaced. Monitoring well 15GGR1 may not require replacement because semiannual sampling of this well is not required in the Remedial Design Monitoring Plan. Monitoring well repair and replacement was evaluated in a NAS Pensacola Facility-wide Monitoring Well Inventory. Both monitoring wells were replaced on December 13, 2012. Based on recent data the Navy proposed that a replacement monitoring well be installed at the same location as monitoring well 15GGR01; but that the replacement monitoring well for 15MW76 be relocated approximately 300 feet to the west. The proposed locations were discussed during NAS Pensacola Partnering Team meeting on December 6, 2012. The Partnering Team approved the replacement monitoring well locations provided that the Navy install a surface water staff gauge along the shoreline of the pond located west of the site. The stream gauge was installed in January 2013.

The cost expended to date for capital costs, O&M costs, and remedial action is $1,331,021.

It should be noted that because of the regulatory standard change for arsenic from 50 µg/L to 10 µg/L, attainment of the new arsenic standard may take longer than the original time estimated to reach the old standard; and thus, impact the cost of groundwater MNA monitoring. However, review of the OU4 ROD (Ensafe, 1999) indicates that costs for the groundwater alternatives were developed as "maximum case scenarios." For example the MNA Alternative costs were based on a 30-year time period to reach the remedial goal and estimated at $740,000. The ROD stated "if the Alternative 2 (MNA and LUC alternative) reaches remedial goals in 20 years rather than 30 years, the alternative total present worth is $540,000 rather than $740,000." To date, 12 years of monitoring have been completed. It is anticipated that the remedial goals will be obtained prior to completion of the 30-year time period.

5.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

Since the last Five-Year Review, groundwater monitoring has continued at OU4. Additionally, institutional controls remain in place and annual inspections and certifications have been conducted.

No issues were identified during the previous Five-Year Review; therefore, there were no follow up actions.

5.5.1 Protectiveness Statements from the Last Review

Based on the results of the 2008 Five-Year Review, the remedy was expected to be protective of human health and the environment upon attainment of groundwater cleanup goals through natural attenuation.

5.5.2 Status of Recommendations and Follow-up Actions from Last Review

No recommendations or follow up actions were identified during the previous Five-Year Review.

5.6 FIVE-YEAR REVIEW PROCESS

This is the second Five-Year Review for OU4. Members of the NAS Pensacola Partnering Team were notified of the initiation of the Five-Year Review in January 2012. The Five-Year Review was led by Gerald Walker of Tetra Tech, the NAVFAC SE Navy CLEAN Contractor, and included other Tetra Tech staff. Patty Marajh-Whittemore of NAVFAC SE, Greg Campbell of NAS Pensacola Public Works Department, Tim Woolheater of USEPA, David Grabka of FDEP, and Sam Naik of CH2M Hill assisted in the review.

The review included the following components:

- Document Review
- Data Review
- Site Inspection
- Five-Year Review Report development and review

5.6.1 Document Review

This Five-Year Review consisted of a review of relevant documents including the ROD, Interim Remedial Action Report, Groundwater Monitoring Plan, semiannual monitoring reports, and applicable federal and state statutes.

5.6.2 Data Review and Review of COC Data for Groundwater

The results presented in the Interim Remedial Action Report indicate that arsenic impacted soil at concentrations greater than the remedial goal were removed and replaced with clean backfill. Graphs developed using the concentrations of arsenic provided from data in monitoring reports summarizes the analytical results of MNA of groundwater; suggesting that arsenic concentrations have decreased. With the exception of monitoring well location 15GR66R, Mann-Kendall trend test suggest that no trend is present at a 95 percent confidence level. Trend analysis results are provided in Appendix D. Review of the March 2012 groundwater analytical data indicates that arsenic concentrations exceeded the ROD specified remedial goal of 50 µg/L and the current federal and state MCL of 10 µg/L at monitoring well location 15GR03RR (110 µg/L). The arsenic concentration at monitoring well 15GR66R (16 µg/L) exceeded the current federal and state MCL of 10 µg/L.

5.6.3 LUC Inspections

Following completion of the final ROD, LUCs were established for OU4 via a MOA for LUCs completed by USEPA, FDEP and the Navy. The MOA completed on September 24, 1999 and implemented on October 24, 1999 (updated February 7, 2000) established the institutional controls that are currently in

place and include: a restriction of groundwater use of the surficial zone of the sand-and-gravel aquifer within 300 feet of the site boundaries and restrict site use to industrial. The Base Master Plan was reviewed and the OU4 LUC documentation was present. In addition, current and historic annual LUC inspection forms for OU4, during the period of review, were obtained and reviewed. The inspection forms noted no problematic observations. At the time of the inspection, institutional controls were found to be adequate, the site was non–residential and use of groundwater was not observed. There were no apparent signs of vandalism or trespassing.

5.6.4 Site Inspection and Interviews

An inspection was conducted at the site on May 3, 2012 by Tetra Tech and NAS Pensacola personnel. The purpose of the inspection was to assess the protectiveness of the remedy and condition of the monitoring wells. Because surficial soil with arsenic concentrations exceeding the remedial goal was removed, fencing the site was not warranted. Monitoring wells 15GGR01 and 15MW76 were missing at the time of the inspection and need to be replaced. The remainder of the monitoring wells were accessible and in good condition.

The institutional controls that are in place include the restriction of groundwater use within 300 feet of the site. At the time of the inspection, institutional controls were found to be adequate, and use of groundwater was not observed. Roadways within OU4 appeared adequate, and there were no apparent signs of vandalism or trespassing.

An interview was conducted on May 2, 2012 with Greg Campbell, Environmental Engineer for NAS Pensacola. According to the interview, Mr. Campbell indicated he is well informed about the site's activities and progress, and was not aware of any community concerns regarding the site or its operation, or of any incidents such as vandalism, trespassing or emergency responses at the site. The interview forms are presented in Appendix E.

Mr. Campbell indicated annual LUC inspections are performed. In addition, complaints, violations, or other incidents related to the site requiring a response by his office have not occurred. Future construction of a warehouse is planned for the site.

5.6.5 ARAR Level Changes

The following standards were identified as chemical-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- Safe Drinking Water Act MCLs (40 CFR 141.11)
- Safe Drinking Water Act MCLGs (40 CFR 141.50 – 141.51)
- Florida GCTLs, Chapter 62-777, F.A.C.
- Florida SCTLs, Chapter 62-777, F.A.C.

- Florida Drinking Water Standards, Monitoring and Reporting, Chapter 62-550, F.A.C.
- Florida Ground Water Classes, Standards, and Exemptions, Chapter 62-520, F.A.C.

Contaminant Cleanup Target Levels, Chapter 62-777, F.A.C. (Amended 4/17/05), and Contaminated Site and Cleanup Criteria, Chapter 62-780, F.A.C., were promulgated after the ROD. These new criteria need to be considered to determine if the remedy is still protective. Chapter 62-777, F.A.C. provides GCTLs for contaminants without MCLs per Chapter 62-550, F.A.C. The CTLs in Chapter 62-777, F.A.C. do not affect the protectiveness of the remedy.

Chapter 62-780, F.A.C. provides rules for the assessment and cleanup of non-petroleum sites with contaminants that have been released or discharged into the environment. Rules promulgated per Chapter 62-780, F.A.C. do not affect the protectiveness of the remedy. Since signing the ROD for OU4 on September 27, 2000, changes to federal regulations in 2002 and 2006 and to Florida regulations in 2005 lowered the MCL for arsenic in groundwater from 50 to 10 µg/L. On January 22, 2001, the USEPA adopted a new MCL for arsenic in drinking water at 10 µg/L, replacing the old standard of 50 µg/L. The USEPA rule became effective on February 22, 2002 and became enforceable to water systems on January 23, 2006. Florida's drinking water standards are contained in Chapter 62-550, F.A.C. Florida's primary drinking water standards, which are health based, are described in Rule 62-550.310, F.A.C. Florida changed its MCL for arsenic from 50 µg/L to 10 µg/L on January 1, 2005. This change in the federal and state MCL for arsenic is being implemented in a draft ESD.

Since the ROD was signed on September 27, 2000, the dieldrin standard per Florida Chapter 62-777, F.A.C. has changed from 0.1 µg/L to 0.002 µg/L.

There have been no other changes in Safe Drinking Water Act and Chapter 62-550, F.A.C. MCLs that may affect the protectiveness of the remedy.

The following standards were identified as location-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- Executive Order 11990 Wetlands Protection Policy
- Procedures for Implementing the Requirements of the National Environmental Policy Act (40 CFR Part 6, Appendix A)

These ARARs apply only to the soil excavation which was completed in 2002. No further evaluation is necessary.

The following standards were identified as action-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- Florida Storm Water Discharge Regulations, Chapter 62-25, F.A.C.
- Florida Water Well Permitting and Construction, Chapter 62-532, F.A.C.

The storm water regulation only applied during soil excavation which was completed in 2002. No further evaluation is necessary. The sections covering General Provisions for Water Well Permitting and Construction and Abandonment of Water Wells in 62-532, F.A.C. were repealed October 7, 2010. Monitoring well installation and abandonment are now addressed in the FDEP Monitoring Well Design and Construction Guidance Manual, 2008. The use of the guidance will not affect the protectiveness of the remedy.

5.7 TECHNICAL ASSESSMENT

5.7.1 Question A: Is the remedy functioning as intended by the ROD?

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicate that the remedy is functioning as intended by the ROD.

Remedial Action Performance: Contaminated soil was removed from Site 15 and replaced with clean backfill. Monitored natural attenuation of groundwater contaminants is being conducted. Based on the groundwater monitoring data, MNA appears to have effectively reduced the concentration of arsenic.

Early Indicators of Potential Remedy Failure: None, the source of the contaminants has been removed and natural attenuation monitoring is being conducted.

Implementation of Institutional Controls and Other Measures: The reporting and certification requirements for the LUCs are incorporated into the LUCAP between the Navy, USEPA, and FDEP supported by a MOA between the agencies. Site 15 will be available for industrial use. Residential use of the site would be prohibited, and the Navy would perform periodic site inspections and ensure the LUCs are being properly maintained and administered. Groundwater use is prohibited within 300 feet of the site. The Navy will conduct an annual review of the institutional controls and certify that the controls should either remain in place or be modified to reflect changing site conditions.

5.7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Exposure Assumptions: There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes to Standards and To Be Considered: ARARs and TBCs considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. The arsenic MCL per the Safe Drinking Water Act and Chapter 62-550, F.A.C. has been changed from 50 µg/L, which is the Performance Standard in the ROD, to 10 µg/L.

Since the ROD was signed, the dieldrin standard per Florida Chapter 62-777, F.A.C. has changed from 0.1 µg/L to 0.002 µg/L and that a groundwater sampling event of select wells should be conducted for dieldrin analysis to confirm the remedy is still protective based on the current Florida GCTL. An additional monitoring event of select wells should be conducted if necessary. Dieldrin was not determined to be a COC in the ROD.

Florida groundwater regulations Chapter 62-550, F.A.C. and Chapter 62-777, F.A.C. have performance criteria that are equal to or lower than the Federal Safe Drinking Water Act of 1974 (amended in 1986 and 1996), and therefore are adequate to assess whether the remedies are functioning as intended because the lower of the state or federal performance criteria are used.

Changes in Exposure Pathways: No changes in the site conditions or land use that affect exposure pathways were identified as part of the Five-Year Review. Exposure to the site groundwater is still restricted by the LUC.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in human health or ecological toxicity criteria that would impact protectiveness of the remedy.

Changes in Risk Assessment Methodologies: Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

5.7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that calls into question the protectiveness of the remedy.

5.8 ISSUES

Issues were discovered during the Five-Year Review and are noted in Table 5-4.

TABLE 5-4
OU4 ISSUES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

	Issues	Affects Protectiveness (Y/N)	
		Current	Future
1	The arsenic MCL per the Safe Drinking Water Act and Chapter 62-550, F.A.C. has been changed from 50 µg/L, which is the Performance Standard in the ROD, to 10 µg/L	N	Y
2	Since the ROD was signed, the dieldrin standard per Florida Chapter 62-777, F.A.C. has changed from 0.1 µg/L to 0.002 µg/L, Dieldrin was not determined to be a COC in the ROD.	N	Y
3	LUCs were implemented under a LUCIP developed pursuant to a LUCAP (MOA) executed by the USEPA, FDEP and the Navy in 1998. USEPA has raised the issue that MOA unenforceability may affect overall site protectiveness. The Navy disagrees with that premise and believes the LUCs are fully enforceable in any event via the OU4 ROD. However, the Navy is willing to discuss with USEPA and FDEP existing LUC implementation procedures intended to ensure site protectiveness so that the issue raised may be mutually resolved in CY2014.	N	Y
4	A background investigation is recommended to evaluate natural levels of arsenic since source removal was previously performed.	N	N

5.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

An ESD is planned to change the Performance Standard in the ROD for arsenic (50 µg/L) to the current MCL per the Safe Drinking Water Act and Chapter 62-550, F.A.C, which is 10 µg/L. The change in the performance standards will not involve a change in scope or cost to the MNA remedy and will not be a significant change to the MNA component of the remedy or fundamentally alter the cleanup approach. By meeting the performance standard, groundwater will eventually return to its beneficial use. In addition because dieldrin standard, per Florida Chapter 62-777, F.A.C., changed from 0.1 µg/L to 0.002 µg/L; review and discuss with USEPA and FDEP existing LUC implementation procedures intended to ensure site protectiveness; and groundwater samples collected during the next sampling event should be analyzed for dieldrin to determine if concentrations exceed federal and state regulatory standards and the compound should be added as a COC.

TABLE 5-5
OU4 RECOMMENDATIONS AND FOLLOW-UP ACTIONS
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Complete the ESA for arsenic	Navy	USEPA & FDEP	January 27, 2014	N	Y
2	Analyze groundwater samples for dieldrin	Navy	USEPA & FDEP	May 1, 2014	N	Y
3	Review and discuss with USEPA and FDEP existing LUC implementation procedures intended to ensure site protectiveness	Navy	USEPA & FDEP	December 30, 2014	N	Y
4	Complete a background investigation for arsenic to include in the ESD, if warranted	Navy	USEPA & FDEP	January 27, 2014	N	Y

5.10 PROTECTIVENESS STATEMENT

The remedy at OU4 currently protects human health and the environment because it prevents residential development of the site, a soil removal action has eliminated risk due to soil contamination, and the restriction on groundwater use eliminates the exposure to contaminated groundwater. In addition, monitoring wells 15GGR1 and 15MW76 have been replaced. However, in order for the remedy to be protective in the long term, the remedy needs to be modified through an ESD to change the performance standard for arsenic from 50 µg/L to 10 µg/L. In addition the Navy needs to review and discuss with USEPA and FDEP existing LUC implementation procedures intended to ensure site protectiveness and analyzed groundwater samples for dieldrin as part of the next groundwater monitoring event.

6.0 OPERABLE UNIT 10, SITES 32, 33, AND 35 – IWTP SLUDGE DRYING BEDS, WWTP PONDS, AND IWTP SWMUs

Implementation of the remedial actions at OU10 began in 1997. This Five-Year Review consists of an approximate five-year period of data and provides a status update for OU10. This statutory review is required by regulation because wastes are still contained on site and do not allow for unlimited use and unrestricted exposure.

6.1 SITE CHRONOLOGY

A list of important OU10 historical events and relevant dates in the site chronology is shown in Table 6-1.

TABLE 6-1
OU10 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Wastewater treated on Magazine Point	1941 – 08/01/09
Facility upgraded to treat both industrial and domestic wastewater separately	1971
Domestic sludge generated at the IWTP determined to be hazardous	1978
IWTP surge pond designated as a hazardous waste surface impoundment	1981
Industrial Sludge Drying Beds (ISDBs) removed from service	1984
RCRA detection monitoring identifies groundwater contamination caused by the surge pond	1984
Monitoring program implemented to determine the extent of contamination	1984
Temporary RCRA operation permit for the surge pond is issued	1985
RCRA Corrective Action Program implemented at the IWTP	1986
Groundwater recovery system is designed and installed to remediate groundwater	1986
Groundwater recovery system placed into operation	February 1987
RCRA permit issued to operate the surge pond. Permit stipulates the continued operation of the corrective action system and the implementation of two quarterly groundwater monitoring programs	September 1987
Closure permit issued for the polishing pond, stabilization pond, and ISDBs	January 1988
Liquids and sludge removed. Clay liner and soil are sampled.	January 1988
Clean closure issued for the impoundments	1988

TABLE 6-1 (CONT.)
OU10 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Closure permit for the surge pond issued	November 1988
Surge pond and ISDBs capped	1989
Monitoring requirement for each program changed from quarterly to semi-annually	1991
New RCRA Permit Issued	1991
IWTP investigation shifted from RCRA to CERCLA	1992
RI conducted	December 1992 – October 1995
Removal action performed on the Imhoff tank	1994 - 1995
Leachability Study issued	February 14, 1997
Remedial Design issued	May 16, 1997
ROD issued	June 17, 1997
Remedial Action begun (trigger date)	November 3, 1997
Remedial Action Completion Report issued	February 1998
MOA for LUCs issued	March 31, 1999
Corrective Action Plan (CAP) Issued/Hydraulic Control System Deactivated	July 28, 2000
Groundwater Treatment System Taken off-line.	2000
Oxygen Releasing Compound (ORC) Pilot Study initiated	March 2001
Renewal of Post-closure Permit	January 16, 2002
RCRA Transfer Agreement Letter was submitted to USEPA and FDEP by NAVFAC SE (formerly SOUTHNAVFACENGCOM)	March 6, 2002
Groundwater Monitoring Semiannual Report	January 2003
Initial Five-Year Review Report	February 7, 2003
Groundwater Monitoring Semiannual Report	July 2003
Groundwater Monitoring Semiannual Report	January 2004
Groundwater Monitoring Semiannual Report	July 2004
Groundwater Monitoring Semiannual Report	January 2005
Biosparging project initiated at Solid Waste Management Unit (SWMU) 1	May 2005
Groundwater Monitoring Semiannual Report	July 2005
Groundwater Monitoring Semiannual Report	January 2006
Biosparging Remedial Action Completion Report and fourth quarter Report	July 2006

TABLE 6-1 (CONT.)
OU10 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Groundwater Monitoring Semiannual Report	July 2006
Groundwater Monitoring Semiannual Report	January 2007
Groundwater Monitoring Semiannual Report	July 2007
Groundwater Monitoring Semiannual Report	May 2008
Pilot Study for Enhanced Reductive Dechlorination of Chlorinated Ethenes	July 2008
2nd Five-Year Review Report Issued (OU10 not Included)	August 22, 2008
RCRA Permit Renewal (Permit Number 0154498-005-HF) completed	September 2008
Groundwater Monitoring Semiannual Report	November 2008
Groundwater Monitoring Semiannual Report	May 2009
Pilot Study Report for Enhanced Reductive Dechlorination of Chlorinated Ethenes	September 2009
Groundwater Monitoring Semiannual Report	November 2009
Groundwater Monitoring Semiannual Report	May 2010
Full-Scale Implementation of Enhanced Reductive Dechlorination of Chlorinated Ethenes	May-June 2010
Groundwater Monitoring Semiannual Report	November 2010
Groundwater Monitoring Semiannual Report	May 2011
Fourth Quarter Technical Memorandum Documenting Results of Full-Scale Enhanced Reductive Dechlorination	July 2011
Groundwater Monitoring Semiannual Report	November 2011
Work Plan Amendment Issued for Full-Scale Enhanced Reductive Dechlorination of Chlorinated Solvents	February 2012
Groundwater Monitoring Semiannual Report	May 2012
Groundwater Monitoring Semiannual Report	November 2012
Groundwater Monitoring Semiannual Report	May 2013

6.2 BACKGROUND

6.2.1 Physical Characteristics of OU10

OU10 is on Magazine Point at the NAS Pensacola as shown on Figure 1-2. Ordnance and munitions are stored there. In addition, domestic wastewater generated on station is treated on Magazine Point, which is bounded to the north and west by Bayou Grande and east by Pensacola Bay. South of Magazine Point is the former Chevalier Field, which is currently Chief of Naval Education and Training (CNET) facilities.

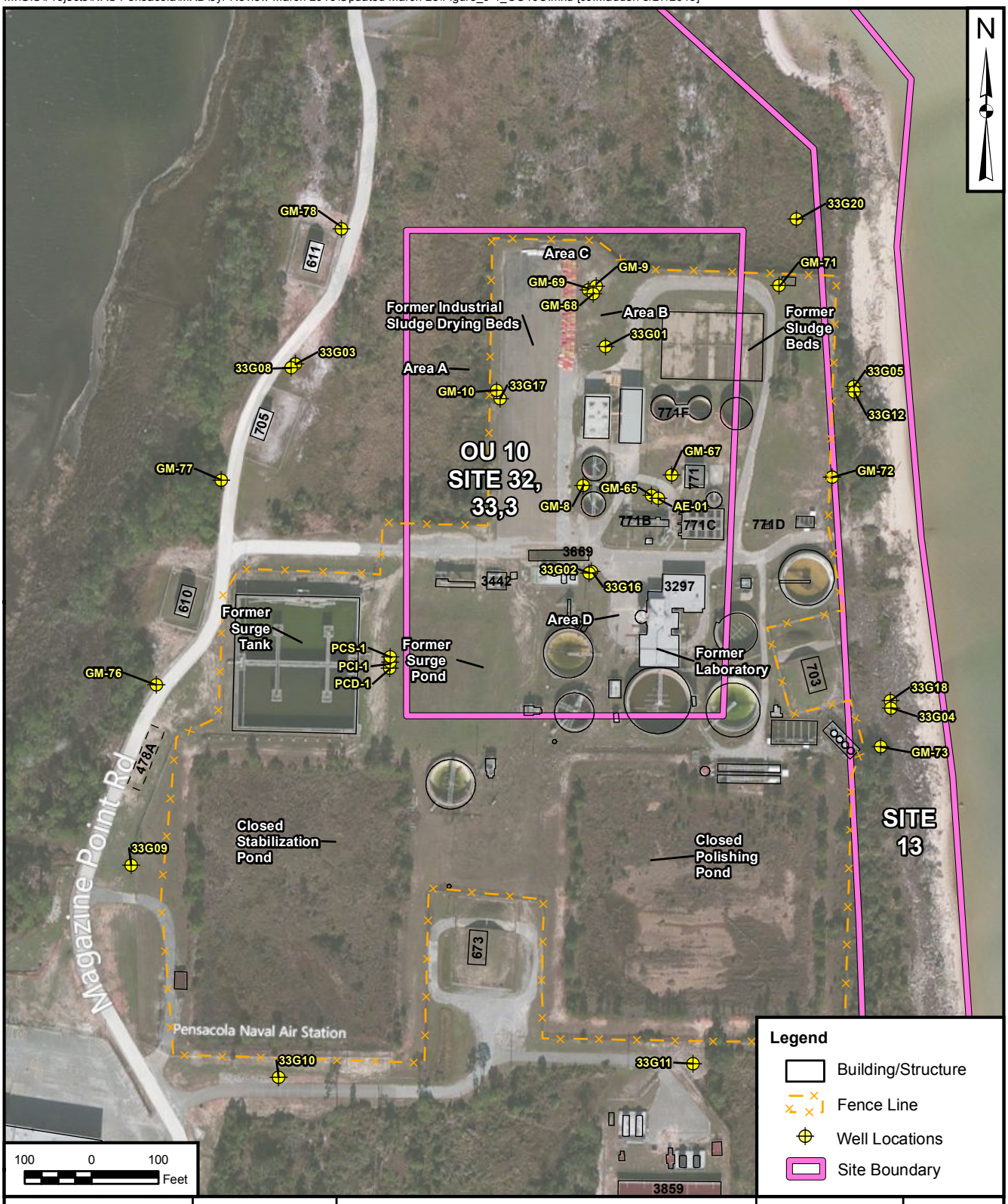
The OU10 site area is shown on Figure 6-1 and is comprised of three sites: 1) the former Industrial Sludge Drying Beds (ISDBs) (Site 32); 2) the former Wastewater Treatment Plant (WWTP) Ponds including the former surge pond, stabilization pond, and 3) polishing pond (Site 33); and miscellaneous Industrial Waste Treatment Plant (IWTP) SWMUs (Site 35) which are listed below.

Industrial grit chamber	Industrial primary clarifier and oil/water separator
Industrial comminutor	Aerobic sludge digester
Industrial sludge thickener	Aeration (activated sludge) tank
Industrial sludge presses	Surge tank
Waste oil storage tanks	Sludge truck loading station
Acid storage tank	Parallel flocculator
Sludge bed pumping station	Parallel final clarifiers
Pump dock	Chlorine contact chamber
Ancillary piping, pumps, junction boxes, etc.	

6.2.2 Land and Resource Use at OU10

The facility's main area is topographically higher than the surrounding areas and is dominated by fill and development. Large amounts of fill (mounded into berms 4 to 7 feet high) are present around the closed stabilization and polishing ponds. An extensive plateau of fill (5 to 6 feet high) is at the former surge pond and associated berms. Vegetation is limited to grasses within the fenced IWTP, and in several areas grass is absent, exposing loose organic-poor sand. Marsh vegetation has colonized the closed stabilization and polishing ponds. The area south of the IWTP is a low-lying, heavily wooded swampy area. The area north of OU10 is a wooded peninsula with thick underbrush bounded on the east by Pensacola Bay and on the west by Bayou Grande (EnSafe, 1997).

M:\GIS\Projects\NAS Pensacola\MXD\5yr Review March 2013\Updated March 28\Figure_6-1_OU10C.mxd [JJ.Madden 8/27/2013]



DRAWN BY: J.MADDEN	DATE: 8/27/2013	SITE MAP - OPERABLE UNIT 10 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00390 / CTO NUMBER: 067
CHECKED BY: G.WALKER	DATE: 8/27/2013		APPROVED BY: ___ / DATE: ___
REVISED BY: ___	DATE: ___		APPROVED BY: ___ / DATE: ___
SCALE: AS NOTED			FIGURE NO.: 6-1 / REV: 0

Depth to groundwater ranges from 0 to 4 feet bls, depending on tidal influence and ground surface elevation. Most runoff does not flow from the site but infiltrates into the subsurface rapidly through the sandy surface soil; however, a channeled ditch drains water toward the south. Erosion channels in the steeply sloped berms and flanks of the three former ponds indicate surface runoff down these structures. Standing water was observed in the RCRA clean-closed, cement-lined stabilization and polishing ponds at depths of approximately 6 to 8 inches. The asphalt cap of the closed ISDBs slopes southward, resulting in a southerly surface runoff from the asphalt area toward a sump intake to the wastewater treatment system near the chemical storage area (EnSafe, 1997).

Groundwater flow generally mimics the peninsular topography (with flow to the northwest, north, northeast, east, and southeast) and discharges to Pensacola Bay and Bayou Grande. Groundwater is not currently used as a potable water source at OU10 (EnSafe, 1997).

6.3 HISTORY OF CONTAMINATION

Site 32, IWTP Sludge Drying Beds

These contiguous units operated with the IWTP from 1971 to 1984. These units received listed hazardous waste sludges (F006) from the RCRA surface impoundment (IWTP Surge Pond), and, as a result, underwent RCRA closure in 1989. Contamination by organic compounds in Site 32 soil consisted primarily of dichlorobenzene isomers (predominantly 1,4-dichlorobenzene), PAHs, cyanide, and localized pesticide and PCB concentrations. Inorganic contamination consisted of heavy metals including cadmium, chromium, and lead. Organic contaminants were concentrated primarily in the relict drainage swell area east/northeast of the former ISDBs. Secondary organic soil contamination occurred in a horizon above the water table at the southeast edge of the former ISDBs, in the domestic sludge drying beds, and near-surface soil at the northwest slope from the ISDBs. Metals concentrations were elevated in the swell (especially in the northeast portion). The spatial distribution of these contaminants suggested the sources were related to past operation of the three sludge drying units, with most environmental contamination related to the former ISDBs and their historical surface overflow drainage into the adjoining swell and potential wetlands (EnSafe, 1997).

Sites 33 and 35

The Site 33 surface impoundments consist of the domestic polishing pond, phenol/stabilization pond, and industrial surge pond. In 1987, the USEPA RCRA Compliance Branch determined the polishing and stabilization ponds received listed F006 hazardous waste from the surge pond. The ponds were taken out-of-service. In 1988 to 1989, the ponds underwent RCRA permitted "clean closures."

In addition to PSC 32 and 33 units, other units in the IWTP may receive hazardous waste or constituents and were designated Site 35, Miscellaneous IWTP SWMUs. These individual SWMU were investigated

for possible releases. Most of these units are above ground tanks. These tanks require only visual inspection for leaks, cracks, or other evidence of release. Also included were underground oil/sludge storage tanks and underground piping which were appurtenances to SWMUs. The following units were included as IWTP area SWMUs:

- Industrial Grit Chamber
- Primary Clarifier
- Oil/Water Separator
- Oil Storage Tanks
- Sludge Thickener
- Belt Filter Presses
- Parallel Flocculators
- Aeration (activated sludge) Tank
- Parallel Final Clarifiers
- Aerobic Sludge Digester
- Contact Chlorinator
- Ancillary Piping, Pumps, Junction Boxes, etc.

Two general types of organic contamination were detected in the soil at Sites 33 and 35. The most pervasive contaminants were PAHs, pesticides, and PCBs. In general, concentrations were lower in magnitude than those detected at Site 32. The irregular and poorly delineated distribution of contaminants suggested that historically documented source areas (surge pond and stabilization pond) and several potential localized sources (i.e., miscellaneous spills, leaks, and/or line breaks) might have contributed to soil contamination. The spatial distribution of the contaminants indicated impacted soil at the southeastern corner of the former surge pond and around the surge tank. In addition, the spatial distribution indicated impacted soil from an undefined source near the chlorine contact chamber (EnSafe, 1997).

A second type of soil contamination appeared restricted to the oily horizon at the water table around the area of the former waste oil UST. The contaminant source was thought to be leakage from the former waste oil tank (EnSafe, 1997).

Groundwater sampling activities conducted to date indicate that the groundwater in the vicinity of OU10 had been impacted by VOC, base neutral acid (BNA) extractable organic compounds (or SVOC), metals, and other inorganics (ADVENT, 2007).

6.3.1 Initial Response

RCRA detection monitoring identified groundwater contamination attributable to the surge pond. Therefore, a RCRA assessment monitoring program was implemented to determine the extent of contamination. Based on results of the RCRA assessment monitoring program, a groundwater recovery system was designed and installed to remediate contaminated groundwater.

In September 1987, Environmental Regulation (FDER) issued RCRA Permit No. H017-127026 to the U.S. Navy Public Works Center (PWC) to operate the surge pond. The permit stipulated the continued operation of the corrective action system (the recovery wells) and the implementation of two quarterly groundwater monitoring programs: (1) point-of-compliance monitoring at the surge pond and (2) corrective action monitoring to determine the effectiveness of ongoing groundwater remediation. Well sets and parameters for analysis were separately defined for each monitoring program. The first quarterly groundwater sampling for corrective action and point-of-compliance programs was initiated in November 1987.

In January 1988, FDER (presently FDEP) issued closure permits to the U.S. Navy PWC for the polishing pond, stabilization pond, and the ISDBs (No. HF17-134657). Liquids removed from the impoundments were processed through the IWTP. Sludge was removed and transported to a hazardous waste disposal facility. Upon closure, the clay liner and/or subsurface soil of each impoundment were sampled and analyzed.

The subsequent laboratory report indicated only low concentrations of phenol in liners or soil beneath the stabilization and polishing ponds; and hence, FDER granted clean closure status to these impoundments. Samples from the liner or soil beneath the ISDBs, however, indicated several contaminants.

A closure permit for the surge pond (No. HF17-148989) was issued in November 1988 to the U.S. Navy PWC. Upon closure, the clay liner and/or subsurface soil were sampled and analyzed. As with the ISDBs, several contaminants were identified. Consequently, both the surge pond and ISDBs were capped with low-permeability covers (clay and asphalt, respectively) as a condition of closure in 1989. A groundwater monitoring program was developed to ensure the effectiveness of the caps.

In 1992, regulatory focus of environmental investigation at the IWTP shifted from RCRA to CERCLA. An RI/FS Work Plan for OU10 was submitted to meet CERCLA requirements. (EnSafe, 1997). On March 11, 2002 The Navy sent a letter to the regulatory agencies requesting that OU11 groundwater remediation be handled under RCRA regulatory authority. The transfer was requested because OU10 met the criteria established in 62 FR 62523 to defer the site to the RCRA program and the performance standards for CERCLA were included in the RCRA Corrective Action Plan. Therefore the RCRA corrective action would afford equivalent protection to a CERCLA action and the transfer to RCRA would

eliminate the need for further cleanup under CERCLA. On August 12, 2003 FDEP approved the transfer of OU10 to the RCRA program with the provision that the site also be monitored under the CERCLA Five-Year Review process.

6.3.2 Basis for Taking Action

Contaminants

Hazardous substances that have been released at the site in each media are shown on Table 6-2.

TABLE 6-2
CONTAMINATS OF CONCERN OU10
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Site 32 Soil	**Sites 33 and 35 Soil**
Dichlorobenzene isomers	PAHs
PAHs	Pesticides
Cyanide	PCBs
Pesticides	
PCBs	
Heavy Metals	
Sites 32, 33, and 35 - Sediment	**Sites 32, 33, and 35 – Surface Water**
PAHs	Non-chlorinated aromatics
Pesticides	Pesticides
PCBs	Heavy Metals
Heavy Metals	
Sites 32, 33 and 35 - Shallow Groundwater	**Sites 32, 33 and 35 - Intermediate Groundwater**
Toluene	Tetrachloroethylene, Trichloroethene
Pesticides	Vinyl chloride, cis-1,2-dichloroethene
Chromium	Chlorobenzene
Lead	1,2-Dichlorobenzene
Iron	1,4-Dichlorobenzene
Manganese	Cadmium, Chromium
Cadmium	Beryllium
	Iron
	Manganese

Risk associated with exposure to all environmental media (and combinations) was within USEPA's generally acceptable ranges for both current site workers and potential current child trespassers (EnSafe, 1997). For an unlikely hypothetical future site resident, exposure media were shown to exceed acceptable residential goals. These media included surface soil, shallow/intermediate groundwater, and deep groundwater (EnSafe, 1997).

6.4 REMEDIAL ACTIONS

6.4.1 Remedy Selection at OU10

The ROD for NAS Pensacola OU10 was signed on June 16, 1997. RAOs were developed as a result of data collected during the RI to aid in the development and screening of remedial alternatives to be considered for the ROD.

The purpose of the remedial action at OU10 was to reduce the risks to human health and environment associated with exposure to soil and groundwater. To meet these goals, RAOs were identified. Table 6-3 lists the RAOs for OU10.

TABLE 6-3
REMEDIAL ACTION OBJECTIVES FOR OU10
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Medium	Contaminants Causing Unacceptable Risk	Remedial Action Objectives
Soil	Benzo(a)pyrene and dibenzo(a,h)anthracene	Eliminate human health risk above 1E-6.
Groundwater	Chlorinated benzenes and naphthalene	Protect groundwater from contaminants leaching from the soil.

Four remedial alternatives were evaluated in the FS for OU10 to address the soil RAO. Of the four alternatives evaluated, the selected remedial action for OU10 was two components of the preferred alternative and a component of Alternative 4. The major components involved:

- Leachability study on Areas B, C, and D with excavation as a contingency and groundwater treatment under RCRA
- Excavation of Area A

The following components constituted the remedial action for OU10 to address the groundwater RAO:

- Implementation of a groundwater remediation system.

- Groundwater monitoring will continue at sampling intervals established during the remedial design developed in the CAP for the RCRA permit modification. The groundwater monitoring program will continue until a five-year review concludes that the alternative has continuously attained the performance standards and remains protective of human health and the environment.

6.4.2 Remedy Implementation

In March 1997, soil samples were collected from Areas B, C, and D. The samples were submitted to a laboratory for Synthetic Precipitation Leaching Procedure (SPLP) analysis of SVOCs and VOCs. No compounds were detected above the groundwater cleanup criteria; therefore, soil from Areas B, C, and D does not pose a threat to the groundwater and no further action was required at Areas B, C, and D (BEI, 1998).

The remedial contractor mobilized to the site on November 3, 1997. All site preparation activities were completed on November 5, 1997 and excavation of contaminated soils from Area A was completed on November 7, 1997. Ten dump trucks transported approximately 200 cubic yards (or approximately 230 tons) of soil to a Subtitle D landfill for disposal. Backfill of the excavation was completed on November 10, 1997. Replacement of fencing and topsoil, placement of grass seed, and demobilization occurred on November 12, 1997.

On July 28, 2000, in accordance with the ROD and RCRA permit compliance requirements, a CAP was issued detailing the methods to be used for source reduction, monitored natural attenuation, corrective action verification, and a contingency plan. Corrective action verification would determine if the groundwater treatment and natural attenuation were reducing the groundwater contaminant levels and ensure that the contamination is not migrating off-site. Both the monitored natural attenuation and RCRA permit compliance sampling would be conducted simultaneously. Monitored natural attenuation data would be reported in an annual monitored natural attenuation report, which would be included in the respective semiannual RCRA monitoring report. The state of Florida's RCRA Authority would administer all groundwater remedial actions at OU10. The contingency plan was developed to address the possibility of the groundwater treatment protocol and natural attenuation not effectively reducing contaminants below groundwater standards.

Groundwater monitoring in accordance with the CAP and the RCRA permit began in February 2001. Oxygen Release Compound (ORC) was injected into the groundwater on March 24, 2001 to enhance biodegradation of chlorinated benzenes. Following the ORC injection concentrations of chlorobenzene immediately down gradient of the source were lowered substantially. Similar decreases in benzene and dichlorobenzene concentrations were observed during the ORC Pilot Study. Based on the results of the pilot study, ORC proved to be effective in delivering dissolved oxygen and stimulating the biodegradation

of the benzene and chlorobenzene. However, the ORC injection lost effectiveness within 9 months of the injection date and therefore it was determined that the high cost of re-injection on an annual basis was not cost effective (TN&A, 2006).

In May 2005, TN & Associates, Inc. initiated a Biosparging remediation system at SWMU 1 the Sludge Drying Beds located at the OU10 the WWTP. The biosparging system was operated over the course of a year and four quarterly sampling events were completed. The Remedial Action Completion Report and Fourth Quarter Report (TN&A, 2006) was completed in July 2006 and the conclusions indicated:

- The biosparging remediation system reduced contaminant concentrations and dramatically altered the site water chemistry. Significant contaminant mass reduction had been achieved and the natural attenuation default goals were met for all wells and constituents.

- Based on sampling data the groundwater system pH and other chemistry parameters return to baseline when system operation was limited.

- Contaminant concentrations remained low and did not rebound within the sampling period even when system operation was limited.

The recommendations of the completion report indicated, “Contaminate mass reduction has been achieved and the natural attenuation default goals have been met for all constituents. It is recommended that the biosparging system be turned off and left in place while potential for contaminant rebound is evaluated during subsequent sampling events.” (TN&A, 2006). Subsequent rebound monitoring confirmed that concentrations remained below natural attenuation default criteria and the biosparging system was removed from the site.

In April 2008 Solutions- IES submitted a Work Plan to complete a Pilot System Installation for the treatment of Chlorinated Solvents in Groundwater at SWMU 1. The pilot study was completed to evaluate the reduction in chlorinated solvents concentrations associated with the introduction of a buffered organic substrate. The substrate was an emulsified oil substrate amended with alkaline solids, known as AquaBupH™. The product was used to create anaerobic conditions and to enhance the growth of indigenous microorganisms capable of degrading chlorinated solvents.

Following injection of the remediation agents, groundwater monitoring was conducted for a period of one year to evaluate the effectiveness of the pilot study. Data from the pilot study showed that AquaBupH™ created anaerobic conditions, raised the groundwater pH and slightly enhanced the growth of indigenous microorganisms capable of degrading chlorinated solvents. The results were an indication that with modification of aquifer geochemistry, enhanced reductive dechlorination (ERD) had potential to reduce chlorinated VOC concentrations at this site.

Following the successful results of the 2008 pilot study, the bioremediation system at SWMU 1 was expanded to address a larger portion of the residual chlorinated VOC contamination in the lower portion of the aquifer. The remaining contamination serves as a continuing source of dissolved chlorinated solvents in groundwater, making the objective of utilizing monitored natural attenuation as the groundwater remedy more difficult to achieve. The elevated trichloroethene loading, unusually high sulfate concentrations and low groundwater pH (as a result of the sulfuric acid spill), and geochemical artifacts from historical abiotic remediation attempts, presented several challenges for the full-scale design to consider. The March 2010 Work Plan was submitted to FDEP that described the layout of 52 injection points in a quasi-grid pattern covering approximately 0.1 acre of the site. The focus of the full-scale implementation was to reduce source area concentrations. The full-scale injections were performed in May-June 2010. The site was monitored for approximately 13 months post-injection. The results were detailed in the Fourth Technical Memorandum prepared by Solutions-IES, Inc. (July 2011), and provided multiple lines of evidence that the treatment of SWMU 1 actively improved the groundwater situation.

The substrate injections conducted in 2010 resulted in significant concentrations of electron donor throughout the source area and immediately downgradient from the source (total organic carbon [TOC] > 20 mg/L). The buffered substrate increased the pH in most monitoring wells, creating conditions more conducive to reductive dechlorination. The average concentration of trichloroethene in groundwater beneath the treatment area has decreased by 48 percent from 5,460 µg/L to 2,820 µg/L since the beginning of the bioremediation activities (i.e.,Pilot and Full-scale) at the site. Biodegradation daughter products including cis-1,2-dichloroethene, vinyl chloride, ethene and ethane were reported in most wells in the treatment area, although the amounts varied widely across the site. Compound Specific Isotope Analysis (CSIA) showed that biotransformation was occurring consistent with the observed concentration changes.

While the 2010 full-scale implementation of enhanced reductive dechlorination has been successful in creating anaerobic conditions, increasing the pH, and partially reducing trichloroethene concentrations, efficient reductive dechlorination of trichloroethene and daughter products has not been observed. The presence of elevated sulfate concentrations along with organic carbon under strongly reducing anaerobic conditions has the potential to inhibit ERD itrichloroethenen two ways: (1) as an electron acceptor, the sulfate can consume electrons generated from fermentation of the organic substrate before they become available for use by bacteria to degrade trichloroethene and cis-1,2-dichloroethene; and (2) sulfate can be transformed by sulfate-reducing bacteria to sulfide, which can be toxic to bacteria. An area of the site with the historically highest sulfate concentration showed little to no reductive dechlorination. Despite elevated TOC and reducing conditions, these data strongly suggest toxicity in this location. Additional optimization studies are on-going to evaluate options to enhance reductive dechlorination and increase the rates of trichloroethene biodegradation in the source. Even with the observed sub-optimal rates of trichloroethene biodegradation occurring in the source area, the groundwater plume remains stable and

trichloroethene and daughter product concentrations are completely reduced to non-detect levels prior to groundwater discharging to Pensacola Bay. The success of MNA at this site has been documented through regular reporting to FDEP since 1997.

In accordance with the RCRA permit and ROD, groundwater monitoring for RCRA compliance, natural attenuation monitoring, and corrective action verification will continue to occur twice a year (May and November). Groundwater samples are collected and analyzed for VOC, SVOC, metal contaminants, and MNA parameters.

As stated in the ROD for OU10 (EnSafe, 1997) the Navy's original 1997 cost estimate for implementation of the remedial action was $186,500. The actual costs of remedial actions (soil removal and leachability study) for OU10 were $143,684. The cost for groundwater and natural attenuation monitoring required in the RCRA permit as well as additional active remediation are funded through the ER,N Program.

6.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

6.5.1 Protectiveness Statements from the Last Review

This is the second Five-Year Review since the approval of the ROD. The first NAS Pensacola Five-Year Review addressed OU1 and OU10 and was prepared in February 2003. The second Five-Year Review addressed OU1, OU4, OU11, and OU13 and was completed and signed by the Navy on August 22, 2008. However, OU10 was not included in the second Five-Year Review because the site was transferred to the RCRA Program. At the request of the regulatory agencies OU10 has been added to this the third Five-Year Review for NAS Pensacola.

6.5.2 Status of Recommendations and Follow-up Actions from Last Review

Because OU10 was not included in the last Five-Year Review there are no recommendations or follow-up actions.

6.6 FIVE-YEAR REVIEW

This is the second Five-Year Review for this site. The first Five-Year Review only addressed OU1 and OU10 and was prepared in February 2003. The second Five-Year Review addressed OU1, OU4, OU11, and OU13 and was completed and signed by the Navy on August 22, 2008. OU10 was not included in the second Five-Year Review because the site was transferred to the RCRA Program. Based on the NAS Pensacola Partnering Team's decision, OU10 was removed from the NAS Pensacola Five Year Review completed in 2008, and regulatory review is completed in the semiannual report submitted to FDEP. The OU10 corrective action including the groundwater MNA program is continuing under the RCRA regulatory program currently administrated by FDEP.

It should be noted that there is a ROD requirement to review OU10 in the Five-Year Review and that the FDEP correspondence approving the transfer to the RCRA program stipulated that the site be included in the NAS Pensacola Five-Year Review. The Navy plans to discuss with the Regulatory Agencies a full transfer of OU10 to the RCRA program to eliminate the duplicate regulatory review and processing caused by oversight in both the CERCLA and RCRA programs. The full transfer will require an ESD for the completed ROD and regulatory concurrence. Once completed, OU10 would not be included in the NAS Pensacola Five-Year Review, similar to the previous 2008 Five-Year Review.

6.6.1 Document Review

This Five-Year Review consisted of a review of relevant documents including the Proposed Plan, the ROD, the Completion Report for Remediation Work, the CAP, the Post-closure RCRA permit, and subsequent semiannual monitoring reports, the Work Plan for the Pilot Study and Full-Scale system Installation for the Treatment of Chlorinated Solvents in Groundwater at SWMU 1, and Remedial Action completion Report and Fourth Quarter Report for Biosparging at SWMU 1 Waste Water Treatment Plant. Additionally, FDEP CTLs from Chapter 62-777, FAC were reviewed.

6.6.2 Data Review

The results from the soil removal indicate that all contaminated soil was removed, and the soil was replaced with clean backfill (BEI, 1998).

Review of RCRA compliance and natural attenuation monitoring reports for years 2003 through 2012 indicates a general reduction in source area and plume-wide contaminant concentrations. In addition, significant reductions in concentrations of chlorinated ethenes and chlorinated benzenes are observed along groundwater flow paths from the source areas near the former sludge drying beds toward Pensacola Bay. The success of natural attenuation processes at reducing chlorinated solvent concentrations to below FDEP GCTLs prior to discharge to Pensacola Bay has been documented in numerous monitoring reports to FDEP since 1997. In addition to successful MNA, two remedial systems have been implemented at the site in the last eight years to enhance in situ treatment of elevated concentrations chlorinated benzenes and chlorinated ethenes in two separate source areas. The first remediation system relied on biosparging to successfully treat benzene and chlorinated benzenes present under the former sludge drying beds through aerobic biodegradation. The second remediation system was discussed in detail in Section 6.4.2 and relied on enhanced reductive dechlorination of chlorinated ethenes in a small source area immediately downgradient of the former sludge drying beds. This remedial system is on-going.

6.6.3 Site Inspection and interviews

Tetra Tech personnel conducted an inspection at OU10 on May 3, 2012. The purpose of the inspection was to assess the protectiveness of the remedy based on visual observation. The fencing surrounding the areas of highest known contamination was intact and in good condition. Appropriate signage is in place at the entrance to the site. The remedial cap covering the ponds, appears to be in good condition with no sign of compromised integrity and the monitoring wells were accessible and in good condition. No deficiencies were noted during the site inspection.

Discussions with the Navy, including the Base and NAVFAC SE personnel were conducted in preparation of this report. Based on these discussions, it was determined that groundwater sampling events were being conducted in accordance with the RCRA permit and in situ remediation systems had been initiated to address source area groundwater contamination. Local authorities have not received reports of vandalism, trespassing or any emergency responses occurring at the Site. The base is well informed of Site activity and progress. A Resource Conservation and Recovery Act (RCRA) inspection is conducted semiannually. The permit renewal date is September 20, 2016.

6.6.4 ARAR Level Changes

The following standards were identified as chemical, action, or location specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

Federal

- National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)
- Clean Water Act Discharge Limits NPDES Permit (40 CFR 122, 125, 129, 136)
- Ambient Water Quality Criteria (40 CFR 131)
- National Primary Drinking Water Standards (40 CFR 141)
- Identification and Listing of Hazardous Wastes (40 CFR 261)
- Standards Applicable to Generators of Hazardous Waste (40 CFR 262)
- Standards Applicable to Transporters of Hazardous Waste (40 CFR 263)
- Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR 264)
- RCRA Location Requirements (40 CFR 264.18)
- RCRA Land Disposal Restrictions (40 CFR 268)
- Department of Transportation Rules for the Transport of Hazardous Substances (49 CFR 107, 171-179)
- National Primary and Secondary Ambient Air Quality Standards (40 CFR 50)
- MCLGs (PL No. 99-339 100 Stat. 462 (1986)
- Executive Order 11990 Wetlands Protection Policy

State

- Florida Water Quality Standards, FAC, Chapter 62-3
- Florida Rules on Permits, FAC, Chapter 62-4
- Florida Surface Water Standards, FAC, Chapter 62-301 and – 302
- Florida Drinking Water Standards, Monitoring and Reporting, FAC, Chapter 62-550
- Florida Ambient Air Quality Standards
- Florida Hazardous Waste Rules, FAC, Chapter 62-730
- Florida Cleanup Target Levels, FAC Chapter 62-777 (Amended)
- Florida Hazardous Substances Release Notification
- Contaminated Site Cleanup Criteria, FAC, Chapter 62-780

It should be noted that Florida Water Quality Standards, FAC, Chapter 62-3 and Chapter 62-550 were repealed in January 2000 and December 2006, respectively. FAC Chapter 62-777 was amended In April 2005. The addition of FAC Chapter 62-780 to the list of ARAR standards does not affect the protectiveness for groundwater because Chapter 62-777, FAC provides default groundwater, surface water, and soil CTLs, which defaults to the MCLs listed in Chapter 62-550.

Since the ROD for OU10 was finalized in 1997, changes to federal regulations in 2002 and 2006 and to Florida regulations in 2005 lowered the MCL for arsenic in groundwater from 50 to 10 µg/L. On January 22, 2001, the USEPA adopted a new MCL for arsenic in drinking water at 10 µg/L, replacing the old standard of 50 µg/L. The USEPA rule became effective on February 22, 2002 and became enforceable to water systems on January 23, 2006. Florida's drinking water standards are contained in Chapter 62-550, F.A.C. Florida's primary drinking water standards, which are health based, are described in Rule 62-550.310, F.A.C. Florida changed its MCL for arsenic from 50 µg/L to 10 µg/L on January 1, 2005.

These standards have remained unchanged and no new ARARs were identified that impact the effectiveness of the remedy for OU10.

6.7 TECHNICAL ASSESSMENT

6.7.1 Question A: Is the remedy functioning as intended by the decision documents?

Remedial Action Performance*:* Contaminated soil was previously removed from Area A of OU10 and replaced with clean backfill and groundwater has been treated through a number of remediation technologies, including chemical oxidation and enhanced bioremediation, to reduce concentrations of chlorinated solvents in source areas. Monitored natural attenuation sampling of residual concentrations of regulated compounds in the downgradient plume is being conducted at the prescribed intervals. An in situ bioremediation system is currently in operation to address elevated concentrations of chlorinated ethenes in a small source area directly downgradient of the former sludge drying beds. Monitored natural

attenuation has been shown to be extremely effective in limiting migration of the plume and in preventing the plume from discharging into Pensacola Bay.

Early Indicators of Potential Remedy Failure: Remedial systems have been very effective in treating benzene and chlorobenzene-contaminated groundwater. A biosparging system was installed in 2005 and significantly reduced benzene and chlorobenzene concentrations. A full-scale enhanced bioremediation system for the chlorinated ethene source area is on-going. Initial results from the full-scale implementation are encouraging in that the groundwater conditions are anaerobic, the pH has been raised throughout most of the source area, and trichloroethene concentrations have been reduced. Additional optimization of the system is on-going to evaluate options to enhance trichloroethene biodegradation rates and increase the efficiency of the system.

Implementation of Institutional Controls and Other Measures: The MOA was completed on August 31, 1999 and has been approved and authorized by the responsible parties including USEPA, FDEP, and the Navy. The LUCIP is included as an appendix to the MOA.

6.7.2 Question B: Are the assumptions used at the time of remedy selection still valid?

Exposure Assumptions: There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes to Standards and To Be Considered: ARARs and TBCs considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. For groundwater, there have been no changes that affect the protectiveness.

Florida groundwater regulations Chapter 62-550, F.A.C. and Chapter 62-777, F.A.C. have performance criteria that are equal to or lower than the Federal Safe Drinking Water Act of 1974 (amended in 1986 and 1996, and therefore are adequate to assess whether the remedies are functioning as intended because the lower of the state or federal performance criteria are used.

Changes in Exposure Pathways: No changes in the site conditions or land use that affect exposure pathways were identified as part of the Five-Year Review. Exposure to the site groundwater is still restricted by institutional controls.

USEPA has new guidance to address VI issues, specifically titled Assessing Protectiveness at Sites for Vapor Intrusion, Supplement to the “Comprehensive Five-Year Review Guidance,” OSWER Directive 9200.2-84. The Navy does not currently have any occupied buildings within the OU10 groundwater contaminant plume, nor are occupied buildings located within 100 feet of the groundwater plume. Further the facility is currently preparing plans to demolish the existing building which will be completed as

funding becomes available. The buildings are currently located within a secured fenced area which restricts access. Therefore OU10 does not require consideration for vapor intrusion.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in human health or ecological toxicity criteria that would impact protectiveness of the remedy.

Changes in Risk Assessment Methodologies: Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

6.7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Institutional controls for groundwater use were not included in the OU10 ROD. However, a LUCIP for OU10 was developed and included in the MOA.

6.8 ISSUES

Issues were discovered during the Five-Year Review and are noted in Table 6-4.

TABLE 6-4
OU10 ISSUES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

	Issues	Affects Protectiveness (Y/N)	
		Current	Future
1	Some monitoring wells are reported to be in disrepair.	N	Y
2	The arsenic MCL per the Safe Drinking Water Act and Chapter 62-550, F.A.C. has been changed from 50 µg/L, which is the Performance Standard in the ROD, to 10 µg/L	N	Y
3	Although OU10 was previously transferred from the CERCLA program to the RCRA program a full transfer was not completed. A CERCLA Five-Year Review of the site is still required even though it is managed under the RCRA program.	N	Y
4	The on-going in situ bioremediation system has showed only partial success in treating trichloroethene concentrations in the source area. Geochemical conditions in the aquifer (reduced pH and elevated sulfate concentrations) have made in situ bioremediation challenging.	N	Y

6.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The recommendations and follow-up actions are outlined in Table 6-5.

TABLE 6-5
OU10 RECOMMENDATIONS AND FOLLOW-UP ACTIONS
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Repair or replace damaged monitoring wells	Navy	USEPA & FDEP	September 1, 2014	N	Y
2	Complete the ESA for arsenic	Navy	USEPA & FDEP	September 1, 2014	N	Y
3	Evaluate and discuss the full transfer of OU10 to RCRA and remove the Five-Year Review requirement from the ROD.	Navy	USEPA & FDEP	September 1, 2014	N	Y
4	An Optimization Study of the current in situ bioremediation system is underway to diagnose problems and evaluate technical options to improve system performance and efficiency.	Navy	USEPA & FDEP	September 1, 2014	N	Y

6.10 PROTECTIVENESS STATEMENT

The remedy at OU10 currently protects human health and the environment because LUCs have been implemented and are being enforced. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure long-term protectiveness: repair or replace damaged monitoring wells; complete an ESD for the change in arsenic standards and possible the full site transfer to the RCRA program; and complete the ongoing Optimization Study.

7.0 OPERABLE UNIT 11

The OU11 ROD was issued by the Navy and USEPA on October 5, 2006. FDEP concurred with the ROD on March 10, 2006. Implementation of the remedial actions at OU11 began in 2006. The initial Five-Year Review for OU11 was completed in 2008. This Five-Year Review consists of an approximate five-year period of data and provides a status update for OU11, Site 38 – Building 71 and 604 (hereinafter Site 38), surrounding areas, and the IWTP sewer line. This Five-Year Review for Site 38 is being conducted because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

7.1 SITE CHRONOLOGY

A list of significant Site 38 historical events and relevant dates is provided in Table 7-1.

TABLE 7-1
OU11 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Aircraft painting and stripping conducted at Building 71	1935 – Late 1970's
Metal plating operations at Building 604	1960 – 1996
Hazardous materials stored on second floor of Building 604	1970's - 1996
Hazardous waste stored at Building 71	1980 - 1989
IAS on-site survey	1982
IAS Final Report	June 1983
Confirmation and Verification Study conducted	1984
Characterization Study conducted	1986
RCRA Facility Assessment	1988
RCRA/HSWA Permit issued	1988
RCRA Closure of hazardous waste storage facility	1989
Contamination assessment/RI – Phase I conducted	1991
UST removed from facility	1992
Contamination Assessment/RI – Phase II conducted	1993
Contamination detected in surface soil, subsurface soil, and shallow groundwater, soil and groundwater COCs identified and remedial goals established	1994-2004

TABLE 7-1
OU11 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Final Technical Memorandum, Evaluation of MNA at OU11, Site 38	December 1999
RCRA/HSWA Permit renewed	January 2002
Limited source removal activities conducted	2004
Final ROD	October 5, 2006
Five-Year Review	August 2008
Remedial Design for Land Use Controls and Groundwater Monitoring at Operable Unit 11 (Draft)	November 29, 2010
Confirmatory Sampling Letter Report for OU11, Site 38	June 17, 2011

7.2 BACKGROUND

7.2.1 Physical Characteristics of OU11

Site 38 is within the boundaries of NAS Pensacola in Pensacola, Florida (Figure 1-2). Building 71, shown on Figure 7-1, was used from 1935 to the late 1970s for aircraft paint stripping and painting operations, and consisted of a steel-framed structure with metal siding on a 10 to 14 inch thick concrete slab. The building was approximately 100 feet wide by 160 feet long and approximately 35 feet high. An interior concrete block wall divided it into a northern half, curbed with concrete in several places, and a southern half enclosing 10 dip tanks. The building was demolished in 1993. Building 71 was used from 1935 to the late 1970s for aircraft paint stripping and painting operations.

From 1980 to 1989, hazardous waste was stored on the north side of Building 71, which was permitted for hazardous waste storage in January 1985 by the FDEP (formerly the FDER) (NEESA, 1985). Waste stored during this period reportedly consisted of solvents, acids, caustics, oxidizers, and liquid and non-liquid toxic materials (E&E, 1992).

Wastes from various operations at Site 38 (including paint stripping) were discharged to Pensacola Bay until the IWTP was built in 1973. Wastes previously entered the IWTP sewer line by gravity feed and force main without any pretreatment or segregation. Except for one 18-foot section constructed of 8-inch diameter polyvinyl chloride (PVC) pipe, the lines in this area are constructed of 8 to 12 inch diameter vitrified clay with hub and spigot joints. Building 3435, north of the Building 71 area, housed the lift station for the force main. The interconnected gravity lines, which previously served operations at Building 604

and Building 71, flow to the lift station at Building 3435. The force main extends northeast from the lift station where it eventually discharged to the IWTP (EnSafe, 2005a).

Building 604, shown on Figure 7-1, was an irregularly shaped, brick/masonry structure built in 1937. NADEP metal plating operations were located in Building 604 until it was closed in May 1996 (EnSafe, 2005a).

Initial plating operations were conducted in the western portion of Building 604 from approximately 1960 until the shop was demolished around 1970 (NEESA, 1983). Plating operations were subsequently transferred to a larger plating shop, constructed in 1970, in the southwest portion of Building 604. Three cadmium plating lines and a magnesium treatment line were located in the plating shop. Chromium was used in the magnesium treatment process. NEESA (1983) reports that 50-gallon tanks containing chromium solutions were drained approximately once per month; larger tanks were present but were drained less frequently. Reportedly, these tanks were emptied into sewer lines that discharged into Pensacola Bay (NEESA, 1983). Cyanide solutions were also used in the plating process, and prior 1962, cyanide waste was disposed in the sanitary sewer. Cyanide and chromium wastes that were dumped into the sewer system were routed to bypass the treatment plant and flowed untreated into Pensacola Bay. Hazardous materials were stored on the second floor of Building 604.

7.2.2 Land and Resource Use at OU11

Site 38 is located north of Pensacola Bay along Radford Boulevard, in the southeastern portion of the NAS Pensacola facility. The site, formerly an approximate 12 acre industrial area, was primarily paved or covered by buildings. Building 71 was used from 1935 to the late 1970s for aircraft paint stripping and painting operations. Wastes from various operations, including paint stripping, were discharged to the Pensacola Bay until the IWTP was built in 1973. Building 604 housed the NADEP metal plating operations until it was closed in May 1996. This two-story, irregularly shaped, brick masonry structure was built in 1937 as a hangar on the west side of East Avenue in the old Navy yard.

The area is generally flat with land surface elevations approximately 3 to 8 feet above mean sea level. Rainfall is addressed via an existing storm water management system (EnSafe, 2005a). Groundwater flow generally mimics the peninsular topography and flows to the south towards Pensacola Bay. Groundwater is not used as a potable water source at OU11 (EnSafe, 2005a). The main source of potable water for NAS Pensacola is the Navy-owned well field located at NTTC Corry Station, which is located approximately three miles north of NAS Pensacola on the northern (opposite) side of Bayou Grande.

Many of the buildings in the Site 38 area were damaged in 2004 by Hurricane Ivan and subsequently demolished. The Building 71 area is currently a recreational area that is used for ceremonial activities.

The Building 71 area is mostly grass and shrubbery bordered by concrete sidewalks, a small parking area is on the northern portion of the site for parking. Much of the Building 604 area is a natural area and parts of the southern end of the site are used for parking. Future uses for Site 38 are limited to commercial/industrial and recreational land use. The projected future land use for these areas is designated as green space area that includes a walking trail along the Pensacola Bay waterfront.

7.3 HISTORY OF CONTAMINATION

Site 38 was found to have contaminated soil and groundwater at Buildings 71 and 604 that were associated with the IWTP sewer line areas. Soil data generated by various investigations at Site 38 identified constituents in surface and subsurface soil above Florida's applicable Chapter 62-777, F.A.C. residential and industrial direct exposure SCTLs, and Leachability to Groundwater SCTLs.

Contaminants identified in the surface soil in the Building 71 study area included inorganics, SVOCs, pesticides, and PCBs. Soils that contained organic exceedances of industrial direct exposure and Leachability to Groundwater SCTLs were limited in areal extent, and pesticide and PCB exceedances were limited to two locations. Pesticide detections in these areas are likely the result of pesticide application. Contaminants identified in the subsurface soil included inorganics, SVOCs, pesticides, and VOCs, with much of the contamination underneath the building. The contaminants are likely the result of past paint stripping and metal refinishing activities at Building 71.

Contaminants identified in the surface soil in the Building 604 study area included inorganics, SVOCs, pesticides, and PCBs. The exceedances of industrial direct exposure and Leachability to Groundwater SCTLs were limited in areal extent. Pesticide detections in these areas are likely the result of pesticide application. Contaminants identified in the subsurface soil included inorganics, SVOCs, pesticides, and VOCs. The contaminants are likely the result of past plating activities at Building 604.

7.3.1 Initial Investigation at OU11

The hazard presented by potential exposure to the contaminants identified at Site 38 initiated a baseline risk assessment in accordance with USEPA and FDEP guidance. The results of the baseline risk assessment prompted the performance of a preliminary risk evaluation of potential risks from site constituents to human receptors at the site. The risks calculated in a preliminary risk evaluation are derived by a comparison of exposure concentrations to CTLs. These CTLs are derived using default exposure assumptions established by the USEPA and FDEP. There are no deviations between the Navy and the regulatory agencies regarding those exposure assumptions or pathways defined by the regulatory agencies for residential and industrial exposures. Florida's acceptable target risk is 1E-6 (1 in

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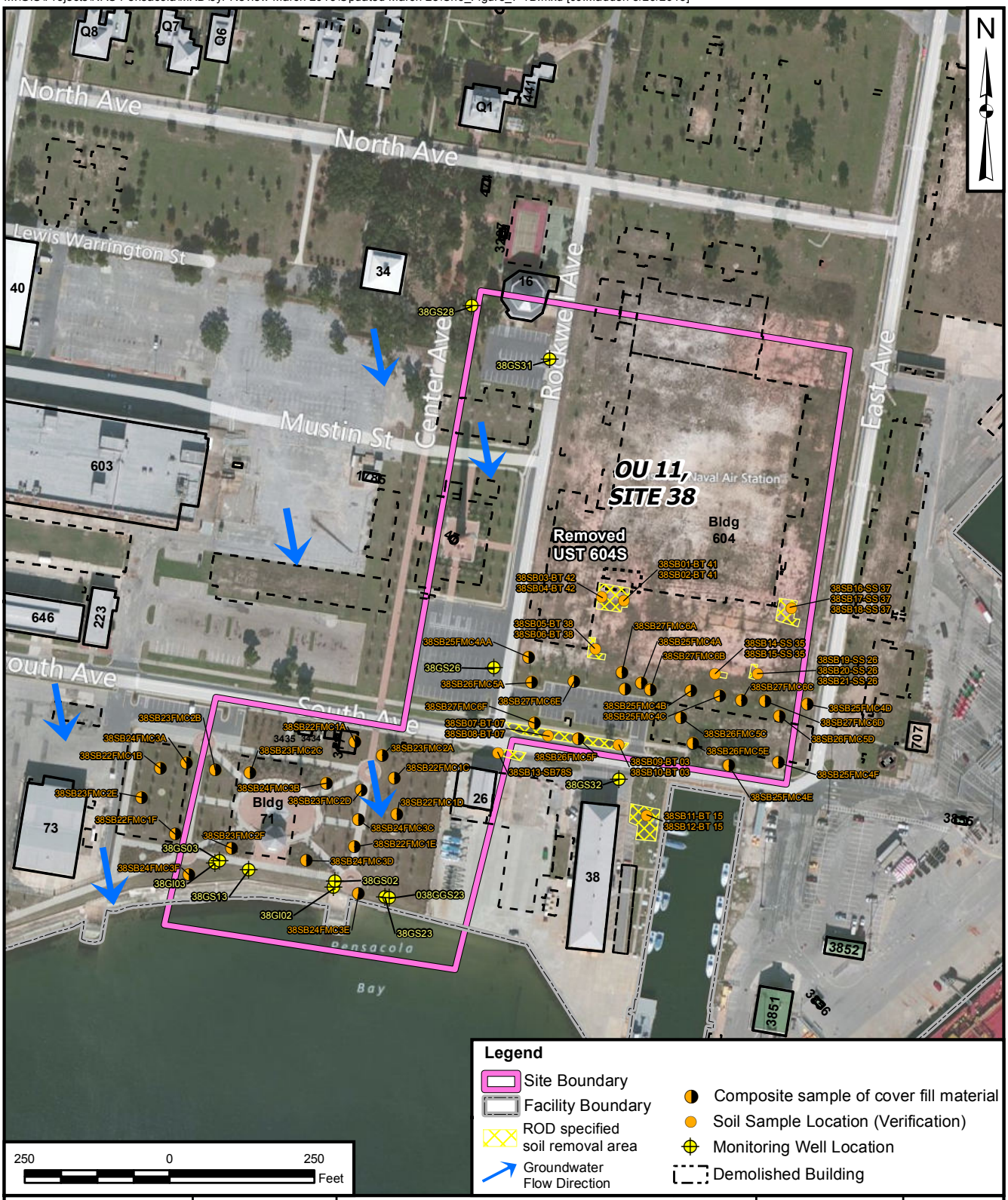


DRAWN BY: GIS	DATE: 8/26/2013	SITE MAP - OPERABLE UNIT 11 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00390
CHECKED BY: A.I.	DATE: 8/26/2013		CTO NUMBER: 067
REVISED BY: ___	DATE: ___		APPROVED BY: ___ DATE: ___
SCALE: AS NOTED			APPROVED BY: ___ DATE: ___
			FIGURE NO.: 7 - 1 REV: 0

1,000,000) for those substances whose cleanup goal was derived because they pose an incremental increase in lifetime cancer risk, not for those substances whose cleanup goal was derived because of systemic non-carcinogenic risks. This represents the risk level on which CTLs are based. Similarly USEPA's acceptable target risk range is 1E-4 to 1E-6 (1 in 10,000 to 1 in 1,000,000) for those substances whose cleanup goal was derived because they pose an incremental increase in lifetime cancer risk. Preliminary risk evaluation is the risk evaluation tool on which remedial decisions are based, and was conducted to refine the list of potential contaminants to actual COCs using guidance by USEPA and FDEP.

7.3.2 Basis for Taking Action at OU11

The RI included a baseline risk assessment to determine potential risks to human health from exposure to contaminants in soil and groundwater. Contaminants were detected in concentrations causing unacceptable risk for future residents within various media at Site 38. COCs related to each medium are summarized in Table 7-2.

TABLE 7-2
OU11 CONTAMINANTS OF CONCERN
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Site 38 Building 71 – Soil	Site 38 Building 71 – Shallow Groundwater
Arsenic	Acenaphthalene
Chromium	Dibenzofuran
Copper	Fluorene
Lead	Naphthalene
Aroclor 1254	Ethylbenzene
Benzo(a)pyrene	Tetrachloroethene
Phenol	Trichloroethene
1,2-Dichloroethane	Vinyl Chloride
2-Methylphenol	Barium
4-Methylphenol	Cadmium
Tetrachloroethene	Copper
Trichloroethene	Iron
	Manganese
	Zinc

TABLE 7-2
OU11 CONTAMINANTS OF CONCERN
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Site 38, Building 604 – Soil	Site 38, Building 604 – Shallow Groundwater
Antimony	Acenaphthalene
Arsenic	Anthracene
Cadmium	Dibenzofuran
Chromium	Fluoranthene
Copper	Naphthalene
Lead	Phenanthrene
Beta-BHC	Pyrene
Delta-BHC	1,2,-Dibro-3-Chloropropar
Dieldrin	Ethylbenzene
Benzo(a)anthracene	Tetrachloroethene
Benzo(a)pyrene	Trichloroethene
Benzo(b)fluoranthene	Vinyl Chloride
Dibenzo(a,h)anthracene	Barium
Methylene Chloride	Cadmium
Tetrachloroethene	Copper
Perchloroethene	Iron
	Manganese
	Mercury

The concentrations of contaminants detected in the soil samples collected at Site 38 exceeded USEPA acceptable risk range (1×10^{-4} to 1×10^{-6}) and FDEP target risk level (1×10^{-6}) for current workers, trespassers, and future residents (Tetra Tech, 2006a). Contaminant concentrations in groundwater were compared against promulgated regulatory criteria per the Safe Drinking Water Act, Chapter 62-550, F.A.C. and Chapter 62-777, F.A.C., and to evaluate potential unacceptable risk due to use/consumption of the water and if natural attenuation may occur. Contaminants exceeding any of these regulatory criteria were listed as COCs.

It was determined there are no unacceptable risks to ecological receptors associated with surface soil contamination, primarily because natural terrestrial habitat features were not present in or around Site 38. The only terrestrial receptors are shorebirds that periodically visit the area. In addition, most of the site was formerly covered by asphalt, concrete, or buildings, and contamination within former small grassy

areas was minimal. The removal of the top 2 feet of soil across Site 38 that contained COCs makes the exposure pathway for surface soil contamination incomplete.

7.4 REMEDIAL ACTIONS

7.4.1 Remedy Selection at OU11

The ROD for OU11 was finalized on October 5, 2006. RAOs were developed from the data collected during the RI to aid in the development and screening of remedial alternatives to be considered for the ROD. The goals of the selected soil and groundwater remedies at OU11 are to protect human health and the environment by eliminating, reducing, or controlling hazards posed by the site and to meet ARARs. Table 7-3 lists the RAOs for OU11.

TABLE 7-3
OU11 REMEDIAL ACTION OBJECTIVES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Medium	Contaminants Causing Unacceptable Risk	Remedial Action Objectives
Soil	Antimony, Arsenic, Cadmium, Chromium, Copper, Lead, Beta-BHC, Delta-BHC, Dieldrin, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Dibenzo(a,h)anthracene, Methylene Chloride, Tetrachloroethene, and Perchloroethene	Prevent unacceptable risk from exposure to surface soil.
Groundwater	Acenaphthalene, Anthracene, Dibenzofuran, Fluoranthene, Fluorene, Naphthalene, Phenanthrene, Phenanthrene, Pyrene, 1,2 Dibromo-3-chloropropar, Ethylbenzene, Tetrachloroethene, Trichloroethene, Vinyl Chloride, Barium, Cadmium, Copper, Iron, Lead, Manganese, Mercury, and Zinc	• Prevent unacceptable risk from ingestion of groundwater with concentrations greater than the Florida CTLs and federal MCLs • Reduce detected concentrations in groundwater to less than the Florida CTLs and federal MCLs • Reduce detected concentrations in groundwater next to the surface water body to below Florida surface water CTLs and federal water criteria.

Five remedial alternatives were considered for soil at Site 38. Of the alternatives evaluated, the selected remedial action was Soil Alternative S4: excavation of industrial direct exposure “hot spots” (3X industrial direct exposure SCTLs) and leachability to groundwater criteria exceedances with off-site disposal and LUCs to prevent residential use. The major components of Alternative S4 are listed below:

- Exposed surface soils exceeding three times the Florida industrial direct exposure SCTLs and leachability to groundwater SCTLs to be excavated and disposed of at an appropriate disposal facility.

- Maintenance of existing asphalt and concrete paved areas covering areas.

- LUCs to prohibit use of the site for residential or residential-like uses and prohibit excavation and removal of subsurface soil unless prior written approval is obtained from the Navy, USEPA, and FDEP.

A supplemental confirmation soil sampling event was conducted in July 2009 at locations where COCs exceeded 3 times their FDEP industrial standards to confirm that the site meets the Chapter 62-780.680, F.A.C., Risk Management Options Level II - A No Further Action with institutional controls determination. The analytical results indicate that with the exception of one sample location where dieldrin exceeded its industrial direct exposure and leachability to groundwater criteria, the concentrations of COCs detected in the confirmatory soil samples were less than 3 times their FDEP industrial standards and met the criteria for a No Further Action with institutional controls determination, and therefore, achieved the objectives of the selected remedy (Soil Alternative S4) presented in the ROD.

The assumption for removing COCs that exceed three-times their industrial standard requires the maximum COC concentration(s) remaining at a site meet or be below a concentration that is three-times the un-apportioned industrial SCTL using the 95% UCL in a quarter acre area. This means that within a quarter acre area of the site there may be a limited number of sample locations where the COC was detected at a concentration above the SCTL, as long as the majority of the other sample locations within the quarter acre area are below the SCTL. In this context, the COC within a quarter acre exposure area does not constitute an unacceptable health risk and is protective of human health.

Three remedial alternatives were considered for groundwater at Site 38. Of the alternatives evaluated, the selected remedial action was Groundwater Alternative G2: natural attenuation, LUCs, and groundwater monitoring to address contaminants in groundwater. The major components of Alternative G2 are listed below:

- MNA.

- LUCs to prevent access and prohibit all use of groundwater from the surficial aquifer underlying the site without prior written approval from the Navy, USEPA, and FDEP, and maintain the integrity of any existing or future monitoring or remediation system.

The remedy was selected for the following reasons:

- Except for the areas identified for removal, detected concentrations of COCs remaining in soil do not present an unacceptable threat to human health or the environment assuming that only industrial and/or commercial uses are permitted at Site 38 and the existing caps are maintained. Because of Hurricane Ivan damage, the Navy removed the buildings and associated parking lots. Surface soil areas identified as exceeding industrial direct exposure SCTLs were to be removed and replaced with clean fill to prevent unacceptable exposure.

- Although contamination is present in groundwater at concentrations greater than federal and Florida CTLs, detected concentrations are relatively low and do not present an unacceptable threat to human health or the environment under the groundwater use restrictions to be implemented as part of the selected remedy.

- The contaminant plume is small and stable and confined to the shallow aquifer, and there is no evidence of ongoing contaminant migration.

7.4.2 Remedy Implementation at OU11

According to NAS Pensacola personnel, in 2004 because of damage as a result of Hurricane Ivan, the Navy elected to remove buildings and associated parking lots in the area of OU11. In addition, surface soil areas identified as exceeding SCTLs were removed and replaced with clean fill to prevent unacceptable exposure. Although the contractor that performed the work did not adequately document the source removal activity; the waste disposal manifests documenting the volume of soil removed are available and the Navy is currently revising a draft Remedial Action Completion Report that will contain additional information requested by the regulatory agencies. The final version of the remedial action completion report with the requested information is currently not available. Below is a description of the cleanup activities conducted at Site 38.

Building 604: Building 604 was demolished and contaminated soil that was identified during the RI to occur from the land surface to 2 feet bls was removed and disposed of between February and March 2006. The soil excavation boundaries and land surface elevations prior to excavation, after excavation and upon final grade of backfill were not surveyed at the Building 604 area; however, Navy personnel conducted periodic inspections to ensure that excavation boundaries and depths occurred as per the contract specifications. A sample was collected from the excavated soil and analyzed utilizing the TCLP. The results indicated that the soil was a non-hazardous waste. Confirmation samples were not collected for chemical analysis. The contractor placed 2 feet of clean backfill into the excavation pit at the

Building 604 area, then re-graded and grass/seeded the area. The clean backfill was not tested for any chemical parameters prior to being placed into the excavation pit.

Building 71: Following Hurricane Ivan in 2004, the on-site buildings and hurricane debris was removed. Contaminated soil from the land surface to 2 feet bls was also removed and disposed of. Four soil samples were collected from the excavated soil and analyzed utilizing the TCLP; the TCLP analytical results indicated that the soil was a non-hazardous waste. Confirmation samples were not collected for chemical analysis. The soil excavation boundaries and land surface elevations prior to excavation, after excavation, and upon final grade of backfill were surveyed at the Building 71 area. The contractor placed 2 feet of clean backfill into the excavation pit, then re-graded and sodded the area. The backfill was tested for a hazardous waste utilizing the TCLP test prior to being placed into the excavation pit. The soil was found to be non-hazardous and could be disposed of at a RCRA Subtitle D landfill. However, because totals analysis was not conducted for VOCs, SVOCs, pesticides, PCBs, and metals, it was determined that the analysis did not meet FDEP and USEPA requirements of determining whether the backfill soil was "clean" (e.g., did not contain constituents at concentrations that would exceed regulatory screening criteria for direct exposure or leachability to groundwater). In late 2008, as part of a larger water front reuse project the Building 71 area was extensively landscaped and a ceremonial pavilion was constructed.

In July 2009, Tetra Tech on behalf of the Navy completed a supplemental confirmation soil sampling event at OU11, Site 38. The study was conducted to determine: 1) if the top 2 feet of soil was removed in the specific areas identified in the ROD; 2) if the top 5 feet of soil was removed in the specific areas identified in the ROD (shown on Figure 7-1); and 3) to determine if clean fill material was used as a replacement for the removed soil. The study included collection of 27 soil samples from the locations of soil exceedances identified during the RI and FS. In addition, six soil samples of the fill material were collected to verify clean fill was used on site. The samples were analyzed for select parameters and a specific dieldrin risk evaluation/discussion was completed. The study samples were collected at the same locations as the previous soil exceedances to determine if the soils had been removed. The analytical results indicate that with the exception of one sample location where dieldrin exceeded its industrial direct exposure and leachability to groundwater criteria, the concentrations of COCs detected in the confirmatory soil samples were less than 3 times their FDEP industrial standards and met the criteria for a No Further Action with institutional controls determination, and therefore, achieved the objectives of the selected remedy (Soil Alternative S4) presented in the ROD.

Additionally, asphalt and the soil backfill at Site 38 provide an effective cover to mitigate direct contact with the COPCs that remain at the site as was the intent of the selected remedy of LUCs that were described in the final ROD. Therefore, the soil excavation remedy is believed to be protective.

A UFP-SAP was submitted in April 2010 for conducting natural attenuation monitoring at Site 38 per the ROD (Tetra Tech, 2006b). Delays in implementation of the groundwater MNA program were caused initially by delay in determining if the soil remediation program had been completed adequately. In addition, there was an extended regulatory review of the UFP SAP planning document, which resulted in additional delays to include OU20 and OU21 groundwater monitoring tasks in the UFP SAP as a cost saving measure. Implementation of the Site 38 UFP-SAP is pending regulatory concurrence of the Groundwater Monitoring Plan for OU11, Site 38. As indicated above , based on comments provided by the USEPA, more current groundwater data is required at adjacent IR Sites 45 and 46 to support the respective Draft Proposed Plans. The NAS Pensacola Partnering Team agreed during their meeting on December 13 and 14, 2011 that the Navy would amend the UFP-SAP for OU11, Site 38 to include collecting a round of groundwater samples from monitoring wells at Sites 45 and 46 to assess the current conditions of COCs at Site 45 and Site 46. The monitoring has not been initiated because regulatory concurrence has not been received.

To date no cost associated with site remediation have been expended. Because the soil remedial activities were completed using Hurricane Ivan cleanup funding, site specific remedial funds were not awarded. The cost of soil cleanup was not tracked, but included as part of the overall facility-wide hurricane cleanup operation.

7.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

A Final Land Use Control Remedial Design (LUC RD) for soil and groundwater was submitted to the regulatory agencies on December 12, 2011 and approved as final by USEPA on December 17, 2013 and by FDEP on January 4, 2013. Within 30 days of USEPA and FDEP approval of this LUC RD, the NAS Pensacola Environmental Department incorporated the Site 38 LUC information (specifically the land/groundwater use restrictions) into the NAS Pensacola Master Planning Process by placing a copy in the Environmental Department's LUC files and also providing copies to cognizant facilities planning personnel with both the NAS Pensacola Public Works Department and NAVFAC SE Planning Division.

7.5.1 Protectiveness Statements from the Last Review

The 2008 Five-Year Review concluded that the remedy is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals through natural attenuation. In addition, the previous Five-Year Review stated that in the interim, exposure pathways that could result in unacceptable risks are being controlled and institutional controls are preventing exposure to, or the ingestion of, contaminated groundwater.

Issues identified in the 2008 Five-Year Review and actions taken are summarized in Table 7-4.

TABLE 7-4
OU11 ISSUES IDENTIFIED AND ACTIONS TAKEN
2008 FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

	Issues Identified in 2008 Five-Year Review	Actions Taken Since the 2008 Five-Year Review
1	A source removal action was completed in 2007 using Hurricane Ivan funds; however, the extent of the excavated site area was not documented	A soil confirmation report to confirm the extent of soil excavations and use of proper fill has been completed
2	Groundwater Natural Attenuation monitoring will begin in December 2008	The monitoring plan is in development. A UFP-SAP has been prepared and is being modified to include confirmation sampling and analysis activities for OU20, Site 45 and OU21, Site 46

7.5.2 Status of Recommendations and Follow-up Actions from Last Review

Table 7-5 provides a list of recommendations, recommended follow-up actions from the 2008 Five-Year Review, milestone dates, actions taken, outcomes, and dates of action.

TABLE 7-5
OU11 RECOMMENDATIONS AND FOLLOW-UP ACTIONS
2008 FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
1	Conduct confirmatory soil sampling and analysis to verify successful abatement of impacted soil	Navy	December 2008	Confirmatory sampling action competed and final letter report submitted	June 17, 2011
2	Implement Natural Attenuation Monitoring	Navy	December 2008	Revised Draft UFP SAP submitted	November 1, 2012

7.5.2.1 Follow Up Actions Taken for Item 1 from Table 7-5

Confirmation soil sampling conducted during July 2009 at Site 38 and a final report was submitted to the USEPA and FDEP in June 2011. The confirmation samples were collected to determine if the contaminated soil that exceeded three times the Florida industrial direct exposure SCTLs and/or leaching

to groundwater SCTLs has been removed from the Building 604 area north of Radford Boulevard as specified in the ROD. The confirmation soil sampling results indicate that the COCs detected in the soil samples at sampling locations BT38, BT41, BT42, SS26, and S78S met the criteria for No Further Action to achieve the objectives of the selected remedy in the final ROD (Tetra Tech, 2006a). Additionally, asphalt and the soil backfill at Site 38 provide an effective cover to mitigate direct contact with the COCs that remain at site as was the intent of the selected remedy of LUCs that were described in the final ROD.

7.5.2.2 Follow Up Actions Taken for Item 2 from Table 7-5

A Groundwater Monitoring Plan and UFP-SAP for a natural attenuation groundwater monitoring program are being prepared. Drafts of the two documents have been submitted for regulatory review and approval.

7.6 FIVE-YEAR REVIEW PROCESS

This is the second Five-Year Review for this site. Members of the NAS Pensacola Partnering Team were notified of the initiation of the Five-Year Review in January 2012. The Five-Year Review was led by Gerald Walker of Tetra Tech, the NAVFAC SE Navy CLEAN Contractor, and included other Tetra Tech staff. Patty Marajh-Whittemore of NAVFAC SE, Greg Campbell of NAS Pensacola Public Works Department, Tim Woolheater of USEPA, David Grabka of FDEP, and Sam Naik of CH2M Hill assisted in the review.

The review included the following components:

- Document Review
- Data Review
- Site Inspection
- Five-Year Review Report development and review

7.6.1 Document Review

This Five-Year Review consisted of a review of relevant documents including the ROD, and applicable federal and state statutes.

7.6.2 Data Review

Source removal activities were conducted at OU11, Site 38 in conjunction with cleanup of hurricane related debris, and clean fill was placed in the excavated areas to limit direct exposure to soil containing the COCs remaining in subsurface soils at the site. Monitoring of natural attenuation of groundwater

quality has not been initiated. The Navy is preparing documentation for the source removal activity at Site 38.

7.6.3 LUC Inspections

Following completion of the final ROD, LUCs were established for OU11 in the OU11 Final Remedial Design submitted on December 12, 2012. The final Remedial Design was approved by USEPA on December 17, 2012 and by FDEP on January 4, 2013. The OU11 Remedial Design specified the institutional controls be placed in the NAS Pensacola Base Master Plan and that annual LUC inspections be completed. The LUCs specifically included: no residential or residential-like use on parcel including, but not limited to, any form of housing, child-care facilities, preschools, elementary schools, secondary schools, playgrounds, or adult full-time convalescent or nursing facilities; no excavation or uncontrolled removal of soils unless previously approved by USEPA and FDEP; no groundwater use for any purpose; no tampering or damage to groundwater monitoring wells; and any violation of these LUCs were reported within 10 days of discovery and an explanation provided of those actions taken or to be taken was provided within 10 days of notification. The Base Master Plan was reviewed and the OU11 LUC documentation was present. In addition, current and historic annual LUC inspection forms for OU11, during the period of review, were obtained and reviewed. The inspection forms noted no problematic observations. There were no apparent signs of vandalism or tampering.

7.6.4 Site Inspection and Interviews

Inspections at the site were conducted on May 3, 2012, by Tetra Tech personnel. The purpose of the inspection was to assess the protectiveness of the remedy, including general site condition and condition of the monitoring wells. At the time of the inspection, institutional controls appeared to be adequate, and use of groundwater was not observed. Roadways within Site 38 appeared adequate, and there were no apparent signs of vandalism or trespassing.

Since surficial soil with contaminant concentrations above the remedial goal were reportedly removed, fencing the site was not warranted. Existing monitoring wells were accessible and in good condition. Many monitoring wells at the Building 604 “return to nature” area were not present and were either abandoned or covered by fill. However, new replacement monitoring wells are to be installed for the natural attenuation monitoring program. Therefore, deficiencies were not noted during the site inspection.

An interview was conducted with Greg Campbell, Environmental Engineer for NAS Pensacola, on May 2, 2012. According to the interview, Mr. Campbell indicated he is well informed about the site’s activities and progress, and was not aware of any community concerns regarding the site or its operation,

or of any incidents such as vandalism, trespassing, or emergency responses at the site. The interview forms are presented in Appendix F.

Mr. Campbell indicated annual LUC inspections are performed. In addition, complaints, violations, or other incidents related to the site requiring a response by his office have not occurred.

7.6.5 ARAR Level Changes

The following standards were identified as chemical-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- Safe Drinking Water Act MCLs (40 CFR 141.11–141.16)
- Safe Drinking Water Act MCLGs (40 CFR 141.50–141.51)
- Safe Drinking Water Act Secondary Drinking Water Standards (40 CFR 143)
- Cancer Slope Factors (CSFs) (Integrated Risk Information System)
- Reference Dose Factors (RfDs) (Integrated Risk Information System)
- Florida SCTLs, Chapter 62-777, F.A.C.
- Florida Ground Water Guidance Concentrations
- Florida Drinking Water Standards, Monitoring and Reporting, Chapter 62-550, F.A.C.
- Ground Water Classes, Standards, and Exemptions, Chapter 62-520, F.A.C.

Since signing the ROD for OU11 in October 5, 2006, there have not been any changes to the above regulations that affect the protectiveness of the remedy.

The soil criteria in the selected remedy included meeting industrial direct exposure SCTLs and leachability to groundwater criteria. These criteria are listed on Tables 2-1 and 2-2 of the ROD. The values in the table were compared to the current version of Chapter 62-777, F.A.C., and no differences were found. The remediation goals are protective.

The Remedial Goals in Table 2-3 from the ROD include CTLs and MSWCTLs. The values in the table were compared to the current version of Chapter 62-777, F.A.C. In the absence of an MSWCTL, the water quality criteria for Class III Marine Waters in Chapter 62-302, F.A.C. were used. A few differences were noted as summarized in Table 7-6.

TABLE 7-6
OU11 REMEDIAL GOALS
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Parameter	Type of Remedial Goal	Value from ROD Table 2-3 µg/L	Value from Chapter 62-302, F.A.C., µg/L
Phenanthrene	MSWCTL	0.3	Total PAHs[1], 0.031 µg/L
Cadmium	MSWCTL	9.3	8.8
Copper	MSWCTL	2.9	3.7

µg/L = microgram per liter

MSWCTL = Marine Surface Water Cleanup Target Level

1 = Annual average of the total of acenaphthylene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, indeno(1,2,3-cd)pyrene, and phenanthrene

The ROD values for phenanthrene and copper are more restrictive than the current values, so there is no change in the protectiveness is the current values are used. The ROD value for cadmium is slightly greater than the current value, so there may be slightly less protectiveness. The natural attenuation monitoring program has not been implemented.

The following standards were identified in the ROD as location-specific ARARs. They were reviewed for changes that could affect protectiveness:

- National Environmental Policy Act (40 CFR Part 6, Appendix A)
- Fish and Wildlife Coordination Act (40 CFR 6.302)
- Executive Order 11988 Wetlands Protection Policy

The soil excavation is complete, so the location-specific ARARs are no longer pertinent and were not evaluated further.

The following standards were identified as action-specific ARARs for OU11:

- RCRA Identification and Listing of Hazardous Wastes (40 CFR 261)
- RCRA Generator Standards (40 CFR 262)

- RCRA Location Requirements (40 CFR 264.18)
- RCRA Facility Standards (40 CFR 265, Subparts C, D, I, J and L)
- RCRA Land Disposal Restrictions (40 CFR 268)
- Department of Transportation (DOT) Rules for Transport of Hazardous Substances (49 CFR Parts 107 and 171-179)
- USEPA Monitored Natural Attenuation Guidance
- Florida Stormwater Discharge Regulations, Chapter 62-25, F.A.C.
- Florida Hazardous Substance Release Notification Rules, Chapter 62-150, F.A.C.
- Florida Hazardous Waste Rules, Chapter 62-730, F.A.C.
- Florida Rules on Hazardous Waste Warning Signs — July 1991
- Florida Water Well Permitting and Construction Requirements Chapter 62-532, F.A.C.

The soil excavation is complete, so the RCRA, DOT, Florida Stormwater, Florida Hazardous Substance, and Florida Hazardous Waste are no longer pertinent and were not evaluated further. The groundwater monitoring program has not been implemented, so the USEPA Monitored Natural Attenuation Guidance was not evaluated. The sections covering General Provisions for Water Well Permitting and Construction and Abandonment of Water Wells in Chapter 62-532, F.A.C. were repealed October 7, 2010. Monitoring well installation and abandonment are now addressed in the FDEP Monitoring Well Design and Construction Guidance Manual, 2008.

7.7 TECHNICAL ASSESSMENT

7.7.1 Question A: Is the remedy functioning as intended by the ROD?

LUCs appear to be successful in preventing exposure to contaminated groundwater; therefore, this portion of the remedy is functioning as intended. MNA has yet to be initiated.

Remedial Action Performance: Surface soil containing COCs were removed from Site 38 and replaced with clean backfill. MNA of the COCs remaining at the site has not been initiated.

System O&M: There are no active remediation systems at OU11, therefore no system O&M is required.

Cost of System Operations/O&M: There are no active remediation systems at OU11, therefore no system O&M is required.

Early Indications of Potential Remedy Failure: None.

Implementation of Institutional Controls and Other Measures: LUCs have been implemented as evidenced by the NAS Pensacola Master Plan dated December 2007.

7.7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Exposure Assumptions: There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes to Standards and To Be Considered: ARARs and TBCs considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. For soil, there are no changes to the cleanup goals identified in the ROD. For groundwater, there are two COCs that currently have less stringent cleanup criteria compared to the ROD (phenanthrene and copper), and there is one COC (cadmium) that currently has a slightly more stringent criterion compared to the ROD.

The LTM Plan was prepared according to the action-specific ARAR for LTM Plans.

Florida groundwater regulations Chapter 62-550, F.A.C. and Chapter 62-777, F.A.C. have performance criteria that are equal to or lower than the Federal Safe Drinking Water Act of 1974 (amended in 1986 and 1996), and therefore are adequate to assess whether the remedies are functioning as intended because the lower of the state or federal performance criteria are used.

Changes in Exposure Pathways: No changes in the site conditions or land use that affect exposure pathways were identified as part of the Five-Year Review. Exposure to the site groundwater is still restricted by the institutional controls.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in human health or ecological toxicity criteria that would impact protectiveness of the remedy.

Changes in Risk Assessment Methodologies: Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

7.7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that calls into question the protectiveness of the remedy.

7.8 ISSUES

Issues were discovered during the Five-Year Review and are noted in Table 7-7.

TABLE 7-7
OU11 ISSUES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Issues	Affects Protectiveness (Y/N)	
	Current	Future
Monitoring wells are reported to be either in disrepair or missing. MNA has not yet been initiated (Implementation of the UFP-SAP is pending regulatory concurrence of the Groundwater Monitoring Plan).	N	Y

7.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Recommendations and follow up actions are provided in Table 7-8.

TABLE 7-8
OU11 RECOMMENDATIONS AND FOLLOW-UP ACTIONS
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Follow-up Actions: Affects Protectiveness (Y or N)	
				Current	Future
Repair or replace damaged or lost monitoring wells required for the MNA program	Navy	USEPA & FDEP	October 5, 2013	N	Y
Implement Natural Attenuation Monitoring	Navy	USEPA & FDEP	October 5, 2013	N	Y

7.10 PROTECTIVENESS STATEMENT

The remedy at OU11 currently protects human health and the environment because LUCs have been implemented and are being enforced. However, in order for the remedy to be protective in the long term, the following actions need to be taken to ensure long-term protectiveness: implement the MNA remedy.

8.0 OPERABLE UNIT 13

The OU13 ROD was issued by the Navy and USEPA on October 5, 2006. FDEP concurred with the ROD on September 30, 2006. Implementation of the remedial actions at OU13 began in 2007. This Five-Year Review consisted of historic and current data collected over a five-year period and provides a status update for OU13 Sites 8 (Rifle Range Disposal Area) and 24 (DDT Mixing Area).

This Five-Year Review for OU13 is being conducted because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

8.1 SITE CHRONOLOGY

A list of important OU13 historical events and relevant dates in the site chronology is shown in Table 8-1.

TABLE 8-1
OU13 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Waste disposal activities initiated at Site 8	Late 1950s – Early 1960's
Dichlorodiphenyltrichloroethane (DDT) mixing conducted at Site 24	Early 1950 – Early 1960's
Building No. 3561 constructed at Site 8 location	1976
IAS on-site survey	1983
Phase I screening investigation conducted	1991
RI/Focused FS completed	1996
RI Report filed	1997
RI Report Addendum issued	September 1999
MOA issued	November 1999
Focused FS issued	May 2000
Focused FS Addendum issued	September 2001
IRA conducted at Site 8	2002 – 2004
IRA Report issued for Site 8	2004
Final ROD issued	October 5, 2006
Groundwater Monitoring Plan issued	2007
Remedial Design approved	September 19, 2007

TABLE 8-1
OU13 SITE CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Semiannual Groundwater Monitoring Report	May 2008
RD for LUC and Groundwater Monitoring	August 2008
Five-Year Review	August 2008
Semiannual Groundwater Monitoring Report	October 2008
Semiannual Groundwater Monitoring Report	May 2009
Semiannual Groundwater Monitoring Report	June 2009
Semiannual Groundwater Monitoring Report	April 2010
Semiannual Groundwater Monitoring Report	July 2010
Semiannual Groundwater Monitoring Report	March 2011

8.2 BACKGROUND

8.2.1 Physical Characteristics

OU13 is comprised of Site 8 (Rifle Range Disposal Area) and Site 24 (DDT Mixing Area), which border the eastern side of John H. Tower Road and are located southeast of the intersection of John H. Tower and Taylor Roads at NAS Pensacola (Figure 8-1). The site is located in an industrialized portion of NAS Pensacola.

Site 8

Site 8, shown in Figure 8-1, is an approximate 450- by 600-foot area currently occupied by Building 3561, which houses the NAS Pensacola PWC Maintenance/Material Department. An extensive asphalt-paved area surrounds Building 3561 to the north, east, and west, covering nearly all land surface. The PWC stores building materials on the paved area west of the building.

Various solid wastes and dry refuse were reportedly placed in trenches and burned at Site 8 during the late 1950s and early 1960s. Aerial photographs and maps from the 1950s and 1960s show a rifle range at Building 3561's current location. Earlier aerial photographs show an excavation at the northern end of the rifle range, and later photographs show the excavated area as overgrown with vegetation. Most of the excavation area observed in earlier photographs is currently covered by Building 3561 and surrounding paved area, which were constructed during the mid-1970s. Facility personnel reported waste or residue

were not identified during the building's construction (NEESA, 1983). However, cemetery personnel have reported finding buried metal, rubber, and plastic aircraft parts during excavation along Site 24's eastern boundary (Tetra Tech, 2006b). Building 3561 was constructed in the mid-1970s and is first visible in aerial photographs from April 1976. During most of the 1980s, a limited portion of Building 3561 was used as a pesticide storage and equipment rinsing area. A tank wash rack rinsing area was constructed in March 1981 midway along Building 3561's eastern side to contain and collect pesticide equipment wash water and rinsate. Wastewater from the wash rack was discharged to the sanitary sewer system. Base pest control operations were moved from Building 3561 to their current location at Building 1538 in the early 1990s (NEESA, 1983; Tetra Tech, 2006b).

Other buildings within the Site 8 area include:

- Building 3680, Hazardous Material Storage Building
- Building 3817, Gas Bottle Storage Shed
- Building 3834, Material Storage
- Building 3816, Lumber Storage Shed

Site 24

Site 24, shown in Figure 8-1, is immediately north of Building 3561, near the northwest corner of the Barrancas National Cemetery. The central and northern portions of Site 24 are primarily unpaved and sparsely covered with native grasses and trees. However, the fenced storage area around Building 3678, in Site 24's southern portion, has a gravel/crushed shell land surface. An unimproved dirt road runs west to east across the site's center.

From the early 1950s until the early 1960s, Site 24 was used to mix DDT with diesel fuel for mosquito control. Reportedly, DDT was spilled in the mixing area during transfer from drums to spray tanks, and may have contaminated local soil and groundwater. DDT was aerially applied for at least 10 years to control mosquito outbreaks. In later years, DDT was applied by a fogger machine. It is estimated that up to 20 gallons of diesel/DDT solution may have been spilled during the years of operation at the site (NEESA, 1983).

The fenced storage area north of Building 3561 was developed during the mid-1980s and the PWC storage building was constructed inside the fenced area prior to November 1989. A water supply well (NAS Pensacola Well No. 1) that is no longer used is located upgradient of the combined site area, approximately 0.3 miles to the southeast; potable water is currently obtained from NTTC Corry Station. The NAS Pensacola Well No. 1 is screened in the main producing zone beneath the low permeability zone, which separates it from the surficial aquifer.

8.2.2 Land and Resource Use

Site 8

Site 8 is generally flat with a land surface elevation averaging 29 feet above mean sea level. Miscellaneous office trailers and fenced storage, including Building 3561, are within the Site 8 boundaries. The paved area east of Building 3561 is used for PWC storage and employee parking. Sidewalks and a grassy median are to the south, between Buildings 3560 and 3561. Although it is not completely shown on the figure, most of Site 8 is surrounded by chain-link fencing. Site use is projected to remain consistent with current use. At Site 8, the depth-to-water measurements ranged from approximately 8 feet bls across most of the site to approximately 11 feet bls in the northeastern portion of the site.

Site 24

Site 24 is generally flat with land surface elevations approximately 24 to 26 feet above mean sea level. Surface drainage across the site is precluded by the high permeability of the surficial soil which allows direct, rapid infiltration of precipitation. The Barrancas National Cemetery currently occupies most of the Site; however, Building 3678 is located on the southern end of the site boundary. Depth-to-water measurements at Site 24 ranged from approximately 5.5 feet bls in the western portion to approximately 8.5 feet bls in the southern portion. Overall, this flow regime generally mimics the local topography, sloping slightly north-northeast across the area. Groundwater is not currently used as a potable water source at OU13, (Tetra Tech, 2006b). The main source of potable water for NAS Pensacola is the Navy-owned well field located at NTTC Corry Station, which is located approximately three miles north of NAS Pensacola on the northern (opposite) side of Bayou Grande.

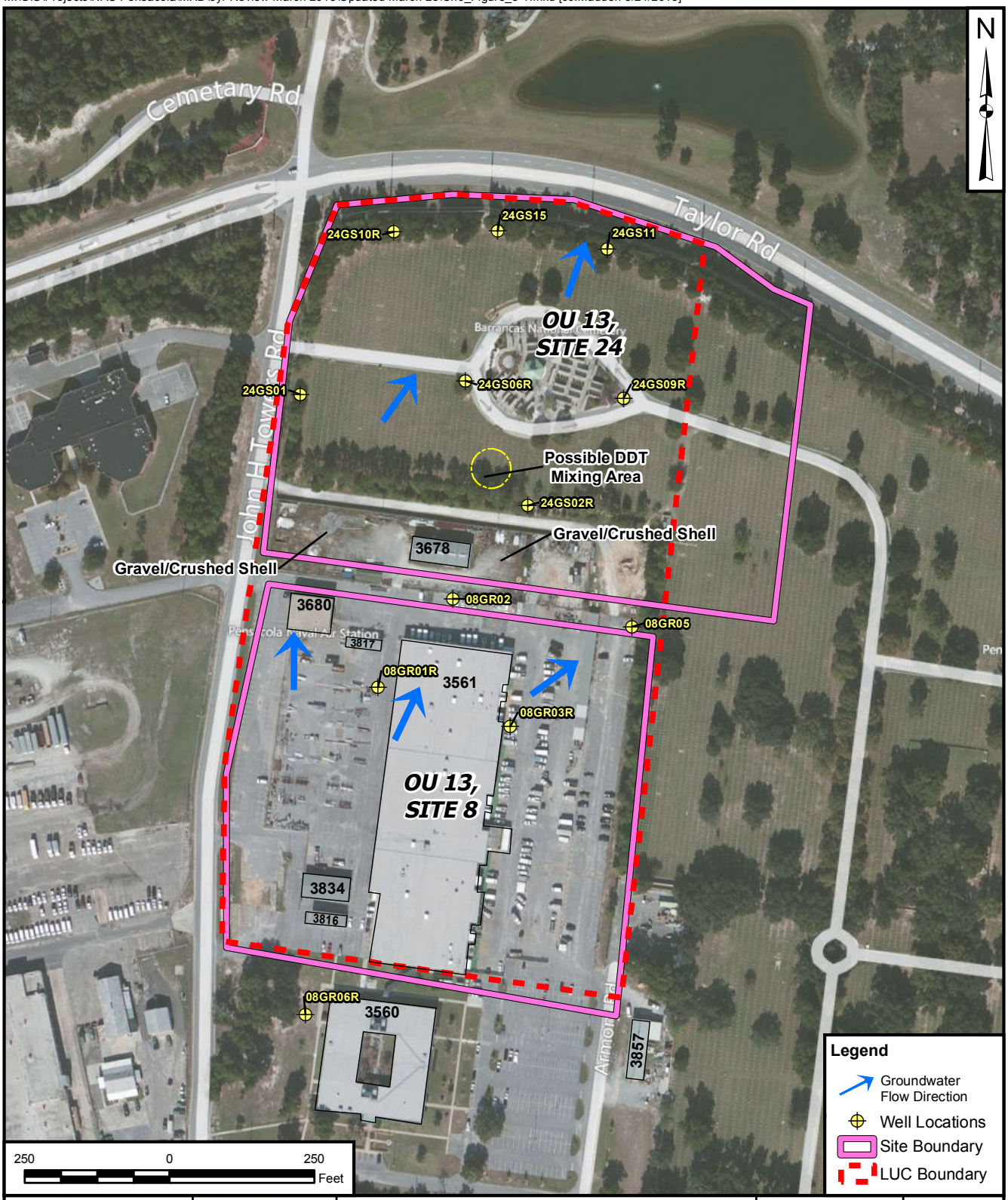
The projected future site use continues to be a cemetery (Tetra Tech, 2006b).

8.3 HISTORY OF CONTAMINATION

Site 8

Site 8 was part of a former rifle range area (1950 and 1960s) where past waste disposal and construction activities disturbed the upper 5 to 10 feet of soil across Site 8. Charred debris (metal, glass and plastic fragments) were typically found in subsurface soil below a depth of 1 foot. In 1976, Building 3651 was constructed at Site 8 and in the 1980s a pesticide storage and equipment rinsing areas existed on the east side of the building. Analytical data generated by investigations of site soils revealed the presence of cadmium, lead, TRPH, PAH, fluometuron (carbamate, a pesticide), and dieldrin in the soil at OU13, Site 8. The detected concentrations of cadmium and dieldrin exceeded their applicable federal and state screening criteria for residential exposure and leachability to groundwater in effect at that time.

M:\GIS\Projects\NAS Pensacola\MXD\5yr Review March 2013\Updated March 28\Ch6_Figure_8-1.mxd [JJ.Madden 8/21/2013]



DRAWN BY: GIS	DATE: 8/21/2013	SITE MAP - OPERABLE UNIT 13 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00702
CHECKED BY: A.I.	DATE: 8/21/2013		CTO NUMBER: 067
REVISED BY: —	DATE: —		APPROVED BY: — DATE: —
SCALE: AS NOTED			APPROVED BY: — DATE: —
			FIGURE NO.: 8 - 1 REV: 0

The groundwater investigation indicated that only cadmium, manganese, and an isolated lead detection exceeded federal and state CTLs and NAS Pensacola background concentrations in groundwater samples collected from Site 8. Antimony exceeded its federal and state CTLs in two groundwater samples; however, there is no NAS Pensacola background concentration for antimony. With the exception of one antimony detection, all exceedances were from monitoring wells located at the north and northeastern portion of the site. This distribution is consistent with past disposal of metallic-alloy aircraft refuse or other metallic material that may lie beneath Building 3561's current location and the site's northern shallow groundwater flow. The extent of shallow groundwater impact does not extend to the farthest downgradient well at Site 8, as confirmed by no inorganic exceedances of federal and state CTLs in the Phase II groundwater sample from that location. None of the targeted VOCs, SVOCs, or PCBs were detected at concentrations that exceed their federal or state CTLs in the Site 8 groundwater.

Site 24

Site 24 (located immediately north of Building 3561) was historically a maintained grass field; however, metal fragments similar to those found at Site 8 were also found in the subsurface soil north of Building 3678, indicating that Site 8 fill activities extended to, or have been reworked onto Site 24. Because of the proximity of Site 8 to Site 24 it is possible that equipment rinsing could have also taken place on Site 24.

Carcinogenic PAHs, pesticides and inorganics were detected in soil samples collected at Site 24. The concentrations of inorganic soil contaminants are similar to background or are attributed to application of fertilizer in the immediate area of sample collection.

The HHRA conducted during the RI for Site 24 indicates that benzo(a)pyrene equivalent concentration (BEQs) for carcinogenic PAHs (cPAHs), arsenic, chlordane, dieldrin, and heptachlor epoxide each contribute to the estimated risk for one or more of the soil exposure pathways evaluated for Site 24. The cPAHs were attributed to the adjacent road and vehicular traffic because small pieces of asphalt were observed in the surface soil samples. Pesticides and arsenic were attributable to routine application in accordance with regulations and are not site-related. These constituents were detected in soils at a small area (approximately 0.5 acre) along John H. Tower Road on the western boundary of the site.

The cPAHs BEQ was the principal contributor to the ILCR projected for the combined soil pathway and arsenic, chlordane, dieldrin, and heptachlor epoxide were secondary contributors. Arsenic and BEQ were the only carcinogenic COCs identified relative to future site workers, with a projected combined ILCR of $6X10^{-6}$. No soil pathway-related COCs were identified for under the current maintenance worker scenario. The detected BEQs are attributable to the adjacent road and vehicular traffic. Small pieces of asphalt were observed in the surface soil sample. Pesticides and arsenic are attributable to routine application in

accordance with regulations and are not site-related. Therefore, because pesticides, arsenic, and cPAHs were all deemed to be not site related, no further CERCLA action for soils was deemed necessary."

Concentrations of iron and manganese that have been detected in groundwater samples from the shallow aquifer zone at Site 24 are attributed to fertilizer application, which commonly contains water-soluble forms of these inorganics as essential nutrients. Iron and manganese have been detected in shallow groundwater at concentrations exceeding their federal and state CTLs.

Based on this evidence, the concentrations of antimony, cadmium, nickel, and thallium exceedances detected in groundwater samples from the shallow aquifer zone are attributed to metal-alloy debris disposal at Site 8 and/or Site 24. Antimony, cadmium, nickel, and thallium have sporadically exceeded their federal and state CTLs. In the RI Addendum investigation, concentrations of aluminum, calcium, iron, magnesium, and sodium in groundwater samples also exceeded federal and state CTLs and NAS Pensacola background concentrations. Relatively low concentrations of methylene chloride, trichloroethene, and vinyl chloride have also been detected in groundwater samples at concentrations that slightly exceeded their federal and state CTLs. The source of these inorganics and organic compounds is suspected to be from past disposal activities at Site 8 and/or Site 24. Pesticides have not been detected in the six downgradient monitoring wells installed for the RI Addendum investigation. SVOCs and PCBs have not been detected at concentrations above their federal and state CTLs.

8.3.1 Initial Response

As a result of the hazard presented by potential exposure to the identified contaminants, CH2M Hill conducted IRAs at OU13 from June 28, 2004 to August 25, 2005. The objective of the IRA was to remove soil from Site 8 that was contaminated by COCs at concentrations that exceed residential exposure and leachability to groundwater criteria so LUCs would not be required. Delineation samples were collected and the remedial volume was calculated for the protection of human health and leachability to groundwater SCTLs. Approximately 429 cubic yards of cadmium impacted soil were removed from an approximate 1,075 square foot area to a depth of 10 feet bls at the western side of Building 3561. The remedial goal for cadmium was the leachability to groundwater criteria of 8 mg/kg and soil that exhibited leaching properties that would exceed the groundwater CTL of 5 μg/L. Approximately 634 cubic yards of dieldrin contaminated soil was removed from two areas at the eastern side of Building 3561; an approximate 376 square foot area to a depth of 5 feet bls and an approximate 1,011 square foot area to a depth of 10 feet bls. The remedial goal for dieldrin was the leachability to groundwater criteria of 0.004 mg/kg and soil that exhibited leaching properties that would exceed the groundwater CTL of 0.005 μg/L. Approximately 1,944 tons of soil and debris were removed from Site 8. The removal action is described in the IRA Report, Excavation of Contaminated Soil at Operable Unit 13 Site 8 (CH2M Hill,

2004). The backfill material was analyzed for USEPA Contract Laboratory Program Target Compound List and Target Analyte List, and determined to be clean fill.

8.3.2 Basis for Taking Action

A baseline risk assessment was conducted for OU13 during the RI to assess the COCs (inorganic and organic constituents) and the potential for unacceptable risk to human health and environment with regard to specific land use scenarios. Based on unacceptable risk posed by the COCs, a response action was selected in the ROD to protect the public health, welfare, and the environment from actual or threatened releases of the COCs into the environment. Although the baseline risk assessment presented unacceptable risks for both soil and groundwater at Site 8, an IRA for soil was completed in October 2004 to eliminate the unacceptable risks to human health and leachability of the COCs to groundwater. No unacceptable risk for the COCs in soil at Site 24 were considered to be present for the current and future receptors. The COCs that were identified in the OU13 RI and prior to the IRA for soil at Sites 8 and 24 are included in Table 8-2.

The extent of impacted media driving the unacceptable excess risk to groundwater at Sites 8 and 24 is limited. The magnitude of this contamination is low relative to most ARARs. This unacceptable excess risk to human health should be qualified based on factors that affect the exposure potential by humans to impacted media at Sites 8 and 24. The shallow groundwater of the surficial zone at both sites is not currently used as a groundwater source due to its poor ambient quality. The main source of potable water for NAS Pensacola is the Navy-owned well field located at NTTC Corry Station, which is located approximately 3 miles north of NAS Pensacola on the northern (opposite) side of Bayou Grande. These two factors greatly reduce the actual exposure potential to groundwater at Sites 8 and 24. However, because the state of Florida considers all groundwater to be resources of the state and worthy of protection, and that groundwater that has been adversely impacted by pollution should be restored to a condition where its prior beneficial use can occur without further treatment, the basis for taking action at OU13 is the presence of COCs in groundwater at concentrations that exceed federal and state drinking water standards. The COCs identified for groundwater at Sites 8 and 24 are included in Table 8-2.

The concentrations of COCs detected in soil samples collected at Site 24 exceeded both USEPA acceptable risk range ($1x10^{-4}$ to $1x10^{-6}$) and the FDEP target risk criteria ($1x10^{-6}$) for current workers, trespassers, and future residents (Tetra Tech, 2006b).

Concentrations of contaminants in groundwater were compared against the Florida natural attenuation default source concentrations in Table V of Chapter 62-777 F.A.C. to evaluate the use of natural attenuation as a remedy for groundwater. Contaminants that exceeded the Florida natural attenuation default source concentration criteria were listed as COCs.

TABLE 8-2
OU13 CONTAMINANTS OF CONCERN
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PEANSACOLA, FLORIDA

Soil	Shallow Groundwater
Aldrin	Antimony
Arsenic	Cadmium
Benzo(b)fluoranthene	Dieldrin
Benzo(a)pyrene	Iron
Dibenzo(a,h)anthracene	Lead
Dieldrin	Manganese
	Methylene Chloride
	Nickel
	Thallium
	Trichloroethene
	Vinyl Chloride

8.4 REMEDIAL ACTIONS

8.4.1 Remedy Selection at OU13

The ROD for NAS Pensacola OU13 was finalized on October 5, 2006. RAOs were developed only for groundwater based on the data collected during the RI and IRA to aid in the development and screening of remedial alternatives to be considered for the ROD. The goals of the remedies selected for soil and groundwater at OU13 are to protect human health and the environment by eliminating, reducing, or controlling hazards posed by the site and to meet ARARs.

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, the Navy selected No Action for soil at OU13, as an IRA had been conducted for Site 8 and no unacceptable risk were considered to be present for the current and future receptors evaluated for Site 24. Results of the IRA, which were available at the time of ROD development, indicate that no site-related contamination above Florida residential direct exposure and leachability to groundwater SCTLs remained on site. The Navy selected LUCs with groundwater monitoring to address contamination of groundwater by the COCs at OU13. Both alternatives, once implemented, will be protective of human health and the environment, are cost-effective, and result in permanent solutions to the maximum extent practicable. With the implementation of these alternatives, the site will be protective of human health and the environment. Table 8-3 lists the RAOs for developed in the ROD for groundwater at OU13.

TABLE 8-3
OU13 REMEDIAL ACTION OBJECTIVES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Medium	Contaminants Causing Unacceptable Risk	Remedial Action Objectives
Groundwater	Antimony Cadmium Dieldrin Heptachlor epoxide Iron Lead Manganese Methylene Chloride Nickel Thallium Trichloroethene Vinyl Chloride	Monitor groundwater to ensure COCs are not migrating off-site and institutional controls are maintained.

The remedy was selected for the following reasons:

- Because the IRA was performed, soil at Site 8 poses no risk.
- No unacceptable risks were considered to be present for the current and future receptors evaluated for Site 24.
- The OU13 area is currently used for industrial uses including a paved area for PWC storage and employee parking (Site 8) and buffer zone and cemetery burials in Barrancas National Cemetery (Site 24).
- The projected future site use is consistent with the current uses. Groundwater on site currently exceeds remedial goals. However, natural degradation appears to be occurring and there is no evidence of contaminant migration off-site. Furthermore, the upper zone of the surficial aquifer near the water table is not likely to be used for potable water due to its low quality. Source control remediation will address restricting exposure to contaminated groundwater.

Source control shall include LUCs which will be used to restrict groundwater use of the surficial zone of the sand and gravel aquifer on site. A Remedial Design for Land Use Controls and Groundwater Monitoring at OU13 (Tetra Tech, 2008a) was prepared as the land use component of the Remedial Design. In accordance with the Site Management Plan and the NAS Pensacola FFA, the LUC RD contains LUC implementation and maintenance actions, and periodic inspections by the USEPA and FDEP. The Navy is responsible for implementing, maintaining, reporting on, and enforcing the LUCs. Although the Navy may later transfer these procedural responsibilities to another party by contract,

property transfer agreement, or through other means, the Navy shall retain ultimate responsibility for the remedial integrity.

The following components constitute the remedial action for OU13 to address the groundwater RAO:

- Performing groundwater monitoring to ensure the COCs are not moving off-site.
- Conducting reviews to determine whether groundwater performance standards continue to be appropriate.
- Implementing institutional controls to restrict use of groundwater from the surficial zone of the sand and gravel aquifer within 300 feet of the site.
- Reviewing the institutional controls and certification in order to determine if they should remain in place or be modified to reflect changing site conditions.

8.4.2 Remedy Implementation at OU13

The OU13 ROD documented removal of isolated hot spot areas of soil impacted by the COCs to reduce the potential for direct exposure. Approximately 634 cubic yards of dieldrin-impacted soil were removed from the eastern side of Building 3561 and approximately 429 cubic yards of cadmium-impacted soil were also removed from the western side of Building 3561. All soil with dieldrin and cadmium at concentrations exceeding their respective remedial goals of 0.004 mg/kg, and 8 mg/kg, respectively were removed. The Groundwater Monitoring Plan has been approved and groundwater monitoring has been initiated. Total remediation cost expended to date for this project is $83,996.

8.4.3 System O&M at OU13

The costs for the selected remedy does not include O&M.

8.4.4 Long-Term Groundwater Monitoring at OU13

In November 2007, the Navy began long-term groundwater monitoring for OU13. Semiannual sampling events were conducted in November 2007, May 2008, October 2008, May 2009, June 2009, April 2010, July 2010, March 2011, and October 2011.

As stated in the ROD for OU13 (Tetra Tech, 2006b), the Navy's original 2006 cost estimate for implementation of remedial action and closure of OU13 and 30 years of LTM program (risk-reduction) was $610,200. The approximate cost to date for remedial actions including O&M and monitoring at OU13 is $83,996.

8.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

This is the second Five-Year Review since the OU13 ROD was signed. No issues were identified during the Five-Year Review process and the remedy was found to be protective.

8.5.1 Protectiveness Statements from the Last Review

Based on the results of the 2008 Five-Year Review, the remedy was expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through natural attenuation.

8.5.2 Status of Recommendations and Follow-up Actions from Last Review

No recommendations or follow up actions were identified during the previous Five-Year Review.

8.6 FIVE-YEAR REVIEW PROCESS

This is the second Five-Year Review for this site. Members of the NAS Pensacola Partnering Team were notified of the initiation of the Five-Year Review in January 2012. The Five-Year Review was led by Gerald Walker of Tetra Tech, the NAVFAC SE Navy CLEAN Contractor, and included other Tetra Tech staff. Patty Marajh-Whittemore of NAVFAC SE, Greg Campbell of NAS Pensacola Public Works Department, Tim Woolheater of USEPA, David Grabka of FDEP, and Sam Naik of CH2M Hill assisted in the review.

The review included the following components:

- Document Review
- Data Review
- Site Inspection
- Five-Year Review Report development and review

8.6.1 Document Review

This Five-Year Review consisted of a review of relevant documents including the ROD, IRA Report, Draft LUC RD, Natural Attenuation Monitoring Reports and applicable federal and state statutes.

8.6.2 Data Review

8.6.2.1 Review of COC Data for Groundwater

Since the initial ROD was signed, five years of semiannual monitoring and sampling have occurred. The COCs for groundwater established for OU13 in the ROD are: antimony, cadmium, dieldrin, heptachlor epoxide, iron, lead, manganese, methylene chloride nickel, thallium, trichloroethene, and vinyl chloride.

Antimony, cadmium and manganese have exceeded their respective Florida CTLs in groundwater samples collected during every sampling event since the inception of the groundwater monitoring. One lead exceedance was detected during the November/December 2007 sampling event at a single one monitoring well, PEN-43-13S.

The groundwater at OU13 was evaluated in light of the changes in the number of monitoring well locations with contaminants that exceed CTLs, and the changes in contaminant concentrations in individual monitoring wells with time. The trend analysis for the COCs for groundwater at NAS Pensacola was performed using the Mann-Kendall test (ProUCL Version 4.1.00 [Lockheed Martin Environmental Services, 2010]) at a 95 percent confidence level and groundwater sample data collected from 2007 to 2011 (Appendix G). The Mann-Kendall test is used because it does not assume any particular distributional form and accommodates values below the detection limit by assigning them a common value (½ the detection limit).

During the November and December 2007 groundwater sampling events, 12 monitoring wells were sampled and the groundwater was analyzed for the 12 groundwater COCs. Only three of the COCs, cadmium, iron, and manganese, were detected in the groundwater samples at concentrations that exceeded their respective Florida CTLs. VOCs and pesticides were not detected in the 2007 sampling event.

During the April and October 2008 groundwater sampling events, 11 monitoring wells (monitoring well 24GS10R was not sampled in April 2008 due to an obstruction in the well) were sampled and the groundwater was analyzed for the 12 groundwater COCs. Only four of the COCs antimony, cadmium, iron, and manganese were detected in the groundwater samples at concentrations that exceeded their Florida CTLs. VOCs were detected but were at concentrations below their Florida cleanup target levels (CTLs). Pesticides were not detected in the 2008 sampling event.

During the March and October 2009 groundwater sampling events, 12 monitoring wells were sampled and the groundwater was analyzed for the 12 groundwater COCs. Only three of the COCs, cadmium,

iron, and manganese, were detected in the groundwater samples at concentrations that exceeded their respective Florida CTLs. VOCs and pesticides were not detected in the 2009 sampling event.

During the March and October 2010 groundwater sampling events, 12 monitoring wells were sampled and the groundwater was analyzed for the 12 groundwater COCs. Only four of the COCs, antimony, cadmium, iron, and manganese, were detected in groundwater samples at concentrations that exceeded their respective Florida CTLs. Bromodichloromethane, although not a COC, was the only VOC that exceeded its CTL. If the criterion for total trihalomethanes is applied per Florida Chapter 62-550, F.A.C., the detected concentration does not exceed its MCL. Pesticides were not detected in the 2010 sampling event.

During the October 2011 groundwater sampling event, 11 monitoring wells (24GS02R was not sampled due to an obstruction) were sampled and the groundwater was analyzed for the 12 groundwater COCs. Only three of the COCs, cadmium, iron, and manganese were detected in the groundwater samples at concentrations that exceeded their respective Florida CTLs. Pesticides were not detected and with the exception of methylene chloride detected between the method detection limit and the practical quantitation limit (but less than the GCTL) in five samples VOCs were not detected during the 2011 sampling event. The Annual Groundwater Monitoring Report for OU13 (Sites 8 & 24) NAS Pensacola April 2012 is included in Appendix J.

The data collected during the 2007, 2008, 2009, 2010, and 2011 groundwater sampling events were evaluated to identify observable trends. Trend analysis results are provided in Appendix G. For metals, in general, cadmium demonstrated no or increasing trends, antimony and iron demonstrated no or decreasing trends, and lead and manganese demonstrated no trends. VOCs, in general, had sporadic detections and no trends were observed. With the exception of a spurious detection of bromodichloromethane at a concentration that exceeded its Florida CTL, VOCs have not exceeded their respective Florida CTLs in the past five years of monitoring. Pesticides have not been detected in the past five years of monitoring.

Based on the groundwater flow direction at Site OU13, the sentinel wells at the site are 24GS10, 24GS11 and 24GS15. Historically, iron is the only COC with concentrations above the background concentration (1,707 µg/L) established for NAS Pensacola. Mann-Kendal analysis shows an increasing trend in iron concentrations detected in groundwater samples collected from monitoring well 24GS10 and a decreasing trend in iron concentrations detected in groundwater sample collected from monitoring wells 24GS11 and 24GS15. Even with the increasing trend for monitoring well 24GS10, iron concentrations detected during the October 2011 sampling event did not exceed the background criteria, indicating that

off-site migration is not occurring at concentrations above the background, therefore meeting the RAO for OU13.

8.6.2.2 LUC Inspections

Following completion of the final ROD, LUCs were established for OU13 in the OU13 Remedial Design submitted as final on August 21, 2008 and implemented September 21, 2008 (the draft final Remedial Design was submitted June 16, 2007 and approved without comments by both FDEP and USEPA on December 7, 2007 and August 4, 2018, respectively). The OU13 Remedial Design specified the institutional controls be placed in the NAS Pensacola Base Master Plan and that annual LUC inspections be completed. The LUCs specified included: Prohibit all uses of groundwater from the surficial aquifer underlying the sites (including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and industrial processes) unless prior written approval is obtained from the Navy, USEPA, and FDEP; and maintain the integrity of any existing or future monitoring or remediation system(s) unless prior written approval is obtained from the Navy, USEPA, and FDEP. The Base Master Plan was reviewed and the OU13 LUC documentation was present. In addition, current and historic annual LUC inspection forms for OU13, during the period of review, were obtained and reviewed. The inspection forms noted no problematic observations. There were no apparent signs of vandalism or tampering.

8.6.3 Site Inspection and Interviews

Inspections at the site were conducted on May 3, 2012 by Tetra Tech personnel. The purpose of the inspection was to assess the protectiveness of the remedy, including the presence of fencing to restrict access and condition of monitoring wells. Fencing the site was not warranted at OU13 since surficial soil with contaminant concentrations above the remedial goal were removed from Site 8 and no unacceptable risk were considered to be present for the current and future receptors evaluated for Site 24., Monitoring wells were accessible and appeared to be in good condition. Therefore, no apparent deficiencies noted during the site inspection.

The institutional controls that are in place include the restriction of groundwater use of the surficial zone of the sand and gravel aquifer underlying the sites. At the time of the inspection, institutional controls were found to be adequate, and use of groundwater was not observed. Roadways within OU13 appeared adequate, and there were no apparent signs of vandalism or trespassing.

An interview was conducted with Greg Campbell, Environmental Engineer for NAS Pensacola, on May 2, 2012. According to the interview, Mr. Campbell indicated he is well informed about the site's activities and progress, and was not aware of any community concerns regarding the site or its operation,

or of any incidents such as vandalism, trespassing or emergency responses at the site. The interview forms are presented in Appendix H.

Mr. Campbell indicated annual LUC inspections are performed. In addition, complaints, violations, or other incidents related to the site requiring a response by his office have not occurred.

8.6.4 ARAR Level Changes

The following standards were identified as chemical-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- Safe Drinking Water Act MCLs (40 CFR 141.11–141.16)
- Safe Drinking Water Act MCLs (40 CFR 141.50–141.51)
- Florida Drinking Water Standards, Monitoring and Reporting, Chapter 62-550, F.A.C.
- Florida Cleanup Target Levels, Chapter 62-777, F.A.C.
- Contaminated Site Cleanup Criteria, Chapter 62-780, F.A.C.
- Ground Water Classes, Standards, and Exemptions, Chapter 62-520, F.A.C.

With the exception of Chapter 62-777, F.A.C., there have been no changes in the MCLs, MCLGs, Florida Drinking Water Standards, Florida Ground Water Classes, Florida GCTLs, and Florida Site cleanup requirements that affect the protectiveness of the remedy.

There are no location-specific or action-specific ARARs identified in the ROD.

The cadmium and dieldrin contaminated areas were removed from Site 8 in 2004. The cleanup criteria used in Site 8 IRA for cadmium and dieldrin were based on their Florida SCTLs that were in effect prior to the revision of Chapter 62-777, F.A.C. in 2005. In the 2005 revision, there were no changes for cadmium and dieldrin in the Florida Residential direct exposure SCTL; review of the revisions indicated the following for industrial exposure and leachability to groundwater:

- Cadmium
    - The Florida industrial direct exposure SCTL for cadmium increased from 1,300 to 1,700 mg/kg and
    - The leachability to groundwater SCTL decreased from 8 to 7.5 mg/kg.
- Dieldrin
    - The Florida industrial direct exposure SCTL remained the same at 0.3 mg/kg and
    - The leachability to groundwater SCTL decreased from 0.004 to 0.002 mg/kg.

Because the IRA previously completed removed all site related contamination exceeding Florida residential direct exposure, the changes in the Florida industrial direct exposure and leachability SCTLs do not affect the remedy which remains protective in the short- and long-term for both COCs.

However, the Florida leachability to groundwater SCTLs for cadmium and dieldrin have decreased, so there may be slightly less protectiveness. Also, it should be noted that dieldrin has not been detected in a groundwater sample since 2007 (monitoring well 08GR01R); therefore, the change in the leachability to groundwater SCTL for dieldrin may be inconsequential.

8.7 TECHNICAL ASSESSMENT

8.7.1 Question A: Is the remedy functioning as intended by the ROD?

The review of documents, ARARs, risk assumptions, and the results of the site inspection indicates that the remedy is functioning as intended by the ROD.

Health and Safety Plan/Work Plan*:* A Site specific Health and Safety Plan (HASP) and Groundwater Monitoring Work Plan has been developed.

Remedial Action Performance: Contaminated soil was removed from Site 8 and replaced with clean backfill. The Groundwater Monitoring Plan for OU13 has been approved and natural attenuation monitoring has been initiated.

System O&M*:* There are no active remediation systems at OU13 and therefore no system O&M is required.

Cost of System Operations/O&M*:* There are no active remediation systems at OU13 and therefore no system O&M is required.

Opportunities for Optimization*:* Optimization of the groundwater monitoring effort was completed.

Early Indications of Potential Remedy Failure*.* No indicators of potential remedy failure have been identified.

Implementation of Institutional Controls and Other Measures: The LUC Remedial Design was published in August 2008 outlining the site specific LUCs to be implemented. The Navy is required to conduct periodic site inspections to ensure the LUCs are being properly maintained and administered and maintain the integrity of any existing or future monitoring or remediation system(s) unless prior written

approval is obtained from the Navy, USEPA, and FDEP. Groundwater use of the surficial zone of the sand and gravel aquifer in the immediate vicinity of OU13 is prohibited. The Navy will conduct an annual review of the institutional controls and certify that the controls should either remain in place or be modified to reflect changing site conditions.

8.7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Exposure Assumptions: There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes to Standards and To Be Considered: ARARs and TBCs considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. The industrial direct exposure SCTL for cadmium increased from 1,300 to 1,700 mg/kg, and the leachability to Groundwater SCTL criteria decreased from 8 to 7.5 mg/kg. The leachability to groundwater SCTL for dieldrin decreased from 0.004 to 0.002 mg/kg. For groundwater, there have been no changes that affect the protectiveness.

Florida groundwater regulations Chapter 62-550, F.A.C. and Chapter 62-777, F.A.C. have performance criteria that are equal to or lower than the Federal Safe Drinking Water Act of 1974 (amended in 1986 and 1996, and therefore are adequate to assess whether the remedies are functioning as intended because the lower of the state or federal performance criteria are used.

Changes in Exposure Pathways: No changes in the site conditions or land use that affect exposure pathways were identified as part of the Five-Year Review. Exposure to the site groundwater is still restricted by institutional controls.

USEPA has new guidance to address vapor intrusion issues, specifically titled Assessing Protectiveness at Sites for Vapor Intrusion, Supplement to the "Comprehensive Five-Year Review Guidance," OSWER Directive 9200.2-84. OU13 currently has no VOCs present in groundwater at concentrations greater than the FDEP GCTLs, as stated in the Annual Groundwater Monitoring Report: "VOC concentrations have been detected below the respective FDEP GCTLs since March 2009, with the exception of bromodichloromethane during the October 2010 sampling event." Bromodichloromethane was detected in a single monitoring well sample at a concentration of 1.28 µg/L which exceeds the FDEP GCTL of 0.6 µg/L. No VOCs were detected above instrument detection limits in the groundwater samples collected during the most recent sampling event completed in 2011 at Sites 8 and 24. Therefore, OU13 does not require consideration for vapor intrusion.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in human health or ecological toxicity criteria that would impact protectiveness of the remedy.

Changes in Risk Assessment Methodologies: Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

8.7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that calls into question the protectiveness of the remedy.

8.8 ISSUES

No issues regarding OU13 were discovered during the Five-Year Review.

8.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

Because no issues regarding OU13 were discovered during the Five-Year Review there are no recommendations.

8.10 PROTECTIVENESS STATEMENT

The remedy at OU13 is protective of human health and the environment because of the restriction on groundwater use eliminates the exposure to contaminated groundwater.

9.0 OPERABLE UNIT 18

The OU18 ROD was issued by the Navy and the USEPA on April 12, 2010. FDEP concurred with the ROD on June 2, 2010. Implementation of remedial action at Site 43 began in 2012. This five-year review consists of data collected since the ROD was signed and provides a status update for Site 43 – Demolition Debris Disposal Area. This statutory review for Site 43 is being conducted because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

9.1 SITE CHRONOLOGY

A list of significant Site 43 historical events and relevant dates is provided in Table 9-1.

TABLE 9-1
OU18 CHRONOLOGY
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Event	Date
Child using a metal detector discovered a partially exposed drum east of the tennis courts	1992
Site Reconnaissance	December 1992
Geophysical Investigation	1994
Site Characterization Sampling	1999
Interim Remedial Action	2001
RI	2005-2006
FS	July 2008
Proposed Plan	July 2009
Final ROD Issued	April 2010
LUC RD Approved	March 2011
Remedial Design Approved	November 2011

9.2 BACKGROUND

9.2.1 Physical Characteristics of Site 43

OU18, also referred to as Site 43, encompasses approximately 180,000 square feet (4.1 acres), approximately 40,000 of which are covered by a paved parking lot (see Figure 9-1). The remainder of the site is an open grassy area covered with scattered trees. Site 43 is located in a developed area in the eastern portion of NAS Pensacola, at the southwestern corner of Murray and Taylor Roads and north of BOQ Road, which provides access to the Officer's Quarters. The site is on the eastern slope of a shallow closed depression, bound by paved roads on all four sides. Surface water features are not present at the site, and overland runoff flows west into the depression. A designated wetland and drainage ditch located approximately 500 feet east of the site are the nearest surface water bodies.

Soil at Site 43 consists of fine to coarse excessively drained sands formed in sandy marine environments and characterized by rapid infiltration and slow runoff. Soils encountered at Site 43 during the RI were typical of regional undifferentiated Pleistocene marine deposits made up of light brown to tan fine quartz sand with associated stringers and lenses of gravel and clay. From the ground surface to 4 feet bls, many areas of the site showed signs of disturbance either from waste disposal or 2001 IRA excavation activities. Below 4 feet, typical lithologies included medium to fine silty or clayey sand ranging from light gray or tan to dark brown in color. Significant clay or gravel horizons were not encountered. Depths to groundwater ranged from approximately 12 to 16 feet bls during the RI, and groundwater flow was generally to the east.

9.2.2 Land and Resource Use at Site 43

The site previously contained a tennis court and building foundation/basketball court; however, the tennis and basketball courts were removed in 2003. Prior to the most recent use as a recreational area, site use is unknown.

Recreational users and maintenance workers use the site currently and are expected to continue use into the foreseeable future. On-site wildlife may temporarily use Site 43, but due to lack of suitable cover, wildlife use is assumed to be infrequent. The NAS Pensacola Base Master Plan identifies the planned future use of the site as open space, indicating no future development or construction activities are planned for the site. If future land use at Site 43 differs from the reasonably anticipated land use, the Navy will reassess risks appropriate to the future use.

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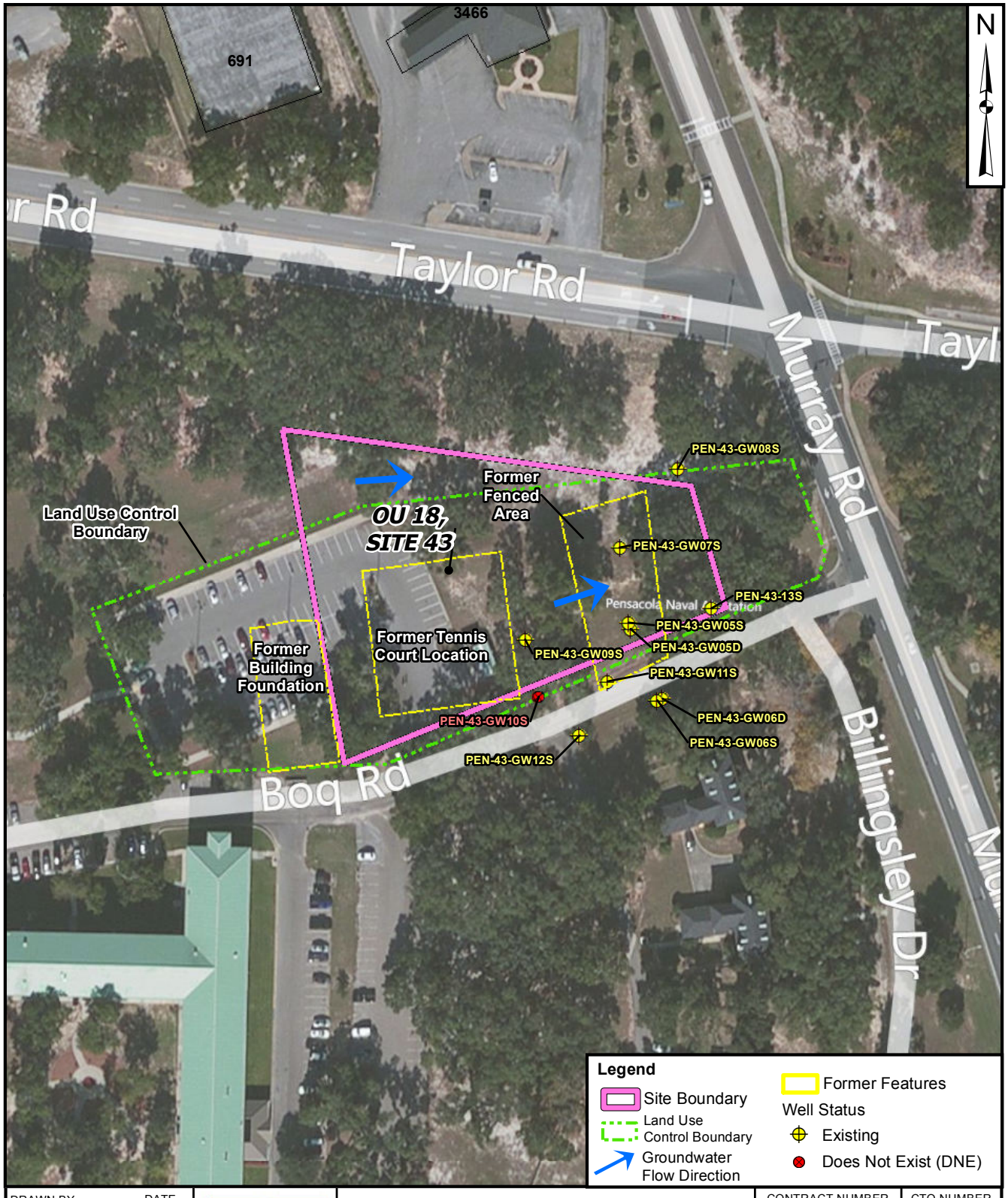

DRAWN BY: GIS	DATE: 8/21/2013	SITE MAP - OPERABLE UNIT 18 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00390
CHECKED BY: A.I.	DATE: 8/21/2013		CTO NUMBER: 067
REVISED BY:	DATE:		APPROVED BY: ___ DATE: ___
SCALE: AS NOTED			APPROVED BY: ___ DATE: ___
			FIGURE NO.: 9 - 1 REV: 0

The nearest water supply well to Site 43 is located approximately 1,600 feet west-southwest; however it is no longer used. The main source of potable water for NAS Pensacola is the Navy-owned well field located at NTTC Corry Station, which is located approximately three miles north of NAS Pensacola on the northern (opposite) side of Bayou Grande.

9.3 HISTORY OF CONTAMINATION

Environmental investigations at Site 43 began in December 1992 when a child using a metal detector discovered a partially exposed drum east of the tennis court, and subsequent site reconnaissance identified additional drums and smaller rusted metallic debris in the area. Odors, visible soil stains, or other indications of contaminant release were not observed. The area surrounding the drums was fenced to prevent general access until further investigations could be conducted. The precise locations of the debris disposal areas were unknown; however, approximate locations of several disposal areas were determined based on the results of subsequent investigations.

9.3.1 Initial Responses at Site 43

A Geophysical Investigation was conducted in 1994 to assess the size of the disposal area and number of drums buried in the area. A total of 25 geophysical anomalies were identified during the investigation, but the actual number of drums disposed in the area was not determined. After the Geophysical Investigation, it was recommended that the drum disposal area and several anomalies outside of the disposal area be further investigated through the use of test pits or trenches.

Site characterization sampling was conducted in 1999 and included surface and subsurface soil sampling from anomalous locations identified through the use of test pits and groundwater sampling from temporary micro wells. Drums with sufficient contents were sampled and were found to contain PAHs at concentrations exceeding Florida residential direct exposure SCTLs and metals at concentrations exceeding residential and industrial direct exposure SCTLs. Concentrations of benzo(a)pyrene, antimony, arsenic, barium, copper, iron, and vanadium exceeded Florida residential direct exposure SCTLs. Concentrations of arsenic and lead exceeded Florida residential direct exposure SCTLs. Fourteen drums were removed during the course of the investigation.

Samples of surface soil, subsurface soil (beneath the drum disposal depth), and soil just above the water table were collected during this investigation. Concentrations of benzo(a)pyrene, antimony, arsenic, barium, copper, iron, zinc, lead, nickel, and vanadium in surface and shallow subsurface soil samples exceeded Florida residential direct exposure SCTLs. Leachability to groundwater SCTLs were exceeded in the surface soil samples by antimony and nickel. Leachability to groundwater SCTLs were exceeded in the subsurface soil samples by antimony, arsenic, barium, nickel, and zinc.

Groundwater samples contained iron and aluminum at concentrations that exceeded their federal and state CTLs.

An IRA to remove metal debris and contaminated surface and subsurface soil was recommended. The IRA was conducted in 2001 and included removal of 657 cubic yards of soil and debris including 20 to 25 rusted metal drums and drum parts and inert ornamental ordnance and munitions. Prior to the IRA, remedial goals were developed for some COCs using 95 percent upper confidence limits (UCLs) for surface soil. COC concentrations in surface and subsurface soil samples collected prior to excavation were compared to these remedial goals to determine the extent of contamination requiring removal. Remedial goals were re-evaluated and revised after excavation activities were completed, and it was determined that additional areas of contaminated soil required excavation. Based on this information, the IRA Report recommended an RI and FS.

9.3.2 Basis for Taking Action at Site 43

Arsenic, barium, copper, vanadium, and cPAHs were detected in surface and subsurface soil at concentrations exceeding Florida's residential risk-based criteria, and cPAHs and lead were detected at concentrations exceeding Florida's industrial risk-based screening criteria and site-specific recreational criteria. Unacceptable risks were identified for residential and non-residential exposure to lead in soil and groundwater at Site 43. Because risks were identified under the current and reasonably anticipated future land use scenario (non-residential), it was determined that a response action was necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances, pollutants, or contaminants into the environment that may present an imminent and substantial endangerment to public health or welfare. COCs related to each medium are summarized in Table 9-2.

TABLE 9-2
OU18 CONTAMINANTS OF CONCERN
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Soil	Groundwater
Arsenic	Lead
Barium	
Copper	
Lead	
Vanadium	
cPAHs	

9.4 REMEDIAL ACTIONS

9.4.1 Remedy Selection at Site 43

The ROD for NAS Pensacola Site 43 was finalized on April 12, 2010. RAOs were developed as a result of data collected during the RI to aid in the development and screening of remedial alternatives to be considered for the ROD.

The goals of the selected soil and groundwater remedies at Site 43 are to protect human health and the environment by eliminating, reducing, or controlling hazards posed by the site and to meet ARARs. Based on consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives, and any comments received from USEPA, FDEP, and the public, excavation and off-site disposal of the most contaminated soil (in unpaved areas) to meet Florida industrial direct exposure SCTLs; groundwater monitoring; and LUCs to prohibit future residential use, to ensure maintenance of paved areas, and prohibit groundwater use were selected to address contamination at Site 43. Table 9-3 lists the RAOs for Site 43.

TABLE 9-3
OU18 REMEDIAL ACTION OBJECTIVES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Medium	COCs	Remedial Action Objectives
Soil	Arsenic, Barium, Copper, Lead, Vanadium, and cPAHs.	Prevent unacceptable human health risk associated with exposure to soil containing concentrations greater than Florida's industrial direct exposure SCTLs.
Groundwater	Lead	Prevent unacceptable human health risk associated with exposure to groundwater containing concentrations greater than the Florida's CTL and USEPA Action Level.

Four soil remedial alternatives and three groundwater remedial alternatives were evaluated in the OU18 FS to address the two RAOs. The selected remedy for Site 43 included limited soil excavation and off-site disposal to meet industrial SCTLs, LUCs, and long-term groundwater monitoring. These soil and groundwater alternatives were selected because they provide the best balance of tradeoffs with respect to the nine CERCLA remedy evaluation criteria and will allow for continued non-residential use of the property. The following components, as provided in the Site 43 ROD, constitute the remedial action for Site 43 to address the soil and groundwater RAOs:

- Excavation and off-site disposal of the most contaminated soil (in unpaved areas) to meet industrial SCTLs.

- Collection and analysis of groundwater samples from four monitoring wells including: one existing well and three new downgradient wells, quarterly for one year. The samples will be analyzed for lead only. After one year, data will be evaluated to determine future monitoring requirements. Additional groundwater samples will be collected in the area surrounding existing monitoring well PEN-43-13S to confirm the extent of the groundwater contamination and to provide direction for installation of the new downgradient wells.

The ROD also states that: "The Selected Remedy includes 1 year of groundwater monitoring followed by a re-evaluation of conditions. Any modifications to the LUCs to be implemented for groundwater based on such a reevaluation(s) will be made in accordance with the provisions of the LUC RD for Site 43."

- LUCs will be implemented within the Site 43 boundaries to:

  - Prohibit residential use of the site, including housing, child-care facilities, schools, playgrounds, convalescent, or nursing care facilities.

  - Prohibit unauthorized excavation and/or removal of soil with contaminant concentrations exceeding Florida residential SCTLs.

  - Prohibit all uses of groundwater from the surficial aquifer underlying the site.

  - Maintain the integrity of the paved areas.

  - Maintain the integrity of existing or future monitoring or remediation systems.

The ROD states that "With regard to soil, because metals contamination does not readily attenuate through natural processes, the LUCs to preclude residential use of the site will need to remain in effect for the foreseeable future unless more active remedial measures are undertaken to allow for future unrestricted site use."

The key factors in the selection of this remedy were as follows:

- The remedy is consistent with the reasonably anticipated future non-residential use of the site and will allow continued use of the parking area without disturbance of the pavement.

- The remedy achieves similar protection at a significantly lower cost less than full-scale removal to achieve unrestricted use and unlimited exposure ($390,000 compared to $706,000).

- Because it is expected that, with the removal of the soil source, lead in groundwater may rapidly decrease to concentrations less than the Florida CTL and USEPA Action Level, and because long-term LUCs will be required to prevent residential development and ensure maintenance of pavement, the inclusion of a groundwater use restriction was not additionally burdensome.

9.4.2 Remedy Implementation at Site 43

A revised final LUC RD was finalized with USEPA and FDEP concurrence in March 2011. The Navy continues to prepare the UFP-SAP and Remedial Action Work Plan and anticipates submittal of the documents in October 2012.

9.5 PROGRESS SINCE THE LAST FIVE-YEAR REVIEW

9.5.1 Protectiveness Statements from the Last Review

This is the first Five-Year Review since the approval of the ROD; therefore, no previous protectiveness statement is available.

9.5.2 Status of Recommendations and Follow-up Actions from Last Review

This is the first Five-Year Review since the approval of the ROD; therefore, there are no follow-up actions.

9.6 FIVE-YEAR REVIEW PROCESS

This is the first Five-Year Review for this site. Members of the NAS Pensacola Partnering Team were notified of the initiation of the Five-Year Review in January 2012. The Five-Year Review was led by Gerald Walker of Tetra Tech, the NAVFAC SE Navy CLEAN Contractor, and included other Tetra Tech staff. Patty Marajh-Whittemore of NAVFAC SE, Greg Campbell of NAS Pensacola Public Works Department, Tim Woolheater of USEPA, David Grabka of FDEP, and Sam Naik of CH2M Hill assisted in the review.

The review included the following components:

- Document Review
- Data Review
- Site Inspection
- Five-Year Review Report development and review

9.6.1 Document Review

This five-year review consisted of a review of relevant documents including the ROD and RI, and applicable federal and state statutes

9.6.2 Data Review

Source removal and groundwater monitoring are pending submittal and approval of the UFP-SAP and Remedial Action Work Plan.

9.6.3 LUC Inspection

Following completion of the final ROD, LUCs were established for OU18 in the OU18 Remedial Design finalized November 22, 2011 and implemented November 06, 2011 (the Final Remedial Design was submitted August 15, 2011; however, additional comments were received from USEPA and the final document was resubmitted November 22, 2011; FDEP and USEPA both approved the final document on December 20, 2011).

The OU18 Remedial Design specified the institutional controls be placed in the NAS Pensacola Base Master Plan and that annual LUC inspections be completed. The LUC specified included: restrict future use of the Site to non-residential land uses unless prior written approval is obtained from the USEPA and FDEP. Non-residential land use restrictions will prohibit residential or residential-like uses including, but not limited to, any form of housing, any kind of school (including pre-schools, elementary schools, and secondary schools), child care facilities, playgrounds, and adult convalescent or nursing care facilities; prohibit any excavation or other disturbances of existing areas with contaminated surface and subsurface soils (exceeding residential Soil Cleanup Target Levels [SCTLs]) at the Site unless prior written approval is obtained from the USEPA and FDEP; maintain the integrity of the current 40,000-square-foot parking lot on the Site; prohibit all uses of groundwater from the surficial aquifer underlying the Site including, but not limited to, human consumption, dewatering, irrigation, heating/cooling purposes, and industrial processes at the Site unless prior written approval is obtained from the USEPA and FDEP; maintain the integrity of all existing or future monitoring and on-site remedy components at the Site; and post signs at the site advising that any excavation activity must be authorized in advance by the base environmental department. The Base Master Plan was reviewed and the OU18 LUC documentation was present. In addition, current and historic annual LUC inspection forms for OU18, during the period of review, were obtained and reviewed. The inspection forms noted no problematic observations.

9.6.4 Site Inspection and Interviews

An inspection was conducted at the site on May 2, 2012 by Tetra Tech personnel. The purpose of the inspection was to assess the protectiveness of the remedy.

At the time of the inspection, institutional controls appeared to be adequate, and use of groundwater was not observed. Roadways within OU18 appeared adequate, and there were no apparent signs of vandalism or trespassing. Existing monitoring wells were accessible and in good condition. Signage is in place restricting access to the site as contaminated soils remain in place. No deficiencies were noted during the site inspection.

An interview was conducted with Greg Campbell, Environmental Engineer for NAS Pensacola, on May 2, 2012. According to the interview, Mr. Campbell indicated he is well informed about the site's activities and progress, and was not aware of any community concerns regarding the site or its operation, or of any incidents such as vandalism, trespassing or emergency responses at the site. The interview forms are presented in Appendix I.

Mr. Campbell indicated annual LUC inspections are performed. In addition, complaints, violations, or other incidents related to the site requiring a response by his office have not occurred.

9.6.5 ARAR Level Changes

The following standards were identified as chemical-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- Lead and Copper Rule Federal Register 26564
- Safe Drinking Water Act MCLs (40 CFR 141.11–141.16)
- Safe Drinking Water Act MCLs (40 CFR 141.50–141.51)
- Florida Drinking Water Standards, Monitoring and Reporting, Chapter 62-550, F.A.C.
- Florida Cleanup Target Levels, Chapter 62-777, F.A.C.
- Ground Water Classes, Standards, and Exemptions, Chapter 62-520, F.A.C.

There have been no other changes in the Lead and Copper Rule, Chapter 62-777, F.A.C., and Chapter 62-550, F.A.C. that affect the protectiveness of the remedy. The soil cleanup goals in the ROD are the same as those in Chapter 62-777, F.A.C. The 15 µg/L Action Level for lead per the Federal Safe Drinking Water Act and Chapter 62-550, F.A.C. has not changed.

The following standards were identified as action-specific ARARs in the ROD. They were reviewed for changes that could affect protectiveness:

- RCRA Regulations, Identification and Listing of Hazardous Wastes (40 CFR Part 262.11 and 264.13(a)(1))
- RCRA Regulations, Land Disposal Restrictions for Contaminated Soil (40 CFR Part 268.49)
- Florida Contaminated Site Cleanup Criteria - Risk Management Option Level II, Chapter 62-780.680(2), F.A.C.
- Florida Natural Attenuation with Monitoring Regulation, Chapter 62-780.690(8)(a) thru (c), F.A.C.
- Florida Water Well Permitting and Construction Requirements, Chapter 62-532.500, F.A.C.
- Florida Hazardous Waste – Requirements for Remedial Action, Chapter 62-730.225(3), F.A.C.

The soil excavation and monitoring program have not been implemented, so most of these ARARs were not evaluated. The sections covering General Provisions for Water Well Permitting and Construction and Abandonment of Water Wells in 62-532, F.A.C. were repealed October 7, 2010. Monitoring well installation and abandonment are now addressed in the FDEP Monitoring Well Design and Construction Guidance Manual, 2008.

There are no location-specific ARARs identified in the ROD.

9.7 TECHNICAL ASSESSMENT

9.7.1 Question A: Is the remedy functioning as intended by the ROD?

The remedy has not yet been fully implemented. The LUC RD was finalized with USEPA and FDEP concurrence in March 2011. The Final Remedial Action Work Plan was submitted to the regulatory agencies on October 18, 2012 and the Final UFP SAP was submitted to the regulatory agencies on May 1, 2013.

Remedial Action Performance: Once implemented, the remedy is expected to perform as designed.

System O&M: There are no active remediation systems at Site 43 and therefore no system O&M is required.

Cost of System Operations/O&M: There are no active remediation systems at Site 43 and therefore no system O&M is required.

Early Indications of Potential Remedy Failure: None.

Implementation of Institutional Controls and Other Measures: The LUC RD was finalized with USEPA and FDEP concurrence in March 2011. Based on the site inspection performed on May 2, 2012, institutional controls have been implemented and are adequate for the site.

9.7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?

Exposure Assumptions: There have been no changes in the physical conditions of the site that would affect the protectiveness of the remedy.

Changes to Standards and To Be Considered: ARARs and TBCs considered during preparation of the ROD were reviewed to determine changes to standards since the remedy was implemented. For soil and groundwater, there are no changes to the cleanup goals identified in the ROD.

Because the remedy has not been implemented yet, the action-specific ARARs could not be evaluated.

Florida groundwater regulations Chapter 62-550, F.A.C. and Chapter 62-777, F.A.C. have performance criteria that are equal to or lower than the Federal Safe Drinking Water Act of 1974 (amended in 1986 and 1996), and therefore are adequate to assess whether the remedies are functioning as intended because the lower of the state or federal performance criteria are used.

Changes in Exposure Pathways: No changes in the site conditions or land use that affect exposure pathways were identified as part of the five-year review. Exposure to the site groundwater is still restricted by the institutional control.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in human health or ecological toxicity criteria that would impact protectiveness of the remedy.

Changes in Risk Assessment Methodologies: Changes in risk assessment methodologies since the time of the ROD do not call into question the protectiveness of the remedy.

9.7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No additional information has come to light that calls into question the protectiveness of the remedy.

9.8 ISSUES

No issues were discovered during the Five-Year Review. As indicated in Table 9-4, the remedy has not yet been fully implemented.

TABLE 9-4
OU18 ISSUES
FIVE-YEAR REVIEW
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Issues	Affects Protectiveness (Y/N)	
	Current	Future
The remedy has yet to be fully implemented.	N	N

9.9 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The recommendation for OU18 is to fully implement the remedy.

9.10 PROTECTIVENESS STATEMENT

The remedy at OU18 upon completion will be protective of human health and the environment, and in the interim, exposure pathways that could result in unacceptable risks are being controlled.

10.0 BASEWIDE CONCLUSIONS

This Five-Year Review shows that the Navy is meeting the requirements of the RODs for OU3 and OU13. The remedies at OU11 and OU18 will be protective of human health and the environment upon completion, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. However, in order for the remedy to be protective in the long term, implementation of the MNA remedy needs to be competed. In addition, the Five-Year Review shows the remedies for OUs 1, 2 and 4 currently protect human health and the environment because LUCs are in place and enforced. However, in order for the remedy to be protective in the long term, an ESD or ROD Amendment is needed.

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APPENDIX A

OU1 GROUNDWATER TREND ANALYSES

Provided on CD

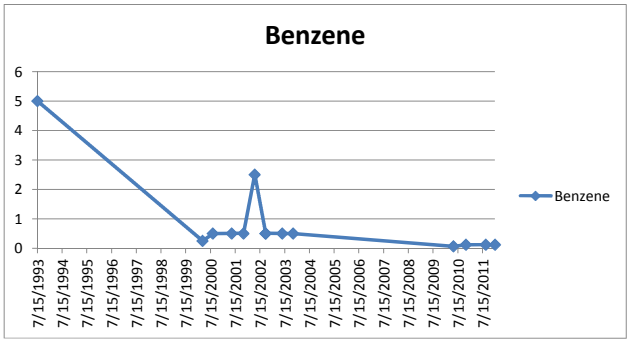
Mann-Kendall Trend Analysis
Groundwater and Surface Water Samples
Operable Unit 1
NAS Pensacola, Florida

Sample Location ID	Benzene	Chlorobenzene	Vinyl Chloride	Naphthalene	Xylenes (Total)	1,1,2,2-Tetrachloroethene	Aluminum	Cadmium	Chromium	Iron	Manganese	Nickel
01GS57	ND	ND	ND	ND	ND	ND	I	NT	NT	NT	D	NT
01GS62	D	NT	NT	D	D	ND	I	NT	NT	I	I	NT
01GS64	NT	NT	NT	NT	NT	ND	NT	NT	NT	I	I	I
01GS71	ND	ND	ND	ND	ND	ND	NT	NT	NT	NT	I	NT
01GS73	ND	ND	ND	ND	ND	ND	NT	NT	NT	NT	NT	NT
01GGM33	NT	I	I	NT	NT	ND	NT	ND	NT	NT	NT	ND
01UPGW01	ND	NT	ND	ND	ND	ND	NT	NT	NT	NT	NT	I
01GI32	D	I	D	ND	ND	ND	NT	ND	I	NT	NT	ND
01GI36	D	ND	D	ND	ND	ND	NT	NT	ND	D	I	ND
01GI41	D	NT	D	NT	D	ND	NT	ND	D	D	NT	ND
01GI43	D	I	D	NT	ND	ND	I	NT	I	D	I	ND
01GI44	NT	NT	D	ND	ND	ND	NT	NT	NT	D	D	ND
01GI46	NT	NT	NT	ND	ND	ND	NT	NT	NT	D	NT	ND
01GI59	D	I	D	NT	D	ND	I	NT	NT	NT	I	ND
01GI65	NT	NT	D	D	I	ND	NT	NT	NT	D	D	NT
01GI74	NT	NT	NT	ND	ND	ND	NT	NT	NT	NT	NT	NT
01GI72	NT	NT	NT	ND	ND	ND	NT	NT	NT	NT	NT	NT
01PZ1	NA	NA	NA	NA	NA	NA	NA	NA	NA	D	NA	NA
01PZ6	NA	NA	NA	NA	NA	NA	NA	NA	NA	NT	NA	NA
01PZ6A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NT	NA	NA
01PZ7	NA	NA	NA	NA	NA	NA	NA	NA	NA	I	NA	NA
01PZ7A	NA	NA	NA	NA	NA	NA	NA	NA	NA	NT	NA	NA
01PZ7B	NA	NA	NA	NA	NA	NA	NA	NA	NA	D	NA	NA
01PZ8	NA	NA	NA	NA	NA	NA	NA	NA	NA	D	NA	NA
01PZ10	NA	NA	NA	NA	NA	NA	NA	NA	NA	D	NA	NA
01SW01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NT	NA	NA
01SW02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NT	NA	NA
01SW03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NT	NA	NA

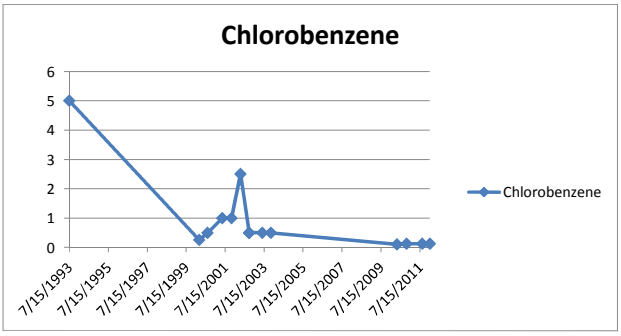
Notes:
NA = Not Analyzed
ND = Not Detected
Mann-Kendall Analysis conducted using ProUCL version 4.1.01 (Lockheed Martin, May 2010)
NT = No Trend
I = Increasing
D = Decreasing

Monitoring Well 01GS57
OU1, Site 1
NAS Pensacoal, Pensacola Florida

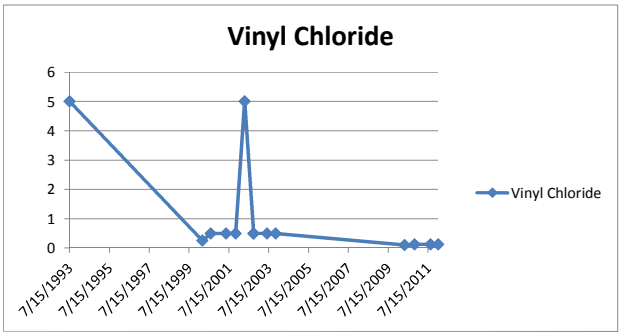
Benzene Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	1	U	0.5	U
11/13/2001	1	U	0.5	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
10/8/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.14	U	0.07	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



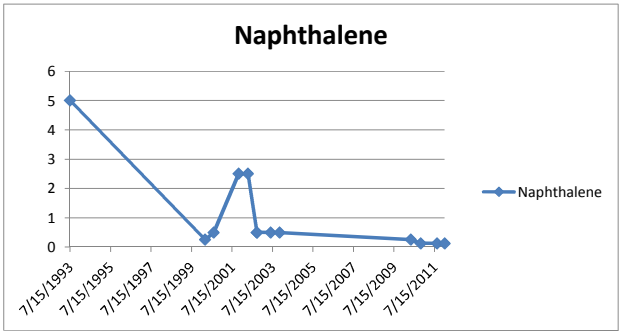
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	2	U	1	U
11/13/2001	2	U	1	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
10/8/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.21	U	0.105	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	1	U	0.5	U
11/13/2001	1	U	0.5	U
4/30/2002	10	U	5	U
10/8/2002	1	U	0.5	U
10/8/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.2	UJ	0.1	UJ
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

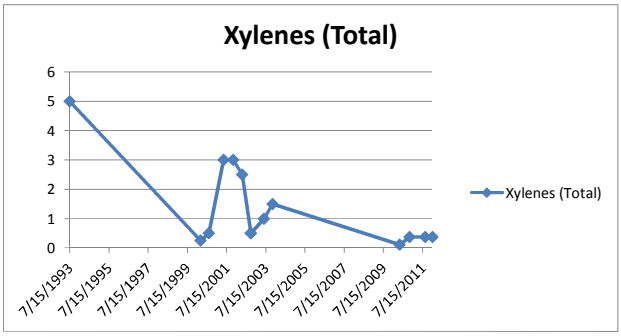


Naphthalene Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
11/13/2001	5	U	2.5	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
10/8/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.5	U	0.25	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

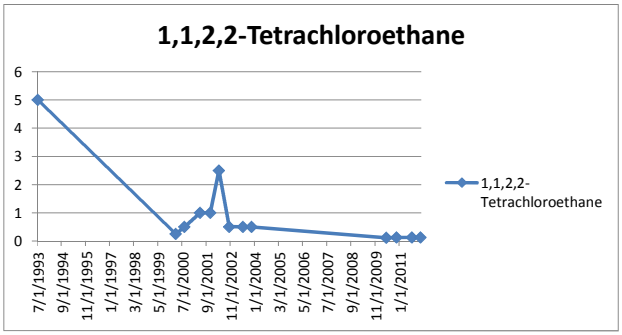


Monitoring Well 01GS57
OU1, Site 1
NAS Pensacoal, Pensacola Florida

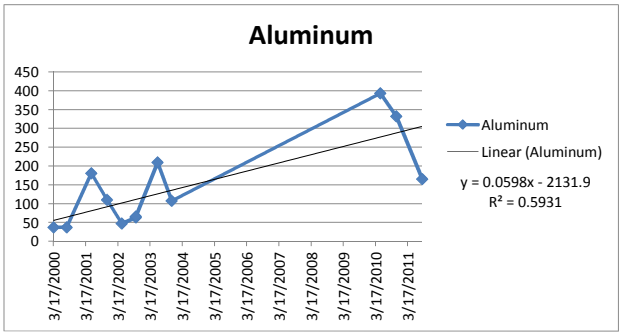
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
7/15/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	6	U	3	U
11/13/2001	6	U	3	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
10/8/2002	1	U	0.5	U
6/11/2003	2	U	1	U
11/18/2003	3	U	1.5	U
5/12/2010	0.22	U	0.11	U
11/10/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



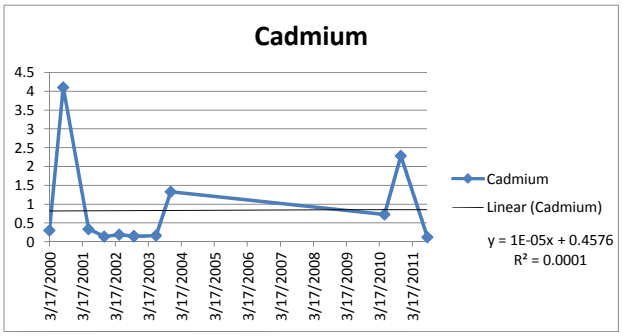
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
7/15/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	2	U	1	U
11/13/2001	2	U	1	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.23	U	0.115	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
7/15/1993	333000		333000	
3/17/2000	73.3	U	36.65	U
8/16/2000	72.8	U	36.4	U
5/22/2001	180	J	180	J
11/13/2001	110	J	110	J
4/30/2002	93.5	U	46.75	U
10/8/2002	126.5	U	63.25	U
10/8/2002	131	U	65.5	U
6/11/2003	209		209	
11/18/2003	215	U	107.5	U
5/12/2010	393		393	
11/10/2010	332		332	
8/30/2011	165		165	

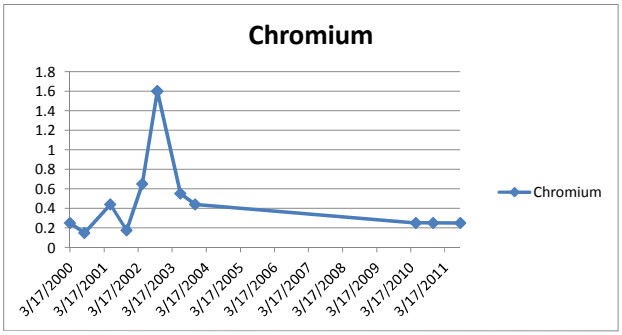


Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
7/15/1993	3	U	1.5	U
3/17/2000	0.6	U	0.3	U
8/16/2000	8.2	U	4.1	U
5/22/2001	0.33	J	0.33	J
11/13/2001	0.27	U	0.135	U
4/30/2002	0.38	U	0.19	U
10/8/2002	0.3	U	0.15	U
10/8/2002	0.3	U	0.15	U
6/11/2003	0.33	U	0.165	U
11/18/2003	2.66	U	1.33	U
5/12/2010	0.723	J	0.723	J
11/10/2010	2.28		2.28	
8/30/2011	0.25	U	0.125	U

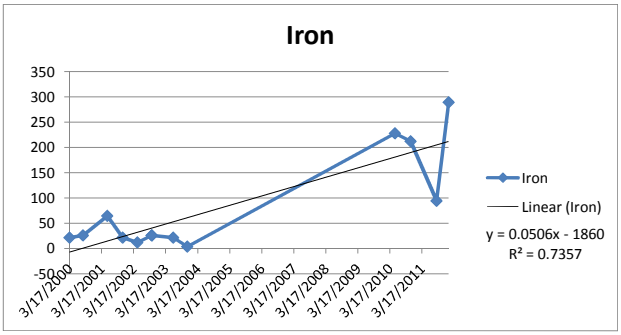


Monitoring Well 01GS57
OU1, Site 1
NAS Pensacoal, Pensacola Florida

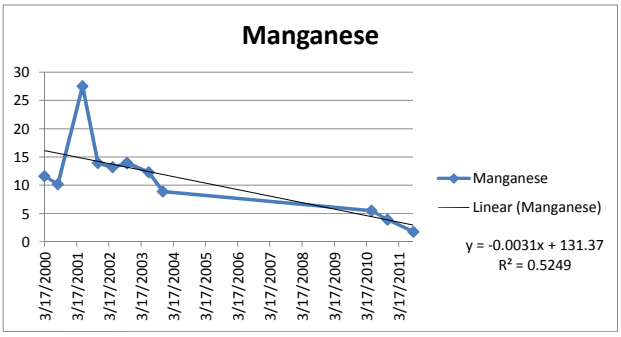
Chromium	Validated		Censored	
Date	Result	Qual	Result	Qual
7/15/1993	351		351	
3/17/2000	0.5	U	0.25	U
8/16/2000	0.3	U	0.15	U
5/22/2001	0.44	J	0.44	J
11/13/2001	0.35	U	0.175	U
4/30/2002	1.3	U	0.65	U
10/8/2002	3.2	U	1.6	U
10/8/2002	3.2	U	1.6	U
6/11/2003	1.1	U	0.55	U
11/18/2003	0.88	U	0.44	U
5/12/2010	0.5	U	0.25	U
11/10/2010	0.5	U	0.25	U
8/30/2011	0.5	U	0.25	U



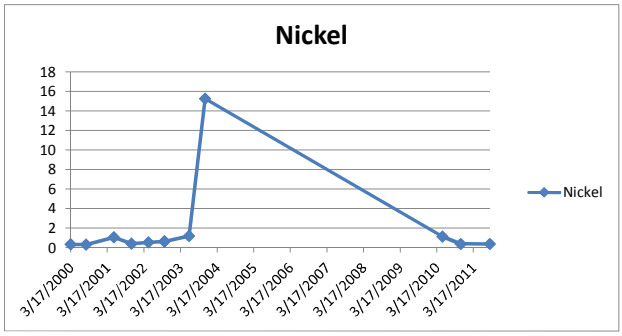
Iron	Validated		Censored	
Date	Result	Qual	Result	Qual
7/15/1993	200000		200000	
3/17/2000	43.6	U	21.8	U
8/16/2000	52	U	26	U
5/22/2001	64.7	J	64.7	J
11/13/2001	43	U	21.5	U
4/30/2002	24.3	U	12.15	U
10/8/2002	51.7	U	25.85	U
10/8/2002	51.7	U	25.85	U
6/11/2003	21.6		21.6	
11/18/2003	8	U	4	U
5/12/2010	228		228	
11/10/2010	212		212	
8/30/2011	94.5		94.5	
1/17/2012	289		289	



Manganese	Validated		Censored	
Date	Result	Qual	Result	Qual
7/15/1993	2020		2020	
3/17/2000	11.6		11.6	
8/16/2000	10.2		10.2	
5/22/2001	27.5		27.5	
11/13/2001	13.9	J	13.9	J
4/30/2002	13.2		13.2	
10/8/2002	13.85		13.85	
10/8/2002	13.9		13.9	
6/11/2003	12.3		12.3	
11/18/2003	8.9		8.9	
5/12/2010	5.48		5.48	
11/10/2010	3.9	J	3.9	J
8/30/2011	1.76	J	1.76	J



Nickel	Validated		Censored	
Date	Result	Qual	Result	Qual
7/15/1993	158	J	158	J
3/17/2000	0.7	U	0.35	U
8/16/2000	0.6	U	0.3	U
5/22/2001	2.1	U	1.05	U
11/13/2001	0.8	U	0.4	U
4/30/2002	1.1	U	0.55	U
10/8/2002	1.3	U	0.65	U
10/8/2002	1.3	U	0.65	U
6/11/2003	1.2		1.2	
11/18/2003	30.5	U	15.25	U
5/12/2010	1.13	J	1.13	J
11/10/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U



Monitoring Well 01GS57
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	12
Minimum	36.4
Maximum	393
Mean	145.4
Geometric Mean	107.8
Median	108.8
Standard Deviation	117.2
SEM	33.82
Mann-Kendall Test	
Test Value (S)	34
Tabulated p-value	0.01
Standard Deviation of S	14.58
Standardized Value of S	2.263
Approximate p-value	0.0118

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	13
Minimum	4
Maximum	289
Mean	80.53
Geometric Mean	40.26
Median	25.85
Standard Deviation	96.97
SEM	26.89
Mann-Kendall Test	
Test Value (S)	23
Tabulated p-value	0.102
Standard Deviation of S	16.36
Standardized Value of S	1.345
Approximate p-value	0.0894

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

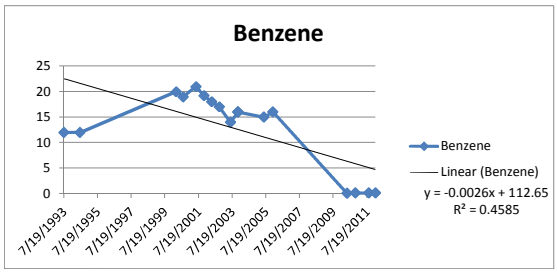
Manganese

General Statistics	
Number of Values	12
Minimum	1.76
Maximum	27.5
Mean	11.37
Geometric Mean	9.396
Median	11.95
Standard Deviation	6.562
SEM	1.894
Mann-Kendall Test	
Test Value (S)	-35
Tabulated p-value	0.01
Standard Deviation of S	14.55
Standardized Value of S	-2.337
Approximate p-value	0.00972

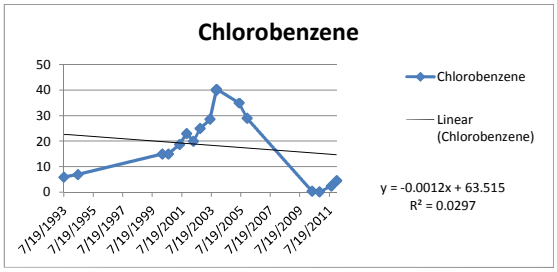
Statistically significant evidence of a decreasing trend at the specified level of significance.

Monitoring Well 01GS62
OU1, Site 1
NAS Pensacoal, Pensacola Florida

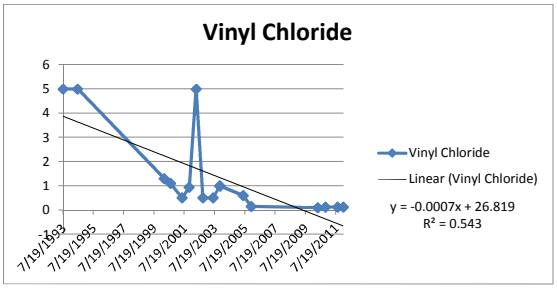
Benzene Date	Validated Result	Qual	Censored Result
7/19/1993	12		12
6/30/1994	12		12
3/17/2000	20		20
8/17/2000	19		19
5/23/2001	21		21
11/12/2001	19.2		19.2
4/30/2002	18		18
10/9/2002	17		17
6/10/2003	14		14
11/19/2003	16		16
11/19/2003	16		16
6/2/2005	15		15
12/16/2005	16		16
5/12/2010	0.14	U	0.07
11/9/2010	0.25	U	0.125
8/30/2011	0.25	U	0.125
1/17/2012	0.25	U	0.125



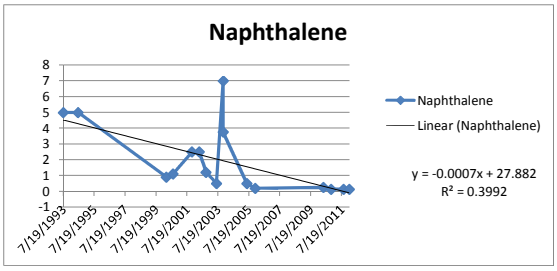
Chlorobenzene Date	Validated Result	Qual	Censored Result
7/19/1993	6	J	6
6/30/1994	7	J	7
3/17/2000	15		15
8/17/2000	15		15
5/23/2001	18.8		18.8
11/12/2001	23		23
4/30/2002	20		20
10/9/2002	25		25
6/10/2003	28.6		28.6
11/19/2003	40		40
11/19/2003	40.5		40.5
6/2/2005	35		35
12/16/2005	29		29
5/12/2010	0.38	J	0.38
11/9/2010	0.25	U	0.125
8/30/2011	2.43		2.43
1/17/2012	4.62		4.62



Vinyl Chloride Date	Validated Result	Qual	Censored Result
7/19/1993	10	U	5
6/30/1994	10	U	5
3/17/2000	1.3		1.3
8/17/2000	1.1		1.1
5/23/2001	1	U	0.5
11/12/2001	0.94	J	0.94
4/30/2002	10	U	5
10/9/2002	1	U	0.5
6/10/2003	1	U	0.5
11/19/2003	2	U	1
11/19/2003	2	U	1
6/2/2005	0.6	J	0.6
12/16/2005	0.3	U	0.15
5/12/2010	0.2	UJ	0.1
11/9/2010	0.25	U	0.125
8/30/2011	0.25	U	0.125
1/17/2012	0.25	U	0.125

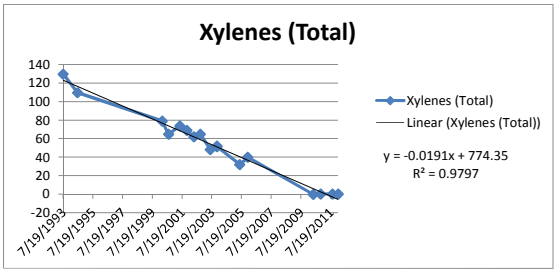


Naphthalene Date	Validated Result	Qual	Censored Result
7/19/1993	10	U	5
6/30/1994	10	U	5
3/17/2000	0.9	J	0.9
8/17/2000	1.1		1.1
11/12/2001	5	U	2.5
4/30/2002	5	U	2.5
10/9/2002	1.2	J	1.2
6/10/2003	1	U	0.5
11/19/2003	7		7
11/19/2003	3.75		3.75
6/2/2005	1	U	0.5
12/16/2005	0.4	U	0.2
5/12/2010	0.5	U	0.25
11/9/2010	0.25	U	0.125
8/30/2011	0.25	U	0.125
1/17/2012	0.25	U	0.125

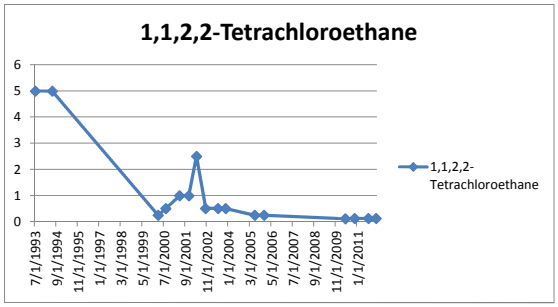


Monitoring Well 01GS62
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Xylenes (Total) Date	Validated Result	Qual	Censored Result
7/19/1993	130		130
6/30/1994	110		110
3/17/2000	79		79
8/17/2000	65		65
5/23/2001	73.8		73.8
11/12/2001	69.1		69.1
4/30/2002	62		62
10/9/2002	65		65
6/10/2003	48.4		48.4
11/19/2003	52		52
11/19/2003	51.5		51.5
6/2/2005	32		32
12/16/2005	40		40
5/12/2010	0.22	U	0.11
11/9/2010	0.75	U	0.375
8/30/2011	0.75	U	0.375
1/17/2012	0.75	U	0.375

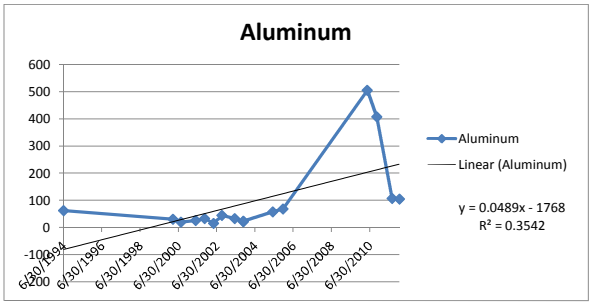


1,1,2,2-Tetrachloroethane Date	Validated Result	Qual	Censored Result
7/19/1993	10	U	5
6/30/1994	10	U	5
3/17/2000	0.5	U	0.25
8/17/2000	1	U	0.5
5/23/2001	2	U	1
11/12/2001	2	U	1
4/30/2002	5	U	2.5
10/9/2002	1	U	0.5
6/10/2003	1	U	0.5
11/19/2003	1	U	0.5
6/2/2005	0.5	U	0.25
12/16/2005	0.5	U	0.25
5/12/2010	0.23	U	0.115
11/9/2010	0.25	U	0.125
8/30/2011	0.25	U	0.125
1/17/2012	0.25	U	0.125

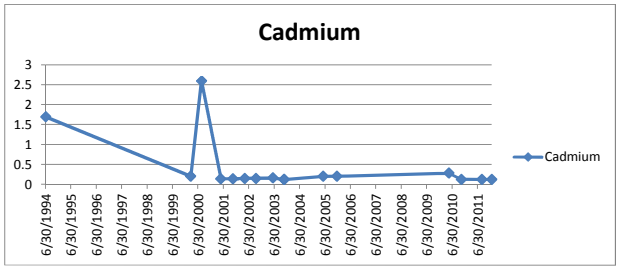


Aluminum Date	Validated Result	Qual	Censored Result
7/19/1993	183000		183000
6/30/1994	125	U	62.5
3/17/2000	61.1	U	30.55
8/17/2000	41.5	U	20.75
5/23/2001	53.6	U	26.8
11/12/2001	67	U	33.5
4/30/2002	30.9	U	15.45
10/9/2002	90.4	U	45.2
6/10/2003	33.5		33.5
11/19/2003	42.3	U	21.15
11/19/2003	47.3	U	23.65
6/2/2005	116	U	58
12/16/2005	137	U	68.5
5/12/2010	506		506
11/9/2010	408		408
8/30/2011	108		108
1/17/2012	105		105

don't use

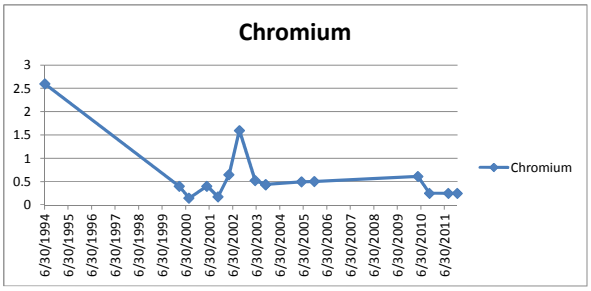


Cadmium Date	Validated Result	Qual	Censored Result
7/19/1993	3	U	1.5
6/30/1994	3.4	U	1.7
3/17/2000	0.4	U	0.2
8/17/2000	5.2	U	2.6
5/23/2001	0.27	U	0.135
11/12/2001	0.27	U	0.135
4/30/2002	0.3	U	0.15
10/9/2002	0.3	U	0.15
6/10/2003	0.33	U	0.165
11/19/2003	0.25	U	0.125
11/19/2003	0.25	U	0.125
6/2/2005	0.41	U	0.205
12/16/2005	0.4	U	0.2
5/12/2010	0.284	J	0.284
11/9/2010	0.25	U	0.125
8/30/2011	0.25	U	0.125
1/17/2012	0.25	U	0.125

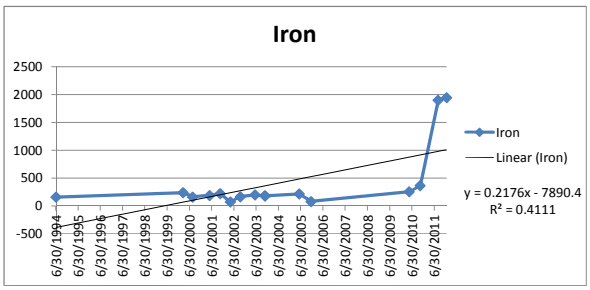


Monitoring Well 01GS62
OU1, Site 1
NAS Pensacoal, Pensacola Florida

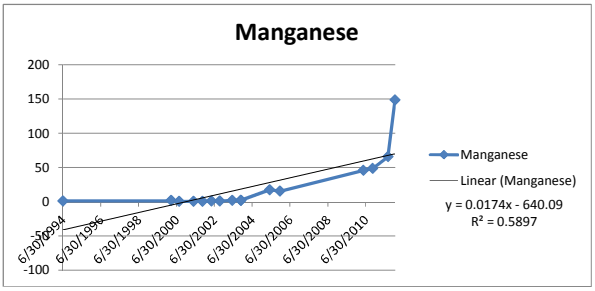
Chromium Date	Validated Result	Qual	Censored Result	Qual
7/19/1993	197		197	
6/30/1994	5.2	U	2.6	U
3/17/2000	0.8	U	0.4	U
8/17/2000	0.3	U	0.15	U
5/23/2001	0.81	U	0.405	U
11/12/2001	0.35	U	0.175	U
4/30/2002	1.3	U	0.65	U
10/9/2002	3.2	U	1.6	U
6/10/2003	1.05	U	0.525	U
11/19/2003	0.88	U	0.44	U
11/19/2003	0.88	U	0.44	U
6/2/2005	1	U	0.5	U
12/16/2005	1.01	U	0.505	U
5/12/2010	0.614	J	0.614	J
11/9/2010	0.5	U	0.25	U
8/30/2011	0.5	U	0.25	U
1/17/2012	0.5	U	0.25	U



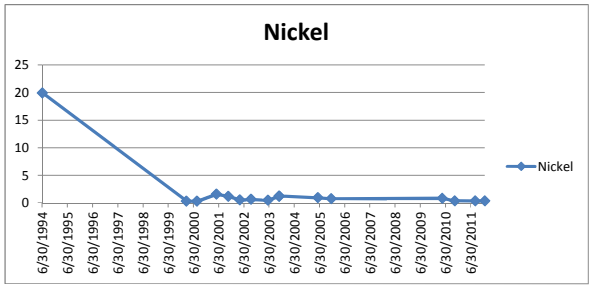
Iron Date	Validated Result	Qual	Censored Result	Qual
7/19/1993	20000		20000	
6/30/1994	162		162	
3/17/2000	240		240	
8/17/2000	164		164	
5/23/2001	192	J	192	J
11/12/2001	225	J	225	J
4/30/2002	149	U	74.5	U
10/9/2002	170		170	
6/10/2003	201		201	
11/19/2003	182		182	
11/19/2003	183		183	
6/2/2005	217		217	
12/16/2005	168	U	84	U
5/12/2010	259		259	
11/9/2010	369		369	
8/30/2011	1900		1900	
1/17/2012	1950		1950	



Manganese Date	Validated Result	Qual	Censored Result	Qual
7/19/1993	43.8		43.8	
6/30/1994	3.1	U	1.55	U
3/17/2000	2.1		2.1	
8/17/2000	1.8	U	0.9	U
5/23/2001	1.6	U	0.8	U
11/12/2001	0.97	J	0.97	J
4/30/2002	1.3		1.3	
10/9/2002	2.7	U	1.35	U
6/10/2003	2.52		2.52	
11/19/2003	2.5		2.5	
11/19/2003	2.4		2.4	
6/2/2005	17.8		17.8	
12/16/2005	15.8		15.8	
5/12/2010	46		46	
11/9/2010	48.9		48.9	
8/30/2011	66.2		66.2	
1/17/2012	149		149	



Nickel Date	Validated Result	Qual	Censored Result	Qual
7/19/1993	43.2	J	43.2	J
6/30/1994	39.9	U	19.95	U
3/17/2000	0.7	U	0.35	U
8/17/2000	0.6	U	0.3	U
5/23/2001	1.6	J	1.6	J
11/12/2001	1.2	J	1.2	J
4/30/2002	1.1	U	0.55	U
10/9/2002	1.3	U	0.65	U
6/10/2003	0.97	U	0.485	U
11/19/2003	2.4	U	1.2	U
11/19/2003	2.55	U	1.275	U
6/2/2005	1.9	U	0.95	U
12/16/2005	1.53	U	0.765	U
5/12/2010	0.849	J	0.849	J
11/9/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



Monitoring Well 01GS62
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	17
Minimum	0.07
Maximum	21
Mean	12.69
Geometric Mean	5.012
Median	16
Standard Deviation	7.604
SEM	1.844
Mann-Kendall Test	
Test Value (S)	-63
Tabulated p-value	0.005
Standard Deviation of S	24.1
Standardized Value of S	-2.572
Approximate p-value	0.00505

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	17
Minimum	0.125
Maximum	40.5
Mean	18.26
Geometric Mean	9.614
Median	18.8
Standard Deviation	13.52
SEM	3.279
Mann-Kendall Test	
Test Value (S)	17
Tabulated p-value	0.271
Standard Deviation of S	24.26
Standardized Value of S	0.66
Approximate p-value	0.255

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	########
From File	C:\USEPA\PROUCL\OU 1 Mann Kendall.xls.wst
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	17
Minimum	0.125
Maximum	40.5
Mean	18.26
Geometric Mean	9.614
Median	18.8
Standard Deviation	13.52
SEM	3.279
Mann-Kendall Test	
Test Value (S)	17
Tabulated p-value	0.271
Standard Deviation of S	24.26
Standardized Value of S	0.66
Approximate p-value	0.255

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GS62
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Naphthalene

General Statistics	
Number of Values	16
Minimum	0.125
Maximum	7
Mean	1.923
Geometric Mean	0.875
Median	1
Standard Deviation	2.168
SEM	0.542
Mann-Kendall Test	
Test Value (S)	-70
Tabulated p-value	0.001
Standard Deviation of S	22.06
Standardized Value of S	-3.128
Approximate p-value	8.81E-04

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	########
From File	C:\USEPA\PROUCL\OU 1 Mann Kendall.xls.wst
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

Xylenes (Total)

General Statistics	
Number of Values	17
Minimum	0.11
Maximum	130
Mean	51.71
Geometric Mean	17.57
Median	52
Standard Deviation	37.61
SEM	9.121
Mann-Kendall Test	
Test Value (S)	-114
Tabulated p-value	0
Standard Deviation of S	24.18
Standardized Value of S	-4.673
Approximate p-value	1.48E-06

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	16
Minimum	15.45
Maximum	506
Mean	97.91
Geometric Mean	53
Median	39.35
Standard Deviation	144.1
SEM	36.02
Mann-Kendall Test	
Test Value (S)	53
Tabulated p-value	0.01
Standard Deviation of S	22.19
Standardized Value of S	2.344
Approximate p-value	0.00955

Statistically significant evidence of an increasing trend at the specified level of significance.

Monitoring Well 01GS62
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	16
Minimum	74.5
Maximum	1950
Mean	410.8
Geometric Mean	243.3
Median	196.5
Standard Deviation	595
SEM	148.7
Mann-Kendall Test	
Test Value (S)	54
Tabulated p-value	0.008
Standard Deviation of S	22.21
Standardized Value of S	2.386
Approximate p-value	0.00851

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	########
From File	C:\USEPA\PROUCL\OU 1 Mann Kendall.xls.wst
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

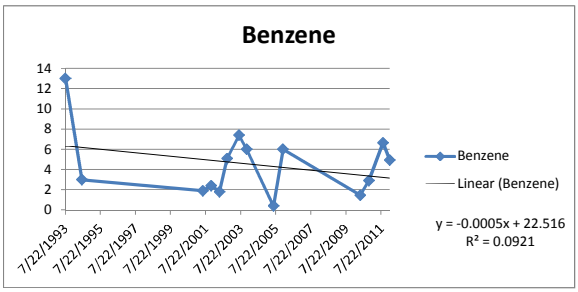
Manganese

General Statistics	
Number of Values	16
Minimum	0.8
Maximum	149
Mean	22.51
Geometric Mean	5.29
Median	2.45
Standard Deviation	39.65
SEM	9.913
Mann-Kendall Test	
Test Value (S)	90
Tabulated p-value	0
Standard Deviation of S	22.21
Standardized Value of S	4.007
Approximate p-value	3.07E-05

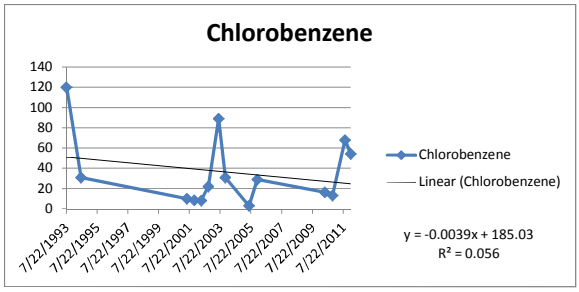
Statistically significant evidence of an increasing trend at the specified level of significance.

Monitoring Well 01GS64
OU1, Site 1
NAS Pensacoal, Pensacola Florida

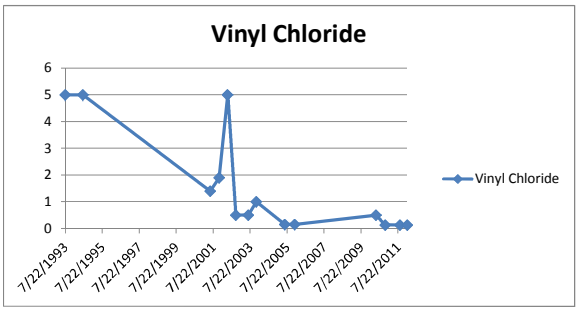
Benzene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	13		13	
6/30/1994	3	J	3	J
5/24/2001	1.9		1.9	
11/13/2001	2.4		2.4	
5/1/2002	1.8	J	1.8	J
10/9/2002	5.1		5.1	
6/11/2003	7.4		7.4	
11/19/2003	6		6	
6/2/2005	0.4	J	0.4	J
12/16/2005	6		6	
5/10/2010	1.45		1.45	
11/9/2010	2.91		2.91	
8/29/2011	6.65		6.65	
1/16/2012	4.94		4.94	



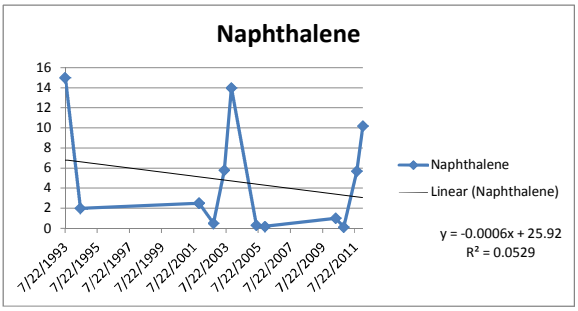
Chlorobenzene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	120		120	
6/30/1994	31		31	
5/24/2001	10		10	
11/13/2001	8.35		8.35	
5/1/2002	8.3		8.3	
10/9/2002	22		22	
6/11/2003	89		89	
11/19/2003	31		31	
6/2/2005	3	J	3	J
12/16/2005	29		29	
5/10/2010	16.5		16.5	
11/9/2010	13.3		13.3	
8/29/2011	68		68	
1/16/2012	54.4		54.4	



Vinyl Chloride	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	10	U	5	U
6/30/1994	10	U	5	U
5/24/2001	1.4		1.4	
11/13/2001	1.9		1.9	
5/1/2002	10	U	5	U
10/9/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/19/2003	2	U	1	U
6/2/2005	0.3	U	0.15	U
12/16/2005	0.3	U	0.15	U
5/10/2010	1	UJ	0.5	UJ
11/9/2010	0.25	U	0.125	U
8/29/2011	0.25	U	0.125	U
1/16/2012	0.25	U	0.125	U



Naphthalene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	15		15	
6/30/1994	2	J	2	J
11/13/2001	5	U	2.5	U
11/13/2001	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/11/2003	5.8		5.8	
11/19/2003	14		14	
6/2/2005	0.6	U	0.3	U
12/16/2005	0.4	U	0.2	U
5/10/2010	2	U	1	U
11/9/2010	0.25	U	0.125	U
8/29/2011	5.7		5.7	
1/16/2012	10.2		10.2	



Monitoring Well 01GS64
OU1, Site 1
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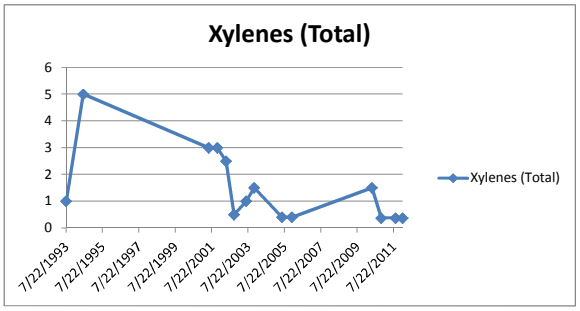
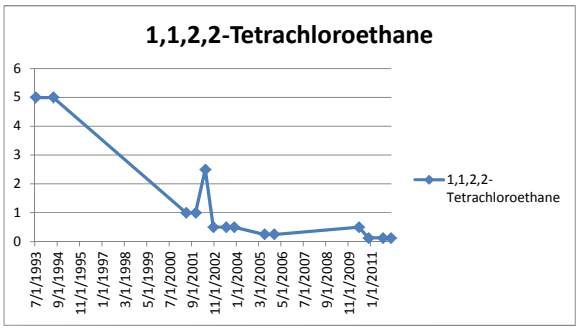
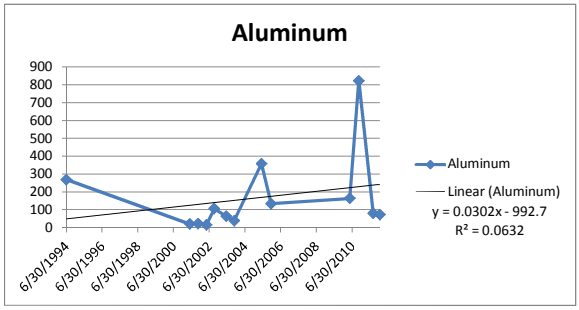
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	1	J	1	J
6/30/1994	10	U	5	U
5/24/2001	6	U	3	U
11/13/2001	6	U	3	U
5/1/2002	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/11/2003	2	U	1	U
11/19/2003	3	U	1.5	U
6/2/2005	0.8	U	0.4	U
12/16/2005	0.8	U	0.4	U
5/10/2010	3	U	1.5	U
11/9/2010	0.75	U	0.375	U
8/29/2011	0.75	U	0.375	U
1/16/2012	0.75	U	0.375	U



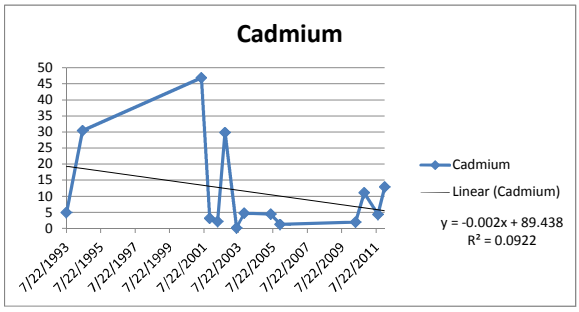
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	10	U	5	U
6/30/1994	10	U	5	U
5/24/2001	2	U	1	U
11/13/2001	2	U	1	U
5/1/2002	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/19/2003	1	UJ	0.5	UJ
6/2/2005	0.5	U	0.25	U
12/16/2005	0.5	U	0.25	U
5/10/2010	1	U	0.5	U
11/9/2010	0.25	U	0.125	U
8/29/2011	0.25	U	0.125	U
1/16/2012	0.25	U	0.125	U



Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	104000	J	104000	J
6/30/1994	269		269	
5/24/2001	41	U	20.5	U
11/13/2001	22.6	J	22.6	J
5/1/2002	30.9	U	15.45	U
10/9/2002	213	U	106.5	U
6/11/2003	64		64	
11/19/2003	79.9	U	39.95	U
6/2/2005	358		358	
12/16/2005	269	U	134.5	U
5/10/2010	164		164	
11/9/2010	823		823	
8/29/2011	79.6		79.6	
1/16/2012	73.4	J	73.4	J



Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	5		5	
6/30/1994	30.5		30.5	
5/24/2001	46.9		46.9	
11/13/2001	3.2	J	3.2	J
5/1/2002	2.2		2.2	
10/9/2002	29.9		29.9	
6/11/2003	0.33	U	0.165	U
11/19/2003	4.8		4.8	
6/2/2005	4.5		4.5	
12/16/2005	1.3		1.3	
5/10/2010	2.02		2.02	
11/9/2010	11.1		11.1	
8/29/2011	4.41		4.41	
1/16/2012	12.9		12.9	



Monitoring Well 01GS64
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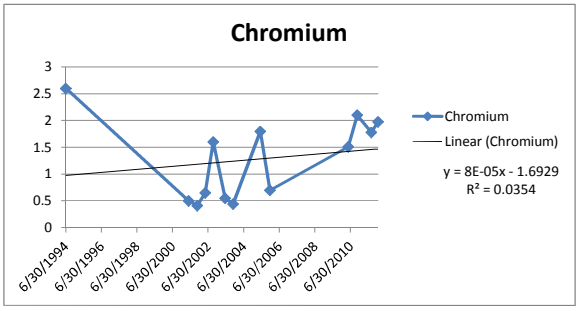
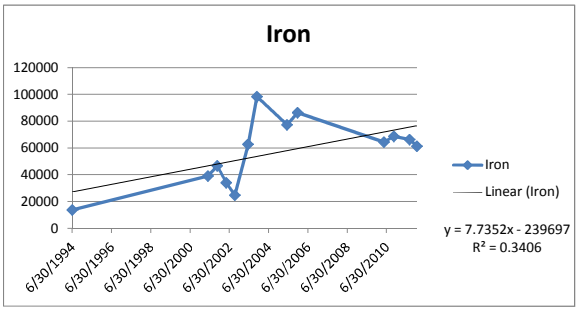
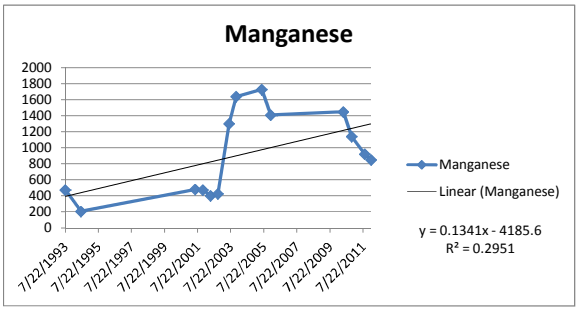
Chromium Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	126		126	
6/30/1994	5.2	U	2.6	U
5/24/2001	1	U	0.5	U
11/13/2001	0.41	J	0.41	J
5/1/2002	1.3	U	0.65	U
10/9/2002	3.2	U	1.6	U
6/11/2003	1.1	U	0.55	U
11/19/2003	0.88	U	0.44	U
6/2/2005	3.6	U	1.8	U
12/16/2005	1.4	U	0.7	U
5/10/2010	1.51		1.51	
11/9/2010	2.1	J	2.1	J
8/29/2011	1.78	J	1.78	J
1/16/2012	1.98	J	1.98	J



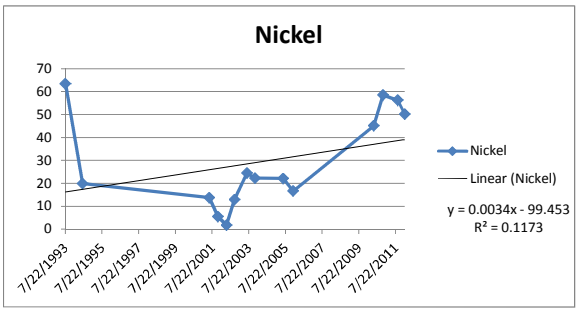
Iron Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	103000		103000	
6/30/1994	13900		13900	
5/24/2001	39100		39100	
11/13/2001	46700		46700	
5/1/2002	34100		34100	
10/9/2002	24700		24700	
6/11/2003	62800		62800	
11/19/2003	98500		98500	
6/2/2005	77400		77400	
12/16/2005	86400		86400	
5/10/2010	64400		64400	
11/9/2010	68700		68700	
8/29/2011	66500		66500	
1/16/2012	61500		61500	



Manganese Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	474		474	
6/30/1994	208		208	
5/24/2001	482		482	
11/13/2001	476		476	
5/1/2002	401		401	
10/9/2002	426		426	
6/11/2003	1300		1300	
11/19/2003	1640		1640	
6/2/2005	1730		1730	
12/16/2005	1410		1410	
5/10/2010	1450		1450	
11/9/2010	1140		1140	
8/29/2011	921		921	
1/16/2012	848		848	



Nickel Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	63.4		63.4	
6/30/1994	39.9	U	19.95	U
5/24/2001	13.8	J	13.8	J
11/13/2001	5.6	J	5.6	J
5/1/2002	3.7	U	1.85	U
10/9/2002	13		13	
6/11/2003	24.5		24.5	
11/19/2003	22.3		22.3	
6/2/2005	22.2		22.2	
12/16/2005	16.7		16.7	
5/10/2010	45.1		45.1	
11/9/2010	58.5		58.5	
8/29/2011	56.3		56.3	
1/16/2012	50.2		50.2	



Monitoring Well 01GS64
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	14
Minimum	0.4
Maximum	13
Mean	4.496
Geometric Mean	3.367
Median	3.97
Standard Deviation	3.278
SEM	0.876
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.457
Standard Deviation of S	18.24
Standardized Value of S	-0.0548
Approximate p-value	0.478

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	14
Minimum	3
Maximum	120
Mean	35.99
Geometric Mean	22.92
Median	25.5
Standard Deviation	34.77
SEM	9.292
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.5
Standard Deviation of S	18.24
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	0
Minimum	N/A
Maximum	N/A
Mean	N/A
Geometric Mean	N/A
Median	N/A
Standard Deviation	N/A
SEM	N/A
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	N/A
Standard Deviation of S	0
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GS64
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Naphthalene

General Statistics	
Number of Values	13
Minimum	0.125
Maximum	15
Mean	4.602
Geometric Mean	1.866
Median	2.5
Standard Deviation	5.274
SEM	1.463
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.255
Standard Deviation of S	16.36
Standardized Value of S	-0.733
Approximate p-value	0.232

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	13
Minimum	15.45
Maximum	823
Mean	167
Geometric Mean	88.32
Median	79.6
Standard Deviation	221.8
SEM	61.52
Mann-Kendall Test	
Test Value (S)	22
Tabulated p-value	0.102
Standard Deviation of S	16.39
Standardized Value of S	1.281
Approximate p-value	0.1

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	13
Minimum	15.45
Maximum	823
Mean	167
Geometric Mean	88.32
Median	79.6
Standard Deviation	221.8
SEM	61.52
Mann-Kendall Test	
Test Value (S)	22
Tabulated p-value	0.102
Standard Deviation of S	16.39
Standardized Value of S	1.281
Approximate p-value	0.1

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GS64
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NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	14
Minimum	0.41
Maximum	126
Mean	10.19
Geometric Mean	1.478
Median	1.555
Standard Deviation	33.34
SEM	8.911
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.259
Standard Deviation of S	18.27
Standardized Value of S	0.657
Approximate p-value	0.256

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	13
Minimum	13900
Maximum	98500
Mean	57285
Geometric Mean	51052
Median	62800
Standard Deviation	24477
SEM	6789
Mann-Kendall Test	
Test Value (S)	30
Tabulated p-value	0.038
Standard Deviation of S	16.39
Standardized Value of S	1.769
Approximate p-value	0.0384

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	13
Minimum	13900
Maximum	98500
Mean	57285
Geometric Mean	51052
Median	62800
Standard Deviation	24477
SEM	6789
Mann-Kendall Test	
Test Value (S)	30
Tabulated p-value	0.038
Standard Deviation of S	16.39
Standardized Value of S	1.769
Approximate p-value	0.0384

Statistically significant evidence of an increasing trend at the specified level of significance.

Monitoring Well 01GS64
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	13
Minimum	1.85
Maximum	58.5
Mean	26.92
Geometric Mean	19.42
Median	22.2
Standard Deviation	19.11
SEM	5.301
Mann-Kendall Test	
Test Value (S)	42
Tabulated p-value	0.005
Standard Deviation of S	16.39
Standardized Value of S	2.501
Approximate p-value	0.00619

Statistically significant evidence of an increasing trend at the specified level of significance.

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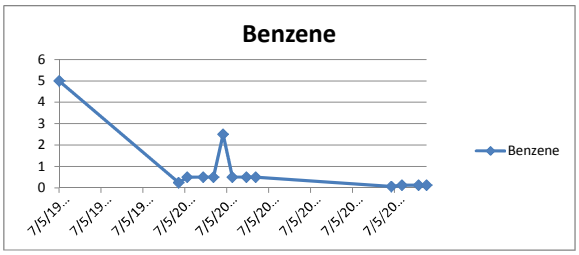
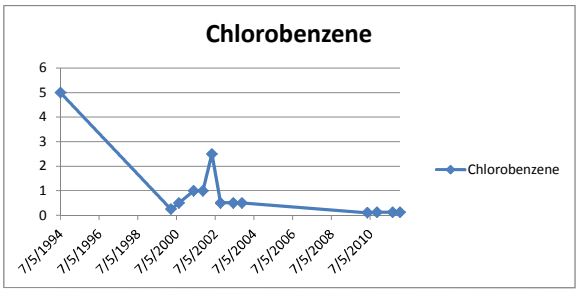
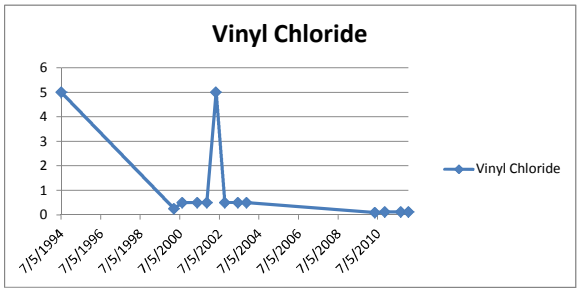
Benzene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/5/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	1	U	0.5	U
11/12/2001	1	U	0.5	U
4/30/2002	5	U	2.5	U
10/8/2002	1	UJ	0.5	UJ
6/10/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.14	U	0.07	U
11/9/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



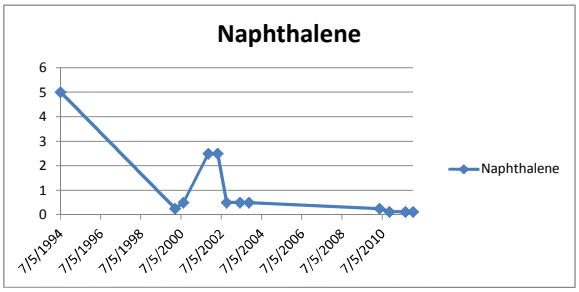
Chlorobenzene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/5/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	2	U	1	U
11/12/2001	2	U	1	U
4/30/2002	5	U	2.5	U
10/8/2002	1	UJ	0.5	UJ
6/10/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.21	U	0.105	U
11/9/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Vinyl Chloride	Validated		Censored	
Date	Result	Qual	Result	Qual
7/5/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	1	U	0.5	U
11/12/2001	1	U	0.5	U
4/30/2002	10	U	5	U
10/8/2002	1	UJ	0.5	UJ
6/10/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.2	UJ	0.1	UJ
11/9/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

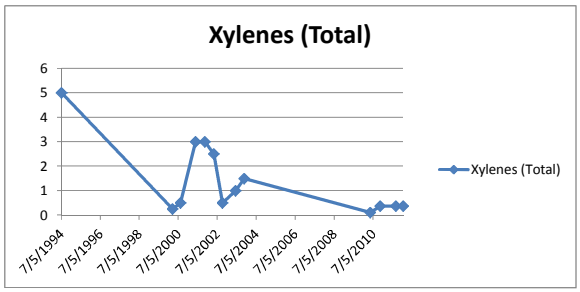


Naphthalene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/5/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
11/12/2001	5	U	2.5	U
4/30/2002	5	U	2.5	U
10/8/2002	1	UJ	0.5	UJ
6/10/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.5	U	0.25	U
11/9/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

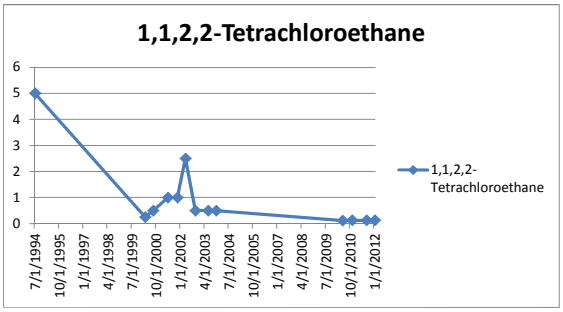


Monitoring Well 01GS71
OU1, Site 1
NAS Pensacoal, Pensacola Florida

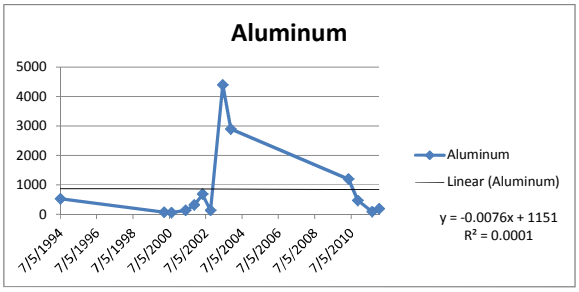
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
7/5/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	6	U	3	U
11/12/2001	6	U	3	U
4/30/2002	5	U	2.5	U
10/8/2002	1	UJ	0.5	UJ
6/10/2003	2	U	1	U
11/18/2003	3	U	1.5	U
5/12/2010	0.22	U	0.11	U
11/9/2010	0.75	U	0.375	U
8/31/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



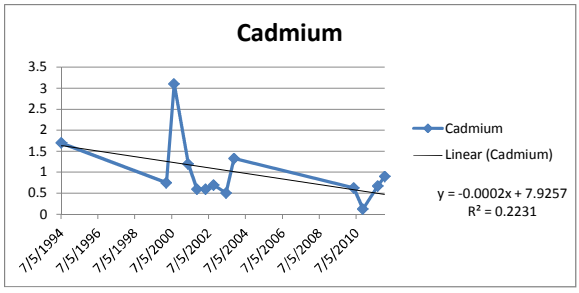
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
7/5/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	2	U	1	U
11/12/2001	2	U	1	U
4/30/2002	5	U	2.5	U
10/8/2002	1	UJ	0.5	UJ
6/10/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
5/12/2010	0.23	U	0.115	U
11/9/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
7/5/1994	533		533	
3/17/2000	145	U	72.5	U
8/16/2000	130	U	65	U
5/22/2001	139	J	139	J
11/12/2001	316	J	316	J
4/30/2002	689		689	
10/8/2002	272	U	136	U
6/10/2003	4400		4400	
11/18/2003	2900		2900	
5/12/2010	1200		1200	
11/9/2010	478		478	
8/31/2011	90		90	
1/17/2012	196		196	

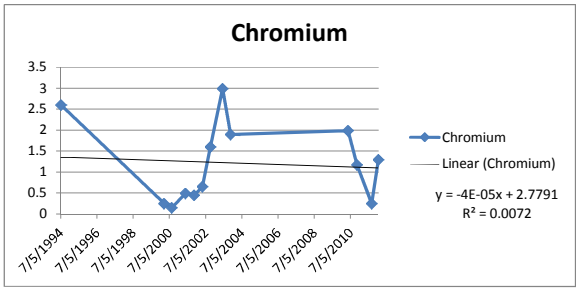


Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
7/5/1994	3.4	U	1.7	U
3/17/2000	1.5	U	0.75	U
8/16/2000	6.2	U	3.1	U
5/22/2001	1.2	J	1.2	J
11/12/2001	1.2	U	0.6	U
4/30/2002	1.2	U	0.6	U
10/8/2002	1.4	U	0.7	U
6/10/2003	0.509		0.509	
11/18/2003	2.66	U	1.33	U
5/12/2010	0.63	J	0.63	J
11/9/2010	0.25	U	0.125	U
8/31/2011	0.676	J	0.676	J
1/17/2012	0.905	J	0.905	J

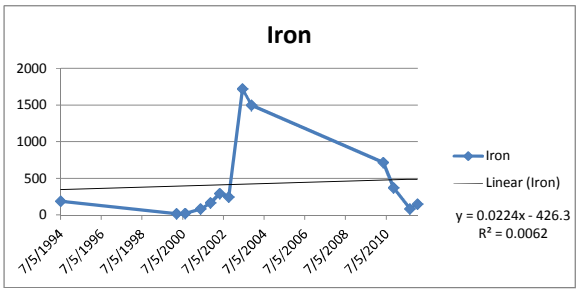


Monitoring Well 01GS71
OU1, Site 1
NAS Pensacoal, Pensacola Florida

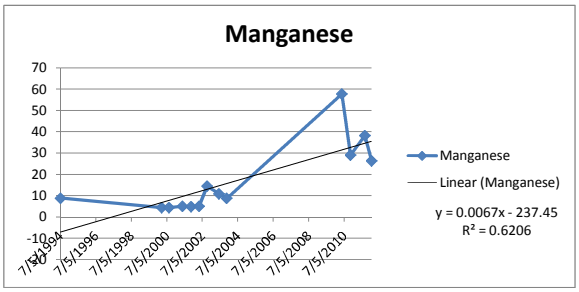
Chromium Date	Validated Result	Qual	Censored Result	Qual
7/5/1994	5.2	U	2.6	U
3/17/2000	0.5	U	0.25	U
8/16/2000	0.3	U	0.15	U
5/22/2001	0.49	J	0.49	J
11/12/2001	0.89	U	0.445	U
4/30/2002	1.3	U	0.65	U
10/8/2002	3.2	U	1.6	U
6/10/2003	2.99		2.99	
11/18/2003	1.9		1.9	
5/12/2010	1.99		1.99	
11/9/2010	1.17	J	1.17	J
8/31/2011	0.5	U	0.25	U
1/17/2012	1.29		1.29	



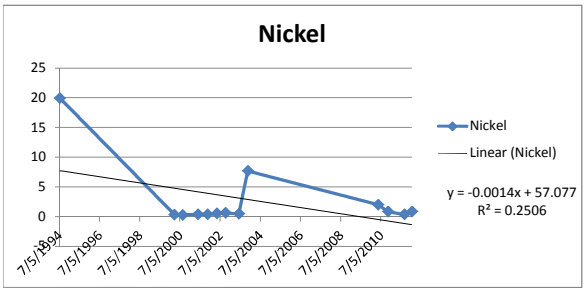
Iron Date	Validated Result	Qual	Censored Result	Qual
7/5/1994	190		190	
3/17/2000	42.7	U	21.35	U
8/16/2000	52	U	26	U
5/22/2001	85.6	J	85.6	J
11/12/2001	167	J	167	J
4/30/2002	293		293	
10/8/2002	246		246	
6/10/2003	1720		1720	
11/18/2003	1500		1500	
5/12/2010	718		718	
11/9/2010	371		371	
8/31/2011	87.2		87.2	
1/17/2012	149		149	



Manganese Date	Validated Result	Qual	Censored Result	Qual
7/5/1994	8.9		8.9	
3/17/2000	4.5		4.5	
8/16/2000	4.5		4.5	
5/22/2001	5.1	J	5.1	J
11/12/2001	4.9	J	4.9	J
4/30/2002	5.1		5.1	
10/8/2002	14.5		14.5	
6/10/2003	10.9		10.9	
11/18/2003	8.8		8.8	
5/12/2010	57.8		57.8	
11/9/2010	29.1		29.1	
8/31/2011	38.3		38.3	
1/17/2012	26.4		26.4	



Nickel Date	Validated Result	Qual	Censored Result	Qual
7/5/1994	39.9	U	19.95	U
3/17/2000	0.7	U	0.35	U
8/16/2000	0.6	U	0.3	U
5/22/2001	0.8	U	0.4	U
11/12/2001	0.8	U	0.4	U
4/30/2002	1.1	U	0.55	U
10/8/2002	1.3	U	0.65	U
6/10/2003	0.97	U	0.485	U
11/18/2003	15.4	U	7.7	U
5/12/2010	2.02	J	2.02	J
11/9/2010	0.881	J	0.881	J
8/31/2011	0.75	U	0.375	U
1/17/2012	0.897	J	0.897	J



Monitoring Well 01GS71
OU1, Site 1
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Mann-Kendall Trend Test Analysis

Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	13
Minimum	65
Maximum	4400
Mean	862.7
Geometric Mean	353.3
Median	316
Standard Deviation	1314
SEM	364.4
Mann-Kendall Test	
Test Value (S)	12
Tabulated p-value	0.255
Standard Deviation of S	16.39
Standardized Value of S	0.671
Approximate p-value	0.251

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	13
Minimum	0.125
Maximum	3.1
Mean	0.987
Geometric Mean	0.779
Median	0.7
Standard Deviation	0.751
SEM	0.208
Mann-Kendall Test	
Test Value (S)	-23
Tabulated p-value	0.102
Standard Deviation of S	16.36
Standardized Value of S	-1.345
Approximate p-value	0.0894

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	13
Minimum	0.15
Maximum	2.99
Mean	1.213
Geometric Mean	0.834
Median	1.17
Standard Deviation	0.946
SEM	0.262
Mann-Kendall Test	
Test Value (S)	15
Tabulated p-value	0.218
Standard Deviation of S	16.36
Standardized Value of S	0.856
Approximate p-value	0.196

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GS71
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	13
Minimum	21.35
Maximum	1720
Mean	428.8
Geometric Mean	202.6
Median	190
Standard Deviation	556.8
SEM	154.4
Mann-Kendall Test	
Test Value (S)	24
Tabulated p-value	0.082
Standard Deviation of S	16.39
Standardized Value of S	1.403
Approximate p-value	0.0803

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	13
Minimum	4.5
Maximum	57.8
Mean	16.83
Geometric Mean	11.39
Median	8.9
Standard Deviation	16.51
SEM	4.579
Mann-Kendall Test	
Test Value (S)	46
Tabulated p-value	0.002
Standard Deviation of S	16.33
Standardized Value of S	2.756
Approximate p-value	0.00293

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	13
Minimum	0.3
Maximum	19.95
Mean	2.689
Geometric Mean	0.904
Median	0.55
Standard Deviation	5.557
SEM	1.541
Mann-Kendall Test	
Test Value (S)	21
Tabulated p-value	0.126
Standard Deviation of S	16.36
Standardized Value of S	1.222
Approximate p-value	0.111

Insufficient evidence to identify a significant trend at the specified level of significance.

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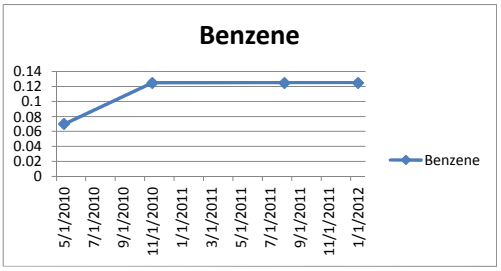
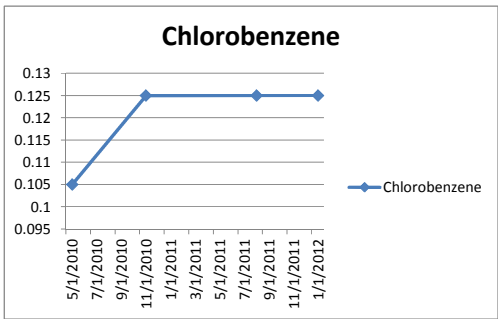
Benzene Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	0.14	U	0.07	U
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

Not Detected



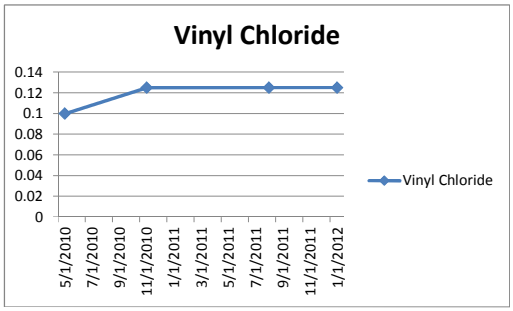
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	0.21	U	0.105	U
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

Not Detected



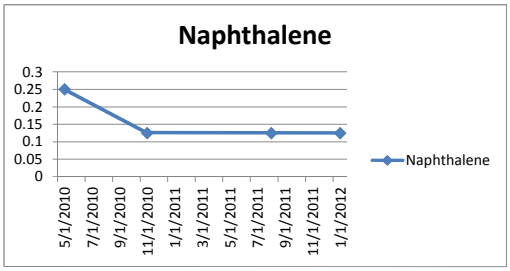
Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	0.2	UJ	0.1	UJ
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

Not Detected



Naphthalene Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	0.5	U	0.25	U
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

Not Detected



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OU1, Site 1
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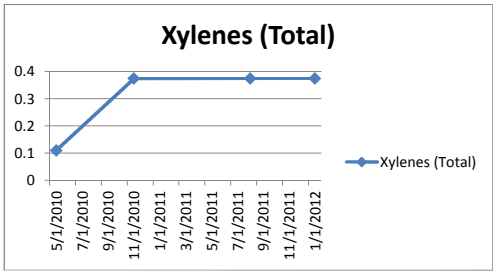
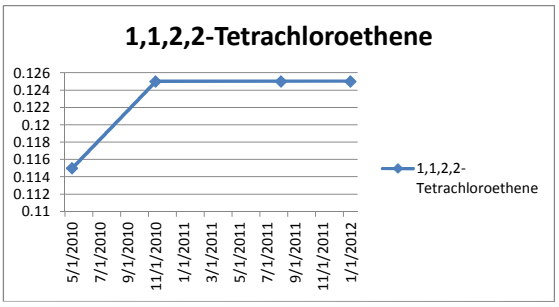
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.22	U	0.11	U
11/10/2010	0.75	U	0.375	U
8/31/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U

Not Detected

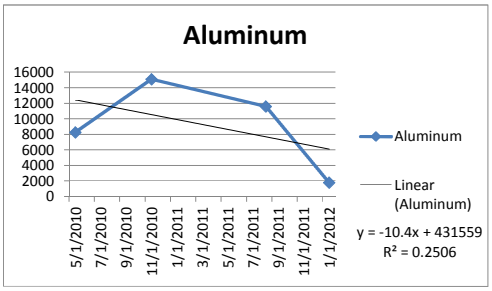


1,1,2,2-Tetrachloroethene	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.23	U	0.115	U
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

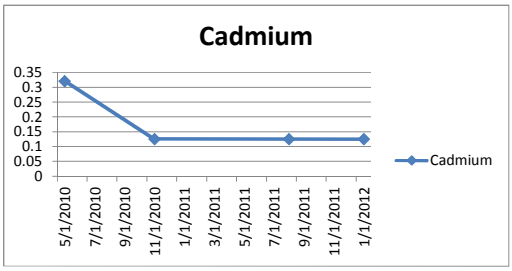
Not Detected



Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	8260		8260	
11/10/2010	15100		15100	
8/31/2011	11600		11600	
1/17/2012	1780		1780	

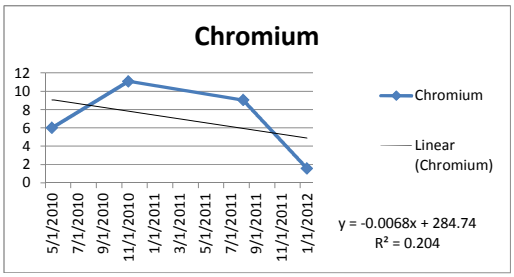


Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.321	J	0.321	J
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

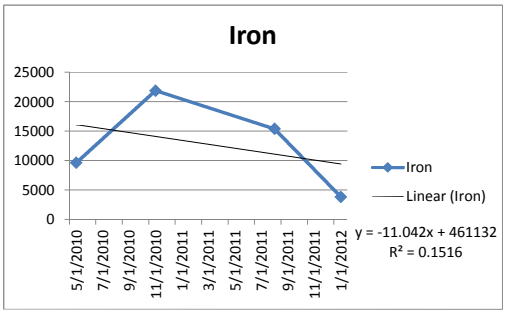


Monitoring Well 01GS73
OU1, Site 1
NAS Pensacoal, Pensacola Florida

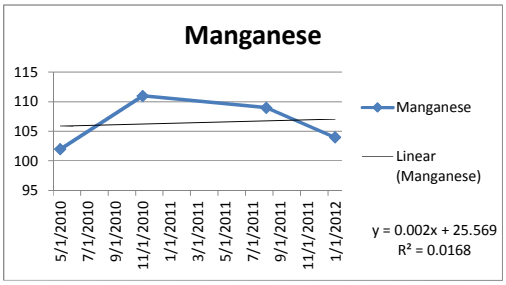
Chromium	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	6.01		6.01	
11/10/2010	11.1		11.1	
8/31/2011	9.06		9.06	
1/17/2012	1.59		1.59	



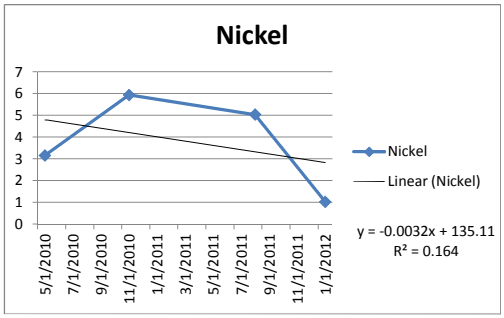
Iron	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	9630		9630	
11/10/2010	21900		21900	
8/31/2011	15400		15400	
1/17/2012	3840		3840	



Manganese	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	102		102	
11/10/2010	111		111	
8/31/2011	109		109	
1/17/2012	104		104	



Nickel	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	3.16		3.16	
11/10/2010	5.94		5.94	
8/31/2011	5.04		5.04	
1/17/2012	1.02	J	1.02	J



Monitoring Well 01GS73
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	4
Minimum	1780
Maximum	15100
Mean	9185
Geometric Mean	7124
Median	9930
Standard Deviation	5672
SEM	2836
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.375
Standard Deviation of S	2.944
Standardized Value of S	-0.34
Approximate p-value	0.367

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	4
Minimum	1.59
Maximum	11.1
Mean	6.94
Geometric Mean	5.568
Median	7.535
Standard Deviation	4.135
SEM	2.067
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.375
Standard Deviation of S	2.944
Standardized Value of S	-0.34
Approximate p-value	0.367

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	4
Minimum	3840
Maximum	21900
Mean	12693
Geometric Mean	10568
Median	12515
Standard Deviation	7743
SEM	3871
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.375
Standard Deviation of S	2.944
Standardized Value of S	-0.34
Approximate p-value	0.367

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GS73
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	4
Minimum	102
Maximum	111
Mean	106.5
Geometric Mean	106.4
Median	106.5
Standard Deviation	4.203
SEM	2.102
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.625
Standard Deviation of S	2.944
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

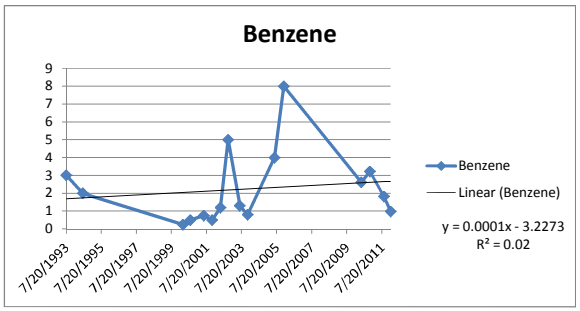
Nickel

General Statistics	
Number of Values	4
Minimum	1.02
Maximum	5.94
Mean	3.79
Geometric Mean	3.134
Median	4.1
Standard Deviation	2.18
SEM	1.09
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.375
Standard Deviation of S	2.944
Standardized Value of S	-0.34
Approximate p-value	0.367

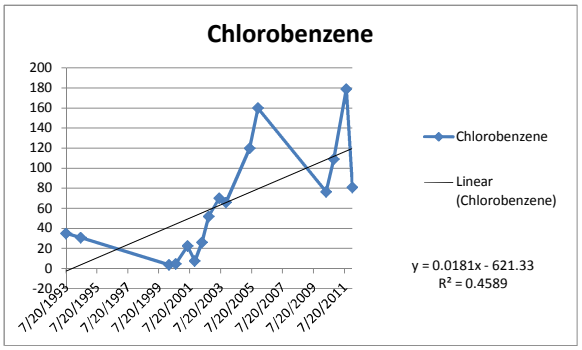
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GGM33
OU1, Site 1
NAS Pensacoal, Pensacola Florida

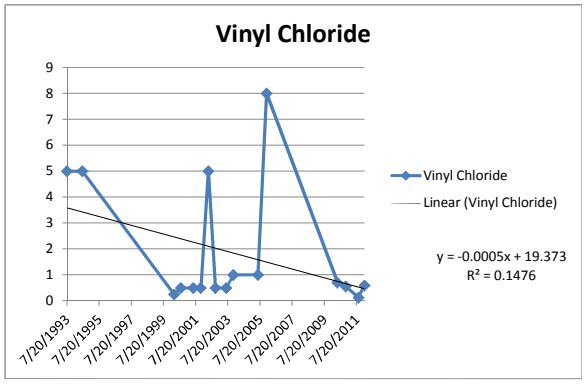
Benzene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/20/1993	3	J	3	J
7/1/1994	2	J	2	J
3/15/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/23/2001	0.75	J	0.75	J
11/12/2001	1	U	0.5	U
5/1/2002	1.2	J	1.2	J
10/8/2002	5		5	
6/10/2003	1.3		1.3	
11/19/2003	0.8	J	0.8	J
6/2/2005	4		4	
12/15/2005	8	J	8	J
5/11/2010	2.62		2.62	
11/10/2010	3.23		3.23	
8/30/2011	1.82		1.82	
1/17/2012	0.991	J	0.991	J



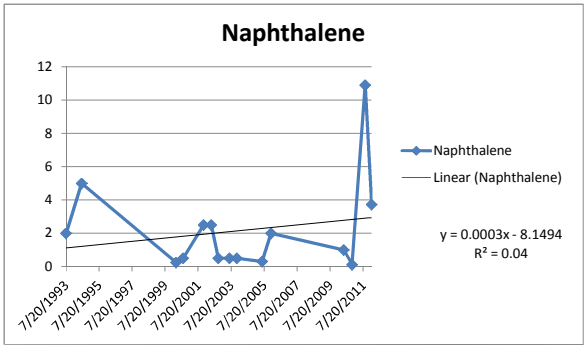
Chlorobenzene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/20/1993	35		35	
7/1/1994	31		31	
3/15/2000	3.8		3.8	
8/17/2000	4.7		4.7	
5/23/2001	22.6		22.6	
11/12/2001	7.7		7.7	
5/1/2002	26		26	
10/8/2002	52		52	
6/10/2003	70.1		70.1	
11/19/2003	66		66	
6/2/2005	120		120	
12/15/2005	160	J	160	J
5/11/2010	76.4		76.4	
11/10/2010	109		109	
8/30/2011	179		179	
1/17/2012	81.1		81.1	



Vinyl Chloride	Validated		Censored	
Date	Result	Qual	Result	Qual
7/20/1993	10	U	5	U
7/1/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/23/2001	1	U	0.5	U
11/12/2001	1	U	0.5	U
5/1/2002	10	U	5	U
10/8/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	2	U	1	U
6/2/2005	1	J	1	J
12/15/2005	8	J	8	J
5/11/2010	0.701	J	0.701	J
11/10/2010	0.561	J	0.561	J
8/30/2011	0.25	U	0.125	U
1/17/2012	0.595	J	0.595	J



Naphthalene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/20/1993	2	J	2	J
7/1/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
11/12/2001	5	U	2.5	U
5/1/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/2/2005	0.6	U	0.3	U
12/15/2005	4	U	2	U
5/11/2010	2	U	1	U
11/10/2010	0.25	U	0.125	U
8/30/2011	10.9		10.9	
1/17/2012	3.73		3.73	



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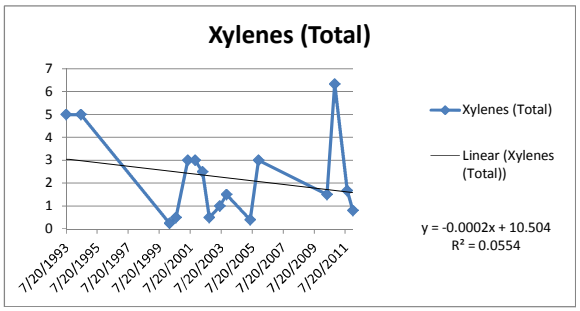
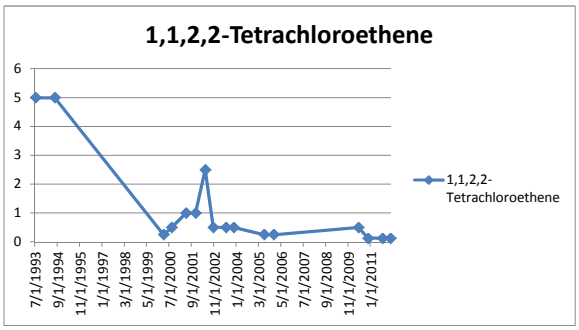
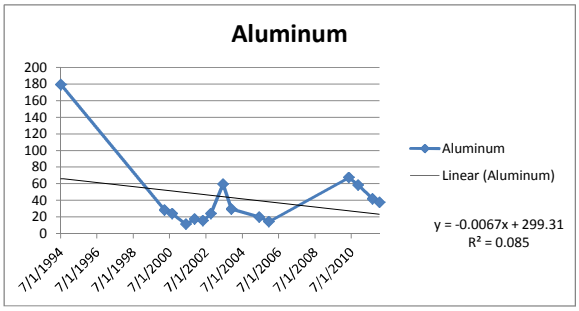
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
7/20/1993	10	U	5	U
7/1/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/23/2001	6	U	3	U
11/12/2001	6	U	3	U
5/1/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	2	U	1	U
11/19/2003	3	U	1.5	U
6/2/2005	0.8	U	0.4	U
12/15/2005	3	J	3	J
5/11/2010	3	U	1.5	U
11/10/2010	6.33		6.33	
8/30/2011	1.68	J	1.68	J
1/17/2012	0.801	J	0.801	J



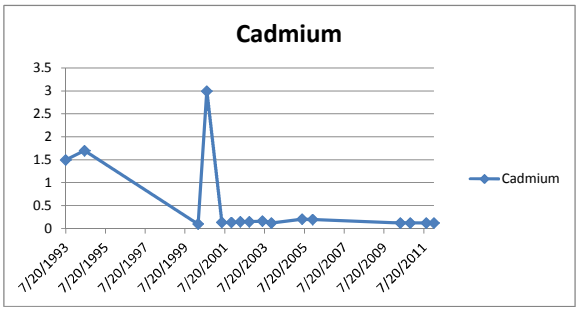
1,1,2,2-Tetrachloroethene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/20/1993	10	U	5	U
7/1/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/23/2001	2	U	1	U
11/12/2001	2	U	1	U
5/1/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/2/2005	0.5	U	0.25	U
12/15/2005	0.5	U	0.25	U
5/11/2010	1	U	0.5	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
7/20/1993	4510	J	4510	J
7/1/1994	359	U	179.5	U
3/15/2000	56.7	U	28.35	U
8/17/2000	47.9	U	23.95	U
5/23/2001	22.4	U	11.2	U
11/12/2001	35.5	U	17.75	U
5/1/2002	30.9	U	15.45	U
10/8/2002	48.6	U	24.3	U
6/10/2003	59.6		59.6	
11/19/2003	59	U	29.5	U
6/2/2005	39.7	U	19.85	U
12/15/2005	28.7	U	14.35	U
5/11/2010	67.6		67.6	
11/10/2010	58.6		58.6	
8/30/2011	41.8	J	41.8	J
1/17/2012	37.5	J	37.5	J



Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
7/20/1993	3	U	1.5	U
7/1/1994	3.4	U	1.7	U
3/15/2000	0.2	U	0.1	U
8/17/2000	6	U	3	U
5/23/2001	0.27	U	0.135	U
11/12/2001	0.27	U	0.135	U
5/1/2002	0.3	U	0.15	U
10/8/2002	0.3	U	0.15	U
6/10/2003	0.33	U	0.165	U
11/19/2003	0.25	U	0.125	U
6/2/2005	0.41	U	0.205	U
12/15/2005	0.4	U	0.2	U
5/11/2010	0.25	U	0.125	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



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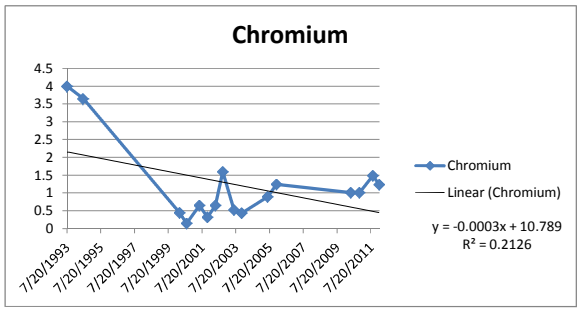
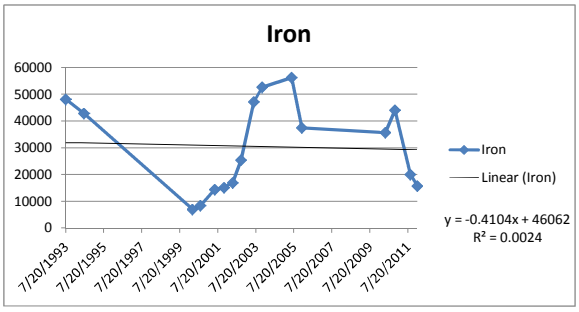
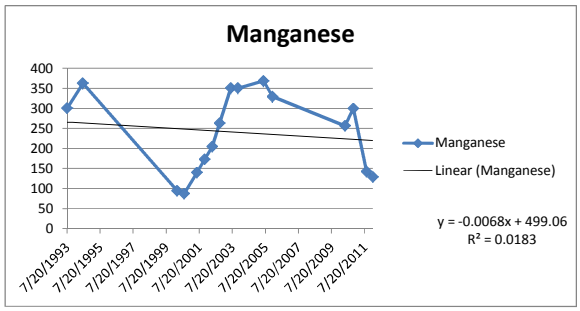
Chromium Date	Validated Result	Qual	Censored Result	Qual
7/20/1993	8	U	4	U
7/1/1994	7.3	U	3.65	U
3/15/2000	0.9	U	0.45	U
8/17/2000	0.3	U	0.15	U
5/23/2001	1.3	U	0.65	U
11/12/2001	0.64	U	0.32	U
5/1/2002	1.3	U	0.65	U
10/8/2002	3.2	U	1.6	U
6/10/2003	1.05	U	0.525	U
11/19/2003	0.88	U	0.44	U
6/2/2005	1.8	U	0.9	U
12/15/2005	2.5	U	1.25	U
5/11/2010	1.01	J	1.01	J
11/10/2010	1.01	J	1.01	J
8/30/2011	1.49	J	1.49	J
1/17/2012	1.24	J	1.24	J



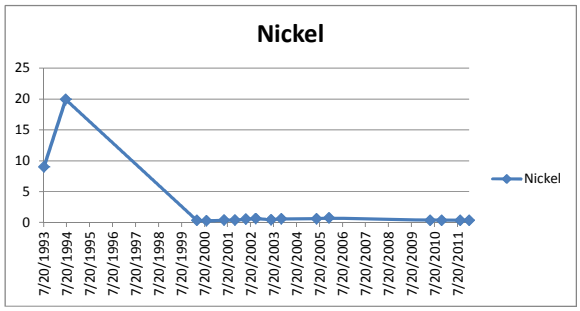
Iron Date	Validated Result	Qual	Censored Result	Qual
7/20/1993	48100		48100	
7/1/1994	42900		42900	
3/15/2000	7070		7070	
8/17/2000	8480		8480	
5/23/2001	14500		14500	
11/12/2001	15200		15200	
5/1/2002	17000		17000	
10/8/2002	25400		25400	
6/10/2003	47200		47200	
11/19/2003	52700		52700	
6/2/2005	56300		56300	
12/15/2005	37500	J	37500	J
5/11/2010	35700		35700	
11/10/2010	44100		44100	
8/30/2011	20100		20100	
1/17/2012	15800		15800	



Manganese Date	Validated Result	Qual	Censored Result	Qual
7/20/1993	301		301	
7/1/1994	363		363	
3/15/2000	95		95	
8/17/2000	87.5		87.5	
5/23/2001	140		140	
11/12/2001	173		173	
5/1/2002	205		205	
10/8/2002	263		263	
6/10/2003	351		351	
11/19/2003	351		351	
6/2/2005	369		369	
12/15/2005	330		330	
5/11/2010	257		257	
11/10/2010	300		300	
8/30/2011	143		143	
1/17/2012	129		129	



Nickel Date	Validated Result	Qual	Censored Result	Qual
7/20/1993	18	U	9	U
7/1/1994	39.9	U	19.95	U
3/15/2000	0.7	U	0.35	U
8/17/2000	0.6	U	0.3	U
5/23/2001	0.8	U	0.4	U
11/12/2001	0.8	U	0.4	U
5/1/2002	1.1	U	0.55	U
10/8/2002	1.3	U	0.65	U
6/10/2003	0.97	U	0.485	U
11/19/2003	1.2	U	0.6	U
6/2/2005	1.26	U	0.63	U
12/15/2005	1.53	U	0.765	U
5/11/2010	0.75	U	0.375	U
11/10/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



Monitoring Well 01GGM33
OU1, Site 1
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	16
Minimum	0.25
Maximum	8
Mean	2.248
Geometric Mean	1.525
Median	1.56
Standard Deviation	2.06
SEM	0.515
Mann-Kendall Test	
Test Value (S)	29
Tabulated p-value	0.114
Standard Deviation of S	22.19
Standardized Value of S	1.262
Approximate p-value	0.103

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	16
Minimum	3.8
Maximum	179
Mean	65.28
Geometric Mean	40.33
Median	59
Standard Deviation	53.92
SEM	13.48
Mann-Kendall Test	
Test Value (S)	78
Tabulated p-value	0
Standard Deviation of S	22.21
Standardized Value of S	3.467
Approximate p-value	2.63E-04

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	16
Minimum	3.8
Maximum	179
Mean	65.28
Geometric Mean	40.33
Median	59
Standard Deviation	53.92
SEM	13.48
Mann-Kendall Test	
Test Value (S)	78
Tabulated p-value	0
Standard Deviation of S	22.21
Standardized Value of S	3.467
Approximate p-value	2.63E-04

Statistically significant evidence of an increasing trend at the specified level of significance.

Monitoring Well 01GGM33
OU1, Site 1
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Naphthalene

General Statistics	
Number of Values	15
Minimum	0.125
Maximum	10.9
Mean	2.154
Geometric Mean	1.075
Median	1
Standard Deviation	2.813
SEM	0.726
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.5
Standard Deviation of S	19.94
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Xylenes (Total)

General Statistics	
Number of Values	16
Minimum	0.25
Maximum	6.33
Mean	2.248
Geometric Mean	1.52
Median	1.59
Standard Deviation	1.865
SEM	0.466
Mann-Kendall Test	
Test Value (S)	-10
Tabulated p-value	0.345
Standard Deviation of S	22.06
Standardized Value of S	-0.408
Approximate p-value	0.342

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	15
Minimum	11.2
Maximum	179.5
Mean	41.95
Geometric Mean	31.39
Median	28.35
Standard Deviation	41.96
SEM	10.83
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.279
Standard Deviation of S	20.21
Standardized Value of S	0.594
Approximate p-value	0.276

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GGM33
OU1, Site 1
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	0
Minimum	N/A
Maximum	N/A
Mean	N/A
Geometric Mean	N/A
Median	N/A
Standard Deviation	N/A
SEM	N/A
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	N/A
Standard Deviation of S	0
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	15
Minimum	0.15
Maximum	3.65
Mean	1.022
Geometric Mean	0.784
Median	0.9
Standard Deviation	0.846
SEM	0.218
Mann-Kendall Test	
Test Value (S)	33
Tabulated p-value	0.057
Standard Deviation of S	20.16
Standardized Value of S	1.587
Approximate p-value	0.0562

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	15
Minimum	7070
Maximum	56300
Mean	29330
Geometric Mean	24389
Median	25400
Standard Deviation	16665
SEM	4303
Mann-Kendall Test	
Test Value (S)	33
Tabulated p-value	0.057
Standard Deviation of S	20.21
Standardized Value of S	1.584
Approximate p-value	0.0566

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GGM33
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	16
Minimum	0
Maximum	56300
Mean	27497
Geometric Mean	0
Median	22750
Standard Deviation	17691
SEM	4423
Mann-Kendall Test	
Test Value (S)	18
Tabulated p-value	0.225
Standard Deviation of S	22.21
Standardized Value of S	0.765
Approximate p-value	0.222

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01UPGW01
OU1, Site 1
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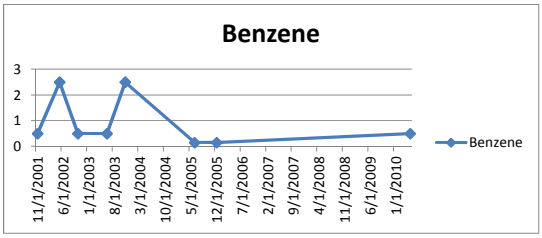
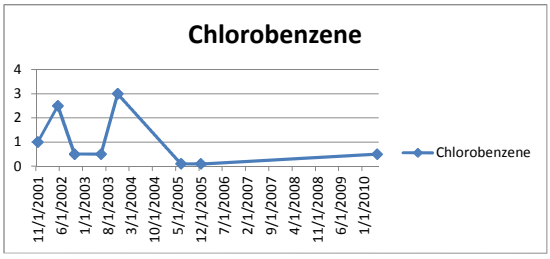
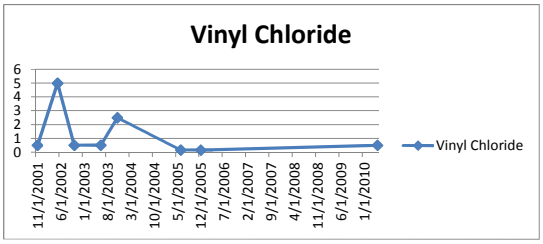
Benzene Date	Validated Result	Qual	Censored Result	Qual
11/13/2001	1	U	0.5	U
5/2/2002	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/17/2003	5	U	2.5	U
6/2/2005	0.3	U	0.15	U
12/15/2005	0.3	U	0.15	U
5/11/2010	1	U	0.5	U



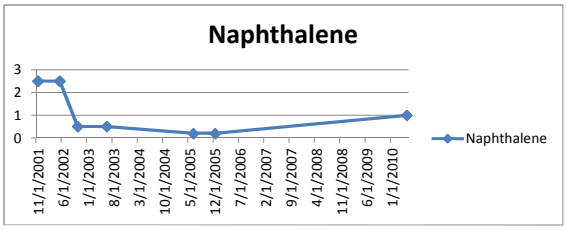
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
11/13/2001	2	U	1	U
5/2/2002	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/17/2003	3	J	3	J
6/2/2005	0.2	U	0.1	U
12/15/2005	0.2	U	0.1	U
5/11/2010	1	U	0.5	U



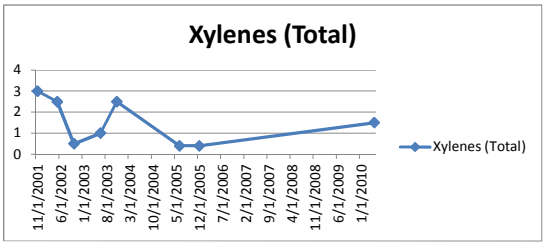
Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
11/13/2001	1	U	0.5	U
5/2/2002	10	U	5	U
10/9/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/17/2003	5	U	2.5	U
6/2/2005	0.3	U	0.15	U
12/15/2005	0.3	U	0.15	U
5/11/2010	1	UJ	0.5	UJ



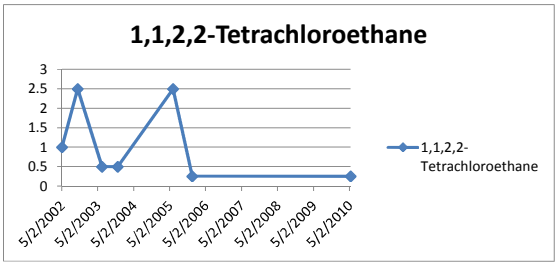
Naphthalene Date	Validated Result	Qual	Censored Result	Qual
11/13/2001	5	U	2.5	U
5/2/2002	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
6/2/2005	0.4	UJ	0.2	UJ
12/15/2005	0.4	U	0.2	U
5/11/2010	2	U	1	U



Xylenes (Total) Date	Validated Result	Qual	Censored Result	Qual
11/13/2001	6	U	3	U
5/2/2002	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/11/2003	2	U	1	U
11/17/2003	5	U	2.5	U
6/2/2005	0.8	U	0.4	U
12/15/2005	0.8	U	0.4	U
5/11/2010	3	U	1.5	U

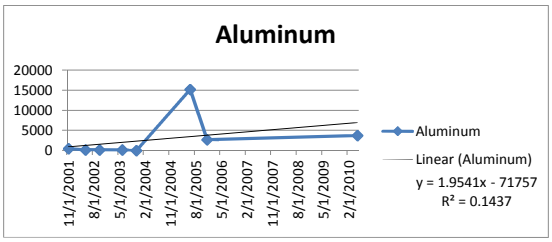


1,1,2,2-Tetrachloroethane Date	Validated Result	Qual	Censored Result	Qual
5/2/2002	2	U	1	U
10/9/2002	5	U	2.5	U
6/11/2003	1	U	0.5	U
11/17/2003	1	U	0.5	U
6/2/2005	5	U	2.5	U
12/15/2005	0.5	U	0.25	U
5/11/2010	0.5	U	0.25	U
5/11/2010	1	U		U

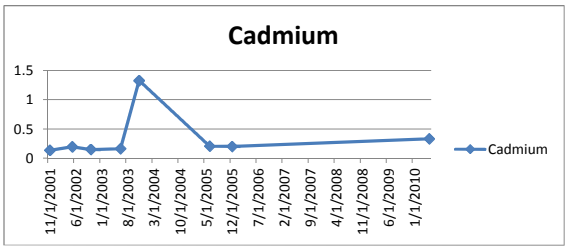


Monitoring Well 01UPGW01
OU1, Site 1
NAS Pensacoal, Pensacola Florida

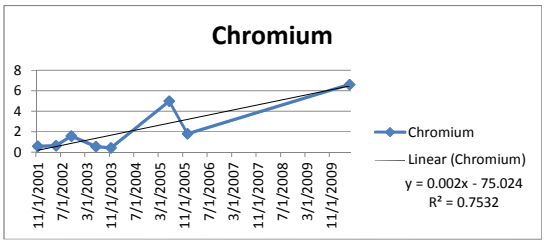
Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
11/13/2001	447		447	
5/2/2002	116		116	
10/9/2002	344	U	172	U
6/11/2003	170		170	
11/17/2003	17.6	U	8.8	U
6/2/2005	15200		15200	
12/15/2005	2670	J	2670	J
5/11/2010	3740		3740	



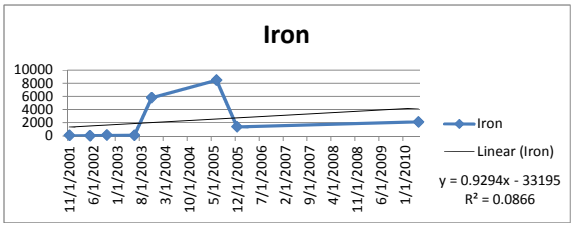
Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
11/13/2001	0.27	U	0.135	U
5/2/2002	0.39	U	0.195	U
10/9/2002	0.3	U	0.15	U
6/11/2003	0.33	U	0.165	U
11/17/2003	2.66	U	1.33	U
6/2/2005	0.41	U	0.205	U
12/15/2005	0.4	U	0.2	U
5/11/2010	0.334	J	0.334	J



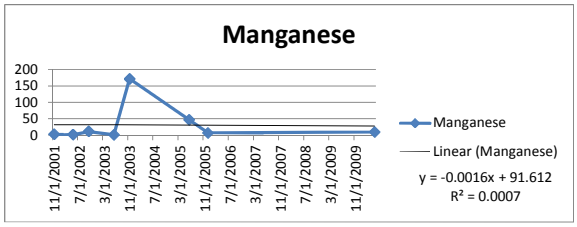
Chromium	Validated		Censored	
Date	Result	Qual	Result	Qual
11/13/2001	0.58	J	0.58	J
5/2/2002	1.3	U	0.65	U
10/9/2002	3.2	U	1.6	U
6/11/2003	1.1	U	0.55	U
11/17/2003	0.88	U	0.44	U
6/2/2005	10	U	5	U
12/15/2005	3.6	U	1.8	U
5/11/2010	6.61		6.61	



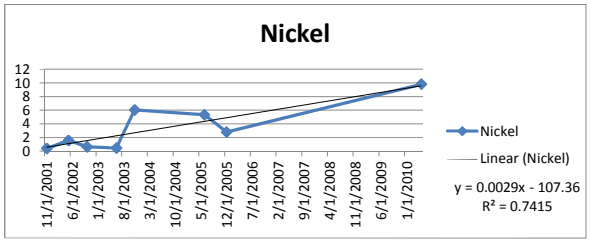
Iron	Validated		Censored	
Date	Result	Qual	Result	Qual
11/13/2001	90.7	J	90.7	J
5/2/2002	59.1	U	29.55	U
10/9/2002	144		144	
6/11/2003	81.2		81.2	
11/17/2003	5810		5810	
6/2/2005	8480		8480	
12/15/2005	1400	J	1400	J
5/11/2010	2140		2140	



Manganese	Validated		Censored	
Date	Result	Qual	Result	Qual
11/13/2001	2.8	J	2.8	J
5/2/2002	1.7		1.7	
10/9/2002	11.3		11.3	
6/11/2003	1.2		1.2	
11/17/2003	172		172	
6/2/2005	47		47	
12/15/2005	7		7	
5/11/2010	9.91		9.91	



Nickel	Validated		Censored	
Date	Result	Qual	Result	Qual
11/13/2001	0.8	U	0.4	U
5/2/2002	1.6		1.6	
10/9/2002	1.3	U	0.65	U
6/11/2003	0.97	U	0.485	U
11/17/2003	12.1	U	6.05	U
6/2/2005	10.7	U	5.35	U
12/15/2005	2.8		2.8	
5/11/2010	9.83		9.83	



Monitoring Well 01UPGW01
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	8
Minimum	8.8
Maximum	15200
Mean	2815
Geometric Mean	460.6
Median	309.5
Standard Deviation	5196
SEM	1837
Mann-Kendall Test	
Test Value (S)	8
Tabulated p-value	0.119
Standard Deviation of S	8.083
Standardized Value of S	0.866
Approximate p-value	0.193

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	29.55
Maximum	8480
Mean	2272
Geometric Mean	510.7
Median	772
Standard Deviation	3184
SEM	1126
Mann-Kendall Test	
Test Value (S)	14
Tabulated p-value	0.054
Standard Deviation of S	8.083
Standardized Value of S	1.608
Approximate p-value	0.0539

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	1.2
Maximum	172
Mean	31.61
Geometric Mean	8.807
Median	8.455
Standard Deviation	58.66
SEM	20.74
Mann-Kendall Test	
Test Value (S)	6
Tabulated p-value	0.274
Standard Deviation of S	8.083
Standardized Value of S	0.619
Approximate p-value	0.268

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01UPGW01
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	8
Minimum	0.4
Maximum	9.83
Mean	3.396
Geometric Mean	1.914
Median	2.2
Standard Deviation	3.398
SEM	1.201
Mann-Kendall Test	
Test Value (S)	16
Tabulated p-value	0.031
Standard Deviation of S	8.083
Standardized Value of S	1.856
Approximate p-value	0.0317

Statistically significant evidence of an increasing trend at the specified level of significance.

Monitoring Well 01GI32
OU1, Site 1
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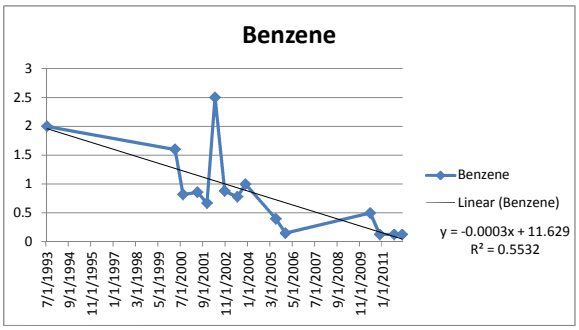
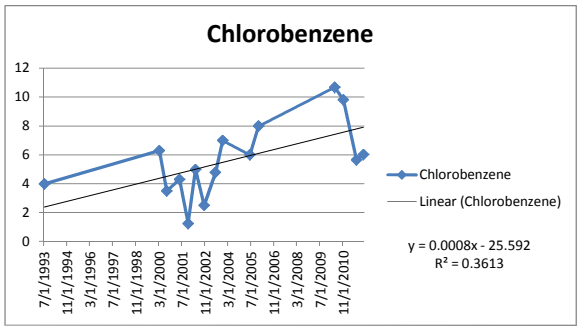
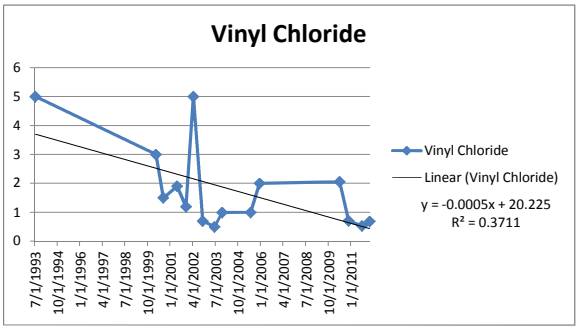
Benzene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	2	J	2	J
3/17/2000	1.6		1.6	
8/16/2000	0.82	J	0.82	J
5/22/2001	0.86	J	0.86	J
11/14/2001	0.67	J	0.67	J
4/30/2002	5	U	2.5	U
10/8/2002	0.88	J	0.88	J
6/11/2003	0.78	J	0.78	J
11/18/2003	1		1	
6/1/2005	0.4	J	0.4	J
12/15/2005	0.3	U	0.15	U
5/11/2010	1	U	0.5	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



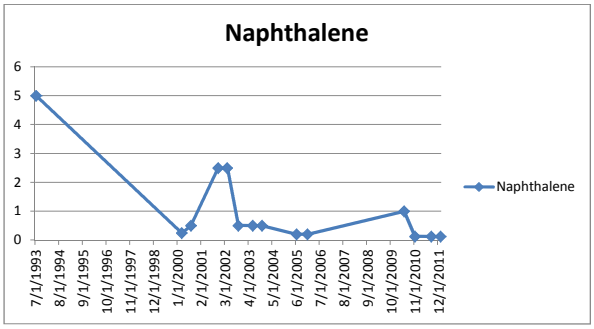
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	4	J	4	J
3/17/2000	6.3		6.3	
8/16/2000	3.5		3.5	
5/22/2001	4.3		4.3	
11/14/2001	2.5	U	1.25	U
4/30/2002	5	J	5	J
10/8/2002	2.5		2.5	
6/11/2003	4.8		4.8	
11/18/2003	7		7	
6/1/2005	6		6	
12/15/2005	8	J	8	J
5/11/2010	10.7		10.7	
11/10/2010	9.83		9.83	
8/30/2011	5.66		5.66	
1/17/2012	6.04		6.04	



Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	10	U	5	U
3/17/2000	3		3	
8/16/2000	1.5		1.5	
5/22/2001	1.9		1.9	
11/14/2001	1.2		1.2	
4/30/2002	10	U	5	U
10/8/2002	0.7	J	0.7	J
6/11/2003	1	U	0.5	U
11/18/2003	1		1	
6/1/2005	1	J	1	J
12/15/2005	2	J	2	J
5/11/2010	2.06	J	2.06	J
11/10/2010	0.708	J	0.708	J
8/30/2011	0.526	J	0.526	J
1/17/2012	0.689	J	0.689	J



Naphthalene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
11/14/2001	5	U	2.5	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
6/1/2005	0.4	UJ	0.2	UJ
12/15/2005	0.4	U	0.2	U
5/11/2010	2	U	1	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



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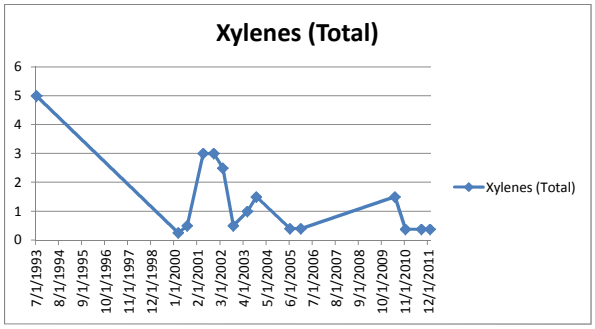
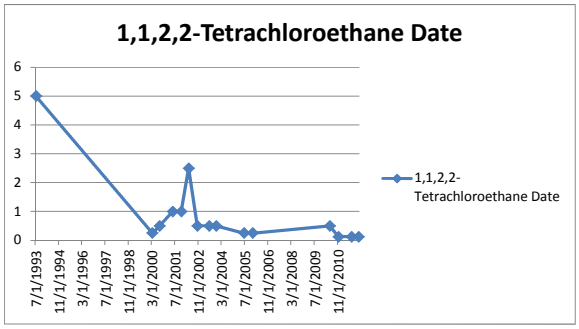
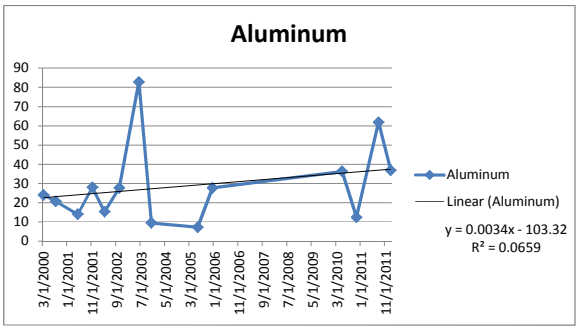
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
7/21/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	6	U	3	U
11/14/2001	6	U	3	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/11/2003	2	U	1	U
11/18/2003	3	U	1.5	U
6/1/2005	0.8	U	0.4	U
12/15/2005	0.8	U	0.4	U
5/11/2010	3	U	1.5	U
11/10/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



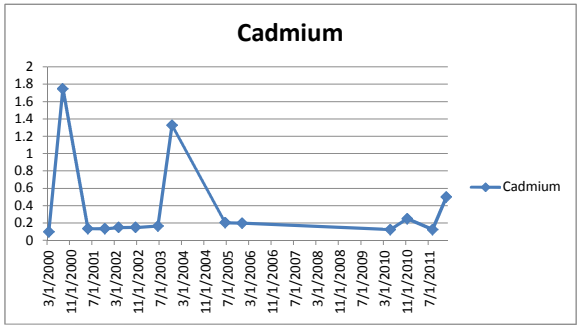
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
7/21/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/22/2001	2	U	1	U
11/14/2001	2	U	1	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/18/2003	1	U	0.5	U
6/1/2005	0.5	U	0.25	U
12/15/2005	0.5	U	0.25	U
5/11/2010	1	U	0.5	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Aluminum	Validated		Censored		
Date	Result	Qual	Result	Qual	
7/21/1993	48100	J	48100	J	do not use
3/17/2000	48.4	U	24.2	U	
8/16/2000	41.5	U	20.75	U	
5/22/2001	28.2	U	14.1	U	
11/14/2001	56.2	U	28.1	U	
4/30/2002	30.9	U	15.45	U	
10/8/2002	55.7	U	27.85	U	
6/11/2003	82.9		82.9		
11/18/2003	19.2	U	9.6	U	
6/1/2005	14.6	U	7.3	U	
12/15/2005	55.6	U	27.8	U	
5/11/2010	36.4	J	36.4	J	
11/10/2010	25	U	12.5	U	
8/30/2011	61.9	J	61.9	J	
1/17/2012	37	J	37	J	



Cadmium	Validated		Censored		
Date	Result	Qual	Result	Qual	
7/21/1993	3	U	1.5	U	do not use
3/17/2000	0.2	U	0.1	U	
8/16/2000	3.5	U	1.75	U	
5/22/2001	0.27	U	0.135	U	
11/14/2001	0.27	U	0.135	U	
4/30/2002	0.3	U	0.15	U	
10/8/2002	0.3	U	0.15	U	
6/11/2003	0.33	U	0.165	U	
11/18/2003	2.66	U	1.33	U	
6/1/2005	0.41	U	0.205	U	
12/15/2005	0.4	U	0.2	U	
5/11/2010	0.25	U	0.125	U	
11/10/2010	0.5	U	0.25	U	
8/30/2011	0.25	U	0.125	U	
1/17/2012	1	U	0.5	U	



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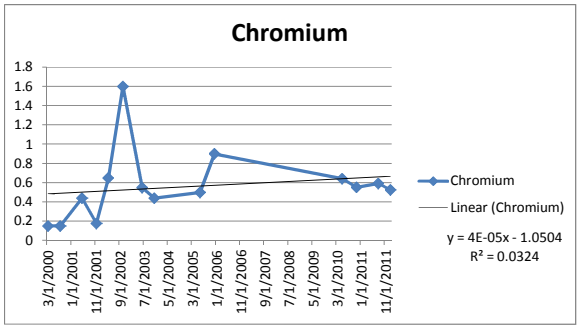
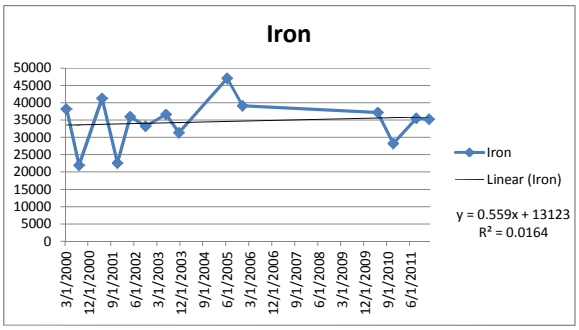
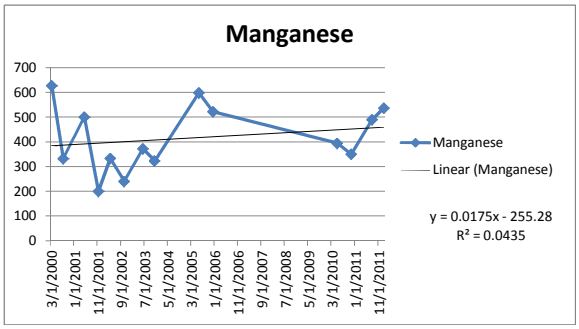
Chromium Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	71.9		71.9		do not use
3/17/2000	0.3	U	0.15	U	
8/16/2000	0.3	U	0.15	U	
5/22/2001	0.44	J	0.44	J	
11/14/2001	0.35	U	0.175	U	
4/30/2002	1.3	U	0.65	U	
10/8/2002	3.2	U	1.6	U	
6/11/2003	1.1	U	0.55	U	
11/18/2003	0.88	U	0.44	U	
6/1/2005	1	U	0.5	U	
12/15/2005	1.8	U	0.9	U	
5/11/2010	0.641	J	0.641	J	
11/10/2010	0.552	J	0.552	J	
8/30/2011	0.591	J	0.591	J	
1/17/2012	0.526	J	0.526	J	



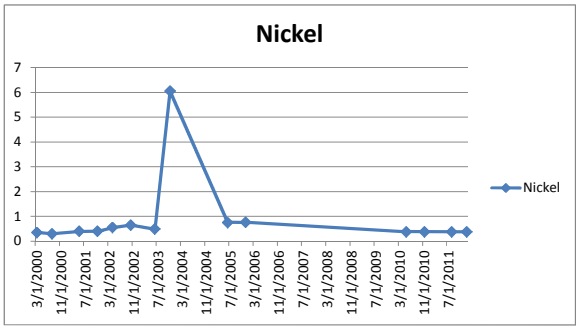
Iron Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	65900		65900		do not use
3/17/2000	38300		38300		
8/16/2000	22000		22000		
5/22/2001	41300		41300		
11/14/2001	22600		22600		
4/30/2002	36000		36000		
10/8/2002	33300		33300		
6/11/2003	36700		36700		
11/18/2003	31400		31400		
6/1/2005	47100		47100		
12/15/2005	39200	J	39200	J	
5/11/2010	37200		37200		
11/10/2010	28300		28300		
8/30/2011	35600		35600		
1/17/2012	35300		35300		



Manganese Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	487		487		do not use
3/17/2000	628		628		
8/16/2000	333		333		
5/22/2001	501		501		
11/14/2001	200		200		
4/30/2002	334		334		
10/8/2002	241		241		
6/11/2003	372		372		
11/18/2003	323		323		
6/1/2005	599		599		
12/15/2005	522		522		
5/11/2010	395		395		
11/10/2010	350		350		
8/30/2011	490		490		
1/17/2012	537		537		



Nickel Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	32		32		do not use
3/17/2000	0.7	U	0.35	U	
8/16/2000	0.6	U	0.3	U	
5/22/2001	0.8	U	0.4	U	
11/14/2001	0.8	U	0.4	U	
4/30/2002	1.1	U	0.55	U	
10/8/2002	1.3	U	0.65	U	
6/11/2003	0.97	U	0.485	U	
11/18/2003	12.1	U	6.05	U	
6/1/2005	1.5	U	0.75	U	
12/15/2005	1.53	U	0.765	U	
5/11/2010	0.75	U	0.375	U	
11/10/2010	0.75	U	0.375	U	
8/30/2011	0.75	U	0.375	U	
1/17/2012	0.75	U	0.375	U	



Monitoring Well 01GI32
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	15
Minimum	0.125
Maximum	2.5
Mean	0.836
Geometric Mean	0.556
Median	0.78
Standard Deviation	0.71
SEM	0.183
Mann-Kendall Test	
Test Value (S)	-68
Tabulated p-value	0
Standard Deviation of S	20.12
Standardized Value of S	-3.331
Approximate p-value	4.33E-04

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	15
Minimum	1.25
Maximum	10.7
Mean	5.659
Geometric Mean	5.04
Median	5.66
Standard Deviation	2.544
SEM	0.657
Mann-Kendall Test	
Test Value (S)	47
Tabulated p-value	0.01
Standard Deviation of S	20.21
Standardized Value of S	2.276
Approximate p-value	0.0114

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	15
Minimum	0.5
Maximum	5
Mean	1.786
Geometric Mean	1.355
Median	1.2
Standard Deviation	1.481
SEM	0.382
Mann-Kendall Test	
Test Value (S)	-45
Tabulated p-value	0.014
Standard Deviation of S	20.16
Standardized Value of S	-2.183
Approximate p-value	0.0145

Statistically significant evidence of a decreasing trend at the specified level of significance.

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NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	14
Minimum	7.3
Maximum	82.9
Mean	28.99
Geometric Mean	23.36
Median	26
Standard Deviation	20.99
SEM	5.609
Mann-Kendall Test	
Test Value (S)	15
Tabulated p-value	0.225
Standard Deviation of S	18.27
Standardized Value of S	0.766
Approximate p-value	0.222

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	14
Minimum	0.15
Maximum	1.6
Mean	0.562
Geometric Mean	0.464
Median	0.538
Standard Deviation	0.365
SEM	0.0975
Mann-Kendall Test	
Test Value (S)	33
Tabulated p-value	0.04
Standard Deviation of S	18.21
Standardized Value of S	1.757
Approximate p-value	0.0394

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	15
Minimum	22000
Maximum	65900
Mean	36680
Geometric Mean	35442
Median	36000
Standard Deviation	10419
SEM	2690
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.279
Standard Deviation of S	20.21
Standardized Value of S	-0.594
Approximate p-value	0.276

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GI32
OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

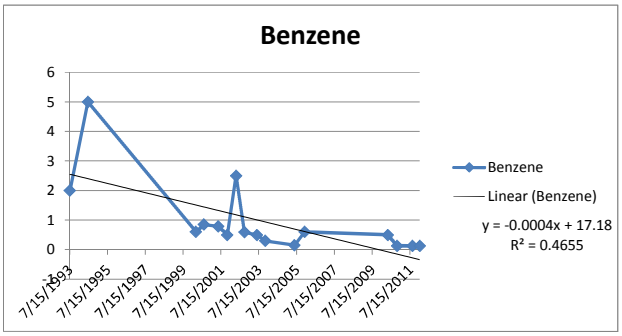
General Statistics	
Number of Values	15
Minimum	200
Maximum	628
Mean	420.8
Geometric Mean	401.2
Median	395
Standard Deviation	127.6
SEM	32.95
Mann-Kendall Test	
Test Value (S)	15
Tabulated p-value	0.248
Standard Deviation of S	20.21
Standardized Value of S	0.693
Approximate p-value	0.244

Insufficient evidence to identify a significant trend at the specified level of significance.

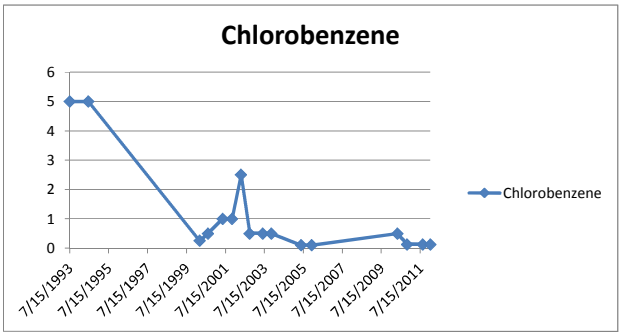
Monitoring Well 01GI36

OU1, Site 1
NAS Pensacoal, Pensacola Florida

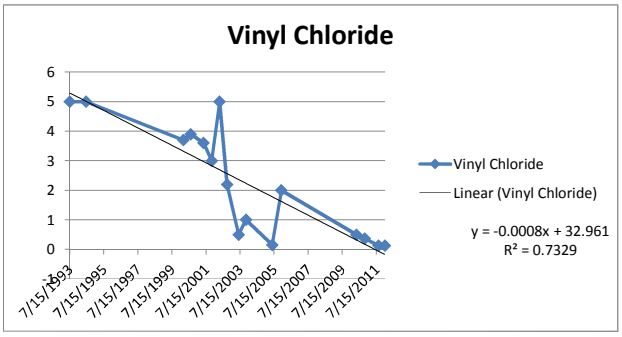
Benzene Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	2	J	2	J
6/29/1994	10	U	5	U
3/15/2000	0.6		0.6	
8/16/2000	0.85	J	0.85	J
5/21/2001	0.79	J	0.79	J
11/13/2001	1	U	0.5	U
4/30/2002	5	U	2.5	U
10/8/2002	0.59	J	0.59	J
6/11/2003	1	U	0.5	U
11/19/2003	0.3	J	0.3	J
6/2/2005	0.3	U	0.15	U
12/15/2005	0.6	J	0.6	J
5/11/2010	1	U	0.5	U
11/9/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



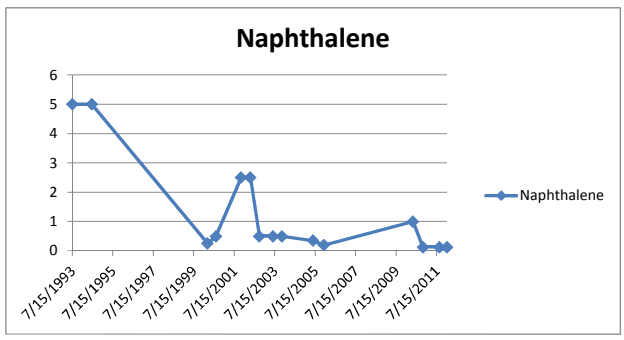
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	10	U	5	U
6/29/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/21/2001	2	U	1	U
11/13/2001	2	U	1	U
4/30/2002	5	U	2.5	U
10/8/2002	1	UJ	0.5	UJ
6/11/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/2/2005	0.2	U	0.1	U
12/15/2005	0.2	U	0.1	U
5/11/2010	1	U	0.5	U
11/9/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	10	U	5	U
6/29/1994	10	U	5	U
3/15/2000	3.7		3.7	
8/16/2000	3.9		3.9	
5/21/2001	3.6		3.6	
11/13/2001	3		3	
4/30/2002	10	U	5	U
10/8/2002	2.2	J	2.2	J
6/11/2003	1	U	0.5	U
11/19/2003	1	J	1	J
6/2/2005	0.3	U	0.15	U
12/15/2005	2	J	2	J
5/11/2010	1	UJ	0.5	UJ
11/9/2010	0.367	J	0.367	J
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



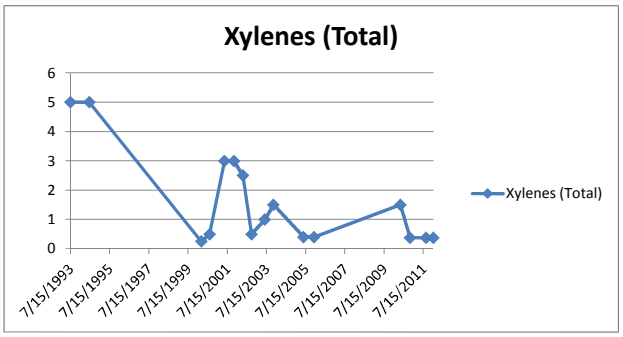
Naphthalene Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	10	U	5	U
6/29/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
11/13/2001	5	U	2.5	U
4/30/2002	5	UJ	2.5	UJ
10/8/2002	1	UJ	0.5	UJ
6/11/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/2/2005	0.7	U	0.35	U
12/15/2005	0.4	U	0.2	U
5/11/2010	2	U	1	U
11/9/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



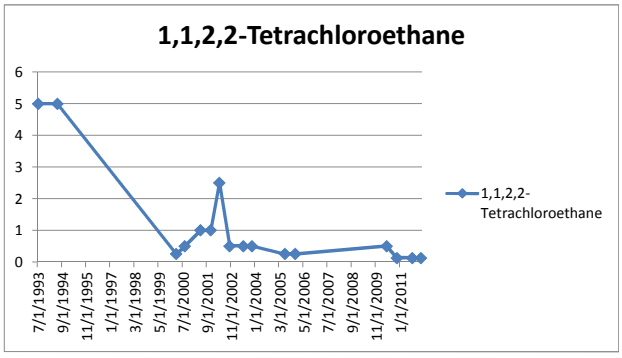
Monitoring Well 01GI36

OU1, Site 1
NAS Pensacoal, Pensacola Florida

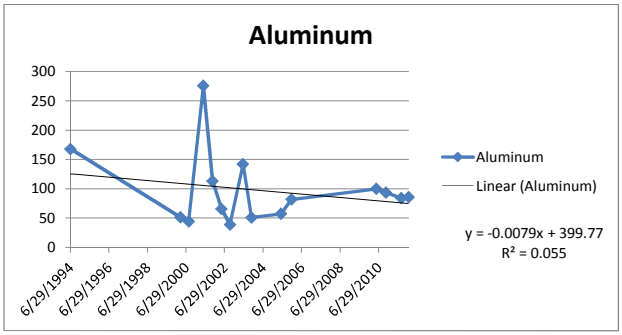
Xylenes (Total) Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	10	U	5	U
6/29/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/21/2001	6	U	3	U
11/13/2001	6	U	3	U
4/30/2002	5	UJ	2.5	UJ
10/8/2002	1	UJ	0.5	UJ
6/11/2003	2	U	1	U
11/19/2003	3	U	1.5	U
6/2/2005	0.8	U	0.4	U
12/15/2005	0.8	U	0.4	U
5/11/2010	3	U	1.5	U
11/9/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



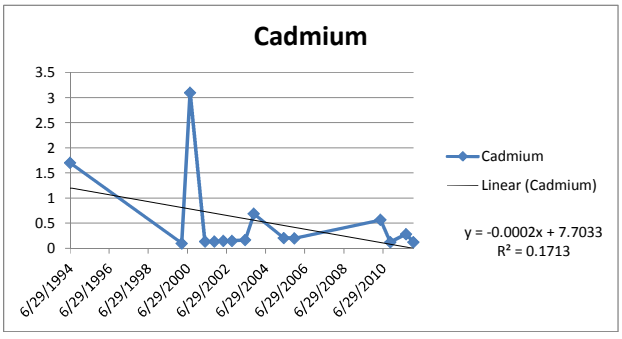
1,1,2,2-Tetrachlorc Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	10	U	5	U
6/29/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/16/2000	1	U	0.5	U
5/21/2001	2	U	1	U
11/13/2001	2	U	1	U
4/30/2002	5	U	2.5	U
10/8/2002	1	UJ	0.5	UJ
6/11/2003	1	U	0.5	U
11/19/2003	1	UJ	0.5	UJ
6/2/2005	0.5	U	0.25	U
12/15/2005	0.5	U	0.25	U
5/11/2010	1	U	0.5	U
11/9/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Aluminum Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	13100		13100	
6/29/1994	168		168	
3/15/2000	103	U	51.5	U
8/16/2000	89.1	U	44.55	U
5/21/2001	276		276	
11/13/2001	113	J	113	J
4/30/2002	131	U	65.5	U
10/8/2002	78.2	U	39.1	U
6/11/2003	142		142	
11/19/2003	102	U	51	U
6/2/2005	115	U	57.5	U
12/15/2005	164	U	82	U
5/11/2010	100		100	
11/9/2010	93.7		93.7	
8/30/2011	84		84	
1/17/2012	85.8		85.8	



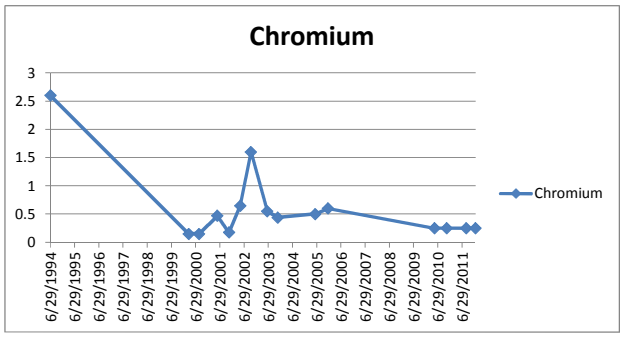
Cadmium Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	3	U	1.5	U
6/29/1994	3.4	U	1.7	U
3/15/2000	0.2	U	0.1	U
8/16/2000	6.2	U	3.1	U
5/21/2001	0.27	U	0.135	U
11/13/2001	0.27	U	0.135	U
4/30/2002	0.3	U	0.15	U
10/8/2002	0.3	U	0.15	U
6/11/2003	0.33	U	0.165	U
11/19/2003	0.69		0.69	
6/2/2005	0.41	U	0.205	U
12/15/2005	0.4	U	0.2	U
5/11/2010	0.567	J	0.567	J
11/9/2010	0.25	U	0.125	U
8/30/2011	0.284	J	0.284	J
1/17/2012	0.25	U	0.125	U



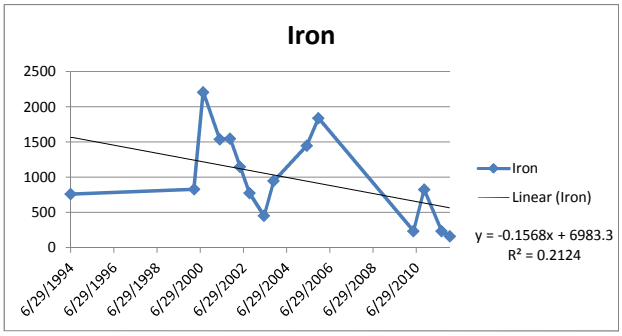
Monitoring Well 01GI36

OU1, Site 1
NAS Pensacoal, Pensacola Florida

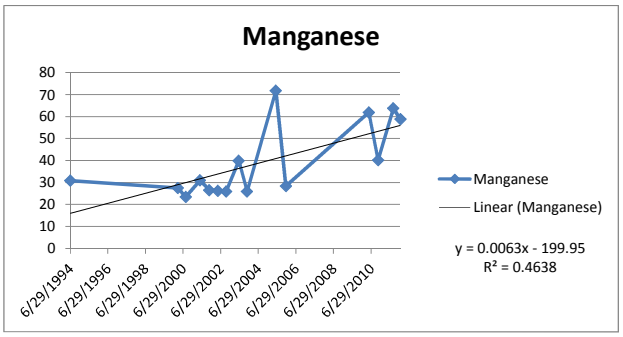
Chromium Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	464	J	464	J
6/29/1994	5.2	U	2.6	U
3/15/2000	0.3	U	0.15	U
8/16/2000	0.3	U	0.15	U
5/21/2001	0.94	U	0.47	U
11/13/2001	0.35	U	0.175	U
4/30/2002	1.3	U	0.65	U
10/8/2002	3.2	U	1.6	U
6/11/2003	1.1	U	0.55	U
11/19/2003	0.88	U	0.44	U
6/2/2005	1	U	0.5	U
12/15/2005	1.2	U	0.6	U
5/11/2010	0.5	U	0.25	U
11/9/2010	0.5	U	0.25	U
8/30/2011	0.5	U	0.25	U
1/17/2012	0.5	U	0.25	U



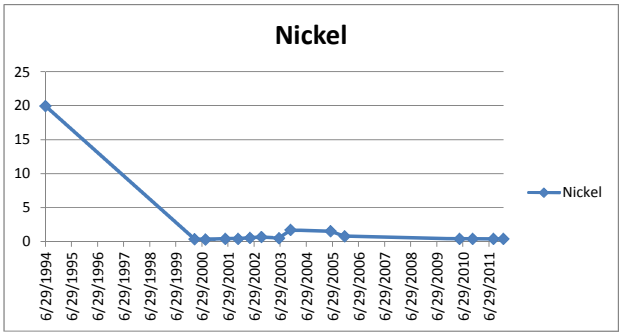
Iron Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	11100	J	11100	J
6/29/1994	761		761	
3/15/2000	829		829	
8/16/2000	2210		2210	
5/21/2001	1540		1540	
11/13/2001	1550		1550	
4/30/2002	1150		1150	
10/8/2002	777		777	
6/11/2003	452		452	
11/19/2003	947		947	
6/2/2005	1450		1450	
12/15/2005	1840	J	1840	J
5/11/2010	234		234	
11/9/2010	827		827	
8/30/2011	232		232	
1/17/2012	163		163	



Manganese Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	74.1		74.1	
6/29/1994	30.9		30.9	
3/15/2000	27.5		27.5	
8/16/2000	23.5		23.5	
5/21/2001	31.1	J	31.1	J
11/13/2001	26.6		26.6	
4/30/2002	26.3		26.3	
10/8/2002	25.9		25.9	
6/11/2003	40		40	
11/19/2003	25.9		25.9	
6/2/2005	71.9		71.9	
12/15/2005	28.5		28.5	
5/11/2010	62		62	
11/9/2010	40.2		40.2	
8/30/2011	63.8		63.8	
1/17/2012	58.8		58.8	



Nickel Date	Validated Result	Qual	Censored Result	Qual
7/15/1993	219	J	219	J
6/29/1994	39.9	U	19.95	U
3/15/2000	0.7	U	0.35	U
8/16/2000	0.6	U	0.3	U
5/21/2001	0.8	U	0.4	U
11/13/2001	0.8	U	0.4	U
4/30/2002	1.1	U	0.55	U
10/8/2002	1.3	U	0.65	U
6/11/2003	0.97	U	0.485	U
11/19/2003	3.4	U	1.7	U
6/2/2005	3	U	1.5	U
12/15/2005	1.53	U	0.765	U
5/11/2010	0.75	U	0.375	U
11/9/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



Monitoring Well 01GI36

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	16
Minimum	0.125
Maximum	5
Mean	0.953
Geometric Mean	0.53
Median	0.545
Standard Deviation	1.266
SEM	0.316
Mann-Kendall Test	
Test Value (S)	-81
Tabulated p-value	0
Standard Deviation of S	22.02
Standardized Value of S	-3.633
Approximate p-value	1.40E-04

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	16
Minimum	0.125
Maximum	5
Mean	2.26
Geometric Mean	1.2
Median	2.1
Standard Deviation	1.908
SEM	0.477
Mann-Kendall Test	
Test Value (S)	-93
Tabulated p-value	0
Standard Deviation of S	22.08
Standardized Value of S	-4.166
Approximate p-value	1.55E-05

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	15
Minimum	39.1
Maximum	276
Mean	96.91
Geometric Mean	83.83
Median	84
Standard Deviation	61.38
SEM	15.85
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.5
Standard Deviation of S	20.21
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GI36

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	15
Minimum	0.1
Maximum	3.1
Mean	0.522
Geometric Mean	0.267
Median	0.165
Standard Deviation	0.825
SEM	0.213
Mann-Kendall Test	
Test Value (S)	2
Tabulated p-value	0.461
Standard Deviation of S	20.13
Standardized Value of S	0.0497
Approximate p-value	0.48

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	15
Minimum	163
Maximum	2210
Mean	997.5
Geometric Mean	781.7
Median	829
Standard Deviation	617.3
SEM	159.4
Mann-Kendall Test	
Test Value (S)	-37
Tabulated p-value	0.037
Standard Deviation of S	20.21
Standardized Value of S	-1.782
Approximate p-value	0.0374

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

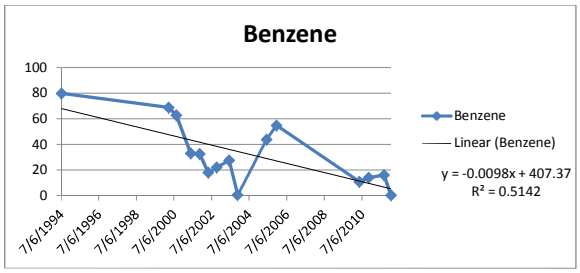
General Statistics	
Number of Values	15
Minimum	23.5
Maximum	71.9
Mean	38.86
Geometric Mean	36.02
Median	30.9
Standard Deviation	16.67
SEM	4.304
Mann-Kendall Test	
Test Value (S)	40
Tabulated p-value	0.023
Standard Deviation of S	20.18
Standardized Value of S	1.932
Approximate p-value	0.0267

Statistically significant evidence of an increasing trend at the specified level of significance.

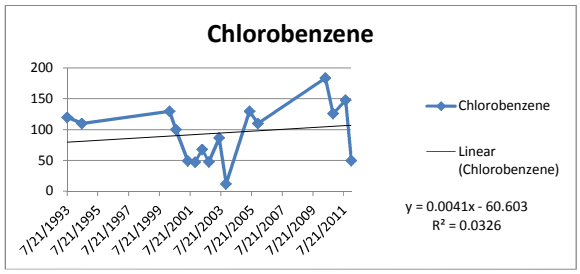
Monitoring Well 01GI41

OU1, Site 1
NAS Pensacoal, Pensacola Florida

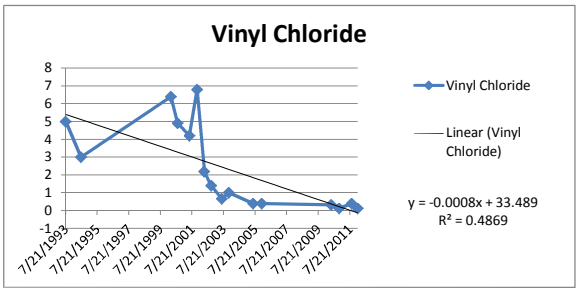
Benzene Date	Validated Result	Qual	Censored Result	Qual
7/6/1994	80		80	
3/17/2000	69		69	
8/17/2000	63		63	
5/23/2001	33.1		33.1	
11/12/2001	32.7		32.7	
4/30/2002	18		18	
10/9/2002	22		22	
6/10/2003	27.7		27.7	
11/19/2003	1	U	0.5	U
6/2/2005	44		44	
12/15/2005	55		55	
5/11/2010	10.9		10.9	
11/10/2010	14		14	
8/30/2011	16.2		16.2	
1/17/2012	0.298	J	0.298	J



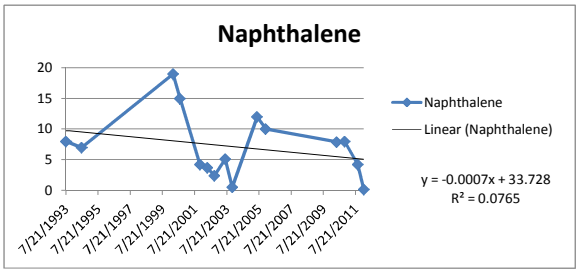
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	120		120	
7/6/1994	110		110	
3/17/2000	130		130	
8/17/2000	100		100	
5/23/2001	49.6		49.6	
11/12/2001	47.4		47.4	
4/30/2002	68		68	
10/9/2002	48		48	
6/10/2003	86.6		86.6	
11/19/2003	12		12	
6/2/2005	130		130	
12/15/2005	110		110	
5/11/2010	184		184	
11/10/2010	126		126	
8/30/2011	148		148	
1/17/2012	49.9		49.9	



Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	10	U	5	U
7/6/1994	3	J	3	J
3/17/2000	6.4		6.4	
8/17/2000	4.9		4.9	
5/23/2001	4.2		4.2	
11/12/2001	6.8		6.8	
4/30/2002	2.2	J	2.2	J
10/9/2002	1.4		1.4	
6/10/2003	0.66	J	0.66	J
11/19/2003	2	U	1	U
6/2/2005	0.4	J	0.4	J
12/15/2005	0.4	J	0.4	J
5/11/2010	0.329	J	0.329	J
11/10/2010	0.25	U	0.125	U
8/30/2011	0.403	J	0.403	J
1/17/2012	0.25	U	0.125	U



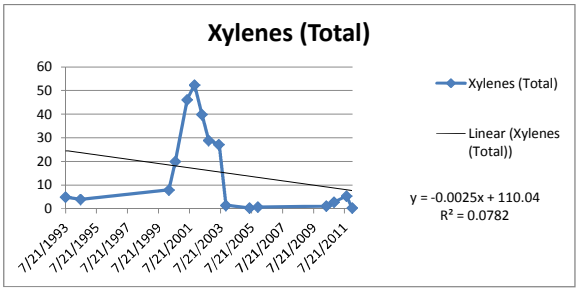
Naphthalene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	8	J	8	J
7/6/1994	7	J	7	J
3/17/2000	19	J	19	J
8/17/2000	15		15	
11/12/2001	4.2	J	4.2	J
4/30/2002	3.7	J	3.7	J
10/9/2002	2.4	J	2.4	J
6/10/2003	5.1		5.1	
11/19/2003	1	U	0.5	U
6/2/2005	12		12	
12/15/2005	10		10	
5/11/2010	7.9		7.9	
11/10/2010	7.96		7.96	
8/30/2011	4.21		4.21	
1/17/2012	0.25	U	0.125	U



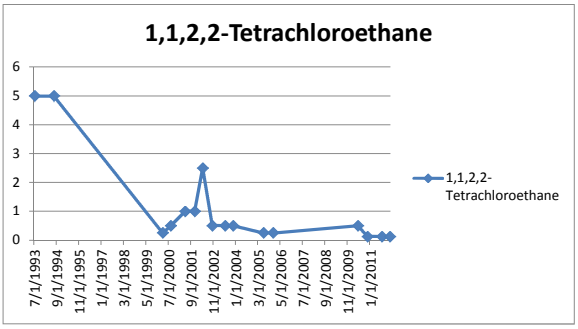
Monitoring Well 01GI41

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Xylenes (Total) Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	10	U	5	U
7/6/1994	4	J	4	J
3/17/2000	8		8	
8/17/2000	20		20	
5/23/2001	46.1		46.1	
11/12/2001	52.4		52.4	
4/30/2002	40		40	
10/9/2002	29		29	
6/10/2003	27.2		27.2	
11/19/2003	3	U	1.5	U
6/2/2005	0.8	U	0.4	U
12/15/2005	0.8	J	0.8	J
5/11/2010	1.14	J	1.14	J
11/10/2010	2.79	J	2.79	J
8/30/2011	5.42		5.42	
1/17/2012	0.75	U	0.375	U

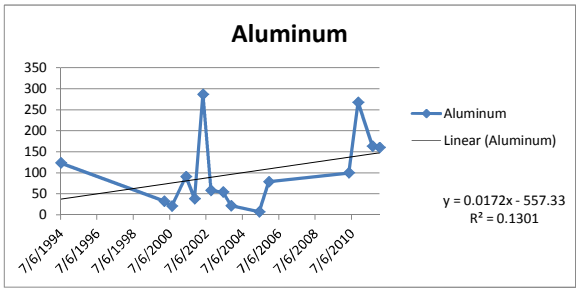


1,1,2,2-Tetrachloroethane Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	10	U	5	U
7/6/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/23/2001	2	U	1	U
11/12/2001	2	U	1	U
4/30/2002	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/2/2005	0.5	U	0.25	U
12/15/2005	0.5	U	0.25	U
5/11/2010	1	U	0.5	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



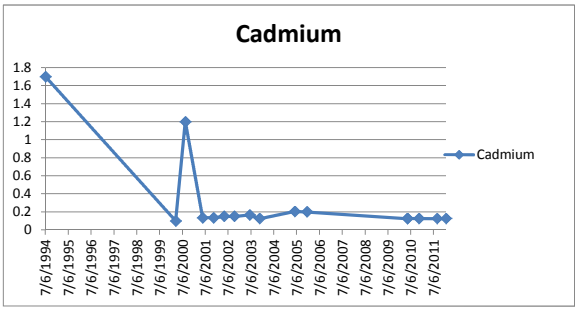
Aluminum Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	65900	J	65900	J
7/6/1994	247	U	123.5	U
3/17/2000	64.8	U	32.4	U
8/17/2000	41.5	U	20.75	U
5/23/2001	91.3	J	91.3	J
11/12/2001	77.1	U	38.55	U
4/30/2002	287		287	
10/9/2002	116	U	58	U
6/10/2003	54.2		54.2	
11/19/2003	43.6	U	21.8	U
6/2/2005	14.6	U	7.3	U
12/15/2005	158	U	79	U
5/11/2010	100		100	
11/10/2010	268	J	268	J
8/30/2011	163		163	
1/17/2012	160		160	

do not use



Cadmium Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	3	U	1.5	U
7/6/1994	3.4	U	1.7	U
3/17/2000	0.2	U	0.1	U
8/17/2000	2.4	U	1.2	U
5/23/2001	0.27	U	0.135	U
11/12/2001	0.27	U	0.135	U
4/30/2002	0.3	U	0.15	U
10/9/2002	0.3	U	0.15	U
6/10/2003	0.33	U	0.165	U
11/19/2003	0.25	U	0.125	U
6/2/2005	0.41	U	0.205	U
12/15/2005	0.4	U	0.2	U
5/11/2010	0.25	U	0.125	U
5/11/2010	0.25	U	0.125	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U

do not use



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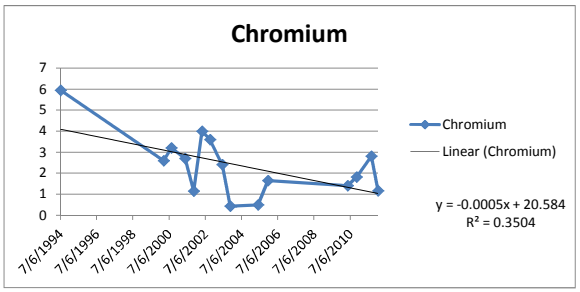
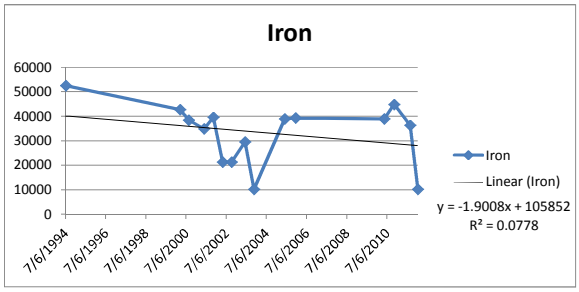
NAS Pensacoal, Pensacola Florida

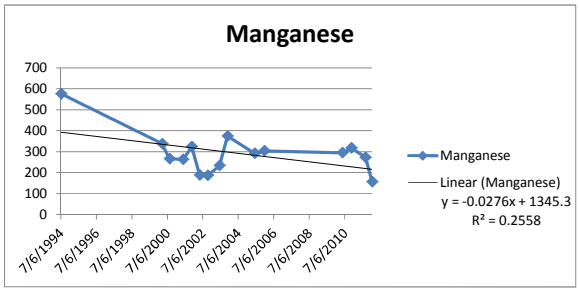
Chromium Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	101		101		do not use
7/6/1994	11.9	U	5.95	U	
3/17/2000	2.6		2.6		
8/17/2000	3.2		3.2		
5/23/2001	5.4	U	2.7	U	
11/12/2001	2.3	U	1.15	U	
4/30/2002	4		4		
10/9/2002	3.6		3.6		
6/10/2003	2.41		2.41		
11/19/2003	0.88	U	0.44	U	
6/2/2005	1	U	0.5	U	
12/15/2005	3.3	U	1.65	U	
5/11/2010	1.41		1.41		
11/10/2010	1.82	J	1.82	J	
8/30/2011	2.81		2.81		
1/17/2012	1.16	J	1.16	J	



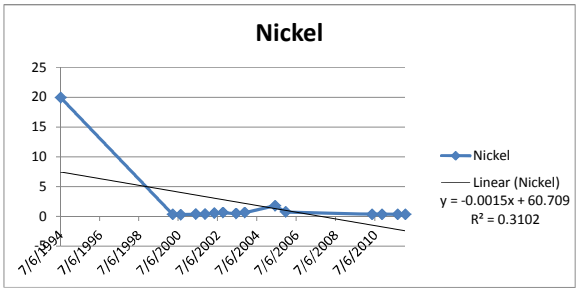
Iron Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	78100		78100		do not use
7/6/1994	52500		52500		
3/17/2000	42800		42800		
8/17/2000	38500		38500		
5/23/2001	34900		34900		
11/12/2001	39600		39600		
4/30/2002	21300		21300		
10/9/2002	21300		21300		
6/10/2003	29600		29600		
11/19/2003	10200		10200		
6/2/2005	39000		39000		
12/15/2005	39300		39300		
5/11/2010	39000		39000		
11/10/2010	44900		44900		
8/30/2011	36400		36400		
1/17/2012	10300		10300		



Manganese Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	542		542		do not use
7/6/1994	576		576		
3/17/2000	338		338		
8/17/2000	267		267		
5/23/2001	263		263		
11/12/2001	324		324		
4/30/2002	188		188		
10/9/2002	187		187		
6/10/2003	234		234		
11/19/2003	374		374		
6/2/2005	292		292		
12/15/2005	304		304		
5/11/2010	295		295		
11/10/2010	318		318		
8/30/2011	273		273		
1/17/2012	156		156		



Nickel Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	24.1		24.1		do not use
7/6/1994	39.9	U	19.95	U	
3/17/2000	0.7	U	0.35	U	
8/17/2000	0.6	U	0.3	U	
5/23/2001	0.8	U	0.4	U	
11/12/2001	0.8	U	0.4	U	
4/30/2002	1.1	U	0.55	U	
10/9/2002	1.3	U	0.65	U	
6/10/2003	0.97	U	0.485	U	
11/19/2003	1.3	U	0.65	U	
6/2/2005	3.6	U	1.8	U	
12/15/2005	1.53	U	0.765	U	
5/11/2010	0.75	U	0.375	U	
11/10/2010	0.75	U	0.375	U	
8/30/2011	0.75	U	0.375	U	
1/17/2012	0.75	U	0.375	U	



Monitoring Well 01GI41

OU1, Site 1
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	15
Minimum	0.298
Maximum	80
Mean	32.43
Geometric Mean	17.29
Median	27.7
Standard Deviation	24.84
SEM	6.413
Mann-Kendall Test	
Test Value (S)	-61
Tabulated p-value	0.001
Standard Deviation of S	20.21
Standardized Value of S	-2.969
Approximate p-value	0.00149

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	16
Minimum	12
Maximum	184
Mean	94.97
Geometric Mean	80.88
Median	105
Standard Deviation	45.83
SEM	11.46
Mann-Kendall Test	
Test Value (S)	10
Tabulated p-value	0.345
Standard Deviation of S	22.17
Standardized Value of S	0.406
Approximate p-value	0.342

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	16
Minimum	0.125
Maximum	6.8
Mean	2.334
Geometric Mean	1.148
Median	1.2
Standard Deviation	2.374
SEM	0.594
Mann-Kendall Test	
Test Value (S)	-90
Tabulated p-value	0
Standard Deviation of S	22.17
Standardized Value of S	-4.015
Approximate p-value	2.97E-05

Statistically significant evidence of a decreasing trend at the specified level of significance.

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OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Naphthalene

General Statistics	
Number of Values	15
Minimum	0.125
Maximum	19
Mean	7.14
Geometric Mean	4.488
Median	7
Standard Deviation	5.246
SEM	1.354
Mann-Kendall Test	
Test Value (S)	-29
Tabulated p-value	0.084
Standard Deviation of S	20.21
Standardized Value of S	-1.386
Approximate p-value	0.0829

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Xylenes (Total)

General Statistics	
Number of Values	16
Minimum	0.375
Maximum	52.4
Mean	15.26
Geometric Mean	5.526
Median	5.21
Standard Deviation	18.03
SEM	4.506
Mann-Kendall Test	
Test Value (S)	-40
Tabulated p-value	0.039
Standard Deviation of S	22.21
Standardized Value of S	-1.756
Approximate p-value	0.0396

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	15
Minimum	7.3
Maximum	287
Mean	100.3
Geometric Mean	66.73
Median	79
Standard Deviation	86.61
SEM	22.36
Mann-Kendall Test	
Test Value (S)	25
Tabulated p-value	0.12
Standard Deviation of S	20.21
Standardized Value of S	1.188
Approximate p-value	0.117

Insufficient evidence to identify a significant trend at the specified level of significance.

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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	16
Minimum	0.44
Maximum	101
Mean	8.525
Geometric Mean	2.445
Median	2.505
Standard Deviation	24.7
SEM	6.175
Mann-Kendall Test	
Test Value (S)	-50
Tabulated p-value	0.013
Standard Deviation of S	22.21
Standardized Value of S	-2.206
Approximate p-value	0.0137

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	16
Minimum	10200
Maximum	78100
Mean	36106
Geometric Mean	32125
Median	38750
Standard Deviation	16368
SEM	4092
Mann-Kendall Test	
Test Value (S)	-38
Tabulated p-value	0.048
Standard Deviation of S	22.17
Standardized Value of S	-1.669
Approximate p-value	0.0475

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	16
Minimum	156
Maximum	576
Mean	308.2
Geometric Mean	290.8
Median	293.5
Standard Deviation	114.1
SEM	28.52
Mann-Kendall Test	
Test Value (S)	-36
Tabulated p-value	0.058
Standard Deviation of S	22.21
Standardized Value of S	-1.576
Approximate p-value	0.0575

Insufficient evidence to identify a significant trend at the specified level of significance.

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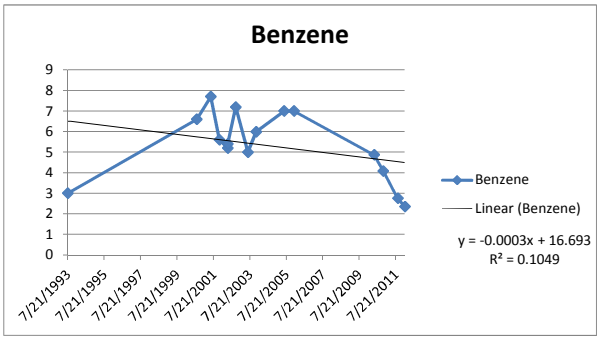
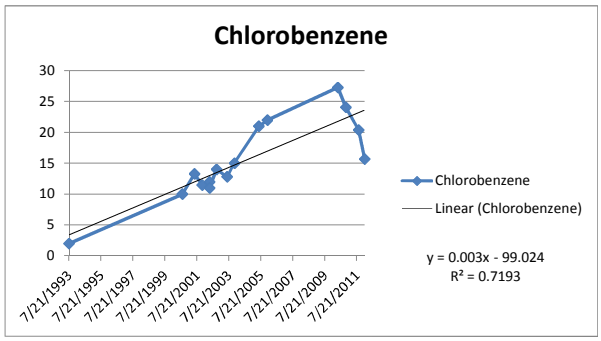
OU1, Site 1
NAS Pensacoal, Pensacola Florida

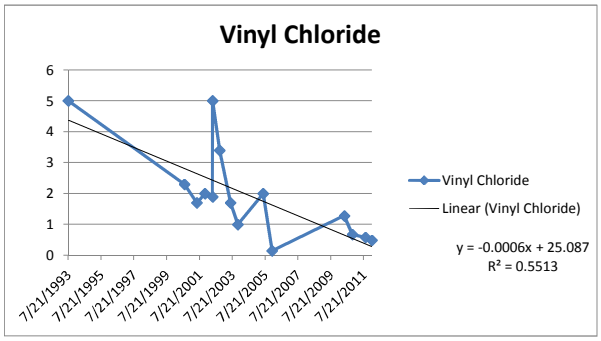
Benzene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	3	J	3	J
8/17/2000	6.6		6.6	
5/23/2001	7.7		7.7	
11/13/2001	5.6		5.6	
5/1/2002	5.2		5.2	
5/1/2002	5.4		5.4	
10/8/2002	7.2		7.2	
6/10/2003	5		5	
11/19/2003	6		6	
6/1/2005	7		7	
12/16/2005	7	J	7	J
5/12/2010	4.87		4.87	
11/9/2010	4.08		4.08	
8/30/2011	2.75		2.75	
1/17/2012	2.36		2.36	



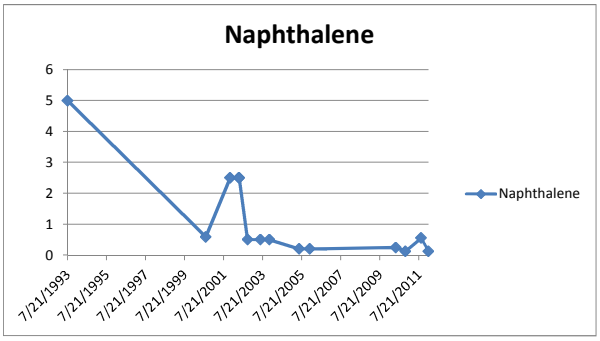
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	2	J	2	J
8/17/2000	10		10	
5/23/2001	13.3		13.3	
11/13/2001	11.5		11.5	
5/1/2002	12		12	
5/1/2002	11		11	
10/8/2002	14		14	
6/10/2003	12.8		12.8	
11/19/2003	15		15	
6/1/2005	21		21	
12/16/2005	22	J	22	J
5/12/2010	27.3		27.3	
11/9/2010	24.1		24.1	
8/30/2011	20.4		20.4	
1/17/2012	15.7		15.7	



Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	10	U	5	U
8/17/2000	2.3		2.3	
5/23/2001	1.7		1.7	
11/13/2001	2		2	
5/1/2002	1.9	J	1.9	J
5/1/2002	10	U	5	U
10/8/2002	3.4		3.4	
6/10/2003	1.7		1.7	
11/19/2003	2	U	1	U
6/1/2005	2		2	
12/16/2005	0.3	U	0.15	U
5/12/2010	1.28	J	1.28	J
11/9/2010	0.678	J	0.678	J
8/30/2011	0.579	J	0.579	J
1/17/2012	0.485	J	0.485	J



Naphthalene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	10	U	5	U
8/17/2000	0.59	J	0.59	J
11/13/2001	5	U	2.5	U
5/1/2002	5	U	2.5	U
5/1/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/1/2005	0.4	UJ	0.2	UJ
12/16/2005	0.4	U	0.2	U
5/12/2010	0.5	U	0.25	U
11/9/2010	0.25	U	0.125	U
8/30/2011	0.552	J	0.552	J
1/17/2012	0.25	U	0.125	U



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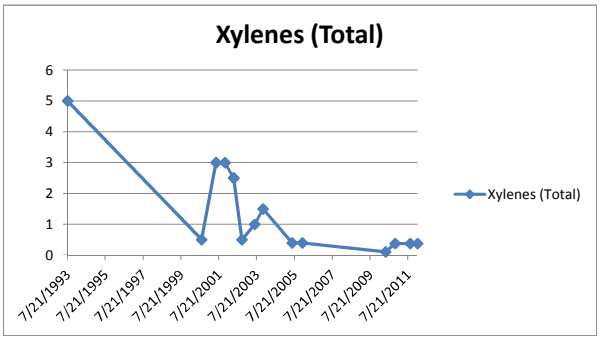
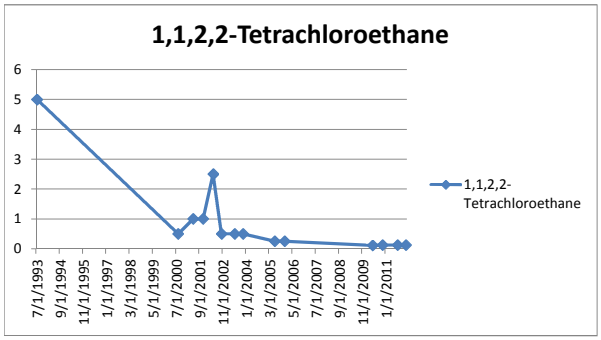
OU1, Site 1
NAS Pensacoal, Pensacola Florida

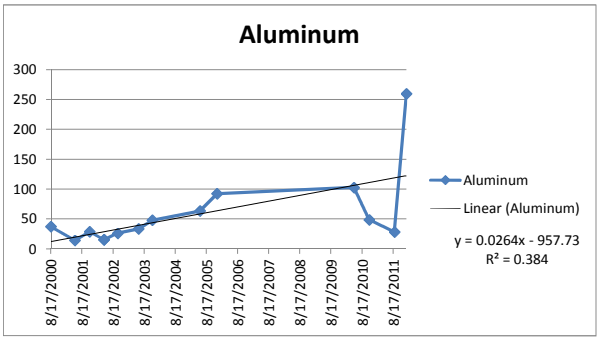
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
7/21/1993	10	U	5	U
8/17/2000	1	U	0.5	U
5/23/2001	6	U	3	U
11/13/2001	6	U	3	U
5/1/2002	5	U	2.5	U
5/1/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	2	U	1	U
11/19/2003	3	U	1.5	U
6/1/2005	0.8	U	0.4	U
12/16/2005	0.8	U	0.4	U
5/12/2010	0.22	U	0.11	U
11/9/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



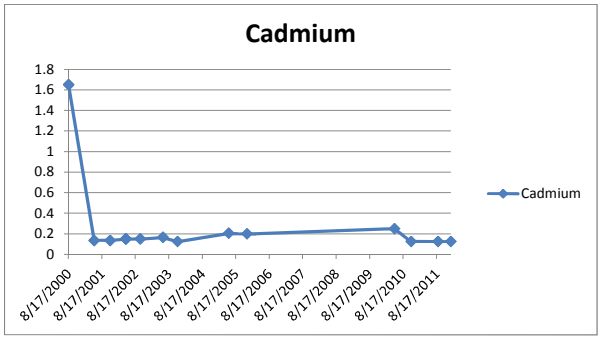
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
7/21/1993	10	U	5	U
8/17/2000	1	U	0.5	U
5/23/2001	2	U	1	U
11/13/2001	2	U	1	U
5/1/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/1/2005	0.5	U	0.25	U
12/16/2005	0.5	U	0.25	U
5/12/2010	0.23	U	0.115	U
11/9/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Aluminum	Validated		Censored		
Date	Result	Qual	Result	Qual	
7/21/1993	33600	J	33600	J	do not use
8/17/2000	74.4	U	37.2	U	
5/23/2001	28.3	U	14.15	U	
11/13/2001	28.6	J	28.6	J	
5/1/2002	30.9	U	15.45	U	
5/1/2002	30.9	U	15.45	U	
10/8/2002	52.7	U	26.35	U	
6/10/2003	33.5		33.5		
11/19/2003	95.7	U	47.85	U	
6/1/2005	127	U	63.5	U	
12/16/2005	185	U	92.5	U	
5/12/2010	103		103		
11/9/2010	48.4	J	48.4	J	
8/30/2011	28.3	J	28.3	J	
1/17/2012	260		260		



Cadmium	Validated		Censored		
Date	Result	Qual	Result	Qual	
7/21/1993	3	U	1.5	U	do not use
8/17/2000	3.3	U	1.65	U	
5/23/2001	0.27	U	0.135	U	
11/13/2001	0.27	U	0.135	U	
5/1/2002	0.3	U	0.15	U	
5/1/2002	0.3	U	0.15	U	
10/8/2002	0.3	U	0.15	U	
6/10/2003	0.33	U	0.165	U	
11/19/2003	0.25	U	0.125	U	
6/1/2005	0.41	U	0.205	U	
12/16/2005	0.4	U	0.2	U	
5/12/2010	0.251	J	0.251	J	
11/9/2010	0.25	U	0.125	U	
8/30/2011	0.25	U	0.125	U	
1/17/2012	0.25	U	0.125	U	



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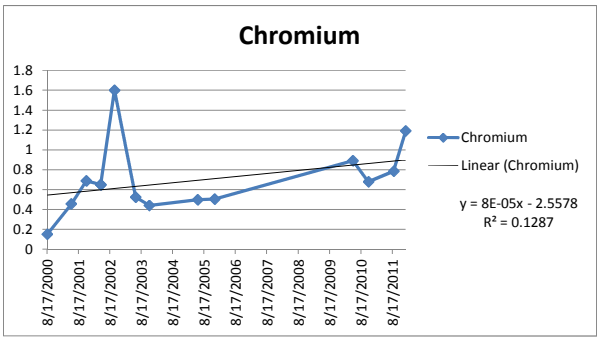
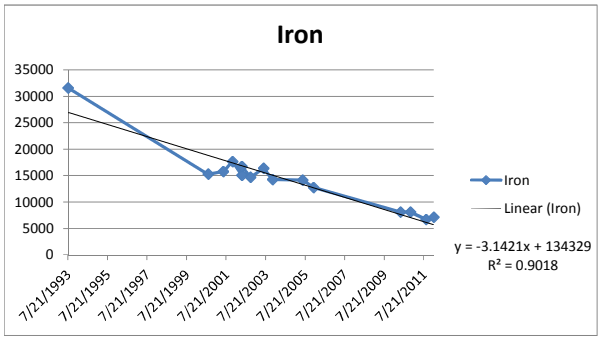
NAS Pensacoal, Pensacola Florida

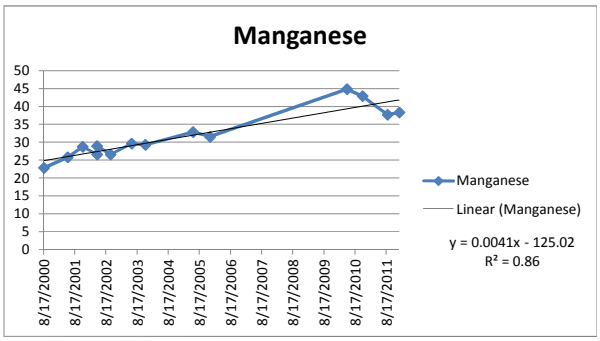
Chromium Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	68.4		68.4		do not use
8/17/2000	0.3	U	0.15	U	
5/23/2001	0.91	U	0.455	U	
11/13/2001	0.69	J	0.69	J	
5/1/2002	1.3	U	0.65	U	
5/1/2002	1.3	U	0.65	U	
10/8/2002	3.2	U	1.6	U	
6/10/2003	1.05	U	0.525	U	
11/19/2003	0.88	U	0.44	U	
6/1/2005	1	U	0.5	U	
12/16/2005	1.01	U	0.505	U	
5/12/2010	0.892	J	0.892	J	
11/9/2010	0.679	J	0.679	J	
8/30/2011	0.785	J	0.785	J	
1/17/2012	1.19	J	1.19	J	



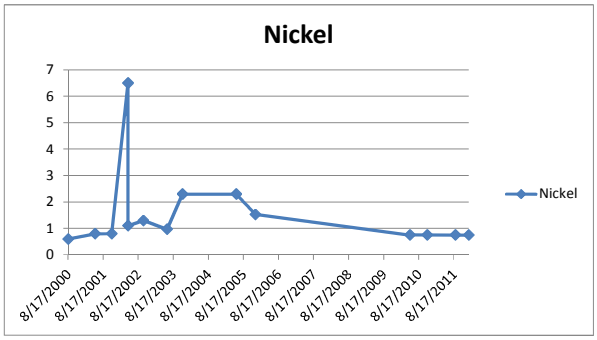
Iron Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	31600		31600		do not use
8/17/2000	15300		15300		
5/23/2001	15800		15800		
11/13/2001	17700		17700		
5/1/2002	15100		15100		
5/1/2002	16800		16800		
10/8/2002	14700		14700		
6/10/2003	16400		16400		
11/19/2003	14300		14300		
6/1/2005	14200		14200		
12/16/2005	12800		12800		
5/12/2010	8130		8130		
11/9/2010	8110		8110		
8/30/2011	6710		6710		
1/17/2012	7150		7150		



Manganese Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	71.1		71.1		do not use
8/17/2000	22.9		22.9		
5/23/2001	25.8		25.8		
11/13/2001	28.8		28.8		
5/1/2002	26.6		26.6		
5/1/2002	29		29		
10/8/2002	26.6		26.6		
6/10/2003	29.7		29.7		
11/19/2003	29.3		29.3		
6/1/2005	32.9		32.9		
12/16/2005	31.6		31.6		
5/12/2010	44.9		44.9		
11/9/2010	42.9		42.9		
8/30/2011	37.7		37.7		
1/17/2012	38.4		38.4		



Nickel Date	Validated Result	Qual	Censored Result	Qual	
7/21/1993	18	U	9	U	do not use
8/17/2000	0.6	U	0.3	U	
5/23/2001	0.8	U	0.4	U	
11/13/2001	0.8	U	0.4	U	
5/1/2002	6.5	U	3.25	U	
5/1/2002	1.1	U	0.55	U	
10/8/2002	1.3	U	0.65	U	
6/10/2003	0.97	U	0.485	U	
11/19/2003	2.3	U	1.15	U	
6/1/2005	2.3	U	1.15	U	
12/16/2005	1.53	U	0.765	U	
5/12/2010	0.75	U	0.375	U	
11/9/2010	0.75	U	0.375	U	
8/30/2011	0.75	U	0.375	U	
1/17/2012	0.75	U	0.375	U	



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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	15
Minimum	2.36
Maximum	7.7
Mean	5.317
Geometric Mean	5.023
Median	5.4
Standard Deviation	1.683
SEM	0.434
Mann-Kendall Test	
Test Value (S)	-36
Tabulated p-value	0.037
Standard Deviation of S	20.18
Standardized Value of S	-1.734
Approximate p-value	0.0414

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	15
Minimum	2
Maximum	27.3
Mean	15.47
Geometric Mean	13.64
Median	14
Standard Deviation	6.466
SEM	1.67
Mann-Kendall Test	
Test Value (S)	71
Tabulated p-value	0
Standard Deviation of S	20.21
Standardized Value of S	3.464
Approximate p-value	2.66E-04

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	15
Minimum	0.15
Maximum	5
Mean	1.945
Geometric Mean	1.401
Median	1.7
Standard Deviation	1.493
SEM	0.385
Mann-Kendall Test	
Test Value (S)	-64
Tabulated p-value	0
Standard Deviation of S	20.13
Standardized Value of S	-3.129
Approximate p-value	8.76E-04

Statistically significant evidence of a decreasing trend at the specified level of significance.

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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	14
Minimum	14.15
Maximum	260
Mean	58.16
Geometric Mean	40.57
Median	35.35
Standard Deviation	64.19
SEM	17.16
Mann-Kendall Test	
Test Value (S)	50
Tabulated p-value	0.002
Standard Deviation of S	18.24
Standardized Value of S	2.687
Approximate p-value	0.00361

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	14
Minimum	0.15
Maximum	1.6
Mean	0.694
Geometric Mean	0.613
Median	0.65
Standard Deviation	0.355
SEM	0.0949
Mann-Kendall Test	
Test Value (S)	32
Tabulated p-value	0.04
Standard Deviation of S	18.24
Standardized Value of S	1.7
Approximate p-value	0.0446

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	15
Minimum	6710
Maximum	31600
Mean	14320
Geometric Mean	13248
Median	14700
Standard Deviation	6053
SEM	1563
Mann-Kendall Test	
Test Value (S)	-83
Tabulated p-value	0
Standard Deviation of S	20.21
Standardized Value of S	-4.058
Approximate p-value	2.48E-05

Statistically significant evidence of a decreasing trend at the specified level of significance.

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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	15
Minimum	22.9
Maximum	71.1
Mean	34.55
Geometric Mean	33.1
Median	29.7
Standard Deviation	11.96
SEM	3.088
Mann-Kendall Test	
Test Value (S)	56
Tabulated p-value	0.002
Standard Deviation of S	20.18
Standardized Value of S	2.725
Approximate p-value	0.00321

Statistically significant evidence of an increasing trend at the specified level of significance.

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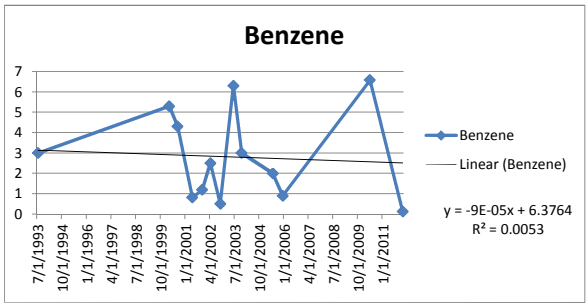
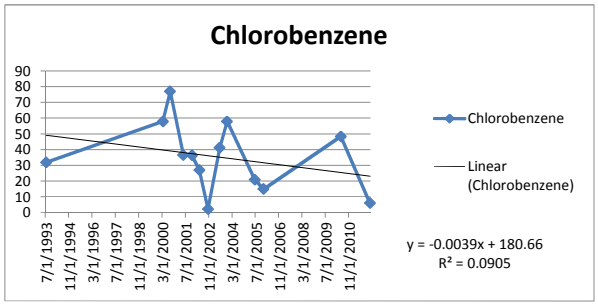
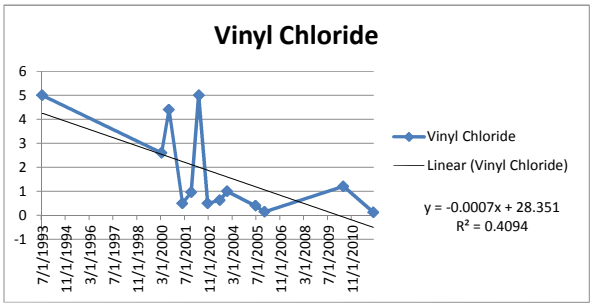
Benzene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/26/1993	3	J	3	J
3/17/2000	5.3		5.3	
8/17/2000	4.3		4.3	
5/22/2001	0.81	J	0.81	J
11/12/2001	1.2		1.2	
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	6.3		6.3	
11/19/2003	3		3	
6/1/2005	2		2	
12/16/2005	0.9	J	0.9	J
5/11/2010	6.58		6.58	
1/19/2012	0.25	U	0.125	U



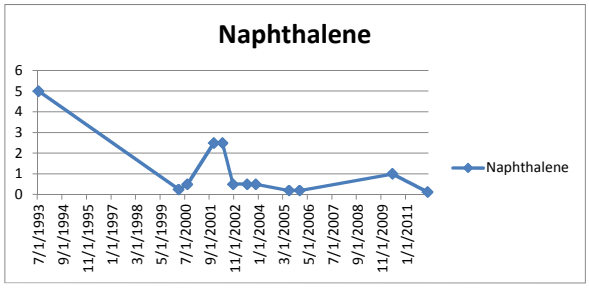
Chlorobenzene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/26/1993	32		32	
3/17/2000	58		58	
8/17/2000	77		77	
5/22/2001	36.7		36.7	
11/12/2001	36.4		36.4	
4/30/2002	27		27	
10/8/2002	2.2		2.2	
6/10/2003	41.2		41.2	
11/19/2003	58		58	
6/1/2005	21		21	
12/16/2005	15	J	15	J
5/11/2010	48.5		48.5	
1/19/2012	6.01		6.01	



Vinyl Chloride	Validated		Censored	
Date	Result	Qual	Result	Qual
7/26/1993	10	U	5	U
3/17/2000	2.6		2.6	
8/17/2000	4.4		4.4	
5/22/2001	1	U	0.5	U
11/12/2001	0.96	J	0.96	J
4/30/2002	10	U	5	U
10/8/2002	1	U	0.5	U
6/10/2003	0.63	J	0.63	J
11/19/2003	1	J	1	J
6/1/2005	0.4	J	0.4	J
12/16/2005	0.3	U	0.15	U
5/11/2010	1.21	J	1.21	J
1/19/2012	0.25	U	0.125	U



Naphthalene	Validated		Censored	
Date	Result	Qual	Result	Qual
7/26/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
11/12/2001	5	U	2.5	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/1/2005	0.4	UJ	0.2	UJ
12/16/2005	0.4	U	0.2	U
5/11/2010	2	U	1	U
1/19/2012	0.25	U	0.125	U



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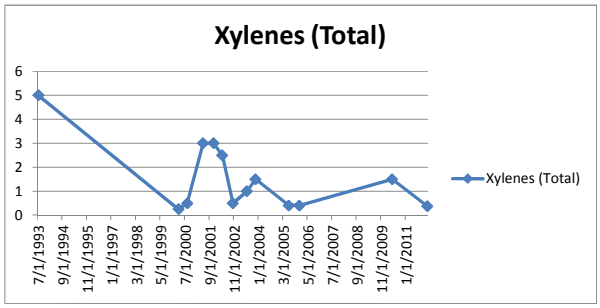
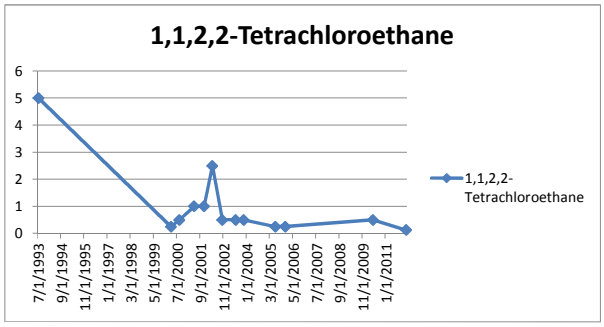
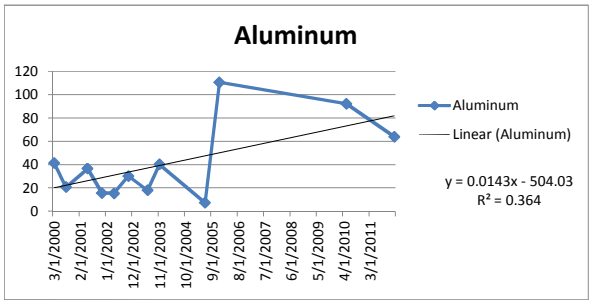
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
7/26/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/22/2001	6	U	3	U
11/12/2001	6	U	3	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	2	U	1	U
11/19/2003	3	U	1.5	U
6/1/2005	0.8	U	0.4	U
12/16/2005	0.8	U	0.4	U
5/11/2010	3	U	1.5	U
1/19/2012	0.75	U	0.375	U



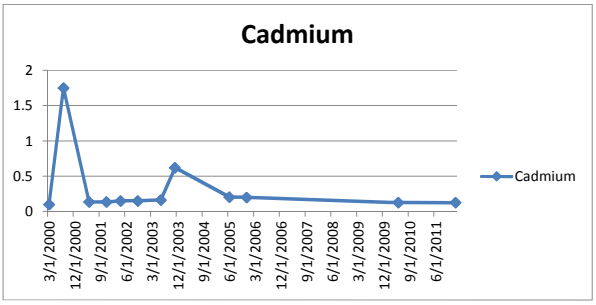
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
7/26/1993	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/22/2001	2	U	1	U
11/12/2001	2	U	1	U
4/30/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/1/2005	0.5	U	0.25	U
12/16/2005	0.5	U	0.25	U
5/11/2010	1	U	0.5	U
1/19/2012	0.25	U	0.125	U



Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
7/26/1993	116000		116000	
3/17/2000	82.8	U	41.4	U
8/17/2000	41.5	U	20.75	U
5/22/2001	73.3	U	36.65	U
11/12/2001	31.1	U	15.55	U
4/30/2002	30.9	U	15.45	U
10/8/2002	60.5	U	30.25	U
6/10/2003	18		18	
11/19/2003	80.4	U	40.2	U
6/1/2005	14.6	U	7.3	U
12/16/2005	221	U	110.5	U
5/11/2010	92.2		92.2	
1/19/2012	63.9		63.9	



Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
7/26/1993	3	U	1.5	U
3/17/2000	0.2	U	0.1	U
8/17/2000	3.5	U	1.75	U
5/22/2001	0.27	U	0.135	U
11/12/2001	0.27	U	0.135	U
4/30/2002	0.3	U	0.15	U
10/8/2002	0.3	U	0.15	U
6/10/2003	0.33	U	0.165	U
11/19/2003	0.62		0.62	
6/1/2005	0.41	U	0.205	U
12/16/2005	0.4	U	0.2	U
5/11/2010	0.25	U	0.125	U
1/19/2012	0.25	U	0.125	U



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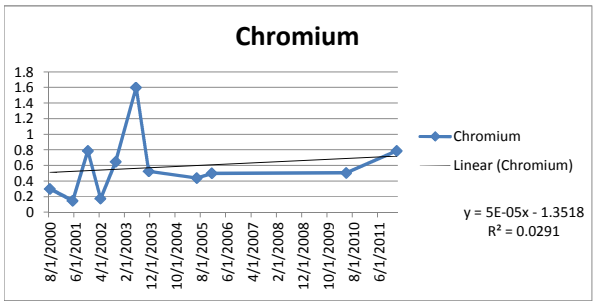
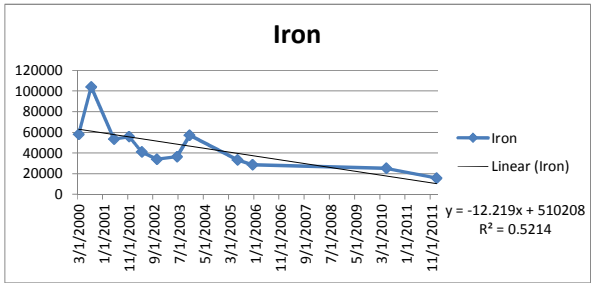
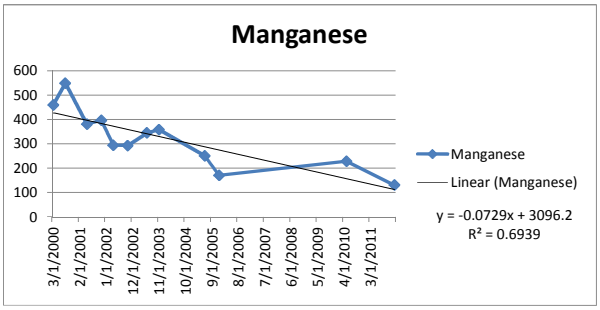
Chromium Date	Validated Result	Qual	Censored Result	Qual
3/17/2000	167	U	167	
8/17/2000	0.6	U	0.3	U
5/22/2001	0.3	J	0.15	U
11/12/2001	0.79	U	0.79	J
4/30/2002	0.35	U	0.175	U
10/8/2002	1.3	U	0.65	U
6/10/2003	3.2	U	1.6	U
11/19/2003	1.05	U	0.525	U
6/1/2005	0.88	U	0.44	U
12/16/2005	1	U	0.5	U
5/11/2010	1.01	J	0.505	U
1/19/2012	0.789		0.789	J



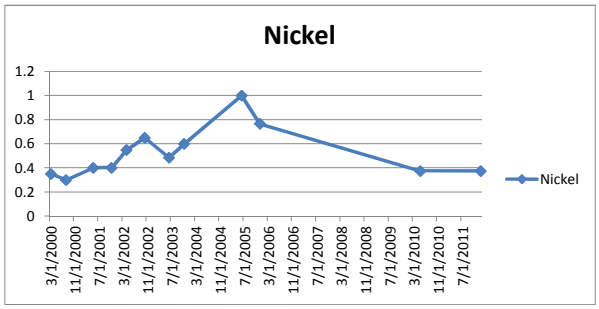
Iron Date	Validated Result	Qual	Censored Result	Qual
7/26/1993	179000		179000	Qual
3/17/2000	58200		58200	
8/17/2000	104000		104000	
5/22/2001	53700		53700	
11/12/2001	55900		55900	
4/30/2002	41100		41100	
10/8/2002	34200		34200	
6/10/2003	36600		36600	
11/19/2003	57300		57300	
6/1/2005	33600		33600	
12/16/2005	28700		28700	
5/11/2010	25300		25300	
1/19/2012	15900		15900	



Manganese Date	Validated Result	Qual	Censored Result	
7/26/1993	1300		1300	Qual
3/17/2000	460		460	
8/17/2000	549		549	
5/22/2001	381		381	
11/12/2001	397		397	
4/30/2002	295		295	
10/8/2002	293		293	
6/10/2003	345		345	
11/19/2003	359		359	
6/1/2005	251		251	
12/16/2005	171		171	
5/11/2010	229		229	
1/19/2012	131		131	



Nickel Date	Validated Result	Qual	Censored Result	
7/26/1993	59.2		59.2	Qual
3/17/2000	0.7	U	0.35	
8/17/2000	0.6	U	0.3	U
5/22/2001	0.8	U	0.4	U
11/12/2001	0.8	U	0.4	U
4/30/2002	1.1	U	0.55	U
10/8/2002	1.3	U	0.65	U
6/10/2003	0.97	U	0.485	U
11/19/2003	1.2	U	0.6	U
6/1/2005	2	U	1	U
12/16/2005	1.53	U	0.765	U
5/11/2010	0.75	U	0.375	U
1/19/2012	0.75	U	0.375	U
				U



Monitoring Well 01GI44

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	13
Minimum	0.125
Maximum	6.58
Mean	2.809
Geometric Mean	1.815
Median	2.5
Standard Deviation	2.206
SEM	0.612
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.255
Standard Deviation of S	16.36
Standardized Value of S	-0.733
Approximate p-value	0.232

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	13
Minimum	2.2
Maximum	77
Mean	35.31
Geometric Mean	26.01
Median	36.4
Standard Deviation	21.66
SEM	6.008
Mann-Kendall Test	
Test Value (S)	-23
Tabulated p-value	0.102
Standard Deviation of S	16.36
Standardized Value of S	-1.345
Approximate p-value	0.0894

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	13
Minimum	0.125
Maximum	5
Mean	1.729
Geometric Mean	0.931
Median	0.96
Standard Deviation	1.865
SEM	0.517
Mann-Kendall Test	
Test Value (S)	-38
Tabulated p-value	0.011
Standard Deviation of S	16.33
Standardized Value of S	-2.266
Approximate p-value	0.0117

Statistically significant evidence of a decreasing trend at the specified level of significance.

Monitoring Well 01GI44

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	12
Minimum	7.3
Maximum	110.5
Mean	41.01
Geometric Mean	31
Median	33.45
Standard Deviation	32.31
SEM	9.328
Mann-Kendall Test	
Test Value (S)	12
Tabulated p-value	0.23
Standard Deviation of S	14.58
Standardized Value of S	0.754
Approximate p-value	0.225

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	11
Minimum	0.15
Maximum	1.6
Mean	0.584
Geometric Mean	0.478
Median	0.505
Standard Deviation	0.399
SEM	0.12
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.179
Standard Deviation of S	12.85
Standardized Value of S	0.934
Approximate p-value	0.175

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	12
Minimum	15900
Maximum	104000
Mean	45375
Geometric Mean	40719
Median	38850
Standard Deviation	23026
SEM	6647
Mann-Kendall Test	
Test Value (S)	-50
Tabulated p-value	0
Standard Deviation of S	14.58
Standardized Value of S	-3.36
Approximate p-value	3.90E-04

Statistically significant evidence of a decreasing trend at the specified level of significance.

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OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	13
Minimum	131
Maximum	1300
Mean	397
Geometric Mean	335.6
Median	345
Standard Deviation	294.3
SEM	81.63
Mann-Kendall Test	
Test Value (S)	-62
Tabulated p-value	0
Standard Deviation of S	16.39
Standardized Value of S	-3.722
Approximate p-value	9.90E-05

Statistically significant evidence of a decreasing trend at the specified level of significance.

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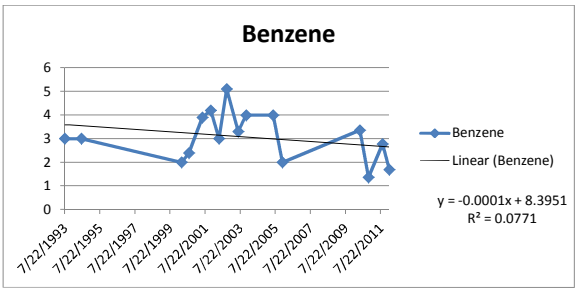
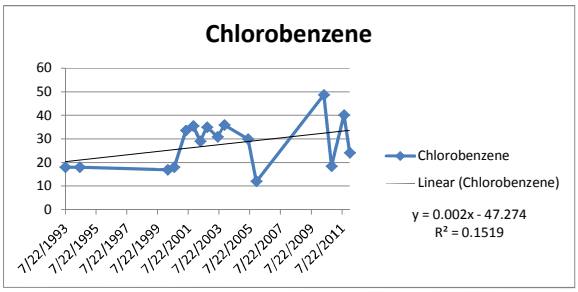
OU1, Site 1
NAS Pensacoal, Pensacola Florida

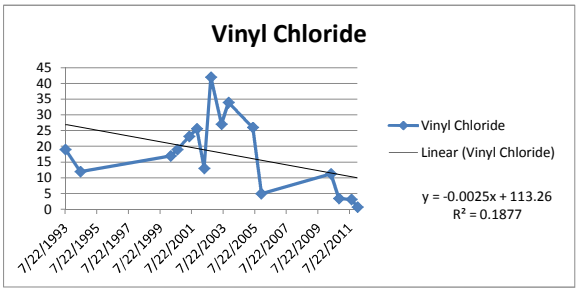
Benzene Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	3	J	3	J
6/28/1994	3	J	3	J
3/17/2000	2		2	
8/17/2000	2.4		2.4	
5/22/2001	3.9		3.9	
11/12/2001	4.2		4.2	
5/1/2002	3	J	3	J
10/8/2002	5.1		5.1	
6/10/2003	3.3		3.3	
11/19/2003	4		4	
6/2/2005	4		4	
12/15/2005	2	J	2	J
5/12/2010	3.36		3.36	
11/10/2010	1.36		1.36	
8/30/2011	2.78		2.78	
1/17/2012	1.69		1.69	



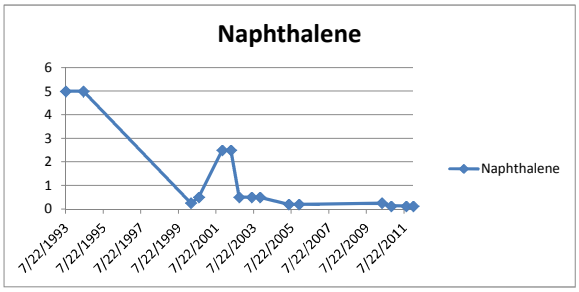
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	18		18	
6/28/1994	18		18	
3/17/2000	17		17	
8/17/2000	18		18	
5/22/2001	33.6		33.6	
11/12/2001	35.6		35.6	
5/1/2002	29		29	
10/8/2002	35		35	
6/10/2003	30.9		30.9	
11/19/2003	36		36	
6/2/2005	30		30	
12/15/2005	12	J	12	J
5/12/2010	48.7		48.7	
11/10/2010	18.5		18.5	
8/30/2011	40.2		40.2	
1/17/2012	24.1		24.1	



Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	19		19	
6/28/1994	12		12	
3/17/2000	17		17	
8/17/2000	19		19	
5/22/2001	23.2		23.2	
11/12/2001	25.6		25.6	
5/1/2002	13		13	
10/8/2002	42		42	
6/10/2003	27.1		27.1	
11/19/2003	34		34	
6/2/2005	26		26	
12/15/2005	5	J	5	J
5/12/2010	11.3	J	11.3	J
11/10/2010	3.44		3.44	
8/30/2011	3.16		3.16	
1/17/2012	0.711	J	0.711	J



Naphthalene Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	10	U	5	U
6/28/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
11/12/2001	5	U	2.5	U
5/1/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/2/2005	0.4	UJ	0.2	UJ
12/15/2005	0.4	U	0.2	U
5/12/2010	0.5	U	0.25	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



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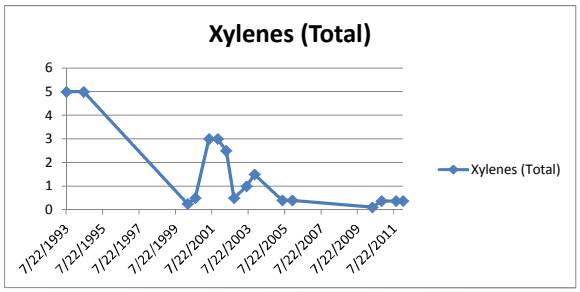
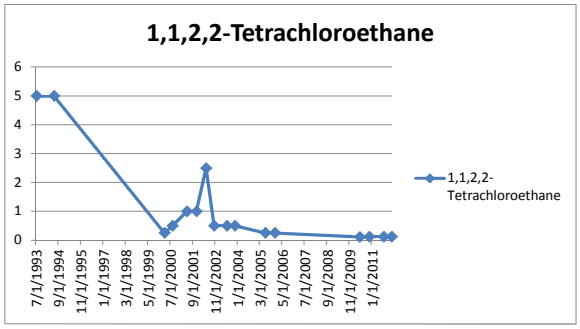
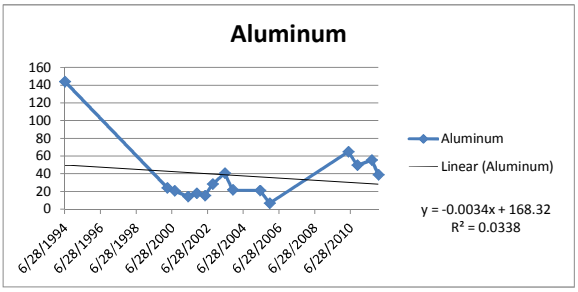
Xylenes (Total) Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	10	U	5	U
6/28/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/22/2001	6	U	3	U
11/12/2001	6	U	3	U
5/1/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	2	U	1	U
11/19/2003	3	U	1.5	U
6/2/2005	0.8	U	0.4	U
12/15/2005	0.8	U	0.4	U
5/12/2010	0.22	U	0.11	U
11/10/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



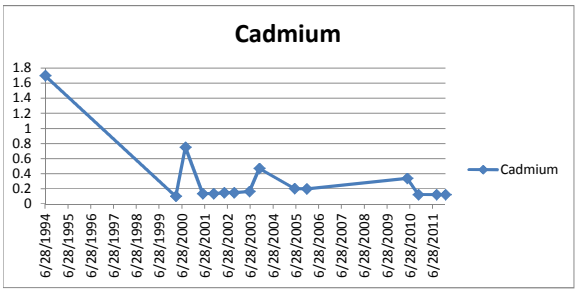
1,1,2,2-Tetrachloroethane Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	10	U	5	U
6/28/1994	10	U	5	U
3/17/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/22/2001	2	U	1	U
11/12/2001	2	U	1	U
5/1/2002	5	U	2.5	U
10/8/2002	1	U	0.5	U
6/10/2003	1	U	0.5	U
11/19/2003	1	UJ	0.5	UJ
6/2/2005	0.5	U	0.25	U
12/15/2005	0.5	U	0.25	U
5/12/2010	0.23	U	0.115	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Aluminum Date	Validated Result	Qual	Censored Result	Qual	
7/22/1993	14400	J	14400	J	Do Not Use
6/28/1994	144		144		
3/17/2000	48.5	U	24.25	U	
8/17/2000	41.5	U	20.75	U	
5/22/2001	29.1	U	14.55	U	
11/12/2001	36	U	18	U	
5/1/2002	30.9	U	15.45	U	
10/8/2002	57.1	U	28.55	U	
6/10/2003	40.7		40.7		
11/19/2003	43.7	U	21.85	U	
6/2/2005	42.7	U	21.35	U	
12/15/2005	13.65	U	6.825	U	
5/12/2010	65		65		
11/10/2010	49.7	J	49.7	J	
8/30/2011	55.5		55.5		
1/17/2012	39.1	J	39.1	J	



Cadmium Date	Validated Result	Qual	Censored Result	Qual	
7/22/1993	3	U	1.5	U	Do Not Use
6/28/1994	3.4	U	1.7	U	
3/17/2000	0.2	U	0.1	U	
8/17/2000	1.5	U	0.75	U	
5/22/2001	0.27	U	0.135	U	
11/12/2001	0.27	U	0.135	U	
5/1/2002	0.3	U	0.15	U	
10/8/2002	0.3	U	0.15	U	
6/10/2003	0.33	U	0.165	U	
11/19/2003	0.47		0.47		
6/2/2005	0.41	U	0.205	U	
12/15/2005	0.4	U	0.2	U	
5/12/2010	0.34	J	0.34	J	
11/10/2010	0.25	U	0.125	U	
8/30/2011	0.25	U	0.125	U	
1/17/2012	0.25	U	0.125	U	



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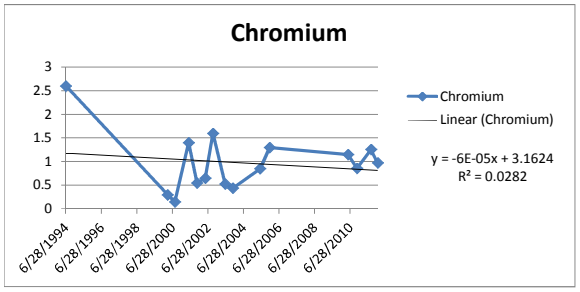
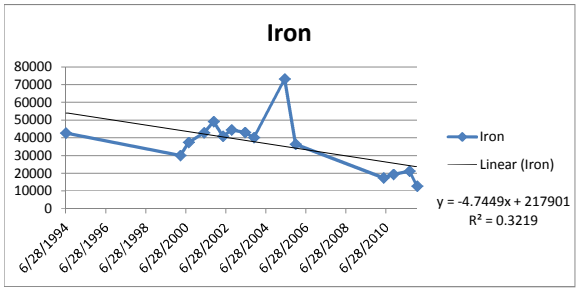
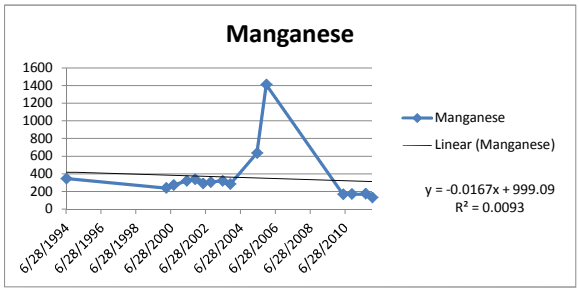
Chromium Date	Validated Result	Qual	Censored Result	Qual	
7/22/1993	31.2		31.2		Do Not Use
6/28/1994	5.2	U	2.6	U	
3/17/2000	0.6	U	0.3	U	
8/17/2000	0.3	U	0.15	U	
5/22/2001	1.4	J	1.4	J	
11/12/2001	1.1	U	0.55	U	
5/1/2002	1.3	U	0.65	U	
10/8/2002	3.2	U	1.6	U	
6/10/2003	1.05	U	0.525	U	
11/19/2003	0.88	U	0.44	U	
6/2/2005	1.7	U	0.85	U	
12/15/2005	2.6	U	1.3	U	
5/12/2010	1.15	J	1.15	J	
11/10/2010	0.861	J	0.861	J	
8/30/2011	1.26	J	1.26	J	
1/17/2012	0.977	J	0.977	J	



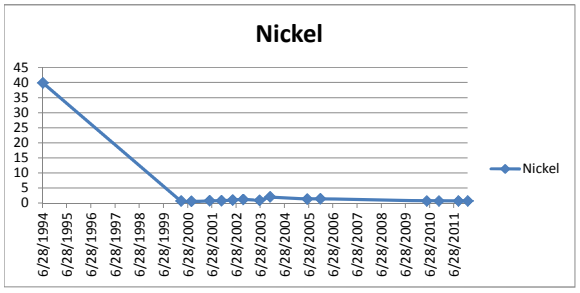
Iron Date	Validated Result	Qual	Censored Result	Qual	
7/22/1993	49300		49300		Do Not Use
6/28/1994	42700		42700		
3/17/2000	30100		30100		
8/17/2000	37500		37500		
5/22/2001	43000		43000		
11/12/2001	49200		49200		
5/1/2002	41000		41000		
10/8/2002	44600		44600		
6/10/2003	43100		43100		
11/19/2003	40200		40200		
6/2/2005	73300		73300		
12/15/2005	36400	J	36400	J	
5/12/2010	17500		17500		
11/10/2010	19500		19500		
8/30/2011	21300		21300		
1/17/2012	12800		12800		



Manganese Date	Validated Result	Qual	Censored Result	Qual	
7/22/1993	356		356		Do Not Use
6/28/1994	348		348		
3/17/2000	242		242		
8/17/2000	273		273		
5/22/2001	322		322		
11/12/2001	341		341		
5/1/2002	294		294		
10/8/2002	308		308		
6/10/2003	323		323		
11/19/2003	285		285		
6/2/2005	637		637		dupliate
12/15/2005	1410	J	1410	J	
5/12/2010	169		169		
11/10/2010	173		173		
8/30/2011	176		176		
1/17/2012	133		133		



Nickel Date	Validated Result	Qual	Censored Result	Qual	
7/22/1993	18	U	9	U	Do Not Use
6/28/1994	39.9	U	19.95	U	
3/17/2000	0.7	U	0.35	U	
8/17/2000	0.6	U	0.3	U	
5/22/2001	0.8	U	0.4	U	
11/12/2001	0.8	U	0.4	U	
5/1/2002	1.1	U	0.55	U	
10/8/2002	1.3	U	0.65	U	
6/10/2003	0.97	U	0.485	U	
11/19/2003	2.1	U	1.05	U	
6/2/2005	1.4	U	0.7	U	
12/15/2005	1.53	U	0.765	U	
5/12/2010	0.75	U	0.375	U	
11/10/2010	0.75	U	0.375	U	
8/30/2011	0.75	U	0.375	U	
1/17/2012	0.75	U	0.375	U	



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OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	16
Minimum	1.36
Maximum	5.1
Mean	3.068
Geometric Mean	2.896
Median	3
Standard Deviation	1.02
SEM	0.255
Mann-Kendall Test	
Test Value (S)	-15
Tabulated p-value	0.282
Standard Deviation of S	22.08
Standardized Value of S	-0.634
Approximate p-value	0.263

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	16
Minimum	12
Maximum	48.7
Mean	27.79
Geometric Mean	25.94
Median	29.5
Standard Deviation	10.25
SEM	2.561
Mann-Kendall Test	
Test Value (S)	33
Tabulated p-value	0.083
Standard Deviation of S	22.13
Standardized Value of S	1.446
Approximate p-value	0.0741

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	16
Minimum	0.711
Maximum	42
Mean	17.59
Geometric Mean	12.23
Median	18
Standard Deviation	11.75
SEM	2.937
Mann-Kendall Test	
Test Value (S)	-33
Tabulated p-value	0.083
Standard Deviation of S	22.19
Standardized Value of S	-1.442
Approximate p-value	0.0746

Insufficient evidence to identify a significant trend at the specified level of significance.

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OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	15
Minimum	6.825
Maximum	144
Mean	37.71
Geometric Mean	28.76
Median	24.25
Standard Deviation	33.76
SEM	8.718
Mann-Kendall Test	
Test Value (S)	17
Tabulated p-value	0.218
Standard Deviation of S	20.21
Standardized Value of S	0.792
Approximate p-value	0.214

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	16
Minimum	0.15
Maximum	31.2
Mean	2.863
Geometric Mean	0.994
Median	0.919
Standard Deviation	7.58
SEM	1.895
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.518
Standard Deviation of S	22.21
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	16
Minimum	12800
Maximum	73300
Mean	37594
Geometric Mean	34460
Median	40600
Standard Deviation	14986
SEM	3747
Mann-Kendall Test	
Test Value (S)	-48
Tabulated p-value	0.016
Standard Deviation of S	22.21
Standardized Value of S	-2.116
Approximate p-value	0.0172

Statistically significant evidence of a decreasing trend at the specified level of significance.

Monitoring Well 01GI46

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

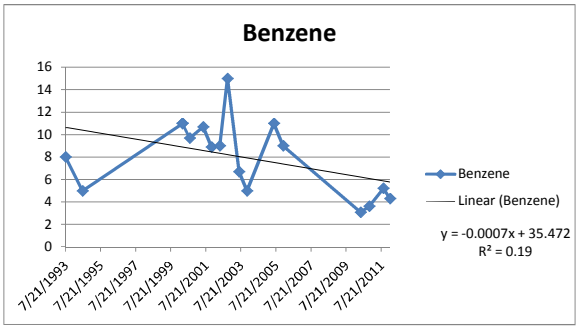
General Statistics	
Number of Values	16
Minimum	133
Maximum	1410
Mean	361.9
Geometric Mean	301.3
Median	301
Standard Deviation	302.6
SEM	75.65
Mann-Kendall Test	
Test Value (S)	-36
Tabulated p-value	0.058
Standard Deviation of S	22.21
Standardized Value of S	-1.576
Approximate p-value	0.0575

Insufficient evidence to identify a significant trend at the specified level of significance.

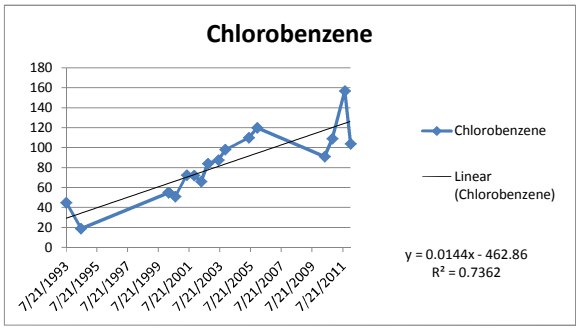
Monitoring Well 01GI59

OU1, Site 1
NAS Pensacoal, Pensacola Florida

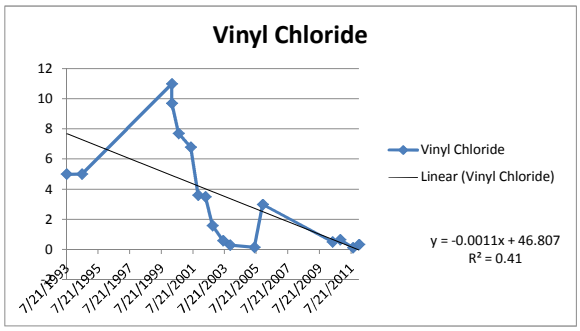
Benzene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	8		8	
7/6/1994	10	U	5	U
3/15/2000	11		11	
3/15/2000	11		11	
8/17/2000	9.7		9.7	
5/23/2001	10.7		10.7	
11/12/2001	8.9		8.9	
5/1/2002	9		9	
10/8/2002	15	J	15	J
6/10/2003	6.7		6.7	
11/19/2003	5		5	
6/2/2005	11		11	
12/15/2005	9	J	9	J
5/11/2010	3.08		3.08	
11/10/2010	3.62		3.62	
8/30/2011	5.21		5.21	
1/17/2012	4.3		4.3	



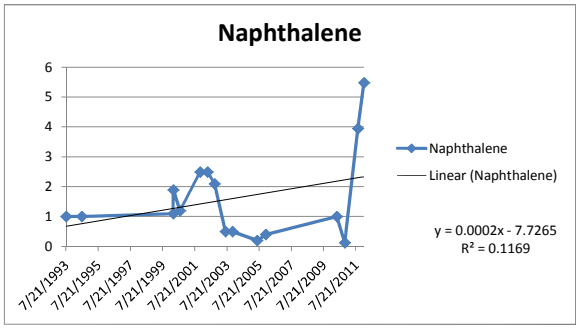
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	45		45	
7/6/1994	19		19	
3/15/2000	55		55	
3/15/2000	55		55	
8/17/2000	51		51	
5/23/2001	72.4		72.4	
11/12/2001	72.2		72.2	
5/1/2002	66		66	
10/8/2002	84	J	84	J
6/10/2003	87.5		87.5	
11/19/2003	98		98	
6/2/2005	110		110	
12/15/2005	120	J	120	J
5/11/2010	91.1		91.1	
11/10/2010	109		109	
8/30/2011	157		157	
1/17/2012	104		104	



Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	10	U	5	U
7/6/1994	10	U	5	U
3/15/2000	11		11	
3/15/2000	9.7		9.7	
8/17/2000	7.7		7.7	
5/23/2001	6.8		6.8	
11/12/2001	3.6		3.6	
5/1/2002	3.5	J	3.5	J
10/8/2002	1.6	J	1.6	J
6/10/2003	0.59	J	0.59	J
11/19/2003	0.3	J	0.3	J
6/2/2005	0.3	U	0.15	U
12/15/2005	3	J	3	J
5/11/2010	1	UJ	0.5	UJ
11/10/2010	0.662	J	0.662	J
8/30/2011	0.25	U	0.125	U
1/17/2012	0.331	J	0.331	J



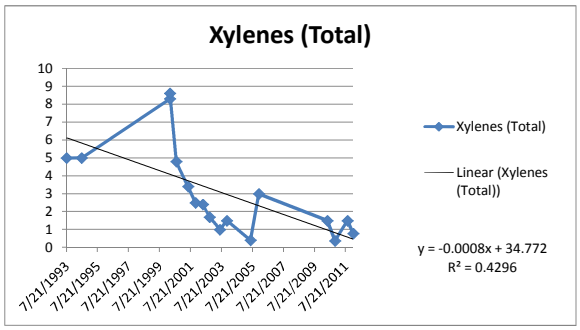
Naphthalene Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	1	J	1	J
7/6/1994	1	J	1	J
3/15/2000	1.1	J	1.1	J
3/15/2000	1.9	J	1.9	J
8/17/2000	1.2		1.2	
11/12/2001	5	U	2.5	U
5/1/2002	5	U	2.5	U
10/8/2002	2.1	J	2.1	J
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/2/2005	0.4	UJ	0.2	UJ
12/15/2005	0.8	U	0.4	U
5/11/2010	2	U	1	U
11/10/2010	0.25	U	0.125	U
8/30/2011	3.95		3.95	
1/17/2012	5.48		5.48	



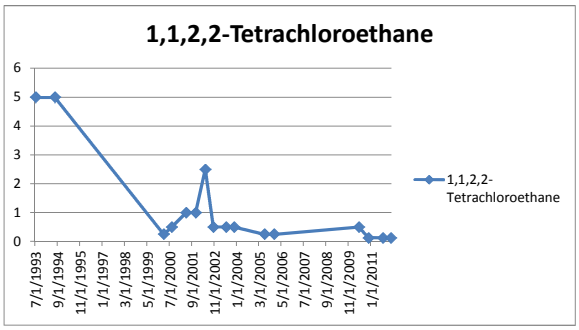
Monitoring Well 01GI59

OU1, Site 1
NAS Pensacoal, Pensacola Florida

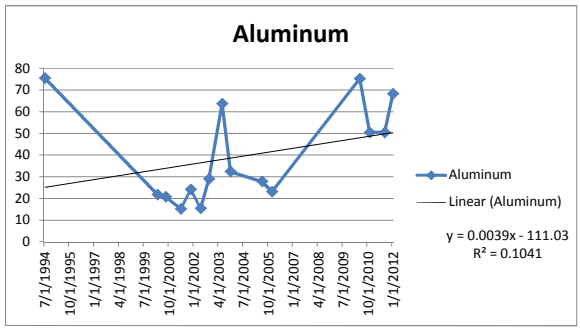
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
7/21/1993	5	J	5	J
7/6/1994	10	U	5	U
3/15/2000	8.3		8.3	
3/15/2000	8.6		8.6	
8/17/2000	4.8		4.8	
5/23/2001	3.4	J	3.4	J
11/12/2001	2.5	J	2.5	J
5/1/2002	2.4	J	2.4	J
10/8/2002	1.7	J	1.7	J
6/10/2003	2	U	1	U
11/19/2003	3	U	1.5	U
6/2/2005	0.8	U	0.4	U
12/15/2005	3	J	3	J
5/11/2010	3	U	1.5	U
11/10/2010	0.75	U	0.375	U
8/30/2011	1.5	J	1.5	J
1/17/2012	0.775	J	0.775	J



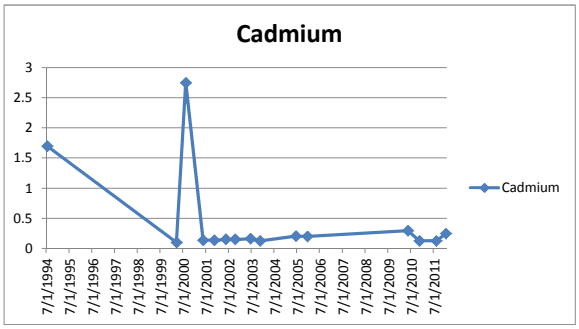
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
7/21/1993	10	U	5	U
7/6/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/23/2001	2	U	1	U
11/12/2001	2	U	1	U
5/1/2002	5	U	2.5	U
10/8/2002	1	UJ	0.5	UJ
6/10/2003	1	U	0.5	U
11/19/2003	1	U	0.5	U
6/2/2005	0.5	U	0.25	U
12/15/2005	0.5	U	0.25	U
5/11/2010	1	U	0.5	U
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
7/21/1993	30900	J	30900	J
7/6/1994	151	U	75.5	U
3/15/2000	43.6	U	21.8	U
8/17/2000	41.5	U	20.75	U
5/23/2001	30.4	U	15.2	U
11/12/2001	48.4	U	24.2	U
5/1/2002	30.9	U	15.45	U
10/8/2002	58.1	U	29.05	U
6/10/2003	63.7		63.7	
11/19/2003	64.8	U	32.4	U
6/2/2005	55.7	U	27.85	U
12/15/2005	46.3	U	23.15	U
5/11/2010	75.3		75.3	
11/10/2010	50.5		50.5	
8/30/2011	50.5		50.5	
1/17/2012	68.4		68.4	



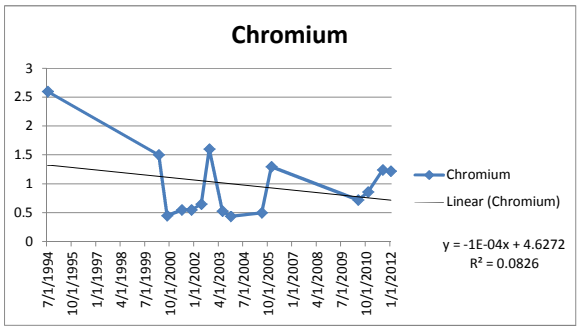
Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
7/21/1993	3	U	1.5	U
7/6/1994	3.4	U	1.7	U
3/15/2000	0.2	U	0.1	U
8/17/2000	5.5	U	2.75	U
5/23/2001	0.27	U	0.135	U
11/12/2001	0.27	U	0.135	U
5/1/2002	0.3	U	0.15	U
10/8/2002	0.3	U	0.15	U
6/10/2003	0.33	U	0.165	U
11/19/2003	0.25	U	0.125	U
6/2/2005	0.41	U	0.205	U
12/15/2005	0.4	U	0.2	U
5/11/2010	0.296	J	0.296	J
11/10/2010	0.25	U	0.125	U
8/30/2011	0.25	U	0.125	U
1/17/2012	0.5	U	0.25	U



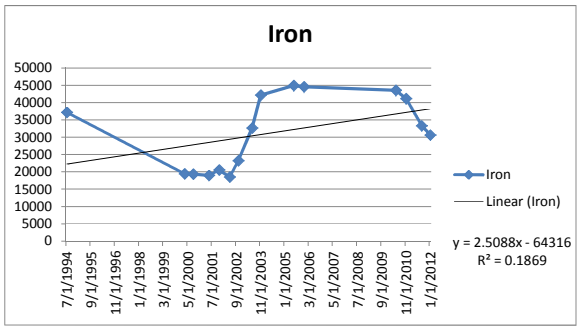
Monitoring Well 01GI59

OU1, Site 1
NAS Pensacoal, Pensacola Florida

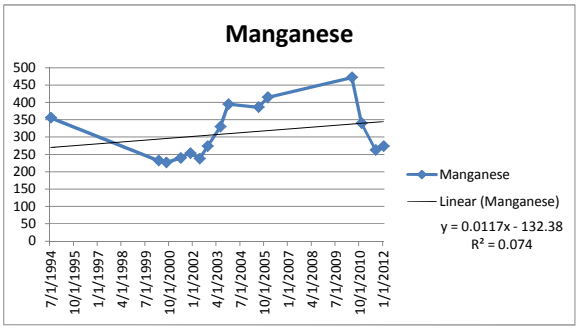
Chromium Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	69.3		69.3	
7/6/1994	5.2	U	2.6	U
3/15/2000	1.5		1.5	
8/17/2000	0.9	U	0.45	U
5/23/2001	1.1	U	0.55	U
11/12/2001	1.1	U	0.55	U
5/1/2002	1.3	U	0.65	U
10/8/2002	3.2	U	1.6	U
6/10/2003	1.05	U	0.525	U
11/19/2003	0.88	U	0.44	U
6/2/2005	1	U	0.5	U
12/15/2005	2.6	U	1.3	U
5/11/2010	0.723	J	0.723	J
11/10/2010	0.857	J	0.857	J
8/30/2011	1.24	J	1.24	J
1/17/2012	1.22	J	1.22	J



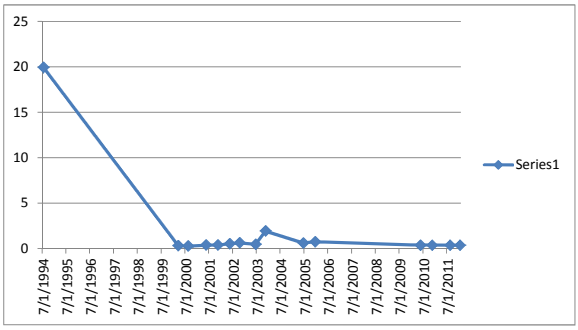
Iron Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	54900		54900	
7/6/1994	37200		37200	
3/15/2000	19500		19500	
8/17/2000	19400		19400	
5/23/2001	19000		19000	
11/12/2001	20600		20600	
5/1/2002	18600		18600	
10/8/2002	23300		23300	
6/10/2003	32700		32700	
11/19/2003	42200		42200	
6/2/2005	45000		45000	
12/15/2005	44600	J	44600	J
5/11/2010	43600		43600	
11/10/2010	41200		41200	
8/30/2011	33400		33400	
1/17/2012	30700		30700	



Manganese Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	352		352	
7/6/1994	356		356	
3/15/2000	232		232	
8/17/2000	227		227	
5/23/2001	240		240	
11/12/2001	254		254	
5/1/2002	238		238	
10/8/2002	274		274	
6/10/2003	330		330	
11/19/2003	395		395	
6/2/2005	386		386	
12/15/2005	415		415	
5/11/2010	472		472	
11/10/2010	340		340	
8/30/2011	263		263	
1/17/2012	274		274	



Nickel Date	Validated Result	Qual	Censored Result	Qual
7/21/1993	18	U	9	U
7/6/1994	39.9	U	19.95	U
3/15/2000	0.7	U	0.35	U
8/17/2000	0.6	U	0.3	U
5/23/2001	0.8	U	0.4	U
11/12/2001	0.8	U	0.4	U
5/1/2002	1.1	U	0.55	U
10/8/2002	1.3	U	0.65	U
6/10/2003	0.97	U	0.485	U
11/19/2003	3.9	U	1.95	U
6/2/2005	1.26	U	0.63	U
12/15/2005	1.53	U	0.765	U
5/11/2010	0.75	U	0.375	U
11/10/2010	0.75	U	0.375	U
8/30/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



Monitoring Well 01GI59

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	17
Minimum	3.08
Maximum	15
Mean	8.012
Geometric Mean	7.322
Median	8.9
Standard Deviation	3.293
SEM	0.799
Mann-Kendall Test	
Test Value (S)	-45
Tabulated p-value	0.038
Standard Deviation of S	24.16
Standardized Value of S	-1.821
Approximate p-value	0.0343

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	17
Minimum	19
Maximum	157
Mean	82.13
Geometric Mean	74.7
Median	84
Standard Deviation	33.2
SEM	8.053
Mann-Kendall Test	
Test Value (S)	105
Tabulated p-value	0
Standard Deviation of S	24.26
Standardized Value of S	4.288
Approximate p-value	9.03E-06

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	13
Minimum	0.15
Maximum	11
Mean	4.457
Geometric Mean	2.58
Median	3.6
Standard Deviation	3.531
SEM	0.979
Mann-Kendall Test	
Test Value (S)	-53
Tabulated p-value	0
Standard Deviation of S	16.36
Standardized Value of S	-3.178
Approximate p-value	7.41E-04

Statistically significant evidence of a decreasing trend at the specified level of significance.

Monitoring Well 01GI59

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Naphthalene

General Statistics	
Number of Values	16
Minimum	0.125
Maximum	5.48
Mean	1.591
Geometric Mean	1.037
Median	1.05
Standard Deviation	1.461
SEM	0.365
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.518
Standard Deviation of S	22.08
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Xylenes (Total)

General Statistics	
Number of Values	17
Minimum	0.375
Maximum	8.6
Mean	3.044
Geometric Mean	2.119
Median	2.4
Standard Deviation	2.531
SEM	0.614
Mann-Kendall Test	
Test Value (S)	-94
Tabulated p-value	0
Standard Deviation of S	24.18
Standardized Value of S	-3.846
Approximate p-value	6.00E-05

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	15
Minimum	15.2
Maximum	75.5
Mean	39.58
Geometric Mean	34.11
Median	29.05
Standard Deviation	22.15
SEM	5.72
Mann-Kendall Test	
Test Value (S)	36
Tabulated p-value	0.037
Standard Deviation of S	20.18
Standardized Value of S	1.734
Approximate p-value	0.0414

Statistically significant evidence of an increasing trend at the specified level of significance.

Monitoring Well 01GI59

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	16
Minimum	0.44
Maximum	69.3
Mean	5.25
Geometric Mean	1.111
Median	0.79
Standard Deviation	17.09
SEM	4.272
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.313
Standard Deviation of S	22.19
Standardized Value of S	-0.541
Approximate p-value	0.294

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	16
Minimum	18600
Maximum	54900
Mean	32869
Geometric Mean	30837
Median	33050
Standard Deviation	11730
SEM	2932
Mann-Kendall Test	
Test Value (S)	20
Tabulated p-value	0.199
Standard Deviation of S	22.21
Standardized Value of S	0.855
Approximate p-value	0.196

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

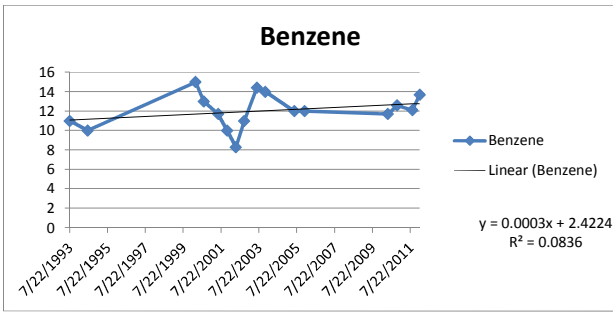
General Statistics	
Number of Values	15
Minimum	227
Maximum	472
Mean	313.1
Geometric Mean	304.6
Median	274
Standard Deviation	77.71
SEM	20.06
Mann-Kendall Test	
Test Value (S)	42
Tabulated p-value	0.018
Standard Deviation of S	20.18
Standardized Value of S	2.031
Approximate p-value	0.0211

Statistically significant evidence of an increasing trend at the specified level of significance.

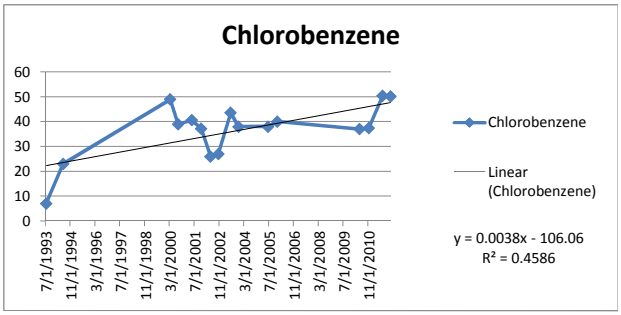
Monitoring Well 01GI65

OU1, Site 1
NAS Pensacoal, Pensacola Florida

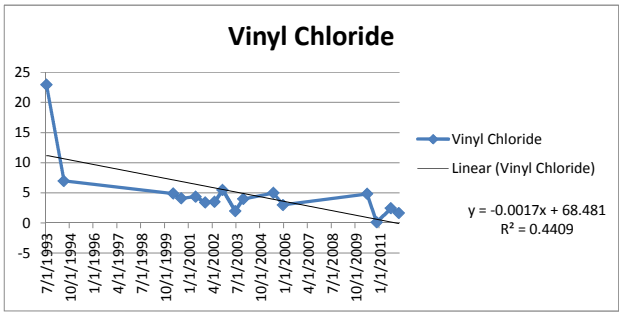
Benzene Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	11		11	
6/30/1994	10		10	
3/15/2000	15		15	
8/17/2000	13		13	
5/23/2001	11.7		11.7	
11/13/2001	10		10	
5/1/2002	8.3		8.3	
10/9/2002	11		11	
6/11/2003	14.4		14.4	
11/19/2003	14		14	
6/2/2005	12		12	
12/16/2005	12		12	
5/10/2010	11.7		11.7	
11/8/2010	12.6		12.6	
8/29/2011	12.1		12.1	
1/16/2012	13.7		13.7	



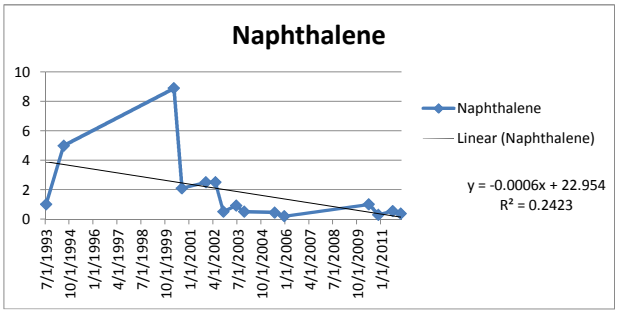
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	7		7	
6/30/1994	23		23	
3/15/2000	49		49	
8/17/2000	39		39	
5/23/2001	40.6		40.6	
11/13/2001	37.1		37.1	
5/1/2002	26		26	
10/9/2002	27		27	
6/11/2003	43.6		43.6	
11/19/2003	38		38	
6/2/2005	38		38	
12/16/2005	40		40	
5/10/2010	37		37	
11/8/2010	37.4		37.4	
8/29/2011	50.5		50.5	
1/16/2012	50.2		50.2	



Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	23		23	
6/30/1994	7	J	7	J
3/15/2000	4.9		4.9	
8/17/2000	4.1		4.1	
5/23/2001	4.4		4.4	
11/13/2001	3.4		3.4	
5/1/2002	3.5	J	3.5	J
10/9/2002	5.5		5.5	
6/11/2003	2		2	
11/19/2003	4		4	
6/2/2005	5		5	
12/16/2005	3	J	3	J
5/10/2010	4.83	J	4.83	J
11/8/2010	0.25	U	0.125	U
8/29/2011	2.44		2.44	
1/16/2012	1.65		1.65	



Naphthalene Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	1	J	1	J
6/30/1994	5	J	5	J
3/15/2000	8.9		8.9	
8/17/2000	2.1		2.1	
11/13/2001	5	U	2.5	U
5/1/2002	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/11/2003	0.93	J	0.93	J
11/19/2003	1	U	0.5	U
6/2/2005	0.9	U	0.45	U
12/16/2005	0.4	U	0.2	U
5/10/2010	2	U	1	U
11/8/2010	0.294	J	0.294	J
8/29/2011	0.559	J	0.559	J
1/16/2012	0.749	U	0.3745	U



Monitoring Well 01GI65

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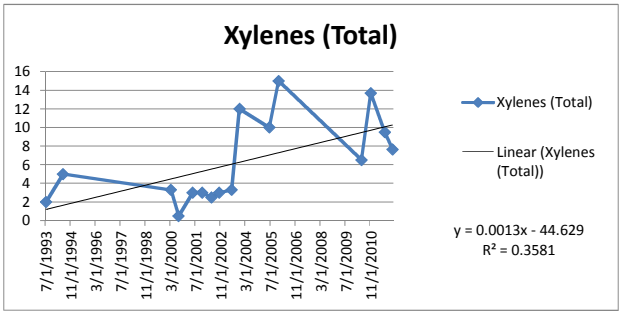
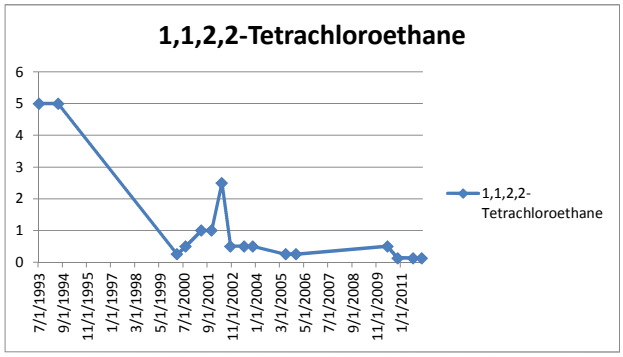
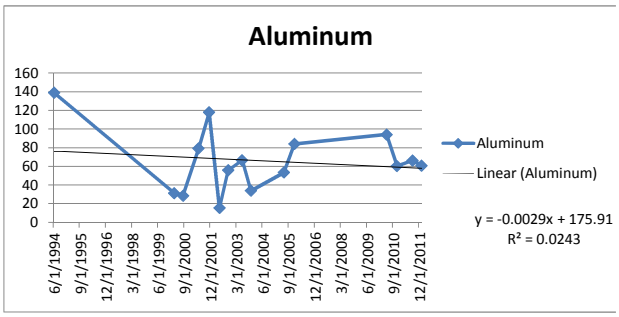
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	2	J	2	J
6/30/1994	5	J	5	J
3/15/2000	3.3		3.3	
8/17/2000	1	U	0.5	U
5/23/2001	6	U	3	U
11/13/2001	6	U	3	U
5/1/2002	5	U	2.5	U
10/9/2002	3		3	
6/11/2003	3.3		3.3	
11/19/2003	12		12	
6/2/2005	10		10	
12/16/2005	15		15	
5/10/2010	6.51		6.51	
11/8/2010	13.7		13.7	
8/29/2011	9.49		9.49	
1/16/2012	7.63		7.63	



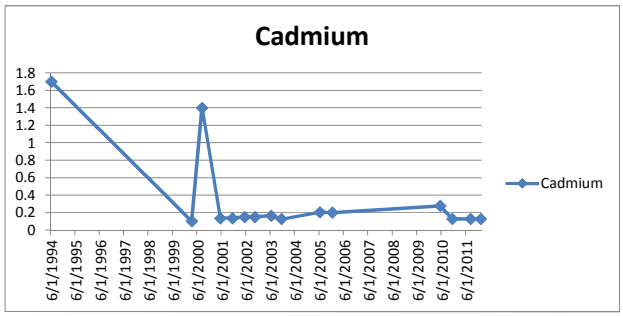
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	10	U	5	U
6/30/1994	10	U	5	U
3/15/2000	0.5	U	0.25	U
8/17/2000	1	U	0.5	U
5/23/2001	2	U	1	U
11/13/2001	2	U	1	U
5/1/2002	5	U	2.5	U
10/9/2002	1	U	0.5	U
6/11/2003	1	U	0.5	U
11/19/2003	1	UJ	0.5	UJ
6/2/2005	0.5	U	0.25	U
12/16/2005	0.5	U	0.25	U
5/10/2010	1	U	0.5	U
11/8/2010	0.25	U	0.125	U
8/29/2011	0.25	U	0.125	U
1/16/2012	0.25	U	0.125	U



Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	70700	J	70700	J
6/30/1994	139		139	
3/15/2000	62.7	U	31.35	U
8/17/2000	57.3	U	28.65	U
5/23/2001	79.2	J	79.2	J
11/13/2001	118	J	118	J
5/1/2002	30.9	U	15.45	U
10/9/2002	112	U	56	U
6/11/2003	66.7		66.7	
11/19/2003	67.8	U	33.9	U
6/2/2005	107	U	53.5	U
12/16/2005	168	U	84	U
5/10/2010	94.2		94.2	
11/8/2010	60.6		60.6	
8/29/2011	66.3		66.3	
1/16/2012	60.9		60.9	



Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
7/22/1993	3	U	1.5	U
6/30/1994	3.4	U	1.7	U
3/15/2000	0.2	U	0.1	U
8/17/2000	2.8	U	1.4	U
5/23/2001	0.27	U	0.135	U
11/13/2001	0.27	U	0.135	U
5/1/2002	0.3	U	0.15	U
10/9/2002	0.3	U	0.15	U
6/11/2003	0.33	U	0.165	U
11/19/2003	0.25	U	0.125	U
6/2/2005	0.41	U	0.205	U
12/16/2005	0.4	U	0.2	U
5/10/2010	0.276	J	0.276	J
11/8/2010	0.25	U	0.125	U
8/29/2011	0.25	U	0.125	U
1/16/2012	0.25	U	0.125	U



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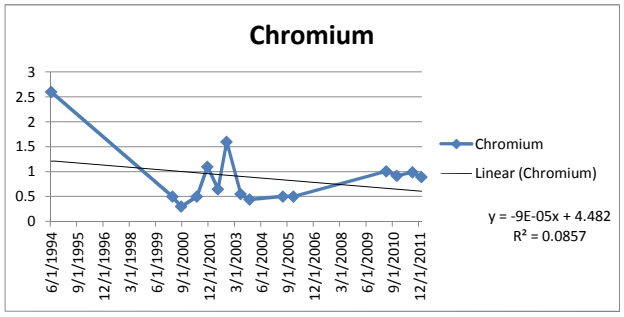
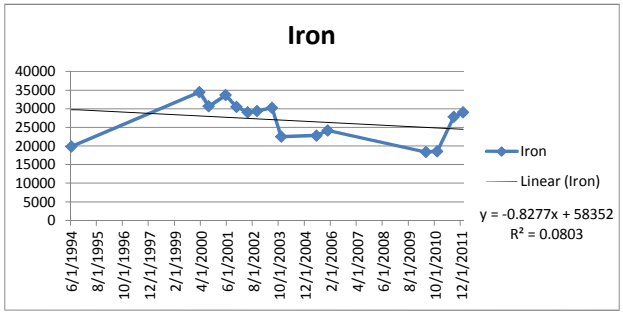
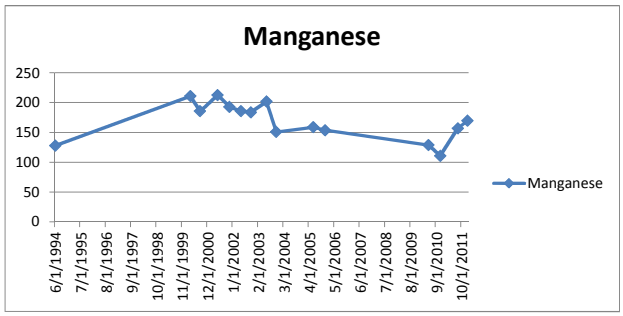
Chromium Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	173		173	
6/30/1994	5.2	U	2.6	U
3/15/2000	1	U	0.5	U
8/17/2000	0.6	U	0.3	U
5/23/2001	1	U	0.5	U
11/13/2001	1.1	J	1.1	J
5/1/2002	1.3	U	0.65	U
10/9/2002	3.2	U	1.6	U
6/11/2003	1.1	U	0.55	U
11/19/2003	0.88	U	0.44	U
6/2/2005	1	U	0.5	U
12/16/2005	1	U	0.5	U
5/10/2010	1.01	J	1.01	J
11/8/2010	0.919	J	0.919	J
8/29/2011	0.991	J	0.991	J
1/16/2012	0.889	J	0.889	J



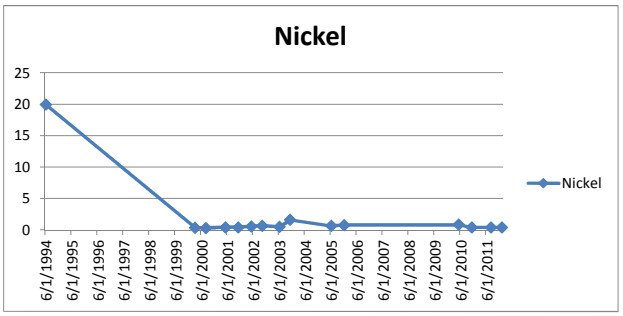
Iron Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	55400		55400	
6/30/1994	19900		19900	
3/15/2000	34500		34500	
8/17/2000	30700		30700	
5/23/2001	33700	J	33700	J
11/13/2001	30500		30500	
5/1/2002	29100		29100	
10/9/2002	29400		29400	
6/11/2003	30300		30300	
11/19/2003	22500		22500	
6/2/2005	22800		22800	
12/16/2005	24200		24200	
5/10/2010	18400		18400	
11/8/2010	18600		18600	
8/29/2011	27900		27900	
1/16/2012	29100		29100	



Manganese Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	132		132	
6/30/1994	128		128	
3/15/2000	211		211	
8/17/2000	186		186	
5/23/2001	213		213	
11/13/2001	193		193	
5/1/2002	186		186	
10/9/2002	184		184	
6/11/2003	202		202	
11/19/2003	151		151	
6/2/2005	159		159	
12/16/2005	154		154	
5/10/2010	129		129	
11/8/2010	111		111	
8/29/2011	157		157	
1/16/2012	170		170	



Nickel Date	Validated Result	Qual	Censored Result	Qual
7/22/1993	49.5		49.5	
6/30/1994	39.9	U	19.95	U
3/15/2000	0.7	U	0.35	U
8/17/2000	0.6	U	0.3	U
5/23/2001	0.8	U	0.4	U
11/13/2001	0.8	U	0.4	U
5/1/2002	1.1	U	0.55	U
10/9/2002	1.3	U	0.65	U
6/11/2003	0.97	U	0.485	U
11/19/2003	3.2	U	1.6	U
6/2/2005	1.26	U	0.63	U
12/16/2005	1.53	U	0.765	U
5/10/2010	0.844	J	0.844	J
11/8/2010	0.75	U	0.375	U
8/29/2011	0.75	U	0.375	U
1/16/2012	0.75	U	0.375	U



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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	16
Minimum	8.3
Maximum	15
Mean	12.03
Geometric Mean	11.9
Median	12
Standard Deviation	1.768
SEM	0.442
Mann-Kendall Test	
Test Value (S)	24
Tabulated p-value	0.153
Standard Deviation of S	22.12
Standardized Value of S	1.04
Approximate p-value	0.149

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	16
Minimum	7
Maximum	50.5
Mean	36.46
Geometric Mean	33.78
Median	38
Standard Deviation	11.21
SEM	2.802
Mann-Kendall Test	
Test Value (S)	37
Tabulated p-value	0.058
Standard Deviation of S	22.19
Standardized Value of S	1.622
Approximate p-value	0.0524

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	16
Minimum	0.125
Maximum	23
Mean	4.928
Geometric Mean	3.366
Median	4.05
Standard Deviation	5.097
SEM	1.274
Mann-Kendall Test	
Test Value (S)	-64
Tabulated p-value	0.002
Standard Deviation of S	22.21
Standardized Value of S	-2.836
Approximate p-value	0.00228

Statistically significant evidence of a decreasing trend at the specified level of significance.

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NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Naphthalene

General Statistics	
Number of Values	15
Minimum	0.2
Maximum	8.9
Mean	1.787
Geometric Mean	0.981
Median	0.93
Standard Deviation	2.351
SEM	0.607
Mann-Kendall Test	
Test Value (S)	-58
Tabulated p-value	0.001
Standard Deviation of S	20.13
Standardized Value of S	-2.831
Approximate p-value	0.00232

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Xylenes (Total)

General Statistics	
Number of Values	16
Minimum	0.5
Maximum	15
Mean	6.246
Geometric Mean	4.618
Median	4.15
Standard Deviation	4.528
SEM	1.132
Mann-Kendall Test	
Test Value (S)	58
Tabulated p-value	0.004
Standard Deviation of S	22.11
Standardized Value of S	2.579
Approximate p-value	0.00496

Statistically significant evidence of an increasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	15
Minimum	15.45
Maximum	139
Mean	65.85
Geometric Mean	57.31
Median	60.9
Standard Deviation	33.61
SEM	8.679
Mann-Kendall Test	
Test Value (S)	7
Tabulated p-value	0.385
Standard Deviation of S	20.21
Standardized Value of S	0.297
Approximate p-value	0.383

Insufficient evidence to identify a significant trend at the specified level of significance.

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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	15
Minimum	0.3
Maximum	2.6
Mean	0.87
Geometric Mean	0.74
Median	0.65
Standard Deviation	0.587
SEM	0.152
Mann-Kendall Test	
Test Value (S)	7
Tabulated p-value	0.385
Standard Deviation of S	19.99
Standardized Value of S	0.3
Approximate p-value	0.382

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	15
Minimum	18400
Maximum	34500
Mean	26773
Geometric Mean	26251
Median	29100
Standard Deviation	5300
SEM	1368
Mann-Kendall Test	
Test Value (S)	-42
Tabulated p-value	0.018
Standard Deviation of S	20.18
Standardized Value of S	-2.031
Approximate p-value	0.0211

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	15
Minimum	111
Maximum	213
Mean	168.9
Geometric Mean	166.1
Median	170
Standard Deviation	31.18
SEM	8.05
Mann-Kendall Test	
Test Value (S)	-40
Tabulated p-value	0.023
Standard Deviation of S	20.18
Standardized Value of S	-1.932
Approximate p-value	0.0267

Statistically significant evidence of a decreasing trend at the specified level of significance.

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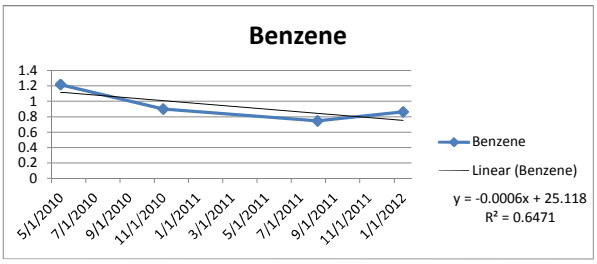
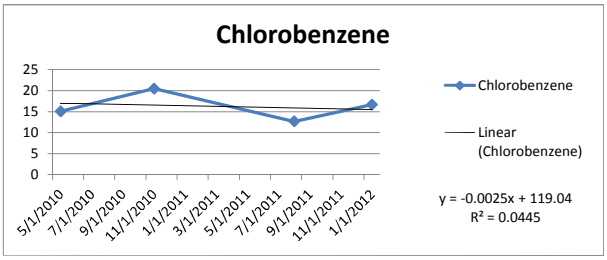
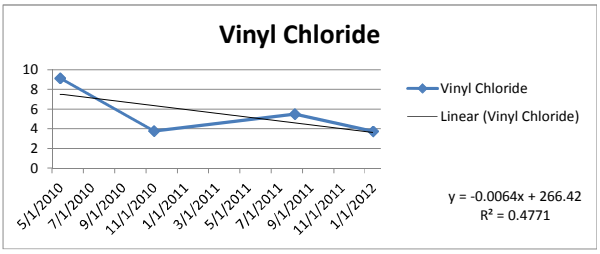
Benzene Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	1.22		1.22	
11/10/2010	0.901	J	0.901	J
8/31/2011	0.748	J	0.748	J
1/17/2012	0.863	J	0.863	J



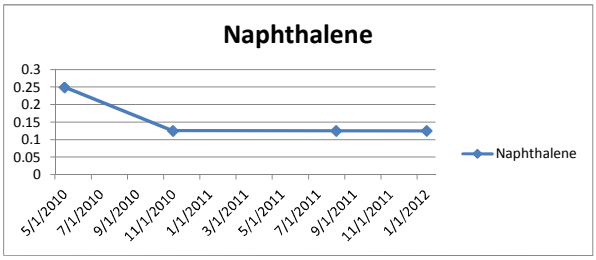
Chlorobenzene Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	15.1		15.1	
11/10/2010	20.5		20.5	
8/31/2011	12.7		12.7	
1/17/2012	16.7		16.7	



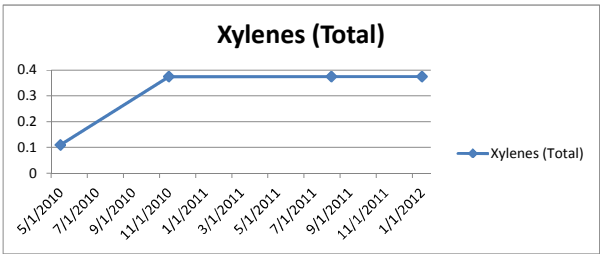
Vinyl Chloride Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	9.15	J	9.15	J
11/10/2010	3.77		3.77	
8/31/2011	5.5		5.5	
1/17/2012	3.76		3.76	



Naphthalene Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	0.5	U	0.25	U
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Xylenes (Total) Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	0.22	U	0.11	U
11/10/2010	0.75	U	0.375	U
8/31/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



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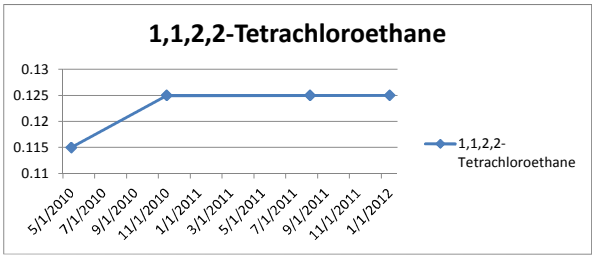
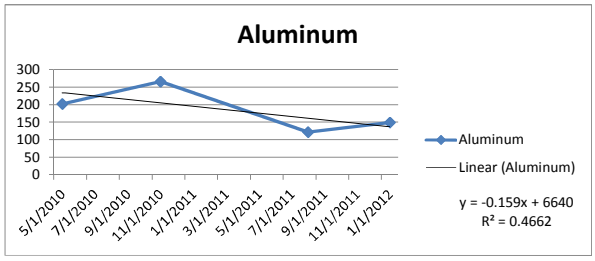
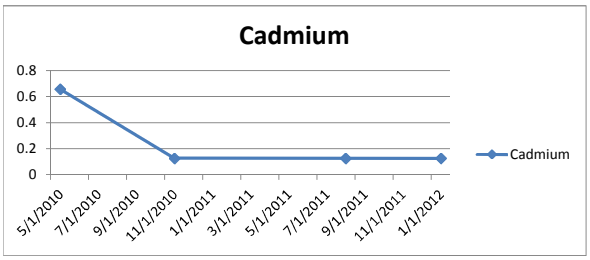
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.23	U	0.115	U
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



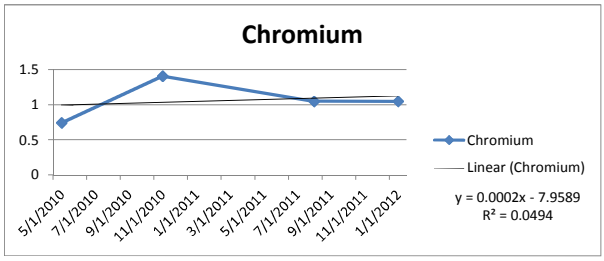
Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	202		202	
11/10/2010	266		266	
8/31/2011	122		122	
1/17/2012	149		149	



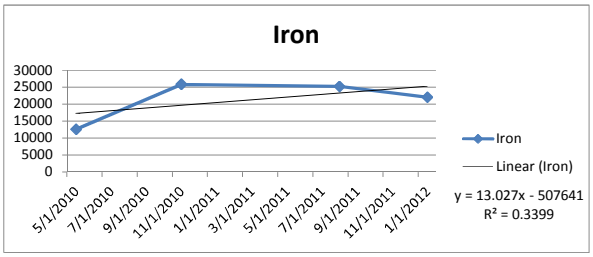
Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.657	J	0.657	J
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Chromium	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.743	J	0.743	J
11/10/2010	1.41	J	1.41	J
8/31/2011	1.05	J	1.05	J
1/17/2012	1.05	J	1.05	J



Iron	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	12600		12600	
11/10/2010	25800		25800	
8/31/2011	25200		25200	
1/17/2012	22000		22000	



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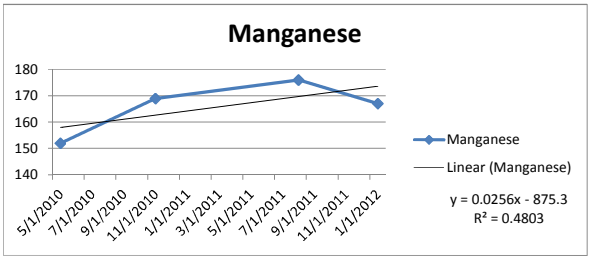
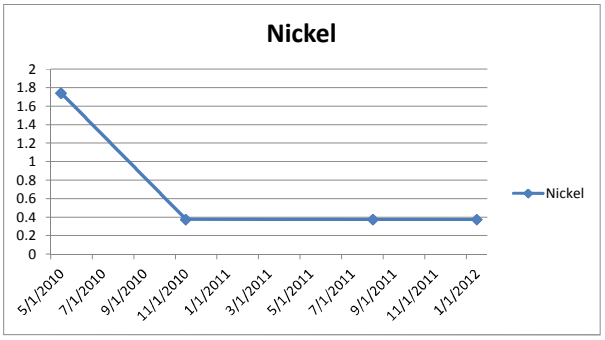
Manganese Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	152		152	
11/10/2010	169		169	
8/31/2011	176		176	
1/17/2012	167		167	



Nickel Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	1.74	J	1.74	J
11/10/2010	0.75	U	0.375	U
8/31/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



Monitoring Well 01GI72

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	4
Minimum	0.748
Maximum	1.22
Mean	0.933
Geometric Mean	0.918
Median	0.882
Standard Deviation	0.202
SEM	0.101
Mann-Kendall Test	
Test Value (S)	-4
Tabulated p-value	0.167
Standard Deviation of S	2.944
Standardized Value of S	-1.019
Approximate p-value	0.154

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	4
Minimum	12.7
Maximum	20.5
Mean	16.25
Geometric Mean	16.01
Median	15.9
Standard Deviation	3.276
SEM	1.638
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.625
Standard Deviation of S	2.944
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	4
Minimum	3.76
Maximum	9.15
Mean	5.545
Geometric Mean	5.168
Median	4.635
Standard Deviation	2.539
SEM	1.269
Mann-Kendall Test	
Test Value (S)	-4
Tabulated p-value	0.167
Standard Deviation of S	2.944
Standardized Value of S	-1.019
Approximate p-value	0.154

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GI72

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	4
Minimum	122
Maximum	266
Mean	184.8
Geometric Mean	176.8
Median	175.5
Standard Deviation	63.55
SEM	31.77
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.375
Standard Deviation of S	2.944
Standardized Value of S	-0.34
Approximate p-value	0.367

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	4
Minimum	0.743
Maximum	1.41
Mean	1.063
Geometric Mean	1.037
Median	1.05
Standard Deviation	0.273
SEM	0.136
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.625
Standard Deviation of S	2.769
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	4
Minimum	12600
Maximum	25800
Mean	21400
Geometric Mean	20604
Median	23600
Standard Deviation	6099
SEM	3050
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.625
Standard Deviation of S	2.944
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GI72

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

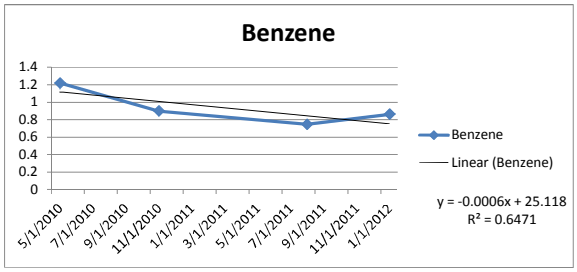
General Statistics	
Number of Values	4
Minimum	152
Maximum	176
Mean	166
Geometric Mean	165.8
Median	168
Standard Deviation	10.1
SEM	5.05
Mann-Kendall Test	
Test Value (S)	2
Tabulated p-value	0.375
Standard Deviation of S	2.944
Standardized Value of S	0.34
Approximate p-value	0.367

Insufficient evidence to identify a significant trend at the specified level of significance.

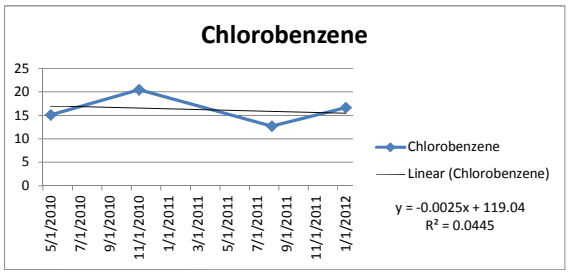
Monitoring Well 01GI74

OU1, Site 1
NAS Pensacoal, Pensacola Florida

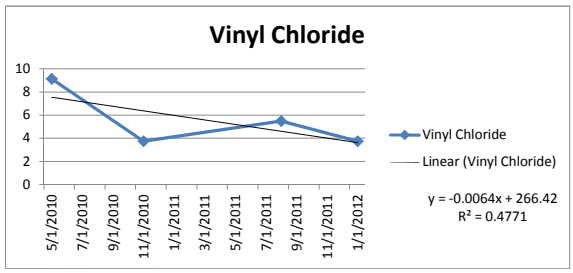
Benzene	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	1.22		1.22	
11/10/2010	0.901	J	0.901	J
8/31/2011	0.748	J	0.748	J
1/17/2012	0.863	J	0.863	J



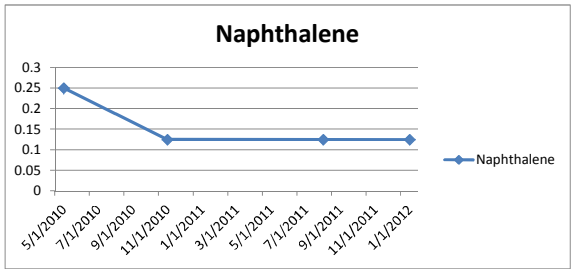
Chlorobenzene	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	15.1		15.1	
11/10/2010	20.5		20.5	
8/31/2011	12.7		12.7	
1/17/2012	16.7		16.7	



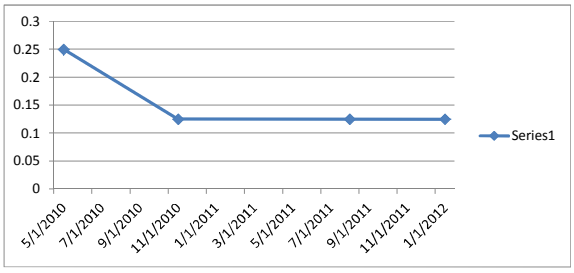
Vinyl Chloride	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	9.15	J	9.15	J
11/10/2010	3.77		3.77	
8/31/2011	5.5		5.5	
1/17/2012	3.76		3.76	



Naphthalene	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.5	U	0.25	U
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



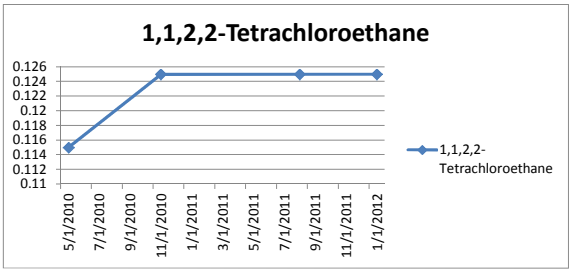
Xylenes (Total)	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.5	U	0.25	U
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



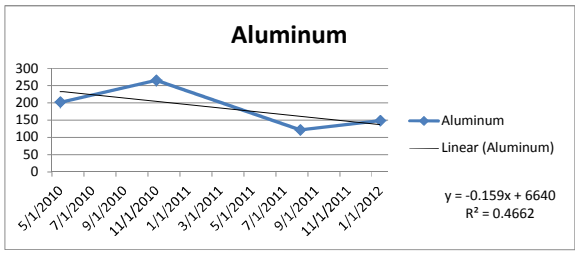
Monitoring Well 01GI74

OU1, Site 1
NAS Pensacoal, Pensacola Florida

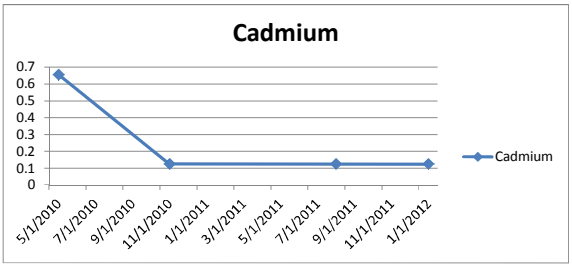
1,1,2,2-Tetrachloroethane	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.23	U	0.115	U
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



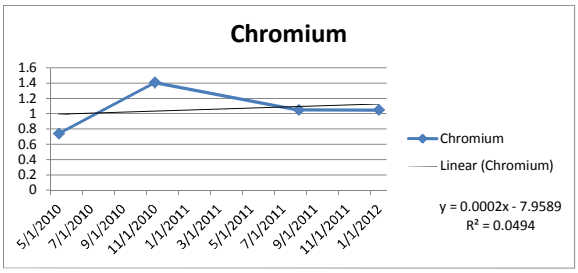
Aluminum	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	202		202	
11/10/2010	266		266	
8/31/2011	122		122	
1/17/2012	149		149	



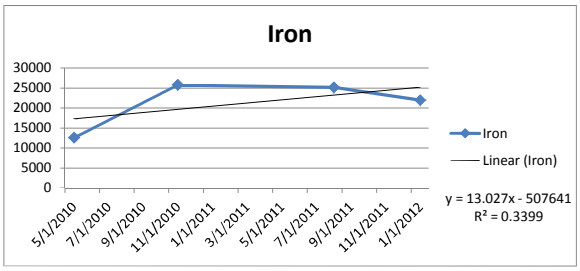
Cadmium	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.657	J	0.657	J
11/10/2010	0.25	U	0.125	U
8/31/2011	0.25	U	0.125	U
1/17/2012	0.25	U	0.125	U



Chromium	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	0.743	J	0.743	J
11/10/2010	1.41	J	1.41	J
8/31/2011	1.05	J	1.05	J
1/17/2012	1.05	J	1.05	J



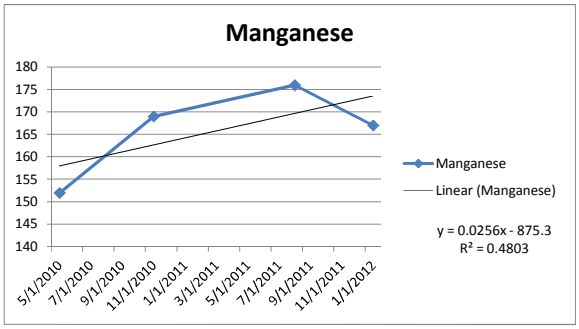
Iron	Validated		Censored	
Date	Result	Qual	Result	Qual
5/12/2010	12600		12600	
11/10/2010	25800		25800	
8/31/2011	25200		25200	
1/17/2012	22000		22000	



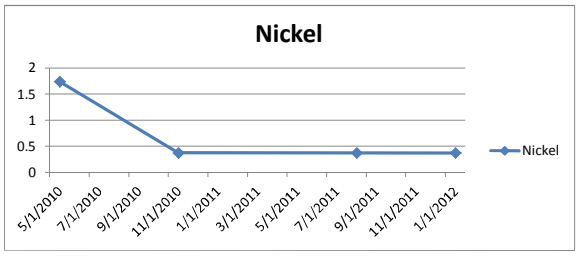
Monitoring Well 01GI74

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Manganese Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	152		152	
11/10/2010	169		169	
8/31/2011	176		176	
1/17/2012	167		167	



Nickel Date	Validated Result	Qual	Censored Result	Qual
5/12/2010	1.74	J	1.74	J
11/10/2010	0.75	U	0.375	U
8/31/2011	0.75	U	0.375	U
1/17/2012	0.75	U	0.375	U



Monitoring Well 01GI74

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Benzene

General Statistics	
Number of Values	4
Minimum	0.748
Maximum	1.22
Mean	0.933
Geometric Mean	0.918
Median	0.882
Standard Deviation	0.202
SEM	0.101
Mann-Kendall Test	
Test Value (S)	-4
Tabulated p-value	0.167
Standard Deviation of S	2.944
Standardized Value of S	-1.019
Approximate p-value	0.154

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chlorobenzene

General Statistics	
Number of Values	4
Minimum	12.7
Maximum	20.5
Mean	16.25
Geometric Mean	16.01
Median	15.9
Standard Deviation	3.276
SEM	1.638
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.625
Standard Deviation of S	2.944
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Vinyl Chloride

General Statistics	
Number of Values	4
Minimum	3.76
Maximum	9.15
Mean	5.545
Geometric Mean	5.168
Median	4.635
Standard Deviation	2.539
SEM	1.269
Mann-Kendall Test	
Test Value (S)	-4
Tabulated p-value	0.167
Standard Deviation of S	2.944
Standardized Value of S	-1.019
Approximate p-value	0.154

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GI74

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Aluminum

General Statistics	
Number of Values	4
Minimum	122
Maximum	266
Mean	184.8
Geometric Mean	176.8
Median	175.5
Standard Deviation	63.55
SEM	31.77
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.375
Standard Deviation of S	2.944
Standardized Value of S	-0.34
Approximate p-value	0.367

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chromium

General Statistics	
Number of Values	4
Minimum	0.743
Maximum	1.41
Mean	1.063
Geometric Mean	1.037
Median	1.05
Standard Deviation	0.273
SEM	0.136
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.625
Standard Deviation of S	2.769
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	4
Minimum	0.743
Maximum	1.41
Mean	1.063
Geometric Mean	1.037
Median	1.05
Standard Deviation	0.273
SEM	0.136
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.625
Standard Deviation of S	2.769
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 01GI74

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

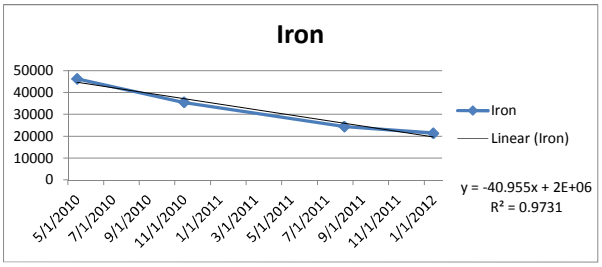
General Statistics	
Number of Values	4
Minimum	152
Maximum	176
Mean	166
Geometric Mean	165.8
Median	168
Standard Deviation	10.1
SEM	5.05
Mann-Kendall Test	
Test Value (S)	2
Tabulated p-value	0.375
Standard Deviation of S	2.944
Standardized Value of S	0.34
Approximate p-value	0.367

Insufficient evidence to identify a significant trend at the specified level of significance.

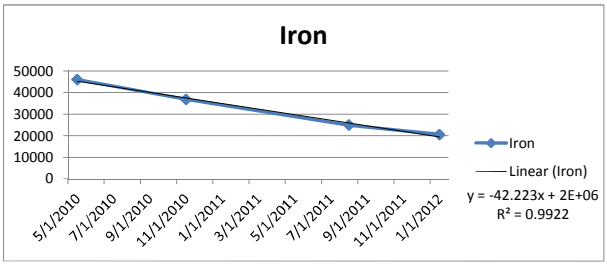
Piezometer 01PZ1

OU1, Site 1
NAS Pensacoal, Pensacola Florida

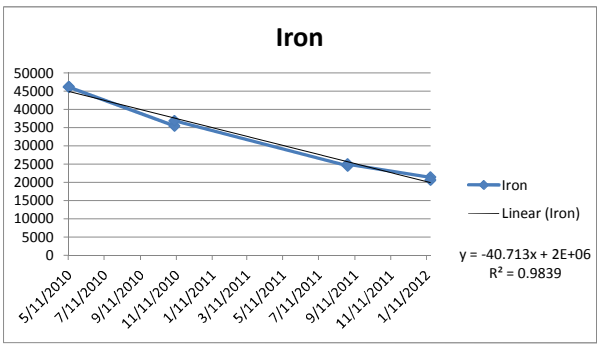
Iron Date	Validated Result	(Sample) Qual	Censored Result	Qual
5/11/2010	46300		46300	
11/7/2010	35500		35500	
8/29/2011	24500		24500	
1/17/2012	21400		21400	



Iron Date	Validated Result	(Duplicate) Qual	Censored Result	Qual
5/11/2010	46100		46100	
11/7/2010	36900		36900	
8/29/2011	25000		25000	
1/17/2012	20600		20600	



Iron Date	Validated Result	(Sample and Duplic Qual	Censored Result	Qual
5/11/2010	46300		46300	
11/7/2010	35500		35500	
8/29/2011	24500		24500	
1/17/2012	21400		21400	
5/11/2010	46100		46100	
11/7/2010	36900		36900	
8/29/2011	25000		25000	
1/17/2012	20600		20600	



Piezometer 01PZ1

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Sample

General Statistics	
Number of Values	4
Minimum	21400
Maximum	46300
Mean	31925
Geometric Mean	30468
Median	30000
Standard Deviation	11333
SEM	5667
Mann-Kendall Test	
Test Value (S)	-6
Tabulated p-value	0.042
Standard Deviation of S	2.944
Standardized Value of S	-1.698
Approximate p-value	0.0447

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Duplicate

General Statistics	
Number of Values	4
Minimum	20600
Maximum	46100
Mean	32150
Geometric Mean	30594
Median	30950
Standard Deviation	11571
SEM	5786
Mann-Kendall Test	
Test Value (S)	-6
Tabulated p-value	0.042
Standard Deviation of S	2.944
Standardized Value of S	-1.698
Approximate p-value	0.0447

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Sample and Duplicate

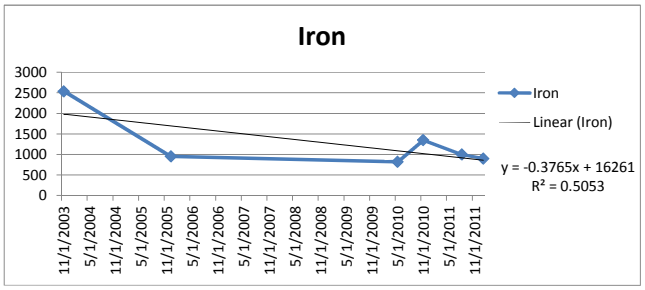
General Statistics	
Number of Values	8
Minimum	20600
Maximum	46300
Mean	32038
Geometric Mean	30531
Median	30250
Standard Deviation	10604
SEM	3749
Mann-Kendall Test	
Test Value (S)	-12
Tabulated p-value	0.089
Standard Deviation of S	8.083
Standardized Value of S	-1.361
Approximate p-value	0.0868

Insufficient evidence to identify a significant trend at the specified level of significance.

Piezometer 01PZ6A

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Iron Date	Validated Result	Qual	Censored Result	Qual
11/18/2003	2540		2540	
12/16/2005	952		952	
5/11/2010	820		820	
11/7/2010	1350		1350	
8/29/2011	1000		1000	
1/17/2012	901		901	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

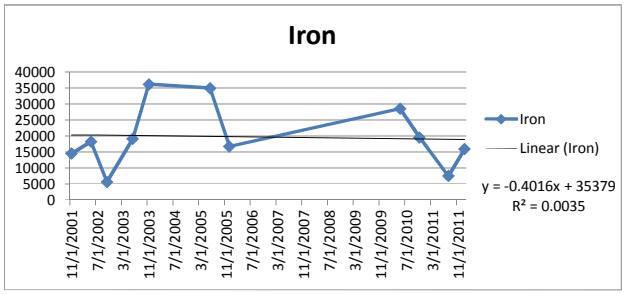
General Statistics	
Number of Values	6
Minimum	820
Maximum	2540
Mean	1261
Geometric Mean	1158
Median	976
Standard Deviation	652.9
SEM	266.5
Mann-Kendall Test	
Test Value (S)	-5
Tabulated p-value	0.235
Standard Deviation of S	5.323
Standardized Value of S	-0.751
Approximate p-value	0.226

Insufficient evidence to identify a significant trend at the specified level of significance.

Piezometer 01PZ6

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Iron Date	Validated Result	Qual	Censored Result	Qual
11/13/2001	14600		14600	
5/1/2002	18300		18300	
10/9/2002	5680		5680	
6/9/2003	19200		19200	
11/18/2003	36200		36200	
6/1/2005	35000		35000	
12/16/2005	16800		16800	
5/11/2010	28600		28600	
11/7/2010	19600		19600	
8/29/2011	7530		7530	
1/17/2012	16000		16000	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

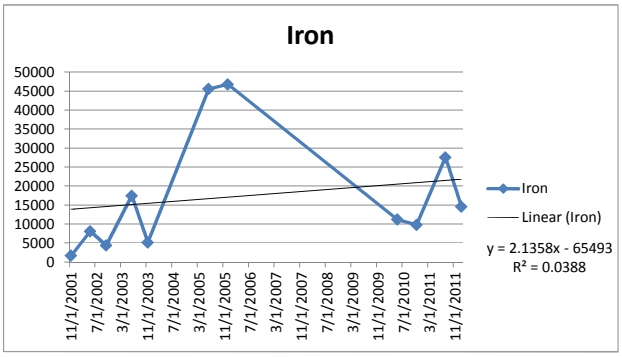
General Statistics	
Number of Values	11
Minimum	5680
Maximum	36200
Mean	19774
Geometric Mean	17313
Median	18300
Standard Deviation	9902
SEM	2986
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.5
Standard Deviation of S	12.85
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Piezometer 01PZ7

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Iron Date	Validated Result	Qual	Censored Result	Qual
11/13/2001	1690		1690	
5/1/2002	8120		8120	
10/9/2002	4360		4360	
6/9/2003	17500		17500	
11/18/2003	5200		5200	
6/1/2005	45600		45600	
12/16/2005	46800		46800	
5/10/2010	11200		11200	
11/7/2010	9830		9830	
8/29/2011	27600		27600	
1/16/2012	14600		14600	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

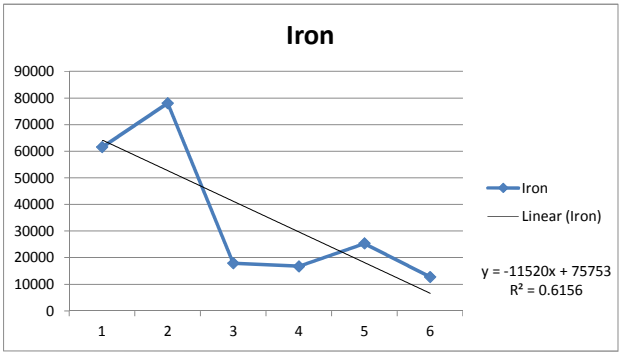
General Statistics	
Number of Values	11
Minimum	1690
Maximum	46800
Mean	17500
Geometric Mean	11608
Median	11200
Standard Deviation	15871
SEM	4785
Mann-Kendall Test	
Test Value (S)	23
Tabulated p-value	0.043
Standard Deviation of S	12.85
Standardized Value of S	1.713
Approximate p-value	0.0434

Statistically significant evidence of an increasing trend at the specified level of significance.

Piezometer 01PZ7A

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Iron Date	Validated Result	Qual	Censored Result	Qual
11/18/2003	61600		61600	
12/16/2005	78100		78100	
5/10/2010	17900		17900	
11/7/2010	16800		16800	
8/29/2011	25400		25400	
1/16/2012	12800		12800	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

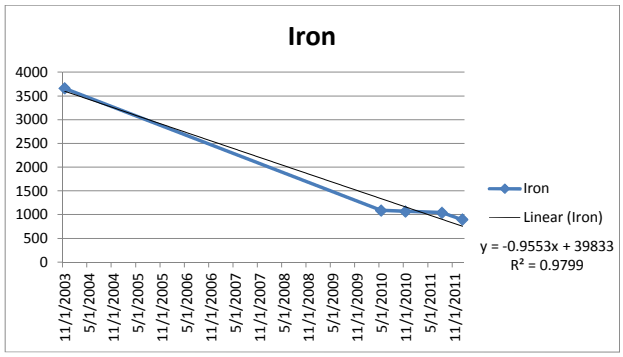
General Statistics	
Number of Values	6
Minimum	12800
Maximum	78100
Mean	35433
Geometric Mean	27887
Median	21650
Standard Deviation	27469
SEM	11214
Mann-Kendall Test	
Test Value (S)	-9
Tabulated p-value	0.068
Standard Deviation of S	5.323
Standardized Value of S	-1.503
Approximate p-value	0.0664

Insufficient evidence to identify a significant trend at the specified level of significance.

Piezometer 01PZ7B

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Iron Date	Validated Result	Qual	Censored Result	Qual
11/18/2003	3660		3660	
5/10/2010	1090		1090	
11/7/2010	1070		1070	
8/29/2011	1040		1040	
1/16/2012	896		896	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

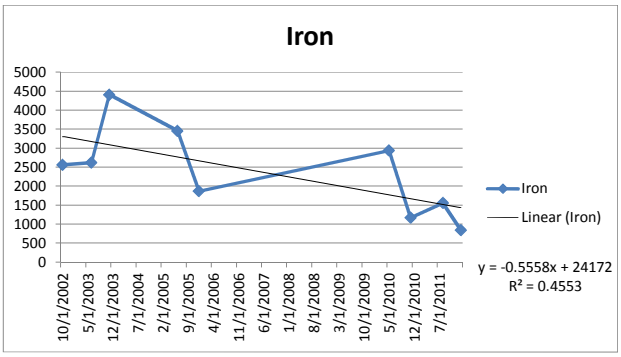
General Statistics	
Number of Values	5
Minimum	896
Maximum	3660
Mean	1551
Geometric Mean	1318
Median	1070
Standard Deviation	1181
SEM	528.3
Mann-Kendall Test	
Test Value (S)	-10
Tabulated p-value	0.008
Standard Deviation of S	4.082
Standardized Value of S	-2.205
Approximate p-value	0.0137

Statistically significant evidence of a decreasing trend at the specified level of significance.

Piezometer 01PZ8

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Iron Date	Validated Result	Qual	Censored Result	Qual
10/9/2002	2560		2560	
6/9/2003	2620		2620	
11/18/2003	4410		4410	
6/1/2005	3460		3460	
12/16/2005	1870		1870	
5/10/2010	2940		2940	
11/7/2010	1170		1170	
8/29/2011	1560		1560	
1/16/2012	846		846	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

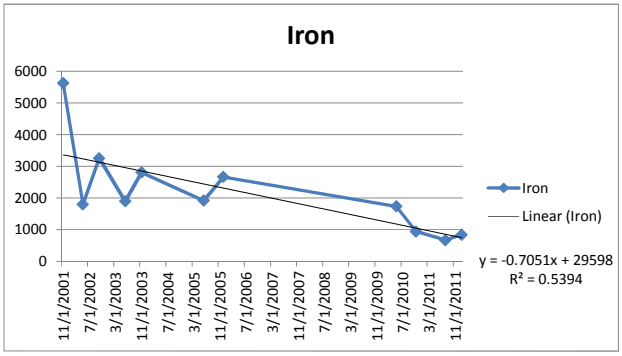
General Statistics	
Number of Values	9
Minimum	846
Maximum	4410
Mean	2382
Geometric Mean	2121
Median	2560
Standard Deviation	1142
SEM	380.8
Mann-Kendall Test	
Test Value (S)	-18
Tabulated p-value	0.038
Standard Deviation of S	9.592
Standardized Value of S	-1.772
Approximate p-value	0.0382

Statistically significant evidence of a decreasing trend at the specified level of significance.

Piezometer 01PZ10

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Iron Date	Validated Result	Qual	Censored Result	Qual
11/14/2001	5630		5630	
5/1/2002	1800		1800	
10/9/2002	3260		3260	
6/9/2003	1900		1900	
11/18/2003	2810		2810	
6/1/2005	1920		1920	
12/20/2005	2670		2670	
5/10/2010	1740		1740	
11/7/2010	945		945	
8/29/2011	671		671	
1/16/2012	846		846	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

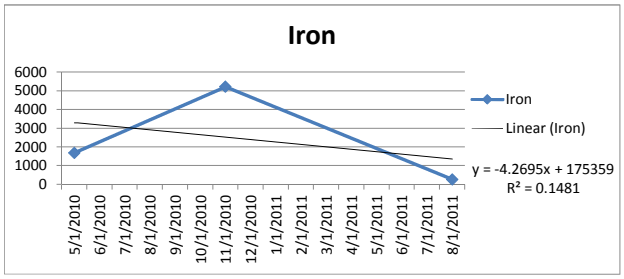
General Statistics	
Number of Values	11
Minimum	671
Maximum	5630
Mean	2199
Geometric Mean	1845
Median	1900
Standard Deviation	1406
SEM	423.9
Mann-Kendall Test	
Test Value (S)	-35
Tabulated p-value	0.003
Standard Deviation of S	12.85
Standardized Value of S	-2.647
Approximate p-value	0.00406

Statistically significant evidence of a decreasing trend at the specified level of significance.

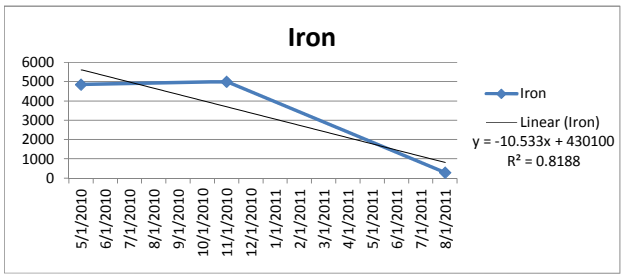
Surface Water Sample 01SW01

OU1, Site 1
NAS Pensacoal, Pensacola Florida

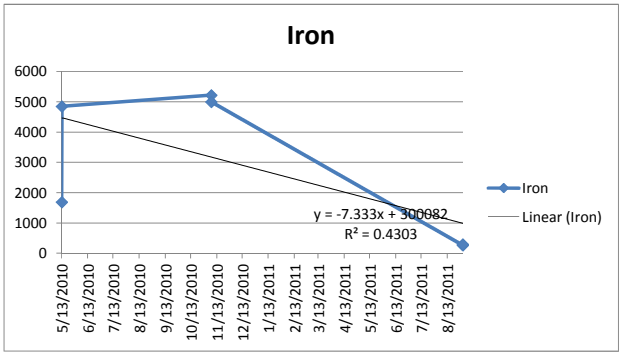
Iron Date	Validated Result	(Sample) Qual	Censored Result	Qual
5/13/2010	1690		1690	
11/6/2010	5220		5220	
8/31/2011	265		265	



Iron Date	Validated Result	(Duplicate Qual	Censored Result	Qual
5/13/2010	4850		4850	
11/6/2010	5000		5000	
8/31/2011	291		291	



Iron Date	Validated Result	(Sample a Qual	Censored Result	Qual
5/13/2010	1690		1690	
11/6/2010	5220		5220	
8/31/2011	265		265	
5/13/2010	4850		4850	
11/6/2010	5000		5000	
8/31/2011	291		291	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Sample

General Statistics	
Number of Values	3
Minimum	265
Maximum	5220
Mean	2392
Geometric Mean	1327
Median	1690
Standard Deviation	2551
SEM	1473
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	N/A
Standard Deviation of S	1.915
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Duplicate

General Statistics	
Number of Values	3
Minimum	291
Maximum	5000
Mean	3380
Geometric Mean	1918
Median	4850
Standard Deviation	2676
SEM	1545

Surface Water Sample 01SW01

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	N/A
Standard Deviation of S	1.915
Standard Deviation of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Sample and Duplicate

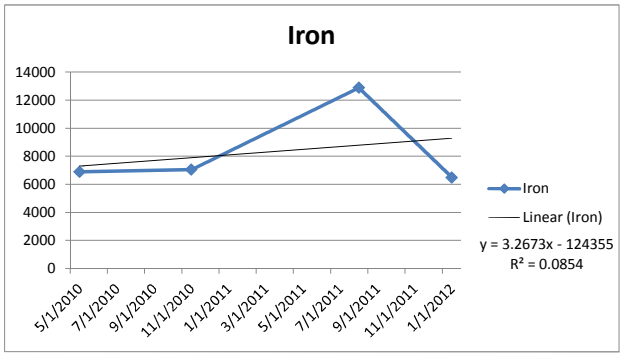
General Statistics	
Number of Values	6
Minimum	265
Maximum	5220
Mean	2886
Geometric Mean	1596
Median	3270
Standard Deviation	2400
SEM	979.9
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.5
Standard Deviation of S	5.323
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Surface Water Sample 01SW02

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Iron Date	Validated Result	(Sample) Qual	Censored Result	Qual
5/13/2010	6890	J	6890	J
11/6/2010	7050		7050	
8/31/2011	12900		12900	
1/17/2012	6500		6500	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

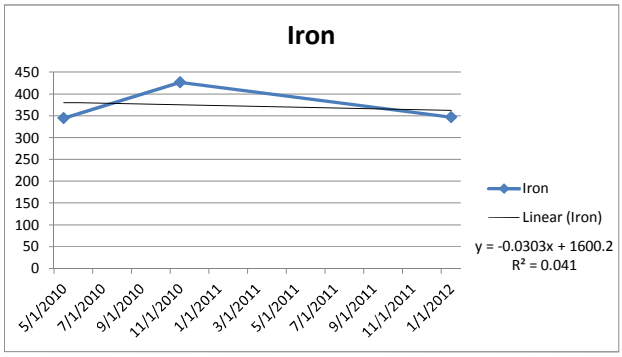
General Statistics	
Number of Values	4
Minimum	6500
Maximum	12900
Mean	8335
Geometric Mean	7989
Median	6970
Standard Deviation	3052
SEM	1526
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.625
Standard Deviation of S	2.944
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Surface Water Sample 01SW03

OU1, Site 1
NAS Pensacoal, Pensacola Florida

Iron Date	Validated Result	Qual	Censored Result	Qual
5/13/2010	345	J	345	J
11/6/2010	427		427	
1/17/2012	347		347	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	3
Minimum	345
Maximum	427
Mean	373
Geometric Mean	371.1
Median	347
Standard Deviation	46.78
SEM	27.01
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	N/A
Standard Deviation of S	1.915
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis
Groundwater Samples
Operable Unit 4
NAS Pensacola, Florida

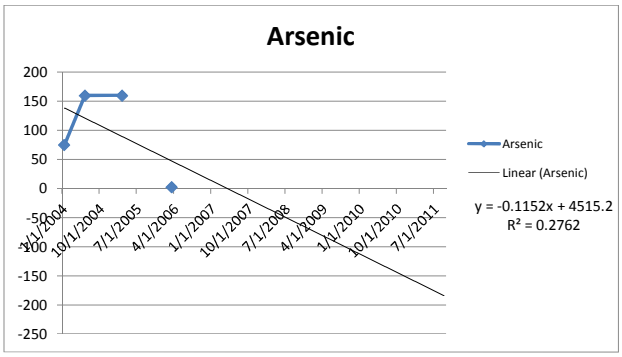
Sample Location ID	Arsenic
15GR03R	NT
15GR03RR	NT
15GR04R	NT
15GR07R	NT
15GR65R	NT
15GR66R	D
15GS68	NT
15GS69R	NT
15GS70	NT
15GS71	NT
15MW72	NT
15MW73	ND
15MW74	NT
15MW75	ND
15MW76	ND

Notes:
ND = Not Detected
Mann-Kendall Analysis conducted using ProUCL version 4.1.01 (Lockheed Martin, May 2010)
NT = No Trend
D = Decreasing

Monitoring Well 15GR03R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/21/2004	**150**	**U**	75	**U**
6/28/2004	**160**		160	
3/14/2005	**160**		160	
9/13/2005	CNL			
3/9/2006	5.0		2.5	
9/19/2006	CNL			
3/22/2007	CNL			
10/8/2007	CNL			
4/23/2008	CNL			
9/28/2010	CNL			
3/25/2011	CNL			
9/21/2011	CNL			

CNL = Could Not Locate



Mann-Kendall Trend Test Analysis

r Selected Options	
Confidence Coefficient	0.95
Level of Significance	0.05

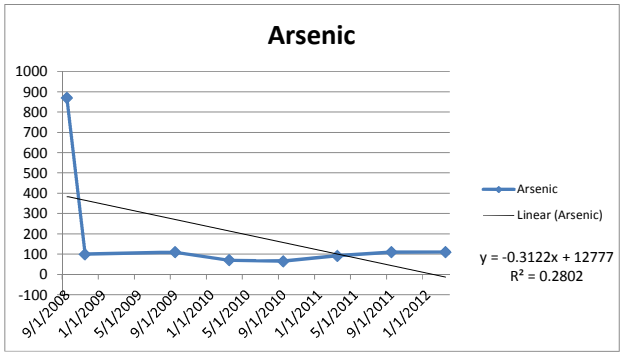
Arsenic

General Statistics	
Number of Values	4
Minimum	2.5
Maximum	160
Mean	99.38
Geometric Mean	46.81
Median	117.5
Standard Deviation	76
SEM	38
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.625
Standard Deviation of S	2.769
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 15GR03RR
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
9/11/2008	**870**		870	
11/12/2008	**100**		100	
9/25/2009	**110**		110	
3/31/2010	**71.0**		71.0	
9/28/2010	**65.0**		65.0	
3/25/2011	**92.0**		92.0	
9/21/2011	**110**		110	
3/21/2012	**110**		110	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

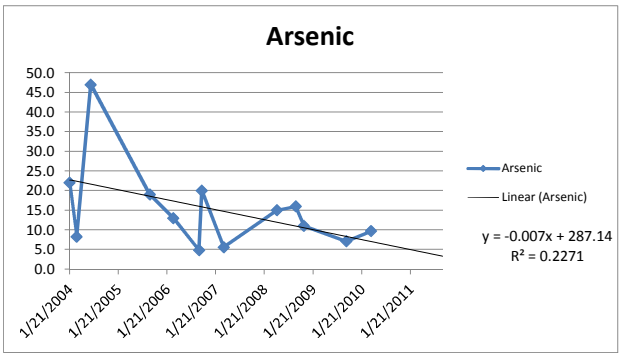
Arsenic

General Statistics	
Number of Values	8
Minimum	65
Maximum	870
Mean	191
Geometric Mean	122
Median	105
Standard Deviation	274.9
SEM	97.2
Mann-Kendall Test	
Test Value (S)	-3
Tabulated p-value	0.452
Standard Deviation of S	7.853
Standardized Value of S	-0.255
Approximate p-value	0.399

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 15GR04R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/21/2004	**22.0**		22.0	
6/28/2004	**47.0**		47.0	
3/14/2004	8.3		8.3	
9/13/2005	**19.0**		19.0	
3/8/2006	**13.0**		13.0	
9/18/2006	4.8		4.8	
10/8/2006	**20.0**		20.0	
3/22/2007	5.6	I	5.6	I
4/23/2008	**15.0**		15.0	
9/11/2008	**16.0**		16.0	
11/12/2008	**11.0**		11.0	
9/25/2009	7.1	I	7.1	I
3/31/2010	9.7	I	9.7	I
9/28/2010	NS			
3/25/2011	NS			
9/21/2011	NS			



NS = Not Sampled

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Arsenic

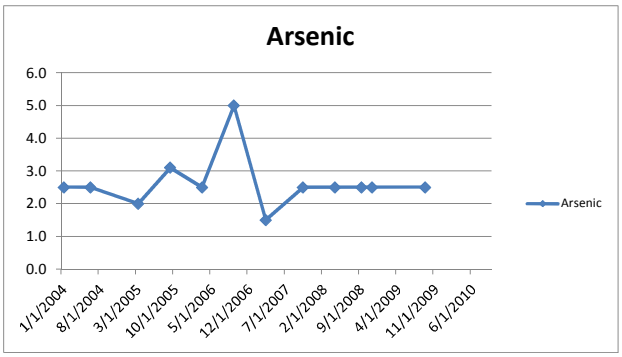
General Statistics	
Number of Values	13
Minimum	4.8
Maximum	47
Mean	15.27
Geometric Mean	12.63
Median	13
Standard Deviation	11.04
SEM	3.061
Mann-Kendall Test	
Test Value (S)	-26
Tabulated p-value	0.064
Standard Deviation of S	16.39
Standardized Value of S	-1.525
Approximate p-value	0.0636

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 15GR07R
OU4
NAS Pensacola, Pensacola Florida

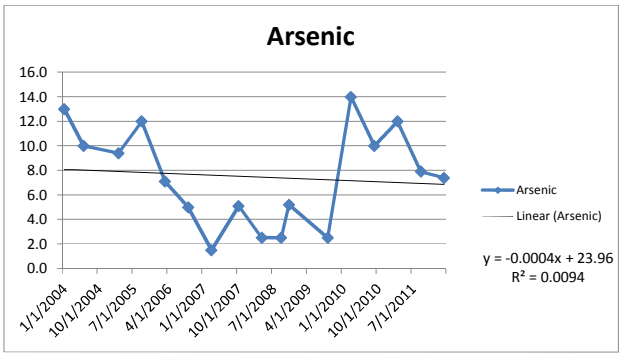
Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/21/2004	5.0	U	2.5	U
6/28/2004	5.0	U	2.5	U
3/14/2005	4.0	U	2.0	U
9/13/2005	3.1	B	3.1	B
3/9/2006	5.0	U	2.5	U
9/18/2006	10.0	U	5.0	U
3/22/2007	3.0	U	1.5	U
10/8/2007	5.0	U	2.5	U
4/23/2008	5.0	U	2.5	U
9/11/2008	5.0	U	2.5	U
11/12/2008	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
3/31/2010	NS			
9/28/2010	NS			

NS = Not Sampled



Monitoring Well 15GR65R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/21/2004	**13.0**		13.0	
6/28/2004	10.0		10.0	
3/14/2005	9.4		9.4	
9/14/2005	**12.0**		12.0	
3/8/2006	7.1		7.1	
9/19/2006	10.0	**U**	5.0	**U**
3/22/2007	3.0	**U**	1.5	**U**
10/8/2007	5.1	**I**	5.1	**I**
4/23/2008	5.0	**U**	2.5	**U**
9/11/2008	5.0	**U**	2.5	**U**
11/12/2008	5.2	**I**	5.2	**I**
9/25/2009	5.0	**U**	2.5	**U**
3/31/2010	**14.0**		14.0	
9/28/2010	**10.0**		10.0	
3/25/2011	**12.0**		12.0	
9/21/2011	7.9		7.9	
3/21/2012	7.4		7.4	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

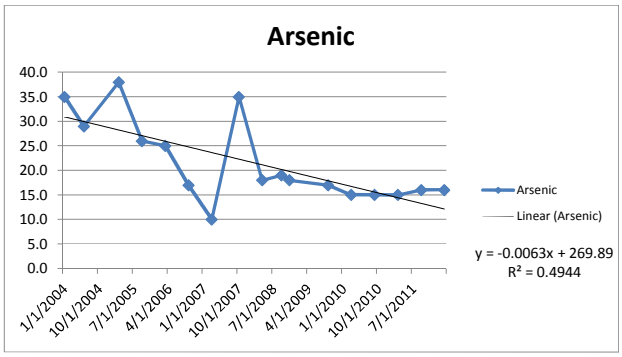
Arsenic

General Statistics	
Number of Values	17
Minimum	1.5
Maximum	14
Mean	7.476
Geometric Mean	6.226
Median	7.4
Standard Deviation	4.013
SEM	0.973
Mann-Kendall Test	
Test Value (S)	-11
Tabulated p-value	0.358
Standard Deviation of S	24.16
Standardized Value of S	-0.414
Approximate p-value	0.339

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 15GR66R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/21/2004	**35.0**		35.0	
6/28/2004	**29.0**		29.0	
3/14/2005	**38.0**		38.0	
9/13/2005	**26.0**		26.0	
3/9/2006	**25.0**		25.0	
9/18/2006	**17.0**		17.0	
3/22/2007	**10.0**		10.0	
10/8/2007	**35.0**		35.0	
4/23/2008	**18.0**		18.0	
9/11/2008	**19.0**		19.0	
11/12/2008	**18.0**		18.0	
9/25/2009	**17.0**		17.0	
3/31/2010	**15.0**		15.0	
9/28/2010	**15.0**		15.0	
3/25/2011	**15.0**		15.0	
9/21/2011	**16.0**		16.0	
3/21/2012	**16.0**		16.0	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

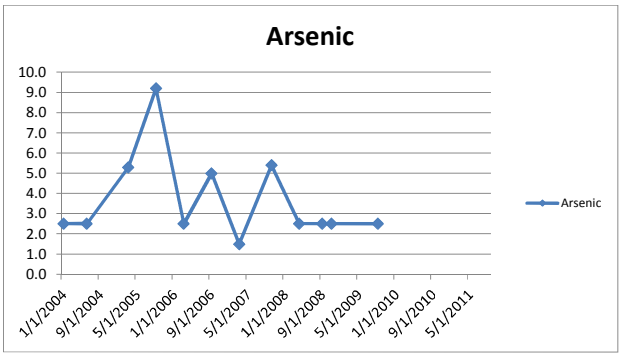
Arsenic

General Statistics	
Number of Values	17
Minimum	10
Maximum	38
Mean	21.41
Geometric Mean	20.03
Median	18
Standard Deviation	8.352
SEM	2.026
Mann-Kendall Test	
Test Value (S)	-77
Tabulated p-value	0.001
Standard Deviation of S	24.12
Standardized Value of S	-3.151
Approximate p-value	8.13E-04

Statistically significant evidence of a decreasing trend at the specified level of significance.

Monitoring Well 15GS68
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/22/2004	5.0	U	2.5	U
6/28/2004	5.0	U	2.5	U
3/14/2005	5.3		5.3	
9/13/2005	9.2		9.2	
3/8/2006	5.0	U	2.5	U
9/19/2006	10.0	U	5.0	U
3/22/2007	3.0	U	1.5	U
10/8/2007	5.4	I	5.4	I
4/23/2008	5.0	U	2.5	U
9/11/2008	5.0	U	2.5	U
11/12/2008	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
3/31/2010	NS			
9/28/2010	NS			
3/25/2011	NS			
9/21/2011	NS			



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

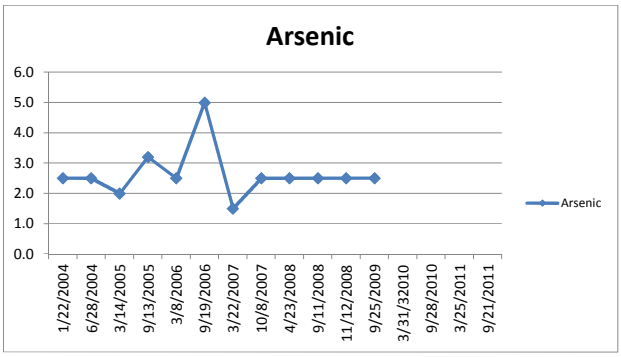
Arsenic

General Statistics	
Number of Values	12
Minimum	1.5
Maximum	9.2
Mean	3.658
Geometric Mean	3.212
Median	2.5
Standard Deviation	2.18
SEM	0.629
Mann-Kendall Test	
Test Value (S)	-9
Tabulated p-value	0.319
Standard Deviation of S	12.97
Standardized Value of S	-0.617
Approximate p-value	0.269

Insufficient evidence to identify a significant trend at the specified level of significance.

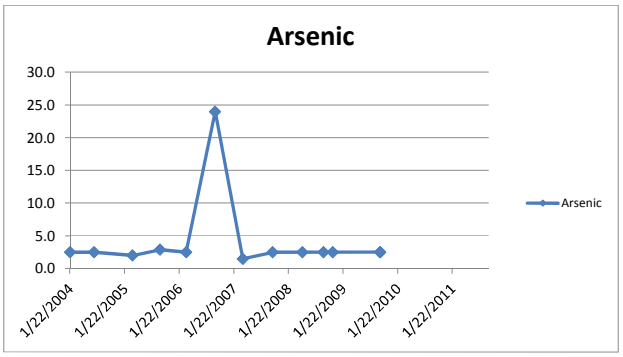
Monitoring Well 15GS69R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/22/2004	5.0	U	2.5	U
6/28/2004	5.0	U	2.5	U
3/14/2005	4.0	U	2.0	U
9/13/2005	3.2	B	3.2	B
3/8/2006	5.0	U	2.5	U
9/19/2006	10.0	U	5.0	U
3/22/2007	3.0	U	1.5	U
10/8/2007	5.0	U	2.5	U
4/23/2008	5.0	U	2.5	U
9/11/2008	5.0	U	2.5	U
11/12/2008	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
3/31/32010	NS			
9/28/2010	NS			
3/25/2011	NS			
9/21/2011	NS			



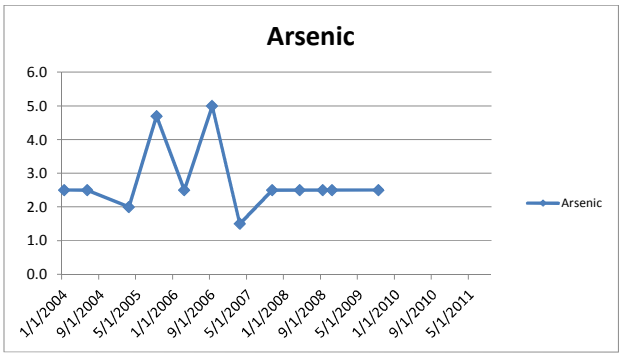
Monitoring Well 15GS70
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/22/2004	5.0	U	2.5	U
6/29/2004	5.0	U	2.5	U
3/14/2005	4.0	U	2.0	U
9/13/2005	2.9	B	2.9	B
3/8/2006	5.0	U	2.5	U
9/18/2006	**24.0**		24.0	
3/22/2007	3.0	U	1.5	U
10/8/2007	5.0	U	2.5	U
4/23/2008	5.0	U	2.5	U
9/11/2008	5.0	U	2.5	U
11/12/2008	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
3/31/2010	NS			
9/28/2010	NS			
3/25/2011	NS			
9/21/2011	NS			



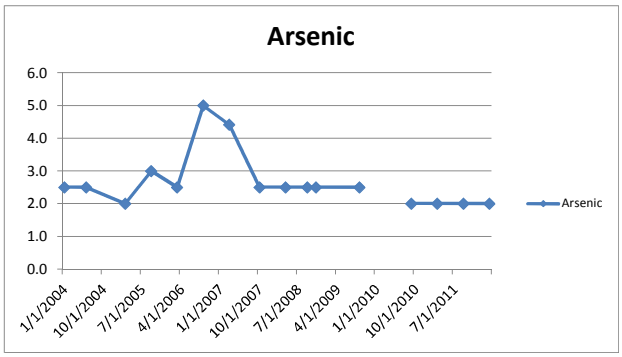
Monitoring Well 15GS71
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/22/2004	5.0	U	2.5	U
6/29/2004	5.0	U	2.5	U
3/14/2005	4.0	U	2.0	U
9/13/2005	4.7	B	4.7	B
3/8/2006	5.0	U	2.5	U
9/18/2006	10.0	U	5.0	U
3/22/2007	3.0	U	1.5	U
10/8/2007	5.0	U	2.5	U
4/23/2008	5.0	U	2.5	U
9/11/2008	5.0	U	2.5	U
11/12/2008	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
3/31/2010	NS			
9/28/2010	NS			
3/25/2011	NS			
9/21/2011	NS			



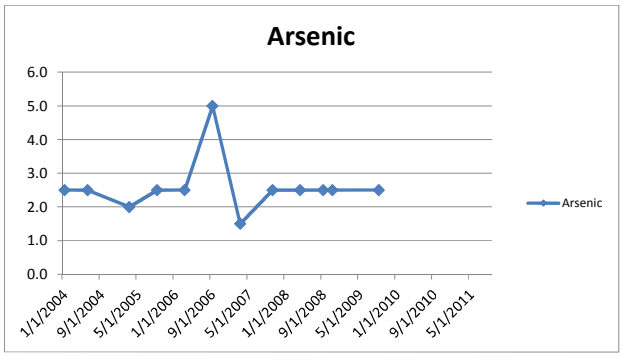
Monitoring Well 15MW72
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/22/2004	5.0	U	2.5	U
6/28/2004	5.0	U	2.5	U
3/14/2005	4.0	U	2.0	U
9/13/2005	3.0	B	3.0	B
3/8/2006	5.0	U	2.5	U
9/19/2006	10.0	U	5.0	U
3/22/2007	4.41		4.4	
10/8/2007	5.0	U	2.5	U
4/23/2008	5.0	U	2.5	U
9/11/2008	5.0	U	2.5	U
11/12/2008	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
3/31/2010	NS			
9/28/2010	4.0	U	2.0	U
3/25/2011	4.0	U	2.0	U
9/21/2011	4.0	U	2.0	U
3/21/2012	4.0	U	2.0	U



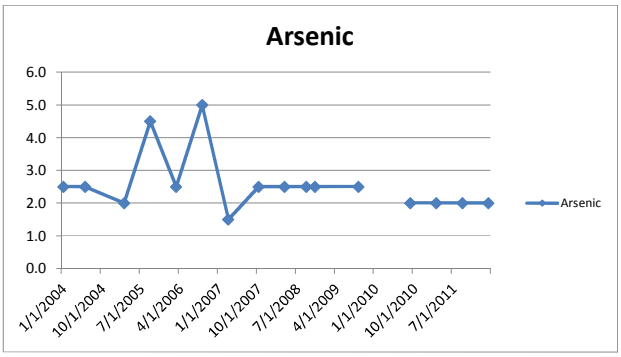
Monitoring Well 15MW73
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/21/2004	5.0	U	2.5	U
6/28/2004	5.0	U	2.5	U
3/14/2005	4.0	U	2.0	U
9/13/2005	5.0	U	2.5	U
3/8/2006	5.0	U	2.5	U
9/19/2006	10.0	U	5.0	U
3/22/2007	3.0	U	1.5	U
10/8/2007	5.0	U	2.5	U
4/23/2008	5.0	U	2.5	U
9/11/2008	5.0	U	2.5	U
11/12/2008	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
3/31/2010	NS			
9/28/2010	NS			
3/25/2011	NS			
9/21/2011	NS			



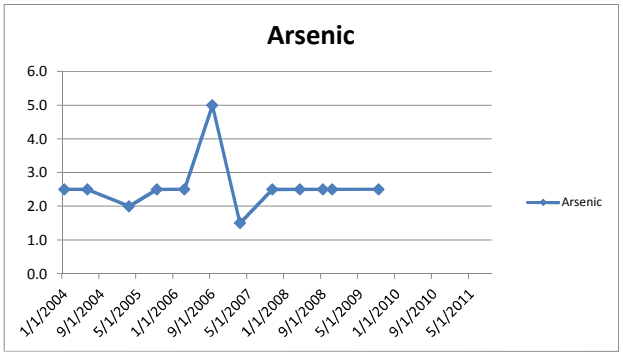
Monitoring Well 15MW74
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/22/2004	5.0	U	2.5	U
6/29/2004	5.0	U	2.5	U
3/14/2005	4.0	U	2.0	U
9/13/2005	4.5	B	4.5	B
3/9/2006	5.0	U	2.5	U
9/18/2006	10.0	U	5.0	U
3/22/2007	3.0	U	1.5	U
10/8/2007	5.0	U	2.5	U
4/24/2008	5.0	U	2.5	U
9/11/2008	5.0	U	2.5	U
11/12/2008	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
3/31/2010	NS			
9/28/2010	4.0	U	2.0	U
3/25/2011	4.0	U	2.0	U
9/21/2011	4.0	U	2.0	U
3/21/2012	4.0	U	2.0	U



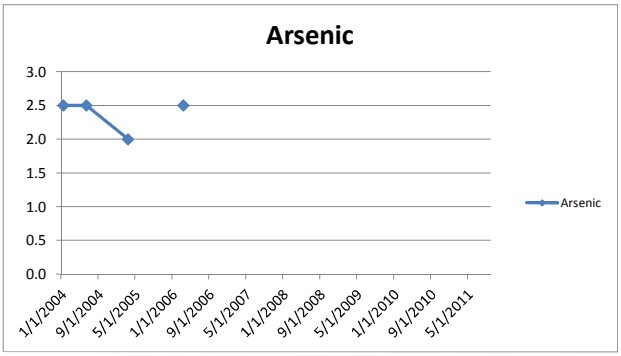
Monitoring Well 15MW75
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/22/2004	5.0	U	2.5	U
6/29/2004	5.0	U	2.5	U
3/14/2005	4.0	U	2.0	U
9/13/2005	5.0	U	2.5	U
3/9/2006	5.0	U	2.5	U
9/18/2006	10.0	U	5.0	U
3/22/2007	3.0	U	1.5	U
10/8/2007	5.0	U	2.5	U
4/24/2008	5.0	U	2.5	U
9/11/2008	5.0	U	2.5	U
11/12/2008	5.0	U	2.5	U
9/25/2009	5.0	U	2.5	U
3/31/2010	NS			
9/28/2010	NS			
3/25/2011	NS			
9/21/2011	NS			



Monitoring Well 15MW76
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Qual	Censored Result	Qual
1/22/2004	5.0	**U**	2.5	**U**
6/29/2004	5.0	**U**	2.5	**U**
3/14/2005	4.0	**U**	2.0	**U**
9/13/2005	NS			
3/9/2006	5.0	**U**	2.5	**U**
9/19/2006	CNL			
3/22/2007	CNL			
10/8/2007	CNL			
4/23/2008	CNL			
9/11/2008	CNL			
11/12/2008	CNL			
9/25/2009	CNL			
3/31/2010	CNL			
9/28/2010	CNL			
3/25/2011	CNL			
9/21/2011	CNL			



Mann-Kendall Trend Analysis
Groundwater Samples
Operable Unit 13
NAS Pensacola, Florida

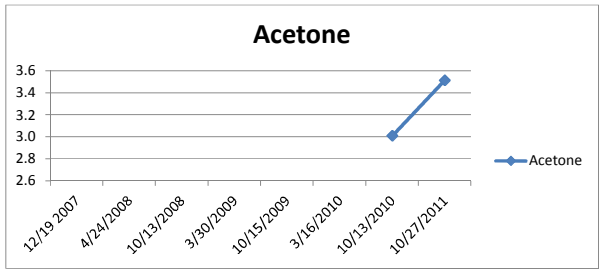
Sample Location ID	Acetone	Carbon Disulfide	Cymene-p	Bromodichloromethane	Chloroform	Dibromochloromethane	Methylene Chloride	Methyl-tert-butyl-ether	Tetrachloroethylene	Trichloroethylene
08GR01R	NT	NT	ND	ND	ND	ND	NT	ND	ND	NT
08GR02R	NT	ND	ND	ND	ND	ND	NT	ND	ND	ND
08GR03R	NT	ND	ND	ND	ND	ND	NT	ND	NT	ND
08GR05	NT	ND	ND	ND	ND	ND	NT	NT	NT	ND
08GR06R	NT	NT	ND	ND	ND	ND	NT	ND	ND	ND
24GS01	NT	ND	NT	ND	ND	ND	ND	ND	ND	ND
24GS02R	NT	ND	ND	ND	ND	ND	NT	ND	ND	ND
24GS06R	ND	ND	ND	ND	NT	NT	NT	ND	ND	ND
24GS09R	NT	ND	ND	NT	NT	NT	NT	ND	ND	ND
24GS10R	NT	ND	ND	ND	NT	ND	ND	ND	ND	ND
24GS11	NT	ND	ND	ND	ND	ND	NT	ND	ND	ND
24GS15	NT	ND	ND	ND	ND	ND	NT	ND	ND	ND

Notes:
ND = Not Detected
Mann-Kendall Analysis conducted using ProUCL version 4.1.01 (Lockheed Martin, May 2010)
NT = No Trend
I = Increasing
D = Decreasing

Monitoring Well 08GR01R
OU 13
NAS Pensacola, Pensacola Florida

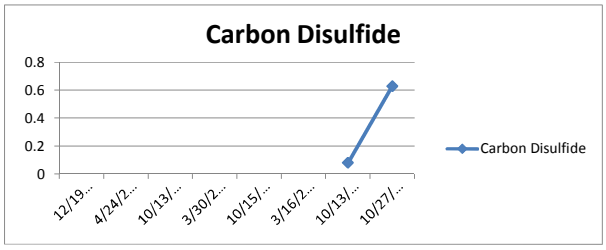
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	3.01	I	3.01	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed

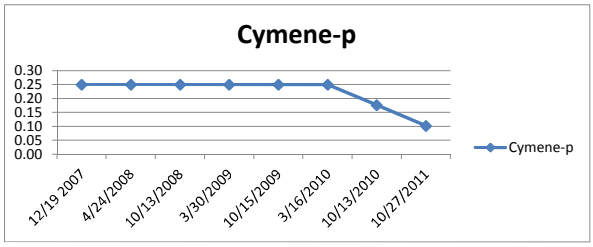


Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.16	U	0.08	U
10/27/2011	1.26	U	0.63	U

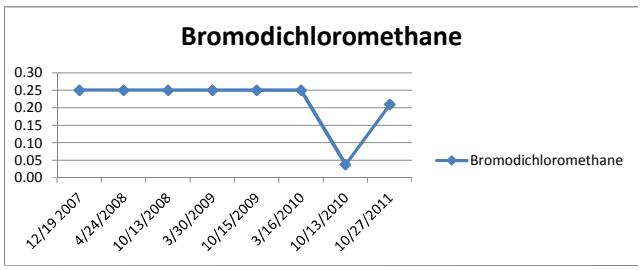
NA = Not Analyzed



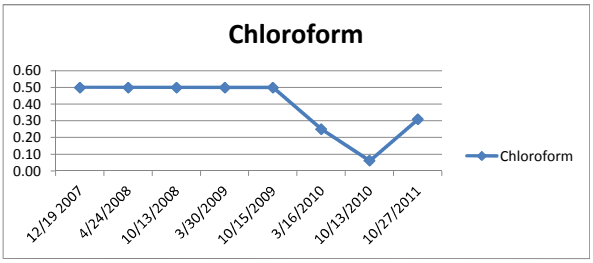
Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.203	U	0.10	U



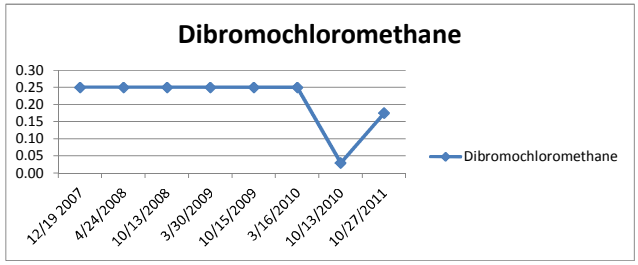
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.122	U	0.06	U
10/27/2011	0.62	U	0.31	U

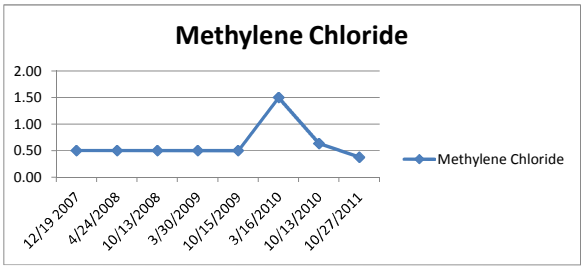


Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U

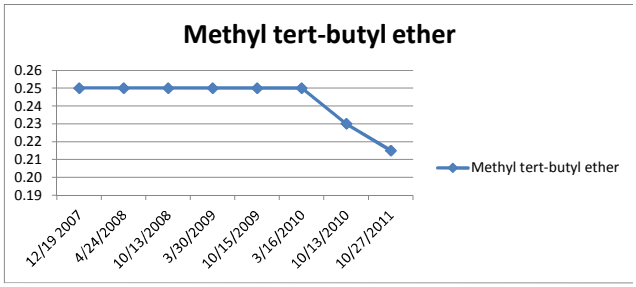


Monitoring Well 08GR01R
OU 13
NAS Pensacola, Pensacola Florida

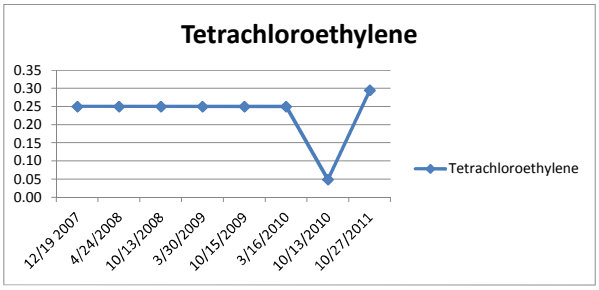
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.5	I	1.50	I
10/13/2010	1.27	U	0.64	U
10/27/2011	0.75	U	0.38	U



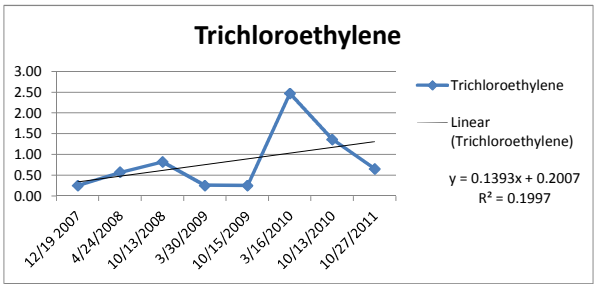
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.46	U	0.23	U
10/27/2011	0.43	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	U	0.30	U



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.57	I	0.57	I
10/13/2008	0.82	I	0.82	I
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	2.47	I	2.47	I
10/13/2010	1.36		1.36	
10/27/2011	0.65	I	0.65	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Trichloroethylene

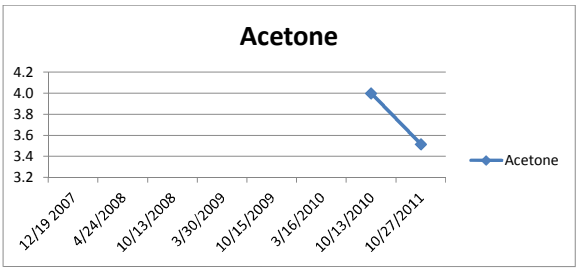
General Statistics	
Number of Values	8
Minimum	0.25
Maximum	2.47
Mean	0.828
Geometric Mean	0.596
Median	0.61
Standard Deviation	0.763
SEM	0.27
Mann-Kendall Test	
Test Value (S)	9
Tabulated p-value	0.119
Standard Deviation of S	7.853
Standardized Value of S	1.019
Approximate p-value	0.154

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR02R
OU 13
NAS Pensacola, Pensacola Florida

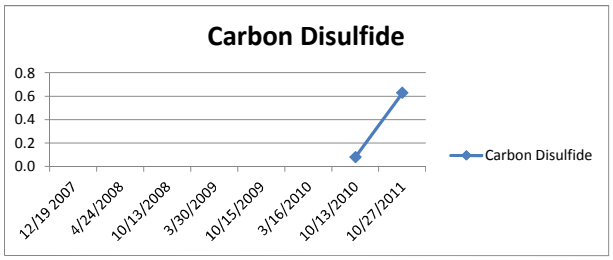
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	4.00	I	4.00	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



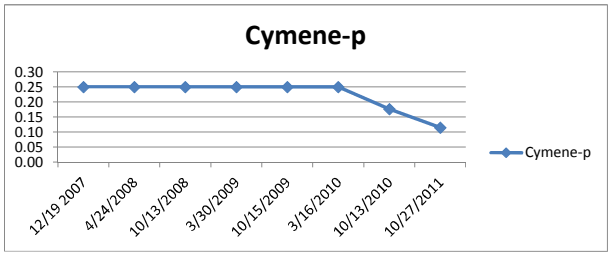
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.16	U	0.08	U
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

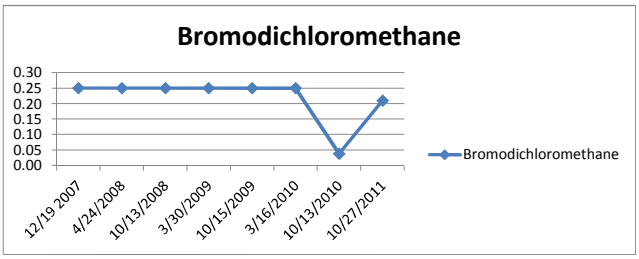


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

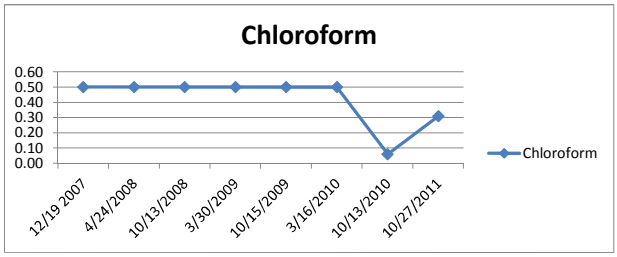
NA = Not Analyzed



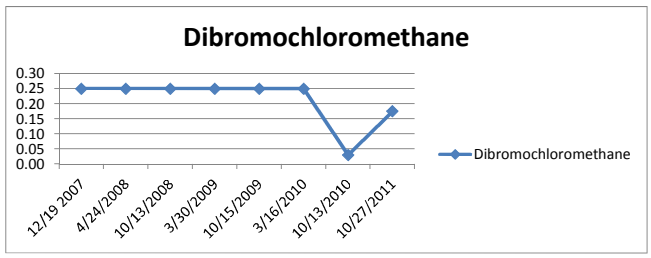
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	0.122	U	0.06	U
10/27/2011	0.620	U	0.31	U



Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U



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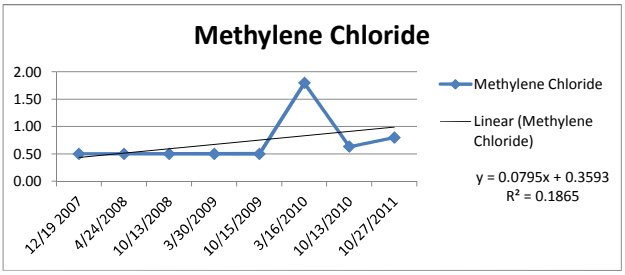
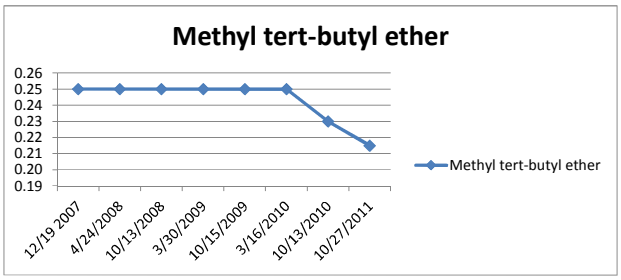
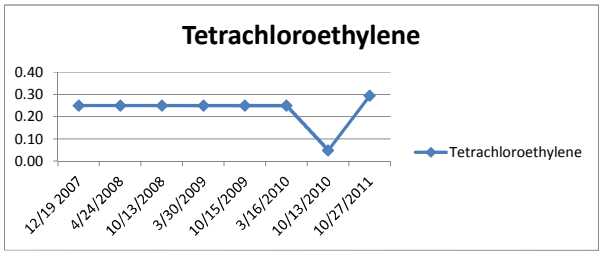
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.8	I	1.80	I
10/13/2010	1.27	U	0.64	U
10/27/2011	0.8	IV	0.80	IV



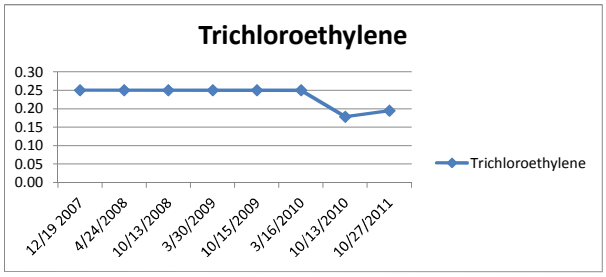
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.46	U	0.23	U
10/27/2011	0.43	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	U	0.30	U



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.390	U	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

General Statistics	
Number of Values	8
Minimum	0.5
Maximum	1.8
Mean	0.717
Geometric Mean	0.641
Median	0.5
Standard Deviation	0.451
SEM	0.159
Mann-Kendall Test	
Test Value (S)	14
Tabulated p-value	0.054
Standard Deviation of S	6.976
Standardized Value of S	1.863
Approximate p-value	0.0312

Insufficient evidence to identify a significant trend at the specified level of significance.

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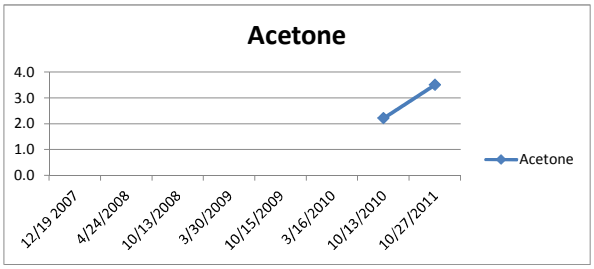
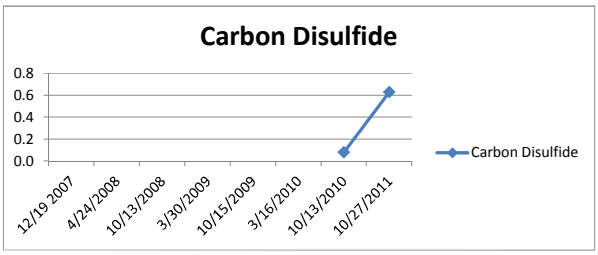
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	2.22	I	2.22	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



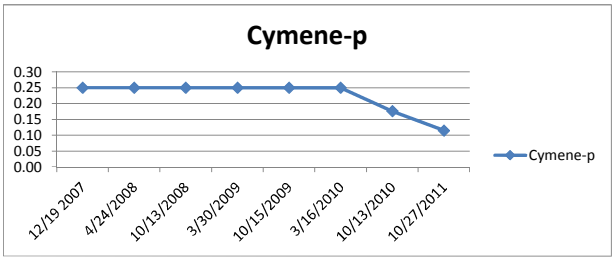
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.16	U	0.08	U
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

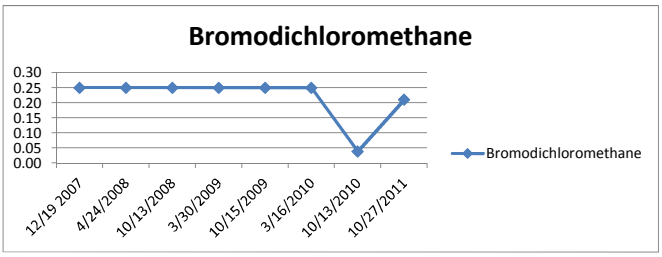


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

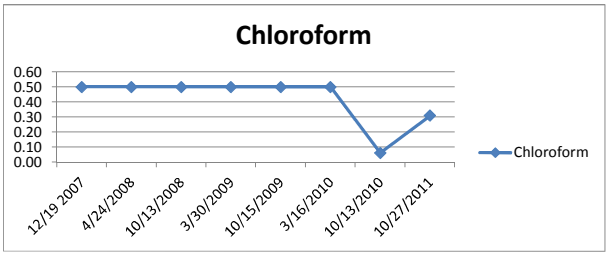
NA = Not Analyzed



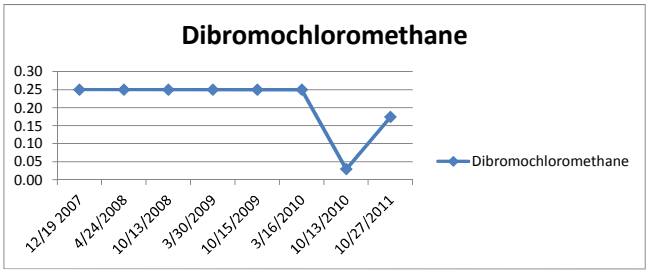
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	0.122	U	0.06	U
10/27/2011	0.620	U	0.31	U



Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U



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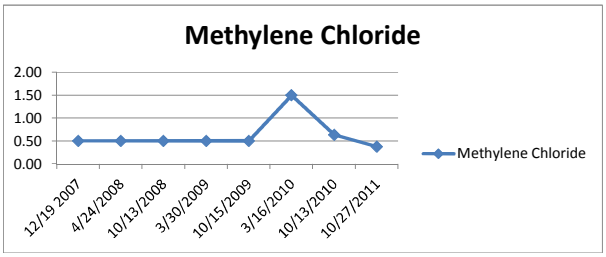
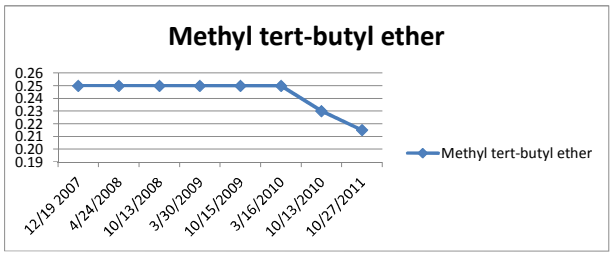
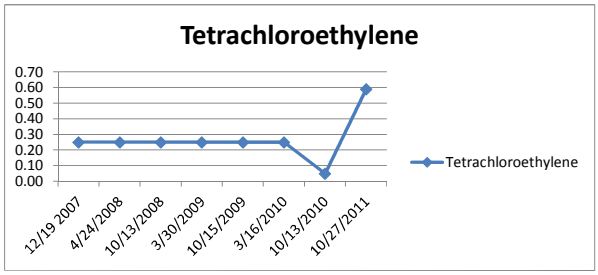
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.5	I	1.50	I
10/13/2010	1.27	U	0.64	U
10/27/2011	0.75	U	0.38	U



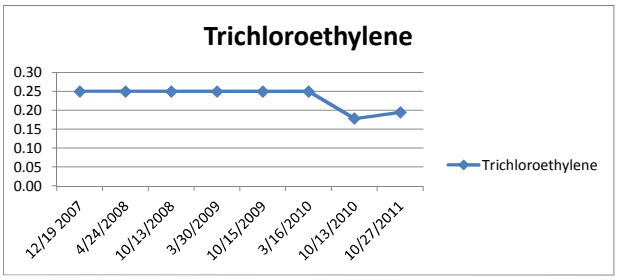
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.460	U	0.23	U
10/27/2011	0.430	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	I	0.59	I



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.390	U	0.20	U



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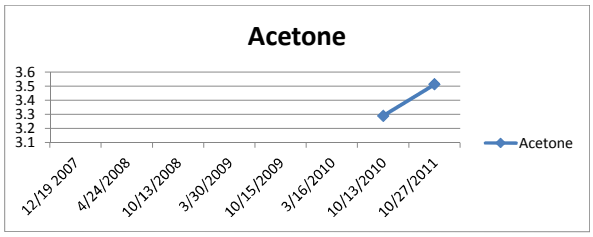
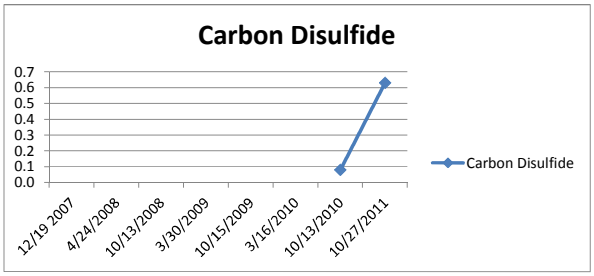
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	3.29	I	3.29	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



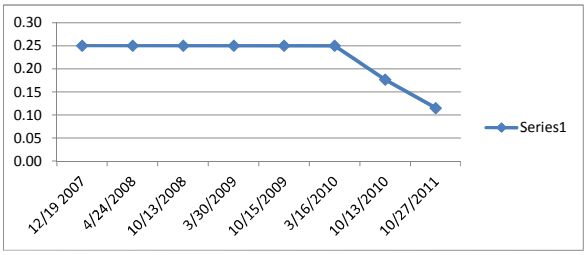
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.162	U	0.08	U
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

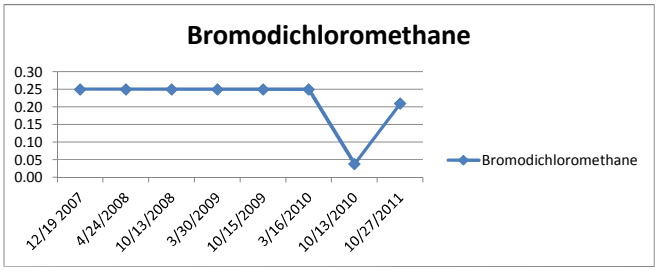


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

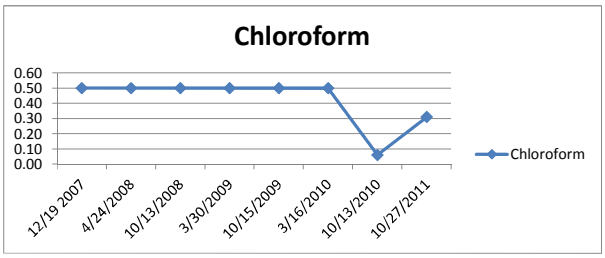
NA = Not Analyzed



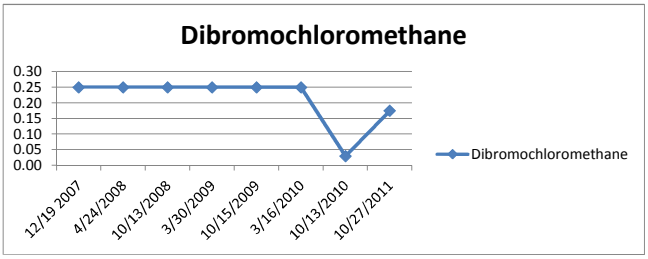
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	0.122	U	0.06	U
10/27/2011	0.620	U	0.31	U



Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U



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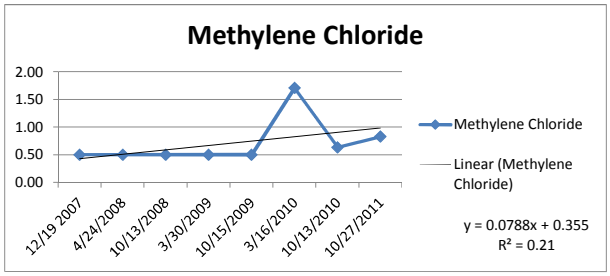
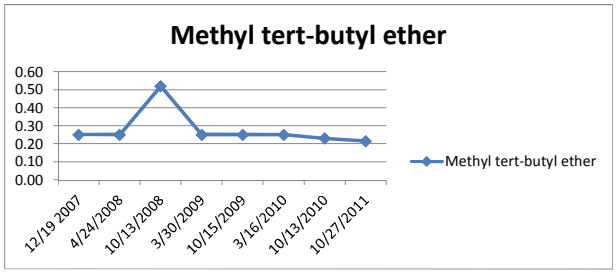
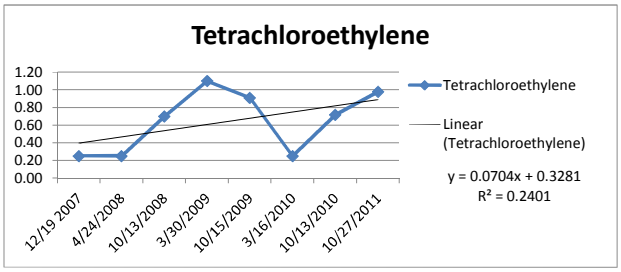
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.71	I	1.71	I
10/13/2010	1.27	U	0.64	U
10/27/2011	0.830	IV	0.83	IV



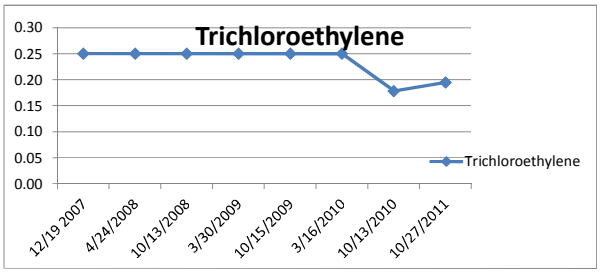
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.52	I	0.52	I
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.460	U	0.23	U
10/27/2011	0.430	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.7	I	0.70	I
3/30/2009	1.1	I	1.10	I
10/15/2009	0.91	I	0.91	I
3/16/2010	0.5	U	0.25	U
10/13/2010	0.718	I	0.72	I
10/27/2011	0.980	I	0.98	I



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.390	U	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

General Statistics	
Number of Values	8
Minimum	0.5
Maximum	1.71
Mean	0.709
Geometric Mean	0.64
Median	0.5
Standard Deviation	0.421
SEM	0.149
Mann-Kendall Test	
Test Value (S)	14
Tabulated p-value	0.054
Standard Deviation of S	6.976
Standardized Value of S	1.863
Approximate p-value	0.0312

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR05R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Tetrachloroethylene

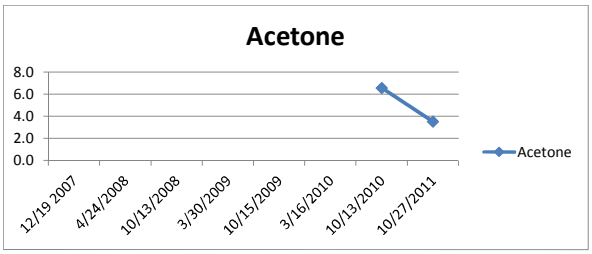
General Statistics	
Number of Values	8
Minimum	0.25
Maximum	1.1
Mean	0.645
Geometric Mean	0.544
Median	0.709
Standard Deviation	0.352
SEM	0.124
Mann-Kendall Test	
Test Value (S)	11
Tabulated p-value	0.138
Standard Deviation of S	7.853
Standardized Value of S	1.273
Approximate p-value	0.101

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR06R
OU 13
NAS Pensacola, Pensacola Florida

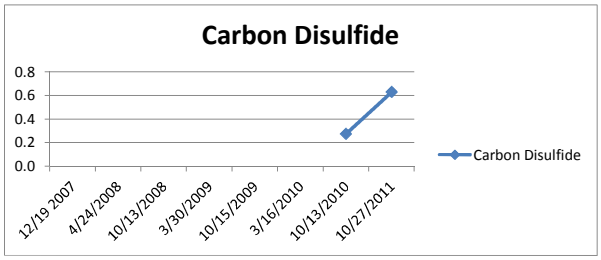
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	6.58	I	6.58	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



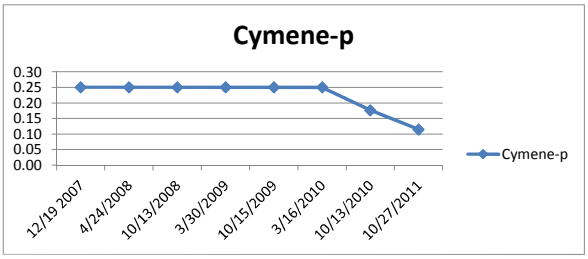
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.276	I	0.28	I
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

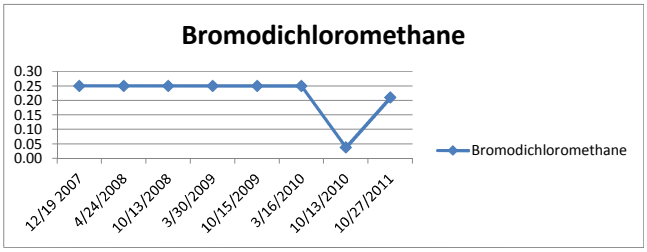


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

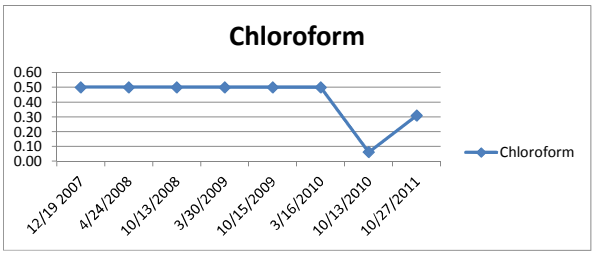
NA = Not Analyzed



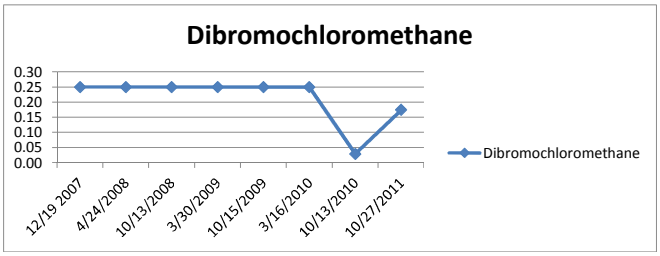
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	0.122	U	0.06	U
10/27/2011	0.62	U	0.31	U



Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U



Monitoring Well 08GR06R
OU 13
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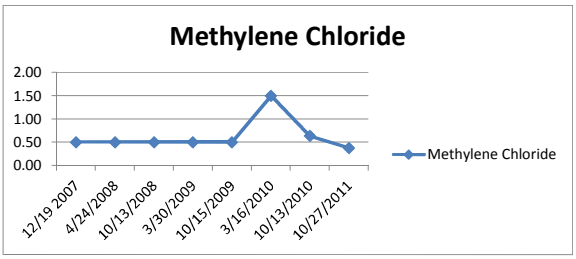
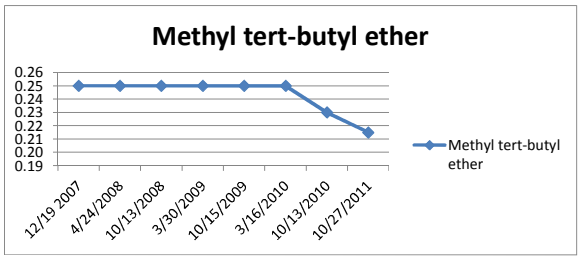
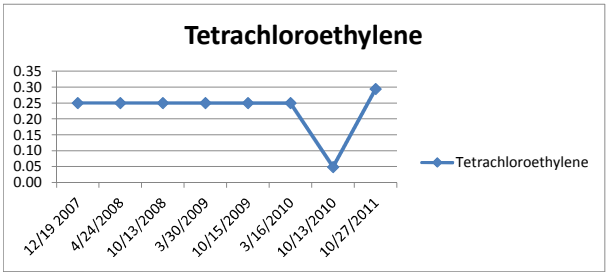
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.5	I	1.50	I
10/13/2010	1.27	U	0.64	U
10/27/2011	0.750	U	0.38	U



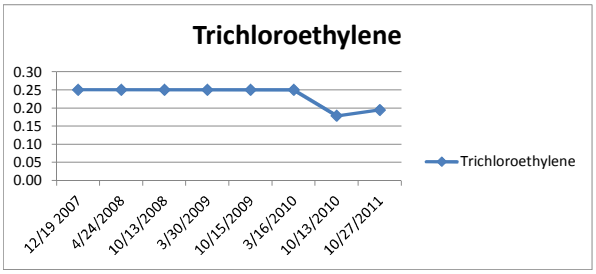
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.460	U	0.23	U
10/27/2011	0.430	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	U	0.30	U



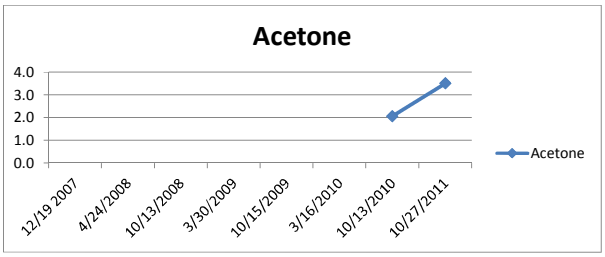
Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.390	U	0.20	U



Monitoring Well 24GS01
OU 13
NAS Pensacola, Pensacola Florida

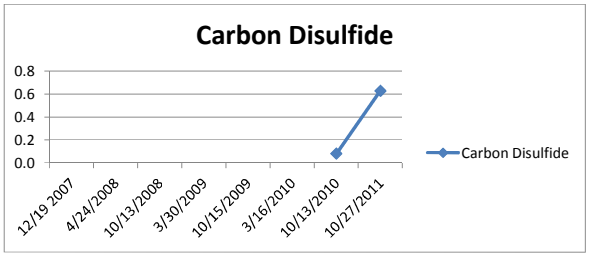
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	2.07	I	2.07	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



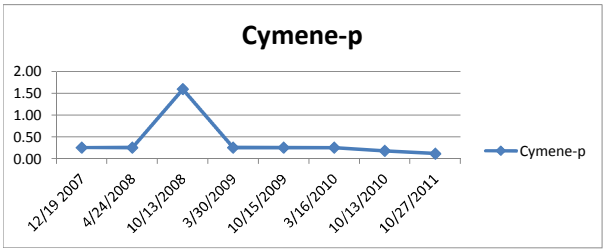
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.162	U	0.08	U
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

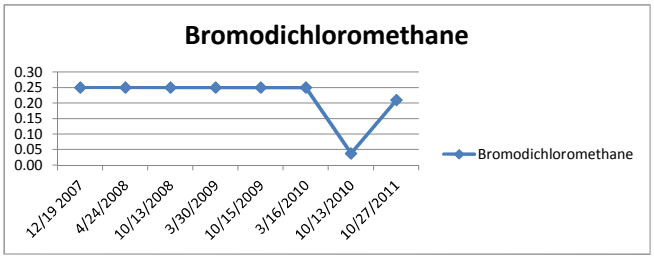


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	1.6	I	1.60	I
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

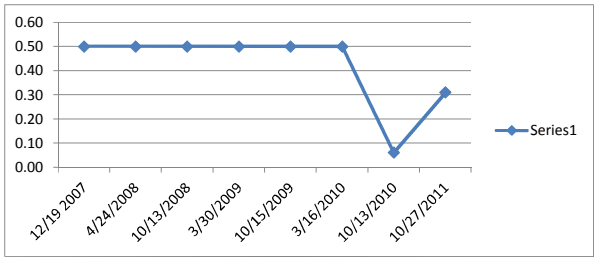
NA = Not Analyzed



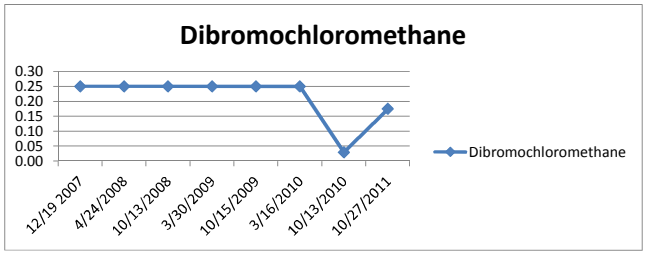
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	0.122	U	0.06	U
10/27/2011	0.620	U	0.31	U



Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U



Monitoring Well 24GS01
OU 13
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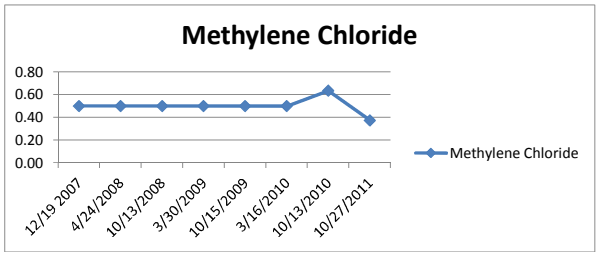
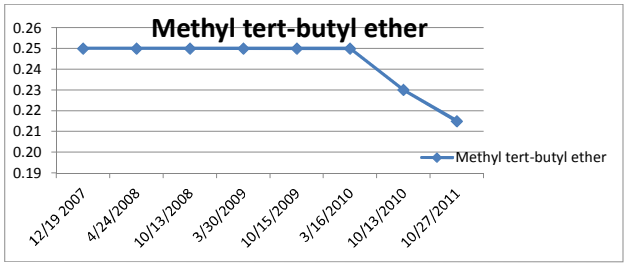
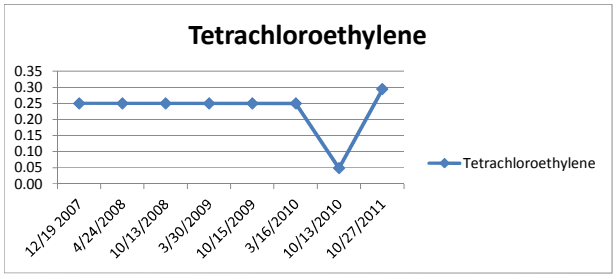
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	1.27	U	0.64	U
10/27/2011	0.75	U	0.38	U



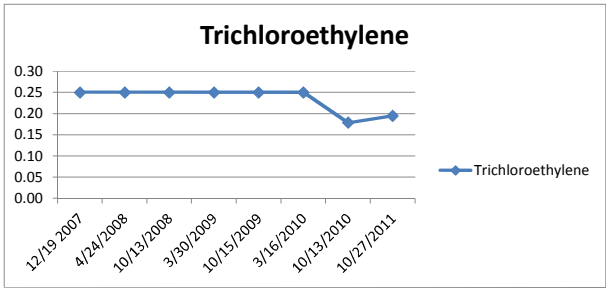
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.46	U	0.23	U
10/27/2011	0.430	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	U	0.30	U



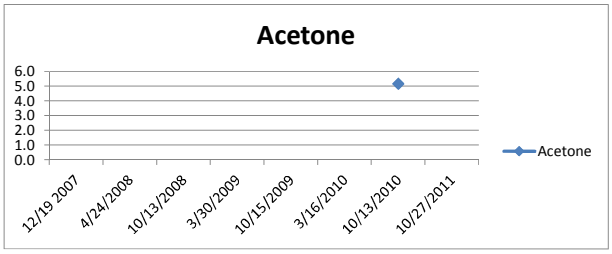
Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.390	U	0.20	U



Monitoring Well 24GS02R
OU 13
NAS Pensacola, Pensacola Florida

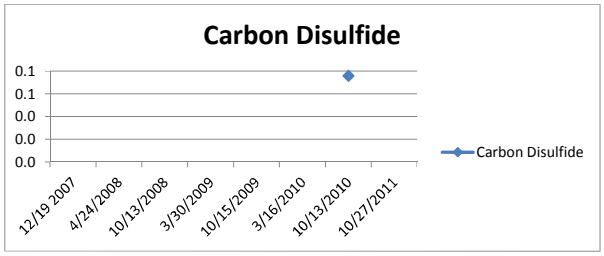
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	5.16	I	5.16	I
10/27/2011	NS			

NA = Not Analyzed
NS = Not Sampled



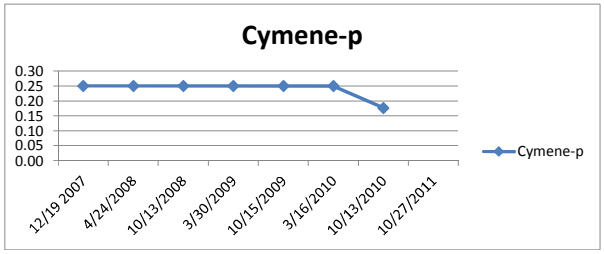
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.162	U	0.08	U
10/27/2011				

NA = Not Analyzed
NS = Not Sampled



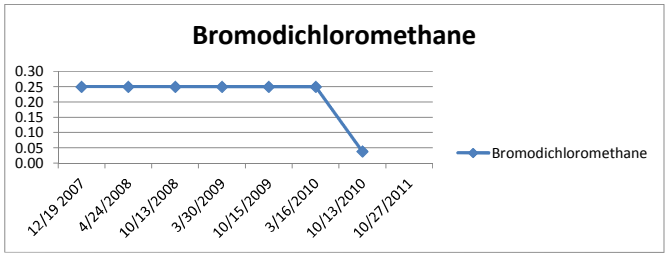
Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	NS			

NS = Not Sampled



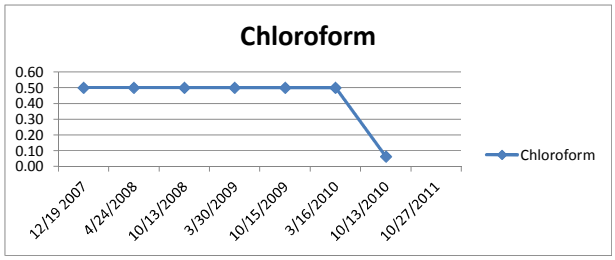
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	NS			

NS = Not Sampled



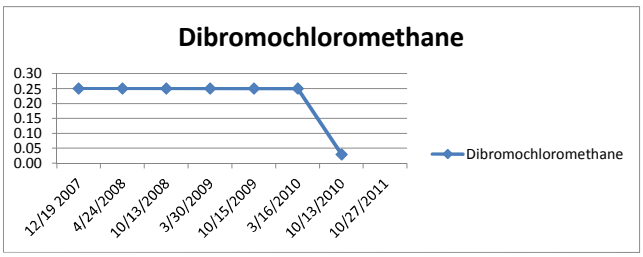
Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	0.122	U	0.06	U
10/27/2011	NS			

NS = Not Sampled



Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	NS			

NS = Not Sampled



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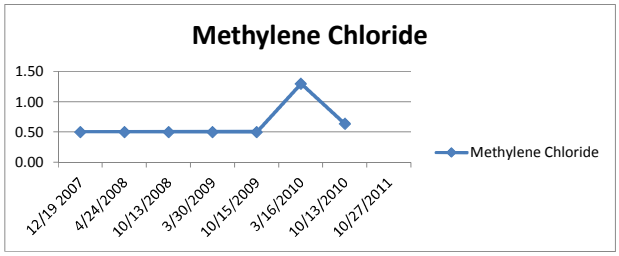
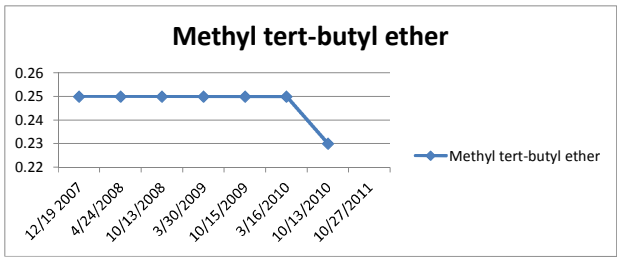
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.3	I	1.30	I
10/13/2010	1.27	U	0.64	U
10/27/2011	NS			

NS = Not Sampled



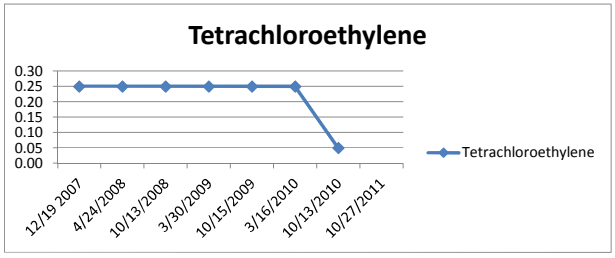
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.46	U	0.23	U
10/27/2011	NS			

NS = Not Sampled



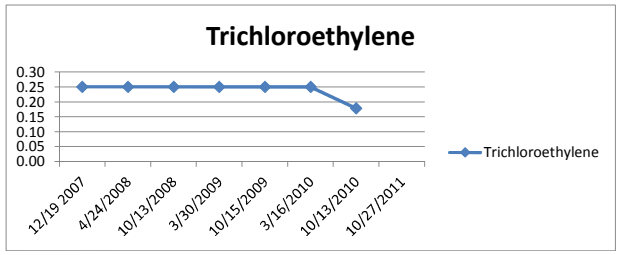
Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	NS			

NS = Not Sampled



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	NS			

NS = Not Sampled



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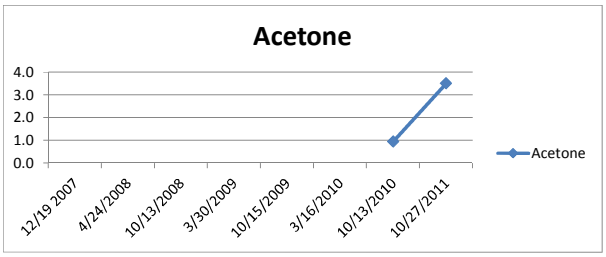
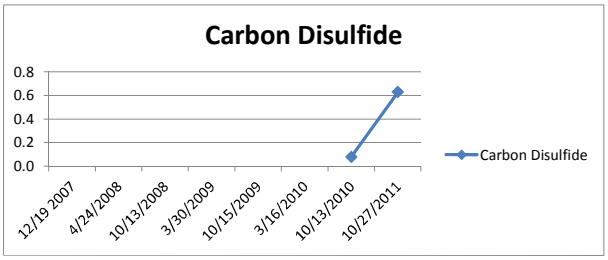
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	1.90	U	0.95	U
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



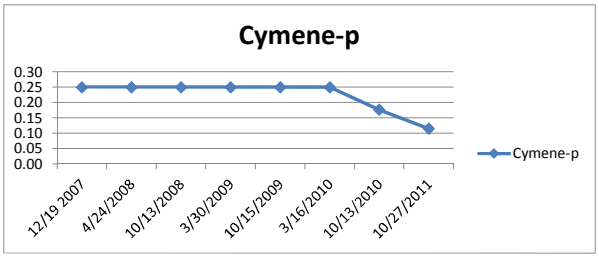
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.16	U	0.08	U
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

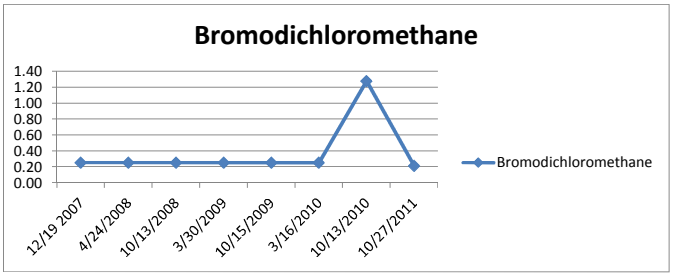


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

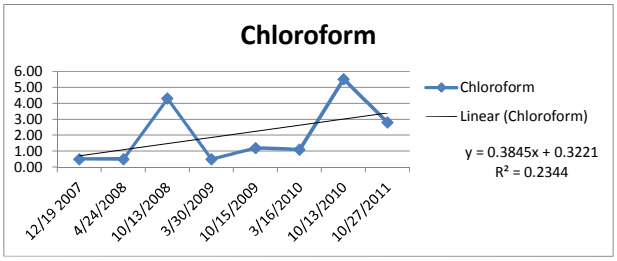
NA = Not Analyzed



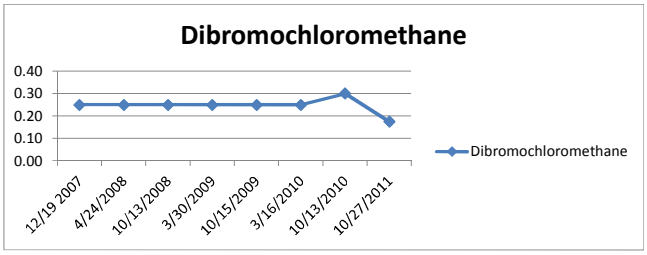
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	1.28		1.28	
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	4.3	I	4.30	I
3/30/2009	1.0	U	0.50	U
10/15/2009	1.2	I	1.20	I
3/16/2010	1.1	I	1.10	I
10/13/2010	5.52		5.52	
10/27/2011	2.80	I	2.80	I



Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.301	I	0.30	I
10/27/2011	0.350	U	0.18	U



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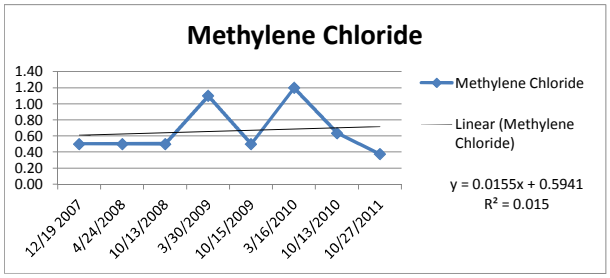
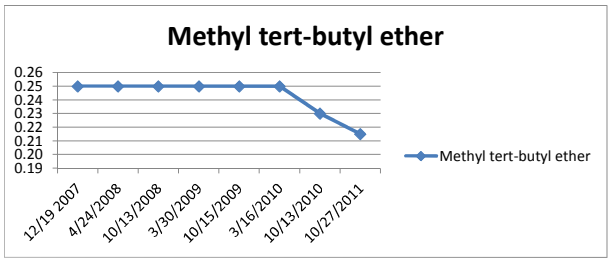
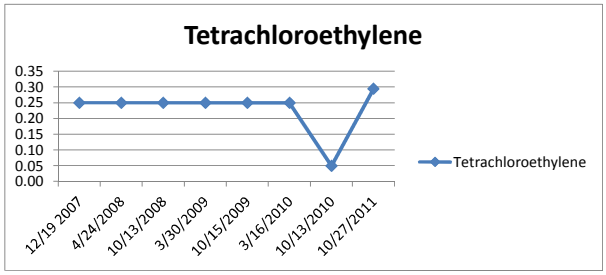
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.1	I	1.10	I
10/15/2009	1.0	U	0.50	U
3/16/2010	1.2	I	1.20	I
10/13/2010	1.27	U	0.64	U
10/27/2011	0.750	U	0.38	U



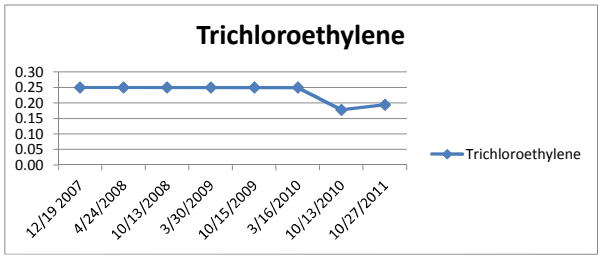
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.460	U	0.23	U
10/27/2011	0.430	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	U	0.30	U



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.390	U	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chloroform

General Statistics	
Number of Values	8
Minimum	0.5
Maximum	5.52
Mean	2.053
Geometric Mean	1.349
Median	1.15
Standard Deviation	1.946
SEM	0.688
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.089
Standard Deviation of S	7.853
Standardized Value of S	1.528
Approximate p-value	0.0632

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS06R
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

General Statistics	
Number of Values	8
Minimum	0.375
Maximum	1.2
Mean	0.664
Geometric Mean	0.612
Median	0.5
Standard Deviation	0.309
SEM	0.109
Mann-Kendall Test	
Test Value (S)	2
Tabulated p-value	0.452
Standard Deviation of S	7.528
Standardized Value of S	0.133
Approximate p-value	0.447

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS09R
OU 13
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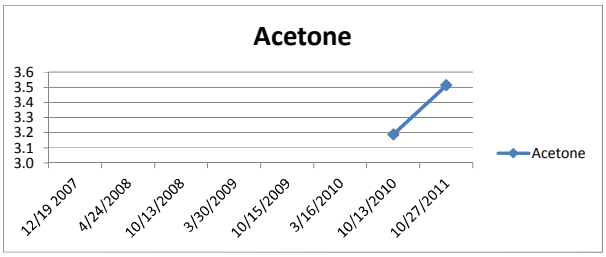
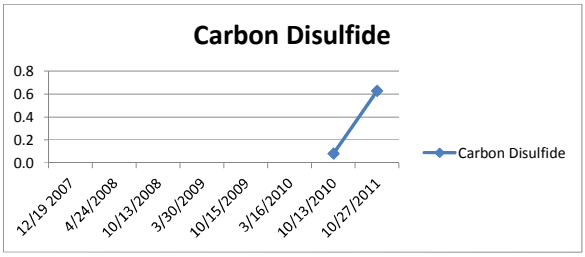
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	3.19	I	3.19	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



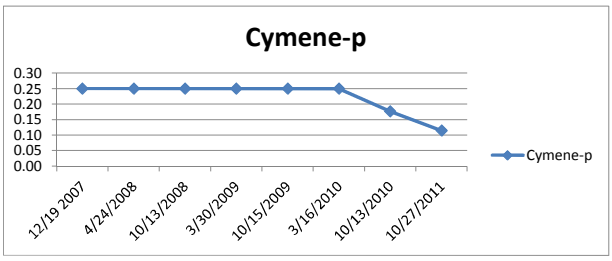
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.16	U	0.08	U
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

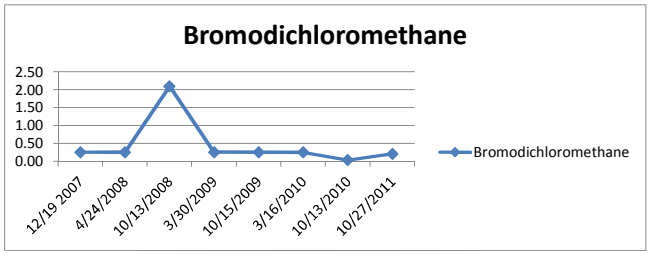


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

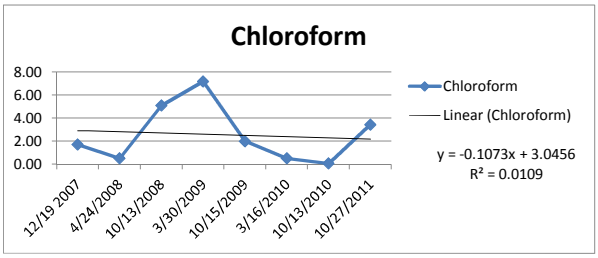
NA = Not Analyzed



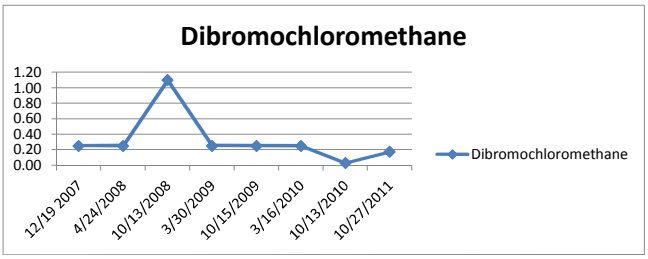
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	2.1	I	2.10	I
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.7	I	1.70	I
4/24/2008	1.0	U	0.50	U
10/13/2008	5.1		5.10	
3/30/2009	7.2		7.20	
10/15/2009	2.0	I	2.00	I
3/16/2010	1.0	U	0.50	U
10/13/2010	0.122	U	0.06	U
10/27/2011	3.44	I	3.44	I



Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	1.1	I	1.10	I
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U



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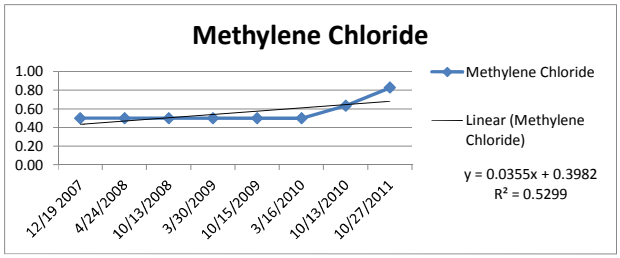
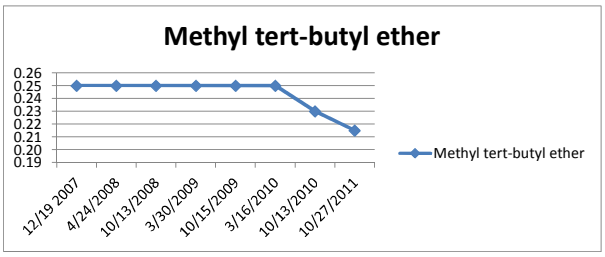
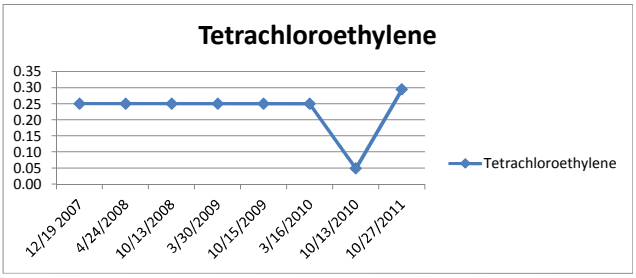
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	1.27	U	0.64	U
10/27/2011	0.83	IV	0.83	IV



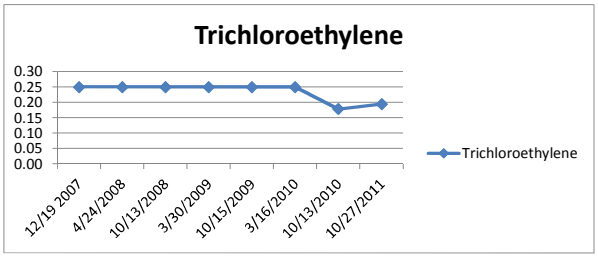
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.46	U	0.23	U
10/27/2011	0.43	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	U	0.30	U



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.390	U	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chloroform

General Statistics	
Number of Values	8
Minimum	0.061
Maximum	7.2
Mean	2.563
Geometric Mean	1.265
Median	1.85
Standard Deviation	2.522
SEM	0.892
Mann-Kendall Test	
Test Value (S)	-3
Tabulated p-value	0.452
Standard Deviation of S	8.021
Standardized Value of S	-0.249
Approximate p-value	0.402

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS09R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

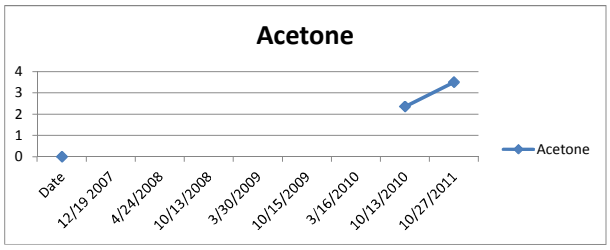
General Statistics	
Number of Values	8
Minimum	0.5
Maximum	0.83
Mean	0.558
Geometric Mean	0.549
Median	0.5
Standard Deviation	0.12
SEM	0.0423
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.089
Standard Deviation of S	6.083
Standardized Value of S	1.973
Approximate p-value	0.0243

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS10R
OU 13
NAS Pensacola, Pensacola Florida

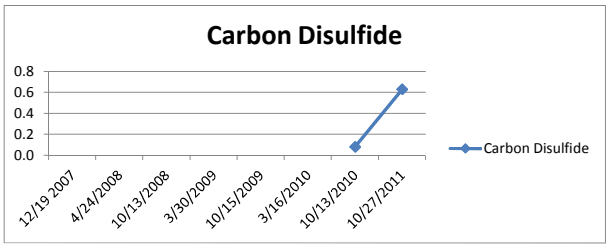
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	2.36	I	2.36	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



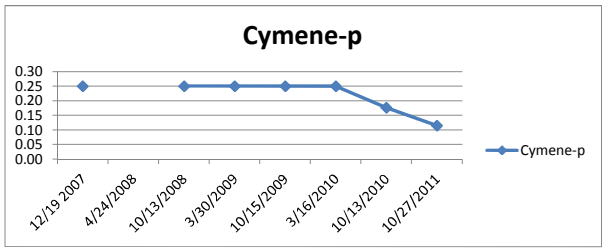
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.16	U	0.08	U
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

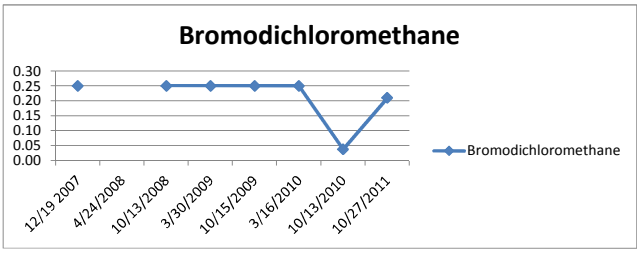


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	NA			
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

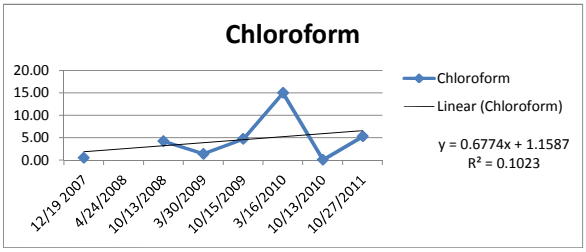
NA = Not Analyzed



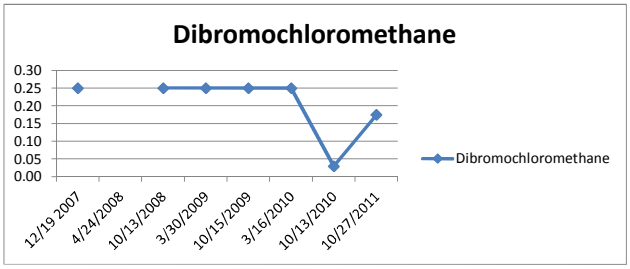
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	NA			
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	NA			
10/13/2008	4.2	I	4.20	I
3/30/2009	1.4	I	1.40	I
10/15/2009	4.7	I	4.70	I
3/16/2010	15		15.00	
10/13/2010	0.122	U	0.06	U
10/27/2011	5.28		5.28	

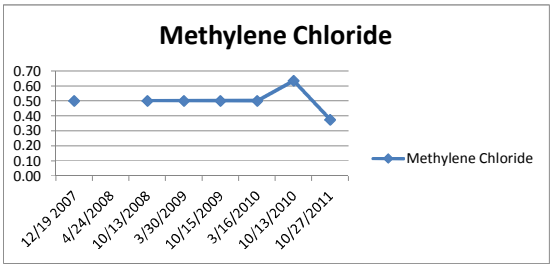


Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	NA			
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U

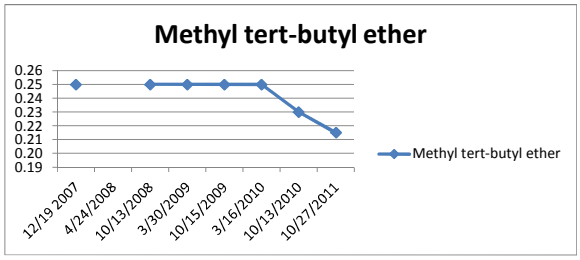


Monitoring Well 24GS10R
OU 13
NAS Pensacola, Pensacola Florida

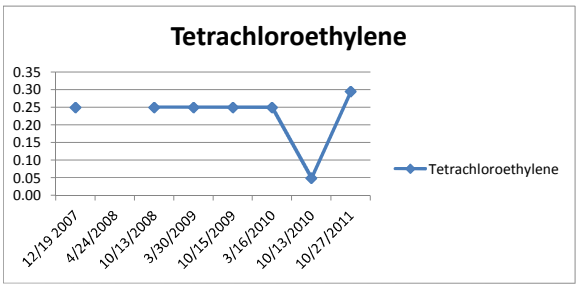
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	NA			
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	1.27	U	0.64	U
10/27/2011	0.750	U	0.38	U



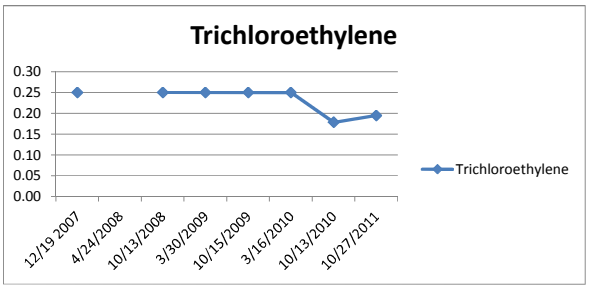
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	NA			
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.46	U	0.23	U
10/27/2011	0.43	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	NA			
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	U	0.30	U



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	NA			
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.39	U	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chloroform

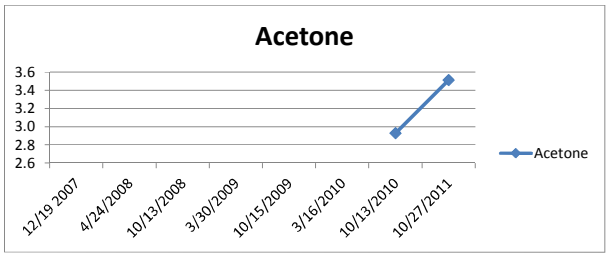
General Statistics	
Number of Values	7
Minimum	0.061
Maximum	15
Mean	4.449
Geometric Mean	1.822
Median	4.2
Standard Deviation	5.104
SEM	1.929
Mann-Kendall Test	
Test Value (S)	7
Tabulated p-value	0.191
Standard Deviation of S	6.658
Standardized Value of S	0.901
Approximate p-value	0.184

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS11
OU 13
NAS Pensacola, Pensacola Florida

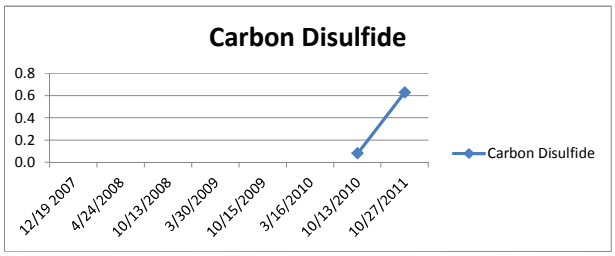
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	2.93	I	2.93	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



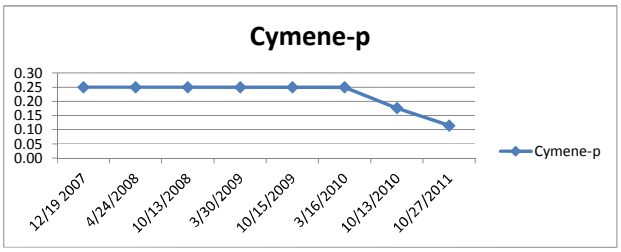
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.16	U	0.08	U
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

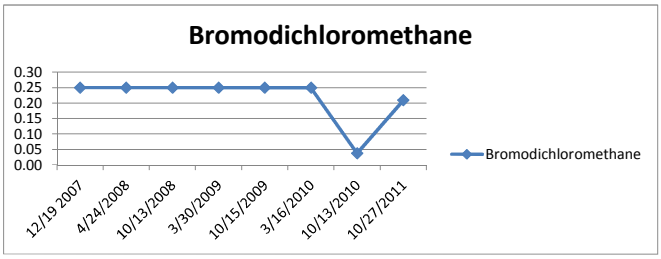


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

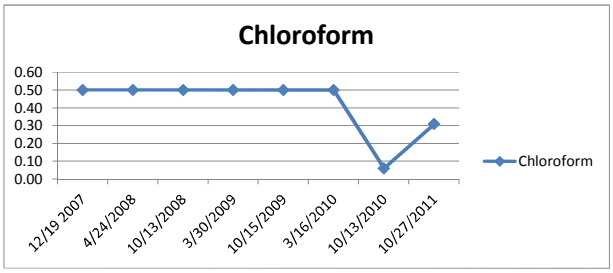
NA = Not Analyzed



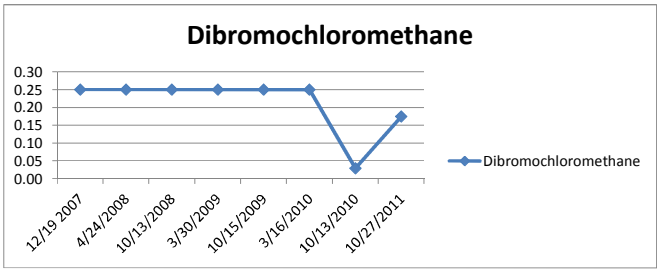
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	0.122	U	0.06	U
10/27/2011	0.62	U	0.31	U

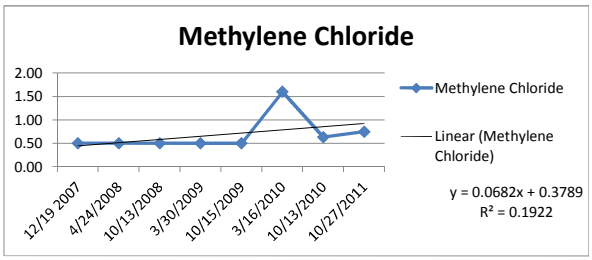


Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U

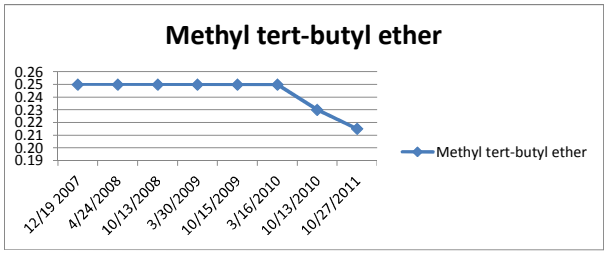


Monitoring Well 24GS11
OU 13
NAS Pensacola, Pensacola Florida

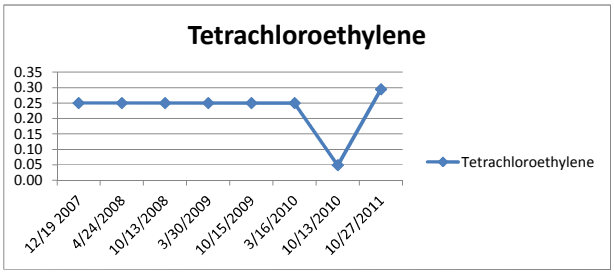
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.6	I	1.60	I
10/13/2010	1.27	U	0.64	U
10/27/2011	0.75	IV	0.75	IV



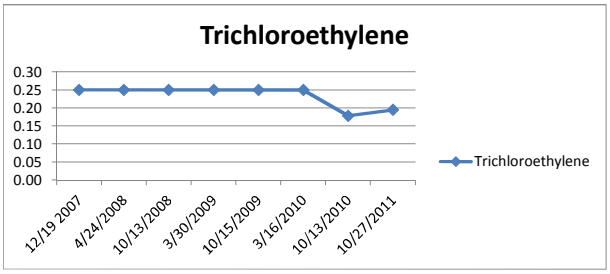
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.46	U	0.23	U
10/27/2011	0.43	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	U	0.30	U



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.390	U	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

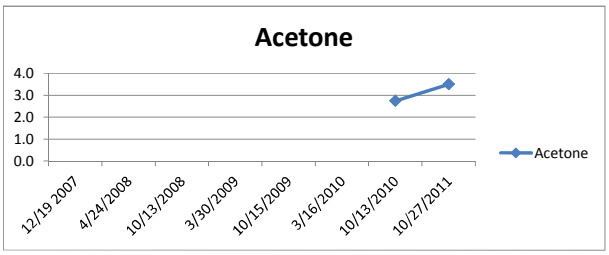
General Statistics	
Number of Values	8
Minimum	0.5
Maximum	1.6
Mean	0.686
Geometric Mean	0.627
Median	0.5
Standard Deviation	0.381
SEM	0.135
Mann-Kendall Test	
Test Value (S)	14
Tabulated p-value	0.054
Standard Deviation of S	6.976
Standardized Value of S	1.863
Approximate p-value	0.0312

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS15
OU 13
NAS Pensacola, Pensacola Florida

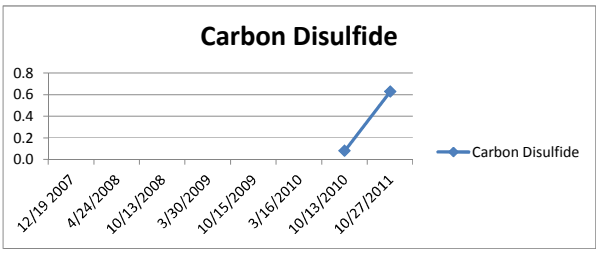
Acetone Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	2.75	I	2.75	I
10/27/2011	7.03	U	3.52	U

NA = Not Analyzed



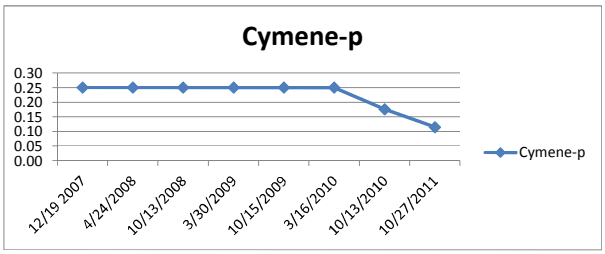
Carbon Disulfide Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	NA			
10/13/2010	0.16	U	0.08	U
10/27/2011	1.26	U	0.63	U

NA = Not Analyzed

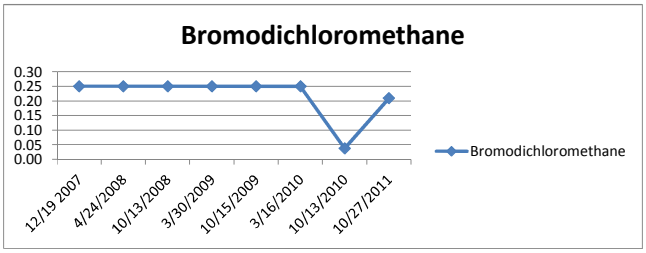


Cymene-p Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.353	U	0.18	U
10/27/2011	0.230	U	0.12	U

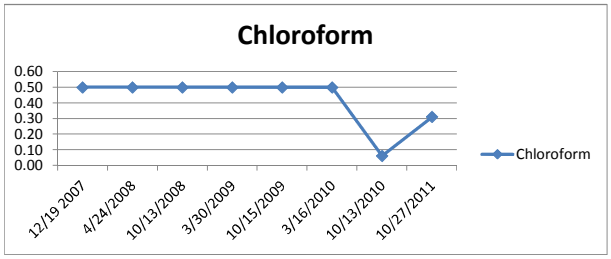
NA = Not Analyzed



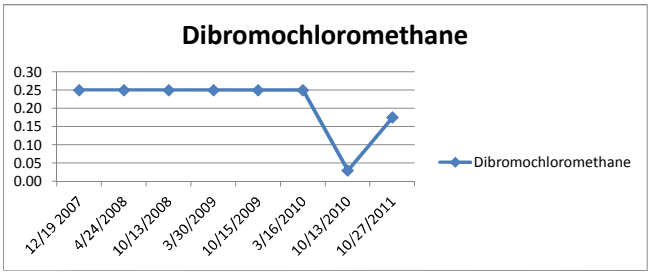
Bromodichloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.076	U	0.04	U
10/27/2011	0.420	U	0.21	U



Chloroform Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	0.122	U	0.06	U
10/27/2011	0.620	U	0.31	U

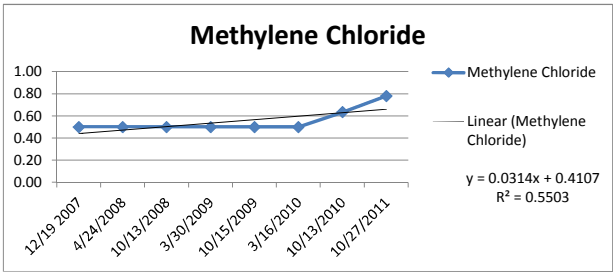


Dibromochloromethane Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.059	U	0.03	U
10/27/2011	0.350	U	0.18	U

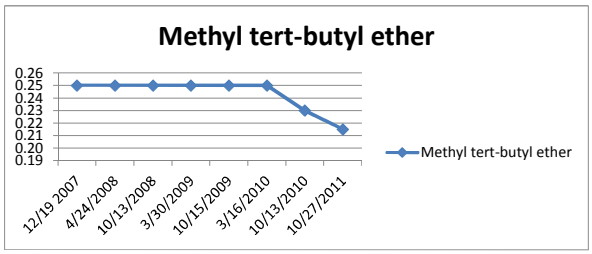


Monitoring Well 24GS15
OU 13
NAS Pensacola, Pensacola Florida

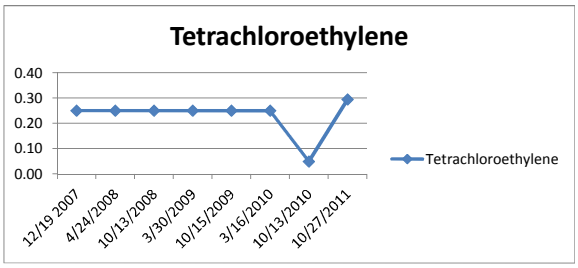
Methylene Chloride Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	1.0	U	0.50	U
4/24/2008	1.0	U	0.50	U
10/13/2008	1.0	U	0.50	U
3/30/2009	1.0	U	0.50	U
10/15/2009	1.0	U	0.50	U
3/16/2010	1.0	U	0.50	U
10/13/2010	1.27	U	0.64	U
10/27/2011	0.78	IV	0.78	IV



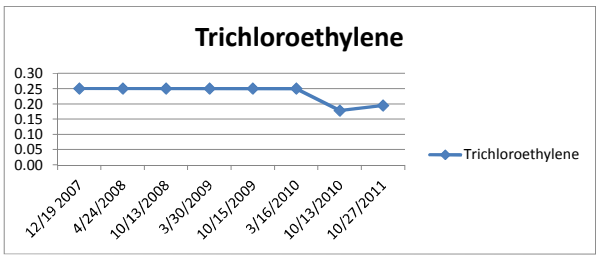
Methyl tert-butyl ether Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.46	U	0.23	U
10/27/2011	0.43	U	0.22	U



Tetrachloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.098	U	0.05	U
10/27/2011	0.590	U	0.30	U



Trichloroethylene Date	Validated Result	Qual	Censored Result	Qual
12/19 2007	0.5	U	0.25	U
4/24/2008	0.5	U	0.25	U
10/13/2008	0.5	U	0.25	U
3/30/2009	0.5	U	0.25	U
10/15/2009	0.5	U	0.25	U
3/16/2010	0.5	U	0.25	U
10/13/2010	0.357	U	0.18	U
10/27/2011	0.390	U	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

General Statistics	
Number of Values	8
Minimum	0.5
Maximum	0.78
Mean	0.552
Geometric Mean	0.545
Median	0.5
Standard Deviation	0.104
SEM	0.0366
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.089
Standard Deviation of S	6.083
Standardized Value of S	1.973
Approximate p-value	0.0243

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Analysis
Groundwater Samples
Operable Unit 13
NAS Pensacola, Florida

Sample Location ID	4,4-DDD	4,4-DDE	4,4-DDT	Aldrin	Alpha-BHC	Alpha-Chlordane	Beta-BHC	Heptachlor Epoxide	Chlordane	Delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan Sulfate
08GR01R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	NT	ND	ND	ND
08GR02R	ND	ND	NT	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
08GR03R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
08GR05	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
08GR06R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS02R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS06R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS09R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS10R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
ND = Not Detected
Mann-Kendall Analysis conducted using ProUCL version 4.1.01 (Lockheed Martin, May 2010)
NT = No Trend

Mann-Kendall Trend Analysis
Groundwater Samples
Operable Unit 13
NAS Pensacola, Florida

Sample Location ID	Endrin	Endrin Ketone	Endrin Aldehyde	Gamma-BHC	Gamma-chlordane	Heptachlor	Methoxychlor	Toxaphene	Alachor	Chlorobezilate	Isodrin
08GR01R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
08GR02R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
08GR03R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
08GR05	ND	ND	ND	ND	NT	ND	ND	ND	ND	ND	ND
08GR06R	ND	ND	ND	ND	NT	ND	ND	ND	ND	ND	ND
24GS01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS02R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS06R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS09R	ND	ND	ND	ND	NT	ND	ND	ND	ND	ND	ND
24GS10R	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
24GS15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Notes:
ND = Not Dete
Mann-Kendall
NT = No Trend

Monitoring Well 08GR01R
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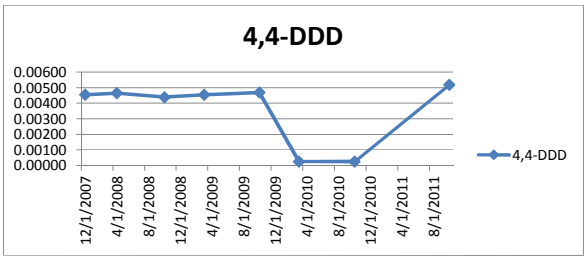
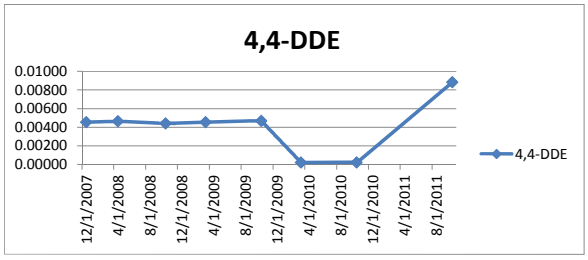
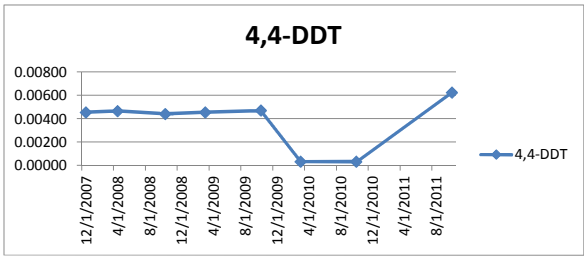
4,4-DDD	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0088	U	0.00440	U
3/30/2009	0.0091	U	0.00455	U
10/15/2009	0.0094	U	0.00470	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0104	U	0.00520	U



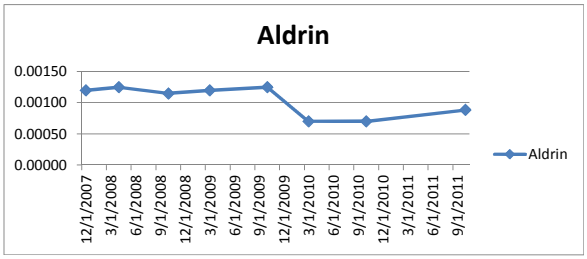
4,4-DDE	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0088	U	0.00440	U
3/30/2009	0.0091	U	0.00455	U
10/15/2009	0.0094	U	0.00470	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0177	U	0.00885	U



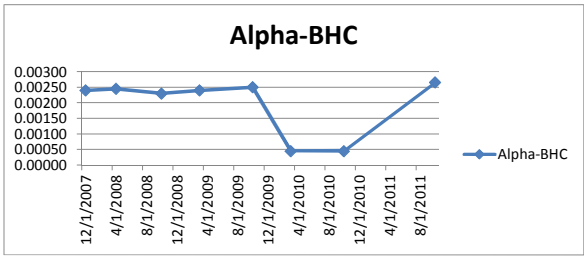
4,4-DDT	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0088	U	0.00440	U
3/30/2009	0.0091	U	0.00455	U
10/15/2009	0.0094	U	0.00470	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0125	U	0.00625	U



Aldrin	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00177	U	0.00089	U

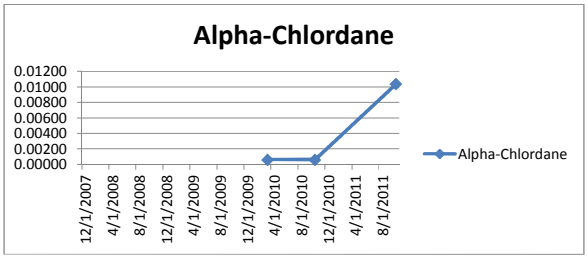


Alpha-BHC	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0046	U	0.00230	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0050	U	0.00250	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00531	U	0.00266	U



Alpha-Chlordane	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0208	U	0.01040	U

NA = Not Analyzed



Monitoring Well 08GR01R
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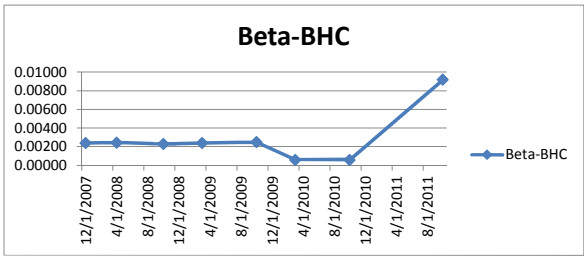
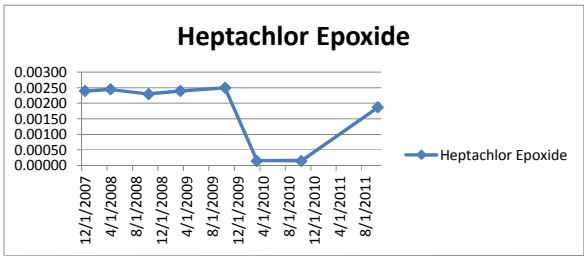
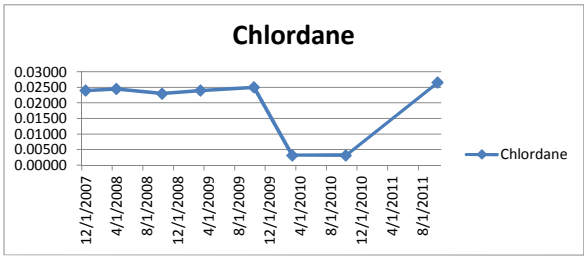
Beta-BHC	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0046	U	0.00230	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0050	U	0.00250	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0184	U	0.00920	U



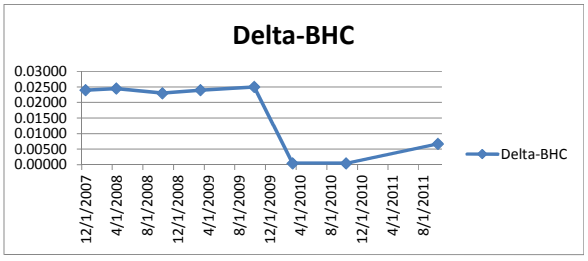
Heptachlor Epoxide	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0046	U	0.00230	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0050	U	0.00250	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00375	U	0.00188	U



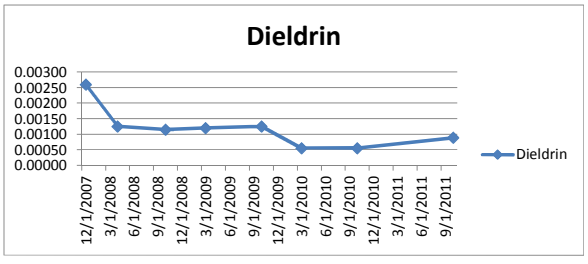
Chlordane	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0531	U	0.02655	U



Delta-BHC	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0135	U	0.00675	U



Dieldrin	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0026	I	0.00260	I
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00177	U	0.00089	U



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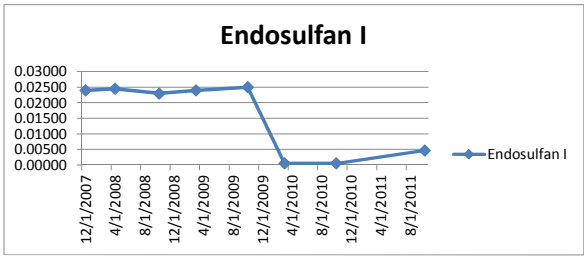
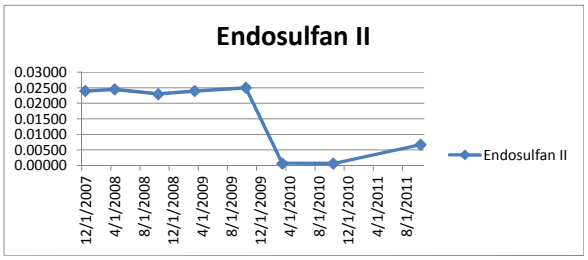
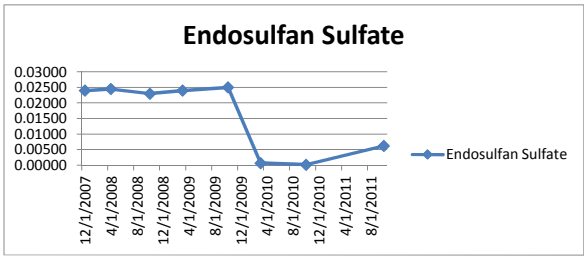
Endosulfan I	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00938	U	0.00469	U



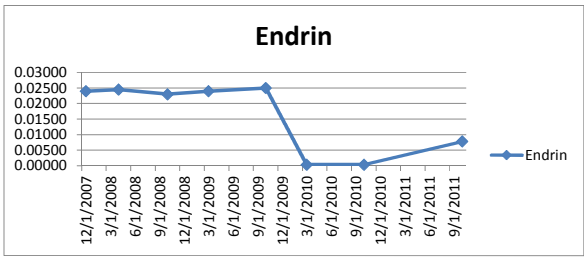
Endosulfan II	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0135	U	0.00675	U



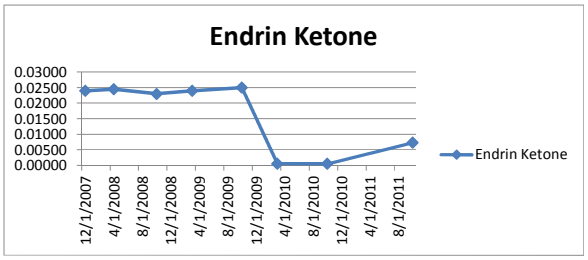
Endosulfan Sulfate	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0125	U	0.00625	U



Endrin	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0156	U	0.00780	U



Endrin Ketone	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0146	U	0.00730	U



Monitoring Well 08GR01R
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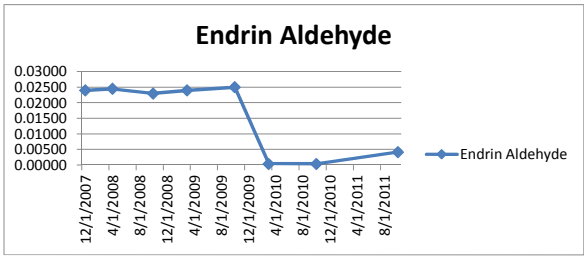
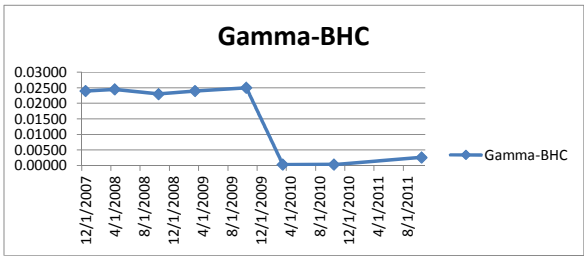
Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00833	U	0.00417	U

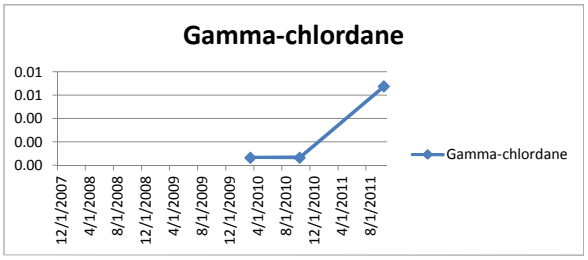


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00521	U	0.00261	U

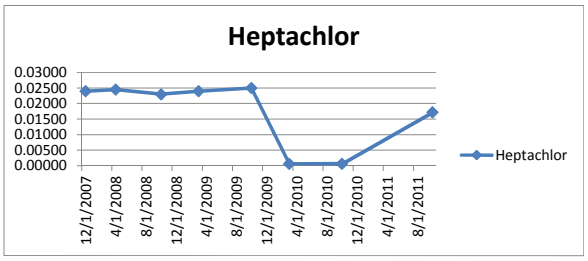


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0135	U	0.00675	U

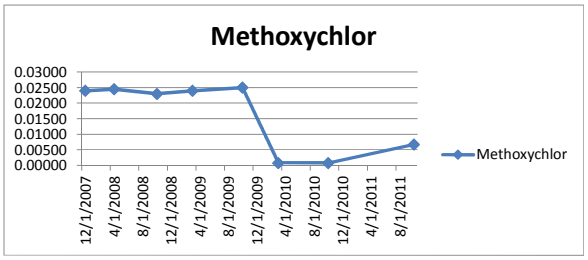
NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0344	U	0.01720	U



Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0135	U	0.00675	U



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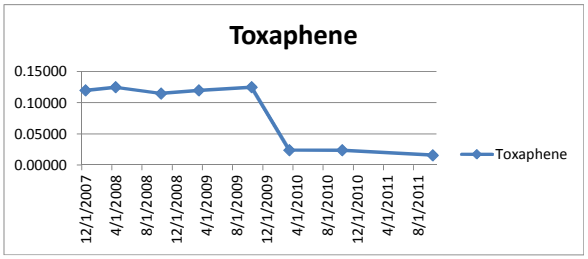
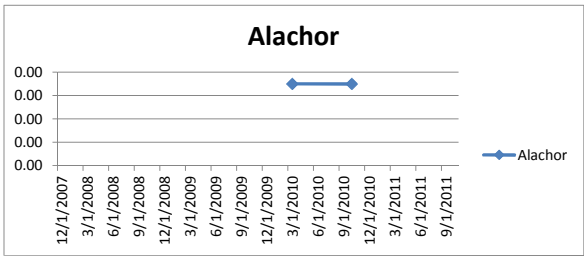
Toxaphene	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.24	U	0.12000	U
4/24/2008	0.25	U	0.12500	U
10/13/2008	0.23	U	0.11500	U
3/30/2009	0.24	U	0.12000	U
10/15/2009	0.25	U	0.12500	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	0.0313	U	0.01565	U



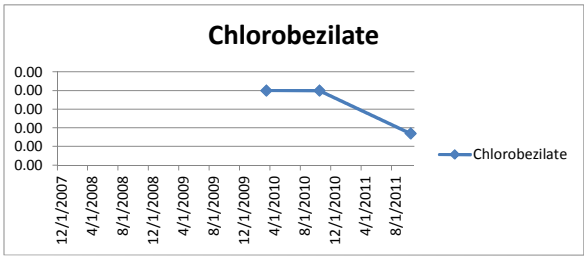
Alachor	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



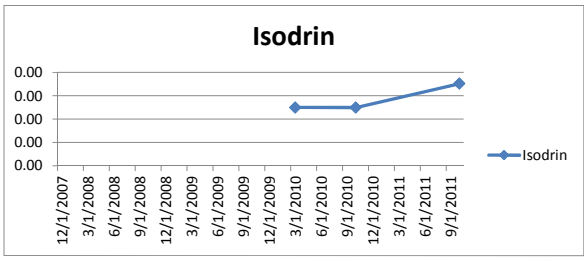
Chlorobezilate	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00177	U	0.00089	U

NA = Not Analyzed



Isodrin	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00141	U	0.00071	U

NA = Not Analyzed



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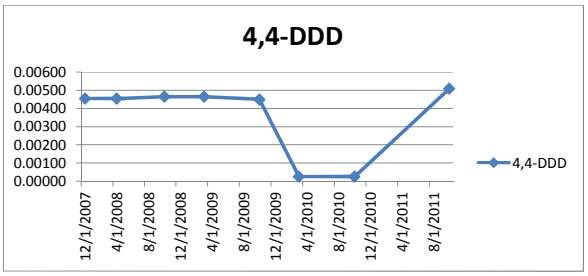
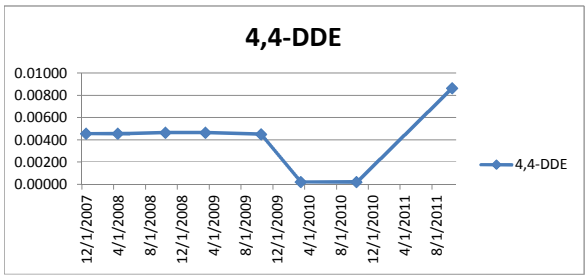
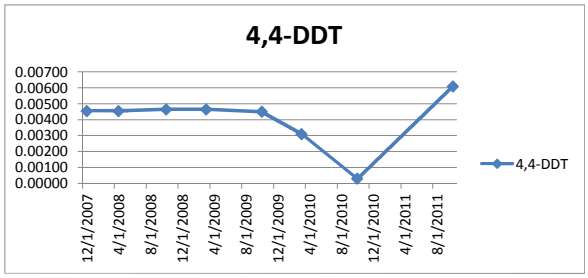
4,4-DDD	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0091	U	0.00455	U
10/13/2008	0.0093	U	0.00465	U
3/30/2009	0.0093	U	0.00465	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0102	U	0.00510	U



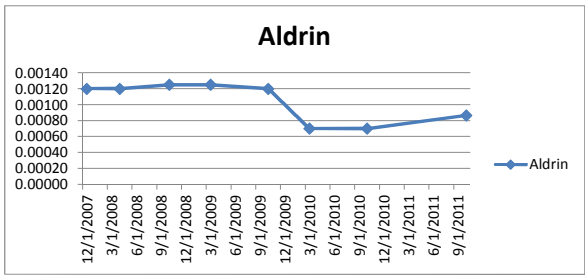
4,4-DDE	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0091	U	0.00455	U
10/13/2008	0.0093	U	0.00465	U
3/30/2009	0.0093	U	0.00465	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0173	U	0.00865	U



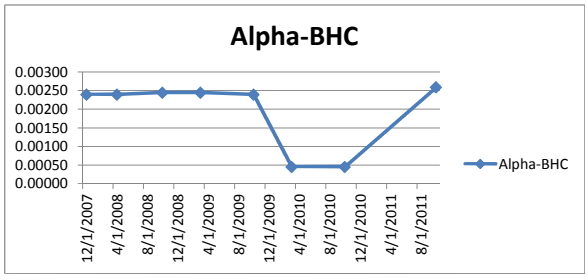
4,4-DDT	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0091	U	0.00455	U
10/13/2008	0.0093	U	0.00465	U
3/30/2009	0.0093	U	0.00465	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0031	I	0.00310	I
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0122	U	0.00610	U



Aldrin	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0025	U	0.00125	U
3/30/2009	0.0025	U	0.00125	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00173	U	0.00087	U



Alpha-BHC	Validated		Censored	
Date	Result	Qual	Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0048	U	0.00240	U
10/13/2008	0.0049	U	0.00245	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00518	U	0.00259	U



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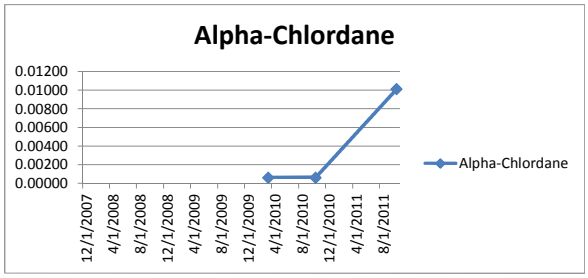
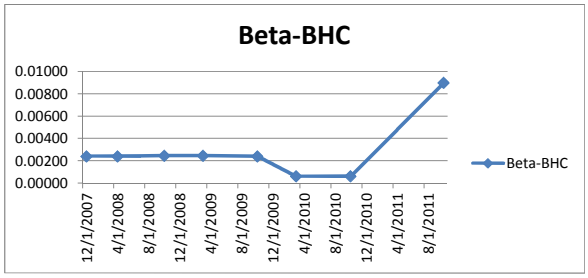
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0203	U	0.01015	U

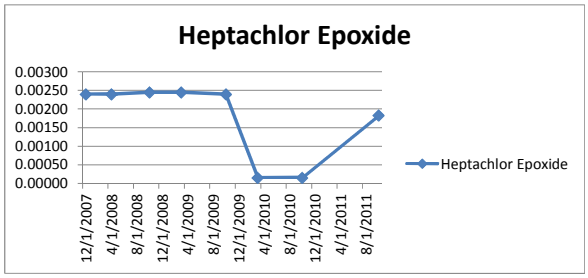
NA = Not Analyzed



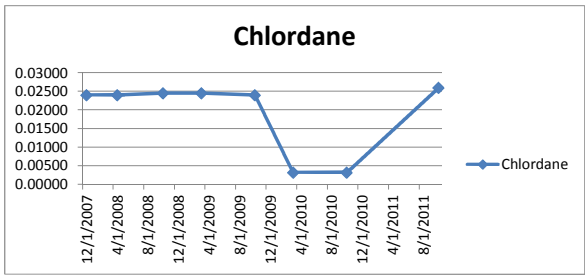
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0048	U	0.00240	U
10/13/2008	0.0049	U	0.00245	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0180	U	0.00900	U



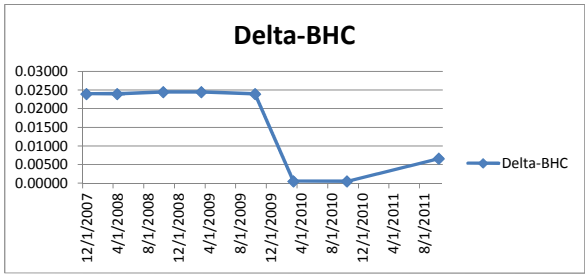
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0048	U	0.00240	U
10/13/2008	0.0049	U	0.00245	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00365	U	0.00183	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0518	U	0.02590	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0132	U	0.00660	U



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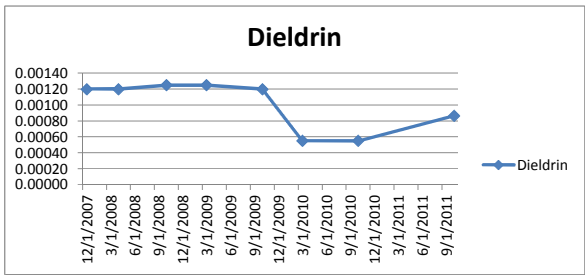
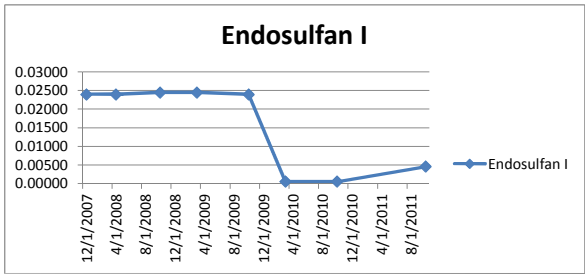
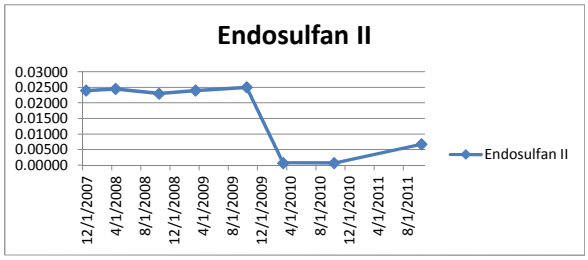
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0025	U	0.00125	U
3/30/2009	0.0025	U	0.00125	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00173	U	0.00087	U



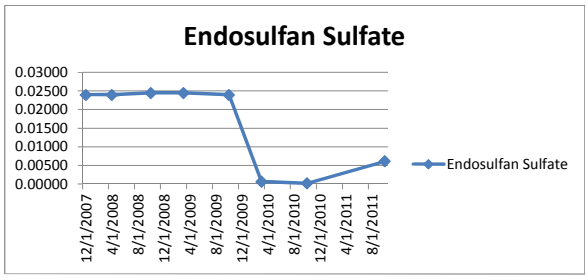
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00914	U	0.00457	U



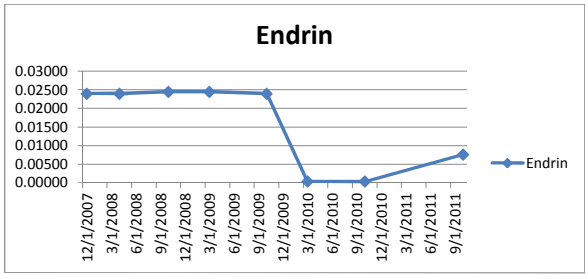
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0135	U	0.00675	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0122	U	0.00610	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0152	U	0.00760	U



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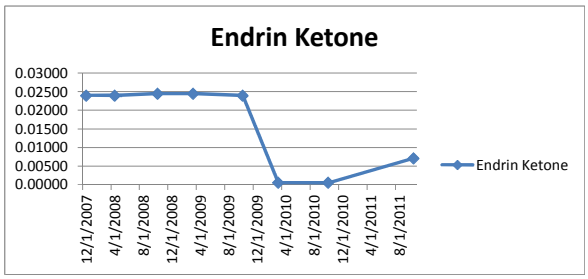
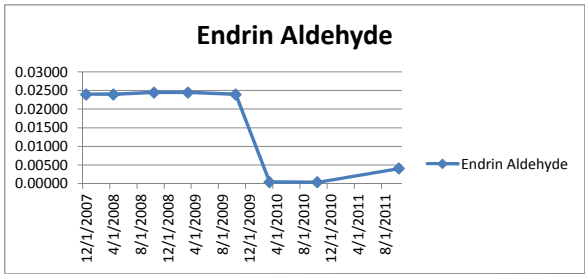
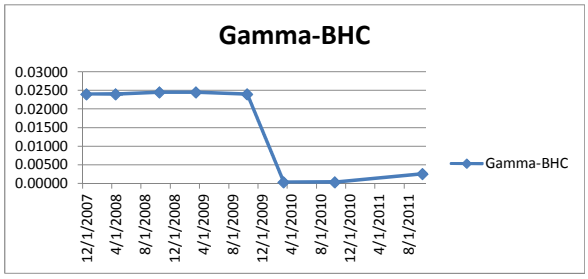
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0142	U	0.00710	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00812	U	0.00406	U

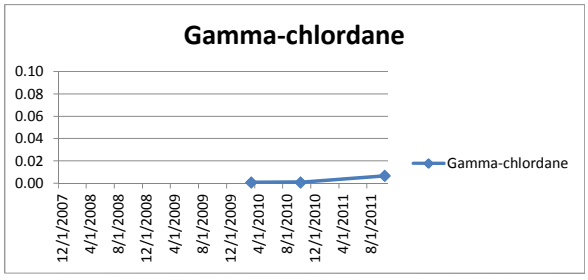


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00508	U	0.00254	U

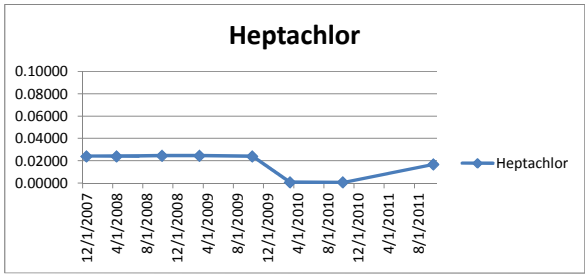


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0132	U	0.00660	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0335	U	0.01675	U



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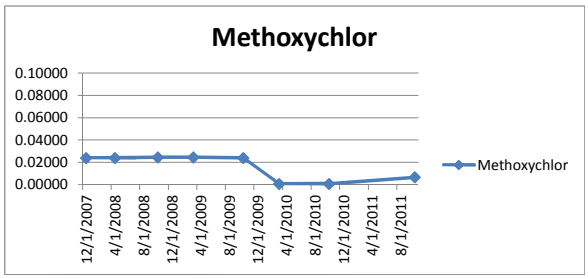
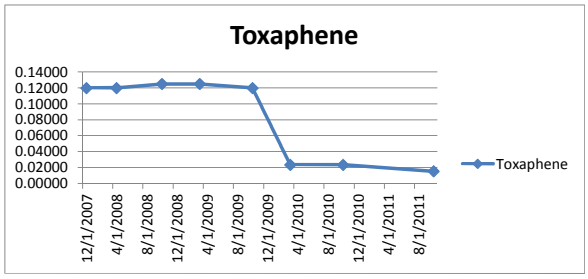
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0132	U	0.00660	U

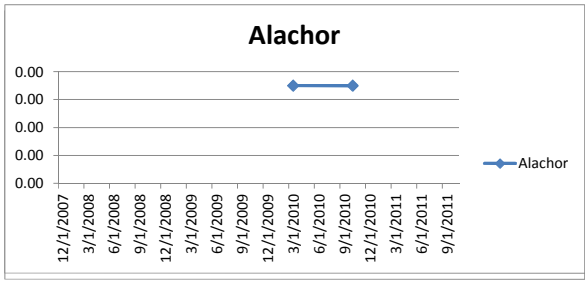


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.24	U	0.12000	U
4/24/2008	0.24	U	0.12000	U
10/13/2008	0.25	U	0.12500	U
3/30/2009	0.25	U	0.12500	U
10/15/2009	0.24	U	0.12000	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	0.0305	U	0.01525	U



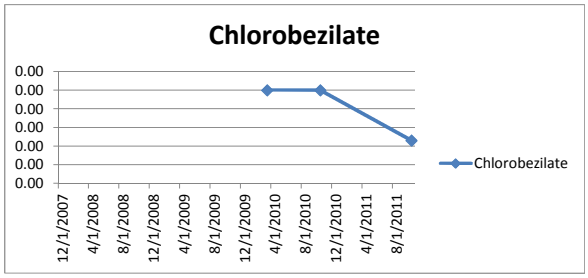
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



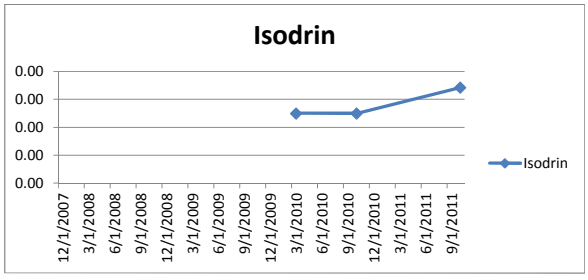
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00173	U	0.00087	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00137	U	0.00069	U

NA = Not Analyzed



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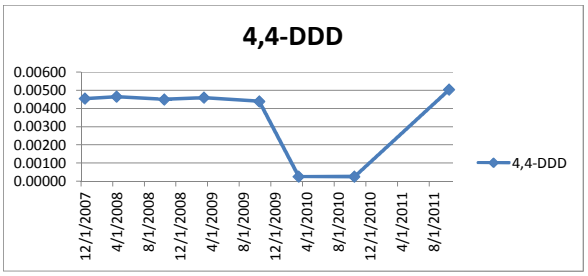
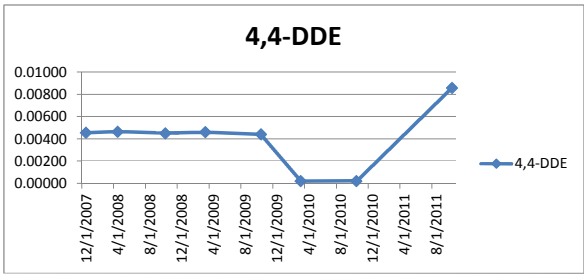
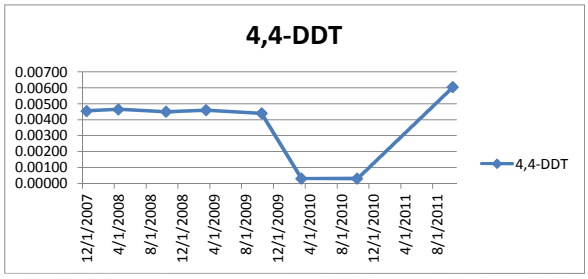
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0088	U	0.00440	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0101	U	0.00505	U



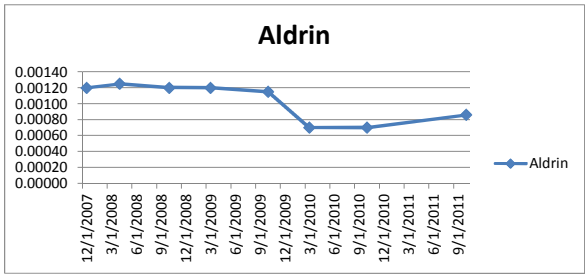
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0088	U	0.00440	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0172	U	0.00860	U



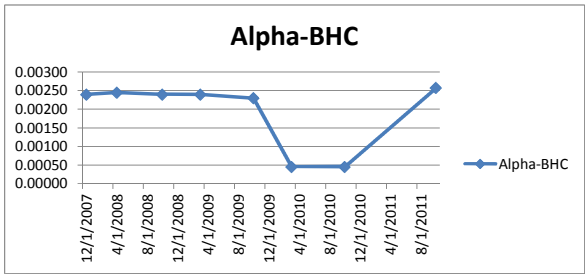
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0088	U	0.00440	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0121	U	0.00605	U



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0023	U	0.00115	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00172	U	0.00086	U



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0048	U	0.00240	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0046	U	0.00230	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00515	U	0.00258	U



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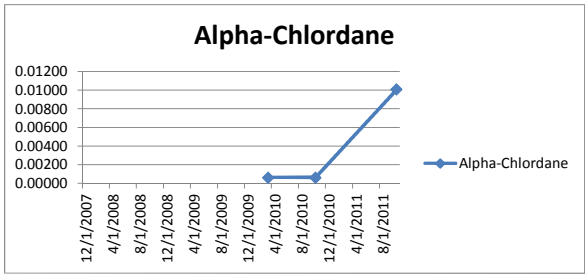
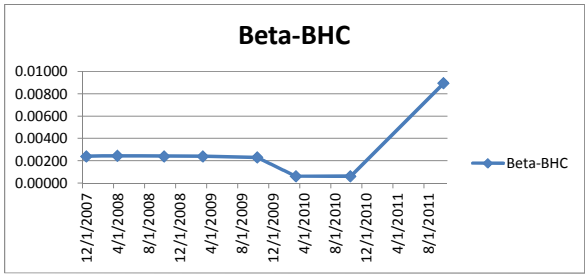
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0202	U	0.01010	U

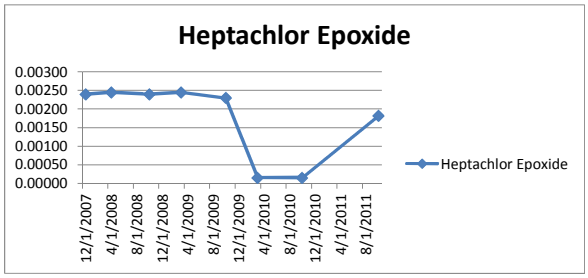
NA = Not Analyzed



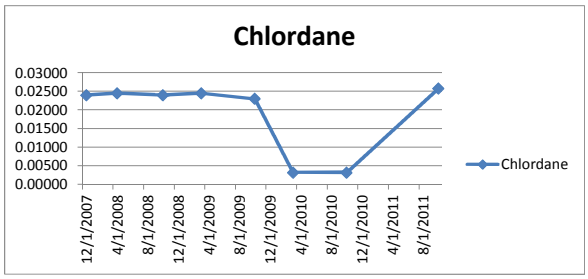
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0048	U	0.00240	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0046	U	0.00230	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0179	U	0.00895	U



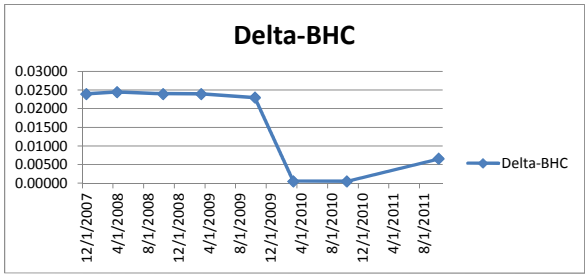
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0048	U	0.00240	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0046	U	0.00230	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00364	U	0.00182	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0515	U	0.02575	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0131	U	0.00655	U



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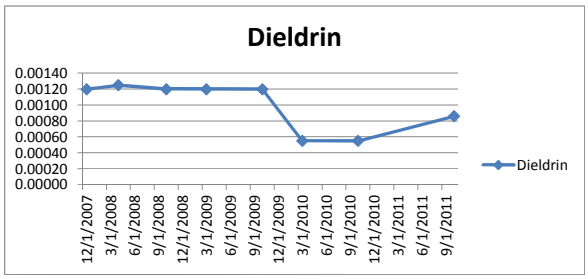
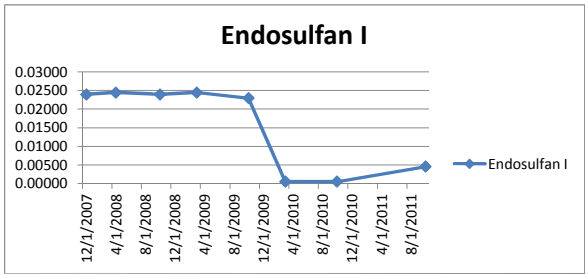
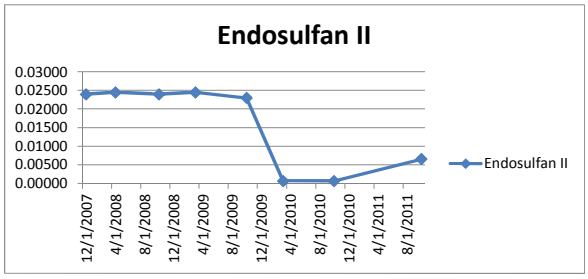
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00172	U	0.00086	U



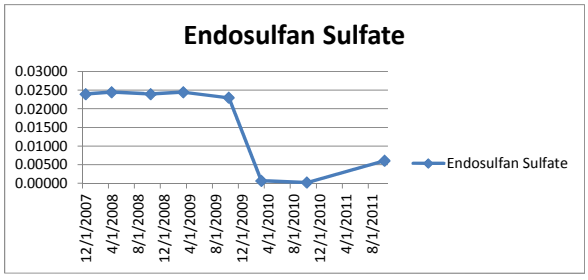
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00909	U	0.00455	U



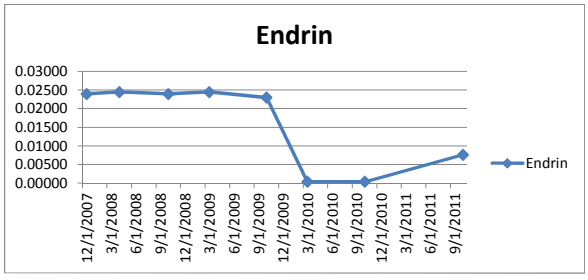
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0131	U	0.00655	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0121	U	0.00605	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0152	U	0.00760	U



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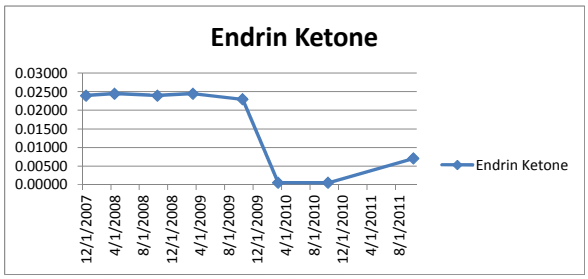
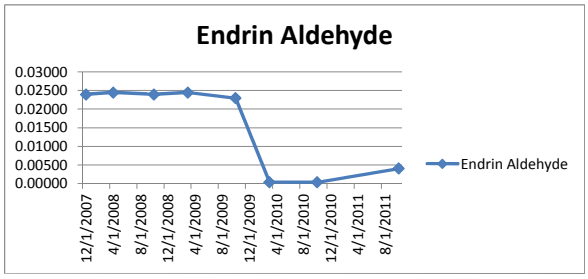
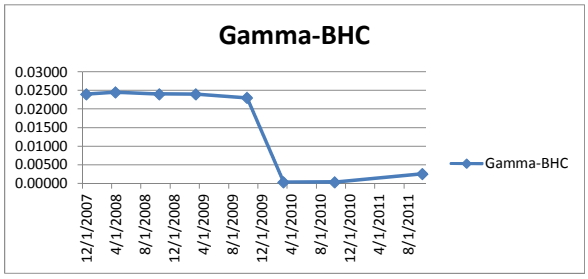
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0141	U	0.00705	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00808	U	0.00404	U

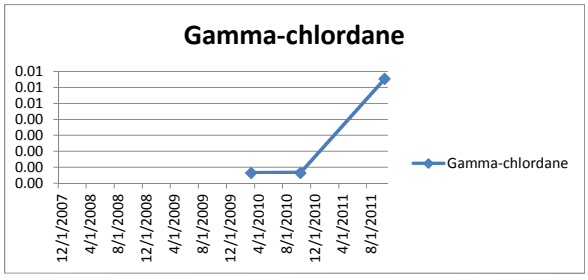


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00505	U	0.00253	U

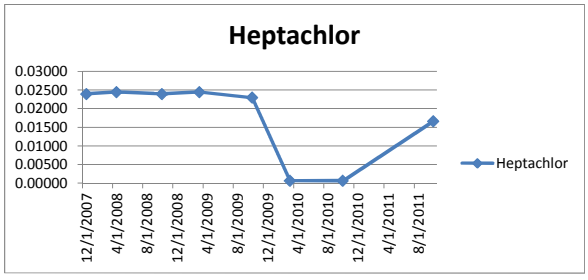


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0131	U	0.00655	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0333	U	0.01665	U



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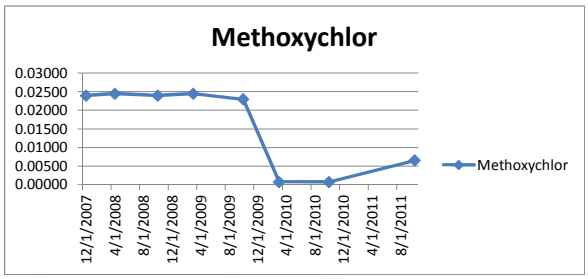
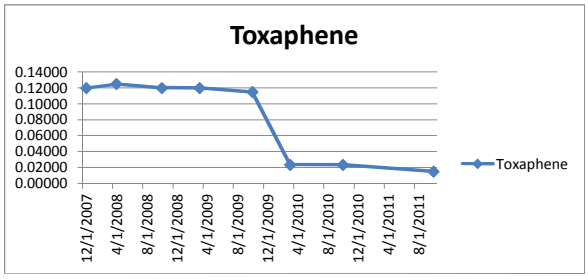
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.046	U	0.02300	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0131	U	0.00655	U

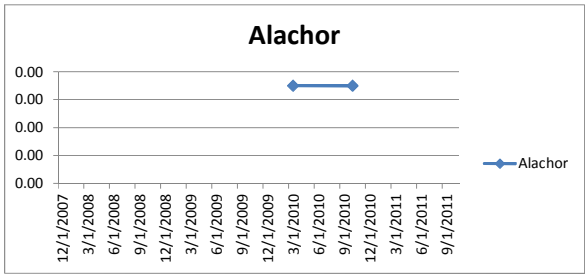


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.24	U	0.12000	U
4/24/2008	0.25	U	0.12500	U
10/13/2008	0.24	U	0.12000	U
3/30/2009	0.24	U	0.12000	U
10/15/2009	0.23	U	0.11500	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	0.0303	U	0.01515	U



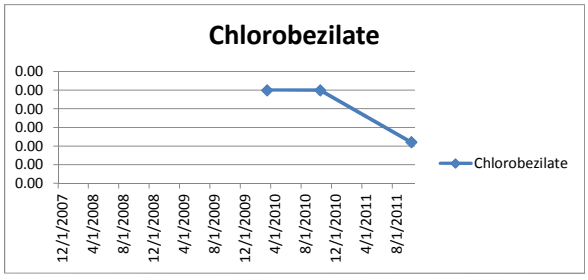
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



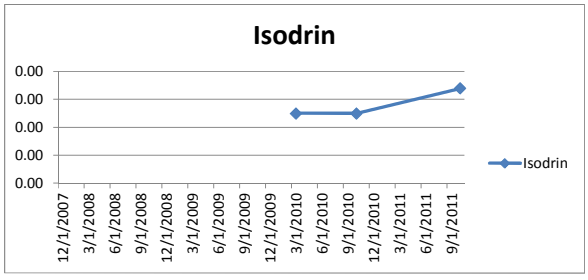
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00172	U	0.00086	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA	U		
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00136		0.00068	U

NA = Not Analyzed



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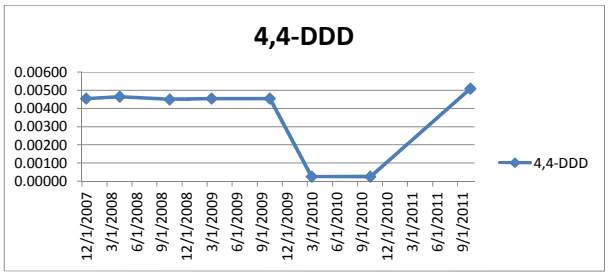
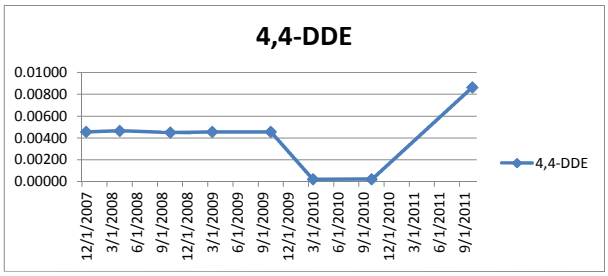
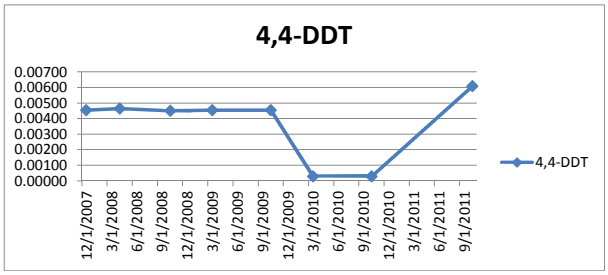
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0091	U	0.00455	U
10/15/2009	0.0091	U	0.00455	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0102	U	0.00510	U



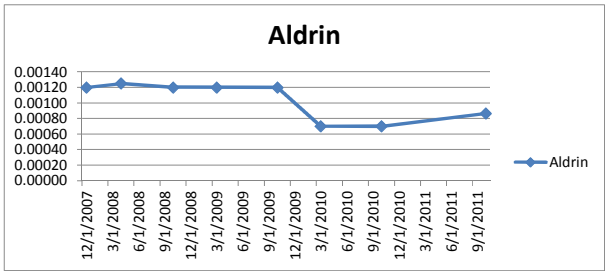
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0091	U	0.00455	U
10/15/2009	0.0091	U	0.00455	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0173	U	0.00865	U



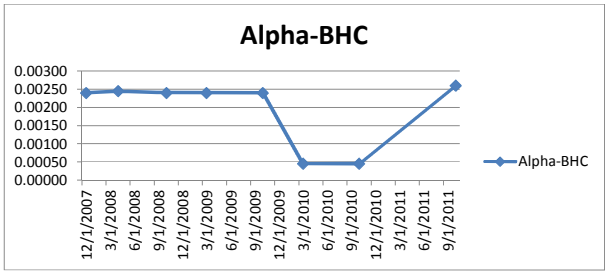
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0091	U	0.00455	U
10/15/2009	0.0091	U	0.00455	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0122	U	0.00610	U



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00173	U	0.00087	U



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0048	U	0.00240	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00520	U	0.00260	U



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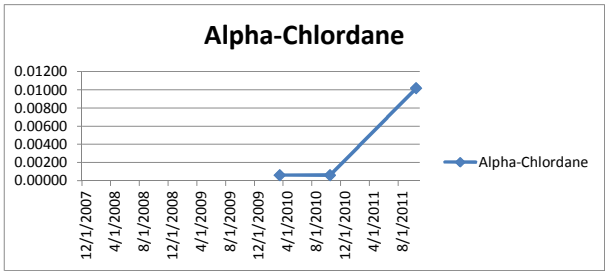
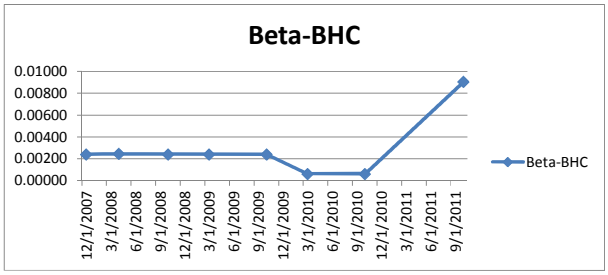
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0204	U	0.01020	U

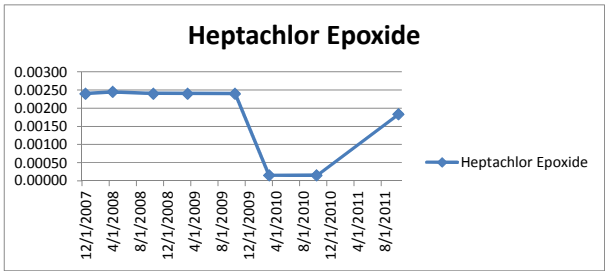
NA = Not Analyzed



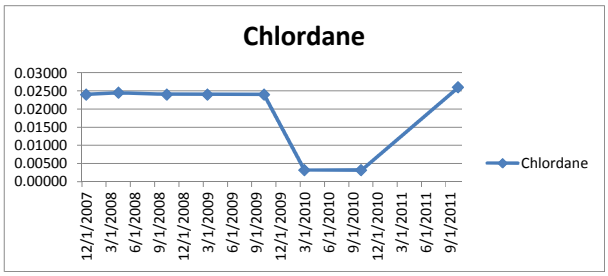
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0048	U	0.00240	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0181	U	0.00905	U



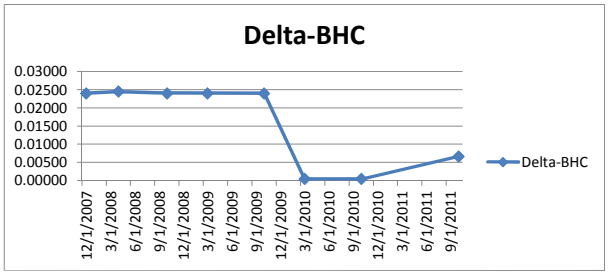
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0048	U	0.00240	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00367	U	0.00184	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0520	U	0.02600	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0133	U	0.00665	U



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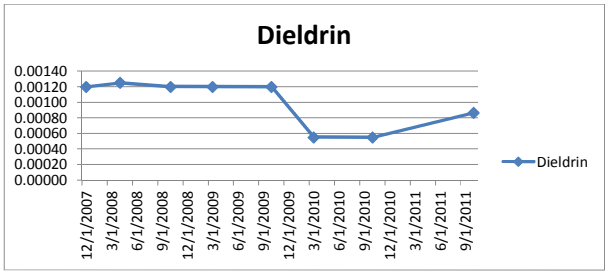
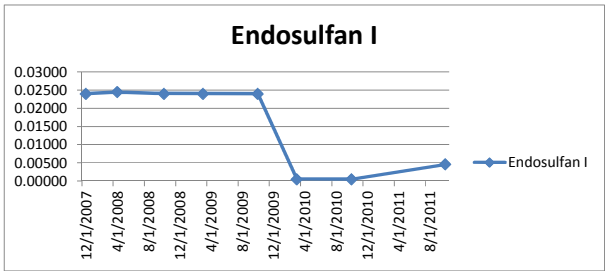
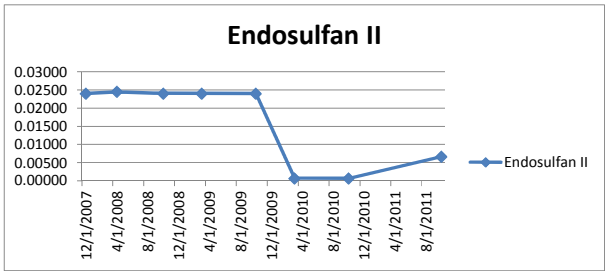
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00173	U	0.00087	U



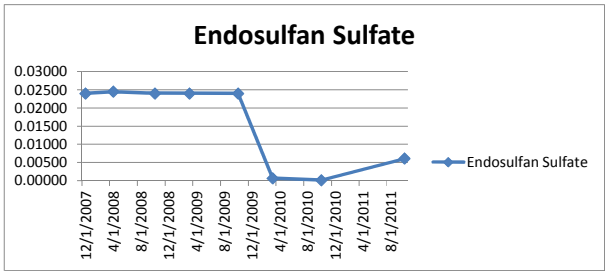
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00918	U	0.00459	U



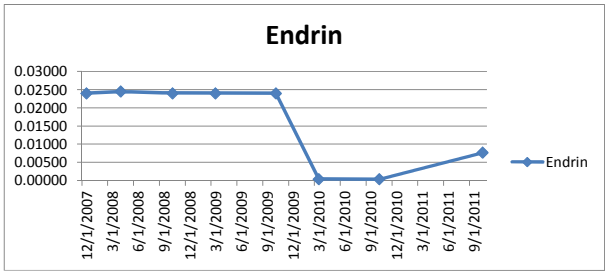
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0133	U	0.00665	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0122	U	0.00610	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0153	U	0.00765	U



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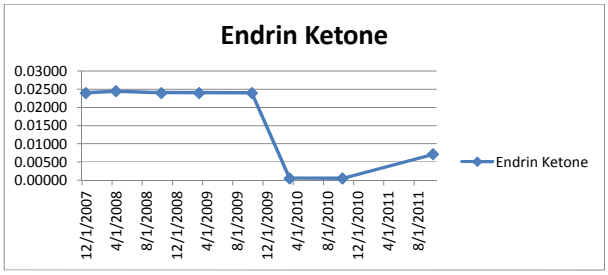
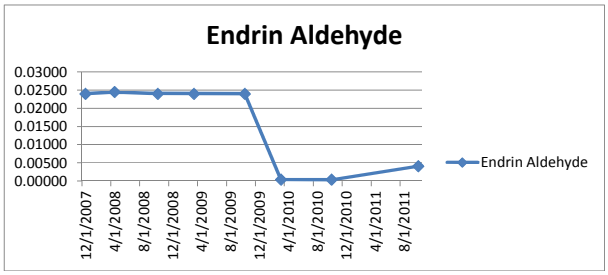
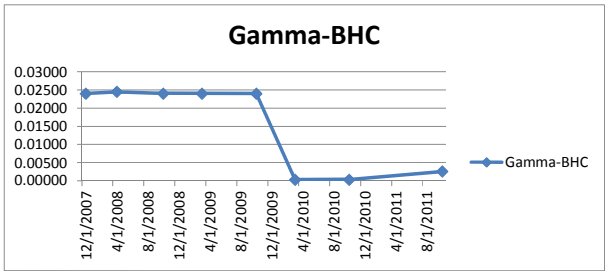
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0143	U	0.00715	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00816	U	0.00408	U

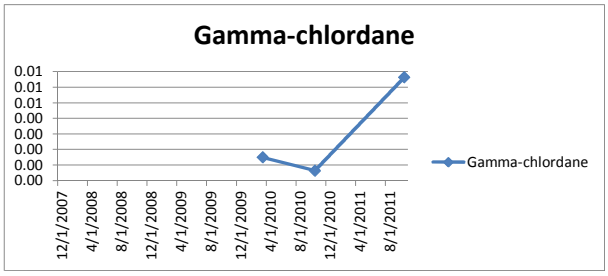


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00510	U	0.00255	U

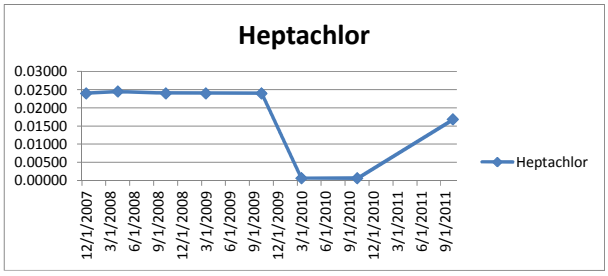


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0015	I	0.00150	I
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0133	U	0.00665	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0337	U	0.01685	U



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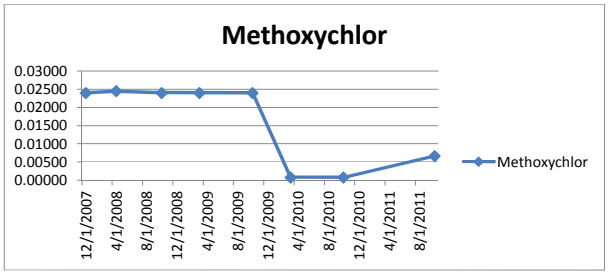
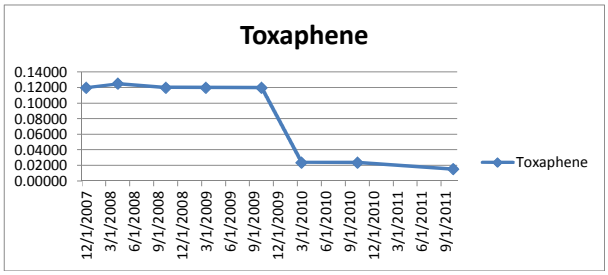
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0133	U	0.00665	U

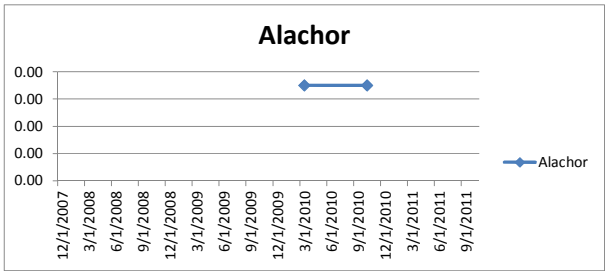


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.24	U	0.12000	U
4/24/2008	0.25	U	0.12500	U
10/13/2008	0.24	U	0.12000	U
3/30/2009	0.24	U	0.12000	U
10/15/2009	0.24	U	0.12000	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	0.0306	U	0.01530	U



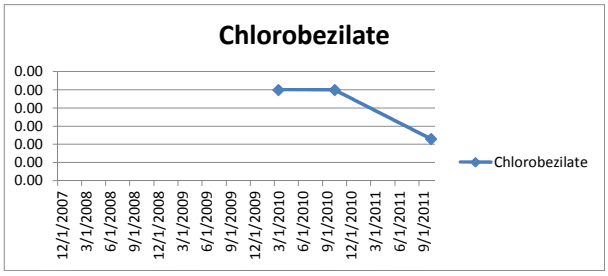
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



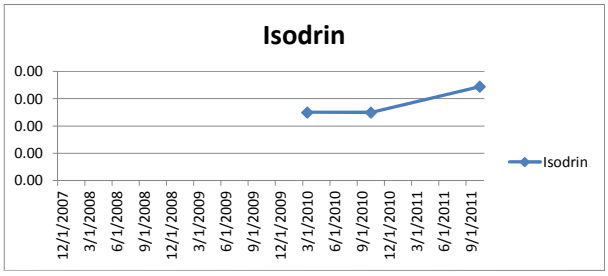
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00173	U	0.00087	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00138	U	0.00069	U

NA = Not Analyzed



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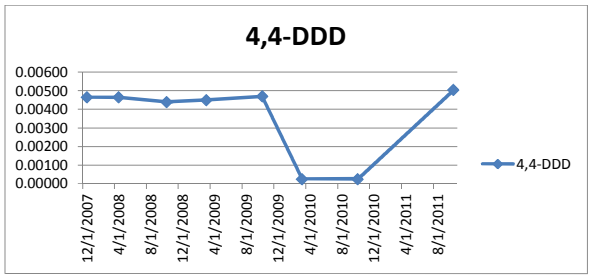
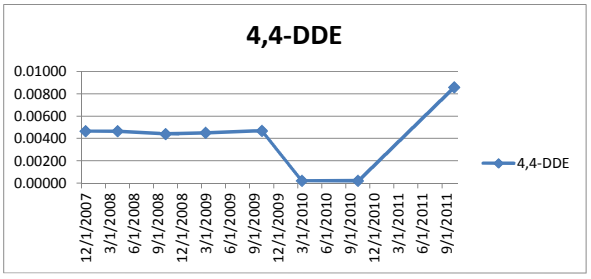
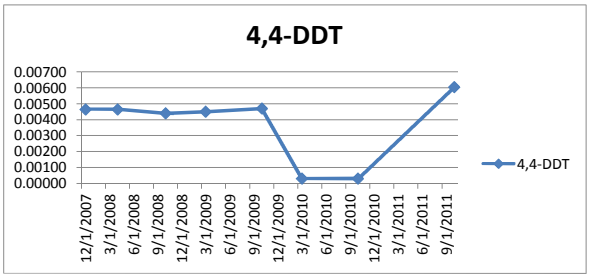
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0088	U	0.00440	U
3/30/2009	0.0090	U	0.00450	U
10/15/2009	0.0094	U	0.00470	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0101	U	0.00505	U



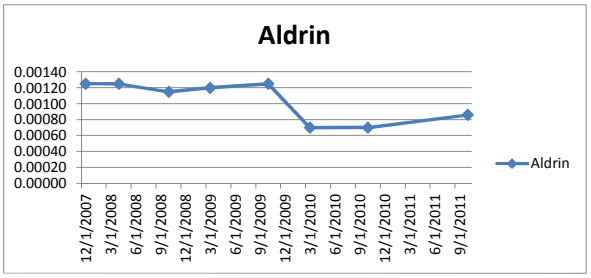
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0088	U	0.00440	U
3/30/2009	0.0090	U	0.00450	U
10/15/2009	0.0094	U	0.00470	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0172	U	0.00860	U



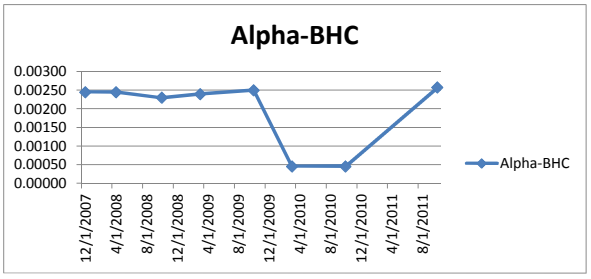
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0088	U	0.00440	U
3/30/2009	0.0090	U	0.00450	U
10/15/2009	0.0094	U	0.00470	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0121	U	0.00605	U



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0025	U	0.00125	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00172	U	0.00086	U



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049	U	0.00245	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0046	U	0.00230	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0050	U	0.00250	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00515	U	0.00258	U



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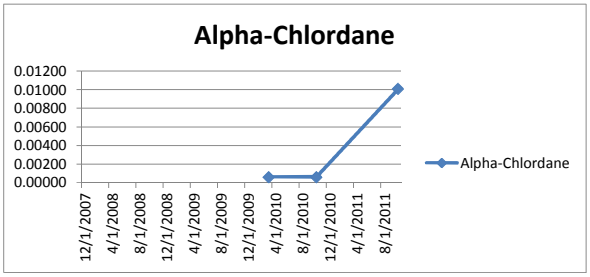
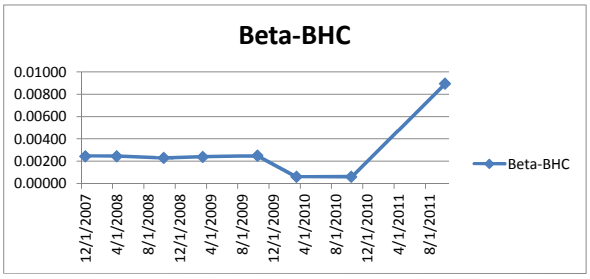
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0202	U	0.01010	U

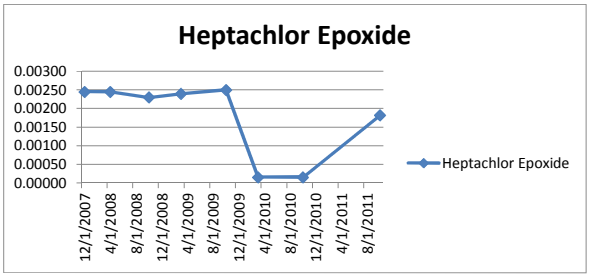
NA = Not Analyzed



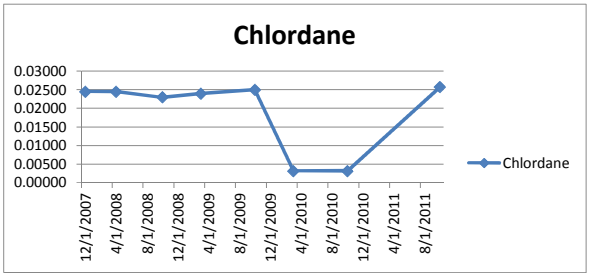
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049	U	0.00245	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0046	U	0.00230	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0050	U	0.00250	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0179	U	0.00895	U



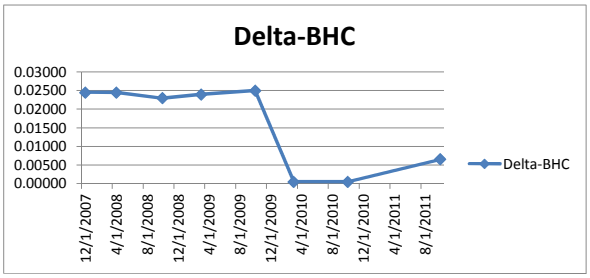
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049	U	0.00245	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0046	U	0.00230	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0050	U	0.00250	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00364	U	0.00182	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0515	U	0.02575	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0131	U	0.00655	U



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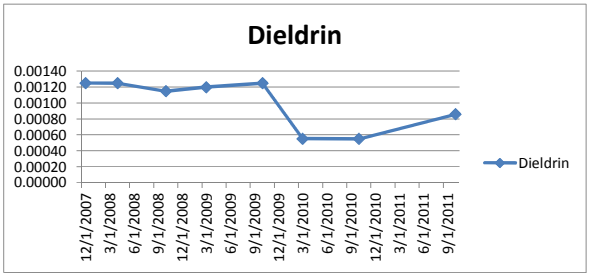
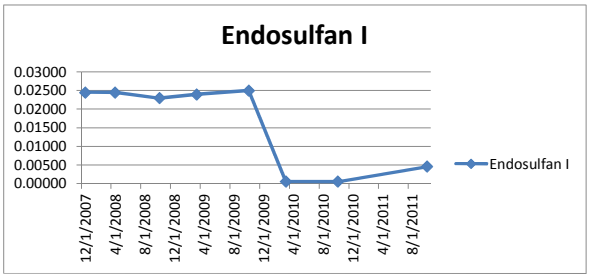
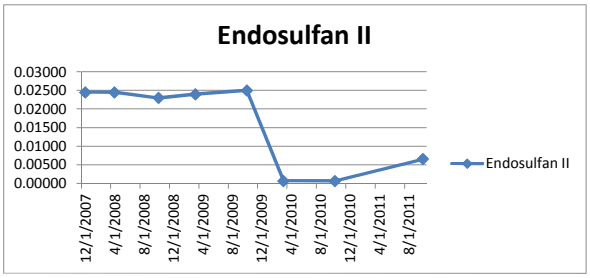
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0025	U	0.00125	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00172	U	0.00086	U



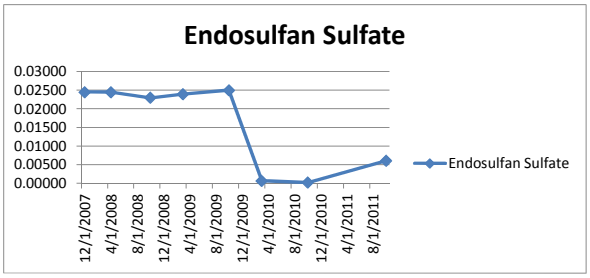
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00909	U	0.00455	U



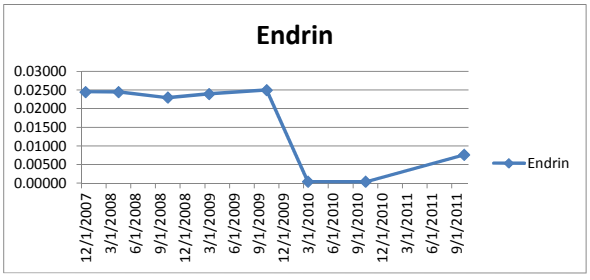
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0131	U	0.00655	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0121	U	0.00605	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0152	U	0.00760	U



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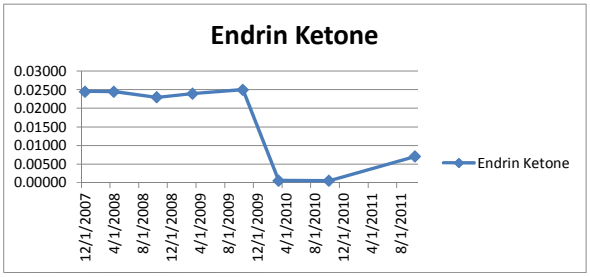
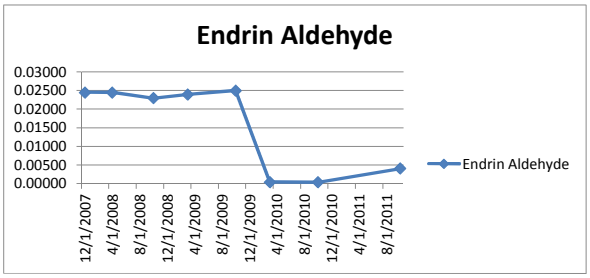
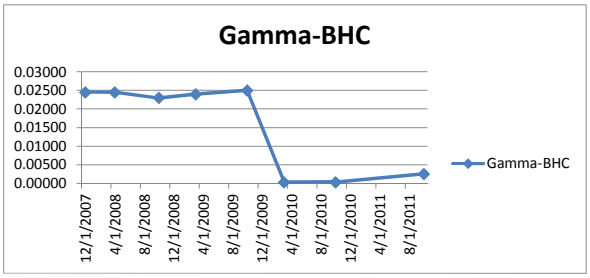
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0141	U	0.00705	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00808	U	0.00404	U

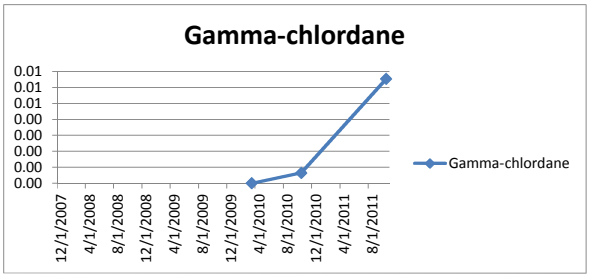


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00505	U	0.00253	U

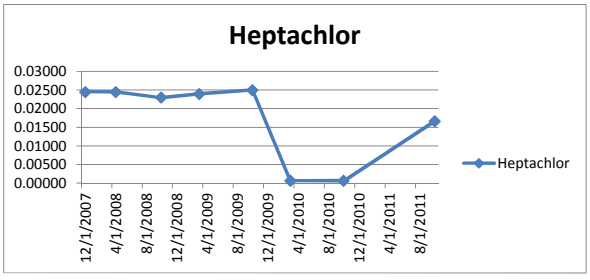


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	I	0.0013	I
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0131	U	0.00655	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0333	U	0.01665	U



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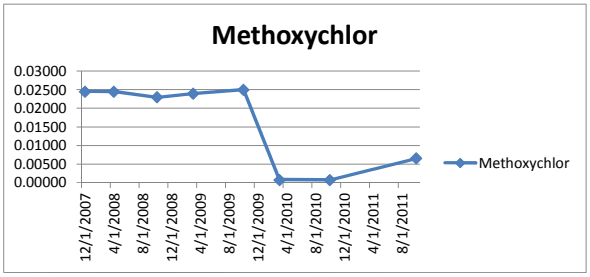
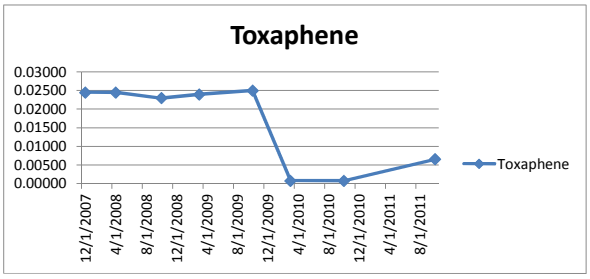
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0131	U	0.00655	U

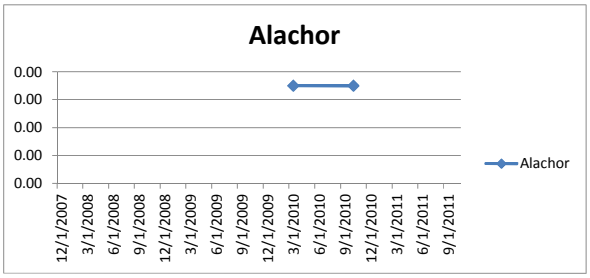


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	.049	U	0.02450	U
4/24/2008	.049	U	0.02450	U
10/13/2008	.046	U	0.02300	U
3/30/2009	.048	U	0.02400	U
10/15/2009	.050	U	0.02500	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0131	U	0.00655	U



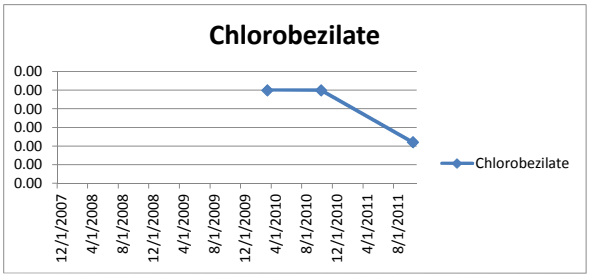
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



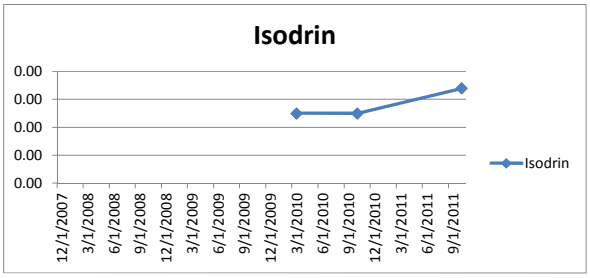
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00172	U	0.00086	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00136	U	0.00068	U

NA = Not Analyzed



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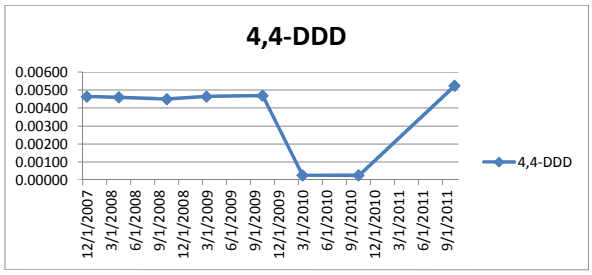
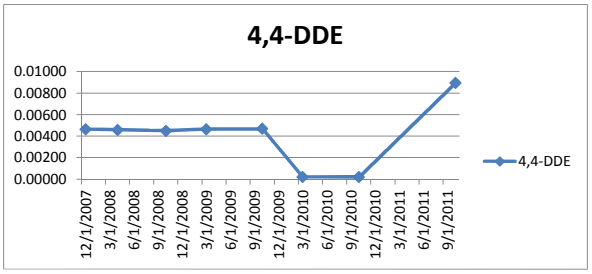
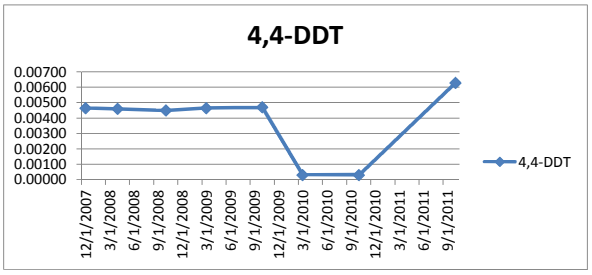
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	0.0092	U	0.00460	U
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0093	U	0.00465	U
10/15/2009	0.0094	U	0.00470	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0105	U	0.00525	U



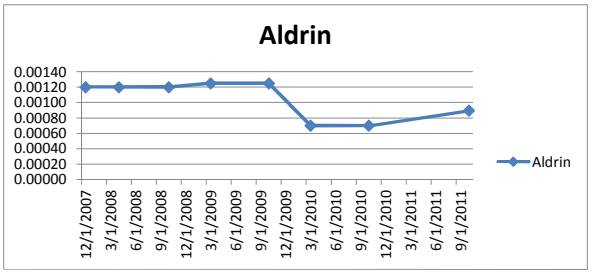
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	0.0092	U	0.00460	U
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0093	U	0.00465	U
10/15/2009	0.0094	U	0.00470	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0179	U	0.00895	U



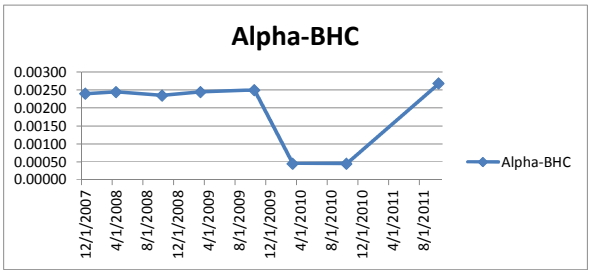
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	0.0092	U	0.00460	U
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0093	U	0.00465	U
10/15/2009	0.0094	U	0.00470	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0126	U	0.00630	U



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0025	U	0.00125	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00179	U	0.00090	U



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0050	U	0.00250	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00537	U	0.00269	U



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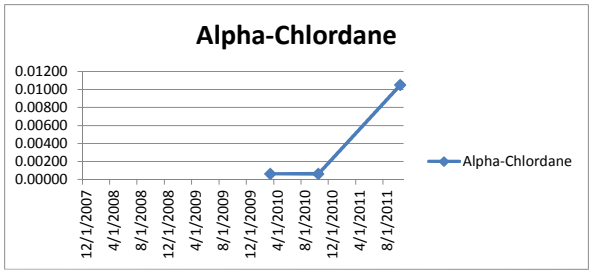
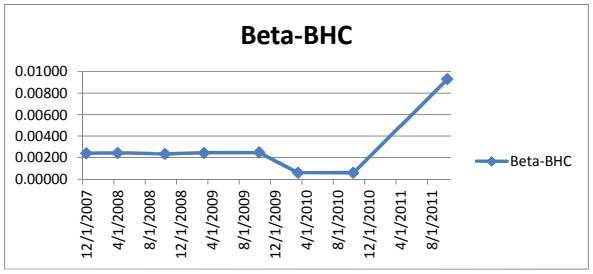
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0211	U	0.01055	U

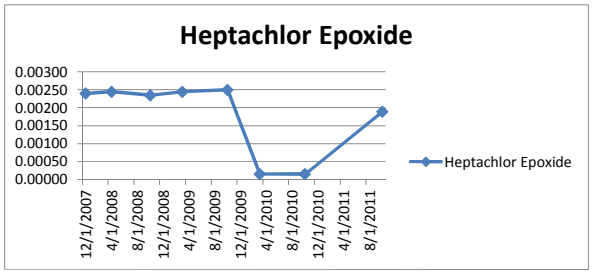
NA = Not Analyzed



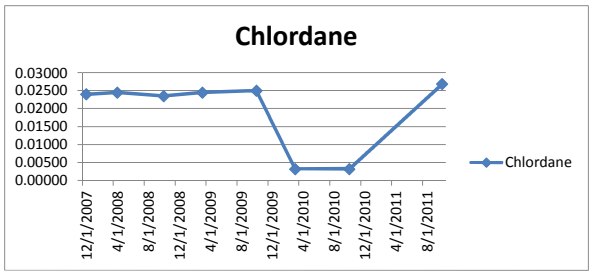
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0050	U	0.00250	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0186	U	0.00930	U



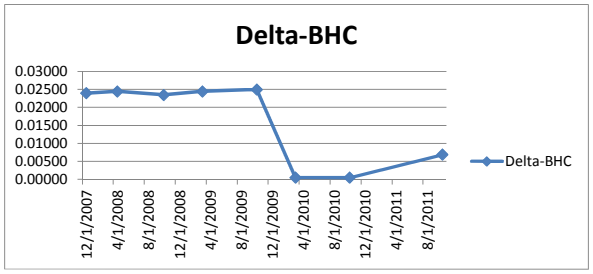
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0050	U	0.00250	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00379	U	0.00190	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0537	U	0.02685	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0137	U	0.00685	U



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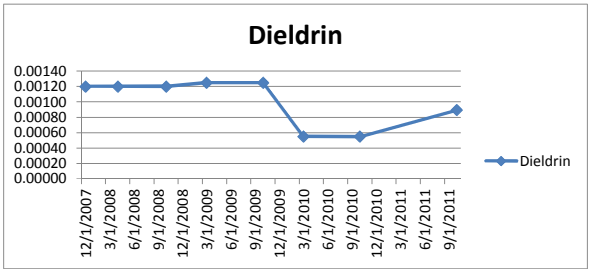
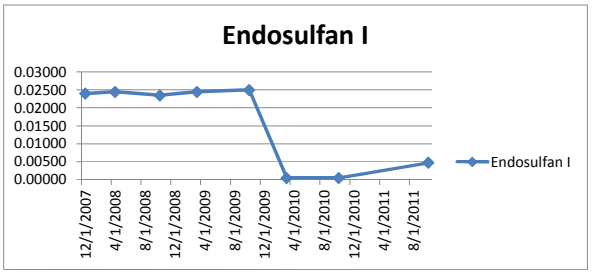
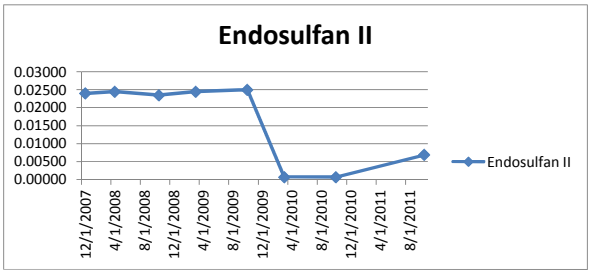
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0025	U	0.00125	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00179	U	0.00090	U



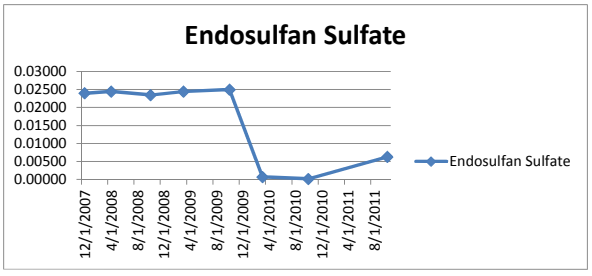
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00947	U	0.00474	U



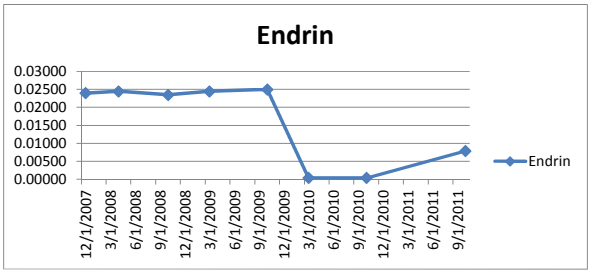
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0137	U	0.00685	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0126	U	0.00630	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0158	U	0.00790	U



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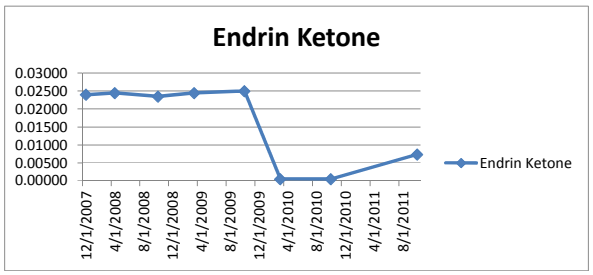
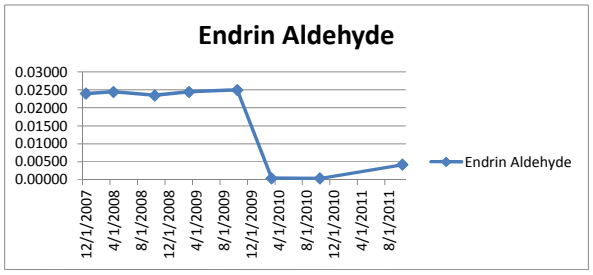
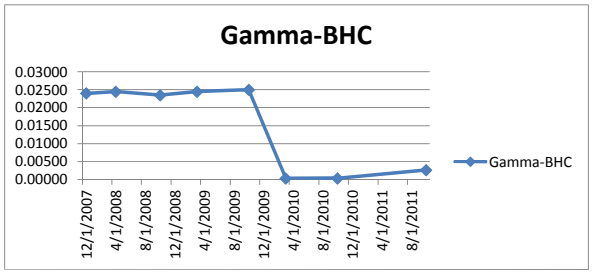
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0147	U	0.00735	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00842	U	0.00421	U

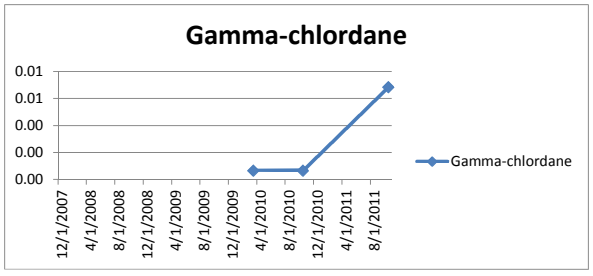


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00526	U	0.00263	U

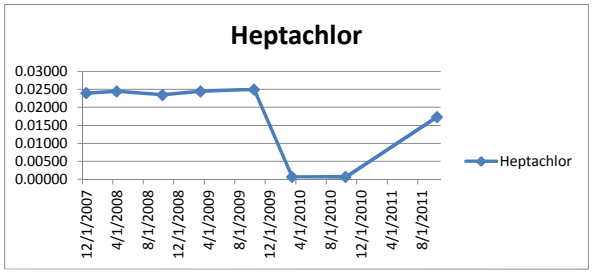


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0137	U	0.00685	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0347	U	0.01735	U



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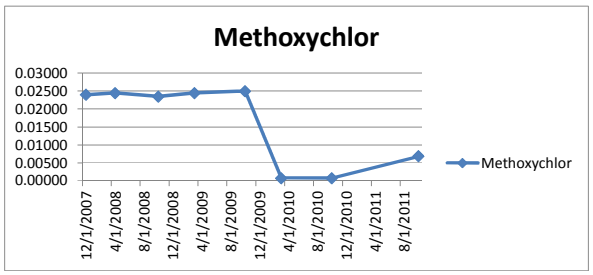
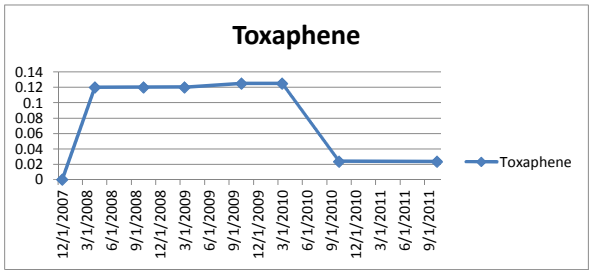
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.050	U	0.02500	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0137	U	0.00685	U

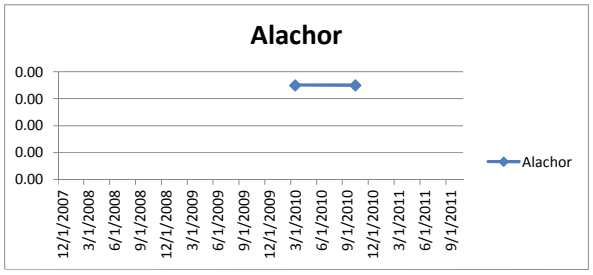


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.24	U	0.12000	U
4/24/2008	0.24	U	0.12000	U
10/13/2008	0.24	U	0.12000	U
3/30/2009	0.25	U	0.12500	U
10/15/2009	0.25	U	0.12500	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	0.0316	U	0.01580	U



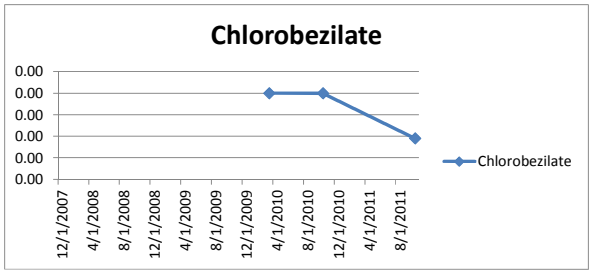
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



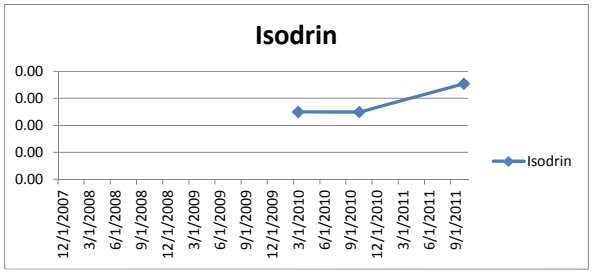
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00179	U	0.00090	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00142	U	0.00071	U

NA = Not Analyzed



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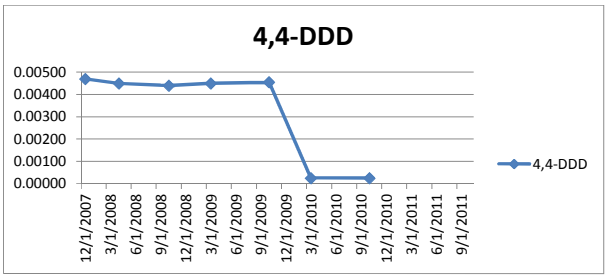
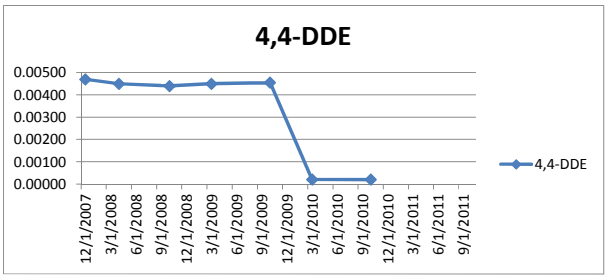
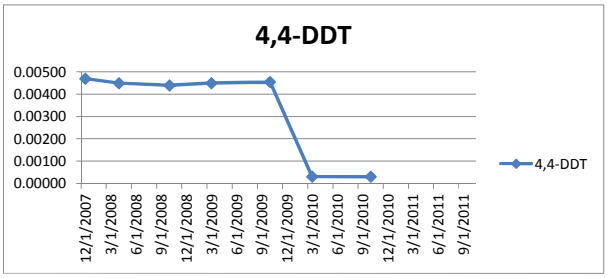
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0094	U	0.00470	U
4/24/2008	0.0090	U	0.00450	U
10/13/2008	0.0088	U	0.00440	U
3/30/2009	0.0090	U	0.00450	U
10/15/2009	0.0091	U	0.00455	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	NS			



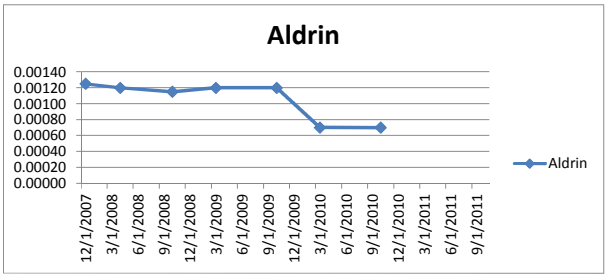
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0094	U	0.00470	U
4/24/2008	0.0090	U	0.00450	U
10/13/2008	0.0088	U	0.00440	U
3/30/2009	0.0090	U	0.00450	U
10/15/2009	0.0091	U	0.00455	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	NS			



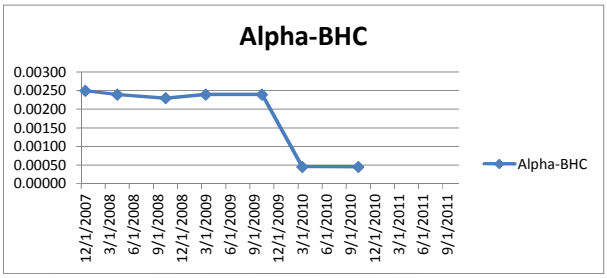
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0094	U	0.00470	U
4/24/2008	0.0090	U	0.00450	U
10/13/2008	0.0088	U	0.00440	U
3/30/2009	0.0090	U	0.00450	U
10/15/2009	0.0091	U	0.00455	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	NS			



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0025	U	0.00125	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NS			



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.005	U	0.00250	U
4/24/2008	0.0048	U	0.00240	U
10/13/2008	0.0046	U	0.00230	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	NS			



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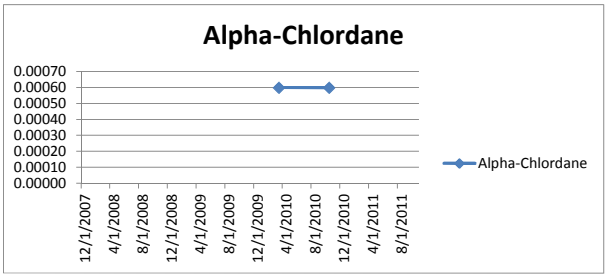
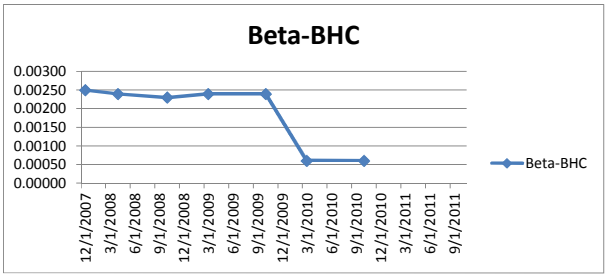
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	NS			

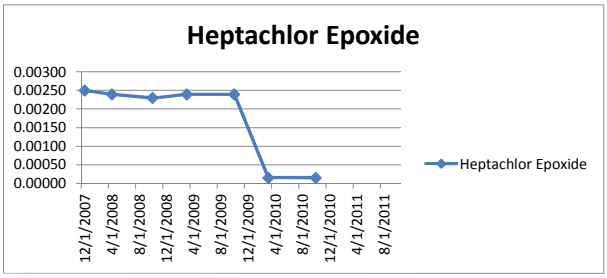
NA = Not Analyzed



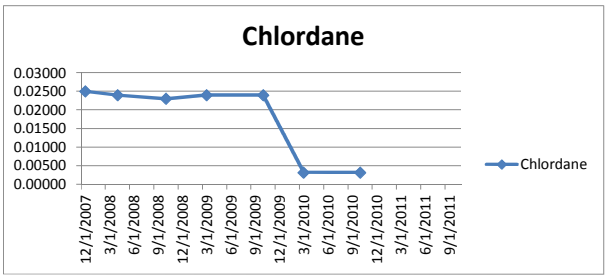
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.005	U	0.00250	U
4/24/2008	0.0048	U	0.00240	U
10/13/2008	0.0046	U	0.00230	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	NS			



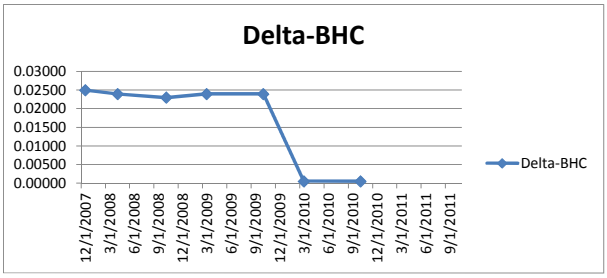
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.005	U	0.00250	U
4/24/2008	0.0048	U	0.00240	U
10/13/2008	0.0046	U	0.00230	U
3/30/2009	0.0048	U	0.00240	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	NS			



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	NS			



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	NS			



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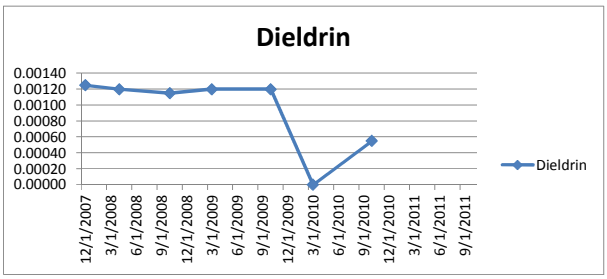
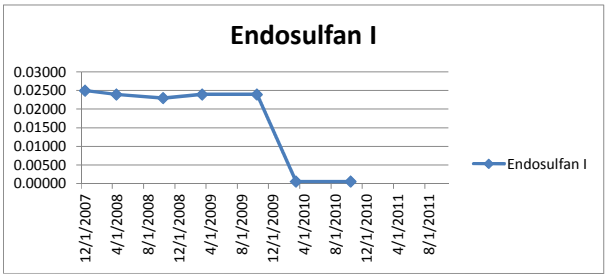
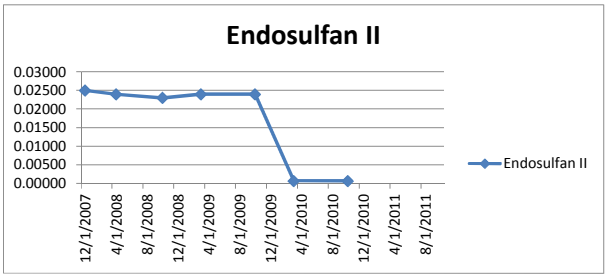
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0025	U	0.00125	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0012 I	I	0012 I	I
10/13/2010	0.0011	U	0.00055	U
10/27/2011	NS			



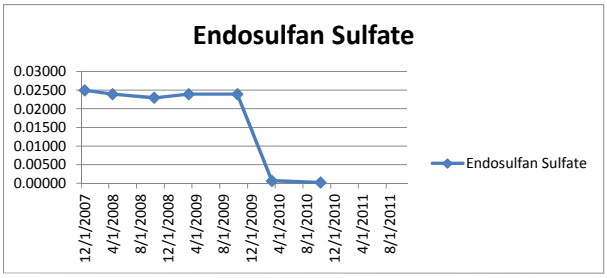
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	NS			



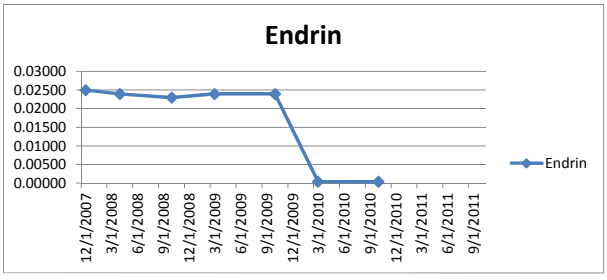
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	NS			



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	NS			



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	NS			



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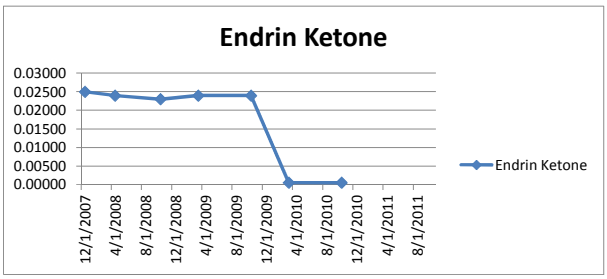
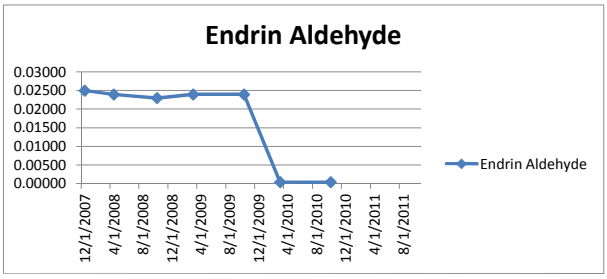
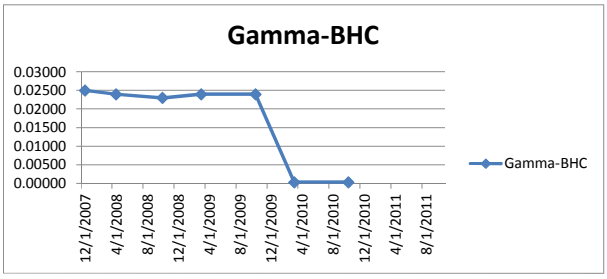
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	NS			



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	NS			

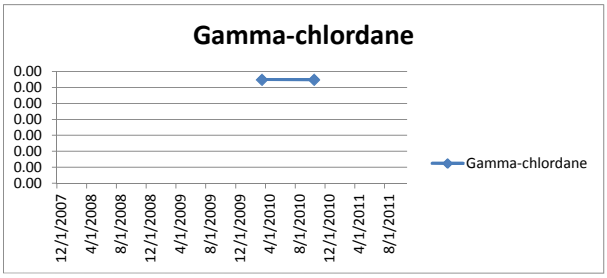


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	NS			

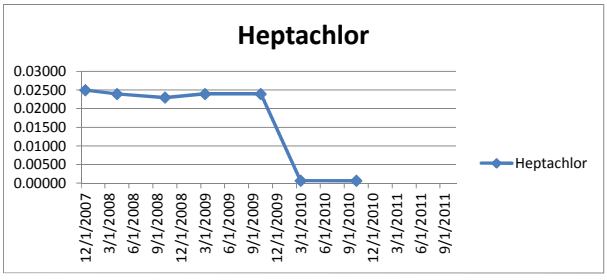


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	NS			

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	NS			



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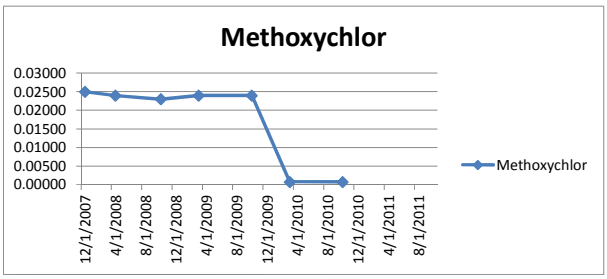
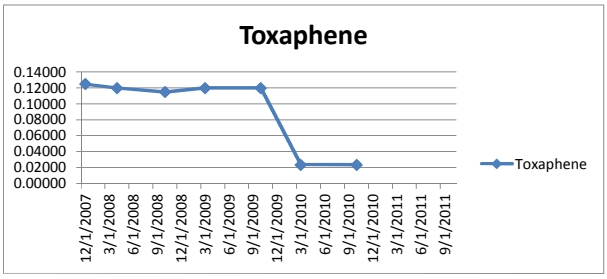
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.05	U	0.02500	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.046	U	0.02300	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	NS			

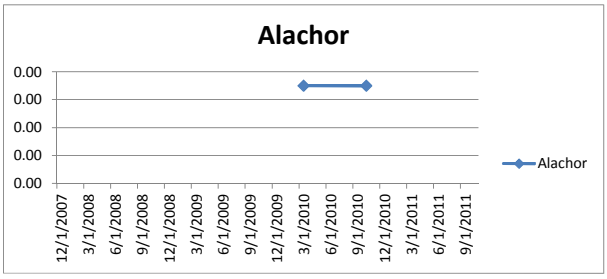


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.25	U	0.12500	U
4/24/2008	0.24	U	0.12000	U
10/13/2008	0.23	U	0.11500	U
3/30/2009	0.24	U	0.12000	U
10/15/2009	0.24	U	0.12000	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	NS			



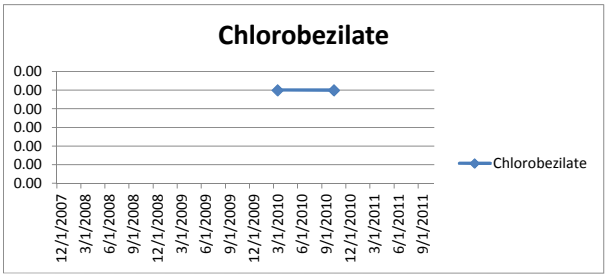
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NS			

NA = Not Analyzed



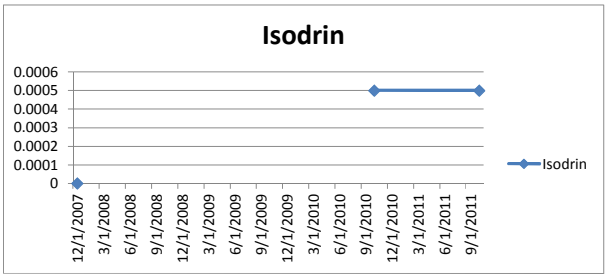
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	NS			

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	NS			

NA = Not Analyzed



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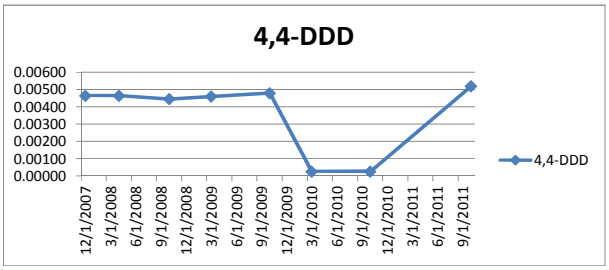
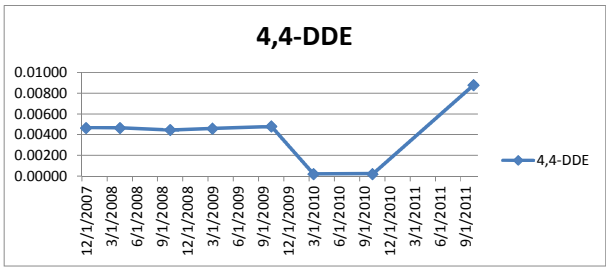
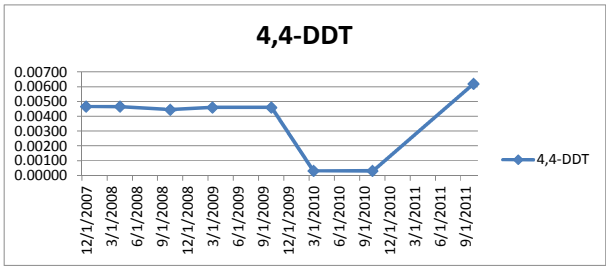
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0089	U	0.00445	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0096	U	0.00480	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0104	U	0.00520	U



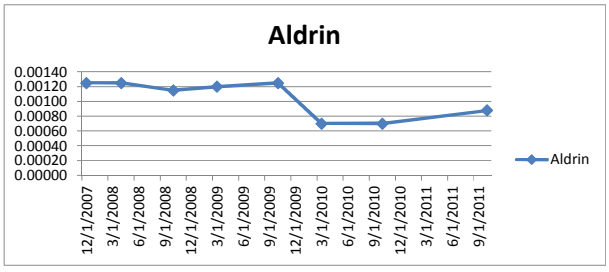
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0089	U	0.00445	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0096	U	0.00480	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0176	U	0.00880	U



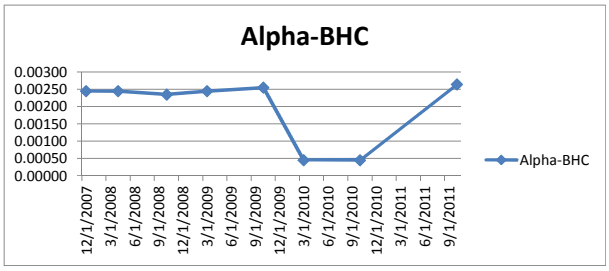
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	0.0093	U	0.00465	U
10/13/2008	0.0089	U	0.00445	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0092	U	0.00460	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0124	U	0.00620	U



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0025	U	0.00125	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00176	U	0.00088	U



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049	U	0.00245	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0051	U	0.00255	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00529	U	0.00265	U



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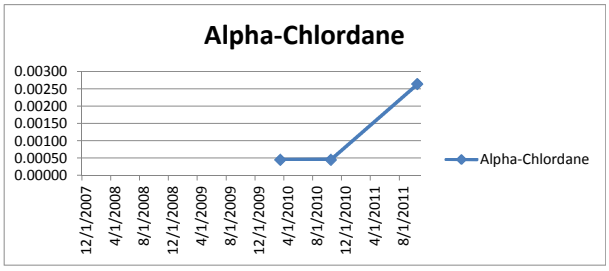
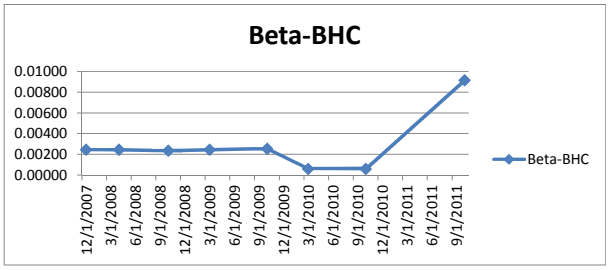
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049			
4/24/2008	0.0049			
10/13/2008	0.0047			
3/30/2009	0.0049			
10/15/2009	0.0051			
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	.00529	U	0.00265	U

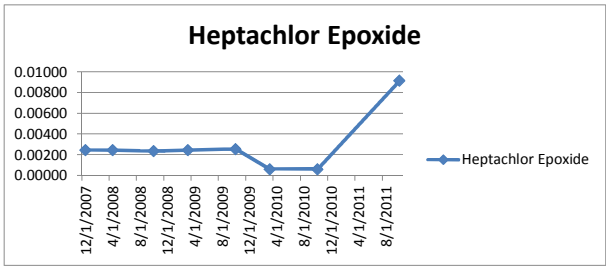
NA = Not Analyzed



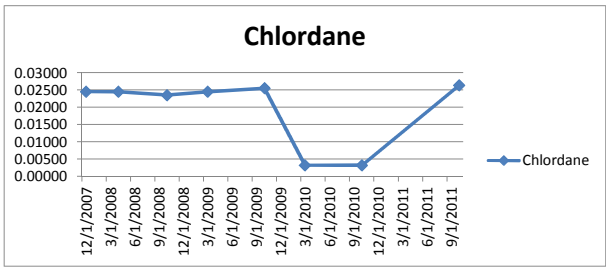
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049	U	0.00245	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0051	U	0.00255	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0183	U	0.00915	U



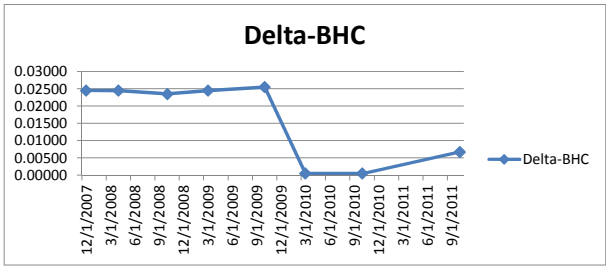
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049	U	0.00245	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0051	U	0.00255	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0183	U	0.00915	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0528	U	0.02640	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0135	U	0.00675	U



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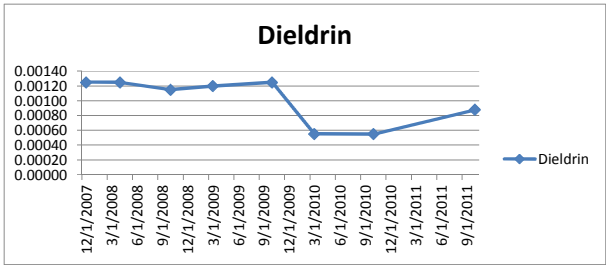
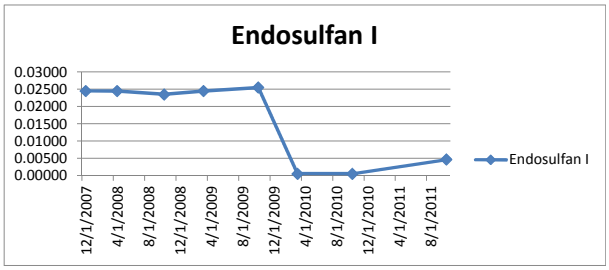
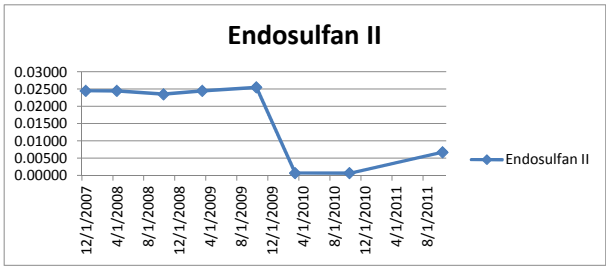
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0025	U	0.00125	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00176	U	0.00088	U



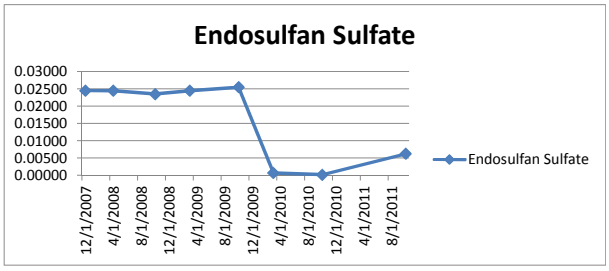
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00933	U	0.00467	U



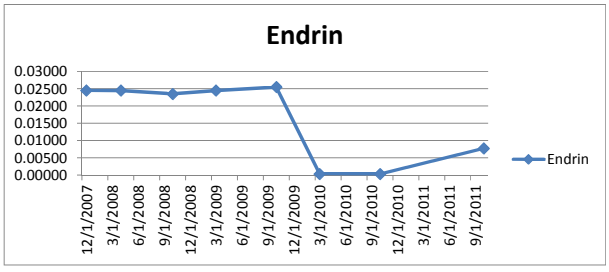
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0135	U	0.00675	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0124	U	0.00620	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0155	U	0.00775	U



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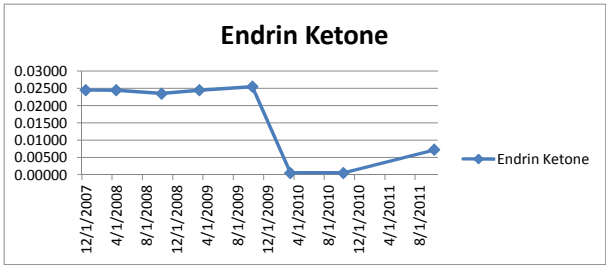
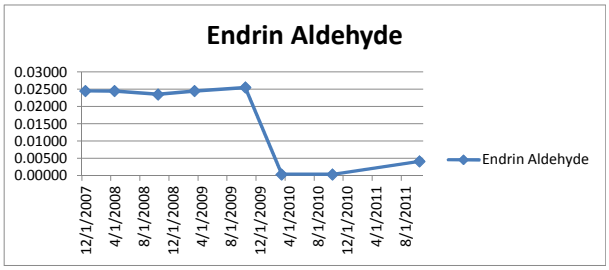
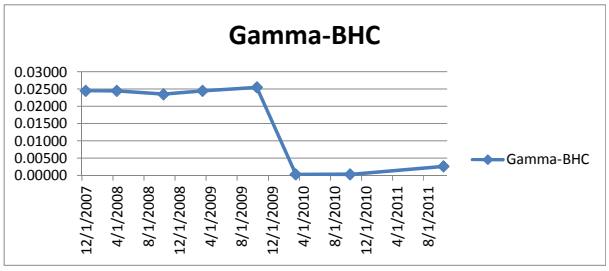
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0145	U	0.00725	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00829	U	0.00415	U

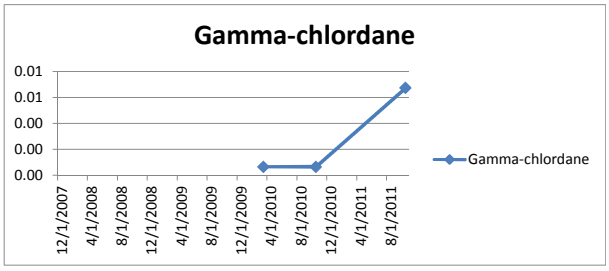


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00518	U	0.00259	U

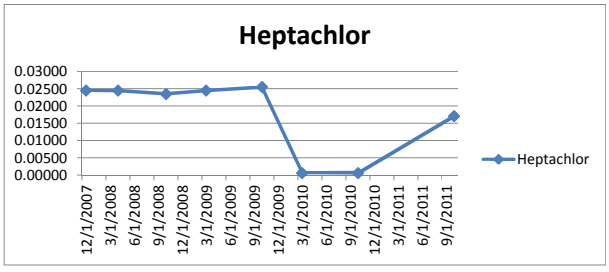


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0135	U	0.00675	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0342	U	0.01710	U



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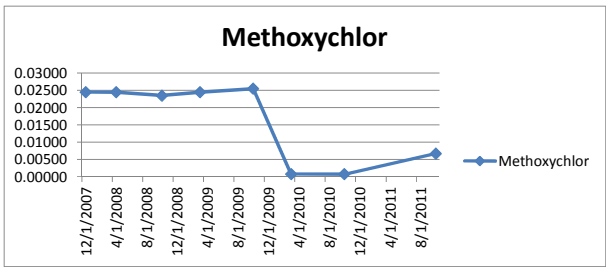
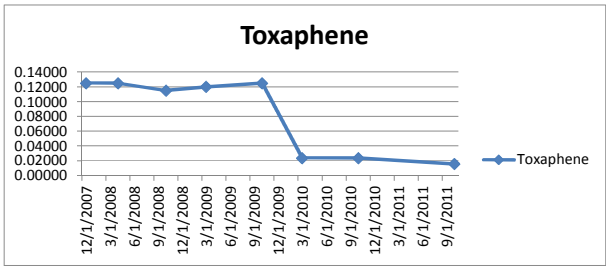
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.051	U	0.02550	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0135	U	0.00675	U

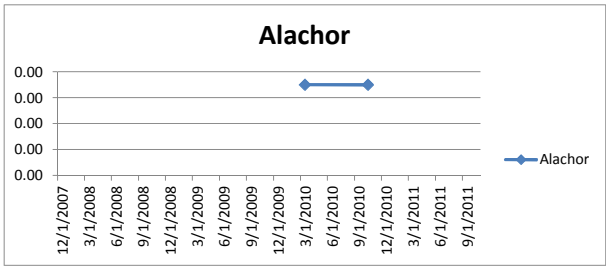


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.25	U	0.12500	U
4/24/2008	0.25	U	0.12500	U
10/13/2008	0.23	U	0.11500	U
3/30/2009	0.24	U	0.12000	U
10/15/2009	0.25	U	0.12500	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	0.0311	U	0.01555	U



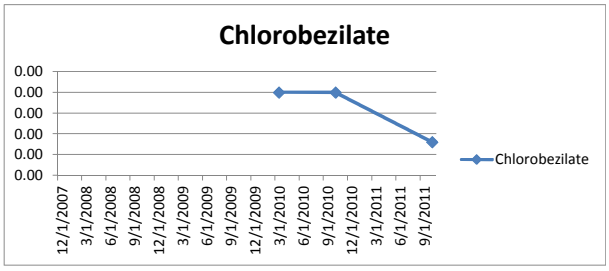
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



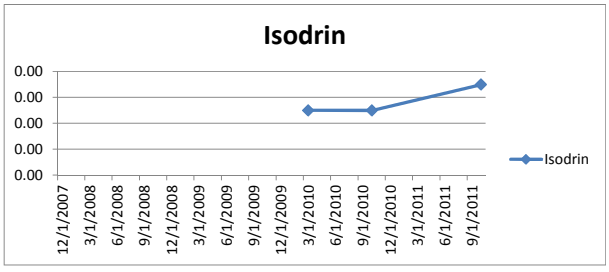
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00176	U	0.00088	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00140	U	0.00070	U

NA = Not Analyzed



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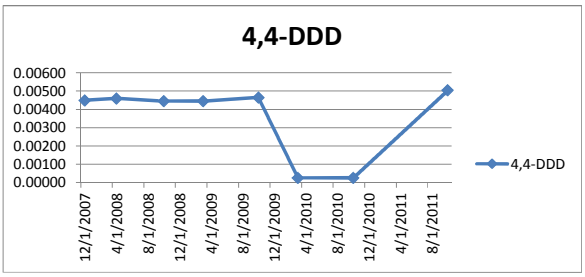
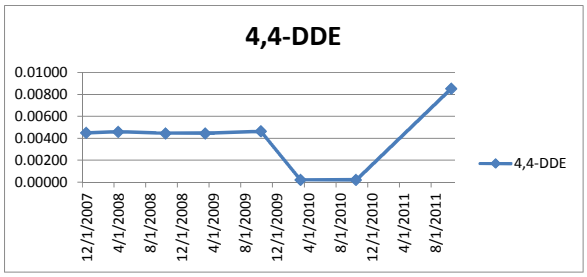
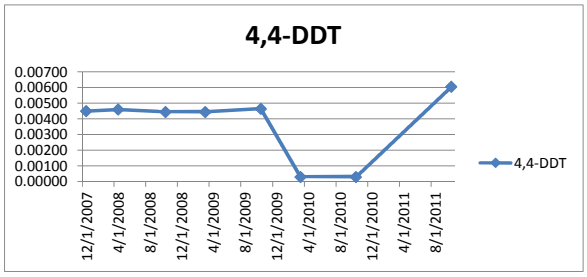
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0090	U	0.00450	U
4/24/2008	0.0092	U	0.00460	U
10/13/2008	0.0089	U	0.00445	U
3/30/2009	0.0089	U	0.00445	U
10/15/2009	0.0093	U	0.00465	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0101	U	0.00505	U



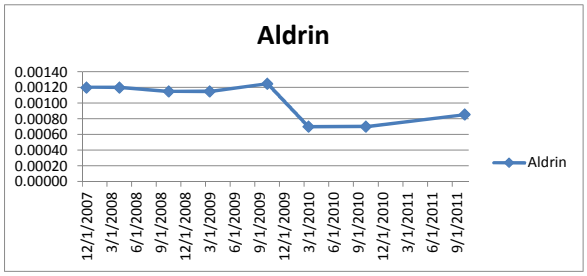
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0090	U	0.00450	U
4/24/2008	0.0092	U	0.00460	U
10/13/2008	0.0089	U	0.00445	U
3/30/2009	0.0089	U	0.00445	U
10/15/2009	0.0093	U	0.00465	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0171	U	0.00855	U



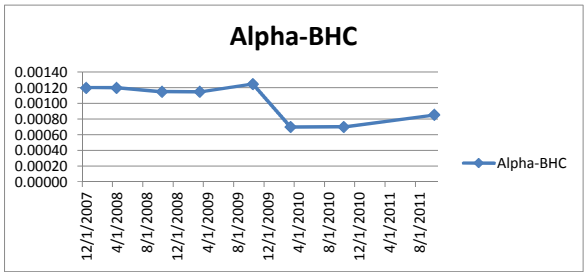
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0090	U	0.00450	U
4/24/2008	0.0092	U	0.00460	U
10/13/2008	0.0089	U	0.00445	U
3/30/2009	0.0089	U	0.00445	U
10/15/2009	0.0093	U	0.00465	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0121	U	0.00605	U



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0023	U	0.00115	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00171	U	0.00086	U



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0023	U	0.00115	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00171	U	0.00086	U



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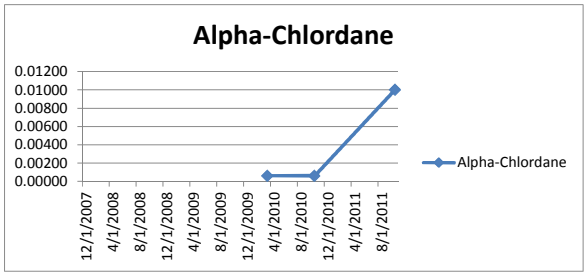
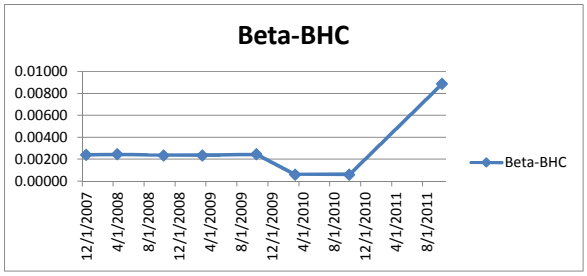
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0201	U	0.01005	U

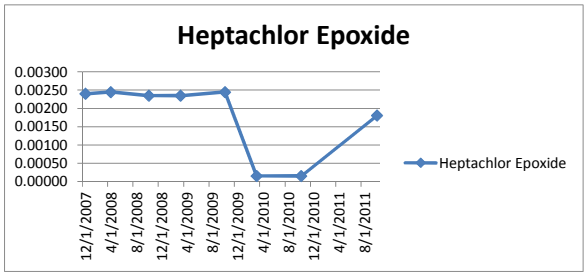
NA = Not Analyzed



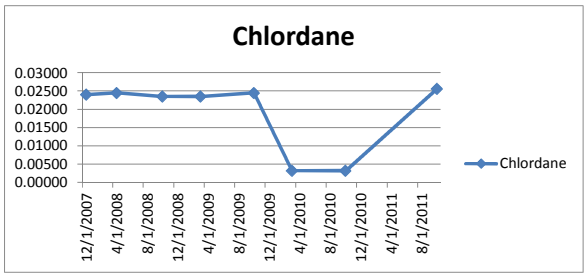
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0047	U	0.00235	U
10/15/2009	0.0049	U	0.00245	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0178	U	0.00890	U



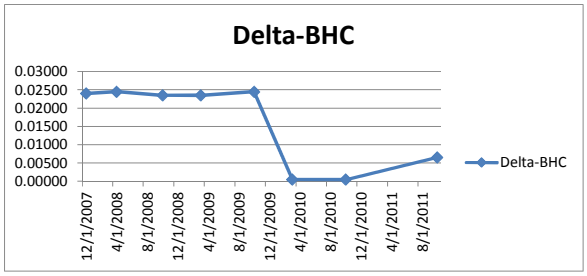
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0049	U	0.00245	U
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0047	U	0.00235	U
10/15/2009	0.0049	U	0.00245	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00362	U	0.00181	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0513	U	0.02565	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0131	U	0.00655	U



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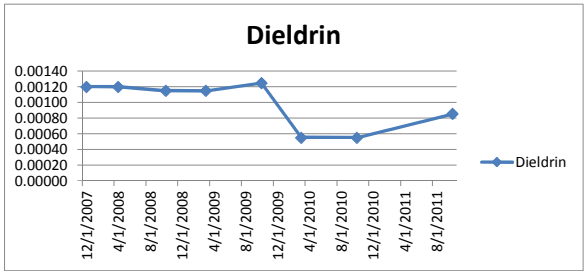
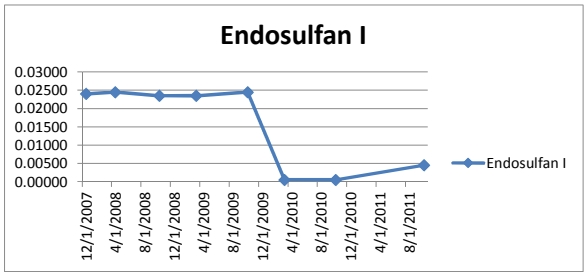
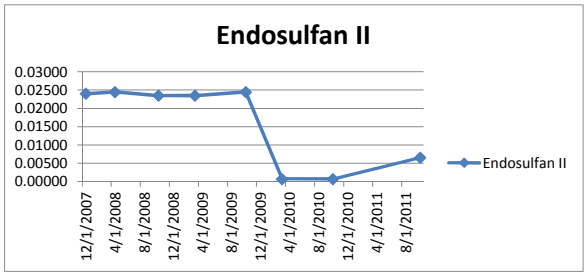
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0023	U	0.00115	U
3/30/2009	0.0023	U	0.00115	U
10/15/2009	0.0025	U	0.00125	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00171	U	0.00086	U



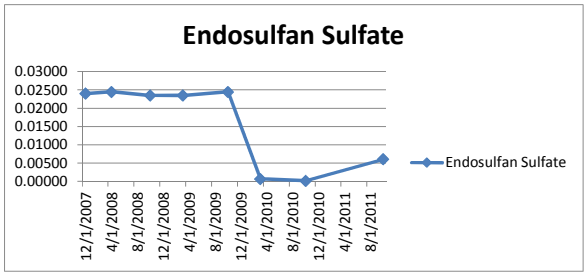
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00905	U	0.00453	U



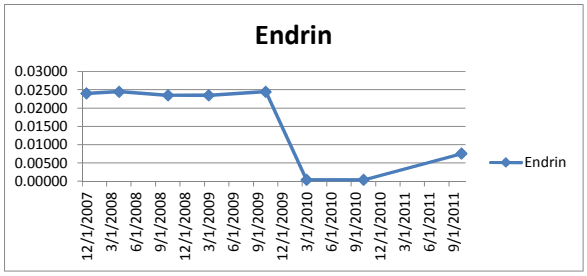
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0131	U	0.00655	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0121	U	0.00605	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0151	U	0.00755	U



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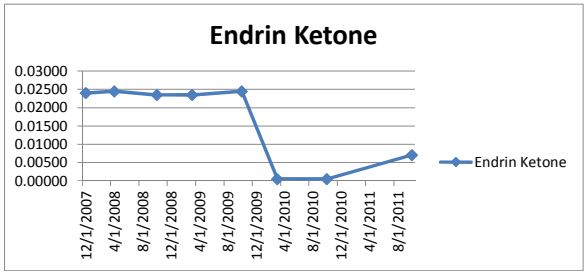
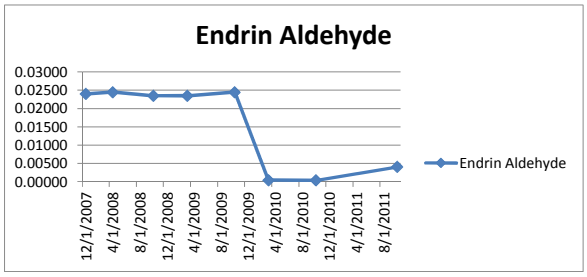
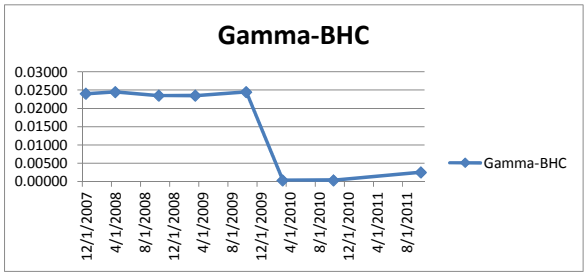
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0141	U	0.00705	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00804	U	0.00402	U

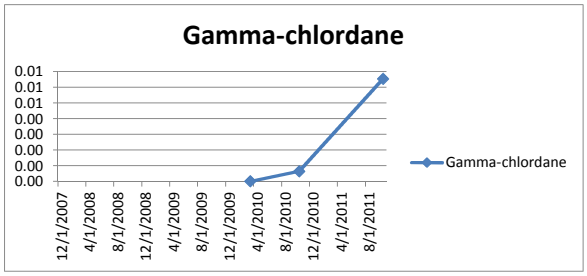


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00503	U	0.00252	U

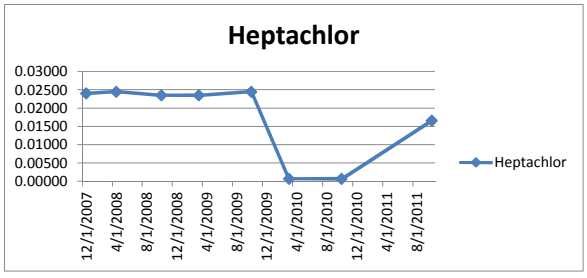


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	I	0.0013	I
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0131	U	0.00655	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0332	U	0.01660	U



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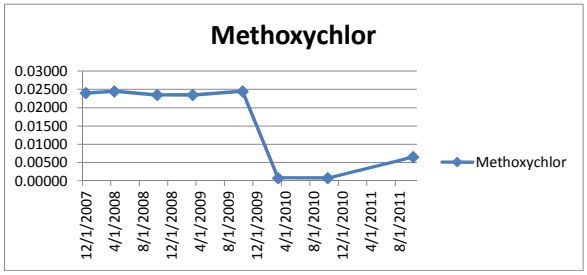
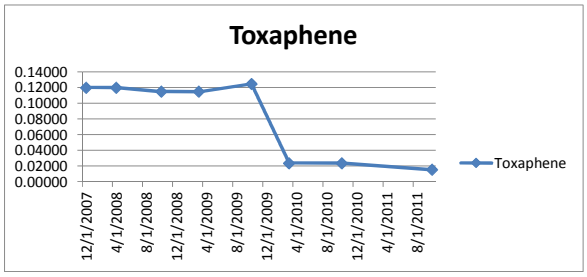
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.049	U	0.02450	U
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.047	U	0.02350	U
10/15/2009	0.049	U	0.02450	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0131	U	0.00655	U

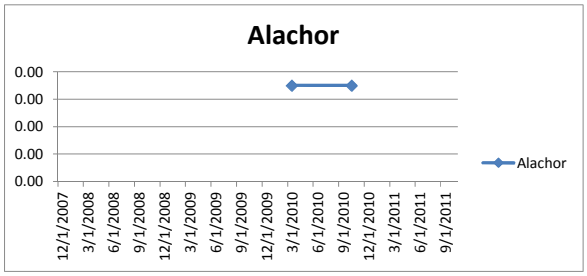


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.24	U	0.12000	U
4/24/2008	0.24	U	0.12000	U
10/13/2008	0.23	U	0.11500	U
3/30/2009	0.23	U	0.11500	U
10/15/2009	0.25	U	0.12500	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	0.0302	U	0.01510	U



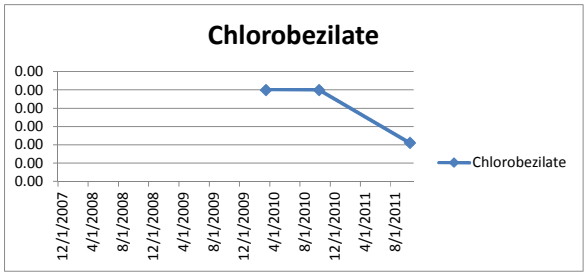
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



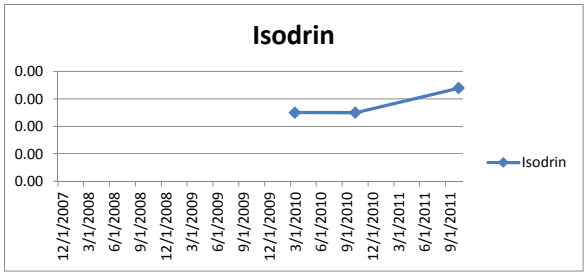
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00171	U	0.00086	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00136	U	0.00068	U

NA = Not Analyzed



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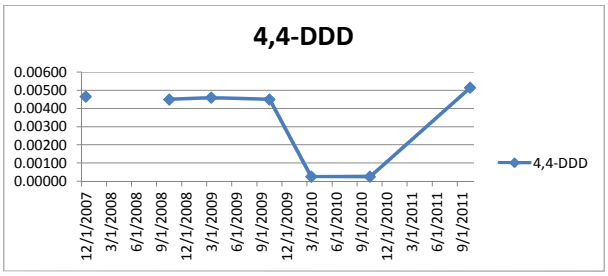
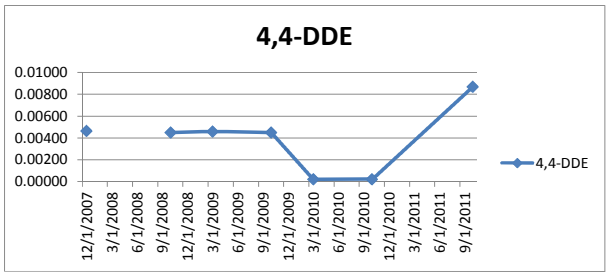
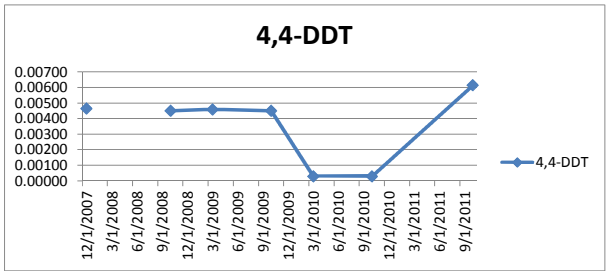
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	NS			
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0103	U	0.00515	U



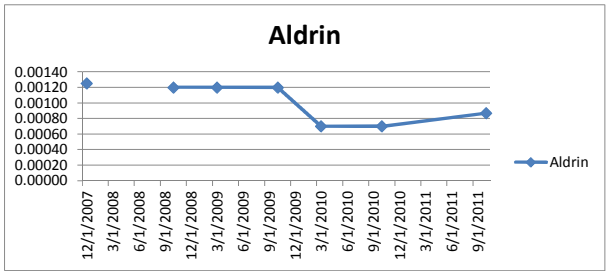
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	NS			
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0174	U	0.00870	U



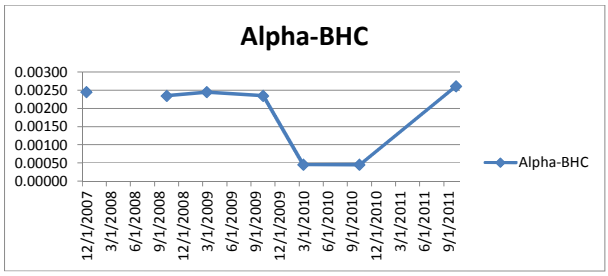
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0093	U	0.00465	U
4/24/2008	NS			
10/13/2008	0.0090	U	0.00450	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0123	U	0.00615	U



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0025	U	0.00125	U
4/24/2008	NS			
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00174	U	0.00087	U



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049	U	0.00245	U
4/24/2008	NS			
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0047	U	0.00235	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00523	U	0.00262	U



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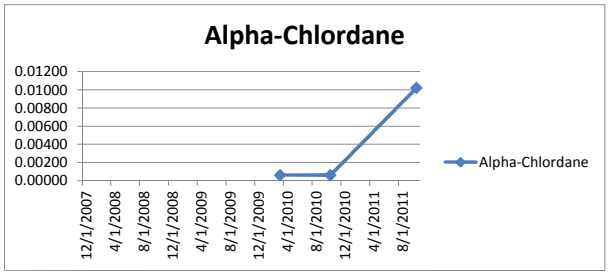
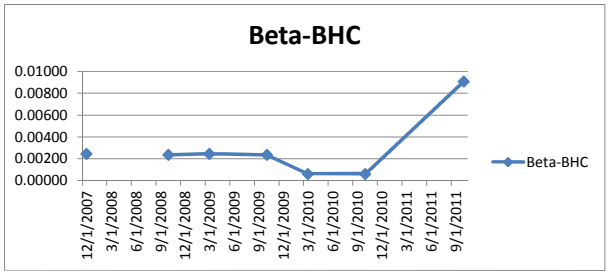
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NS			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0205	U	0.01025	U

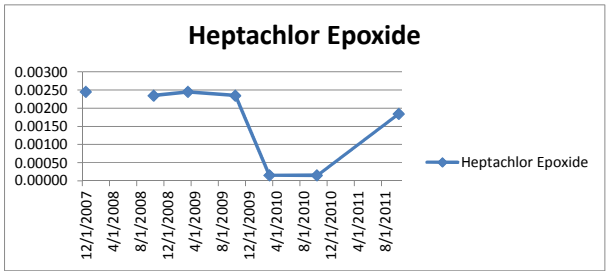
NA = Not Analyzed



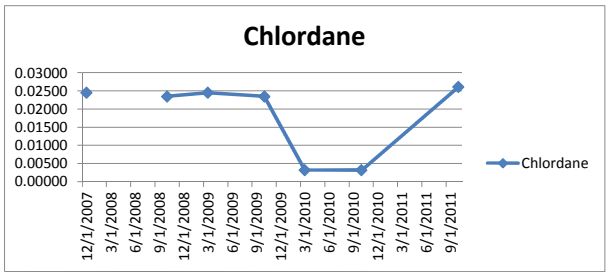
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049	U	0.00245	U
4/24/2008	NS			
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0047	U	0.00235	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0182	U	0.00910	U



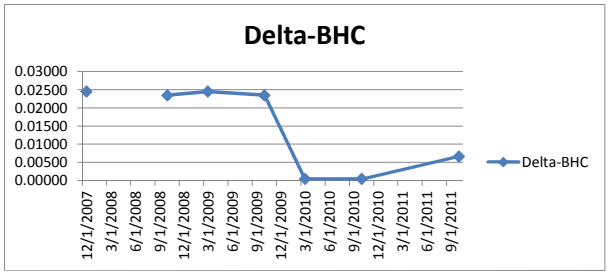
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0049	U	0.00245	U
4/24/2008	NS			
10/13/2008	0.0047	U	0.00235	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0047	U	0.00235	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00369	U	0.00185	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0523	U	0.02615	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0133	U	0.00665	U



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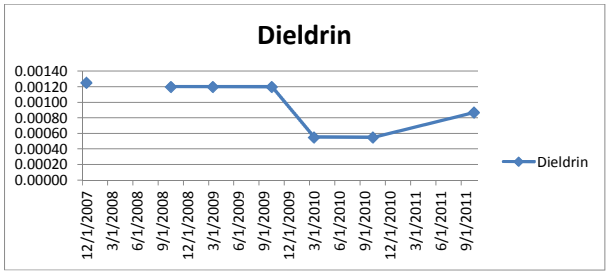
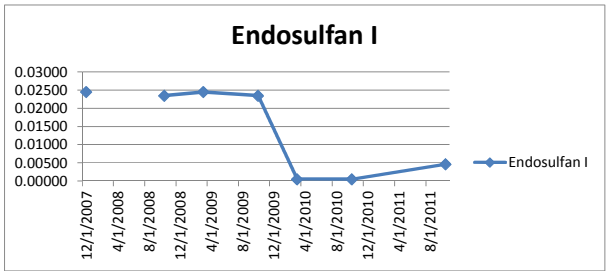
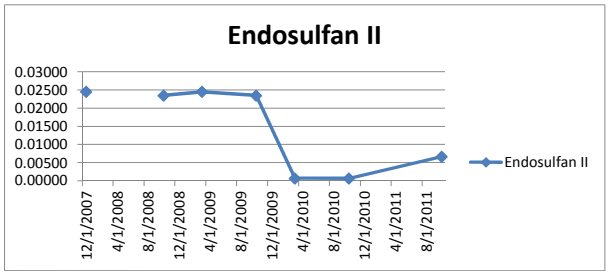
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0025	U	0.00125	U
4/24/2008	NS			
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00174	U	0.00087	U



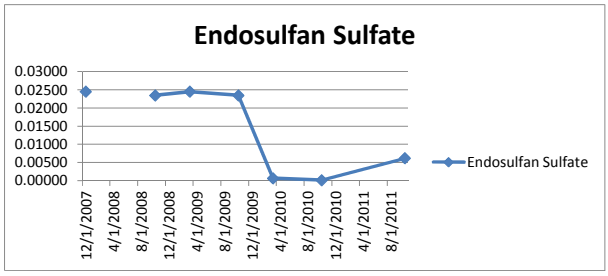
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00923	U	0.00462	U



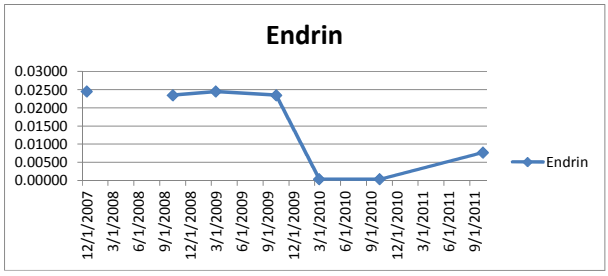
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0133	U	0.00665	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0123	U	0.00615	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0154	U	0.00770	U



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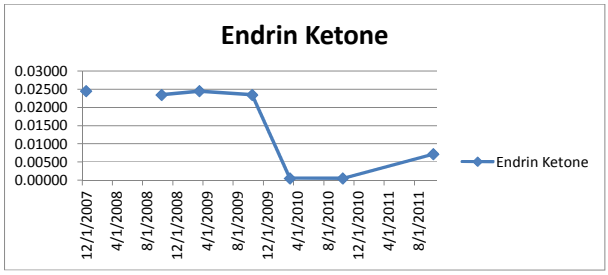
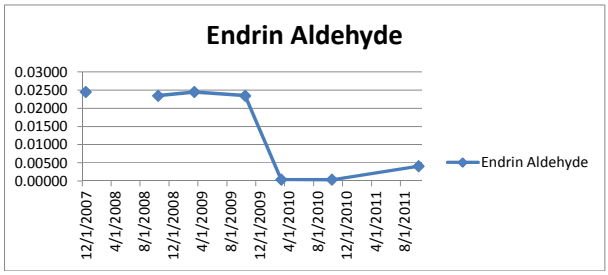
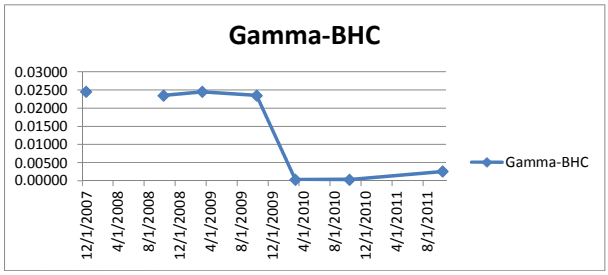
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0144	U	0.00720	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00821	U	0.00411	U

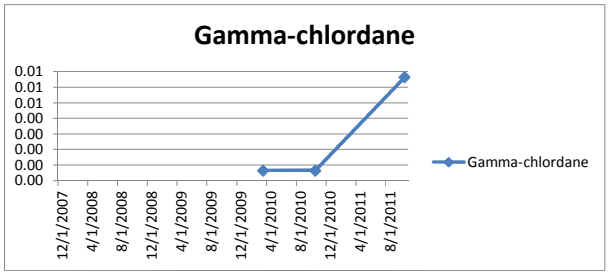


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00513	U	0.00257	U

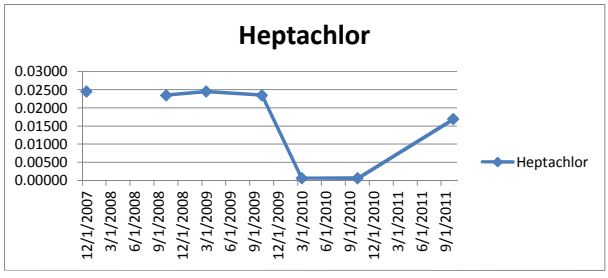


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NS			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0133	U	0.00665	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0338	U	0.01690	U



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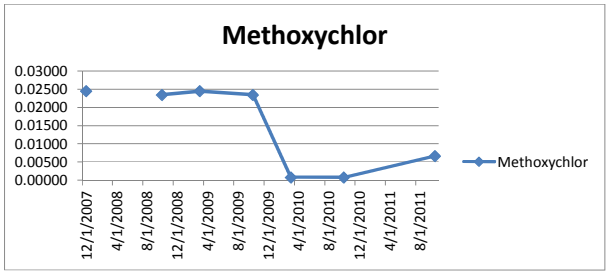
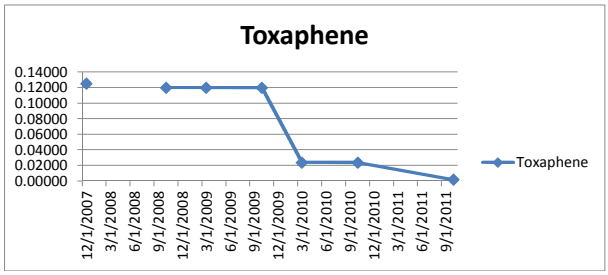
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.049	U	0.02450	U
4/24/2008	NS			
10/13/2008	0.047	U	0.02350	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0133	U	0.00665	U

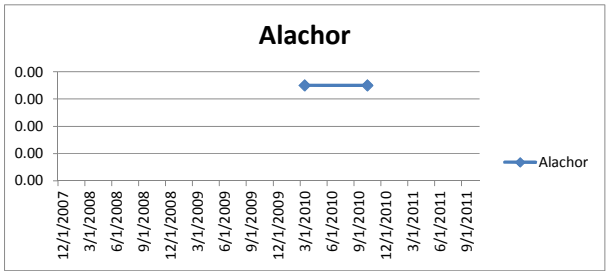


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.25	U	0.12500	U
4/24/2008	NS			
10/13/2008	0.24	U	0.12000	U
3/30/2009	0.24	U	0.12000	U
10/15/2009	0.24	U	0.12000	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	.00308	U	0.00154	U



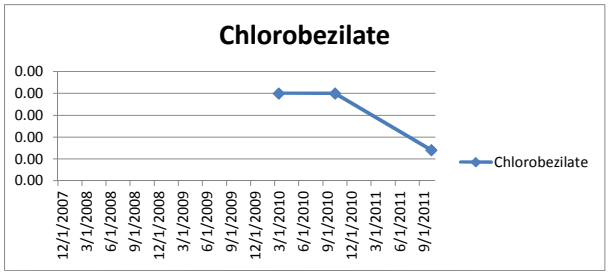
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NS			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



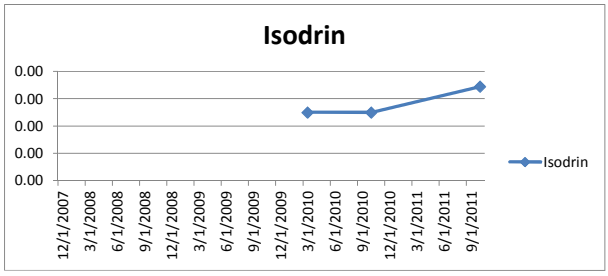
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NS			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00174	U	0.00087	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NS			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00138	U	0.00069	U

NA = Not Analyzed



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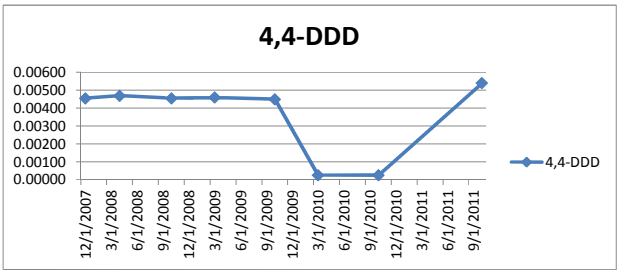
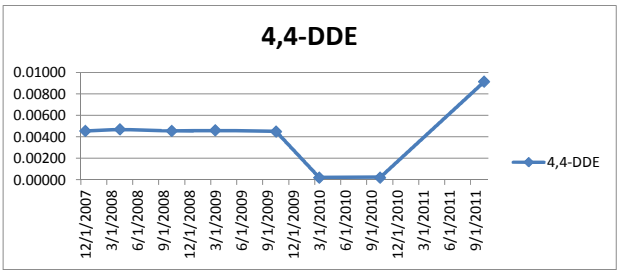
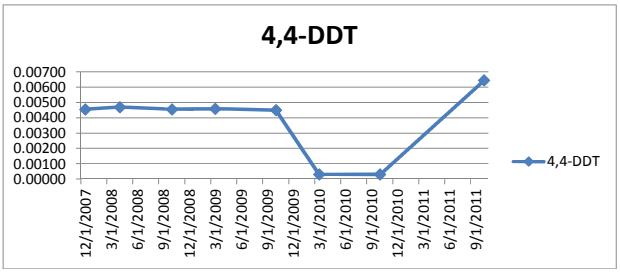
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0094	U	0.00470	U
10/13/2008	0.0091	U	0.00455	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0108	U	0.00540	U



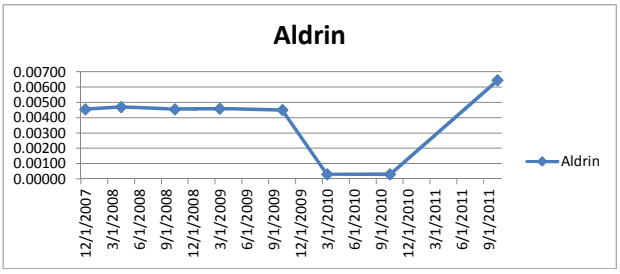
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0094	U	0.00470	U
10/13/2008	0.0091	U	0.00455	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0183	U	0.00915	U



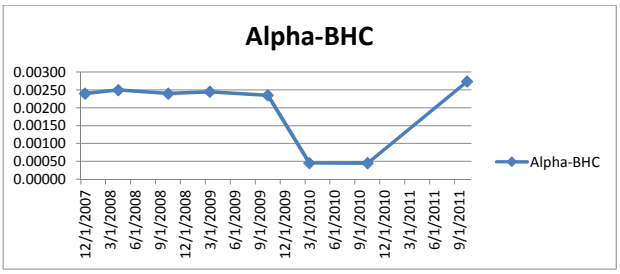
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0094	U	0.00470	U
10/13/2008	0.0091	U	0.00455	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0129	U	0.00645	U



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0091	U	0.00455	U
4/24/2008	0.0094	U	0.00470	U
10/13/2008	0.0091	U	0.00455	U
3/30/2009	0.0092	U	0.00460	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.0129	U	0.00645	U



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.005	U	0.00250	U
10/13/2008	0.0048	U	0.00240	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0047	U	0.00235	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00548	U	0.00274	U



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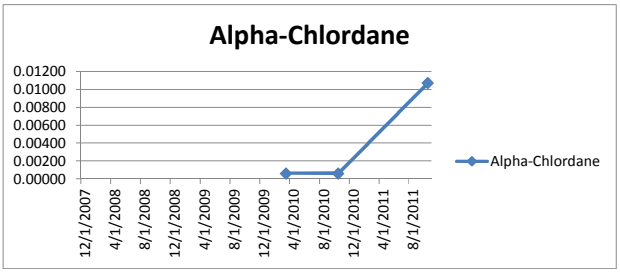
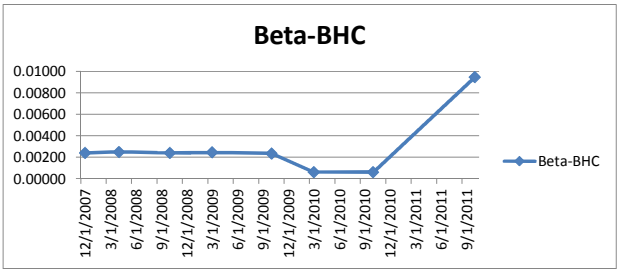
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0215	U	0.01075	U

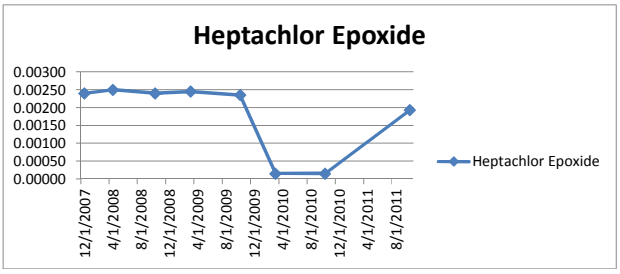
NA = Not Analyzed



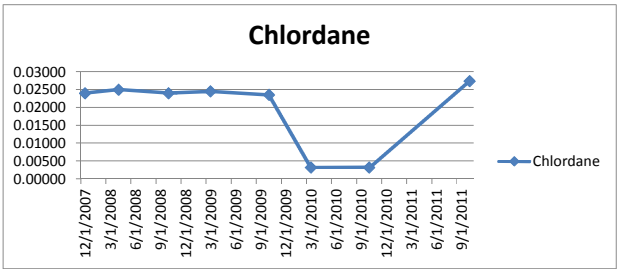
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.005	U	0.00250	U
10/13/2008	0.0048	U	0.00240	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0047	U	0.00235	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0190	U	0.00950	U



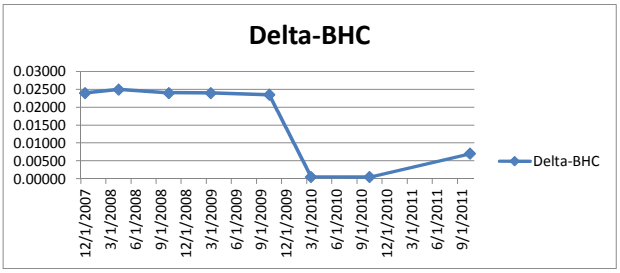
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.005	U	0.00250	U
10/13/2008	0.0048	U	0.00240	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0047	U	0.00235	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00387	U	0.00194	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0063	U	0.00315	U
10/13/2010	0.0063	U	0.00315	U
10/27/2011	0.0548	U	0.02740	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.048	U	0.02400	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0140	U	0.00700	U



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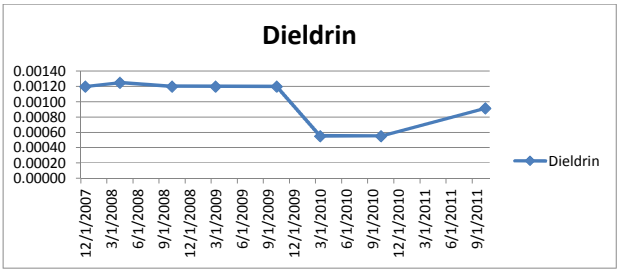
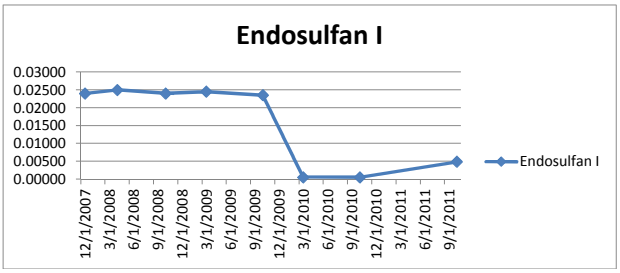
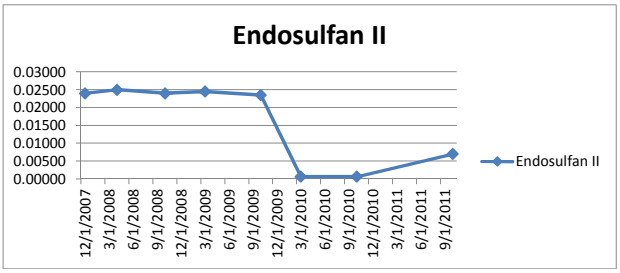
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0025	U	0.00125	U
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0024	U	0.00120	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00183	U	0.00092	U



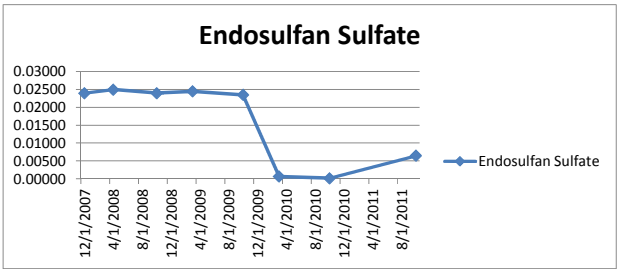
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00968	U	0.00484	U



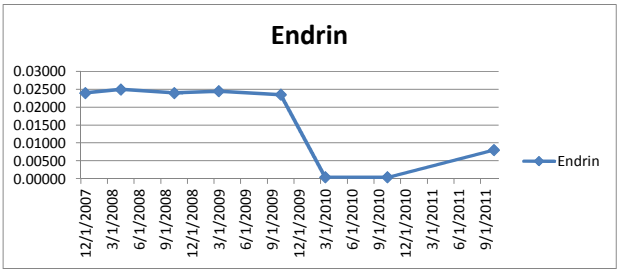
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0140	U	0.00700	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0129	U	0.00645	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0161	U	0.00805	U



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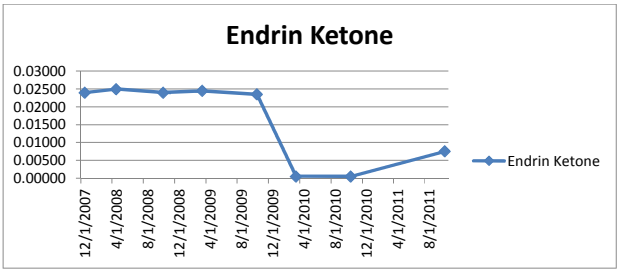
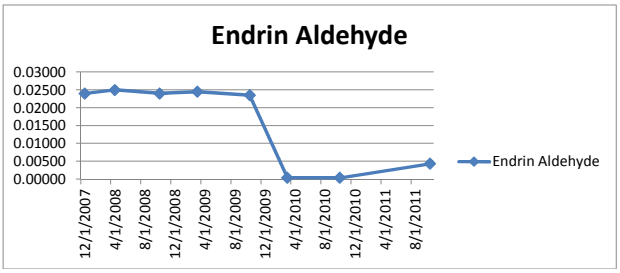
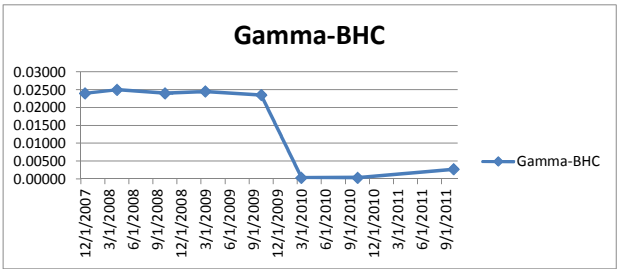
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0151	U	0.00755	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00860	U	0.00430	U

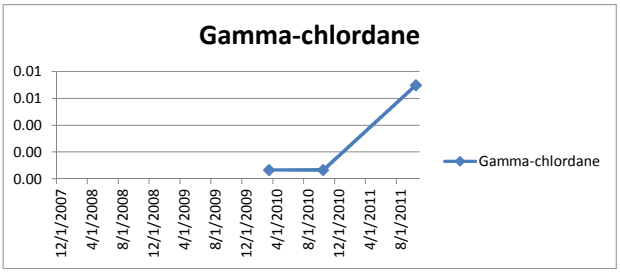


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00538	U	0.00269	U

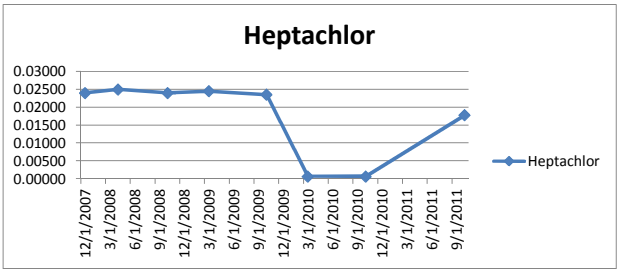


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0140	U	0.00700	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0355	U	0.01775	U



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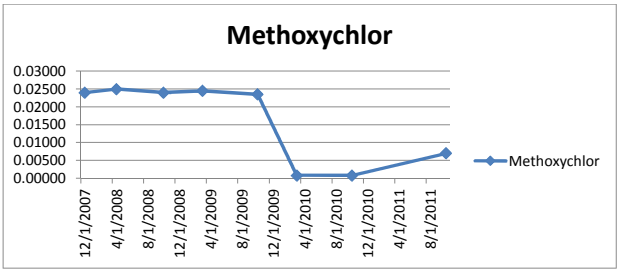
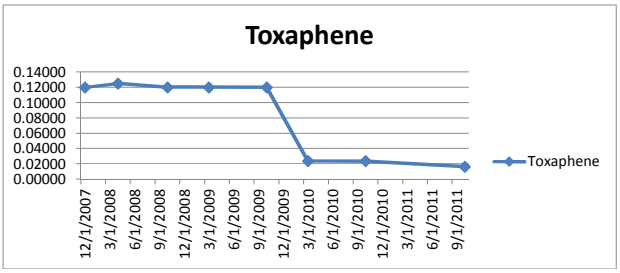
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.05	U	0.02500	U
10/13/2008	0.048	U	0.02400	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.047	U	0.02350	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0140	U	0.00700	U

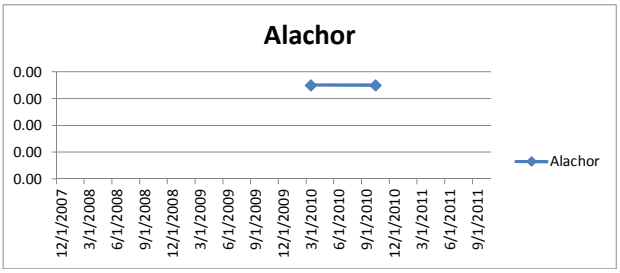


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.24	U	0.12000	U
4/24/2008	0.25	U	0.12500	U
10/13/2008	0.24	U	0.12000	U
3/30/2009	0.24	U	0.12000	U
10/15/2009	0.24	U	0.12000	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	0.0323	U	0.01615	U



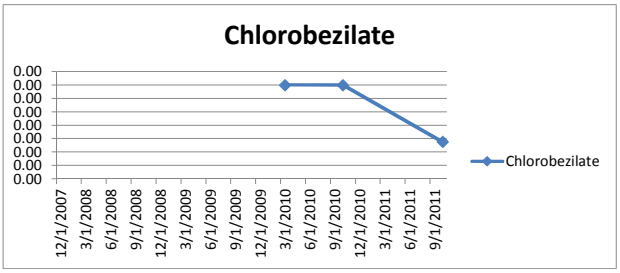
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



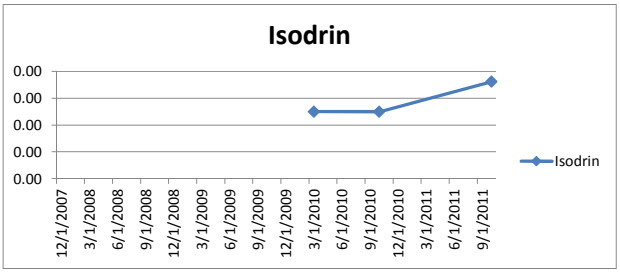
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00183	U	0.00092	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00145	U	0.00073	U

NA = Not Analyzed



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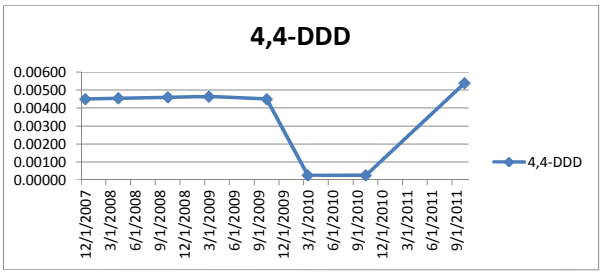
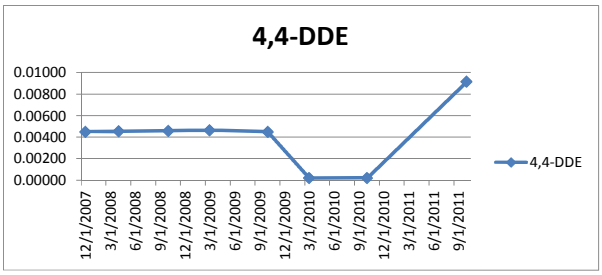
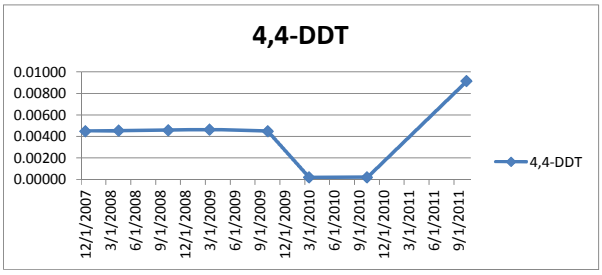
4,4-DDD Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0090	U	0.00450	U
4/24/2008	0.0091	U	0.00455	U
10/13/2008	0.0092	U	0.00460	U
3/30/2009	0.0093	U	0.00465	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0005	U	0.00025	U
10/13/2010	0.0005	U	0.00025	U
10/27/2011	0.0108	U	0.00540	U



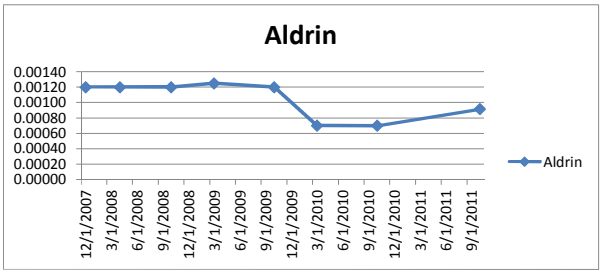
4,4-DDE Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0090	U	0.00450	U
4/24/2008	0.0091	U	0.00455	U
10/13/2008	0.0092	U	0.00460	U
3/30/2009	0.0093	U	0.00465	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0183	U	0.00915	U



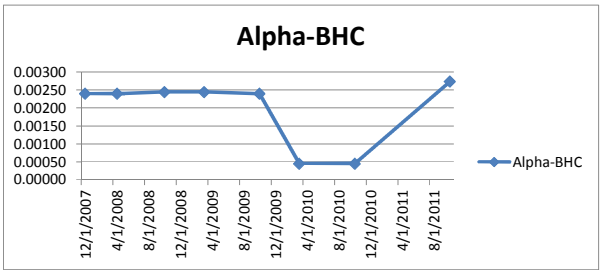
4,4-DDT Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0090	U	0.00450	U
4/24/2008	0.0091	U	0.00455	U
10/13/2008	0.0092	U	0.00460	U
3/30/2009	0.0093	U	0.00465	U
10/15/2009	0.0090	U	0.00450	U
3/16/2010	0.0004	U	0.00020	U
10/13/2010	0.0004	U	0.00020	U
10/27/2011	0.0183	U	0.00915	U



Aldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0025	U	0.00125	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	0.00183	U	0.00092	U



Alpha-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0048	U	0.00240	U
10/13/2008	0.0049	U	0.00245	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.00548	U	0.00274	U



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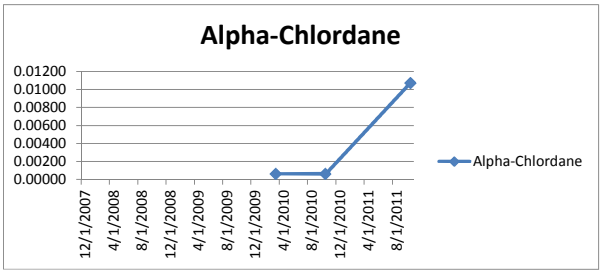
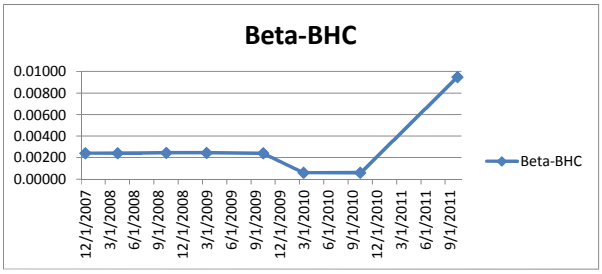
Alpha-Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0215	U	0.01075	U

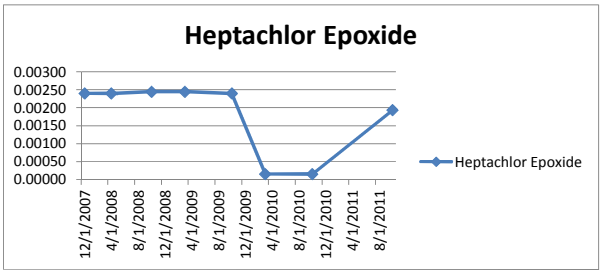
NA = Not Analyzed



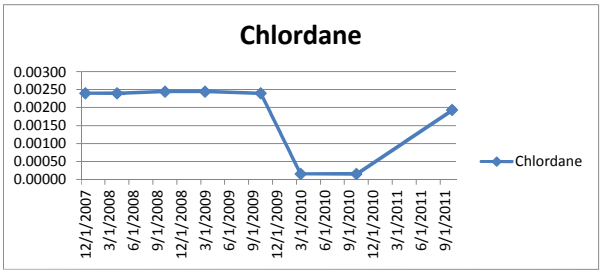
Beta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0048	U	0.00240	U
10/13/2008	0.0049	U	0.00245	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0190	U	0.00950	U



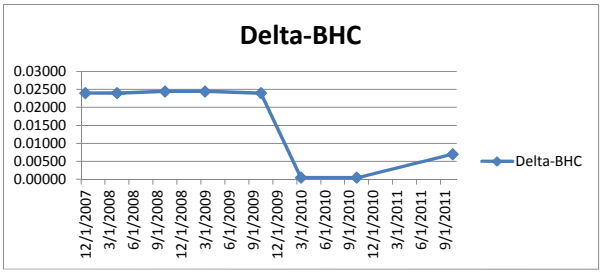
Heptachlor Epoxide Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0048	U	0.00240	U
4/24/2008	0.0048	U	0.00240	U
10/13/2008	0.0049	U	0.00245	U
3/30/2009	0.0049	U	0.00245	U
10/15/2009	0.0048	U	0.00240	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.00387	U	0.00194	U



Chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	.0048	U	0.00240	U
4/24/2008	.0048	U	0.00240	U
10/13/2008	.0049	U	0.00245	U
3/30/2009	.0049	U	0.00245	U
10/15/2009	.0048	U	0.00240	U
3/16/2010	0.0003	U	0.00015	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	.00387	U	0.00194	U



Delta-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0009	U	0.00045	U
10/13/2010	0.0009	U	0.00045	U
10/27/2011	0.0140	U	0.00700	U



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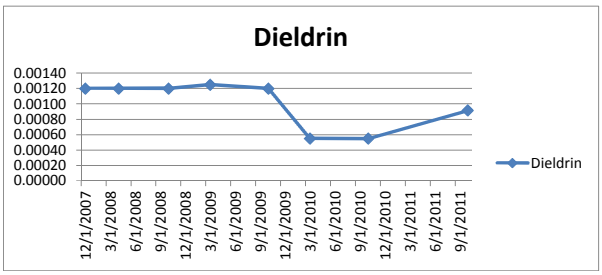
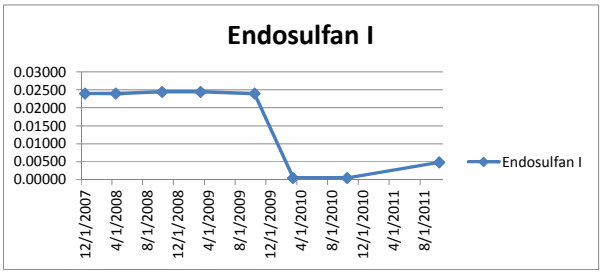
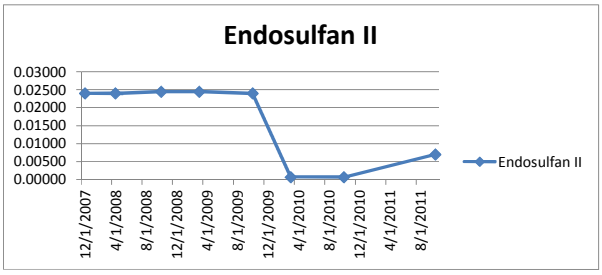
Dieldrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.0024	U	0.00120	U
4/24/2008	0.0024	U	0.00120	U
10/13/2008	0.0024	U	0.00120	U
3/30/2009	0.0025	U	0.00125	U
10/15/2009	0.0024	U	0.00120	U
3/16/2010	0.0011	U	0.00055	U
10/13/2010	0.0011	U	0.00055	U
10/27/2011	0.00183	U	0.00092	U



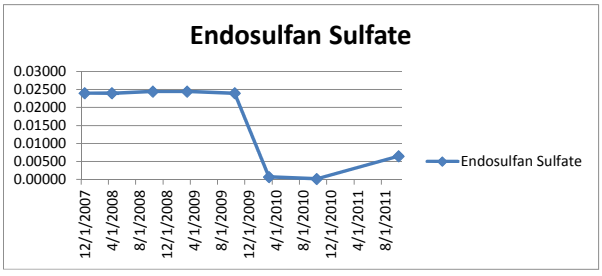
Endosulfan I Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00968	U	0.00484	U



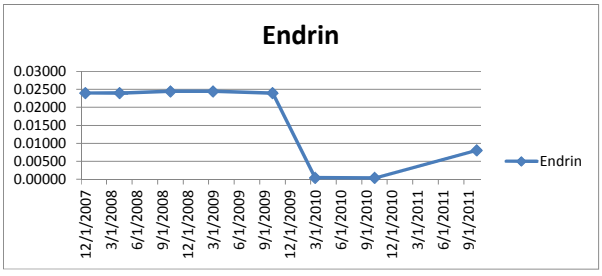
Endosulfan II Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0140	U	0.00700	U



Endosulfan Sulfate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0003	U	0.00015	U
10/27/2011	0.0129	U	0.00645	U



Endrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.0161	U	0.00805	U



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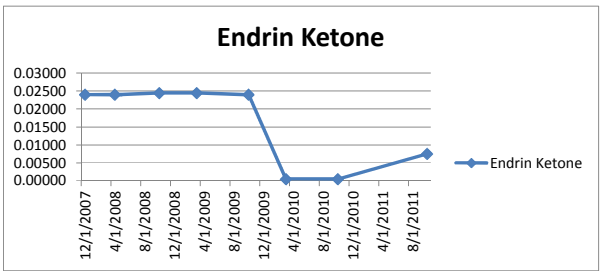
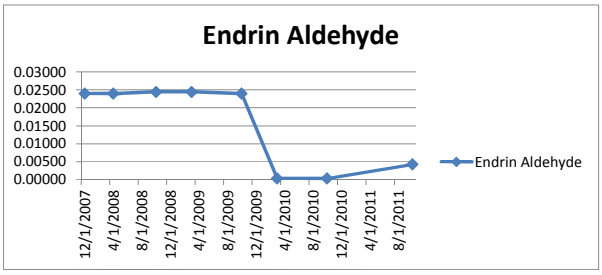
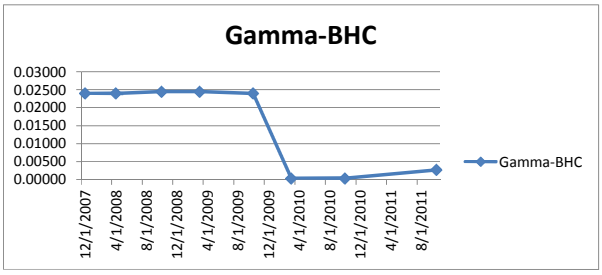
Endrin Ketone Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.0151	U	0.00755	U



Endrin Aldehyde Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0007	U	0.00035	U
10/13/2010	0.0007	U	0.00035	U
10/27/2011	0.00860	U	0.00430	U

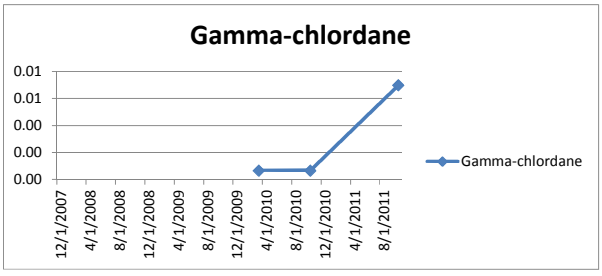


Gamma-BHC Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0006	U	0.00030	U
10/13/2010	0.0006	U	0.00030	U
10/27/2011	0.00538	U	0.00269	U

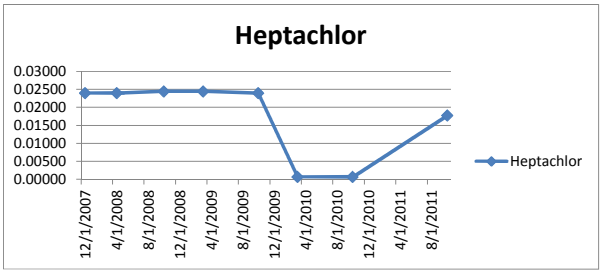


Gamma-chlordane Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0013	U	0.00065	U
10/13/2010	0.0013	U	0.00065	U
10/27/2011	0.0140	U	0.00700	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0012	U	0.00060	U
10/13/2010	0.0012	U	0.00060	U
10/27/2011	0.0355	U	0.01775	U



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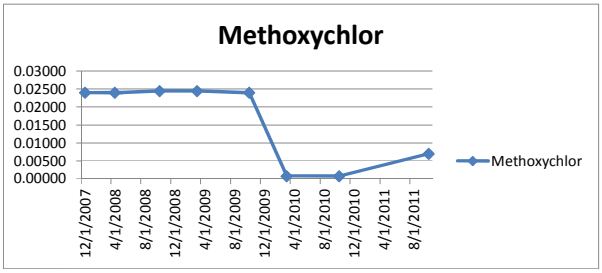
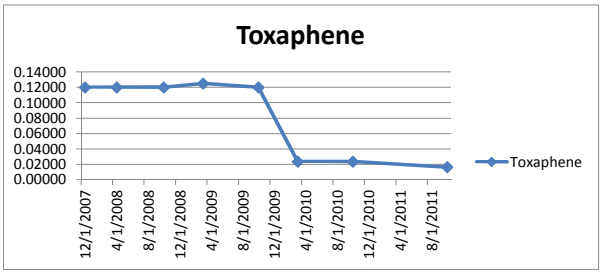
Methoxychlor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.048	U	0.02400	U
4/24/2008	0.048	U	0.02400	U
10/13/2008	0.049	U	0.02450	U
3/30/2009	0.049	U	0.02450	U
10/15/2009	0.048	U	0.02400	U
3/16/2010	0.0015	U	0.00075	U
10/13/2010	0.0015	U	0.00075	U
10/27/2011	0.0140	U	0.00700	U

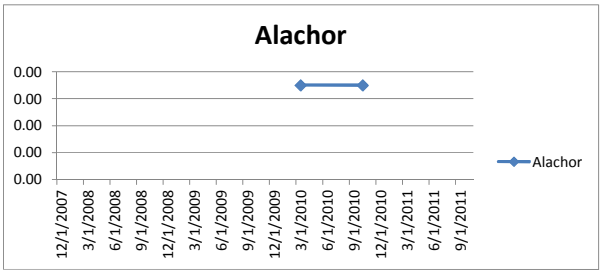


Toxaphene Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.24	U	0.12000	U
4/24/2008	0.24	U	0.12000	U
10/13/2008	0.24	U	0.12000	U
3/30/2009	0.25	U	0.12500	U
10/15/2009	0.24	U	0.12000	U
3/16/2010	0.0471	U	0.02355	U
10/13/2010	0.0471	U	0.02355	U
10/27/2011	0.0323	U	0.01615	U



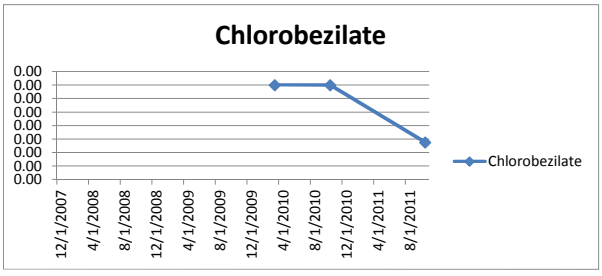
Alachor Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.0014	U	0.00070	U
10/13/2010	0.0014	U	0.00070	U
10/27/2011	NA			

NA = Not Analyzed



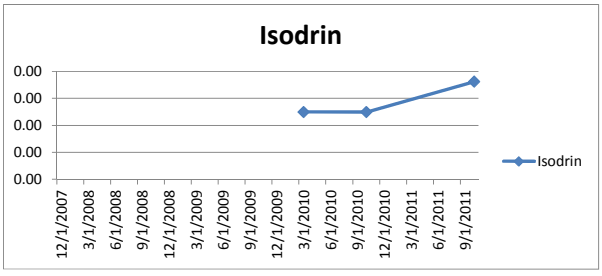
Chlorobezilate Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.002	U	0.00100	U
10/13/2010	0.002	U	0.00100	U
10/27/2011	0.00183	U	0.00092	U

NA = Not Analyzed



Isodrin Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	NA			
4/24/2008	NA			
10/13/2008	NA			
3/30/2009	NA			
10/15/2009	NA			
3/16/2010	0.001	U	0.00050	U
10/13/2010	0.001	U	0.00050	U
10/27/2011	0.00145	U	0.00073	U

NA = Not Analyzed



Mann-Kendall Trend Analysis
Groundwater Samples
Operable Unit 13
NAS Pensacola, Florida

Sample Location ID	Antimony	Cadmium	Iron	Lead	Manganese	Nickel	Thallium
08GR01R	NT	I	D	ND	D	NT	NT
08GR02R	NT	NT	NT	ND	NT	NT	NT
08GR03R	NT	NT	NT	NT	NT	ND	NT
08GR05	NT	NT	NT	ND	NT	NT	NT
08GR06R	NT	ND	NT	NT	NT	NT	NT
24GS01	D	ND	NT	ND	I	ND	ND
24GS02R	D	ND	NT	NT	NT	ND	ND
24GS06R	NT	ND	NT	NT	NT	NT	ND
24GS09R	NT	ND	NT	NT	D	NT	NT
24GS10R	NT	ND	NT	NT	NT	NT	NT
24GS11	NT	ND	D	NT	NT	ND	ND
24GS15	NT	ND	NT	NT	NT	NT	ND

Notes:
ND = Not Detected
Mann-Kendall Analysis conducted using ProUCL version 4.1.01 (Lockheed Martin, May 2010)
NT = No Trend
I = Increasing
D = Decreasing

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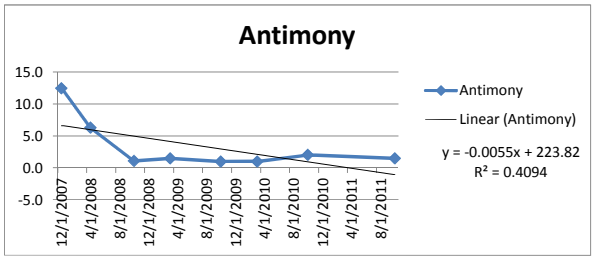
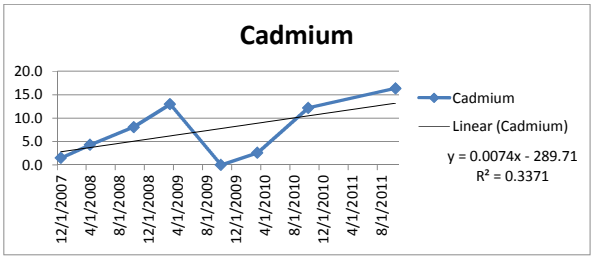
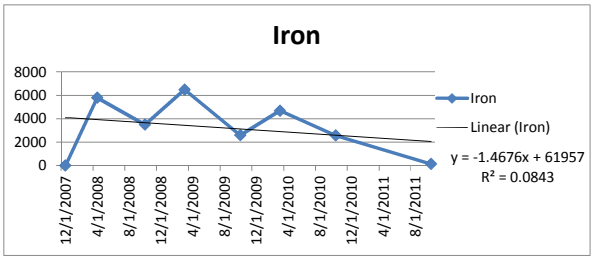
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	25.0	U	12.5	U
4/24/2008	6.3	V	6.3	V
10/13/2008	1.1	IV	1.1	IV
3/30/2009	1.5	IV	1.5	IV
10/15/2009	2.0	U	1.0	U
3/16/2010	2.0	U	1.0	U
10/13/2010	4.1	U	2.1	U
10/27/2011	3	U	1.5	U



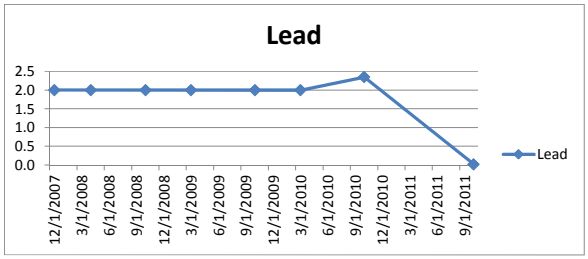
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	I	1.5	I
4/24/2008	4.3	I	4.3	I
10/13/2008	8.1		8.1	
3/30/2009	13.0		13.0	
10/15/2009	9.7		9.7	
3/16/2010	2.6	I	2.6	I
10/13/2010	12.2		12.2	
10/27/2011	16.4		16.4	



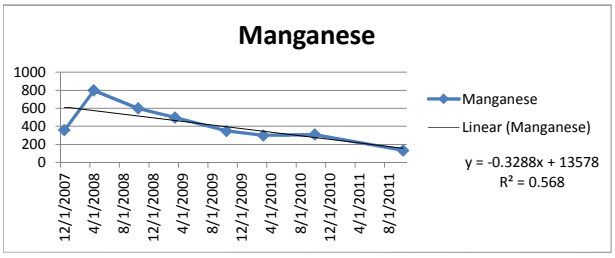
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	2600		2600	
4/24/2008	5800		5800	
10/13/2008	3500		3500	
3/30/2009	6500		6500	
10/15/2009	2600		2600	
3/16/2010	4700		4700	
10/13/2010	2572		2572	
10/27/2011	141	I	141	I



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	4.0	U	2.0	U
4/24/2008	4.0	U	2.0	U
10/13/2008	4.0	U	2.0	U
3/30/2009	4.0	U	2.0	U
10/15/2009	4.0	U	2.0	U
3/16/2010	4.0	U	2.0	U
10/13/2010	4.7	U	2.4	U
10/27/2011	0.0434	U	0.0217	U



Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	360		360	
4/24/2008	800		800	
10/13/2008	600		600	
3/30/2009	500		500	
10/15/2009	350		350	
3/16/2010	300		300	
10/13/2010	310		310	
10/27/2011	133		133	



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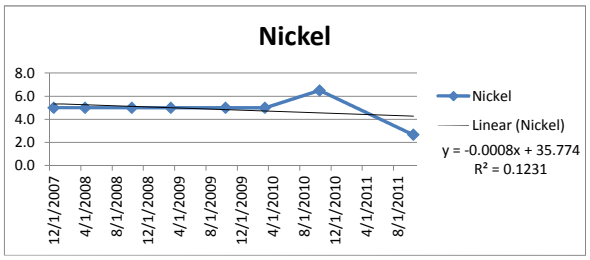
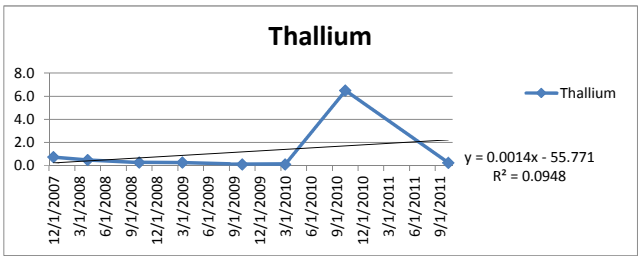
Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	6.5	I	6.5	I
10/27/2011	2.7	I	2.7	I



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	6.5	I	6.5	I
10/27/2011	0.3	I	0.3	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	1
Maximum	12.5
Mean	3.369
Geometric Mean	2.114
Median	1.5
Standard Deviation	4.089
SEM	1.446
Mann-Kendall Test	
Test Value (S)	-10
Tabulated p-value	0.138
Standard Deviation of S	7.958
Standardized Value of S	-1.131
Approximate p-value	0.129

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	7
Minimum	1.5
Maximum	16.4
Mean	8.3
Geometric Mean	6.203
Median	8.1
Standard Deviation	5.74
SEM	2.169
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.035
Standard Deviation of S	6.658
Standardized Value of S	1.802
Approximate p-value	0.0358

Statistically significant evidence of an increasing trend at the specified level of significance.

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Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	########
From File	C:\USEPA\PROUCL\Mann Kendall data sets.xls.wst
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	7
Minimum	141
Maximum	6500
Mean	3688
Geometric Mean	2485
Median	3500
Standard Deviation	2177
SEM	822.9
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.035
Standard Deviation of S	6.658
Standardized Value of S	-1.802
Approximate p-value	0.0358

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	133
Maximum	800
Mean	419.1
Geometric Mean	372.9
Median	355
Standard Deviation	207.2
SEM	73.27
Mann-Kendall Test	
Test Value (S)	-20
Tabulated p-value	0.007
Standard Deviation of S	8.083
Standardized Value of S	-2.351
Approximate p-value	0.00937

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	8
Minimum	2.66
Maximum	6.5
Mean	4.895
Geometric Mean	4.775
Median	5
Standard Deviation	1.045
SEM	0.369
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.548
Standard Deviation of S	6.083
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR01R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

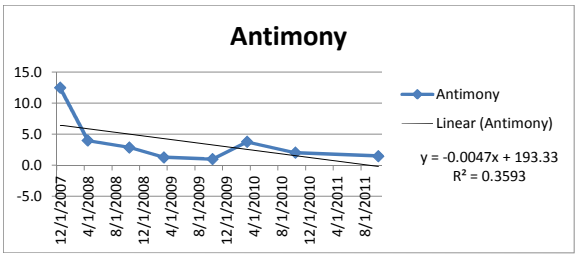
Thallium

General Statistics	
Number of Values	8
Minimum	0.125
Maximum	6.5
Mean	1.1
Geometric Mean	0.405
Median	0.275
Standard Deviation	2.192
SEM	0.775
Mann-Kendall Test	
Test Value (S)	-10
Tabulated p-value	0.138
Standard Deviation of S	7.958
Standardized Value of S	-1.131
Approximate p-value	0.129

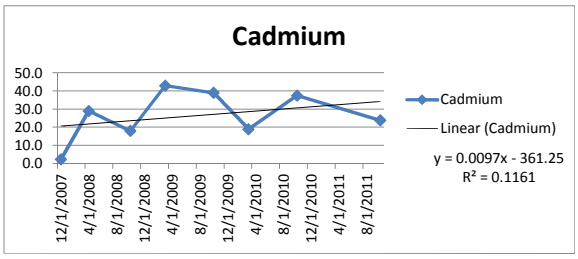
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR02R
OU 13
NAS Pensacola, Pensacola Florida

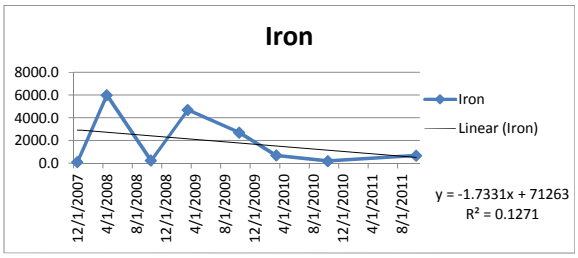
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	25.0	U	12.5	U
4/24/2008	4.0	IV	4.0	IV
10/13/2008	2.9	V	2.9	V
3/30/2009	1.3	IV	1.3	IV
10/15/2009	2.0	U	1.0	U
3/16/2010	3.8	I	3.8	I
10/13/2010	4.1	U	2.1	U
10/27/2011	3	U	1.5	U



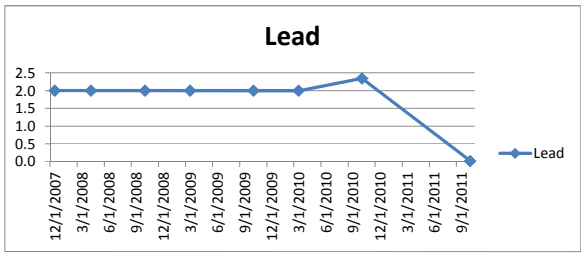
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	2.3	I	2.3	I
4/24/2008	29.0		29.0	
10/13/2008	18.0		18.0	
3/30/2009	43.0		43.0	
10/15/2009	39.0		39.0	
3/16/2010	19.0		19.0	
10/13/2010	37.5		37.5	
10/27/2011	23.8		23.8	



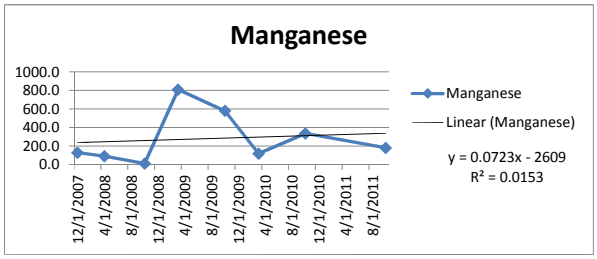
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	96.0	I	96.0	I
4/24/2008	6000		6000	
10/13/2008	230		230	
3/30/2009	4700		4700	
10/15/2009	2700		2700	
3/16/2010	680		680	
10/13/2010	177	I	177	I
10/27/2011	668		668	



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	4.0	U	2.0	U
4/24/2008	4.0	U	2.0	U
10/13/2008	4.0	U	2.0	U
3/30/2009	4.0	U	2.0	U
10/15/2009	4.0	U	2.0	U
3/16/2010	4.0	U	2.0	U
10/13/2010	4.7	U	2.4	U
10/27/2011	0.0434	U	0.0217	U

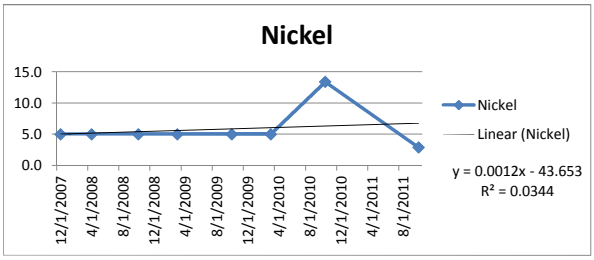


Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	130.0		130.0	
4/24/2008	92.0		92.0	
10/13/2008	12.0		12.0	
3/30/2009	810.0		810.0	
10/15/2009	580.0		580.0	
3/16/2010	120.0		120.0	
10/13/2010	337.7		337.7	
10/27/2011	181.0		181.0	

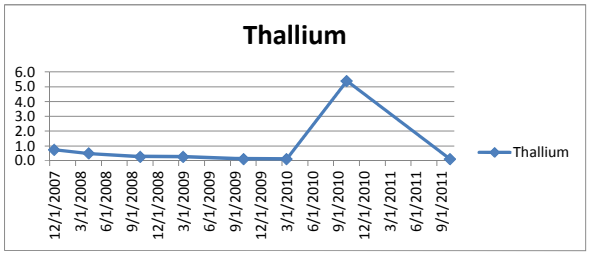


Monitoring Well 08GR02R
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	13.4		13.4	
10/27/2011	2.9	I	2.9	I



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	5.4	I	5.4	I
10/27/2011	0.12	I	0.1	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	1
Maximum	12.5
Mean	3.631
Geometric Mean	2.617
Median	2.475
Standard Deviation	3.756
SEM	1.328
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	8.083
Standardized Value of S	-1.608
Approximate p-value	0.0539

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	8
Minimum	2.3
Maximum	43
Mean	26.45
Geometric Mean	20.73
Median	26.4
Standard Deviation	13.51
SEM	4.776
Mann-Kendall Test	
Test Value (S)	6
Tabulated p-value	0.274
Standard Deviation of S	8.083
Standardized Value of S	0.619
Approximate p-value	0.268

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR02R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	96
Maximum	6000
Mean	1906
Geometric Mean	778.4
Median	674
Standard Deviation	2309
SEM	816.2
Mann-Kendall Test	
Test Value (S)	-4
Tabulated p-value	0.36
Standard Deviation of S	8.083
Standardized Value of S	-0.371
Approximate p-value	0.355

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	12
Maximum	810
Mean	282.8
Geometric Mean	162.8
Median	155.5
Standard Deviation	277.5
SEM	98.13
Mann-Kendall Test	
Test Value (S)	4
Tabulated p-value	0.36
Standard Deviation of S	8.083
Standardized Value of S	0.371
Approximate p-value	0.355

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	8
Minimum	2.88
Maximum	13.4
Mean	5.785
Geometric Mean	5.279
Median	5
Standard Deviation	3.165
SEM	1.119
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.548
Standard Deviation of S	6.083
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR02R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

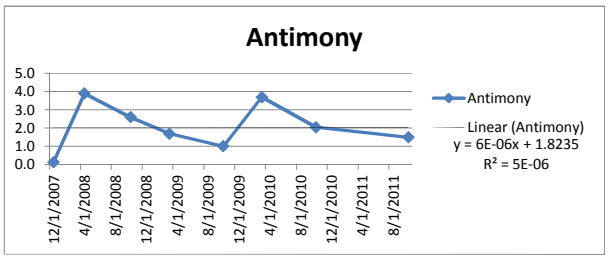
Thallium

General Statistics	
Number of Values	8
Minimum	0.12
Maximum	5.4
Mean	0.946
Geometric Mean	0.361
Median	0.275
Standard Deviation	1.813
SEM	0.641
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	7.958
Standardized Value of S	-1.634
Approximate p-value	0.0512

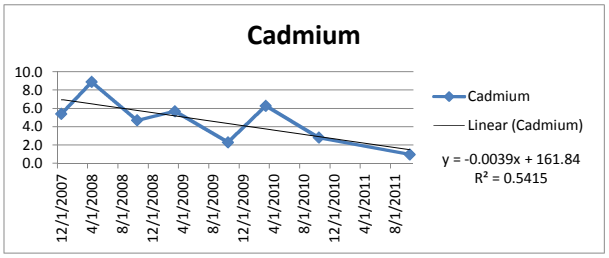
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR03R
OU 13
NAS Pensacola, Pensacola Florida

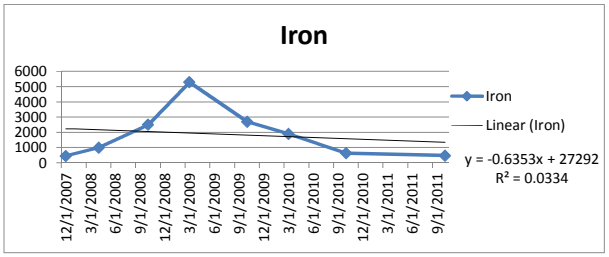
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.25	U	0.1	U
4/24/2008	3.9	IV	3.9	IV
10/13/2008	2.6	V	2.6	V
3/30/2009	1.7	IV	1.7	IV
10/15/2009	2.0	U	1.0	U
3/16/2010	3.7	I	3.7	I
10/13/2010	4.1	U	2.1	U
10/27/2011	3.0	U	1.5	U



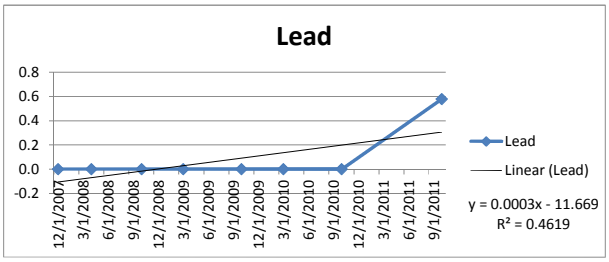
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	5.4		5.4	
4/24/2008	8.9		8.9	
10/13/2008	4.7	I	4.7	I
3/30/2009	5.7		5.7	
10/15/2009	2.3	I	2.3	I
3/16/2010	6.3		6.3	
10/13/2010	2.8	I	2.8	I
10/27/2011	1.0		1.0	



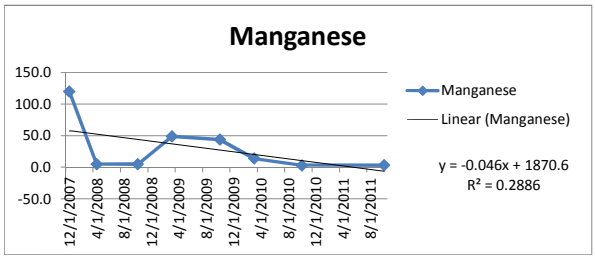
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	450		450	
4/24/2008	1000		1000	
10/13/2008	2500		2500	
3/30/2009	5300		5300	
10/15/2009	2700		2700	
3/16/2010	1900		1900	
10/13/2010	638		638	
10/27/2011	470		470	



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	4.0		4.0	
4/24/2008	4.0		4.0	
10/13/2008	4.0		4.0	
3/30/2009	4.0		4.0	
10/15/2009	4.0		4.0	
3/16/2010	4.0		4.0	
10/13/2010	4.7		4.7	
10/27/2011	0.58	I	0.58	I

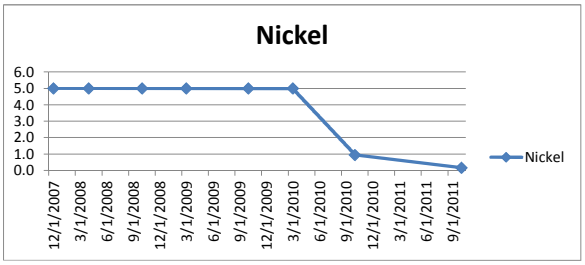


Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	120.0		120.0	
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	49.0		49.0	
10/15/2009	44.0		44.0	
3/16/2010	14.0		14.0	
10/13/2010	6.4	U	3.2	U
10/27/2011	3.77		3.77	

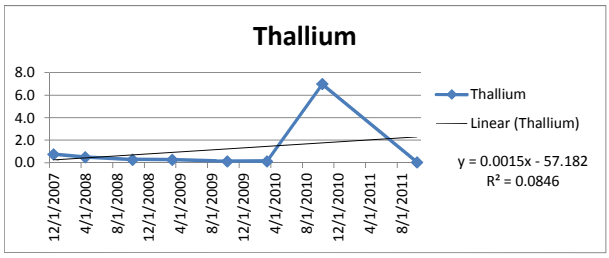


Monitoring Well 08GR03R
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	1.9	U	1.0	U
10/27/2011	0.344	U	0.172	U



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	7.0	I	7.0	I
10/27/2011	0.1	I	0.05	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	0.125
Maximum	3.9
Mean	2.072
Geometric Mean	1.492
Median	1.875
Standard Deviation	1.292
SEM	0.457
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.452
Standard Deviation of S	8.083
Standardized Value of S	-0.124
Approximate p-value	0.451

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	8
Minimum	0.96
Maximum	8.9
Mean	4.633
Geometric Mean	3.868
Median	5.05
Standard Deviation	2.536
SEM	0.897
Mann-Kendall Test	
Test Value (S)	-12
Tabulated p-value	0.089
Standard Deviation of S	8.083
Standardized Value of S	-1.361
Approximate p-value	0.0868

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR03R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	450
Maximum	5300
Mean	1870
Geometric Mean	1319
Median	1450
Standard Deviation	1652
SEM	584.1
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.452
Standard Deviation of S	8.083
Standardized Value of S	-0.124
Approximate p-value	0.451

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	1
Minimum	0.58
Maximum	0.58
Mean	0.58
Geometric Mean	0.58
Median	0.58
Standard Deviation	N/A
SEM	N/A
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	N/A
Standard Deviation of S	0
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	3.2
Maximum	120
Mean	30.5
Geometric Mean	13.48
Median	9.5
Standard Deviation	40.65
SEM	14.37
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.089
Standard Deviation of S	8.021
Standardized Value of S	-1.496
Approximate p-value	0.0673

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR03R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

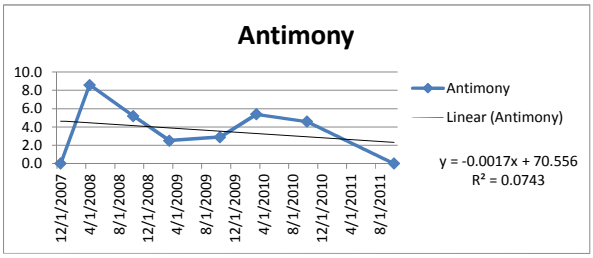
Thallium

General Statistics	
Number of Values	8
Minimum	0.05
Maximum	7
Mean	1.138
Geometric Mean	0.334
Median	0.275
Standard Deviation	2.38
SEM	0.841
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	7.958
Standardized Value of S	-1.634
Approximate p-value	0.0512

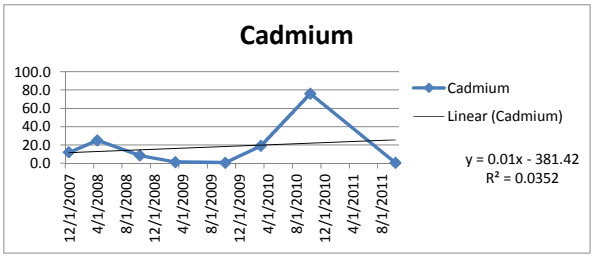
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR05
OU 13
NAS Pensacola, Pensacola Florida

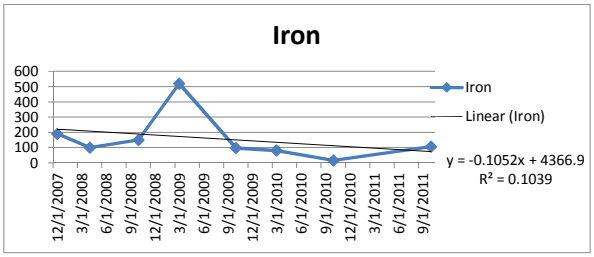
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	0.25		0.25	
4/24/2008	8.6	V	8.6	V
10/13/2008	5.2	V	5.2	V
3/30/2009	2.5	V	2.5	V
10/15/2009	2.9	I	2.9	I
3/16/2010	5.4		5.4	
10/13/2010	4.6	I	4.6	I
10/27/2011	3.0		3.0	



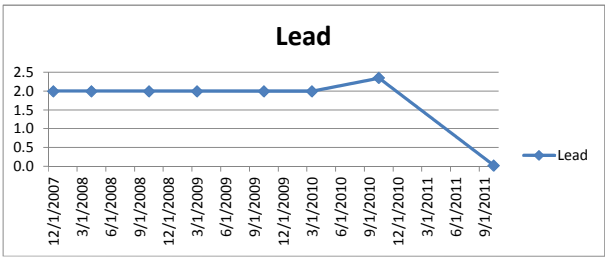
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	12.0		12.0	
4/24/2008	25.0		25.0	
10/13/2008	8.4		8.4	
3/30/2009	1.2	I	1.2	I
10/15/2009	1.0	U	0.5	U
3/16/2010	19.0		19.0	
10/13/2010	76.2		76.2	
10/27/2011	0.42	I	0.42	I



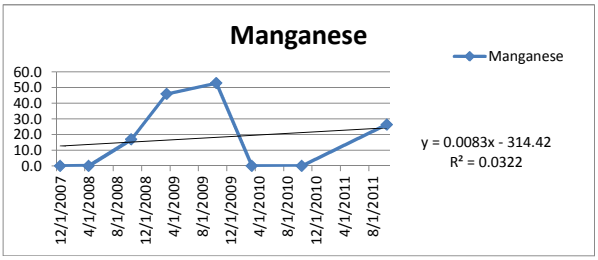
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	190		190	
4/24/2008	100		100	
10/13/2008	150		150	
3/30/2009	520		520	
10/15/2009	97	I	97.0	I
3/16/2010	80	I	80.0	I
10/13/2010	32	U	16.0	U
10/27/2011	106	I	106	I



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	4.0	U	2.0	U
4/24/2008	4.0	U	2.0	U
10/13/2008	4.0	U	2.0	U
3/30/2009	4.0	U	2.0	U
10/15/2009	4.0	U	2.0	U
3/16/2010	4.0	U	2.0	U
10/13/2010	4.7	U	2.4	U
10/27/2011	0.0434	U	0.0217	U

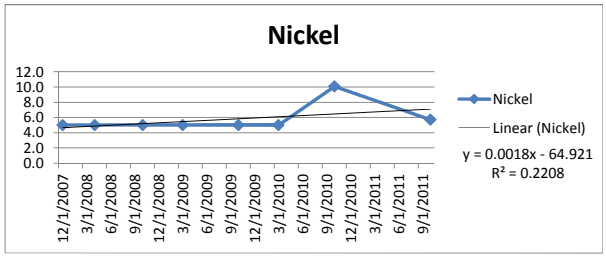


Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	17.0		17.0	
3/30/2009	46.0		46.0	
10/15/2009	53.0		53.0	
3/16/2010	10.0	U	5.0	U
10/13/2010	6.4	U	3.2	U
10/27/2011	26.5		26.5	

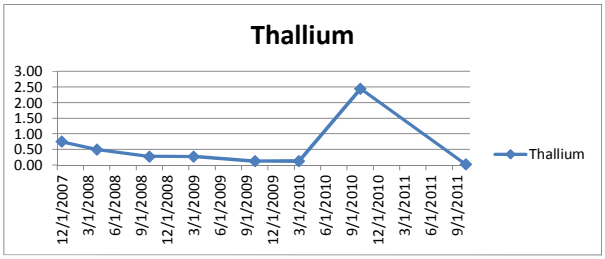


Monitoring Well 08GR05
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	10.1		10.1	
10/27/2011	5.72		5.72	



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.75	U
4/24/2008	1.0	U	0.50	U
10/13/2008	0.55	U	0.28	U
3/30/2009	0.55	U	0.28	U
10/15/2009	0.25	U	0.13	U
3/16/2010	0.25	U	0.13	U
10/13/2010	4.9	U	2.45	U
10/27/2011	0.0475	U	0.0238	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	6
Minimum	2.5
Maximum	8.6
Mean	4.867
Geometric Mean	4.477
Median	4.9
Standard Deviation	2.185
SEM	0.892
Mann-Kendall Test	
Test Value (S)	-3
Tabulated p-value	0.36
Standard Deviation of S	5.323
Standardized Value of S	-0.376
Approximate p-value	0.354

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	8
Minimum	0.42
Maximum	76.2
Mean	17.84
Geometric Mean	5.565
Median	10.2
Standard Deviation	25.25
SEM	8.927
Mann-Kendall Test	
Test Value (S)	-6
Tabulated p-value	0.274
Standard Deviation of S	8.083
Standardized Value of S	-0.619
Approximate p-value	0.268

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR05
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	0.42
Maximum	76.2
Mean	17.84
Geometric Mean	5.565
Median	10.2
Standard Deviation	25.25
SEM	8.927
Mann-Kendall Test	
Test Value (S)	-6
Tabulated p-value	0.274
Standard Deviation of S	8.083
Standardized Value of S	-0.619
Approximate p-value	0.268

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	3.2
Maximum	53
Mean	20.09
Geometric Mean	12.03
Median	11
Standard Deviation	19.9
SEM	7.037
Mann-Kendall Test	
Test Value (S)	3
Tabulated p-value	0.452
Standard Deviation of S	7.853
Standardized Value of S	0.255
Approximate p-value	0.399

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	8
Minimum	5
Maximum	10.1
Mean	5.728
Geometric Mean	5.552
Median	5
Standard Deviation	1.785
SEM	0.631
Mann-Kendall Test	
Test Value (S)	11
Tabulated p-value	0.138
Standard Deviation of S	6.083
Standardized Value of S	1.644
Approximate p-value	0.0501

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR05
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

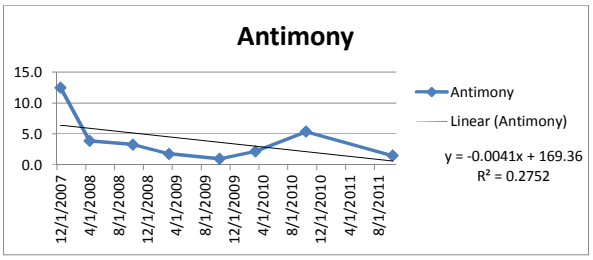
Thallium

General Statistics		
Number of Values		0
Minimum	N/A	
Maximum	N/A	
Mean	N/A	
Geometric Mean	N/A	
Median	N/A	
Standard Deviation	N/A	
SEM	N/A	
Mann-Kendall Test		
Test Value (S)		0
Tabulated p-value	N/A	
Standard Deviation of S		0
Standardized Value of S	N/A	
Approximate p-value	N/A	

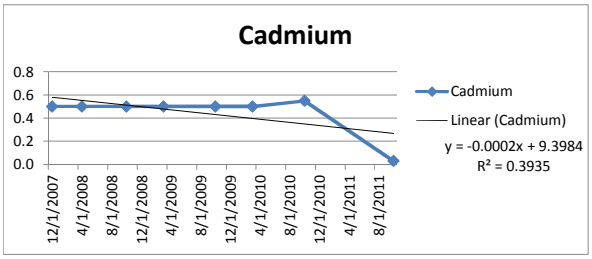
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR06R
OU 13
NAS Pensacola, Pensacola Florida

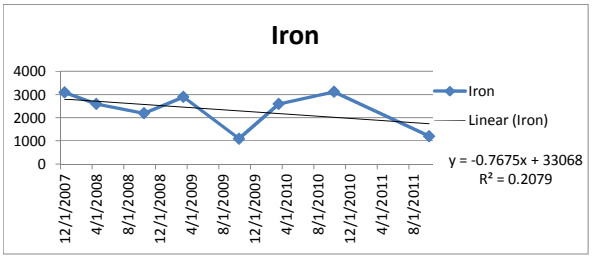
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	25.0	U	12.5	U
4/24/2008	3.9	IV	3.9	IV
10/13/2008	3.3	V	3.3	V
3/30/2009	1.8	IV	1.8	IV
10/15/2009	2.0	U	1.0	U
3/16/2010	2.2	I	2.2	I
10/13/2010	5.4	I	5.4	I
10/27/2011	3.0	U	1.5	U



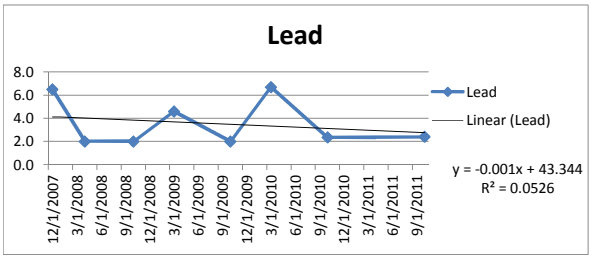
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.0	U	0.5	U
4/24/2008	1.0	U	0.5	U
10/13/2008	1.0	U	0.5	U
3/30/2009	1.0	U	0.5	U
10/15/2009	1.0	U	0.5	U
3/16/2010	1.0	U	0.5	U
10/13/2010	1.1	U	0.6	U
10/27/2011	0.0614	U	0.0307	U



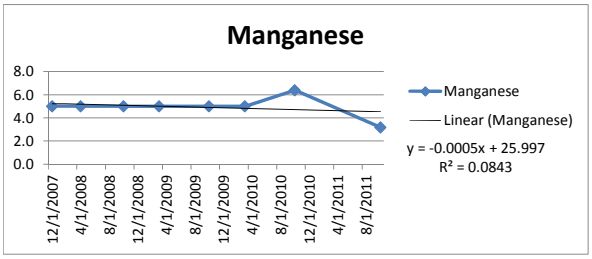
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	3100		3100	
4/24/2008	2600		2600	
10/13/2008	2200		2200	
3/30/2009	2900		2900	
10/15/2009	1100		1100	
3/16/2010	2600		2600	
10/13/2010	3124		3124	
10/27/2011	1210		1210	



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	6.5		6.5	
4/24/2008	4.0	U	2.0	U
10/13/2008	4.0	U	2.0	U
3/30/2009	4.6	I	4.6	I
10/15/2009	4.0	U	2.0	U
3/16/2010	6.7		6.7	
10/13/2010	4.7	U	2.4	U
10/27/2011	2.41		2.41	

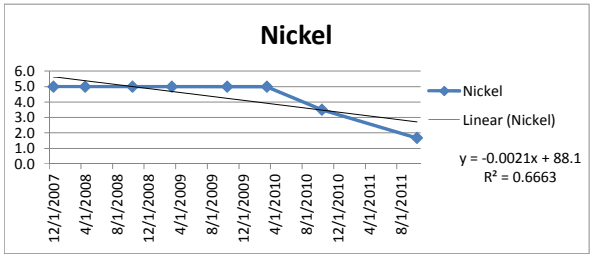


Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	6.4	I	6.4	I
10/27/2011	3.2		3.2	

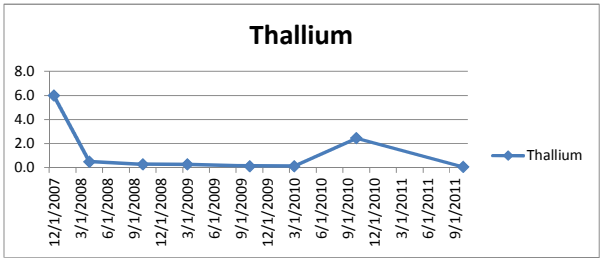


Monitoring Well 08GR06R
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	3.5	I	3.5	I
10/27/2011	1.68	I	1.68	I



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	12	U	6.0	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	4.9	U	2.5	U
10/27/2011	0.05	I	0.05	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	1
Maximum	12.5
Mean	3.95
Geometric Mean	2.911
Median	2.75
Standard Deviation	3.742
SEM	1.323
Mann-Kendall Test	
Test Value (S)	-12
Tabulated p-value	0.089
Standard Deviation of S	8.083
Standardized Value of S	-1.361
Approximate p-value	0.0868

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	1100
Maximum	3124
Mean	2354
Geometric Mean	2204
Median	2600
Standard Deviation	799.4
SEM	282.6
Mann-Kendall Test	
Test Value (S)	-5
Tabulated p-value	0.36
Standard Deviation of S	8.021
Standardized Value of S	-0.499
Approximate p-value	0.309

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR06R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	2
Maximum	6.7
Mean	3.57
Geometric Mean	3.124
Median	2.38
Standard Deviation	2.059
SEM	0.728
Mann-Kendall Test	
Test Value (S)	3
Tabulated p-value	0.452
Standard Deviation of S	7.853
Standardized Value of S	0.255
Approximate p-value	0.399

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	2
Maximum	6.7
Mean	3.57
Geometric Mean	3.124
Median	2.38
Standard Deviation	2.059
SEM	0.728
Mann-Kendall Test	
Test Value (S)	3
Tabulated p-value	0.452
Standard Deviation of S	7.853
Standardized Value of S	0.255
Approximate p-value	0.399

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

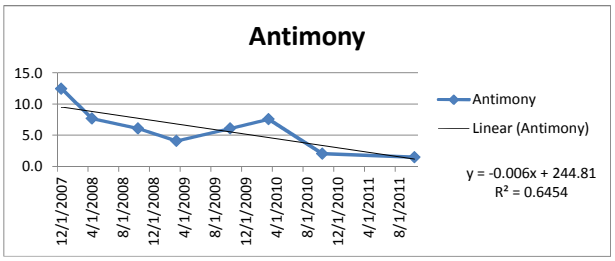
Nickel

General Statistics	
Number of Values	8
Minimum	1.68
Maximum	5
Mean	4.398
Geometric Mean	4.173
Median	5
Standard Deviation	1.217
SEM	0.43
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.089
Standard Deviation of S	6.083
Standardized Value of S	-1.973
Approximate p-value	0.0243

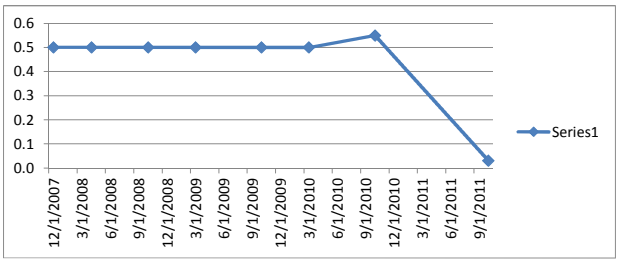
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS01
OU 13
NAS Pensacola, Pensacola Florida

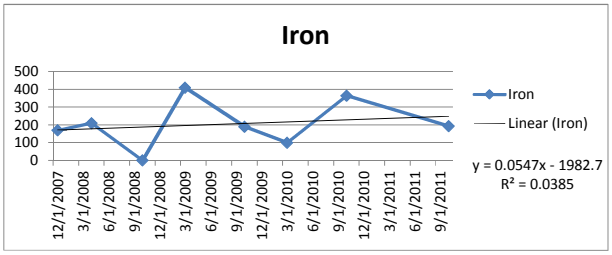
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	25.0	U	12.5	U
4/24/2008	7.7	V	7.7	V
10/13/2008	6.1	V	6.1	V
3/30/2009	4.1	V	4.1	V
10/15/2009	6.1		6.1	
3/16/2010	7.6		7.6	
10/13/2010	4.1	U	2.1	U
10/27/2011	3.0	U	1.5	U



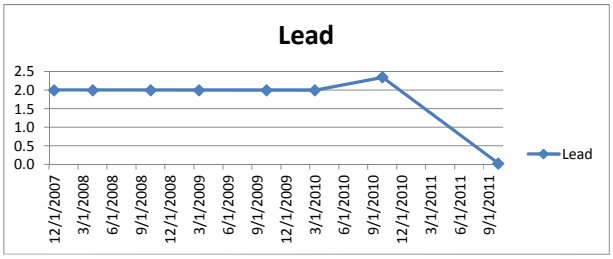
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.0	U	0.5	U
4/24/2008	1.0	U	0.5	U
10/13/2008	1.0	U	0.5	U
3/30/2009	1.0	U	0.5	U
10/15/2009	1.0	U	0.5	U
3/16/2010	1.0	U	0.5	U
10/13/2010	1.1	U	0.6	U
10/27/2011	0.0614	U	0.0307	U



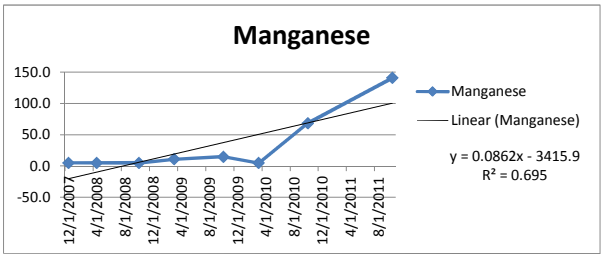
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	170		170	
4/24/2008	210		210	
10/13/2008	60.0		60.0	
3/30/2009	410		410	
10/15/2009	190		190	
3/16/2010	100		100	
10/13/2010	366		366	
10/27/2011	194		194	



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	4.0	U	2.0	U
4/24/2008	4.0	U	2.0	U
10/13/2008	4.0	U	2.0	U
3/30/2009	4.0	U	2.0	U
10/15/2009	4.0	U	2.0	U
3/16/2010	4.0	U	2.0	U
10/13/2010	4.7	U	2.4	U
10/27/2011	0.0434	U	0.0217	U

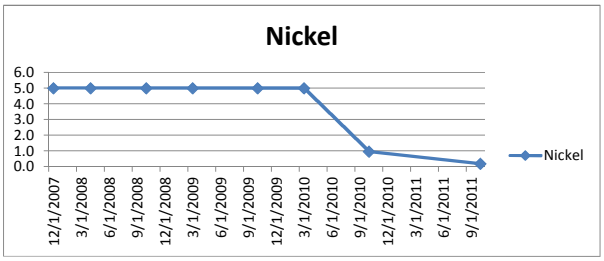


Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	11.0		11.0	
10/15/2009	15.0		15.0	
3/16/2010	10.0	U	5.0	U
10/13/2010	68.6		68.6	
10/27/2011	141		141	

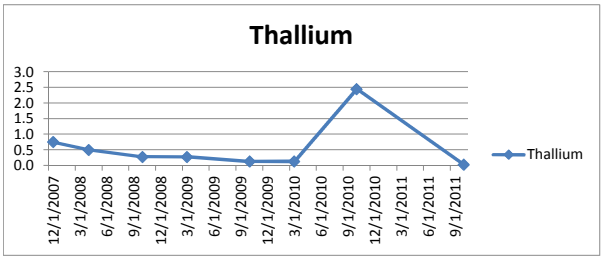


Monitoring Well 24GS01
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	1.9	U	0.95	U
10/27/2011	0.344	U	0.172	U



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	4.9	U	2.5	U
10/27/2011	0.0475	U	0.0	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	1.5
Maximum	12.5
Mean	5.956
Geometric Mean	4.92
Median	6.1
Standard Deviation	3.529
SEM	1.248
Mann-Kendall Test	
Test Value (S)	-19
Tabulated p-value	0.016
Standard Deviation of S	8.021
Standardized Value of S	-2.244
Approximate p-value	0.0124

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	7
Minimum	100
Maximum	410
Mean	234.2
Geometric Mean	212.7
Median	194
Standard Deviation	111.4
SEM	42.1
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.5
Standard Deviation of S	6.658
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS01
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

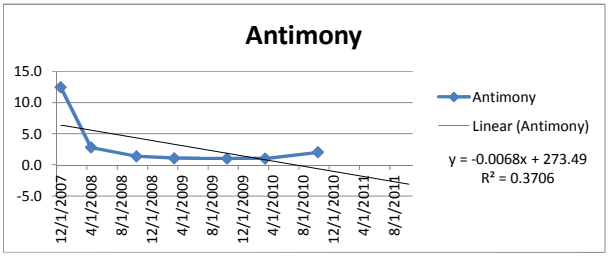
Manganese

General Statistics	
Number of Values	8
Minimum	5
Maximum	141
Mean	31.95
Geometric Mean	13.33
Median	8
Standard Deviation	49.09
SEM	17.35
Mann-Kendall Test	
Test Value (S)	18
Tabulated p-value	0.016
Standard Deviation of S	7.528
Standardized Value of S	2.258
Approximate p-value	0.012

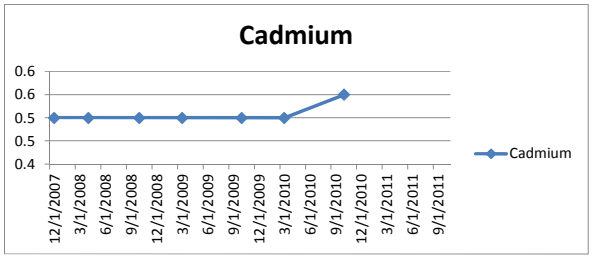
Statistically significant evidence of an increasing trend at the specified level of significance.

Monitoring Well 24GS02R
OU 13
NAS Pensacola, Pensacola Florida

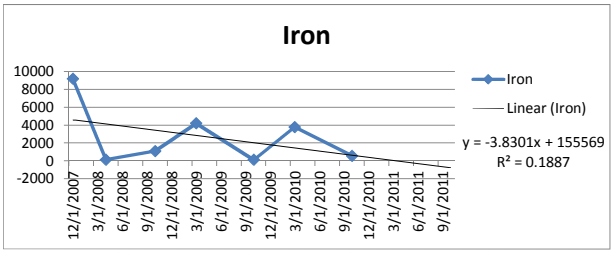
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	25.0	U	12.5	U
4/24/2008	2.8	IV	2.8	IV
10/13/2008	1.4	IV	1.4	IV
3/30/2009	1.1	IV	1.1	IV
10/15/2009	2.0	U	1.0	U
3/16/2010	2.0	U	1.0	U
10/13/2010	4.1	U	2.1	U
10/27/2011	NS			



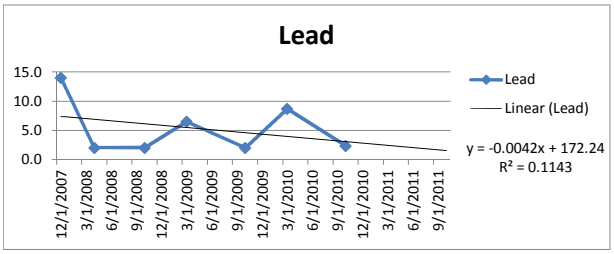
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.0	U	0.5	U
4/24/2008	1.0	U	0.5	U
10/13/2008	1.0	U	0.5	U
3/30/2009	1.0	U	0.5	U
10/15/2009	1.0	U	0.5	U
3/16/2010	1.0	U	0.5	U
10/13/2010	1.1	U	0.55	U
10/27/2011	NS			



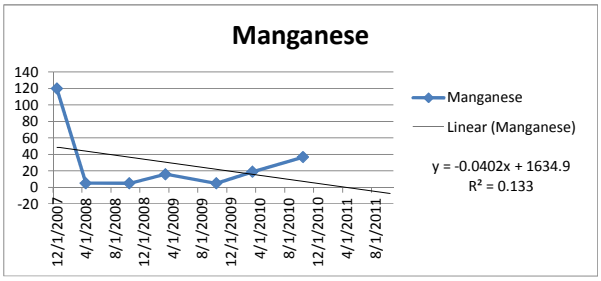
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	9200		9200	
4/24/2008	130		130	
10/13/2008	1100		1100	
3/30/2009	4200		4200	
10/15/2009	120		120	
3/16/2010	3800		3800	
10/13/2010	570		570	
10/27/2011	NS			



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	14.0		14.0	
4/24/2008	4.0	U	2.0	U
10/13/2008	4.0	U	2.0	U
3/30/2009	6.5		6.5	
10/15/2009	4.0	U	2.0	U
3/16/2010	8.7		8.7	
10/13/2010	4.7	U	2.4	U
10/27/2011	NS			



Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	120		120	
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	16.0		16.0	
10/15/2009	10.0	U	5.0	U
3/16/2010	19.0		19.0	
10/13/2010	36.9		36.9	
10/27/2011	NS			



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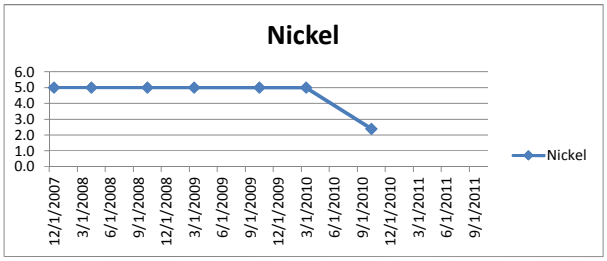
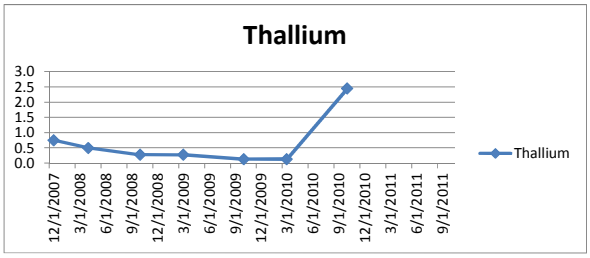
Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	2.4		2.4	
10/27/2011	NS			



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	4.9	U	2.5	U
10/27/2011	NS			



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	7
Minimum	1
Maximum	12.5
Mean	3.121
Geometric Mean	1.958
Median	1.4
Standard Deviation	4.188
SEM	1.583
Mann-Kendall Test	
Test Value (S)	-12
Tabulated p-value	0.035
Standard Deviation of S	6.583
Standardized Value of S	-1.671
Approximate p-value	0.0474

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	7
Minimum	120
Maximum	9200
Mean	2731
Geometric Mean	1053
Median	1100
Standard Deviation	3318
SEM	1254
Mann-Kendall Test	
Test Value (S)	-5
Tabulated p-value	0.281
Standard Deviation of S	6.658
Standardized Value of S	-0.601
Approximate p-value	0.274

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS02R
OU 13
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	7
Minimum	2
Maximum	14
Mean	5.364
Geometric Mean	3.946
Median	2.35
Standard Deviation	4.655
SEM	1.76
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.5
Standard Deviation of S	6.377
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Manganese

General Statistics	
Number of Values	7
Minimum	5
Maximum	120
Mean	29.56
Geometric Mean	14.97
Median	16
Standard Deviation	41.51
SEM	15.69
Mann-Kendall Test	
Test Value (S)	4
Tabulated p-value	0.281
Standard Deviation of S	6.377
Standardized Value of S	0.47
Approximate p-value	0.319

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS06R
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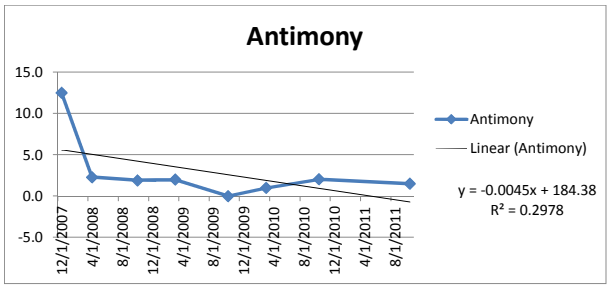
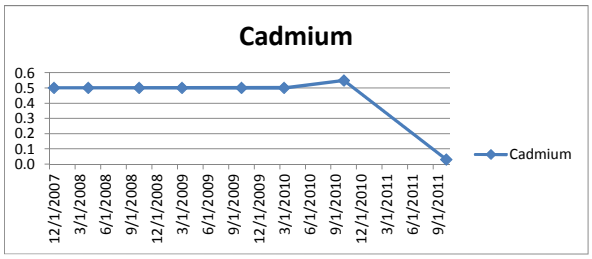
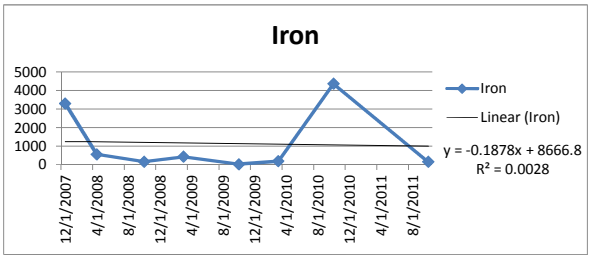
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	25.0	U	12.5	U
4/24/2008	2.3	IV	2.3	IV
10/13/2008	1.9	IV	1.9	IV
3/30/2009	2.0	IV	2.0	IV
10/15/2009	6	I	6	I
3/16/2010	2.0	U	1.0	U
10/13/2010	4.1	U	2.1	U
10/27/2011	3.0	U	1.5	U



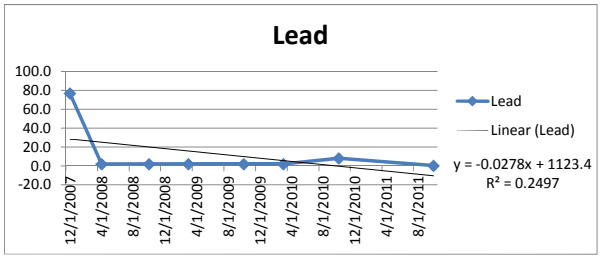
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.0	U	0.5	U
4/24/2008	1.0	U	0.5	U
10/13/2008	1.0	U	0.5	U
3/30/2009	1.0	U	0.5	U
10/15/2009	1.0	U	0.5	U
3/16/2010	1.0	U	0.5	U
10/13/2010	1.1	U	0.6	U
10/27/2011	0.0614	U	0.0307	U



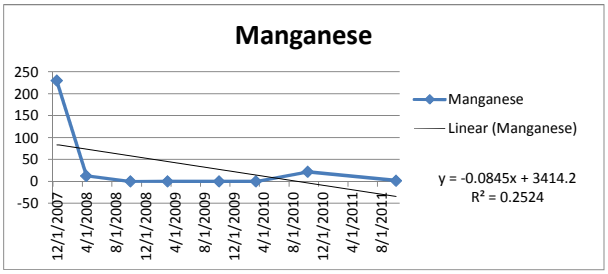
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	3300		3300	
4/24/2008	560		560	
10/13/2008	170		170	
3/30/2009	430		430	
10/15/2009	60	U	30	U
3/16/2010	190		190	
10/13/2010	4373		4373	
10/27/2011	159		159	



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	77.0		77.0	
4/24/2008	4.0	U	2.0	U
10/13/2008	4.0	U	2.0	U
3/30/2009	4.0	U	2.0	U
10/15/2009	4.0	U	2.0	U
3/16/2010	4.0	U	2.0	U
10/13/2010	8.1	I	8.1	I
10/27/2011	0.22	I	0.22	I



Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	230		230	
4/24/2008	13.0		13.0	
10/13/2008	10.0		10.0	
3/30/2009	10.0		10.0	
10/15/2009	10.0		10.0	
3/16/2010	10.0		10.0	
10/13/2010	22.1		22.1	
10/27/2011	1.86	I	1.86	I



Monitoring Well 24GS06R
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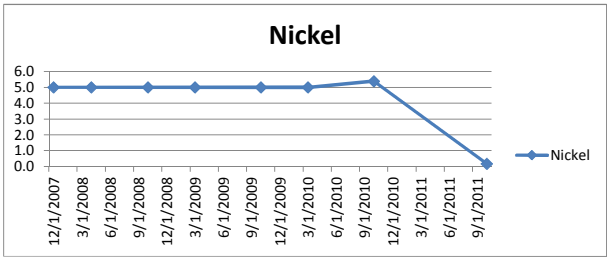
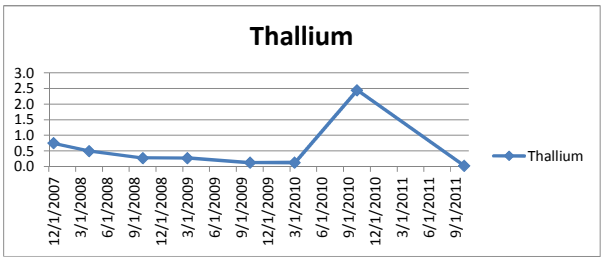
Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	5.4		5.4	
10/27/2011	0.344	U	0.172	U



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	4.9	U	2.5	U
10/27/2011	0.0475	U	0.0	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	7
Minimum	1
Maximum	12.5
Mean	3.321
Geometric Mean	2.296
Median	2
Standard Deviation	4.07
SEM	1.538
Mann-Kendall Test	
Test Value (S)	-11
Tabulated p-value	0.068
Standard Deviation of S	6.658
Standardized Value of S	-1.502
Approximate p-value	0.0666

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	30
Maximum	4373
Mean	1152
Geometric Mean	390
Median	310
Standard Deviation	1690
SEM	597.5
Mann-Kendall Test	
Test Value (S)	-8
Tabulated p-value	0.119
Standard Deviation of S	8.083
Standardized Value of S	-0.866
Approximate p-value	0.193

Insufficient evidence to identify a significant trend at the specified level of significance.

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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	0.22
Maximum	77
Mean	11.92
Geometric Mean	2.853
Median	2
Standard Deviation	26.4
SEM	9.334
Mann-Kendall Test	
Test Value (S)	-8
Tabulated p-value	0.119
Standard Deviation of S	6.976
Standardized Value of S	-1.003
Approximate p-value	0.158

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	4
Minimum	1.86
Maximum	230
Mean	66.74
Geometric Mean	18.72
Median	17.55
Standard Deviation	109.2
SEM	54.58
Mann-Kendall Test	
Test Value (S)	-4
Tabulated p-value	0.167
Standard Deviation of S	2.944
Standardized Value of S	-1.019
Approximate p-value	0.154

Insufficient evidence to identify a significant trend at the specified level of significance.

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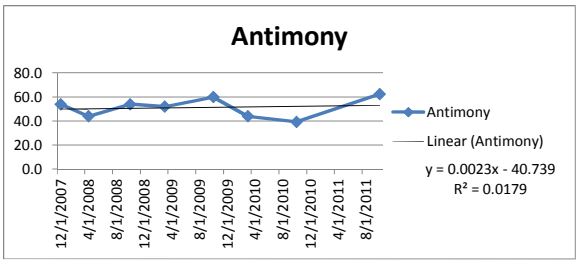
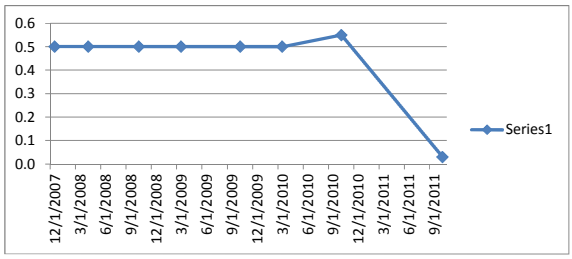
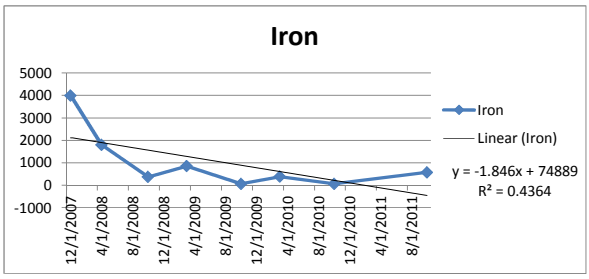
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	54.0		54.0	
4/24/2008	44.0	V	44.0	V
10/13/2008	54.0	V	54.0	V
3/30/2009	52.0	V	52.0	V
10/15/2009	60.0		60.0	
3/16/2010	44.0		44.0	
10/13/2010	39.3		39.3	
10/27/2011	62.4		62.4	



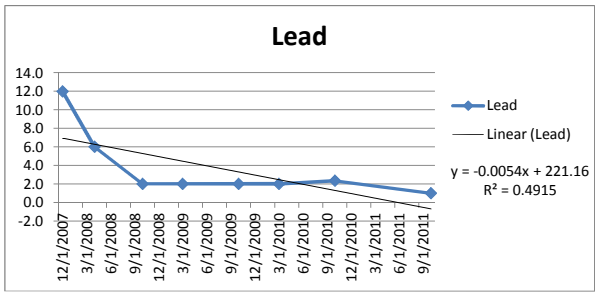
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.0	U	0.5	U
4/24/2008	1.0	U	0.5	U
10/13/2008	1.0	U	0.5	U
3/30/2009	1.0	U	0.5	U
10/15/2009	1.0	U	0.5	U
3/16/2010	1.0	U	0.5	U
10/13/2010	1.1	U	0.6	U
10/27/2011	0.0614	U	0.0	U



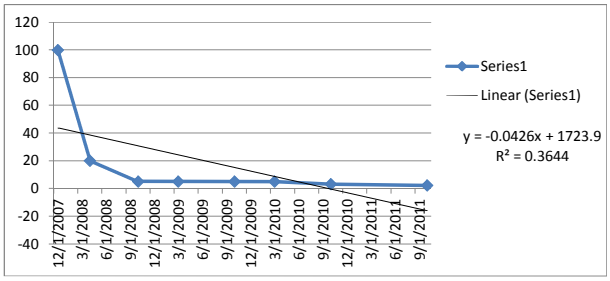
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	4000		4000	
4/24/2008	1800		1800	
10/13/2008	370		370	
3/30/2009	860		860	
10/15/2009	70	I	70	I
3/16/2010	390		390	
10/13/2010	68.8	I	68.8	I
10/27/2011	583		583	



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	12.0		12.0	
4/24/2008	6.0		6.0	
10/13/2008	4.0	U	2.0	U
3/30/2009	4.0	U	2.0	U
10/15/2009	4.0	U	2.0	U
3/16/2010	4.0	U	2.0	U
10/13/2010	4.7	U	2.4	U
10/27/2011	0.99	I	0.99	I



Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	100		100	
4/24/2008	20.0		20.0	
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	6.4	U	3.2	U
10/27/2011	2.2	I	2.2	I



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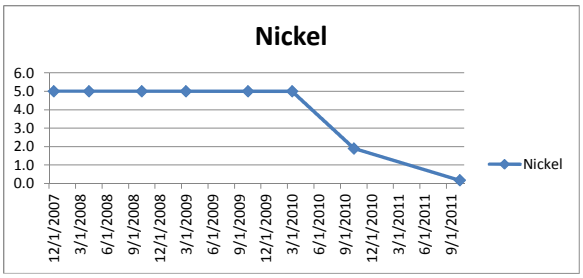
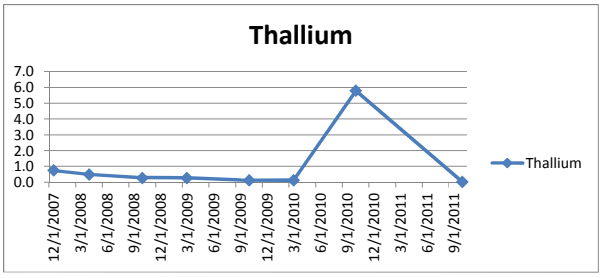
Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	1.9	I	1.9	I
10/27/2011	0.344	U	0.172	U



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	5.8	I	5.8	I
10/27/2011	0.0475	U	0.0238	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	39.3
Maximum	62.4
Mean	51.21
Geometric Mean	50.63
Median	53
Standard Deviation	8.146
SEM	2.88
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.548
Standard Deviation of S	7.958
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	68.8
Maximum	4000
Mean	1018
Geometric Mean	473.1
Median	486.5
Standard Deviation	1327
SEM	469.3
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	8.083
Standardized Value of S	-1.608
Approximate p-value	0.0539

Insufficient evidence to identify a significant trend at the specified level of significance.

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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	0.99
Maximum	12
Mean	3.668
Geometric Mean	2.682
Median	2
Standard Deviation	3.682
SEM	1.302
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	7.528
Standardized Value of S	-1.727
Approximate p-value	0.0421

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

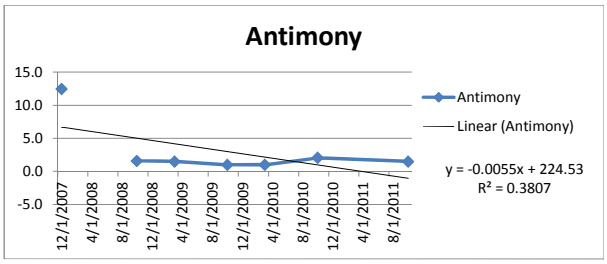
Manganese

General Statistics	
Number of Values	8
Minimum	2.2
Maximum	100
Mean	18.18
Geometric Mean	7.38
Median	5
Standard Deviation	33.54
SEM	11.86
Mann-Kendall Test	
Test Value (S)	-22
Tabulated p-value	0.002
Standard Deviation of S	7.528
Standardized Value of S	-2.79
Approximate p-value	0.00264

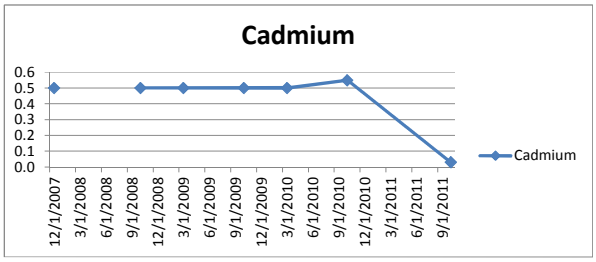
Statistically significant evidence of a decreasing trend at the specified level of significance.

Monitoring Well 24GS10R
OU 13
NAS Pensacola, Pensacola Florida

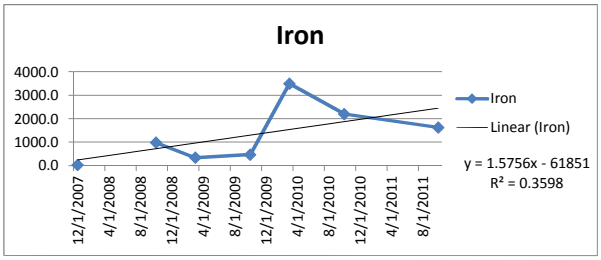
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	25.0	U	12.5	U
4/24/2008	NS			
10/13/2008	1.6	IV	1.6	IV
3/30/2009	1.5	IV	1.5	IV
10/15/2009	2.0	U	1.0	U
3/16/2010	2.0	U	1.0	U
10/13/2010	4.1	U	2.1	U
10/27/2011	3.0	U	1.5	U



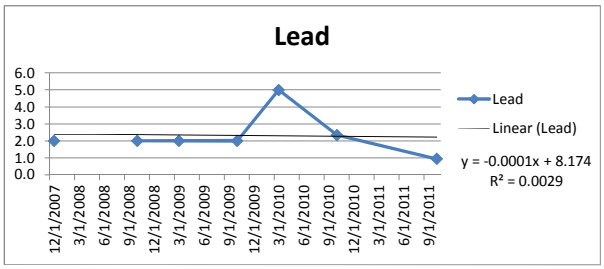
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.0	U	0.5	U
4/24/2008	NS			
10/13/2008	1.0	U	0.5	U
3/30/2009	1.0	U	0.5	U
10/15/2009	1.0	U	0.5	U
3/16/2010	1.0	U	0.5	U
10/13/2010	1.1	U	0.6	U
10/27/2011	0.0614	U	0.0307	U



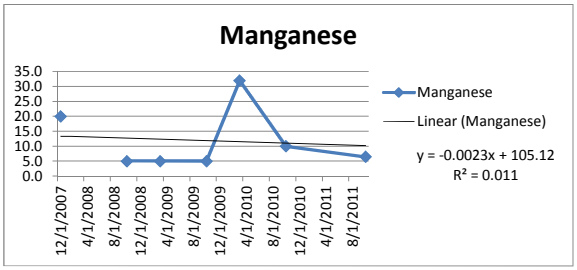
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	60	U	30.0	U
4/24/2008	NS			
10/13/2008	980		980	
3/30/2009	340		340	
10/15/2009	470		470	
3/16/2010	3500		3500	
10/13/2010	2200		2200	
10/27/2011	1630	J	1630	J



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	4.0	U	2.0	U
4/24/2008	NS			
10/13/2008	4.0	U	2.0	U
3/30/2009	4.0	U	2.0	U
10/15/2009	4.0	U	2.0	U
3/16/2010	5.0	I	5.0	I
10/13/2010	4.7	U	2.4	U
10/27/2011	0.94	I	0.94	I



Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	40.0	U	20.0	U
4/24/2008	NS			
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	32.0		32.0	
10/13/2010	10.0	I	10.0	I
10/27/2011	6.5		6.5	



Monitoring Well 24GS10R
OU 13
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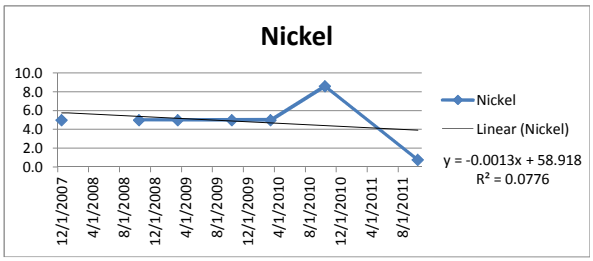
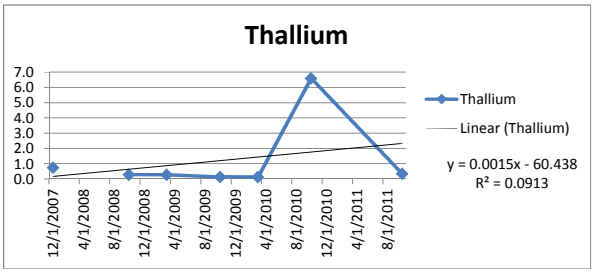
Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	NS			
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	8.6	I	8.6	I
10/27/2011	0.77	I	0.77	I



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	NS			
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	6.6	I	6.6	I
10/27/2011	0.35	I	0.35	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	7
Minimum	1
Maximum	12.5
Mean	3.021
Geometric Mean	1.909
Median	1.5
Standard Deviation	4.195
SEM	1.586
Mann-Kendall Test	
Test Value (S)	-7
Tabulated p-value	0.191
Standard Deviation of S	6.506
Standardized Value of S	-0.922
Approximate p-value	0.178

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	7
Minimum	30
Maximum	3500
Mean	1307
Geometric Mean	667.4
Median	980
Standard Deviation	1230
SEM	465.1
Mann-Kendall Test	
Test Value (S)	11
Tabulated p-value	0.068
Standard Deviation of S	6.658
Standardized Value of S	1.502
Approximate p-value	0.0666

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS10R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	7
Minimum	0.94
Maximum	5
Mean	2.327
Geometric Mean	2.094
Median	2
Standard Deviation	1.258
SEM	0.476
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.5
Standard Deviation of S	5.972
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	7
Minimum	5
Maximum	32
Mean	11.92
Geometric Mean	9.1
Median	6.46
Standard Deviation	10.37
SEM	3.921
Mann-Kendall Test	
Test Value (S)	2
Tabulated p-value	0.386
Standard Deviation of S	6.377
Standardized Value of S	0.157
Approximate p-value	0.438

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	7
Minimum	0.77
Maximum	8.6
Mean	4.91
Geometric Mean	4.136
Median	5
Standard Deviation	2.266
SEM	0.856
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.5
Standard Deviation of S	5.26
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS10R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

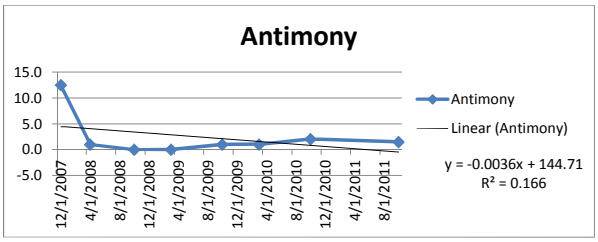
Thallium

General Statistics	
Number of Values	7
Minimum	0.125
Maximum	6.6
Mean	1.214
Geometric Mean	0.413
Median	0.275
Standard Deviation	2.384
SEM	0.901
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.5
Standard Deviation of S	6.506
Standardized Value of S	0
Approximate p-value	0.5

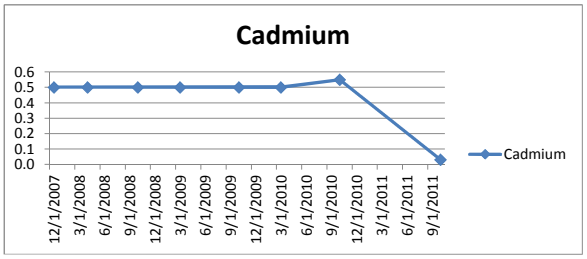
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS11
OU 13
NAS Pensacola, Pensacola Florida

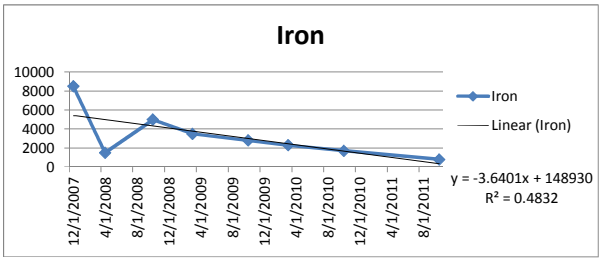
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	25.0	U	12.5	U
4/24/2008	2.0	U	1.0	U
10/13/2008	0.0	IV	0.0	IV
3/30/2009	0.0	IV	0.0	IV
10/15/2009	2.0	U	1.0	U
3/16/2010	2.0	U	1.0	U
10/13/2010	4.1	U	2.1	U
10/27/2011	3.0	U	1.5	U



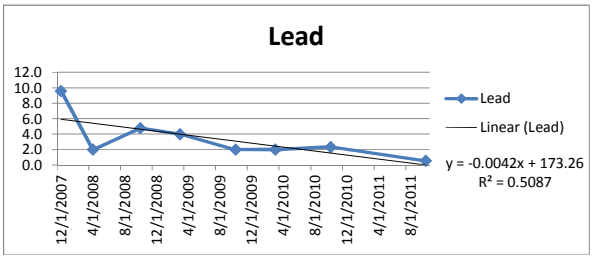
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.0	U	0.5	U
4/24/2008	1.0	U	0.5	U
10/13/2008	1.0	U	0.5	U
3/30/2009	1.0	U	0.5	U
10/15/2009	1.0	U	0.5	U
3/16/2010	1.0	U	0.5	U
10/13/2010	1.1	U	0.6	U
10/27/2011	0.0614	U	0.0	U



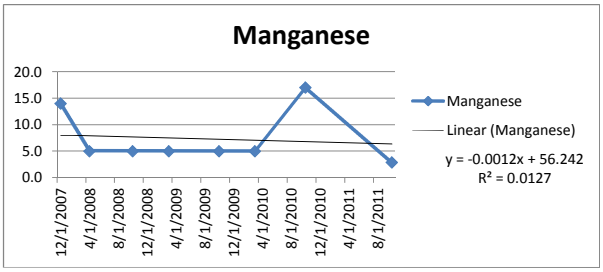
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	8500		8500	
4/24/2008	1500		1500	
10/13/2008	5000		5000	
3/30/2009	3500		3500	
10/15/2009	2800		2800	
3/16/2010	2300		2300	
10/13/2010	1699		1699	
10/27/2011	792		792	



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	9.6		9.6	
4/24/2008	4.0	U	2.0	U
10/13/2008	4.8	I	4.8	I
3/30/2009	4.0	I	4.0	I
10/15/2009	4.0	U	2.0	U
3/16/2010	4.0	U	2.0	U
10/13/2010	4.7	U	2.4	U
10/27/2011	0.5	I	0.5400	I

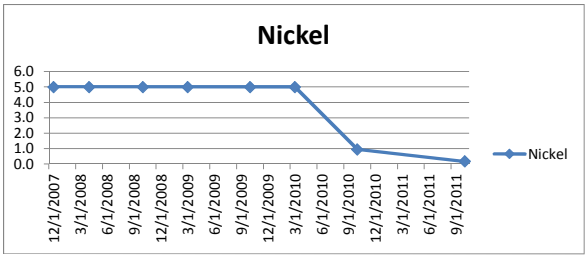


Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	14.0		14.0	
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	17.0	I	17.0	I
10/27/2011	2.84	I	2.84	I

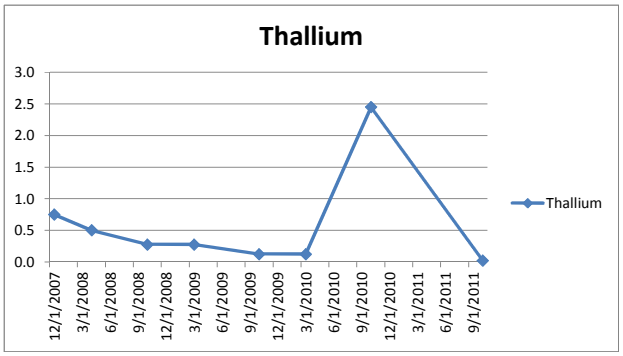


Monitoring Well 24GS11
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	1.9	U	1.0	U
10/27/2011	0.344	U	0.2	U



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	4.9	U	2.5	U
10/27/2011	0.0475	U	0.0	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	0
Maximum	12.5
Mean	2.381
Geometric Mean	0
Median	1
Standard Deviation	4.146
SEM	1.466
Mann-Kendall Test	
Test Value (S)	4
Tabulated p-value	0.36
Standard Deviation of S	7.789
Standardized Value of S	0.385
Approximate p-value	0.35

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	792
Maximum	8500
Mean	3261
Geometric Mean	2575
Median	2550
Standard Deviation	2487
SEM	879.3
Mann-Kendall Test	
Test Value (S)	-18
Tabulated p-value	0.016
Standard Deviation of S	8.083
Standardized Value of S	-2.103
Approximate p-value	0.0177

Statistically significant evidence of a decreasing trend at the specified level of significance.

Monitoring Well 24GS11
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	0.54
Maximum	9.6
Mean	3.411
Geometric Mean	2.565
Median	2.175
Standard Deviation	2.826
SEM	0.999
Mann-Kendall Test	
Test Value (S)	-15
Tabulated p-value	0.054
Standard Deviation of S	7.853
Standardized Value of S	-1.783
Approximate p-value	0.0373

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

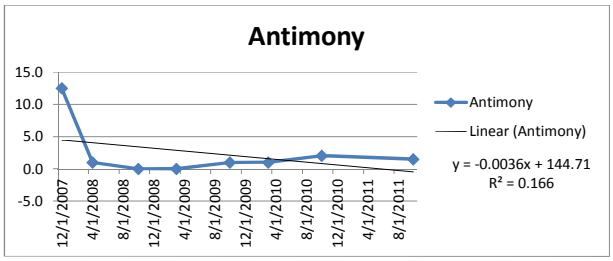
Manganese

General Statistics	
Number of Values	8
Minimum	2.84
Maximum	17
Mean	7.355
Geometric Mean	6.174
Median	5
Standard Deviation	5.145
SEM	1.819
Mann-Kendall Test	
Test Value (S)	-6
Tabulated p-value	0.274
Standard Deviation of S	6.976
Standardized Value of S	-0.717
Approximate p-value	0.237

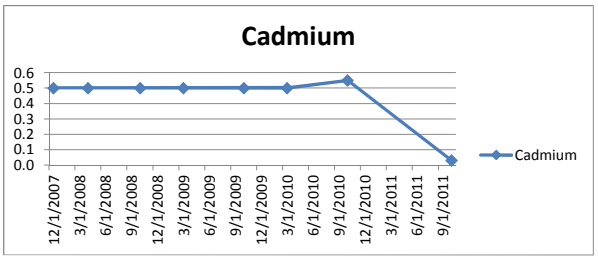
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS15
OU 13
NAS Pensacola, Pensacola Florida

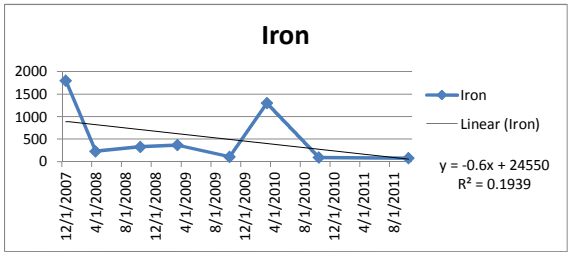
Antimony Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	25.0	U	12.5	U
4/24/2008	2.0	U	1.0	U
10/13/2008	0.0	IV	0.0	IV
3/30/2009	0.0	IV	0.0	IV
10/15/2009	2.0	U	1.0	U
3/16/2010	2.0	U	1.0	U
10/13/2010	4.1	U	2.1	U
10/27/2011	3.0	U	1.5	U



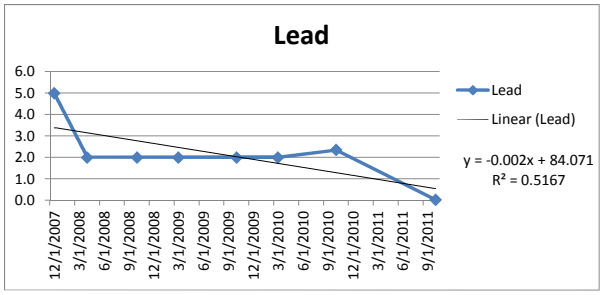
Cadmium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.0	U	0.5	U
4/24/2008	1.0	U	0.5	U
10/13/2008	1.0	U	0.5	U
3/30/2009	1.0	U	0.5	U
10/15/2009	1.0	U	0.5	U
3/16/2010	1.0	U	0.5	U
10/13/2010	1.1	U	0.6	U
10/27/2011	0.0614	U	0.0307	U



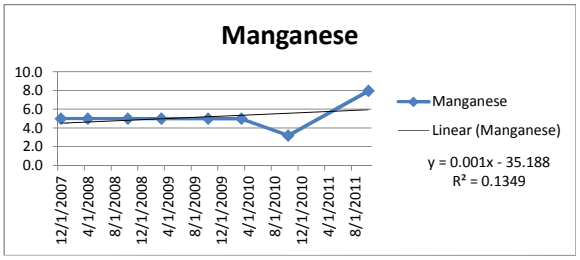
Iron Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1800		1800	
4/24/2008	230		230	
10/13/2008	330		330	
3/30/2009	370		370	
10/15/2009	110		110	
3/16/2010	1300		1300	
10/13/2010	94.6	I	94.6	I
10/27/2011	77.2	I	77.2	I



Lead Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	5.0		5.0	
4/24/2008	4.0	U	2.0	U
10/13/2008	4.0	U	2.0	U
3/30/2009	4.0	U	2.0	U
10/15/2009	4.0	U	2.0	U
3/16/2010	4.0	U	2.0	U
10/13/2010	4.7	U	2.4	U
10/27/2011	0.0434	U	0.0217	U

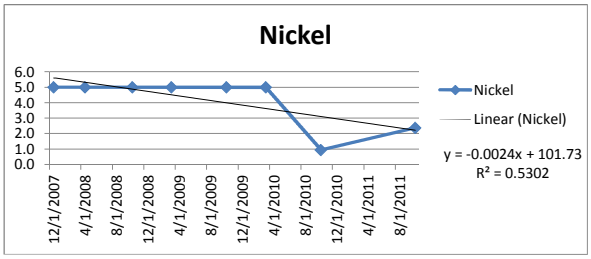


Manganese Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	6.4	U	3.2	U
10/27/2011	7.97		7.97	

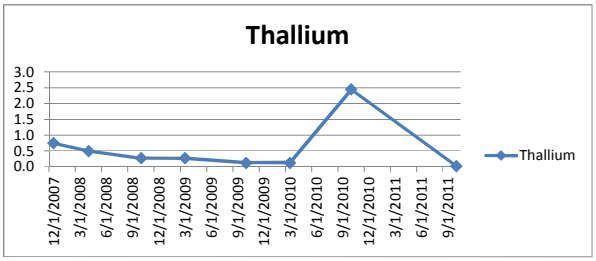


Monitoring Well 24GS15
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	10.0	U	5.0	U
4/24/2008	10.0	U	5.0	U
10/13/2008	10.0	U	5.0	U
3/30/2009	10.0	U	5.0	U
10/15/2009	10.0	U	5.0	U
3/16/2010	10.0	U	5.0	U
10/13/2010	1.9	U	1.0	U
10/27/2011	2.38	I	2.38	I



Thallium Date	Validated Result	Qual	Censored Result	Qual
12/19/2007	1.5	U	0.8	U
4/24/2008	1.0	U	0.5	U
10/13/2008	0.55	U	0.3	U
3/30/2009	0.55	U	0.3	U
10/15/2009	0.25	U	0.1	U
3/16/2010	0.25	U	0.1	U
10/13/2010	4.9	U	2.5	U
10/27/2011	0.0475	U	0.0238	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	0
Maximum	12.5
Mean	2.381
Geometric Mean	0
Median	1
Standard Deviation	4.146
SEM	1.466
Mann-Kendall Test	
Test Value (S)	4
Tabulated p-value	0.36
Standard Deviation of S	7.789
Standardized Value of S	0.385
Approximate p-value	0.35

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	77.2
Maximum	1800
Mean	539
Geometric Mean	292
Median	280
Standard Deviation	647.2
SEM	228.8
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	8.083
Standardized Value of S	-1.608
Approximate p-value	0.0539

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS15
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	0.0217
Maximum	5
Mean	2.171
Geometric Mean	1.3
Median	2
Standard Deviation	1.352
SEM	0.478
Mann-Kendall Test	
Test Value (S)	-8
Tabulated p-value	0.119
Standard Deviation of S	6.976
Standardized Value of S	-1.003
Approximate p-value	0.158

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	3.2
Maximum	7.97
Mean	5.146
Geometric Mean	5.012
Median	5
Standard Deviation	1.303
SEM	0.461
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.548
Standard Deviation of S	6.083
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	8
Minimum	0.95
Maximum	5
Mean	4.166
Geometric Mean	3.703
Median	5
Standard Deviation	1.59
SEM	0.562
Mann-Kendall Test	
Test Value (S)	-11
Tabulated p-value	0.138
Standard Deviation of S	6.083
Standardized Value of S	-1.644
Approximate p-value	0.0501

Insufficient evidence to identify a significant trend at the specified level of significance.

APPENDIX B

OU1 INTERVIEW FORMS, SITE INSPECTION FORM

Provided on CD

INTERVIEW RECORD

Site Name: OU 1 Site 1 Former Sanitary Landfill	**EPA ID No.:**	
Subject:	**Time: 1325**	**Date: 5/2/12**
Type: Telephone Ξ Visit Other **Location of Visit: NAS Pensacola**	Incoming Outgoing	

Contact Made By:

Name: Peggy Churchill	**Title:** Project Manager	**Organization:** Tetra Tech Inc.
Name: Amber Igoe	**Title:** Environmental Specialist II	**Organization:** Tetra Tech Inc.

Individual Contacted:

Name: Greg Campbell	**Title:** Environmental Engineer	**Organization:** NAVFAC
Telephone No: (850) 452-3131 ext 3007 **Fax No:** **E-Mail Address:** gregory.campbell@navy.mil	**Street Address:** 310 John Tower Road **City, State, Zip:** Pensacola FL, 32508	

Summary Of Conversation

The overall impression of the project is that it is great the Land Use Controls (LUCs) are in place to prevent exposure or any building in the area. Site operations have not affected the surrounding community and there has not been any reported community concerns. Local authorities have not received reports of vandalism, trespassing or any emergency responses occurring at the Site. The base is well informed of Site activity, progress and LUC inspections are conducted annually. Mr. Campbell commented that is was a good idea to shut down the iron recovery system and begin using the wetland system for passive treatment as agreed upon by the Partnering Team.

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
GREG CAMPBELL	ENVIRONMENTAL ENGR.	NASP PWD PENSACOLA	5-2-12

Appendix C
Five-Year Review Interviews

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Five-Year Review Interviews

Information gathered from interviews during the site inspection may be key to understanding site status. Interviews should be conducted with various individuals or groups, including the operation and maintenance (O&M) site manager, O&M staff, local regulatory authorities and response agencies, community action groups or associations, site neighbors, and other stakeholders.

When conducting an interview, the interviewer should note the date of the interview, and the name, title, and affiliation of the person interviewed. The interviewer should also indicate whether the interview was conducted at the site, the office, or by phone. Written documentation of the interview should briefly summarize the discussion, address any problems or successes with the implementation of the remedy, and provide suggestions for future reference. Forms to use during interviews are provided at the end of this appendix.

The following tables provide lists of potential individuals to interview and the type of information which may be obtained during the interviews. The potential individuals to be interviewed are categorized by their ability to provide the following types of information:

- Background information;
- State and local considerations;
- Construction considerations; and
- Performance, Operation and maintenance problems.

All of these individuals may be contacted during the five-year review. In most cases interviewing only a few key individuals will provide sufficient information for the review.

Background Information

The individuals listed below may provide information concerning previous and current concerns about the site, influences that affected the remedy decision, and further clarification on decisions made during remedy selection.

Interview	Information Sought
Previous EPA Staff/Management	– staff members may offer insight and clarification on decisions made during remedy selection and implementation
Nearest Neighbors	– neighbors may provide insight into the enforcement of institutional controls, changes in land use, trespassing, and unusual or unexpected activity at the site

Interview	Information Sought
Community Representatives*	– members of the community may provide a broader view of site activities and issues than can be obtained during the site inspection

* Several types of individuals may be interviewed: residents/businesses adjacent to or on the site; residents/businesses within the path of migration; local civic leaders, local officials, Community Advisory Group (CAG), Technical Assistance Grant (TAG) group, and local environmental groups; and other audiences listed in the community profile in the Community Involvement Plan.

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)
   LUCs in place to prevent exposure any building, gw monitoring. Great!
2. What effects have site operations had on the surrounding community?
   none
3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. none

4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. none

5. Do you feel well informed about the site's activities and progress? yes

6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? Good idea to propose to shut down iron recov system

State and Local Considerations

State and local authorities may provide you with information about changes in State laws and regulations and present and prospective land uses and restrictions.

Interview	Information Sought
State Contacts (including those responsible for State water quality, hazardous waste, and environmental health issues)	– changes in State laws and regulations that may impact protectiveness – whether the site has been in compliance with permitting or reporting requirements – information on site activities, status, and issues
Local Authorities (such as police, emergency response or fire departments, and local environmental or planning offices)	– status of institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed, and unusual activities at the site

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results. Yes, annual LUC inspection

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

4. Do you feel well informed about the site's activities and progress? more Yes

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? Some

Construction Considerations

It is important for you to determine the status of construction at the site and to ensure that health and safety concerns are addressed.

Interview	Information Sought
Construction Contractor	– progress of project and changes in design due to field conditions – revisions to the O&M Manual, implementation of the Health and Safety Plan/Contingency Plan – insight into potential O&M problems
Construction Manager	– overview of all contractor construction activities at the site, health and safety issues, site protectiveness during construction, and the quality of the construction
Local Emergency Response Officials	– adequacy of contractor's Health and Safety Plan and the contractor's implementation of the Plan – adequacy of contractor's emergency response duties as outlined in the Contingency Plan or Emergency Response Plan of the Health and Safety Plan

Some example interview questions for remedial actions still under construction are given below.

1. What is your overall impression of the project? (general sentiment)

2. What is the current status of construction (*e.g.*, budget and schedule)?

3. Have any problems been encountered which required, or will require, changes to this remedial design or this ROD?

4. Have any problems or difficulties been encountered which have impacted construction progress or implementability?

5. Do you have any comments, suggestions, or recommendations regarding the project (i.e., design, construction documents, constructability, management, regulatory agencies, etc.)?

Performance, Operation And Maintenance Problems

The following individuals may provide information to you regarding the performance of the remedy and status of O&M at the site so that the team can assess the progress of the implementation and effectiveness of the remedy, and any O&M problems.

Interview	Information Sought
O&M Manager/Operating Contractor	– O&M status of the remedy, compliance with permit and reporting requirements, and complaints filed – effectiveness of the O&M Plan – information about any potential causes for concern about the remedy – progress and performance of the remedy
O&M Staff	– effectiveness of the O&M Manual – information about any potential causes for concern about the remedy – Recommendations for adjusting the mode of operation or optimizing the operations protocol
Remedial Design/Remedial Action Consultant	– original concepts behind the O&M of the remedy – questions about remedial design parameters, expected performance and cost, and changes that have occurred during implementation

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Is the remedy functioning as expected? How well is the remedy performing?

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

8. Do you have any comments, suggestions, or recommendations regarding the project?

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
GREG CAMPBELL	ENVIRONMENTAL ENGR.	NASP PWD PENSACOLA	5-2-12

INTERVIEW RECORD

Site Name: 041		**EPA ID No.:**	
Subject: Greg Campbell		**Time:** 1312	**Date:**
Type: ☐ Telephone ☒ Visit ☐ Other **Location of Visit:** NAS Pensacola		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name:	**Title:**	**Organization:**	
Individual Contacted:			
Name:	**Title:**	**Organization:**	
Telephone No: **Fax No:** **E-Mail Address:**		**Street Address:** **City, State, Zip:**	
Summary Of Conversation			

Page 1 of ____

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Appendix D
Five-Year Review Site Inspection Checklist

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Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: OU 1 Sanitary Landfill	**Date of inspection:** 5/8/12
Location and Region: NAS Pensacola R4	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:**

Remedy Includes: (Check all that apply)

- Landfill cover/containment
- Access controls
- Institutional controls
- Groundwater pump and treatment
- Surface water collection and treatment
- Monitored natural attenuation
- Groundwater containment
- Vertical barrier walls
- Other Landfill Presumptive Remedy

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	**O&M Documents**			
	O&M manual	Readily available	Up to date	N/A
	As-built drawings	Readily available	Up to date	N/A
	Maintenance logs	Readily available	Up to date	N/A
	Remarks			
2.	**Site-Specific Health and Safety Plan**	(Readily available)	(Up to date)	N/A
	Contingency plan/emergency response plan	Readily available	Up to date	N/A
	Remarks For quarterly sampling			
3.	**O&M and OSHA Training Records**	Readily available	Up to date	N/A
	Remarks			
4.	**Permits and Service Agreements**			
	Air discharge permit	Readily available	Up to date	N/A
	Effluent discharge	Readily available	Up to date	N/A
	Waste disposal, POTW	Readily available	Up to date	N/A
	Other permits	Readily available	Up to date	N/A
	Remarks			
5.	**Gas Generation Records**	Readily available	Up to date	(N/A)
	Remarks			
6.	**Settlement Monument Records**	Readily available	Up to date	(N/A)
	Remarks			
7.	**Groundwater Monitoring Records**	(Readily available)	(Up to date)	N/A
	Remarks Yes, monitoring reports			
8.	**Leachate Extraction Records**	Readily available	Up to date	(N/A)
	Remarks			
9.	**Discharge Compliance Records**			
	Air	Readily available	Up to date	N/A
	Water (effluent)	Readily available	Up to date	N/A
	Remarks			
10.	**Daily Access/Security Logs**	Readily available	Up to date	(N/A)
	Remarks			

Ask Greg if there is a permit

IV. O&M COSTS

1. **O&M Organization**

State in-house — Contractor for State
PRP in-house — Contractor for PRP
Federal Facility in-house — Contractor for Federal Facility
Other_____

2. **O&M Cost Records**

Readily available — Up to date
Funding mechanism/agreement in place
Original O&M cost estimate_____ Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ Breakdown attached
Date Date Total cost

From_____ To_____ _____ Breakdown attached
Date Date Total cost

From_____ To_____ _____ Breakdown attached
Date Date Total cost

From_____ To_____ _____ Breakdown attached
Date Date Total cost

From_____ To_____ _____ Breakdown attached
Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS — Applicable — N/A

A. Fencing

1. **Fencing damaged** — Location shown on site map — Gates secured — N/A

Remarks fencing is in place for cemetary access restrictions, not specifically for OU3

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A

Remarks signs in place for cemetary access restrictions

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self reporting
Frequency Annual
Responsible party/agency Navy
Contact Greg Campbell (Name) _____ (Title) _____ (Date) _____ (Phone no.)

Reporting is up-to-date — Yes No N/A
Reports are verified by the lead agency — Yes No N/A

Specific requirements in deed or decision documents have been met — Yes No N/A
Violations have been reported — Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** (ICs are adequate) ICs are inadequate N/A
Remarks

D. General

1. **Vandalism/trespassing** Location shown on site map (No vandalism evident)
Remarks

2. **Land use changes on site** (N/A)
Remarks

3. **Land use changes off site** (N/A)
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** Location shown on site map (Roads adequate) N/A
Remarks

B. Other Site Conditions

Remarks wetlands in use to control discharge/recharge of groundwater.

VII. LANDFILL COVERS Applicable N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
   Remarks_____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** ~~Wet areas/water damage~~ not evident
- ~~Wet areas~~ ~~Location shown on site map~~ Areal extent_____
- ~~Ponding~~ ~~Location shown on site map~~ Areal extent_____
- Seeps Location shown on site map Areal extent_____
- Soft subgrade Location shown on site map Areal extent_____

Remarks wetlands to control ground water recharge/discharge

9. **Slope Instability** Slides Location shown on site map No evidence of slope instability
Areal extent_____
Remarks_____

B. Benches Applicable N/A
(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** Location shown on site map N/A or okay
Remarks_____

2. **Bench Breached** Location shown on site map N/A or okay
Remarks_____

3. **Bench Overtopped** Location shown on site map N/A or okay
Remarks_____

C. Letdown Channels Applicable N/A
(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** Location shown on site map No evidence of settlement
Areal extent_____ Depth_____
Remarks_____

2. **Material Degradation** Location shown on site map No evidence of degradation
Material type_____ Areal extent_____
Remarks_____

3. **Erosion** Location shown on site map No evidence of erosion
Areal extent_____ Depth_____
Remarks_____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment Applicable N/A

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable N/A

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable N/A

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable N/A

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable (N/A)

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES (Applicable) N/A passive

A. Groundwater Extraction Wells, Pumps, and Pipelines — Applicable (N/A)

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks _____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks _____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks _____

B. Surface Water Collection Structures, Pumps, and Pipelines — (Applicable) N/A

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks wet well/interceptor trench is passively functioning with wetlands to control discharge

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   (Good condition) Needs Maintenance
   ~~Remarks~~ _____

3. **Spare Parts and Equipment** N/A
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks _____

C. Treatment System Applicable N/A

1. **Treatment Train** (Check components that apply)
   - Metals removal — Oil/water separation — Bioremediation
   - Air stripping — Carbon adsorbers
   - Filters _____
   - Additive (*e.g.*, chelation agent, flocculent) _____
   - Others _____
   - Good condition — Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually _____
   - Quantity of surface water treated annually _____

   Remarks _____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A — Good condition — Needs Maintenance

   Remarks _____

3. **Tanks, Vaults, Storage Vessels**
   N/A — Good condition — Proper secondary containment — Needs Maintenance

   Remarks _____

4. **Discharge Structure and Appurtenances**
   N/A — Good condition — Needs Maintenance

   Remarks _____

5. **Treatment Building(s)**
   N/A — Good condition (esp. roof and doorways) — Needs repair
   Chemicals and equipment properly stored

   Remarks _____

6. **Monitoring Wells** (pump and treatment remedy)
   Properly secured/locked — Functioning — Routinely sampled — Good condition
   All required wells located — Needs Maintenance — N/A

   Remarks _____

D. Monitoring Data

1. Monitoring Data
   Is routinely submitted on time — Is of acceptable quality

2. Monitoring data suggests:
   Groundwater plume is effectively contained — Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. ~~**Monitoring Wells** (natural attenuation remedy)~~
Properly ~~secured/locked~~ Functioning Routinely sampled Good condition
All required wells located Needs Maintenance N/A
Remarks 01GI44 ~~needs to~~ (PC) has been repaired

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

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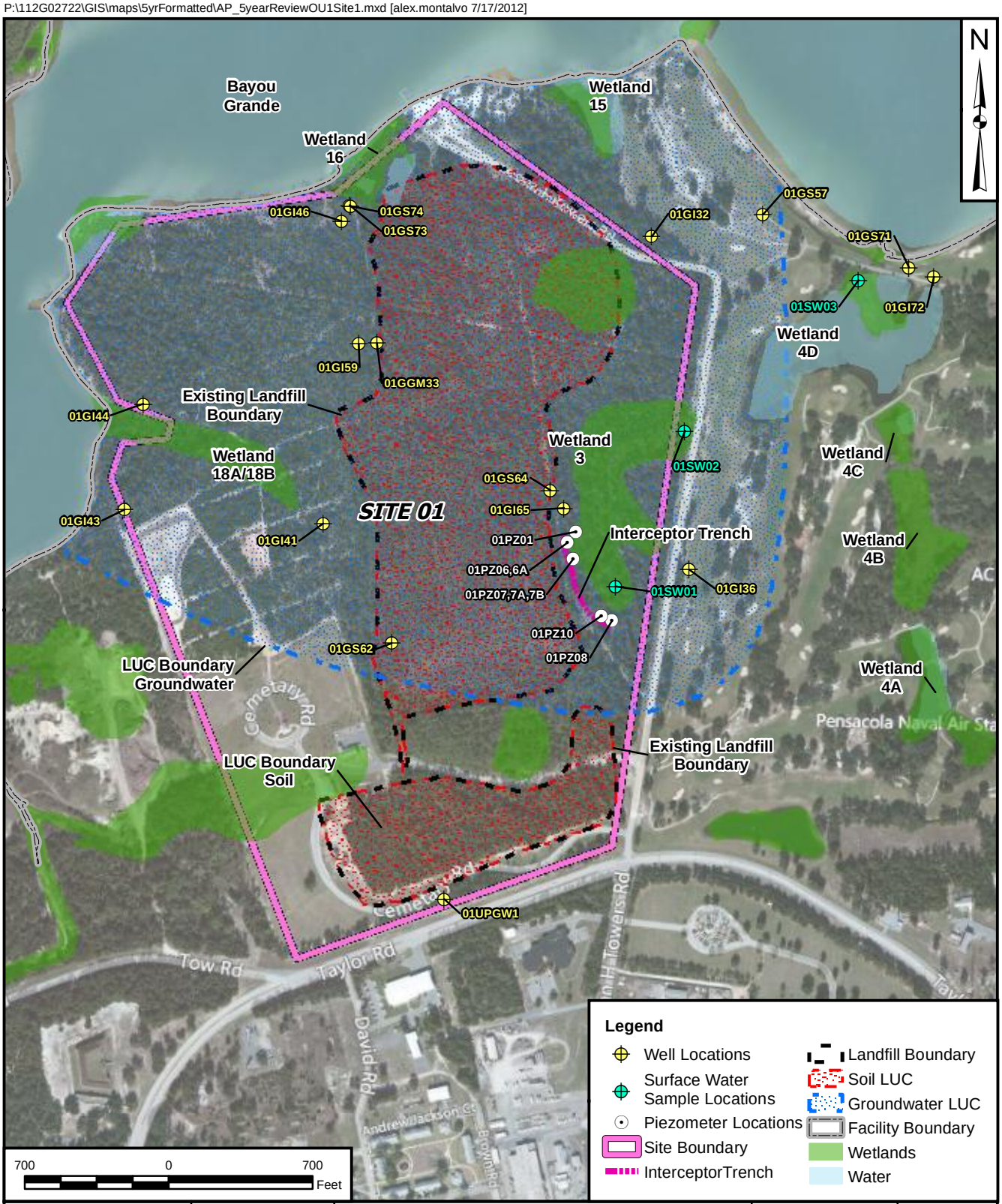

DRAWN BY: GIS	DATE: 7/17/2012		CONTRACT NUMBER: 112G00702	CTO NUMBER: 067
CHECKED BY: A.I.	DATE: 7/17/2012	SITE MAP - OPERABLE UNIT 1 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	APPROVED BY: ___	DATE: ___
REVISED BY:	DATE:		APPROVED BY: ___	DATE: ___
SCALE: AS NOTED			FIGURE NO.: 2 - 1	REV: 0

APPENDIX C

OU2 INTERVIEW FORMS, SITE INSPECTION FORM

Provided on CD

INTERVIEW RECORD

Site Name: OU 2 Sites 11, 12, 25, 26, 27 and 30	**EPA ID No.:**	
Subject:	**Time: 1345**	**Date: 5/2/12**
Type: Telephone Ξ Visit Other **Location of Visit: NAS Pensacola**	Incoming Outgoing	

Contact Made By:

Name: Peggy Churchill	**Title:** Project Manager	**Organization:** Tetra Tech Inc.
Name: Amber Igoe	**Title:** Environmental Specialist II	**Organization:** Tetra Tech Inc.

Individual Contacted:

Name: Greg Campbell	**Title:** Environmental Engineer	**Organization:** NAVFAC
Telephone No: (850) 452-3131 ext 3007 **Fax No:** **E-Mail Address:** gregory.campbell@navy.mil	**Street Address:** 310 John Tower Road **City, State, Zip:** Pensacola FL, 32508	

Summary Of Conversation

The overall impression of the project is that it is going well. The coordination between the Navy and RASO at Site 27 and the Navy and DRMO at Site 12 has been very successful. Site operations have not affected the surrounding community and there has not been any reported community concerns. Local authorities have not received reports of vandalism, trespassing or any emergency responses occurring at the Site. The base is well informed of Site activity, progress and Land Use control (LUC) inspections are conducted annually.

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Greg Campbell	Envir. Engr.	PWD Pensacola	5-2-12

OU 2

Appendix C
Five-Year Review Interviews

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Five-Year Review Interviews

Information gathered from interviews during the site inspection may be key to understanding site status. Interviews should be conducted with various individuals or groups, including the operation and maintenance (O&M) site manager, O&M staff, local regulatory authorities and response agencies, community action groups or associations, site neighbors, and other stakeholders.

When conducting an interview, the interviewer should note the date of the interview, and the name, title, and affiliation of the person interviewed. The interviewer should also indicate whether the interview was conducted at the site, the office, or by phone. Written documentation of the interview should briefly summarize the discussion, address any problems or successes with the implementation of the remedy, and provide suggestions for future reference. Forms to use during interviews are provided at the end of this appendix.

The following tables provide lists of potential individuals to interview and the type of information which may be obtained during the interviews. The potential individuals to be interviewed are categorized by their ability to provide the following types of information:

- Background information;
- State and local considerations;
- Construction considerations; and
- Performance, Operation and maintenance problems.

All of these individuals may be contacted during the five-year review. In most cases interviewing only a few key individuals will provide sufficient information for the review.

Background Information

The individuals listed below may provide information concerning previous and current concerns about the site, influences that affected the remedy decision, and further clarification on decisions made during remedy selection.

Interview	Information Sought
Previous EPA Staff/Management	– staff members may offer insight and clarification on decisions made during remedy selection and implementation
Nearest Neighbors	– neighbors may provide insight into the enforcement of institutional controls, changes in land use, trespassing, and unusual or unexpected activity at the site

Interview	Information Sought
Community Representatives*	– members of the community may provide a broader view of site activities and issues than can be obtained during the site inspection

* Several types of individuals may be interviewed: residents/businesses adjacent to or on the site; residents/businesses within the path of migration; local civic leaders, local officials, Community Advisory Group (CAG), Technical Assistance Grant (TAG) group, and local environmental groups; and other audiences listed in the community profile in the Community Involvement Plan.

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment) Going well, right on track. Coordination between RAGO contractor + Navy to perform soil removal @ Site 27. Able to reopen parking lot for radar school. Coordination for DEMO for site 17
2. What effects have site operations had on the surrounding community? nope
3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. nope
4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. no
5. Do you feel well informed about the site's activities and progress? yes
6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? no

State and Local Considerations

State and local authorities may provide you with information about changes in State laws and regulations and present and prospective land uses and restrictions.

Interview	Information Sought
State Contacts (including those responsible for State water quality, hazardous waste, and environmental health issues)	– changes in State laws and regulations that may impact protectiveness – whether the site has been in compliance with permitting or reporting requirements – information on site activities, status, and issues
Local Authorities (such as police, emergency response or fire departments, and local environmental or planning offices)	– status of institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed, and unusual activities at the site

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results. Yes, ~~annual~~ annual LUC inspection

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

4. Do you feel well informed about the site's activities and progress? no

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Construction Considerations

It is important for you to determine the status of construction at the site and to ensure that health and safety concerns are addressed.

Interview	Information Sought
Construction Contractor	– progress of project and changes in design due to field conditions – revisions to the O&M Manual, implementation of the Health and Safety Plan/Contingency Plan – insight into potential O&M problems
Construction Manager	– overview of all contractor construction activities at the site, health and safety issues, site protectiveness during construction, and the quality of the construction
Local Emergency Response Officials	– adequacy of contractor's Health and Safety Plan and the contractor's implementation of the Plan – adequacy of contractor's emergency response duties as outlined in the Contingency Plan or Emergency Response Plan of the Health and Safety Plan

Some example interview questions for remedial actions still under construction are given below.

1. What is your overall impression of the project? (general sentiment)

2. What is the current status of construction (*e.g.*, budget and schedule)?

3. Have any problems been encountered which required, or will require, changes to this remedial design or this ROD?

4. Have any problems or difficulties been encountered which have impacted construction progress or implementability?

5. Do you have any comments, suggestions, or recommendations regarding the project (i.e., design, construction documents, constructability, management, regulatory agencies, etc.)?

Performance, Operation And Maintenance Problems

The following individuals may provide information to you regarding the performance of the remedy and status of O&M at the site so that the team can assess the progress of the implementation and effectiveness of the remedy, and any O&M problems.

Interview	Information Sought
O&M Manager/Operating Contractor	– O&M status of the remedy, compliance with permit and reporting requirements, and complaints filed – effectiveness of the O&M Plan – information about any potential causes for concern about the remedy – progress and performance of the remedy
O&M Staff	– effectiveness of the O&M Manual – information about any potential causes for concern about the remedy – Recommendations for adjusting the mode of operation or optimizing the operations protocol
Remedial Design/Remedial Action Consultant	– original concepts behind the O&M of the remedy – questions about remedial design parameters, expected performance and cost, and changes that have occurred during implementation

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Is the remedy functioning as expected? How well is the remedy performing?

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

8. Do you have any comments, suggestions, or recommendations regarding the project?

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Greg Campbell	Envir. Engr.	PWD Pensacola	5-2-12

INTERVIEW RECORD

Site Name:		**EPA ID No.:**	
Subject:		**Time:**	**Date:**
Type: ☐ Telephone ☐ Visit ☐ Other **Location of Visit:**		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name:	**Title:**	**Organization:**	
Individual Contacted:			
Name:	**Title:**	**Organization:**	
Telephone No: **Fax No:** **E-Mail Address:**		**Street Address:** **City, State, Zip:**	
Summary Of Conversation			

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042

Appendix D
Five-Year Review Site Inspection Checklist

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Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: OU2 Sites 11,12,25,26	**Date of inspection:** 5/3/12
Location and Region:	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:**

Remedy Includes: (Check all that apply)

Landfill cover/containment	Monitored natural attenuation
Access controls	Groundwater containment
Institutional controls	Vertical barrier walls
Groundwater pump and treatment	
Surface water collection and treatment	

Other _____

_____

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____
   _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____
   _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - O&M manual — Readily available — Up to date — N/A
   - As-built drawings — Readily available — Up to date — N/A
   - Maintenance logs — Readily available — Up to date — N/A

   Remarks _____

2. **Site-Specific Health and Safety Plan** — Readily available — Up to date — N/A
   - Contingency plan/emergency response plan — Readily available — Up to date — N/A

   Remarks for monitoring events

3. **O&M and OSHA Training Records** — Readily available — Up to date — N/A

   Remarks _____

4. **Permits and Service Agreements**
   - Air discharge permit — Readily available — Up to date — N/A
   - Effluent discharge — Readily available — Up to date — N/A
   - Waste disposal, POTW — Readily available — Up to date — N/A
   - Other permits _____ — Readily available — Up to date — N/A

   Remarks _____

5. **Gas Generation Records** — Readily available — Up to date — N/A

   Remarks _____

6. **Settlement Monument Records** — Readily available — Up to date — N/A

   Remarks _____

7. **Groundwater Monitoring Records** — ~~Readily available~~ — Up to date — ~~N/A~~ PC

   Remarks monitoring has not been implemented

8. **Leachate Extraction Records** — Readily available — Up to date — N/A

   Remarks _____

9. **Discharge Compliance Records**
   - Air — Readily available — Up to date — N/A
   - Water (effluent) — Readily available — Up to date — N/A

   Remarks _____

10. **Daily Access/Security Logs** — Readily available — Up to date — N/A

    Remarks _____

IV. O&M COSTS

1. **O&M Organization**
   State in-house — Contractor for State
   PRP in-house — Contractor for PRP
   Federal Facility in-house — Contractor for Federal Facility
   Other_____

2. **O&M Cost Records**
   Readily available — Up to date
   Funding mechanism/agreement in place
   Original O&M cost estimate_____ Breakdown attached

   Total annual cost by year for review period if available

   From_____ To_____ _____ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS — Applicable — N/A

A. Fencing

1. **Fencing damaged** — Location shown on site map — Gates secured — N/A
   Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A
   Remarks_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self
Frequency Annual
Responsible party/agency Navy
Contact Greg Campbell — Name | Title | Date | Phone no.

Reporting is up-to-date — Yes No N/A
Reports are verified by the lead agency — Yes No N/A

Specific requirements in deed or decision documents have been met — Yes No N/A
Violations have been reported — Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** ICs are adequate ICs are inadequate N/A
Remarks

D. General

1. **Vandalism/trespassing** Location shown on site map (No vandalism evident)
Remarks

2. **Land use changes on site** (N/A)
Remarks

3. **Land use changes off site** (N/A)
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads (Applicable) N/A

1. **Roads damaged** Location shown on site map (Roads adequate) N/A
Remarks

B. Other Site Conditions

Remarks_____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS Applicable N/A

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
   Remarks_____
   _____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** — Wet areas/water damage not evident
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** — Slides — Location shown on site map — No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches — Applicable — N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — N/A or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — N/A or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — N/A or okay
   Remarks_____

C. Letdown Channels — Applicable — N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment Applicable N/A

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable N/A

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable N/A

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable N/A

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable N/A

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES	Applicable	N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable (N/A)

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable (N/A)

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System Applicable N/A

1. **Treatment Train** (Check components that apply)
   - Metals removal — Oil/water separation — Bioremediation
   - Air stripping — Carbon adsorbers
   - Filters_____
   - Additive (*e.g.*, chelation agent, flocculent)_____
   - Others_____
   - Good condition — Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually_____
   - Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A — Good condition — Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   N/A — Good condition — Proper secondary containment — Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   N/A — Good condition — Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   N/A — Good condition (esp. roof and doorways) — Needs repair
   - Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   - Properly secured/locked — Functioning — Routinely sampled — Good condition
   - All required wells located — Needs Maintenance — N/A

   Remarks_____

D. Monitoring Data monitoring is not implemented

1. Monitoring Data
   Is routinely submitted on time — Is of acceptable quality

2. Monitoring data suggests:
   Groundwater plume is effectively contained — Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
Properly secured/locked Functioning Routinely sampled Good condition
All required wells located Needs Maintenance N/A
Remarks_____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

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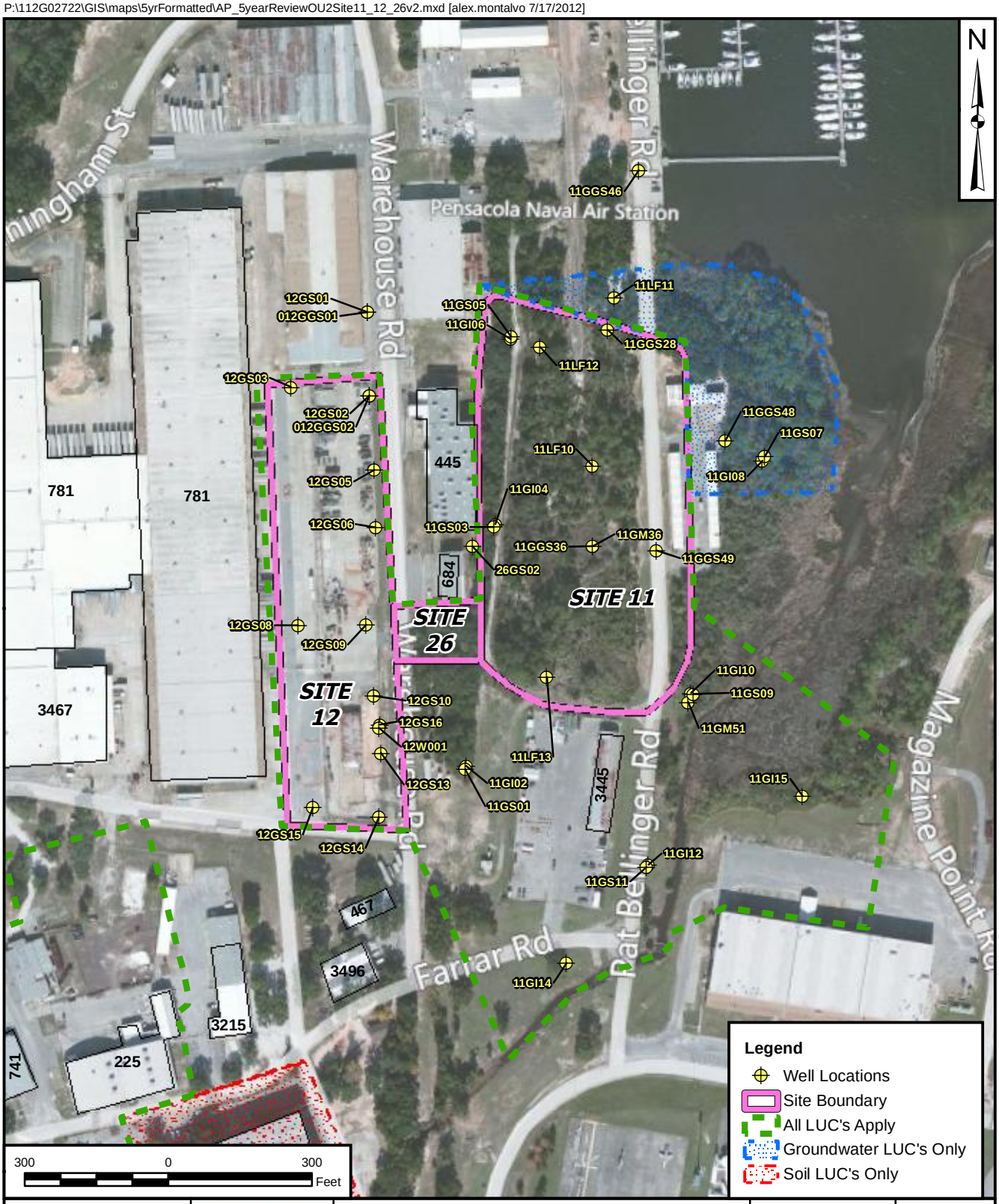

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GIS	7/17/2012
CHECKED BY	DATE
A.I.	7/17/2012
REVISED BY	DATE
SCALE	
AS NOTED	

NAVFAC

SITE MAP - OPERABLE UNIT 2
5 YEAR REVIEW
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER	CTO NUMBER
112G00702	067
APPROVED BY	DATE
___	___
APPROVED BY	DATE
___	___
FIGURE NO.	REV
3 - 1	0

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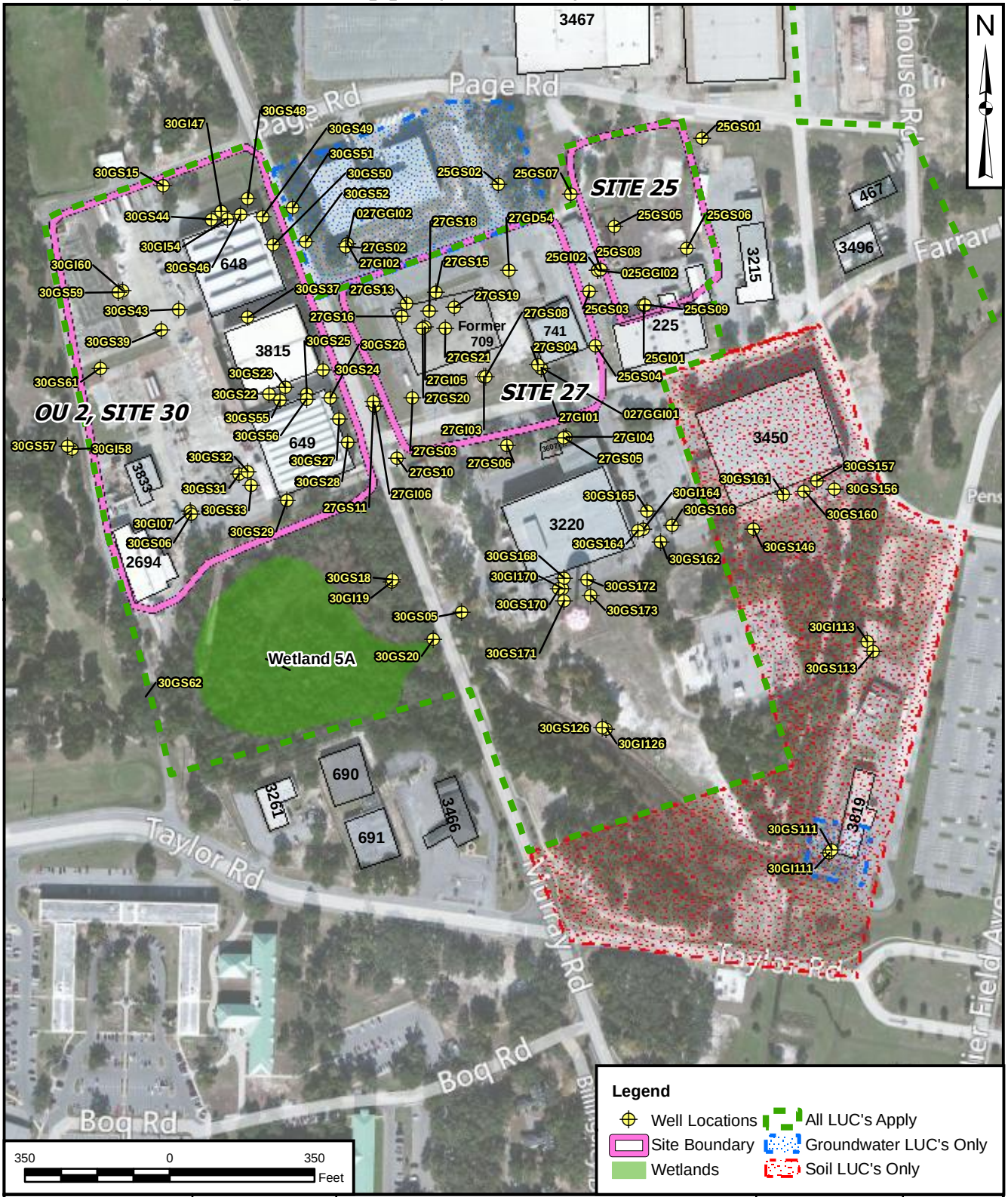


DRAWN BY: GIS	DATE: 7/17/2012	SITE MAP - OPERABLE UNIT 2 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00702
CHECKED BY: A.I.	DATE: 7/17/2012		CTO NUMBER: 067
REVISED BY:	DATE:		APPROVED BY: ___ DATE: ___
SCALE: AS NOTED			APPROVED BY: ___ DATE: ___
			FIGURE NO.: 3 - 2 REV: 0

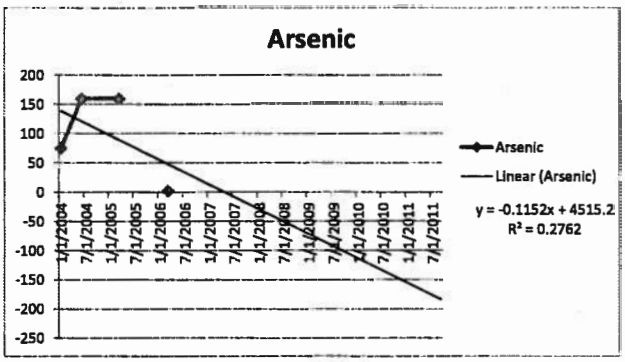
APPENDIX D

OU4 GROUNDWATER TREND ANALYSES
Provided on CD

Monitoring Well 15GR03R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/21/2004	150	75	U
6/28/2004	160	160	
3/14/2005	160	160	
9/13/2005	CNL		
3/9/2006	5.0	2.5	
9/19/2008	CNL		
3/22/2007	CNL		
10/8/2007	CNL		
4/23/2008	CNL		
9/28/2010	CNL		
3/25/2011	CNL		
9/21/2011	CNL		

CNL = Could Not Locate



Mann-Kendall Trend Test Analysis

ır Selected Options	
Confidence Coefficient	0.95
Level of Significance	0.05

Arsenic

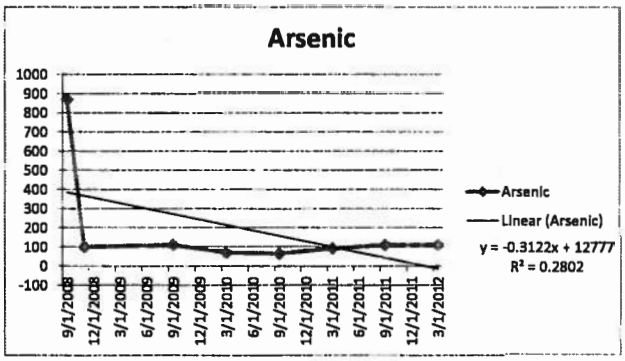
General Statistics	
Number of Values	4
Minimum	2.5
Maximum	160
Mean	99.38
Geometric Mean	46.81
Median	117.5
Standard Deviation	76
SEM	38

Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.625
Standard Deviation of S	2.769
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 15GR03RR
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
9/11/2008	870	870	
11/12/2008	100	100	
9/25/2009	110	110	
3/31/2010	71.0	71.0	
9/28/2010	65.0	65.0	
3/25/2011	92.0	92.0	
9/21/2011	110	110	
3/21/2012	110	110	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

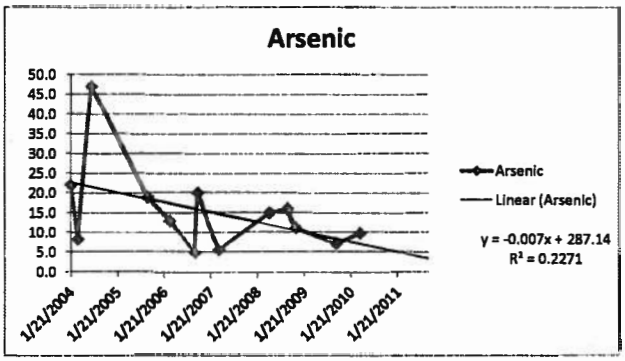
Arsenic

General Statistics	
Number of Values	8
Minimum	65
Maximum	870
Mean	191
Geometric Mean	122
Median	105
Standard Deviation	274.9
SEM	97.2
Mann-Kendall Test	
Test Value (S)	-3
Tabulated p-value	0.452
Standard Deviation of S	7.853
Standardized Value of S	-0.255
Approximate p-value	0.399

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 15GR04R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/21/2004	**22.0**	22.0	
6/28/2004	**47.0**	47.0	
3/14/2004	8.3	8.3	
9/13/2005	**19.0**	19.0	
3/8/2006	**13.0**	13.0	
9/18/2006	4.8	4.8	
10/8/2006	**20.0**	20.0	
3/22/2007	5.6	5.6	I
4/23/2008	**15.0**	15.0	
9/11/2008	**16.0**	16.0	
11/12/2008	**11.0**	11.0	
9/25/2009	7.1	7.1	I
3/31/2010	9.7	9.7	I
9/28/2010	NS		
3/25/2011	NS		
9/21/2011	NS		



NS = Not Sampled

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Arsenic

General Statistics	
Number of Values	13
Minimum	4.8
Maximum	47
Mean	15.27
Geometric Mean	12.63
Median	13
Standard Deviation	11.04
SEM	3.061

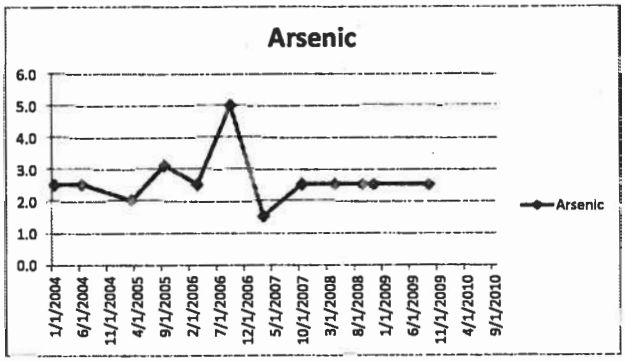
Mann-Kendall Test	
Test Value (S)	-28
Tabulated p-value	0.064
Standard Deviation of S	16.39
Standardized Value of S	-1.525
Approximate p-value	0.0638

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 15GR07R
OU4
NAS Pensacola, Pensacola Florida

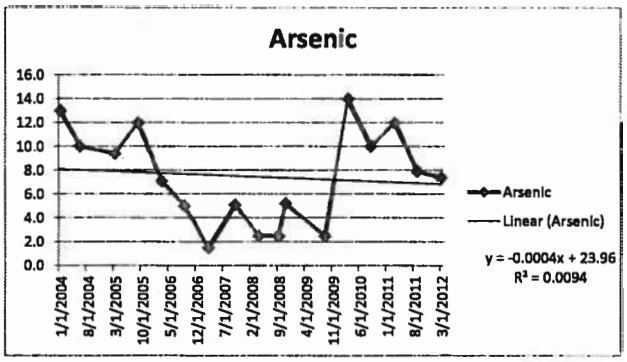
Arsenic Date	Validated Result	Censored Result	Qual
1/21/2004	5.0	2.5	U
6/28/2004	5.0	2.5	U
3/14/2005	4.0	2.0	U
9/13/2005	3.1	3.1	B
3/9/2006	5.0	2.5	U
9/18/2006	10.0	5.0	U
3/22/2007	3.0	1.5	U
10/8/2007	5.0	2.5	U
4/23/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.0	2.5	U
9/25/2009	5.0	2.5	U
3/31/2010	NS		
9/28/2010	NS		

NS = Not Sampled



Monitoring Well 15GR65R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/21/2004	**13.0**	13.0	
6/28/2004	10.0	10.0	
3/14/2005	9.4	9.4	
9/14/2005	**12.0**	12.0	
3/8/2006	7.1	7.1	
9/19/2006	10.0	5.0	U
3/22/2007	3.0	1.5	U
10/8/2007	5.1	5.1	I
4/23/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.2	5.2	I
9/25/2009	5.0	2.5	U
3/31/2010	**14.0**	14.0	
9/28/2010	**10.0**	10.0	
3/25/2011	**12.0**	12.0	
9/21/2011	7.9	7.9	
3/21/2012	7.4	7.4	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

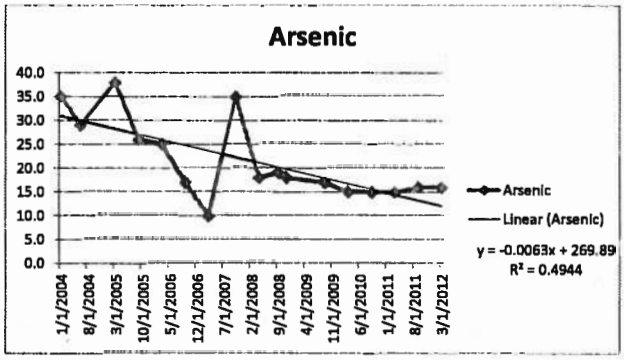
Arsenic

General Statistics	
Number of Values	17
Minimum	1.5
Maximum	14
Mean	7.476
Geometric Mean	6.226
Median	7.4
Standard Deviation	4.013
SEM	0.973
Mann-Kendall Test	
Test Value (S)	-11
Tabulated p-value	0.358
Standard Deviation of S	24.16
Standardized Value of S	-0.414
Approximate p-value	0.339

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 15GR66R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/21/2004	35.0	35.0	
6/28/2004	29.0	29.0	
3/14/2005	38.0	38.0	
9/13/2005	26.0	26.0	
3/9/2006	25.0	25.0	
9/18/2006	17.0	17.0	
3/22/2007	10.0	10.0	
10/8/2007	35.0	35.0	
4/23/2008	18.0	18.0	
9/11/2008	19.0	19.0	
11/12/2008	18.0	18.0	
9/25/2009	17.0	17.0	
3/31/2010	15.0	15.0	
9/28/2010	15.0	15.0	
3/25/2011	15.0	15.0	
9/21/2011	16.0	18.0	
3/21/2012	16.0	16.0	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

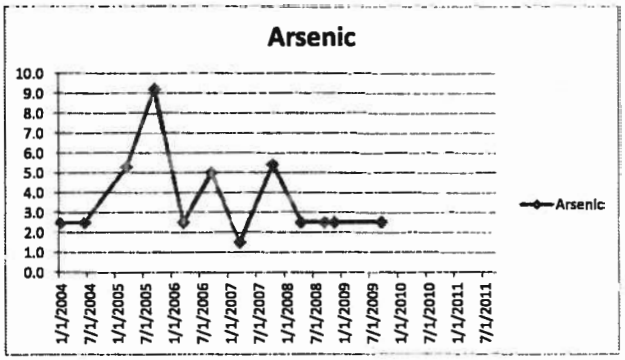
Arsenic

General Statistics	
Number of Values	17
Minimum	10
Maximum	38
Mean	21.41
Geometric Mean	20.03
Median	18
Standard Deviation	8.352
SEM	2.026
Mann-Kendall Test	
Test Value (S)	-77
Tabulated p-value	0.001
Standard Deviation of S	24.12
Standardized Value of S	-3.151
Approximate p-value	8.13E-04

Statistically significant evidence of a decreasing trend at the specified level of significance.

Monitoring Well 15GS68
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/22/2004	5.0	2.5	U
6/28/2004	5.0	2.5	U
3/14/2005	5.3	5.3	
9/13/2005	9.2	9.2	
3/8/2006	5.0	2.5	U
9/19/2006	10.0	5.0	U
3/22/2007	3.0	1.5	U
10/8/2007	5.4	5.4	I
4/23/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.0	2.5	U
9/25/2009	5.0	2.5	U
3/31/2010	NS		
9/28/2010	NS		
3/25/2011	NS		
9/21/2011	NS		



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

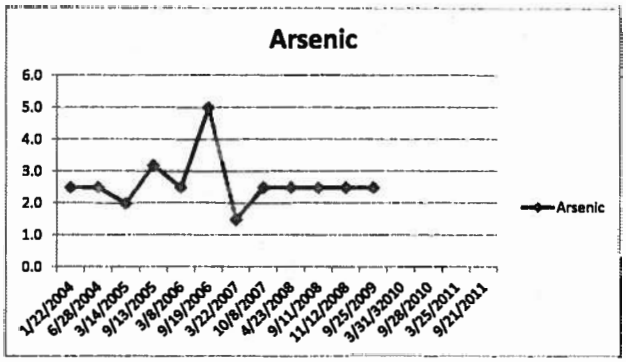
Arsenic

General Statistics	
Number of Values	12
Minimum	1.5
Maximum	9.2
Mean	3.658
Geometric Mean	3.212
Median	2.5
Standard Deviation	2.18
SEM	0.629
Mann-Kendall Test	
Test Value (S)	-9
Tabulated p-value	0.319
Standard Deviation of S	12.97
Standardized Value of S	-0.617
Approximate p-value	0.269

Insufficient evidence to identify a significant trend at the specified level of significance.

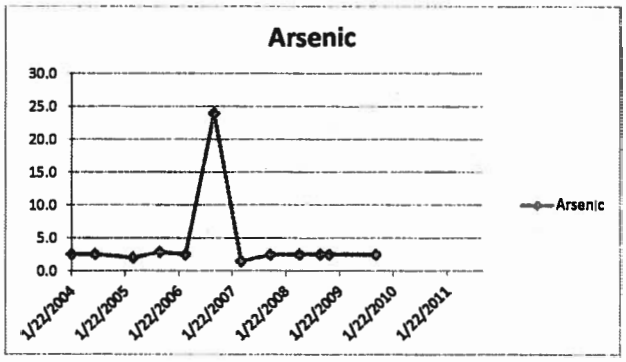
Monitoring Well 15GS69R
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Quali
1/22/2004	5.0	2.5	U
6/28/2004	5.0	2.5	U
3/14/2005	4.0	2.0	U
9/13/2005	3.2	3.2	B
3/8/2006	5.0	2.5	U
9/19/2006	10.0	5.0	U
3/22/2007	3.0	1.5	U
10/8/2007	5.0	2.5	U
4/23/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.0	2.5	U
9/25/2009	5.0	2.5	U
3/31/32010	NS		
9/28/2010	NS		
3/25/2011	NS		
9/21/2011	NS		



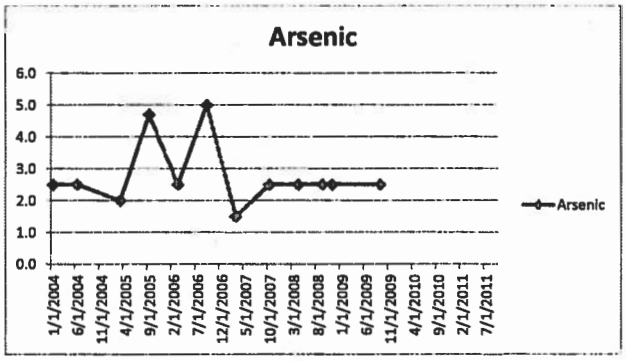
Monitoring Well 15GS70
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/22/2004	5.0	2.5	U
6/29/2004	5.0	2.5	U
3/14/2005	4.0	2.0	U
9/13/2005	2.9	2.9	B
3/8/2006	5.0	2.5	U
9/18/2006	24.0	24.0	
3/22/2007	3.0	1.5	U
10/8/2007	5.0	2.5	U
4/23/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.0	2.5	U
9/25/2009	5.0	2.5	U
9/25/2009	5.0	2.5	U
3/31/2010	NS		
9/28/2010	NS		
3/25/2011	NS		
9/21/2011	NS		



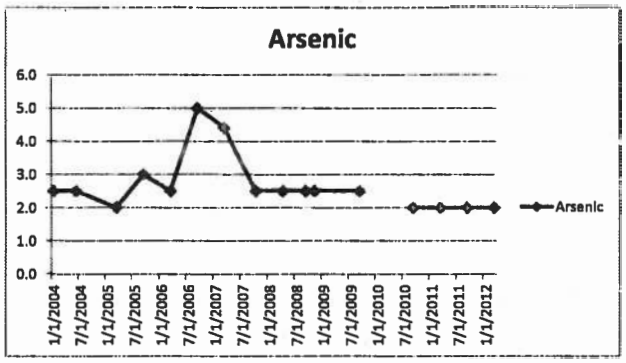
Monitoring Well 15GS71
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/22/2004	5.0	2.5	U
6/29/2004	5.0	2.5	U
3/14/2005	4.0	2.0	U
9/13/2005	4.7	4.7	B
3/8/2006	5.0	2.5	U
9/18/2006	10.0	5.0	U
3/22/2007	3.0	1.5	U
10/8/2007	5.0	2.5	U
4/23/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.0	2.5	U
9/25/2009	5.0	2.5	U
3/31/2010	NS		
9/28/2010	NS		
3/25/2011	NS		
9/21/2011	NS		



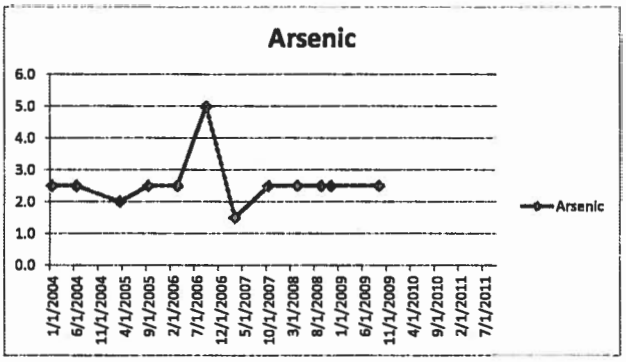
Monitoring Well 15MW72
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/22/2004	5.0	2.5	U
6/28/2004	5.0	2.5	U
3/14/2005	4.0	2.0	U
9/13/2005	3.0	3.0	B
3/8/2006	5.0	2.5	U
9/19/2006	10.0	5.0	U
3/22/2007	4.41	4.4	
10/8/2007	5.0	2.5	U
4/23/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.0	2.5	U
9/25/2009	5.0	2.5	U
3/31/2010	NS		
9/28/2010	4.0	2.0	U
3/25/2011	4.0	2.0	U
9/21/2011	4.0	2.0	U
3/21/2012	4.0	2.0	U



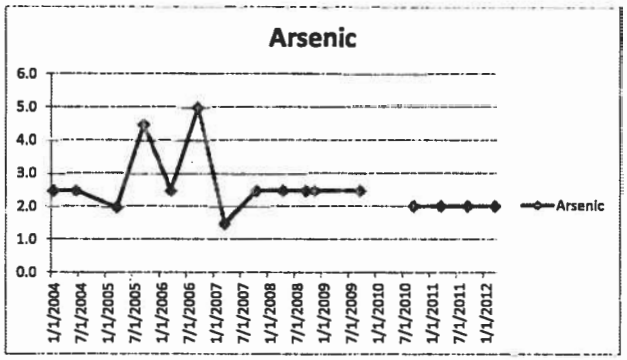
Monitoring Well 15MW73
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/21/2004	5.0	2.5	U
6/28/2004	5.0	2.5	U
3/14/2005	4.0	2.0	U
9/13/2005	5.0	2.5	U
3/8/2006	5.0	2.5	U
9/19/2006	10.0	5.0	U
3/22/2007	3.0	1.5	U
10/8/2007	5.0	2.5	U
4/23/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.0	2.5	U
9/25/2009	5.0	2.5	U
3/31/2010	NS		
9/28/2010	NS		
3/25/2011	NS		
9/21/2011	NS		



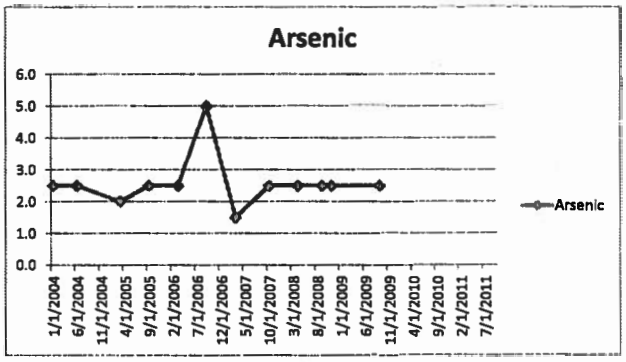
Monitoring Well 15MW74
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/22/2004	5.0	2.5	U
6/29/2004	5.0	2.5	U
3/14/2005	4.0	2.0	U
9/13/2005	4.5	4.5	B
3/9/2006	5.0	2.5	U
9/18/2006	10.0	5.0	U
3/22/2007	3.0	1.5	U
10/8/2007	5.0	2.5	U
4/24/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.0	2.5	U
9/25/2009	5.0	2.5	U
3/31/2010	NS		
9/28/2010	4.0	2.0	U
3/25/2011	4.0	2.0	U
9/21/2011	4.0	2.0	U
3/21/2012	4.0	2.0	U



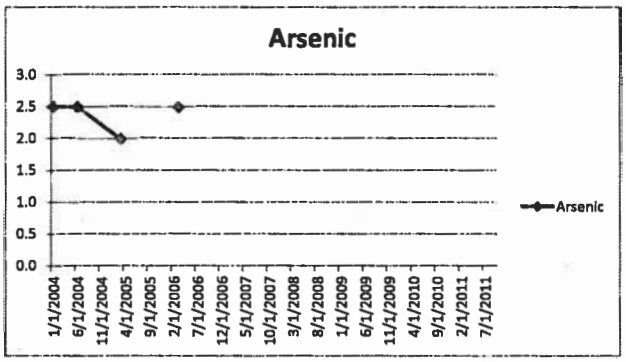
Monitoring Well 15MW75
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/22/2004	5.0	2.5	U
6/29/2004	5.0	2.5	U
3/14/2005	4.0	2.0	U
9/13/2005	5.0	2.5	U
3/9/2006	5.0	2.5	U
9/18/2006	10.0	5.0	U
3/22/2007	3.0	1.5	U
10/8/2007	5.0	2.5	U
4/24/2008	5.0	2.5	U
9/11/2008	5.0	2.5	U
11/12/2008	5.0	2.5	U
9/25/2009	5.0	2.5	U
3/31/2010	NS		
9/28/2010	NS		
3/25/2011	NS		
9/21/2011	NS		



Monitoring Well 15MW76
OU4
NAS Pensacola, Pensacola Florida

Arsenic Date	Validated Result	Censored Result	Qual
1/22/2004	5.0	2.5	U
6/29/2004	5.0	2.5	U
3/14/2005	4.0	2.0	U
9/13/2005	NS		
3/9/2006	5.0	2.5	U
9/19/2006	CNL		
3/22/2007	CNL		
10/8/2007	CNL		
4/23/2008	CNL		
9/11/2008	CNL		
11/12/2008	CNL		
9/25/2009	CNL		
3/31/2010	CNL		
9/28/2010	CNL		
3/25/2011	CNL		
9/21/2011	CNL		



APPENDIX E

OU4 INTERVIEW FORMS, SITE INSPECTION FORM

Provided on CD

INTERVIEW RECORD

Site Name: OU 4 Site 15 Pesticide Rinseate Disposal Area	**EPA ID No.:**	
Subject:	**Time: 1405**	**Date: 5/2/12**
Type: Telephone Ξ Visit Other **Location of Visit: NAS Pensacola**	Incoming Outgoing	

Contact Made By:

Name: Peggy Churchill	**Title:** Project Manager	**Organization:** Tetra Tech Inc.
Name: Amber Igoe	**Title:** Environmental Specialist II	**Organization:** Tetra Tech Inc.

Individual Contacted:

Name: Greg Campbell	**Title:** Environmental Engineer	**Organization:** NAVFAC
Telephone No: (850) 452-3131 ext 3007 **Fax No:** **E-Mail Address:** gregory.campbell@navy.mil	**Street Address:** 310 John Tower Road **City, State, Zip:** Pensacola FL, 32508	

Summary Of Conversation

The overall impression of the project is that the contamination is in a very localized area and is contained. Site operations have not affected the surrounding community and there has not been any reported community concerns. Local authorities have not received reports of vandalism, trespassing or any emergency responses occurring at the Site. The base is well informed of Site activity and progress. The Land Use Control Inspections are conducted annually. A maintenance warehouse is being proposed to be constructed in the area; the proper individuals have been informed of the contamination and all proper measures will be implemented to protect worker safety.

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
GREG CAMPBELL	ENVIR. ENGR.	PWD PENSACOLA	5-2-12

OU 4

Appendix C
Five-Year Review Interviews

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Five-Year Review Interviews

Information gathered from interviews during the site inspection may be key to understanding site status. Interviews should be conducted with various individuals or groups, including the operation and maintenance (O&M) site manager, O&M staff, local regulatory authorities and response agencies, community action groups or associations, site neighbors, and other stakeholders.

When conducting an interview, the interviewer should note the date of the interview, and the name, title, and affiliation of the person interviewed. The interviewer should also indicate whether the interview was conducted at the site, the office, or by phone. Written documentation of the interview should briefly summarize the discussion, address any problems or successes with the implementation of the remedy, and provide suggestions for future reference. Forms to use during interviews are provided at the end of this appendix.

The following tables provide lists of potential individuals to interview and the type of information which may be obtained during the interviews. The potential individuals to be interviewed are categorized by their ability to provide the following types of information:

- Background information;
- State and local considerations;
- Construction considerations; and
- Performance, Operation and maintenance problems.

All of these individuals may be contacted during the five-year review. In most cases interviewing only a few key individuals will provide sufficient information for the review.

Background Information

The individuals listed below may provide information concerning previous and current concerns about the site, influences that affected the remedy decision, and further clarification on decisions made during remedy selection.

Interview	Information Sought
Previous EPA Staff/Management	– staff members may offer insight and clarification on decisions made during remedy selection and implementation
Nearest Neighbors	– neighbors may provide insight into the enforcement of institutional controls, changes in land use, trespassing, and unusual or unexpected activity at the site

Interview	Information Sought
Community Representatives*	– members of the community may provide a broader view of site activities and issues than can be obtained during the site inspection

* Several types of individuals may be interviewed: residents/businesses adjacent to or on the site; residents/businesses within the path of migration; local civic leaders, local officials, Community Advisory Group (CAG), Technical Assistance Grant (TAG) group, and local environmental groups; and other audiences listed in the community profile in the Community Involvement Plan.

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)
   localized area of contamination for arsenic
2. What effects have site operations had on the surrounding community?
   none
3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. nope
4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. nope
5. Do you feel well informed about the site's activities and progress? yes
6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? nope

State and Local Considerations

State and local authorities may provide you with information about changes in State laws and regulations and present and prospective land uses and restrictions.

Interview	Information Sought
State Contacts (including those responsible for State water quality, hazardous waste, and environmental health issues)	– changes in State laws and regulations that may impact protectiveness – whether the site has been in compliance with permitting or reporting requirements – information on site activities, status, and issues
Local Authorities (such as police, emergency response or fire departments, and local environmental or planning offices)	– status of institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed, and unusual activities at the site

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results. Annual LUC inspection

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. none

4. Do you feel well informed about the site's activities and progress?

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? Future construction will be maintenance warehouse on site. Inland ~ site contamination may install septic tank

Construction Considerations

It is important for you to determine the status of construction at the site and to ensure that health and safety concerns are addressed.

Interview	Information Sought
Construction Contractor	– progress of project and changes in design due to field conditions – revisions to the O&M Manual, implementation of the Health and Safety Plan/Contingency Plan – insight into potential O&M problems
Construction Manager	– overview of all contractor construction activities at the site, health and safety issues, site protectiveness during construction, and the quality of the construction
Local Emergency Response Officials	– adequacy of contractor's Health and Safety Plan and the contractor's implementation of the Plan – adequacy of contractor's emergency response duties as outlined in the Contingency Plan or Emergency Response Plan of the Health and Safety Plan

Some example interview questions for remedial actions still under construction are given below.

1. What is your overall impression of the project? (general sentiment)

2. What is the current status of construction (*e.g.*, budget and schedule)?

3. Have any problems been encountered which required, or will require, changes to this remedial design or this ROD?

4. Have any problems or difficulties been encountered which have impacted construction progress or implementability?

5. Do you have any comments, suggestions, or recommendations regarding the project (i.e., design, construction documents, constructability, management, regulatory agencies, etc.)?

Performance, Operation And Maintenance Problems

The following individuals may provide information to you regarding the performance of the remedy and status of O&M at the site so that the team can assess the progress of the implementation and effectiveness of the remedy, and any O&M problems.

Interview	Information Sought
O&M Manager/Operating Contractor	– O&M status of the remedy, compliance with permit and reporting requirements, and complaints filed – effectiveness of the O&M Plan – information about any potential causes for concern about the remedy – progress and performance of the remedy
O&M Staff	– effectiveness of the O&M Manual – information about any potential causes for concern about the remedy – Recommendations for adjusting the mode of operation or optimizing the operations protocol
Remedial Design/Remedial Action Consultant	– original concepts behind the O&M of the remedy – questions about remedial design parameters, expected performance and cost, and changes that have occurred during implementation

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Is the remedy functioning as expected? How well is the remedy performing?

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

8. Do you have any comments, suggestions, or recommendations regarding the project?

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
GREG CAMPBELL	ENVIR. ENGR.	PWD PENSACOLA	5-2-12

INTERVIEW RECORD

Site Name:		**EPA ID No.:**	
Subject:		**Time:**	**Date:**
Type: ☐ Telephone ☐ Visit ☐ Other **Location of Visit:**		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name:	**Title:**	**Organization:**	
Individual Contacted:			
Name:	**Title:**	**Organization:**	
Telephone No: **Fax No:** **E-Mail Address:**		**Street Address:** **City, State, Zip:**	
Summary Of Conversation			

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Appendix D
Five-Year Review Site Inspection Checklist

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Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: OU4 Pesticide Rinsate Disposal Area	**Date of inspection:** 5/3/12
Location and Region: NAS Pensacola R4	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:** 80 cloudy breezy

Remedy Includes: (Check all that apply)

- Landfill cover/containment
- Access controls
- (Institutional controls)
- Groundwater pump and treatment
- Surface water collection and treatment
- (Monitored natural attenuation)
- Groundwater containment
- Vertical barrier walls
- Other Soil Excavation

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**
   - O&M manual — Readily available — Up to date — N/A
   - As-built drawings — Readily available — Up to date — N/A
   - Maintenance logs — Readily available — Up to date — N/A

   Remarks

2. **Site-Specific Health and Safety Plan** — Readily available — Up to date — N/A
   - Contingency plan/emergency response plan — Readily available — Up to date — N/A

   Remarks available for LTM

3. **O&M and OSHA Training Records** — Readily available — Up to date — N/A

   Remarks

4. **Permits and Service Agreements**
   - Air discharge permit — Readily available — Up to date — N/A
   - Effluent discharge — Readily available — Up to date — N/A
   - Waste disposal, POTW — Readily available — Up to date — N/A
   - Other permits _____ — Readily available — Up to date — N/A

   Remarks

5. **Gas Generation Records** — Readily available — Up to date — N/A

   Remarks

6. **Settlement Monument Records** — Readily available — Up to date — N/A

   Remarks

7. **Groundwater Monitoring Records** — Readily available — Up to date — N/A

   Remarks Quarterly reports and Annual Reports submitted

8. **Leachate Extraction Records** — Readily available — Up to date — N/A

   Remarks

9. **Discharge Compliance Records**
   - Air — Readily available — Up to date — N/A
   - Water (effluent) — Readily available — Up to date — N/A

   Remarks

10. **Daily Access/Security Logs** — Readily available — Up to date — N/A

    Remarks

IV. O&M COSTS

1. **O&M Organization**
   State in-house — Contractor for State
   PRP in-house — Contractor for PRP
   Federal Facility in-house — Contractor for Federal Facility
   Other_____

2. **O&M Cost Records**
   Readily available — Up to date
   Funding mechanism/agreement in place
   Original O&M cost estimate_____ Breakdown attached

   Total annual cost by year for review period if available

   From_____ To_____ _____ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ Breakdown attached
   Date Date Total cost
   From_____ To_____ _____ Breakdown attached
   Date Date Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS — Applicable — N/A

A. Fencing

1. **Fencing damaged** — Location shown on site map — Gates secured — N/A
   Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A
   Remarks_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self reporting
Frequency Annual Inspections
Responsible party/agency Navy
Contact Greg Campbell (Name) _____ (Title) _____ (Date) _____ (Phone no.)

Reporting is up-to-date — (Yes) No N/A
Reports are verified by the lead agency — (Yes) No N/A

Specific requirements in deed or decision documents have been met — (Yes) No N/A
Violations have been reported — Yes No (N/A)
Other problems or suggestions: Report attached

2. **Adequacy** (ICs are adequate) ICs are inadequate N/A
Remarks Dig permit in place

D. General

1. **Vandalism/trespassing** Location shown on site map (No vandalism evident)
Remarks

2. **Land use changes on site** N/A
Remarks future construction of warehouse planned

3. **Land use changes off site** (N/A)
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** Location shown on site map (Roads adequate) N/A
Remarks

B. Other Site Conditions

Remarks_____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS Applicable (N/A)

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
   Remarks_____
   _____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** Wet areas/water damage not evident
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** Slides — Location shown on site map — No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches Applicable N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — N/A or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — N/A or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — N/A or okay
   Remarks_____

C. Letdown Channels Applicable N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment	Applicable	N/A

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer	Applicable	N/A

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds	Applicable	N/A

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable N/A

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable (N/A)

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES	Applicable	N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable N/A

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System Applicable (N/A)

1. **Treatment Train** (Check components that apply)
   - Metals removal — Oil/water separation — Bioremediation
   - Air stripping — Carbon adsorbers
   - Filters_____
   - Additive (*e.g.*, chelation agent, flocculent)_____
   - Others_____
   - Good condition — Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually_____
   - Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A — Good condition — Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   N/A — Good condition — Proper secondary containment — Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   N/A — Good condition — Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   N/A — Good condition (esp. roof and doorways) — Needs repair
   Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   Properly secured/locked — Functioning — Routinely sampled — Good condition
   All required wells located — Needs Maintenance — N/A

   Remarks_____

D. Monitoring Data

1. Monitoring Data
   Is routinely submitted on time — Is of acceptable quality

2. Monitoring data suggests:
   Groundwater plume is effectively contained — Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring ~~Wells~~ (~~natural~~ attenuation remedy)**
   Properly secured/locked · Functioning · Routinely sampled · Good condition
   All required wells located · Needs Maintenance · N/A
   Remarks 0156RP1 and 1SMW76 are missing and need to be replaced

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Implemented and functioning as designed.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. N/A

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. MNA wells could be optimized in the future.

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DRAWN BY	DATE
GIS	9/18/2012
CHECKED BY	DATE
A.I.	9/18/2012
REVISED BY	DATE

SCALE
AS NOTED

NAVFAC

SITE MAP - OPERABLE UNIT 4
5 YEAR REVIEW
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER	CTO NUMBER
112G00390	067
APPROVED BY	DATE
___	___
APPROVED BY	DATE
___	___

FIGURE NO.	REV
5 - 1	0

APPENDIX F

OU11 INTERVIEW FORMS, SITE INSPECTION FORM

Provided on CD

INTERVIEW RECORD

Site Name: OU 11 Site 38 Hazardous Waste Storage Facility		**EPA ID No.:**
Subject:		**Time: 1445** **Date: 5/2/12**
Type: Telephone Ξ Visit Other **Location of Visit: NAS Pensacola**		Incoming Outgoing

Contact Made By:

Name: Peggy Churchill	**Title:** Project Manager	**Organization:** Tetra Tech Inc.
Name: Amber Igoe	**Title:** Environmental Specialist II	**Organization:** Tetra Tech Inc.

Individual Contacted:

Name: Greg Campbell	**Title:** Environmental Engineer	**Organization:** NAVFAC
Telephone No: (850) 452-3131 ext 3007 **Fax No:** **E-Mail Address:** gregory.campbell@navy.mil		**Street Address:** 310 John Tower Road **City, State, Zip:** Pensacola FL, 32508

Summary Of Conversation

The overall impression of the project is that the soil removal went well. The beautification project following the soil removal has provided a nice gazebo area for the community. Local authorities have not received reports of vandalism, trespassing or any emergency responses occurring at the Site. The base is well informed of Site activity, progress and Land Use Control (LUC) inspections are conducted annually.

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
GREG CAMPBELL	ENVIR. ENGR.	PWD PENSACOLA	5-2-12

04 11

Appendix C
Five-Year Review Interviews

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Five-Year Review Interviews

Information gathered from interviews during the site inspection may be key to understanding site status. Interviews should be conducted with various individuals or groups, including the operation and maintenance (O&M) site manager, O&M staff, local regulatory authorities and response agencies, community action groups or associations, site neighbors, and other stakeholders.

When conducting an interview, the interviewer should note the date of the interview, and the name, title, and affiliation of the person interviewed. The interviewer should also indicate whether the interview was conducted at the site, the office, or by phone. Written documentation of the interview should briefly summarize the discussion, address any problems or successes with the implementation of the remedy, and provide suggestions for future reference. Forms to use during interviews are provided at the end of this appendix.

The following tables provide lists of potential individuals to interview and the type of information which may be obtained during the interviews. The potential individuals to be interviewed are categorized by their ability to provide the following types of information:

- Background information;
- State and local considerations;
- Construction considerations; and
- Performance, Operation and maintenance problems.

All of these individuals may be contacted during the five-year review. In most cases interviewing only a few key individuals will provide sufficient information for the review.

Background Information

The individuals listed below may provide information concerning previous and current concerns about the site, influences that affected the remedy decision, and further clarification on decisions made during remedy selection.

Interview	Information Sought
Previous EPA Staff/Management	– staff members may offer insight and clarification on decisions made during remedy selection and implementation
Nearest Neighbors	– neighbors may provide insight into the enforcement of institutional controls, changes in land use, trespassing, and unusual or unexpected activity at the site

Interview	Information Sought
Community Representatives*	– members of the community may provide a broader view of site activities and issues than can be obtained during the site inspection

* Several types of individuals may be interviewed: residents/businesses adjacent to or on the site; residents/businesses within the path of migration; local civic leaders, local officials, Community Advisory Group (CAG), Technical Assistance Grant (TAG) group, and local environmental groups; and other audiences listed in the community profile in the Community Involvement Plan.

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)
   Good cleanup, nice pretty area
2. What effects have site operations had on the surrounding community?
   Beautification to the area
3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. no
4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. no
5. Do you feel well informed about the site's activities and progress?
   yes
6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? none

State and Local Considerations

State and local authorities may provide you with information about changes in State laws and regulations and present and prospective land uses and restrictions.

Interview	Information Sought
State Contacts (including those responsible for State water quality, hazardous waste, and environmental health issues)	– changes in State laws and regulations that may impact protectiveness – whether the site has been in compliance with permitting or reporting requirements – information on site activities, status, and issues
Local Authorities (such as police, emergency response or fire departments, and local environmental or planning offices)	– status of institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed, and unusual activities at the site

40-50' stretch of pipe originally charged so not have to donate.
donating 18' pipe 1 foot down not have to go

for flood control

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results. Annual WE inspections

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. no

4. Do you feel well informed about the site's activities and progress? no

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? no

Construction Considerations

It is important for you to determine the status of construction at the site and to ensure that health and safety concerns are addressed.

Interview	Information Sought
Construction Contractor	– progress of project and changes in design due to field conditions – revisions to the O&M Manual, implementation of the Health and Safety Plan/Contingency Plan – insight into potential O&M problems
Construction Manager	– overview of all contractor construction activities at the site, health and safety issues, site protectiveness during construction, and the quality of the construction
Local Emergency Response Officials	– adequacy of contractor's Health and Safety Plan and the contractor's implementation of the Plan – adequacy of contractor's emergency response duties as outlined in the Contingency Plan or Emergency Response Plan of the Health and Safety Plan

Some example interview questions for remedial actions still under construction are given below.

1. What is your overall impression of the project? (general sentiment)

2. What is the current status of construction (*e.g.*, budget and schedule)?

3. Have any problems been encountered which required, or will require, changes to this remedial design or this ROD?

4. Have any problems or difficulties been encountered which have impacted construction progress or implementability?

5. Do you have any comments, suggestions, or recommendations regarding the project (i.e., design, construction documents, constructability, management, regulatory agencies, etc.)?

Performance, Operation And Maintenance Problems

The following individuals may provide information to you regarding the performance of the remedy and status of O&M at the site so that the team can assess the progress of the implementation and effectiveness of the remedy, and any O&M problems.

Interview	Information Sought
O&M Manager/Operating Contractor	– O&M status of the remedy, compliance with permit and reporting requirements, and complaints filed – effectiveness of the O&M Plan – information about any potential causes for concern about the remedy – progress and performance of the remedy
O&M Staff	– effectiveness of the O&M Manual – information about any potential causes for concern about the remedy – Recommendations for adjusting the mode of operation or optimizing the operations protocol
Remedial Design/Remedial Action Consultant	– original concepts behind the O&M of the remedy – questions about remedial design parameters, expected performance and cost, and changes that have occurred during implementation

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Is the remedy functioning as expected? How well is the remedy performing?

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

8. Do you have any comments, suggestions, or recommendations regarding the project?

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
GREG CAMPBELL	ENVIR. ENGR.	PWD PENSACOLA	5-2-12

INTERVIEW RECORD

Site Name:		**EPA ID No.:**	
Subject:		**Time:**	**Date:**
Type: ☐ Telephone ☐ Visit ☐ Other **Location of Visit:**		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name:	**Title:**	**Organization:**	
Individual Contacted:			
Name:	**Title:**	**Organization:**	
Telephone No: **Fax No:** **E-Mail Address:**		**Street Address:** **City, State, Zip:**	
Summary Of Conversation			

Page 1 of ____

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OU 11

Appendix D
Five-Year Review Site Inspection Checklist

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Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: OU II Site 38 Fac Haz Waste Storage	**Date of inspection:** 5/3/12
Location and Region: NAS Pensacola R4	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:** 85° overcast

Remedy Includes: (Check all that apply)

Landfill cover/containment	Monitored natural attenuation
Access controls	Groundwater containment
Institutional controls	Vertical barrier walls
Groundwater pump and treatment	
Surface water collection and treatment	
Other Soil excavation	

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1.	**O&M Documents**			
	O&M manual	Readily available	Up to date	N/A
	As-built drawings	Readily available	Up to date	N/A
	Maintenance logs	Readily available	Up to date	N/A
	Remarks			
2.	**Site-Specific Health and Safety Plan**	Readily available	Up to date	N/A
	Contingency plan/emergency response plan	Readily available	Up to date	N/A
	Remarks			
3.	**O&M and OSHA Training Records**	Readily available	Up to date	N/A
	Remarks			
4.	**Permits and Service Agreements**			
	Air discharge permit	Readily available	Up to date	N/A
	Effluent discharge	Readily available	Up to date	N/A
	Waste disposal, POTW	Readily available	Up to date	N/A
	Other permits	Readily available	Up to date	N/A
	Remarks			
5.	**Gas Generation Records**	Readily available	Up to date	N/A
	Remarks			
6.	**Settlement Monument Records**	Readily available	Up to date	N/A
	Remarks			
7.	**Groundwater Monitoring Records**	Readily available	Up to date	N/A
	Remarks			
8.	**Leachate Extraction Records**	Readily available	Up to date	N/A
	Remarks			
9.	**Discharge Compliance Records**			
	Air	Readily available	Up to date	N/A
	Water (effluent)	Readily available	Up to date	N/A
	Remarks			
10.	**Daily Access/Security Logs**	Readily available	Up to date	N/A
	Remarks			

IV. O&M COSTS

1. **O&M Organization**

State in-house — Contractor for State
PRP in-house — Contractor for PRP
Federal Facility in-house — Contractor for Federal Facility
Other_____

2. **O&M Cost Records**

Readily available — Up to date
Funding mechanism/agreement in place
Original O&M cost estimate_____ — Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS

Applicable — ~~N/A~~

A. Fencing

1. **Fencing damaged** — Location shown on site map — Gates secured — N/A

Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A

Remarks_____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self
Frequency Annual LUC inspections
Responsible party/agency Navy
Contact Greg Campbell — Name | Title | Date | Phone no.

Reporting is up-to-date — Yes No N/A
Reports are verified by the lead agency — Yes No N/A

Specific requirements in deed or decision documents have been met — Yes No N/A
Violations have been reported — Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** ICs are adequate ICs are inadequate N/A
Remarks

D. General

1. **Vandalism/trespassing** Location shown on site map (No vandalism evident)
Remarks

2. **Land use changes on site** (N/A)
Remarks

3. **Land use changes off site** (N/A)
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads (Applicable) N/A

1. **Roads damaged** Location shown on site map (Roads adequate) N/A
Remarks

B. Other Site Conditions

Remarks Beautification post-hurricane

VII. LANDFILL COVERS Applicable (N/A)

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
   Remarks_____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____

8. **Wet Areas/Water Damage** — Wet areas/water damage not evident
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** — Slides — Location shown on site map — No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches — Applicable — N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — N/A or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — N/A or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — N/A or okay
   Remarks_____

C. Letdown Channels — Applicable — N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment	Applicable	N/A
1. **Gas Treatment Facilities** Flaring Thermal destruction Collection for reuse Good condition Needs Maintenance Remarks_____		
2. **Gas Collection Wells, Manifolds and Piping** Good condition Needs Maintenance Remarks_____		
3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) Good condition Needs Maintenance N/A Remarks_____		
F. Cover Drainage Layer	Applicable	N/A
1. **Outlet Pipes Inspected** Remarks_____	Functioning	N/A
2. **Outlet Rock Inspected** Remarks_____	Functioning	N/A
G. Detention/Sedimentation Ponds	Applicable	N/A
1. **Siltation** Areal extent_____ Depth_____ N/A Siltation not evident Remarks_____		
2. **Erosion** Areal extent_____ Depth_____ Erosion not evident Remarks_____		
3. **Outlet Works** Remarks_____	Functioning	N/A
4. **Dam** Remarks_____	Functioning	N/A

H. Retaining Walls Applicable N/A

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable (N/A)

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks sea wall present on site.

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES

Applicable N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines

Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

   Good condition All required wells properly operating Needs Maintenance N/A

   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

   Good condition Needs Maintenance

   Remarks_____

3. **Spare Parts and Equipment**

   Readily available Good condition Requires upgrade Needs to be provided

   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines

Applicable N/A

1. **Collection Structures, Pumps, and Electrical**

   Good condition Needs Maintenance

   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

   Good condition Needs Maintenance

   Remarks_____

3. **Spare Parts and Equipment**

   Readily available Good condition Requires upgrade Needs to be provided

   Remarks_____

C. Treatment System Applicable N/A

1. **Treatment Train** (Check components that apply)
   - Metals removal
   - Oil/water separation
   - Bioremediation
   - Air stripping
   - Carbon adsorbers
   - Filters_____
   - Additive (*e.g.*, chelation agent, flocculent)_____
   - Others_____
   - Good condition
   - Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually_____
   - Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   - N/A
   - Good condition
   - Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   - N/A
   - Good condition
   - Proper secondary containment
   - Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   - N/A
   - Good condition
   - Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   - N/A
   - Good condition (esp. roof and doorways)
   - Needs repair
   - Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   - Properly secured/locked
   - Functioning
   - Routinely sampled
   - Good condition
   - All required wells located
   - Needs Maintenance
   - N/A

   Remarks_____

D. Monitoring Data not yet implemented.

1. Monitoring Data
   - Is routinely submitted on time
   - Is of acceptable quality

2. Monitoring data suggests:
   - Groundwater plume is effectively contained
   - Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **~~Monitoring Wells~~** (~~natural~~ attenuation remedy)
   Properly secured/locked Functioning ~~Routinely sampled~~ ~~Good condition~~
   ~~All required wells located~~ ~~Needs Maintenance~~ N/A
   Remarks many wells were not present during "return to nature" area constuction. New wells will be installed as part of LTM.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

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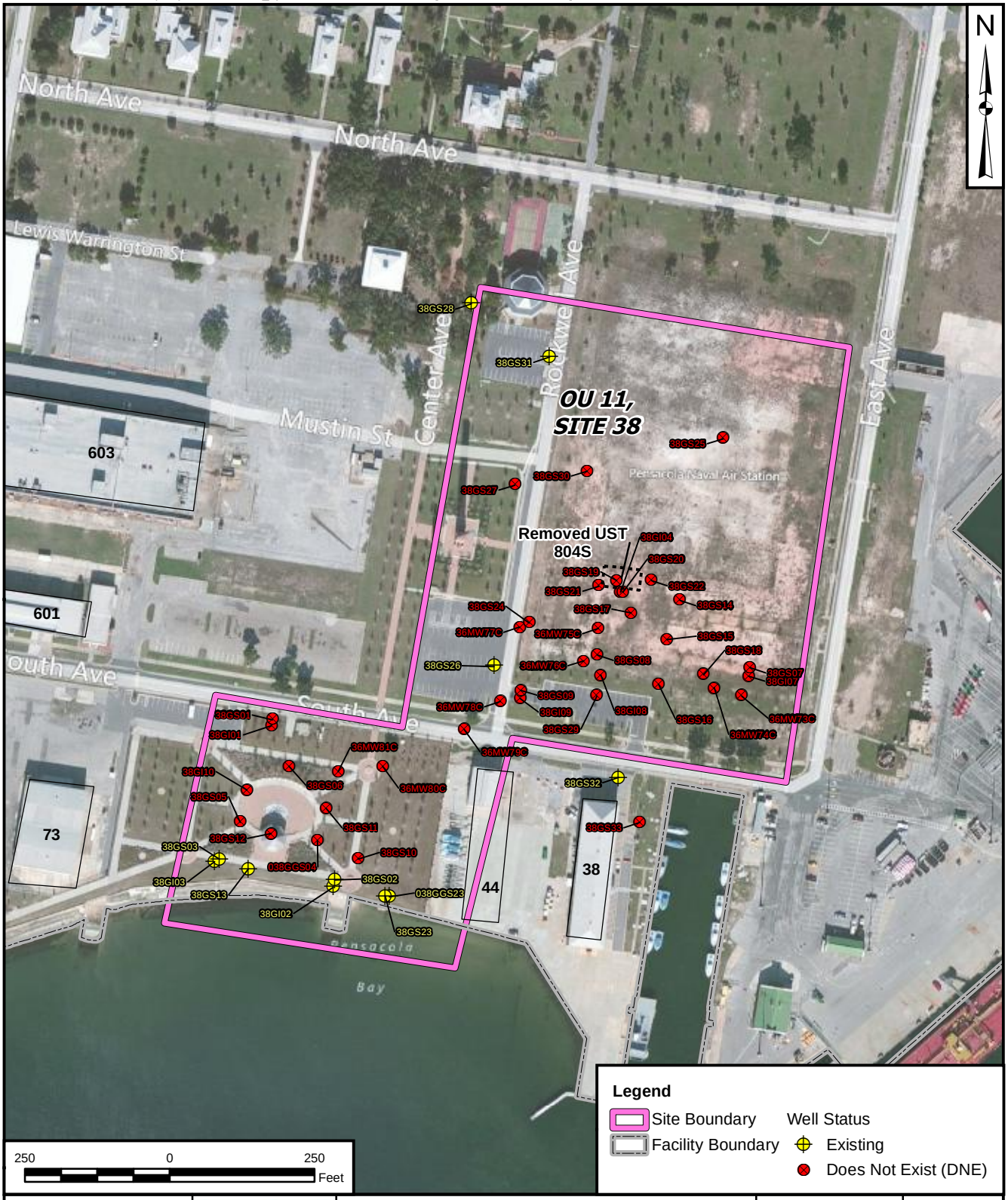


DRAWN BY	DATE
GIS	9/18/2012
CHECKED BY	DATE
A.I.	9/18/2012
REVISED BY	DATE
SCALE	
AS NOTED	

NAVFAC

SITE MAP - OPERABLE UNIT 11
5 YEAR REVIEW
NAS PENSACOLA
PENSACOLA, FLORIDA

CONTRACT NUMBER	CTO NUMBER
112G00390	067
APPROVED BY	DATE
___	___
APPROVED BY	DATE
___	___
FIGURE NO.	REV
6 - 1	0

APPENDIX G

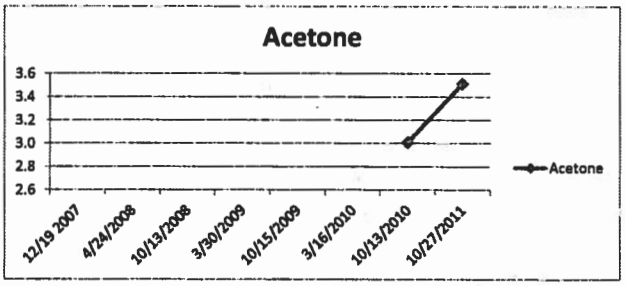
OU13 GROUNDWATER TREND ANALYSES

Provided on CD

Monitoring Well 08GR01R
OU 13
NAS Pensacola, Pensacola Florida

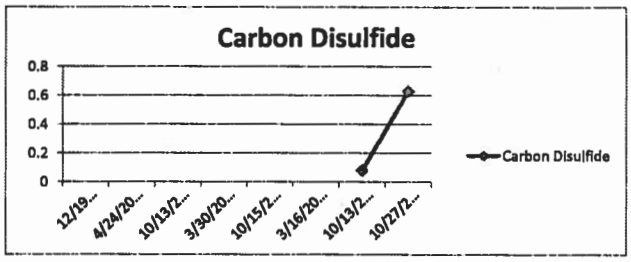
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	3.01	3.01	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed

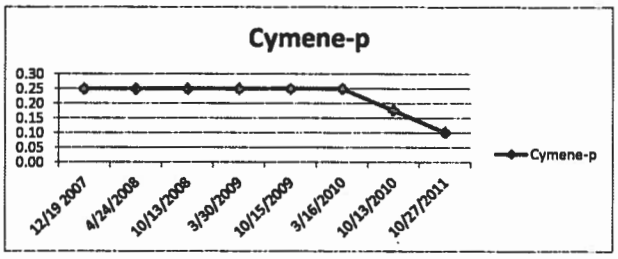


Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.16	0.08	U
10/27/2011	1.26	0.63	U

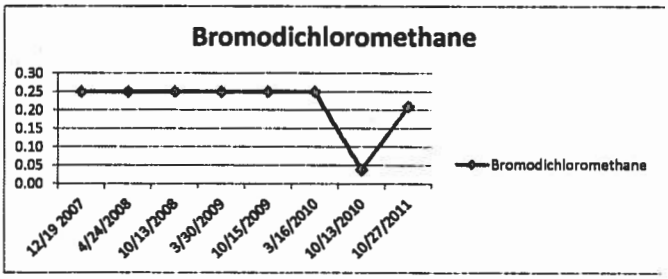
NA = Not Analyzed



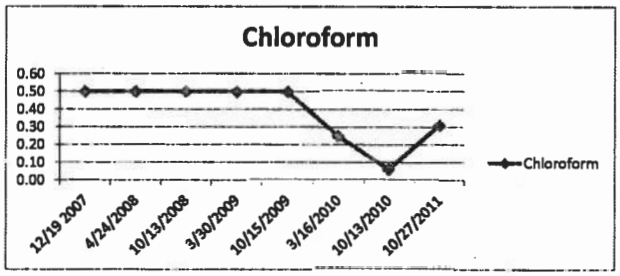
Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.203	0.10	U



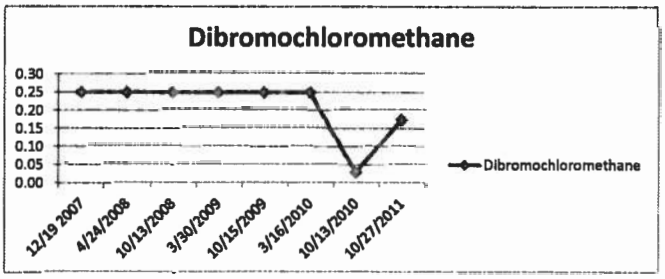
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	0.5	0.25	U
10/13/2010	0.122	0.06	U
10/27/2011	0.62	0.31	U

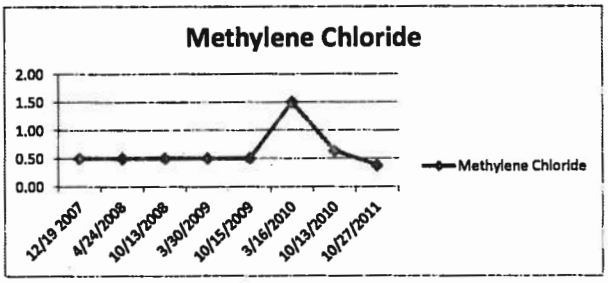


Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U

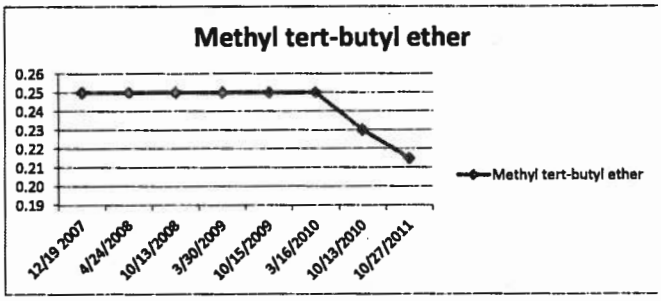


Monitoring Well 08GR01R
OU 13
NAS Pensacola, Pensacola Florida

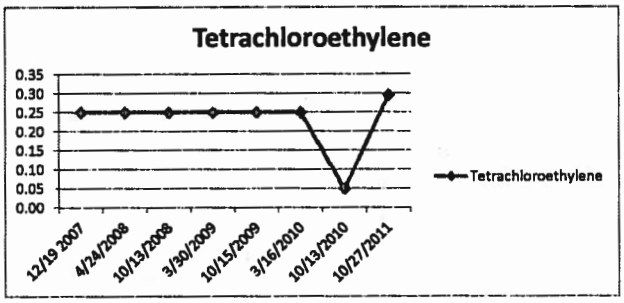
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.5	1.50	I
10/13/2010	1.27	0.64	U
10/27/2011	0.75	0.38	U



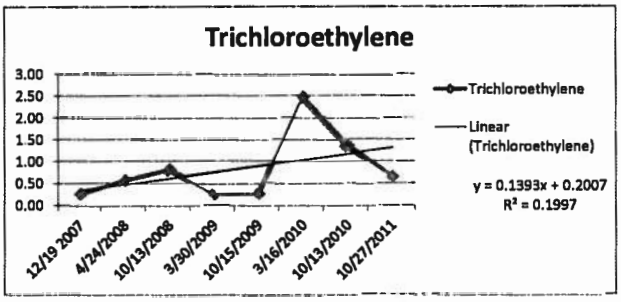
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.46	0.23	U
10/27/2011	0.43	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.30	U



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.57	0.57	I
10/13/2008	0.82	0.82	I
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	2.47	2.47	I
10/13/2010	1.36	1.38	
10/27/2011	0.65	0.65	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Trichloroethylene

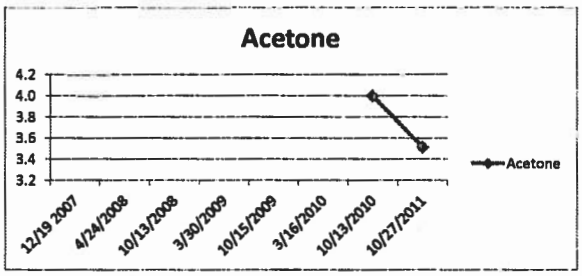
General Statistics	
Number of Values	8
Minimum	0.25
Maximum	2.47
Mean	0.828
Geometric Mean	0.596
Median	0.61
Standard Deviation	0.763
SEM	0.27
Mann-Kendall Test	
Test Value (S)	9
Tabulated p-value	0.119
Standard Deviation of S	7.853
Standardized Value of S	1.019
Approximate p-value	0.154

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR02R
OU 13
NAS Pensacola, Pensacola Florida

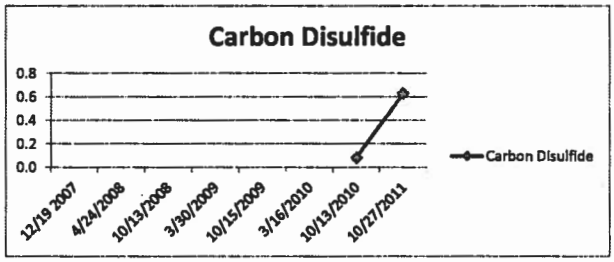
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	4.00	4.00	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed



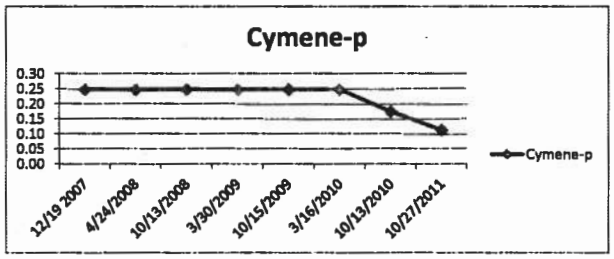
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.16	0.08	U
10/27/2011	1.26	0.63	U

NA = Not Analyzed

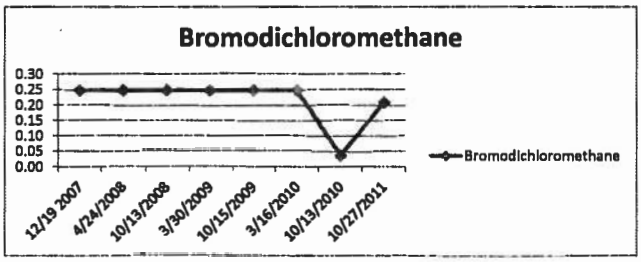


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

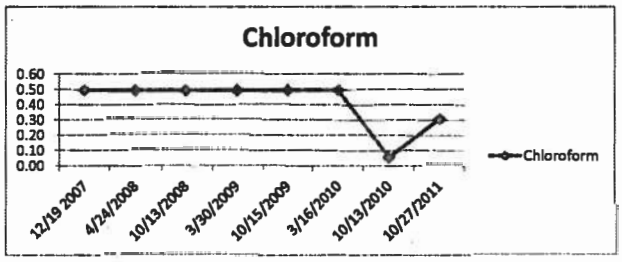
NA = Not Analyzed



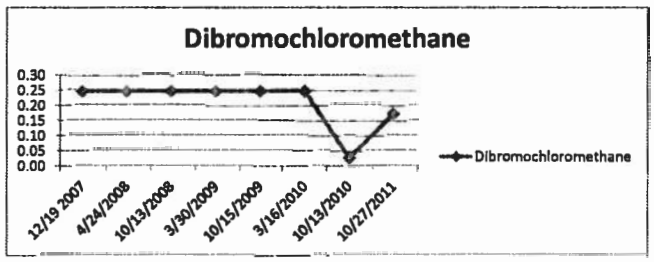
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	0.122	0.06	U
10/27/2011	0.620	0.31	U

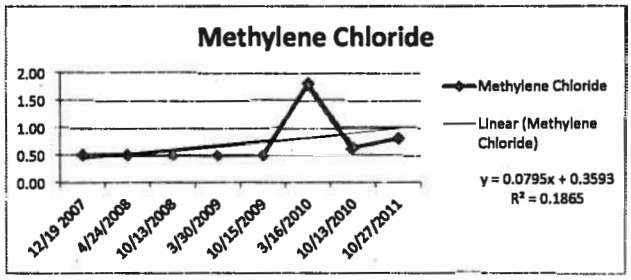


Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U

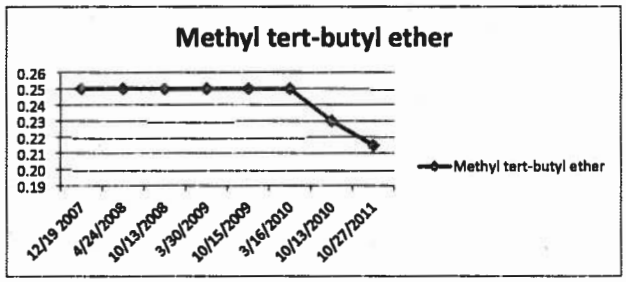


Monitoring Well 08GR02R
OU 13
NAS Pensacola, Pensacola Florida

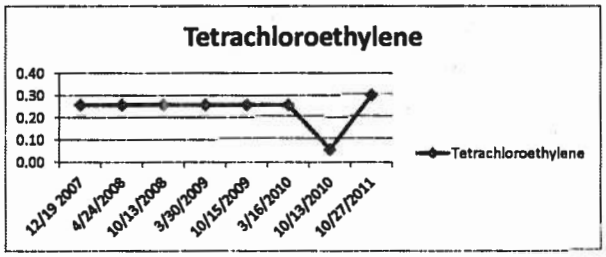
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.8	1.80	I
10/13/2010	1.27	0.64	U
10/27/2011	0.8	0.80	IV



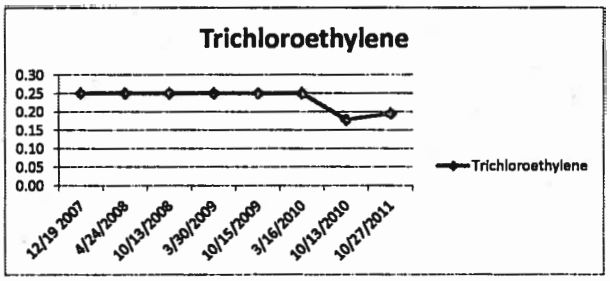
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.46	0.23	U
10/27/2011	0.43	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.30	U



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.390	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

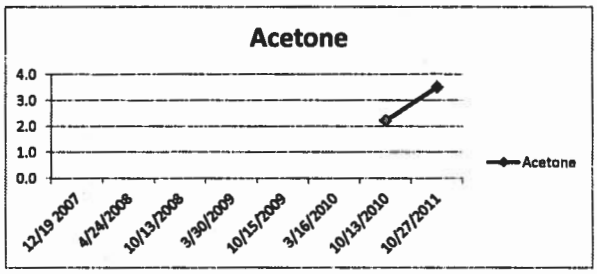
General Statistics	
Number of Values	8
Minimum	0.5
Maximum	1.8
Mean	0.717
Geometric Mean	0.641
Median	0.5
Standard Deviation	0.451
SEM	0.159
Mann-Kendall Test	
Test Value (S)	14
Tabulated p-value	0.054
Standard Deviation of S	6.976
Standardized Value of S	1.863
Approximate p-value	0.0312

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR03R
OU 13
NAS Pensacola, Pensacola Florida

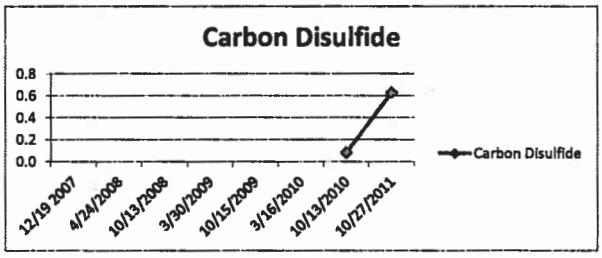
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	2.22	2.22	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed



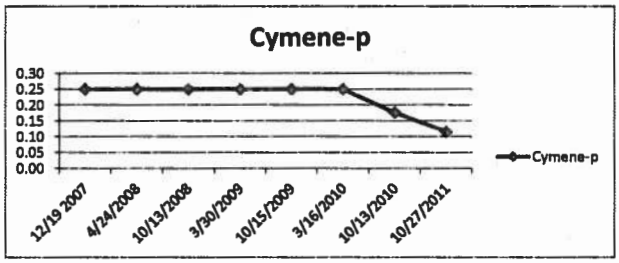
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.16	0.08	U
10/27/2011	1.26	0.63	U

NA = Not Analyzed

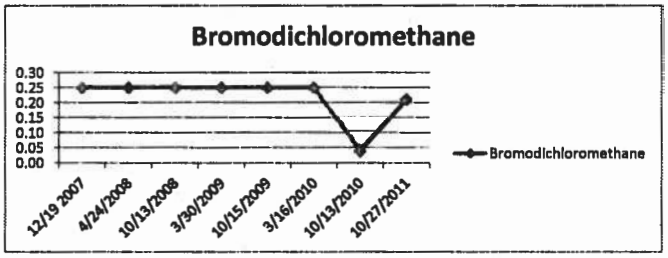


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

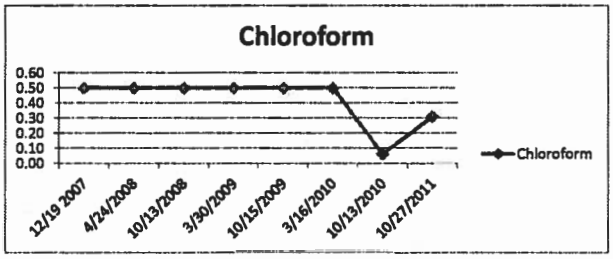
NA = Not Analyzed



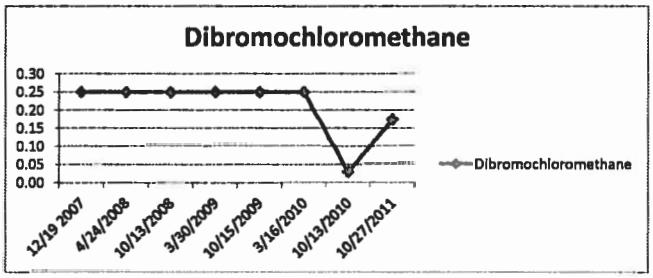
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	0.122	0.06	U
10/27/2011	0.620	0.31	U



Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U



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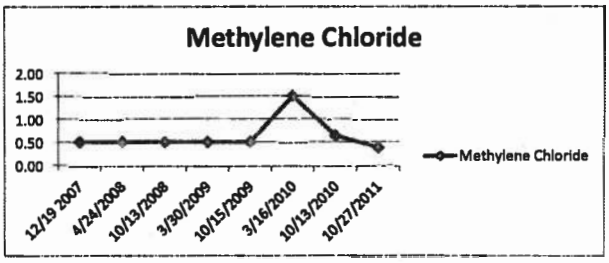
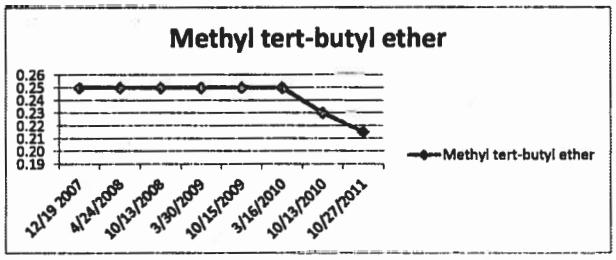
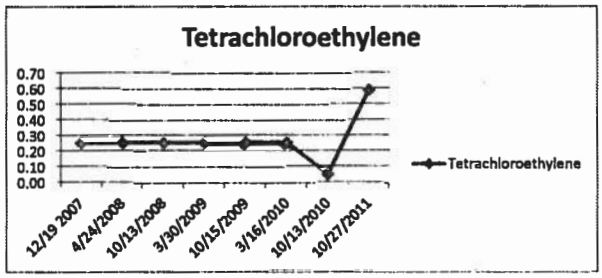
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.5	1.50	I
10/13/2010	1.27	0.64	U
10/27/2011	0.75	0.38	U



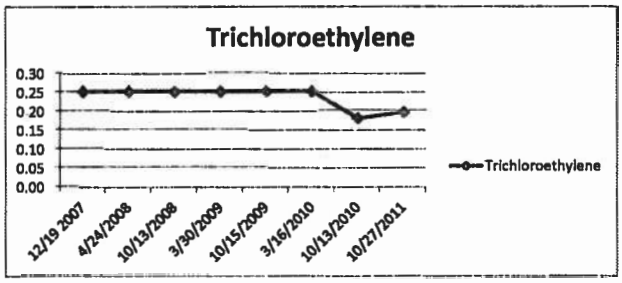
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.460	0.23	U
10/27/2011	0.430	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.59	I



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.390	0.20	U



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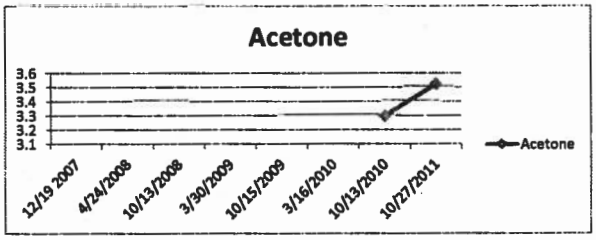
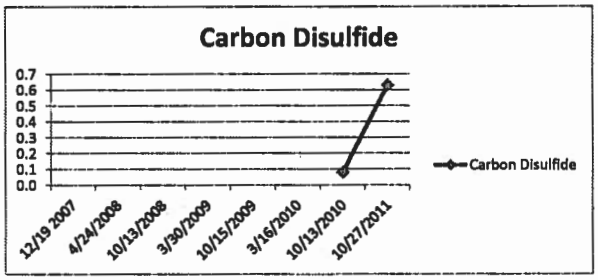
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	3.29	3.29	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed



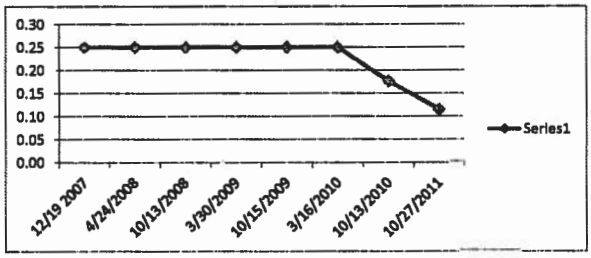
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.162	0.08	U
10/27/2011	1.26	0.63	U

NA = Not Analyzed

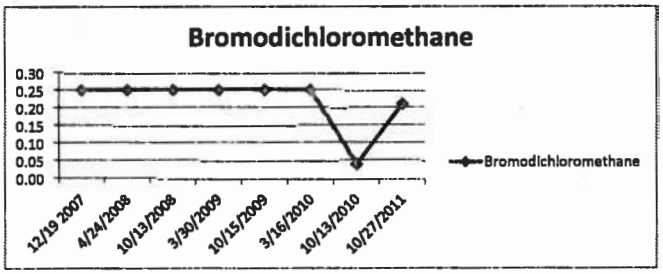


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

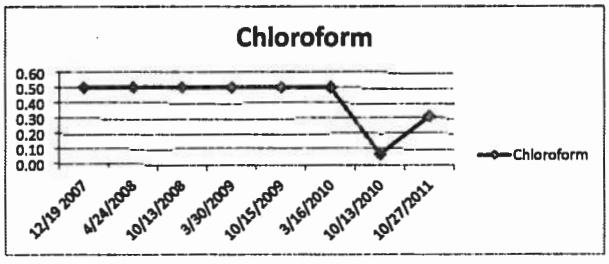
NA = Not Analyzed



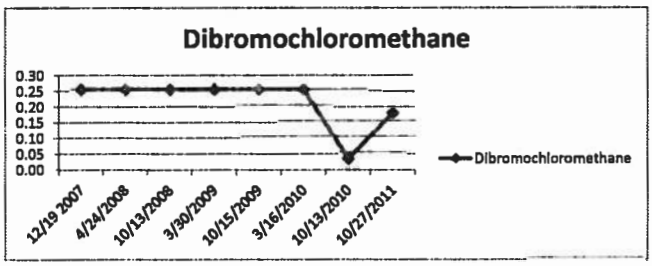
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	0.122	0.06	U
10/27/2011	0.620	0.31	U



Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U



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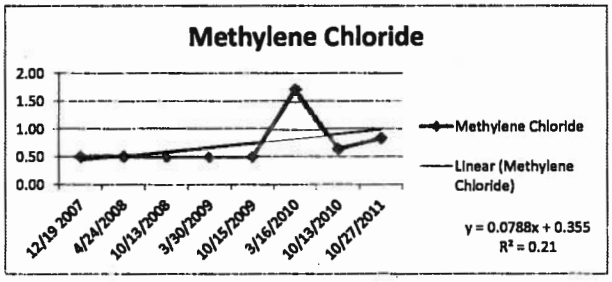
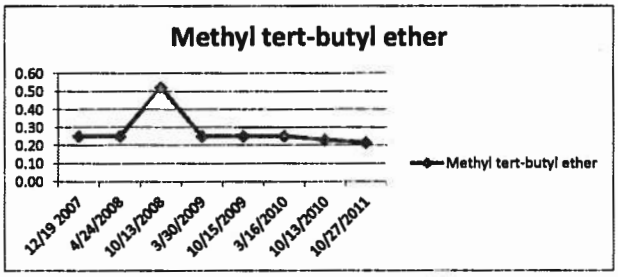
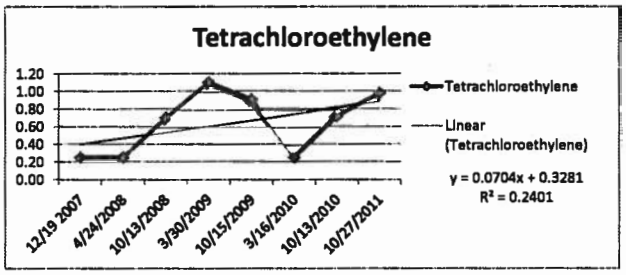
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.71	1.71	I
10/13/2010	1.27	0.64	U
10/27/2011	0.830	0.83	IV



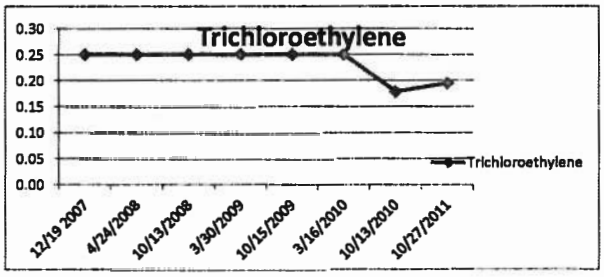
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.52	0.52	I
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.460	0.23	U
10/27/2011	0.430	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.7	0.70	I
3/30/2009	1.1	1.10	I
10/15/2009	0.91	0.91	I
3/16/2010	0.5	0.25	U
10/13/2010	0.718	0.72	I
10/27/2011	0.980	0.98	I



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.390	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

General Statistics	
Number of Values	8
Minimum	0.5
Maximum	1.71
Mean	0.709
Geometric Mean	0.64
Median	0.5
Standard Deviation	0.421
SEM	0.149
Mann-Kendall Test	
Test Value (S)	14
Tabulated p-value	0.054
Standard Deviation of S	6.976
Standardized Value of S	1.863
Approximate p-value	0.0312

Insufficient evidence to identify a significant trend at the specified level of significance.

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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Tetrachloroethylene

General Statistics	
Number of Values	8
Minimum	0.25
Maximum	1.1
Mean	0.645
Geometric Mean	0.544
Median	0.709
Standard Deviation	0.352
SEM	0.124
Mann-Kendall Test	
Test Value (S)	11
Tabulated p-value	0.138
Standard Deviation of S	7.853
Standardized Value of S	1.273
Approximate p-value	0.101

Insufficient evidence to identify a significant trend at the specified level of significance.

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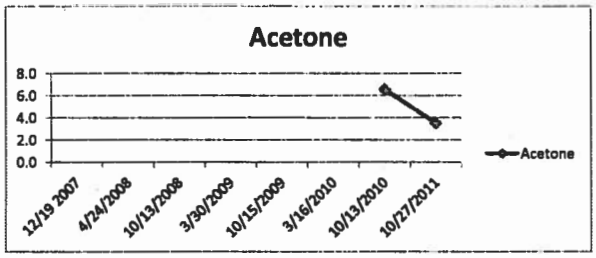
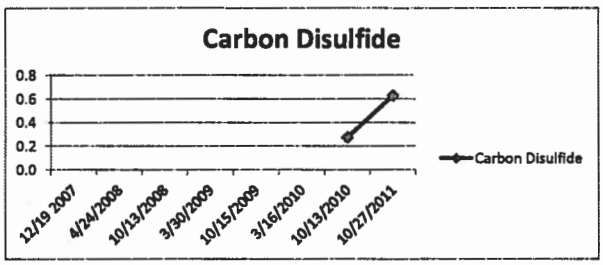
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	6.58	8.58	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed



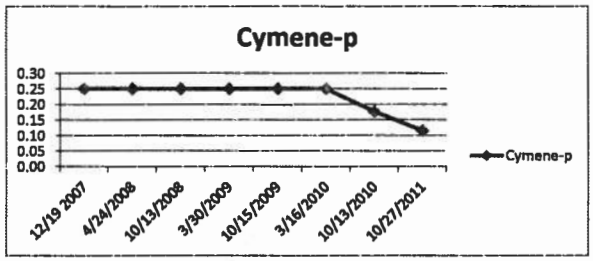
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.276	0.28	I
10/27/2011	1.26	0.63	U

NA = Not Analyzed

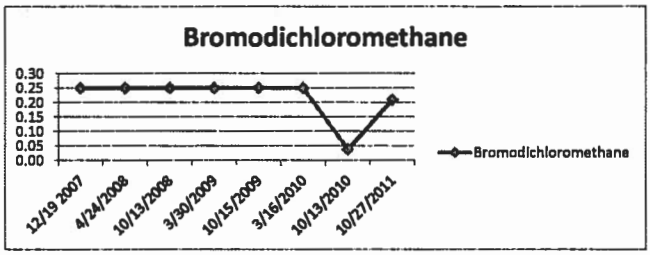


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

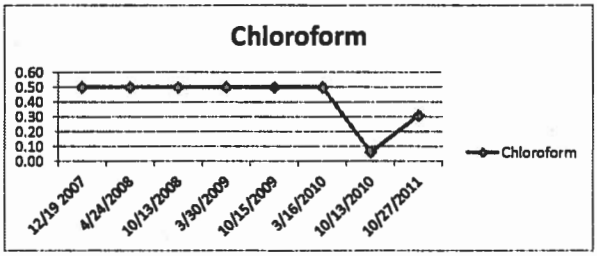
NA = Not Analyzed



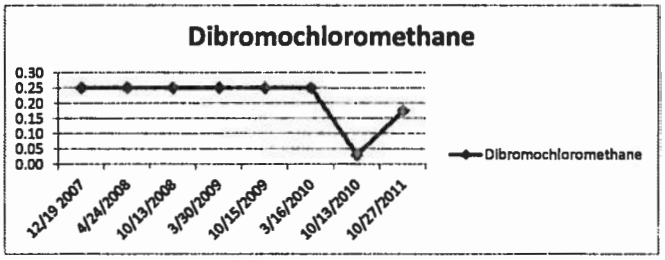
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	0.122	0.06	U
10/27/2011	0.62	0.31	U



Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U



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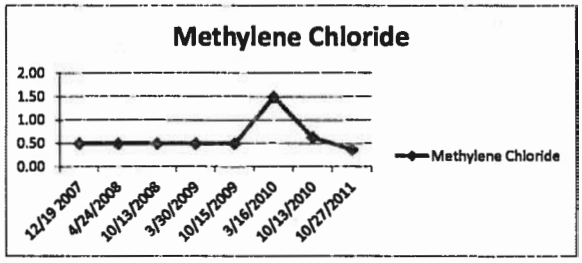
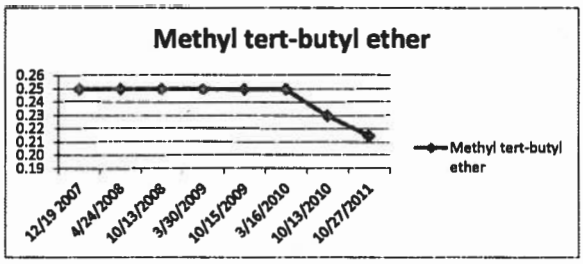
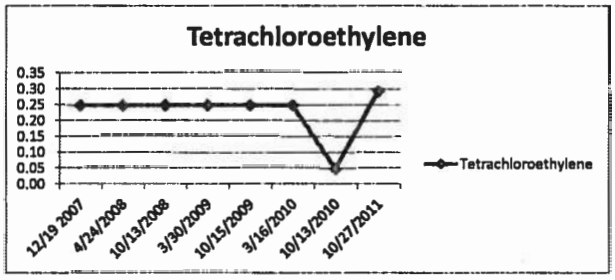
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.5	1.50	I
10/13/2010	1.27	0.84	U
10/27/2011	0.750	0.38	U



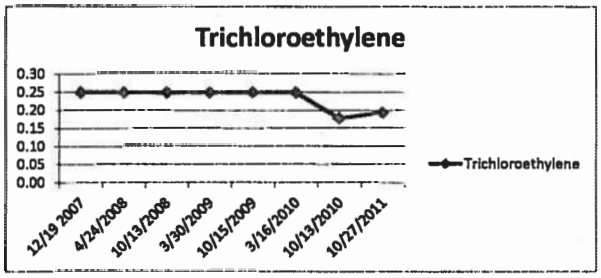
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.460	0.23	U
10/27/2011	0.430	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.30	U



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.390	0.20	U



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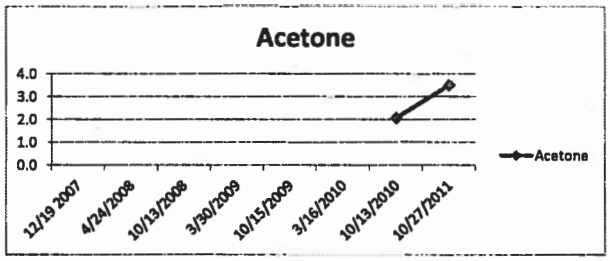
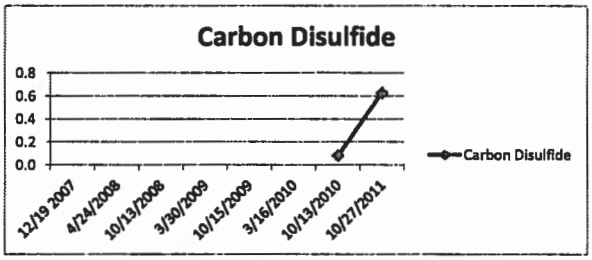
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	2.07	2.07	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed



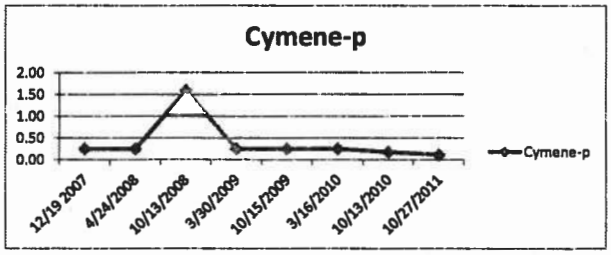
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.162	0.08	U
10/27/2011	1.26	0.63	U

NA = Not Analyzed

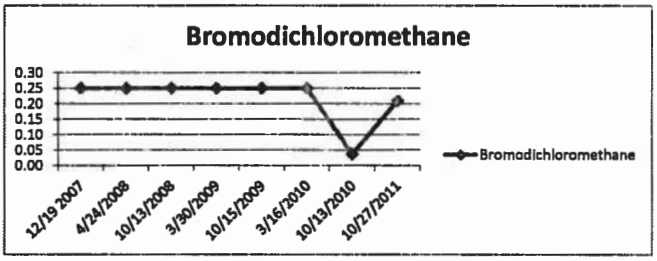


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	1.6	1.60	I
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

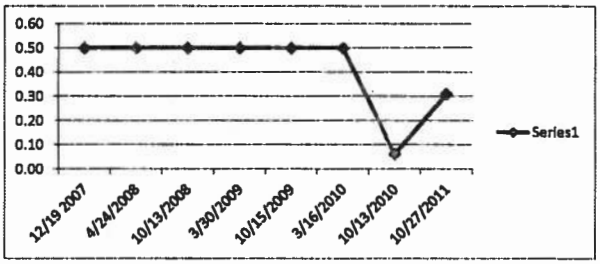
NA = Not Analyzed



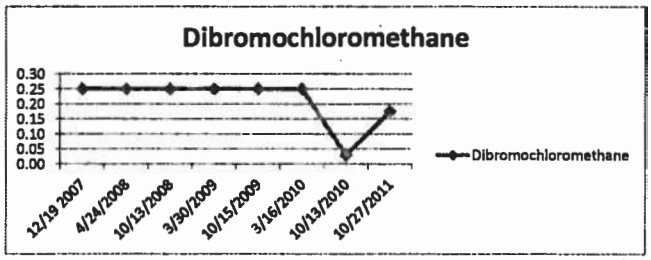
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	0.122	0.06	U
10/27/2011	0.620	0.31	U



Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U



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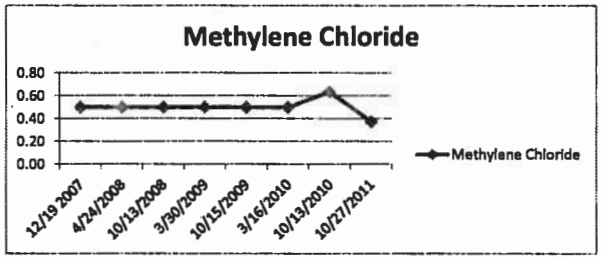
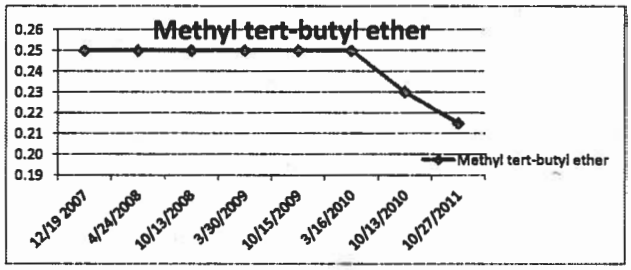
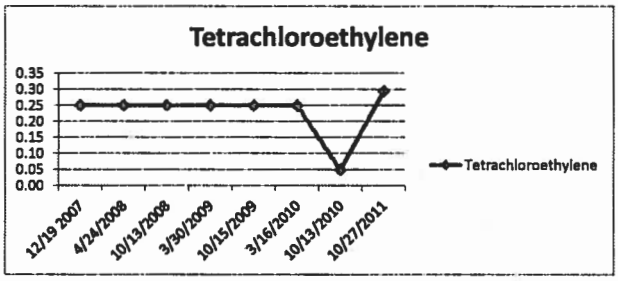
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	1.27	0.64	U
10/27/2011	0.75	0.38	U



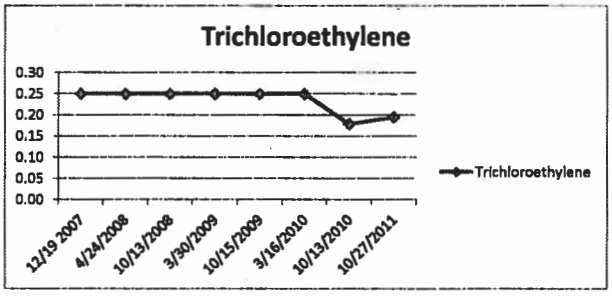
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.46	0.23	U
10/27/2011	0.430	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.30	U



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.390	0.20	U



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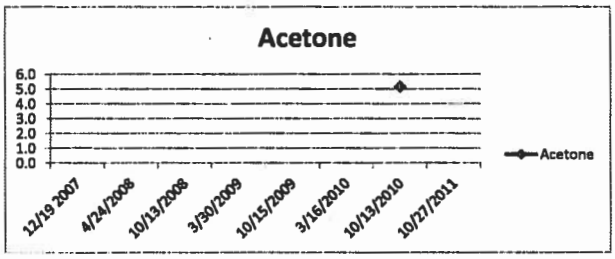
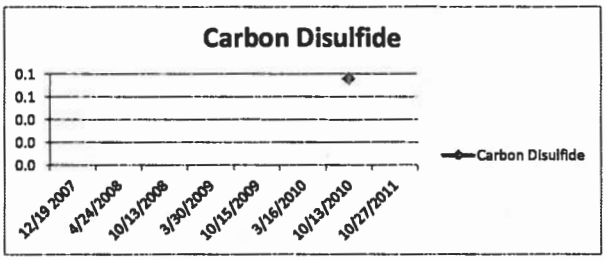
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	5.16	5.16	I
10/27/2011	NS		

NA = Not Analyzed
NS = Not Sampled



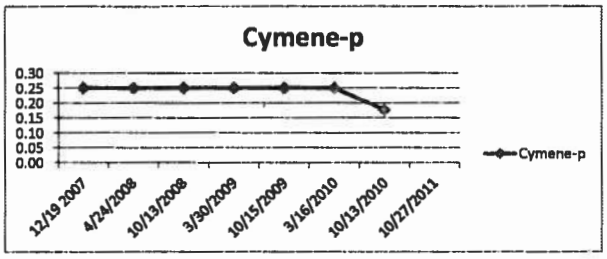
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.162	0.08	U
10/27/2011			

NA = Not Analyzed
NS = Not Sampled



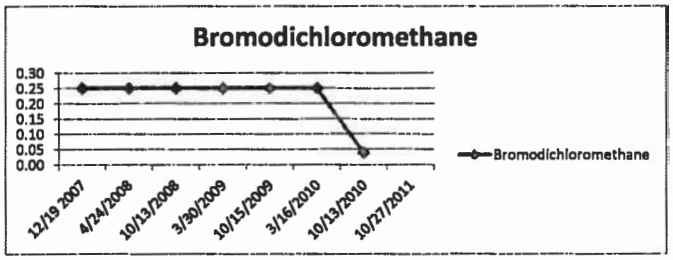
Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	NS		

NS = Not Sampled



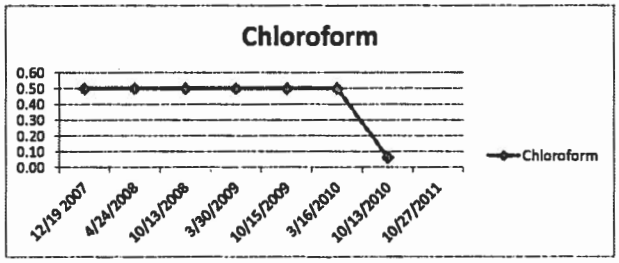
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	NS		

NS = Not Sampled



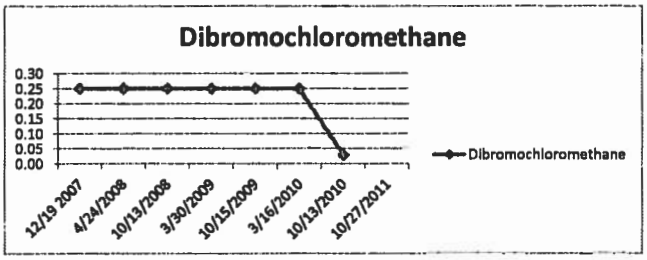
Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	0.122	0.06	U
10/27/2011	NS		

NS = Not Sampled



Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	NS		

NS = Not Sampled



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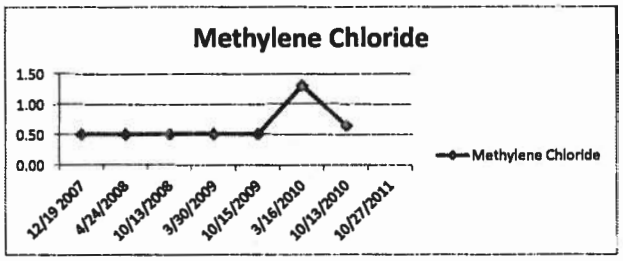
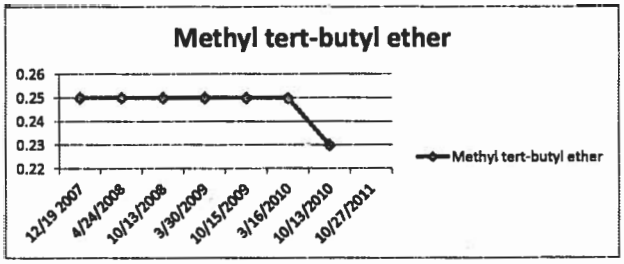
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.3	1.30	I
10/13/2010	1.27	0.64	U
10/27/2011	NS		

NS = Not Sampled



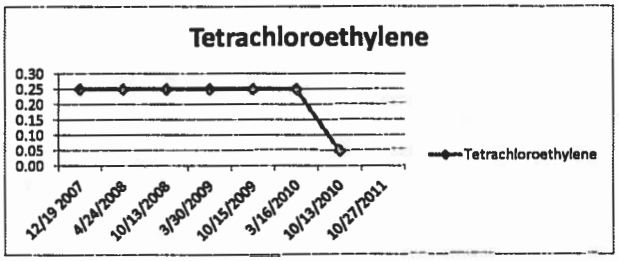
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.46	0.23	U
10/27/2011	NS		

NS = Not Sampled



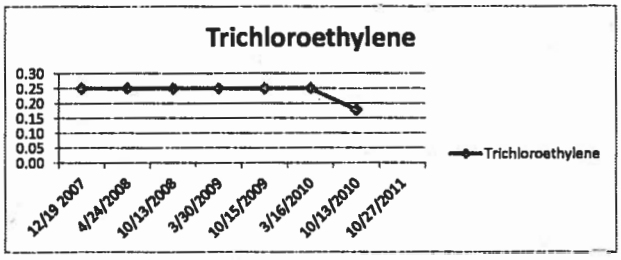
Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	NS		

NS = Not Sampled



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	NS		

NS = Not Sampled



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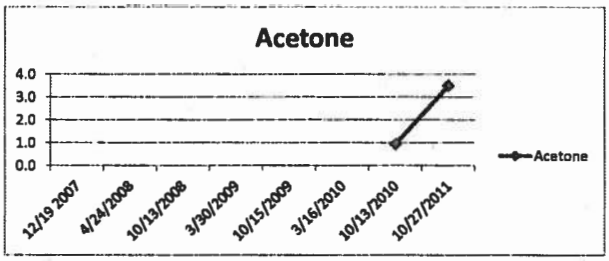
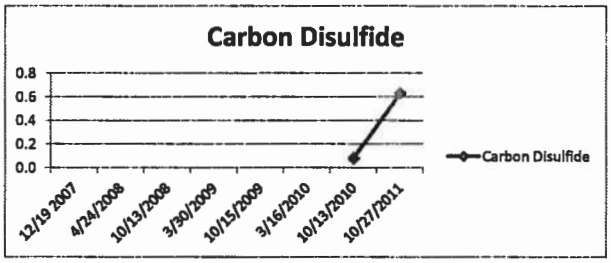
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	1.90	0.95	U
10/27/2011	7.03	3.52	U

NA = Not Analyzed



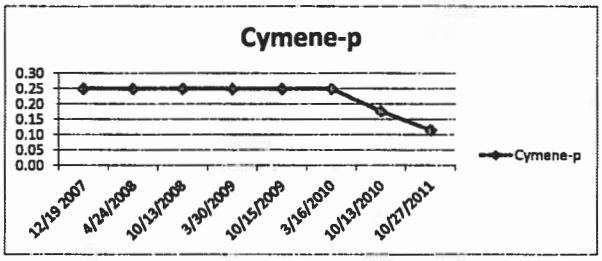
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.16	0.08	U
10/27/2011	1.26	0.63	U

NA = Not Analyzed

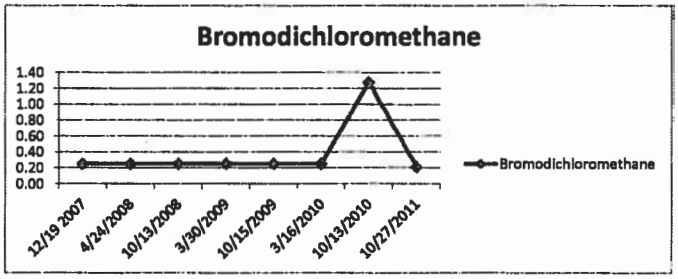


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

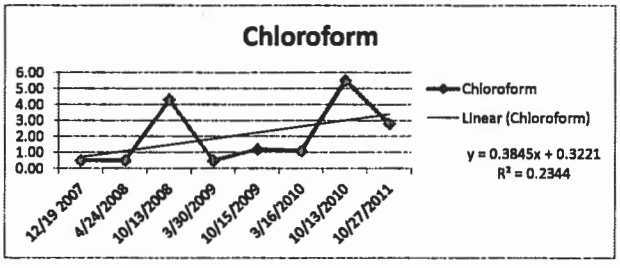
NA = Not Analyzed



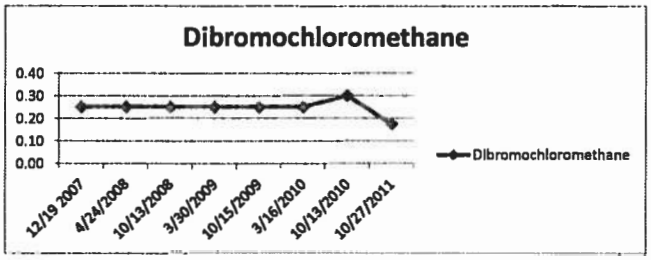
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	1.28	1.28	
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	4.3	4.30	I
3/30/2009	1.0	0.50	U
10/15/2009	1.2	1.20	I
3/16/2010	1.1	1.10	I
10/13/2010	5.52	5.52	
10/27/2011	2.80	2.80	I



Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.301	0.30	I
10/27/2011	0.350	0.18	U



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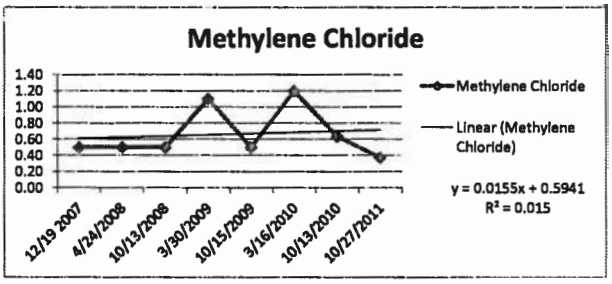
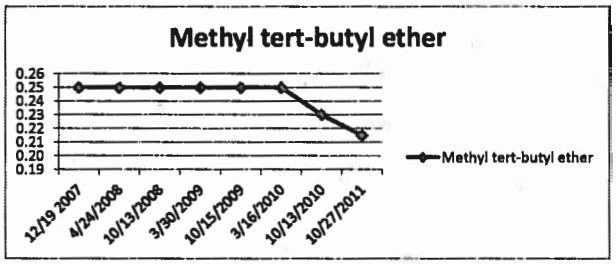
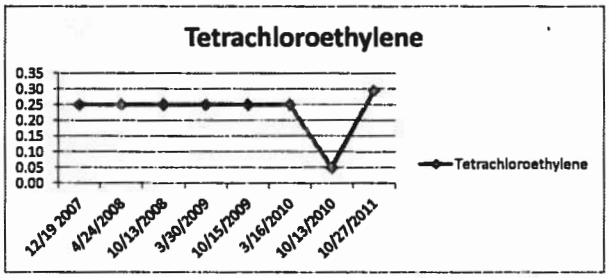
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.1	1.10	I
10/15/2009	1.0	0.50	U
3/16/2010	1.2	1.20	I
10/13/2010	1.27	0.64	U
10/27/2011	0.750	0.38	U



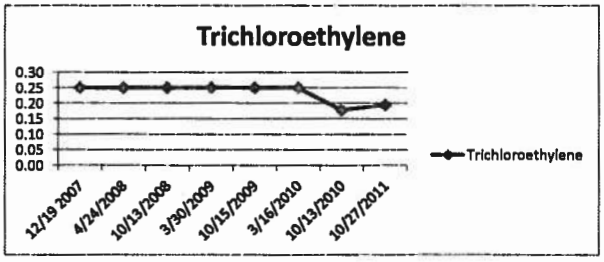
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.460	0.23	U
10/27/2011	0.430	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.30	U



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.390	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chloroform

General Statistics	
Number of Values	8
Minimum	0.5
Maximum	5.52
Mean	2.053
Geometric Mean	1.349
Median	1.15
Standard Deviation	1.946
SEM	0.688
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.089
Standard Deviation of S	7.853
Standardized Value of S	1.528
Approximate p-value	0.0632

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS06R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

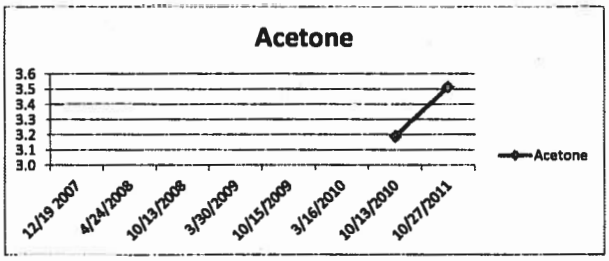
General Statistics	
Number of Values	8
Minimum	0.375
Maximum	1.2
Mean	0.664
Geometric Mean	0.612
Median	0.5
Standard Deviation	0.309
SEM	0.109
Mann-Kendall Test	
Test Value (S)	2
Tabulated p-value	0.452
Standard Deviation of S	7.528
Standardized Value of S	0.133
Approximate p-value	0.447

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS09R
OU 13
NAS Pensacola, Pensacola Florida

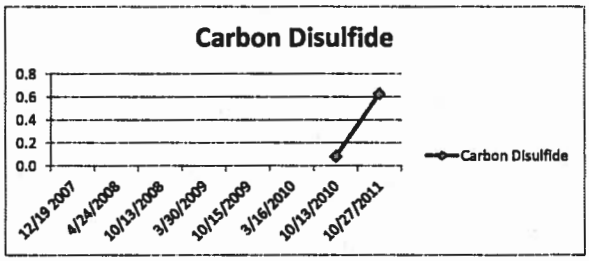
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	3.19	3.19	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed



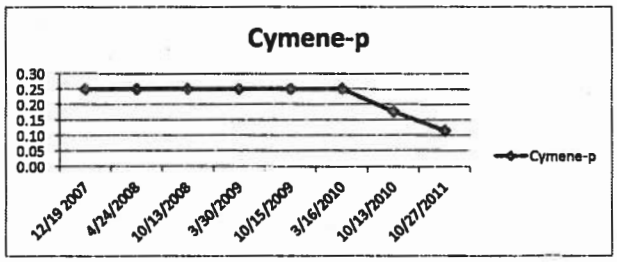
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.16	0.08	U
10/27/2011	1.26	0.63	U

NA = Not Analyzed

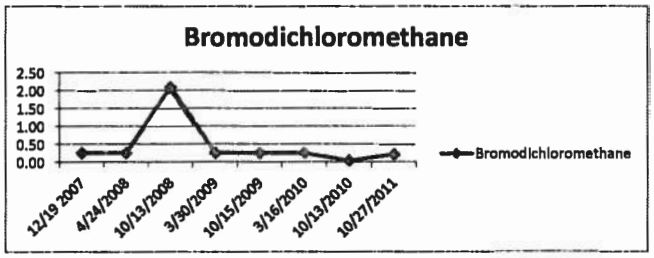


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

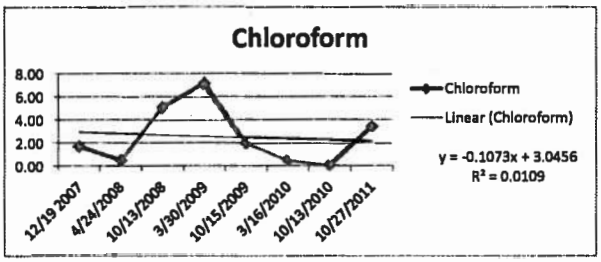
NA = Not Analyzed



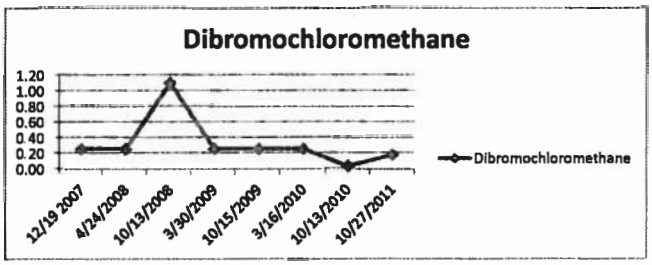
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	2.1	2.10	I
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.7	1.70	I
4/24/2008	1.0	0.50	U
10/13/2008	5.1	5.10	
3/30/2009	7.2	7.20	
10/15/2009	2.0	2.00	I
3/16/2010	1.0	0.50	U
10/13/2010	0.122	0.06	U
10/27/2011	3.44	3.44	I

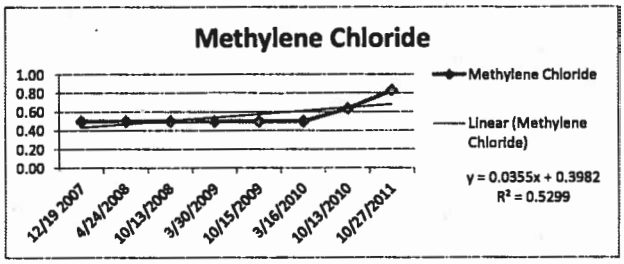


Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	1.1	1.10	I
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U

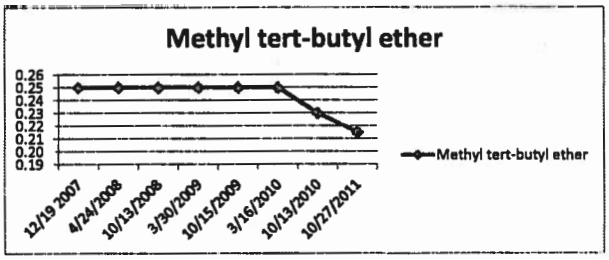


Monitoring Well 24GS09R
OU 13
NAS Pensacola, Pensacola Florida

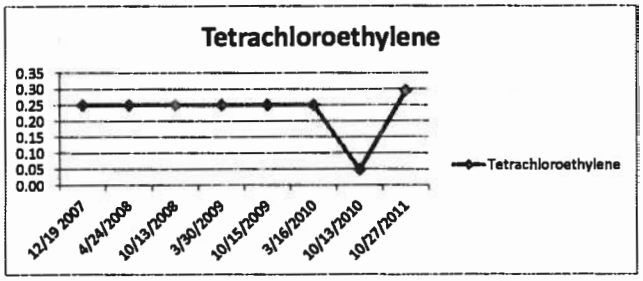
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	1.27	0.64	U
10/27/2011	0.83	0.83	IV



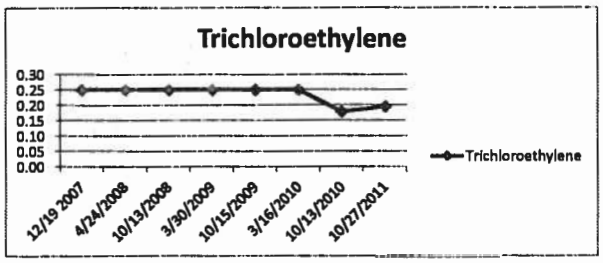
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.46	0.23	U
10/27/2011	0.43	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.30	U



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.390	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chloroform

General Statistics	
Number of Values	8
Minimum	0.061
Maximum	7.2
Mean	2.563
Geometric Mean	1.285
Median	1.85
Standard Deviation	2.522
SEM	0.892
Mann-Kendall Test	
Test Value (S)	-3
Tabulated p-value	0.452
Standard Deviation of S	8.021
Standardized Value of S	-0.249
Approximate p-value	0.402

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS09R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

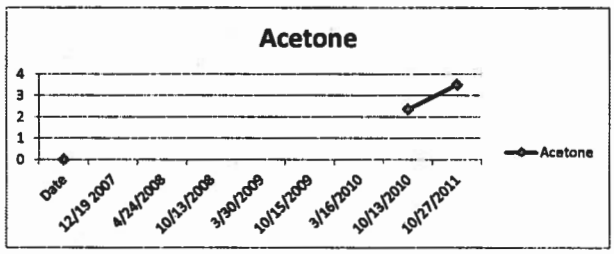
General Statistics	
Number of Values	8
Minimum	0.5
Maximum	0.83
Mean	0.558
Geometric Mean	0.549
Median	0.5
Standard Deviation	0.12
SEM	0.0423
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.089
Standard Deviation of S	6.083
Standardized Value of S	1.973
Approximate p-value	0.0243

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS10R
OU 13
NAS Pensacola, Pensacola Florida

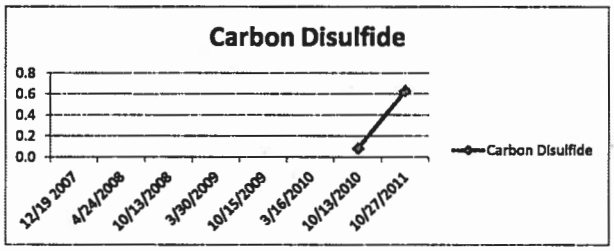
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	2.36	2.36	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed



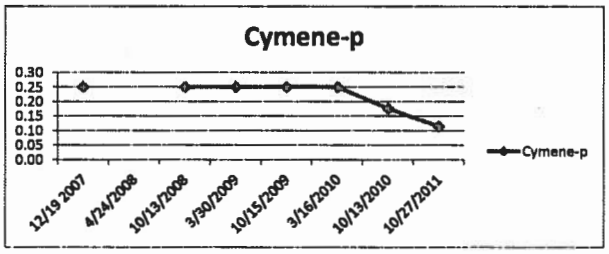
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.16	0.08	U
10/27/2011	1.26	0.63	U

NA = Not Analyzed

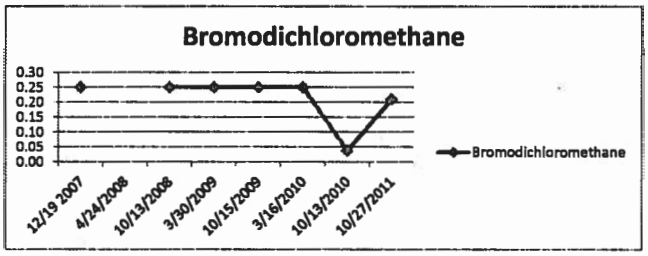


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	NA		
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

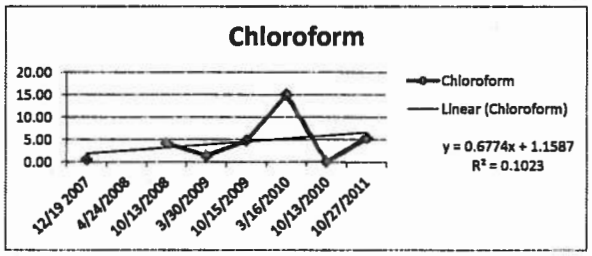
NA = Not Analyzed



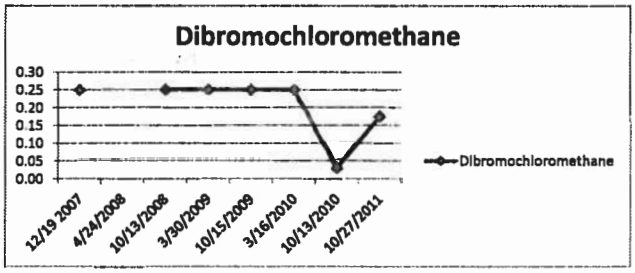
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	NA		
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	NA		
10/13/2008	4.2	4.20	I
3/30/2009	1.4	1.40	I
10/15/2009	4.7	4.70	I
3/16/2010	15	15.00	
10/13/2010	0.122	0.06	U
10/27/2011	5.28	5.28	

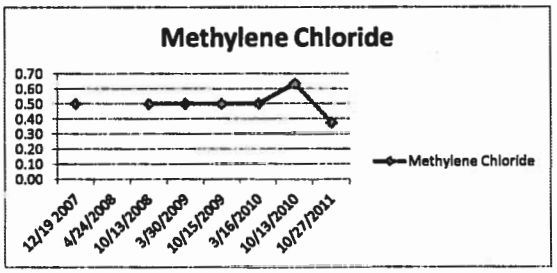


Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	NA		
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U

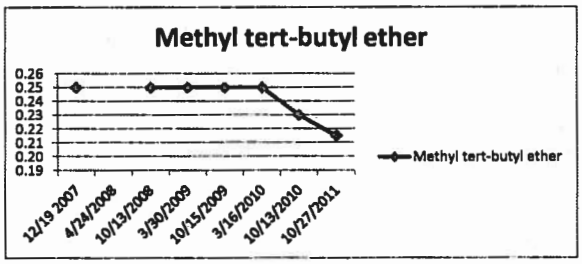


Monitoring Well 24GS10R
OU 13
NAS Pensacola, Pensacola Florida

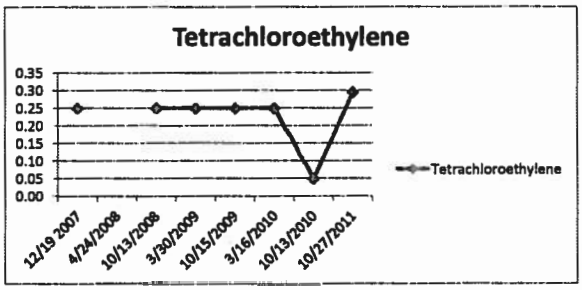
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	NA		
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	1.27	0.64	U
10/27/2011	0.750	0.38	U



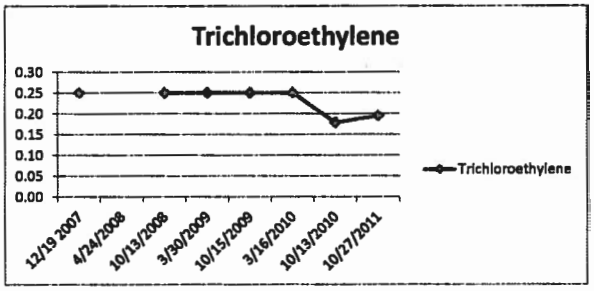
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	NA		
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.46	0.23	U
10/27/2011	0.43	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	NA		
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.30	U



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	NA		
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.39	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Chloroform

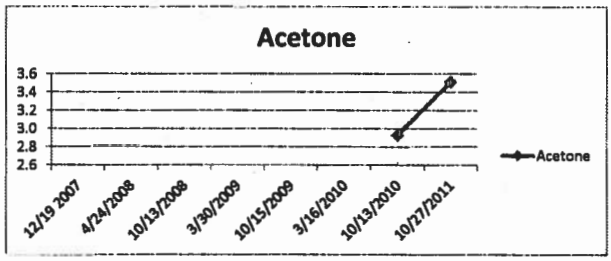
General Statistics	
Number of Values	7
Minimum	0.061
Maximum	15
Mean	4.449
Geometric Mean	1.822
Median	4.2
Standard Deviation	5.104
SEM	1.929
Mann-Kendall Test	
Test Value (S)	7
Tabulated p-value	0.191
Standard Deviation of S	6.658
Standardized Value of S	0.901
Approximate p-value	0.184

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS11
OU 13
NAS Pensacola, Pensacola Florida

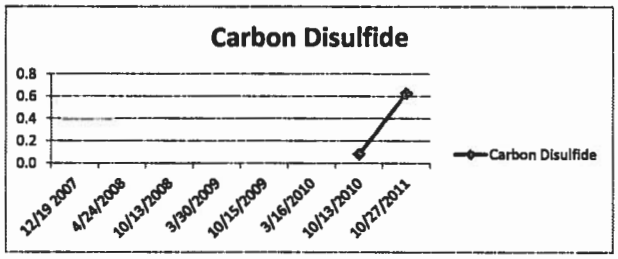
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	2.93	2.93	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed



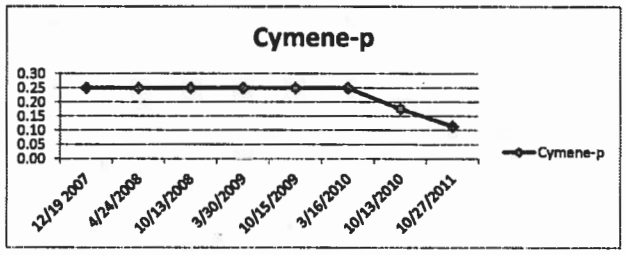
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.16	0.08	U
10/27/2011	1.26	0.63	U

NA = Not Analyzed

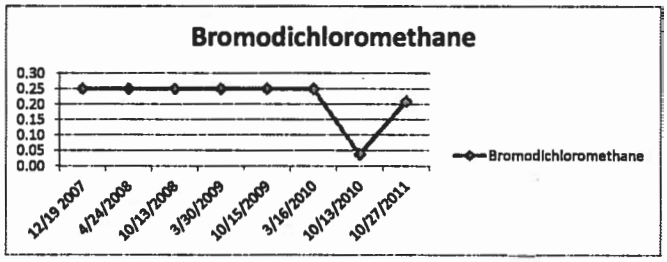


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

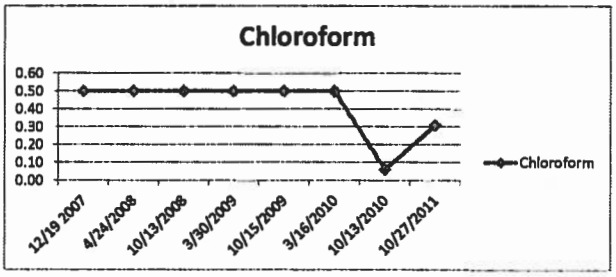
NA = Not Analyzed



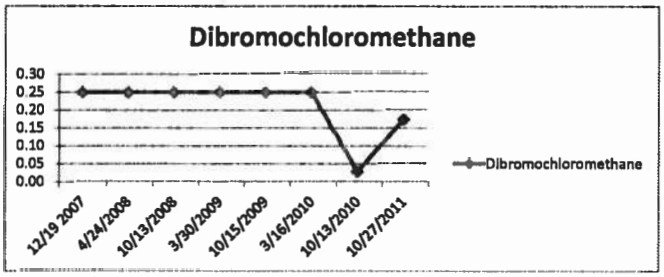
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	0.122	0.06	U
10/27/2011	0.62	0.31	U



Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U



Monitoring Well 24GS11
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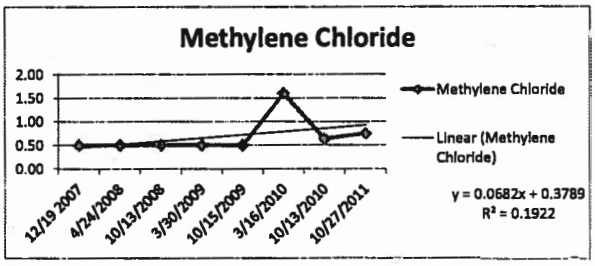
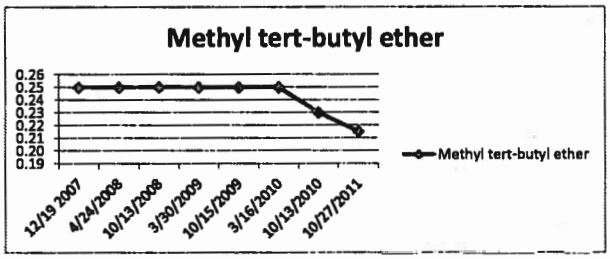
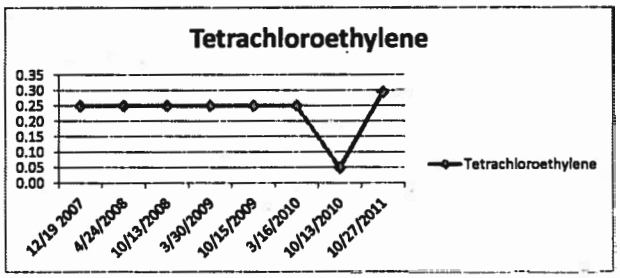
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.6	1.60	I
10/13/2010	1.27	0.64	U
10/27/2011	0.75	0.75	IV



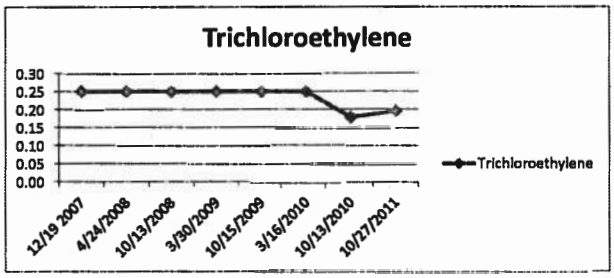
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.46	0.23	U
10/27/2011	0.43	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.30	U



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.390	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

General Statistics	
Number of Values	8
Minimum	0.5
Maximum	1.6
Mean	0.686
Geometric Mean	0.627
Median	0.5
Standard Deviation	0.381
SEM	0.135
Mann-Kendall Test	
Test Value (S)	14
Tabulated p-value	0.054
Standard Deviation of S	6.976
Standardized Value of S	1.863
Approximate p-value	0.0312

Insufficient evidence to identify a significant trend at the specified level of significance.

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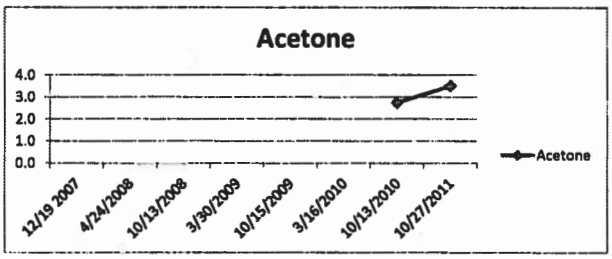
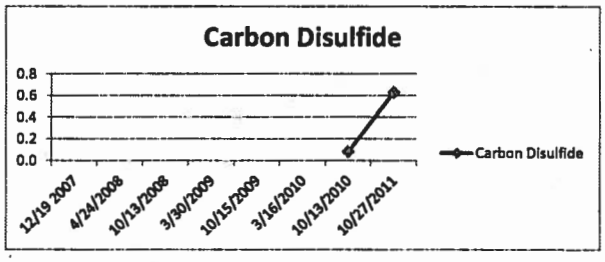
Acetone Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	2.75	2.75	I
10/27/2011	7.03	3.52	U

NA = Not Analyzed



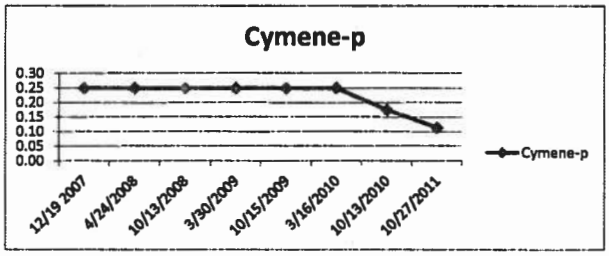
Carbon Disulfide Date	Validated Result	Censored Result	Qual
12/19 2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	NA		
10/13/2010	0.18	0.08	U
10/27/2011	1.28	0.63	U

NA = Not Analyzed

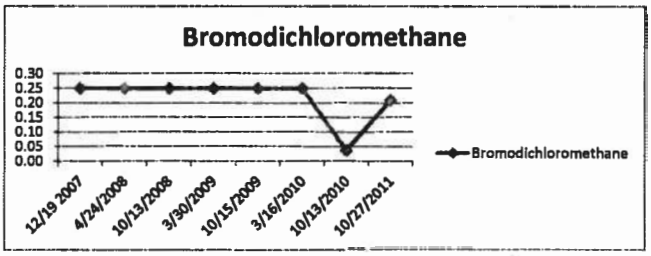


Cymene-p Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.353	0.18	U
10/27/2011	0.230	0.12	U

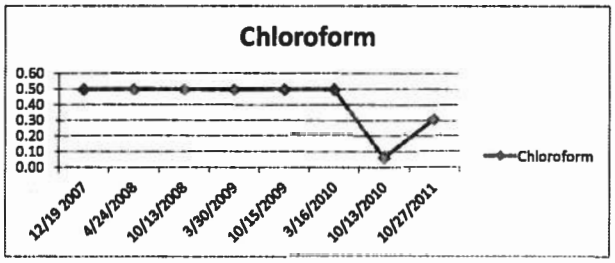
NA = Not Analyzed



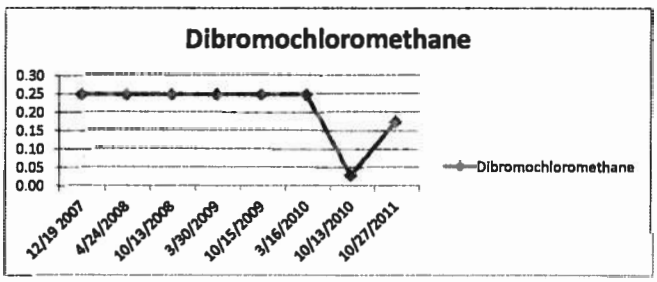
Bromodichloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.076	0.04	U
10/27/2011	0.420	0.21	U



Chloroform Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	0.122	0.06	U
10/27/2011	0.620	0.31	U



Dibromochloromethane Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.059	0.03	U
10/27/2011	0.350	0.18	U



Monitoring Well 24GS15
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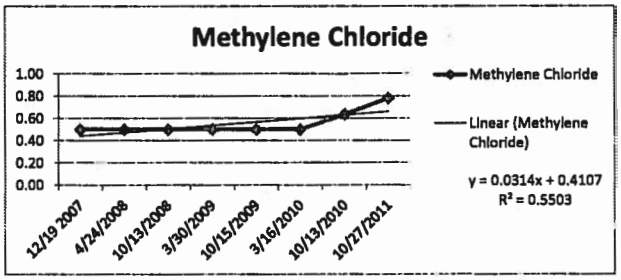
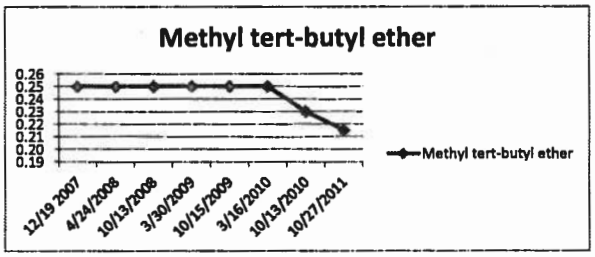
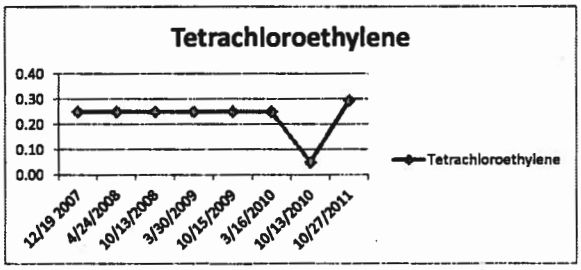
Methylene Chloride Date	Validated Result	Censored Result	Qual
12/19 2007	1.0	0.50	U
4/24/2008	1.0	0.50	U
10/13/2008	1.0	0.50	U
3/30/2009	1.0	0.50	U
10/15/2009	1.0	0.50	U
3/16/2010	1.0	0.50	U
10/13/2010	1.27	0.64	U
10/27/2011	0.78	0.78	IV



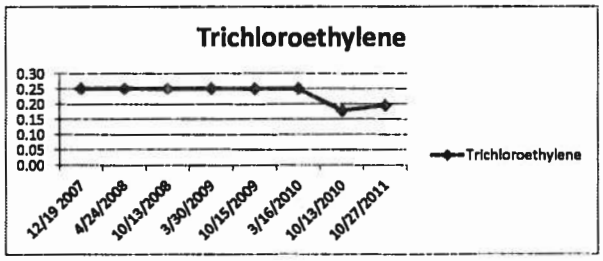
Methyl tert-butyl ether Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.46	0.23	U
10/27/2011	0.43	0.22	U



Tetrachloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.098	0.05	U
10/27/2011	0.590	0.30	U



Trichloroethylene Date	Validated Result	Censored Result	Qual
12/19 2007	0.5	0.25	U
4/24/2008	0.5	0.25	U
10/13/2008	0.5	0.25	U
3/30/2009	0.5	0.25	U
10/15/2009	0.5	0.25	U
3/16/2010	0.5	0.25	U
10/13/2010	0.357	0.18	U
10/27/2011	0.390	0.20	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Methylene Chloride

General Statistics	
Number of Values	8
Minimum	0.5
Maximum	0.78
Mean	0 552
Geometric Mean	0.545
Median	0.5
Standard Deviation	0.104
SEM	0.0366
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.089
Standard Deviation of S	8.083
Standardized Value of S	1.973
Approximate p-value	0.0243

Insufficient evidence to identify a significant trend at the specified level of significance.

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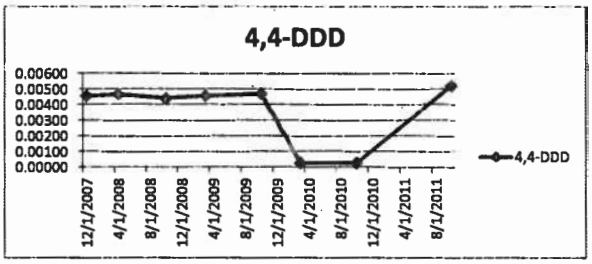
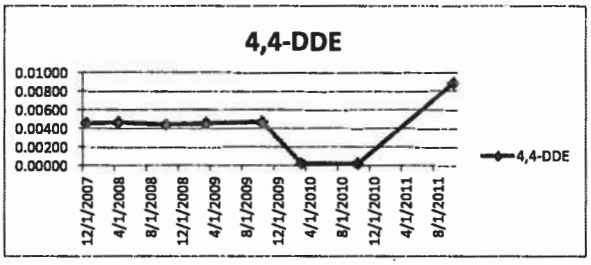
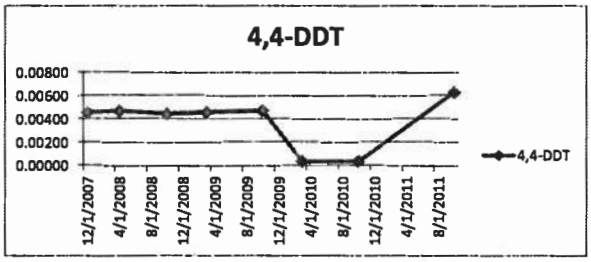
4,4-DDD Date	Validated Result	Censored Result Qual
12/19/2007	0.0091	0.00455 U
4/24/2008	0.0093	0.00465 U
10/13/2008	0.0088	0.00440 U
3/30/2009	0.0091	0.00455 U
10/15/2009	0.0094	0.00470 U
3/16/2010	0.0005	0.00025 U
10/13/2010	0.0005	0.00025 U
10/27/2011	0.0104	0.00520 U



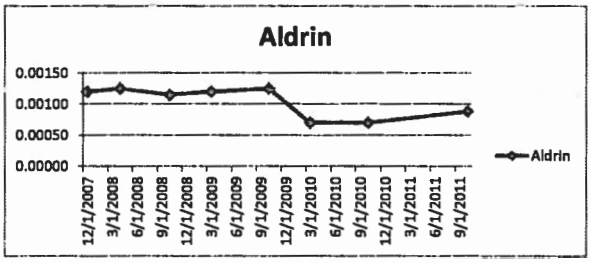
4,4-DDE Date	Validated Result	Censored Result Qual
12/19/2007	0.0091	0.00455 U
4/24/2008	0.0093	0.00465 U
10/13/2008	0.0088	0.00440 U
3/30/2009	0.0091	0.00455 U
10/15/2009	0.0094	0.00470 U
3/16/2010	0.0004	0.00020 U
10/13/2010	0.0004	0.00020 U
10/27/2011	0.0177	0.00885 U



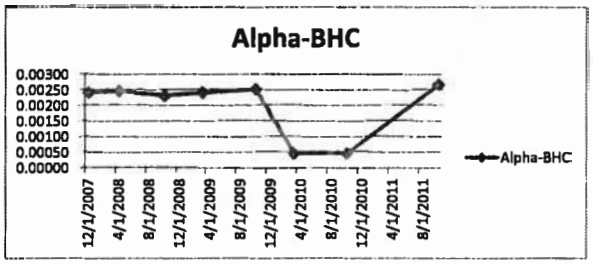
4,4-DDT Date	Validated Result	Censored Result Qual
12/19/2007	0.0091	0.00455 U
4/24/2008	0.0093	0.00465 U
10/13/2008	0.0088	0.00440 U
3/30/2009	0.0091	0.00455 U
10/15/2009	0.0094	0.00470 U
3/16/2010	0.0006	0.00030 U
10/13/2010	0.0006	0.00030 U
10/27/2011	0.0125	0.00825 U



Aldrin Date	Validated Result	Censored Result Qual
12/19/2007	0.0024	0.00120 U
4/24/2008	0.0025	0.00125 U
10/13/2008	0.0023	0.00115 U
3/30/2009	0.0024	0.00120 U
10/15/2009	0.0025	0.00125 U
3/16/2010	0.0014	0.00070 U
10/13/2010	0.0014	0.00070 U
10/27/2011	0.00177	0.00089 U

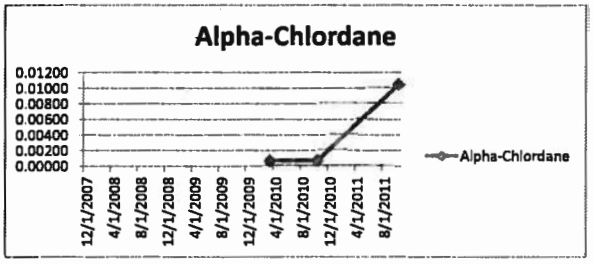


Alpha-BHC Date	Validated Result	Censored Result Qual
12/19/2007	0.0048	0.00240 U
4/24/2008	0.0049	0.00245 U
10/13/2008	0.0046	0.00230 U
3/30/2009	0.0048	0.00240 U
10/15/2009	0.0050	0.00250 U
3/16/2010	0.0009	0.00045 U
10/13/2010	0.0009	0.00045 U
10/27/2011	0.00531	0.00266 U



Alpha-Chlordane Date	Validated Result	Censored Result Qual
12/19/2007	NA	
4/24/2008	NA	
10/13/2008	NA	
3/30/2009	NA	
10/15/2009	NA	
3/16/2010	0.0012	0.00060 U
10/13/2010	0.0012	0.00060 U
10/27/2011	0.0208	0.01040 U

NA = Not Analyzed



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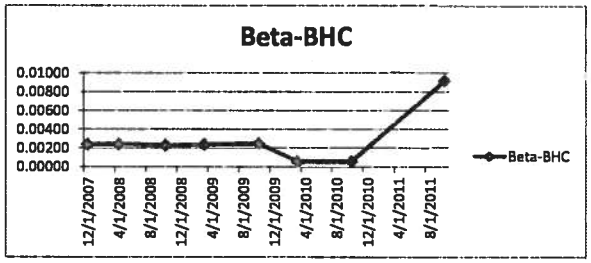
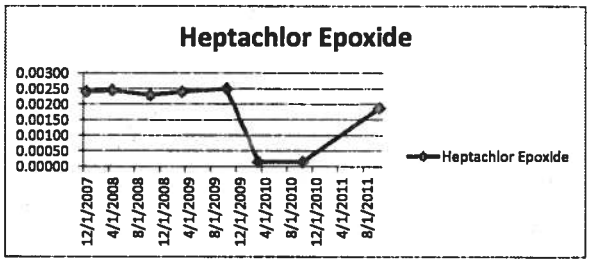
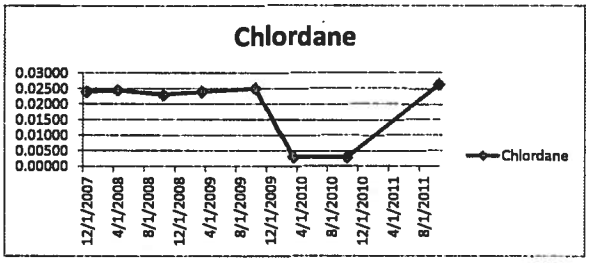
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0046	0.00230	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0050	0.00250	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0184	0.00920	U



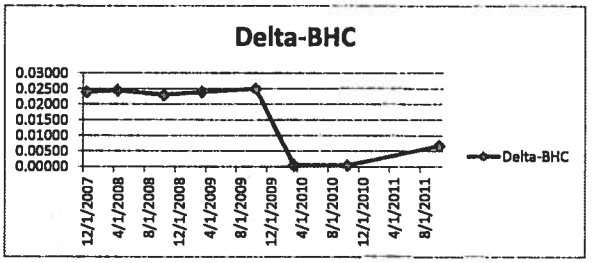
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0048	0.00230	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0050	0.00250	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00375	0.00188	U



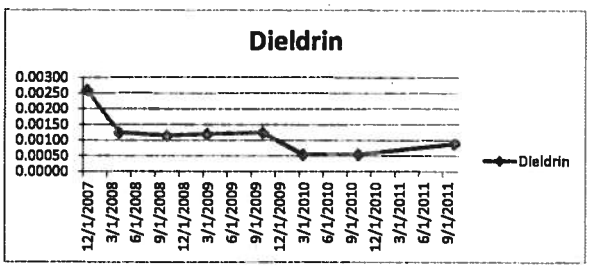
Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0531	0.02655	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0135	0.00675	U



Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0026	0.00260	I
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00177	0.00089	U



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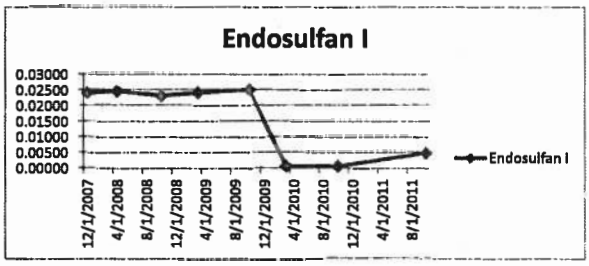
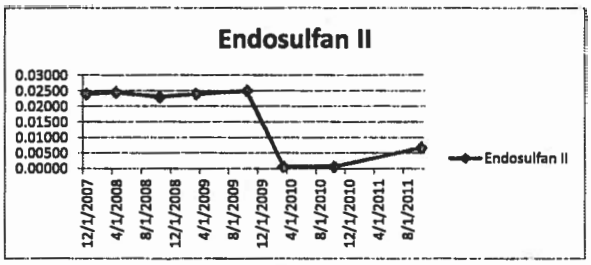
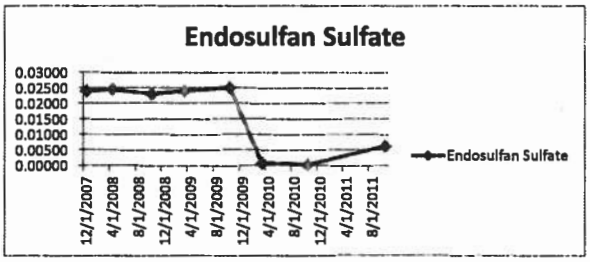
Endosulfan I Date	Validated Result	Censored Result Qual
12/19/2007	0.048	0.02400 U
4/24/2008	0.049	0.02450 U
10/13/2008	0.046	0.02300 U
3/30/2009	0.048	0.02400 U
10/15/2009	0.050	0.02500 U
3/16/2010	0.001	0.00050 U
10/13/2010	0.001	0.00050 U
10/27/2011	0.00938	0.00469 U



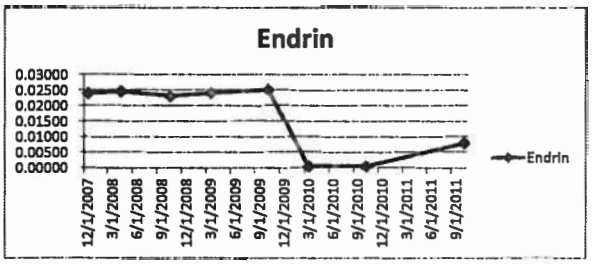
Endosulfan II Date	Validated Result	Censored Result Qual
12/19/2007	0.048	0.02400 U
4/24/2008	0.049	0.02450 U
10/13/2008	0.046	0.02300 U
3/30/2009	0.048	0.02400 U
10/15/2009	0.050	0.02500 U
3/16/2010	0.0013	0.00065 U
10/13/2010	0.0013	0.00065 U
10/27/2011	0.0135	0.00875 U



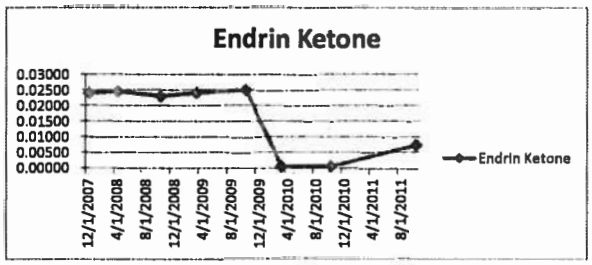
Endosulfan Sulfate Date	Validated Result	Censored Result Qual
12/19/2007	0.048	0.02400 U
4/24/2008	0.049	0.02450 U
10/13/2008	0.046	0.02300 U
3/30/2009	0.048	0.02400 U
10/15/2009	0.050	0.02500 U
3/16/2010	0.0013	0.00065 U
10/13/2010	0.0003	0.00015 U
10/27/2011	0.0125	0.00625 U



Endrin Date	Validated Result	Censored Result Qual
12/19/2007	0.048	0.02400 U
4/24/2008	0.049	0.02450 U
10/13/2008	0.046	0.02300 U
3/30/2009	0.048	0.02400 U
10/15/2009	0.050	0.02500 U
3/16/2010	0.0007	0.00035 U
10/13/2010	0.0007	0.00035 U
10/27/2011	0.0156	0.00780 U



Endrin Ketone Date	Validated Result	Censored Result Qual
12/19/2007	0.048	0.02400 U
4/24/2008	0.049	0.02450 U
10/13/2008	0.046	0.02300 U
3/30/2009	0.048	0.02400 U
10/15/2009	0.050	0.02500 U
3/16/2010	0.001	0.00050 U
10/13/2010	0.001	0.00050 U
10/27/2011	0.0146	0.00730 U



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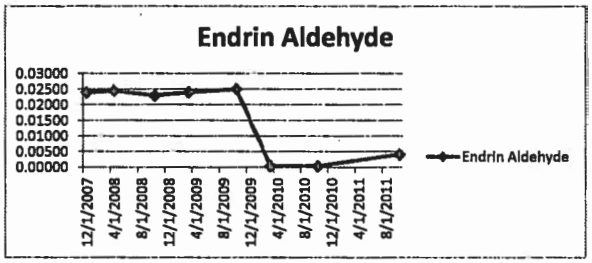
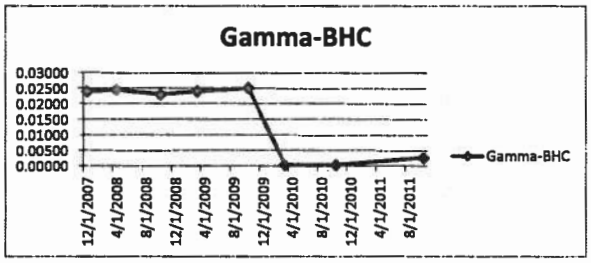
Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00833	0.00417	U

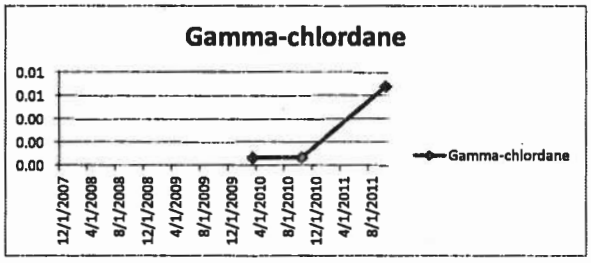


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00521	0.00261	U

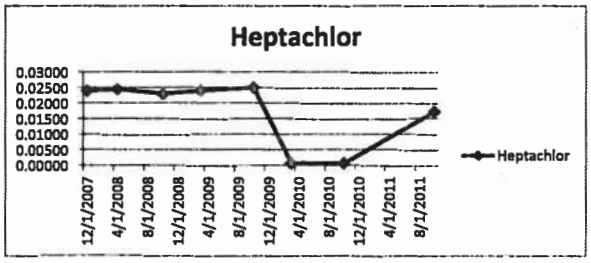


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0135	0.00675	U

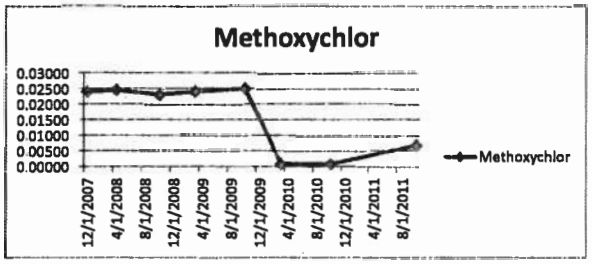
NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0344	0.01720	U



Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0135	0.00675	U



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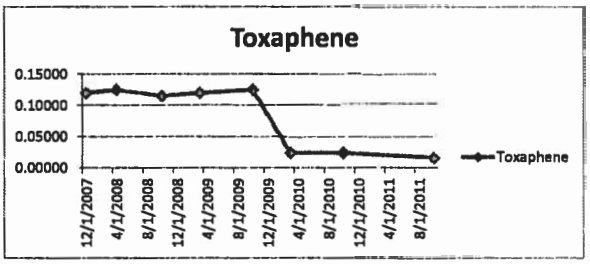
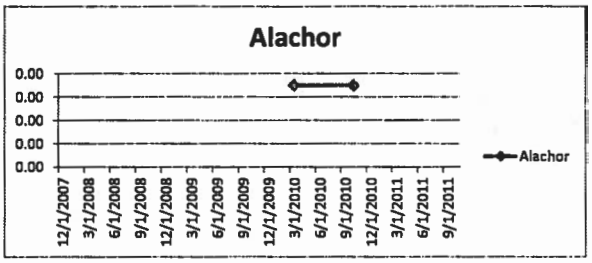
Toxaphene Date	Validated Result	Censored Result Qual
12/19/2007	0.24	0.12000 U
4/24/2008	0.25	0.12500 U
10/13/2008	0.23	0.11500 U
3/30/2009	0.24	0.12000 U
10/15/2009	0.25	0.12500 U
3/16/2010	0.0471	0.02355 U
10/13/2010	0.0471	0.02355 U
10/27/2011	0.0313	0.01565 U



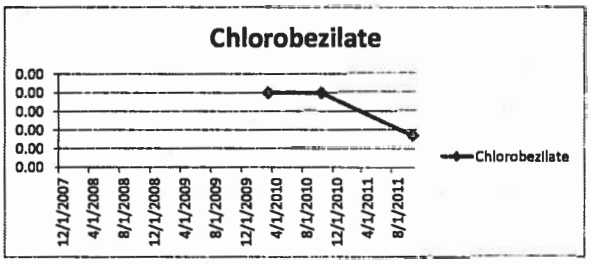
Alachor Date	Validated Result	Censored Result Qual
12/19/2007	NA	
4/24/2008	NA	
10/13/2008	NA	
3/30/2009	NA	
10/15/2009	NA	
3/16/2010	0.0014	0.00070 U
10/13/2010	0.0014	0.00070 U
10/27/2011	NA	

NA = Not Analyzed



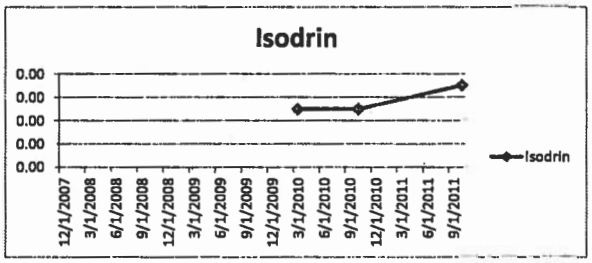
Chlorobezilate Date	Validated Result	Censored Result Qual
12/19/2007	NA	
4/24/2008	NA	
10/13/2008	NA	
3/30/2009	NA	
10/15/2009	NA	
3/16/2010	0.002	0.00100 U
10/13/2010	0.002	0.00100 U
10/27/2011	0.00177	0.00089 U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result Qual
12/19/2007	NA	
4/24/2008	NA	
10/13/2008	NA	
3/30/2009	NA	
10/15/2009	NA	
3/16/2010	0.001	0.00050 U
10/13/2010	0.001	0.00050 U
10/27/2011	0.00141	0.00071 U

NA = Not Analyzed



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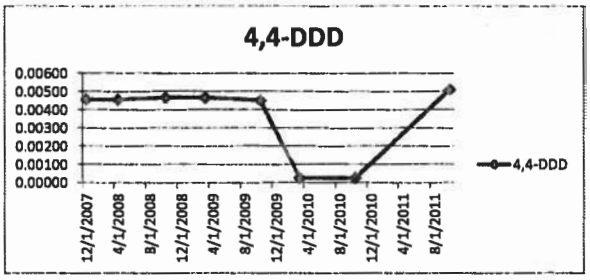
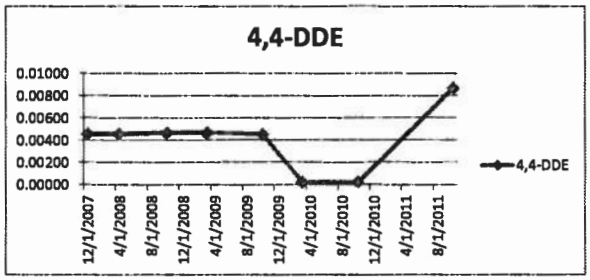
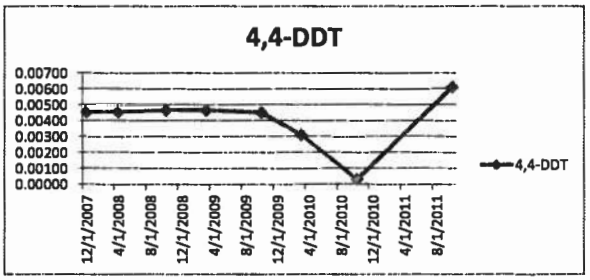
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0091	0.00455	U
10/13/2008	0.0093	0.00465	U
3/30/2009	0.0093	0.00465	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0102	0.00510	U



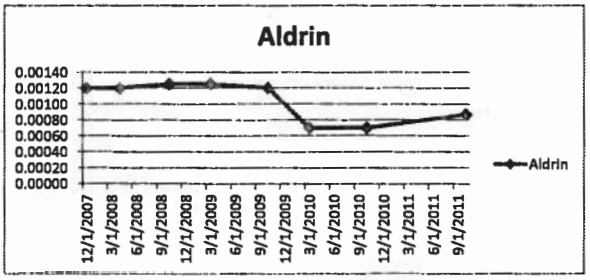
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0091	0.00455	U
10/13/2008	0.0093	0.00465	U
3/30/2009	0.0093	0.00465	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0173	0.00865	U



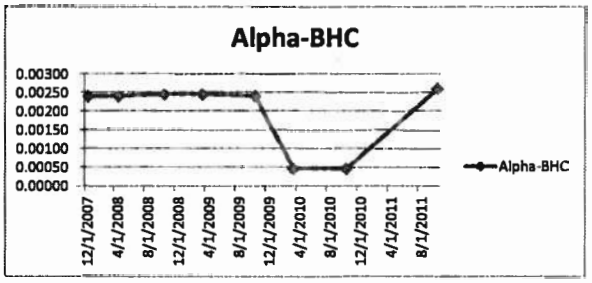
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0091	0.00455	U
10/13/2008	0.0093	0.00465	U
3/30/2009	0.0093	0.00465	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0031	0.00310	I
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0122	0.00610	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0025	0.00125	U
3/30/2009	0.0025	0.00125	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00173	0.00087	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0048	0.00240	U
10/13/2008	0.0049	0.00245	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.00518	0.00259	U



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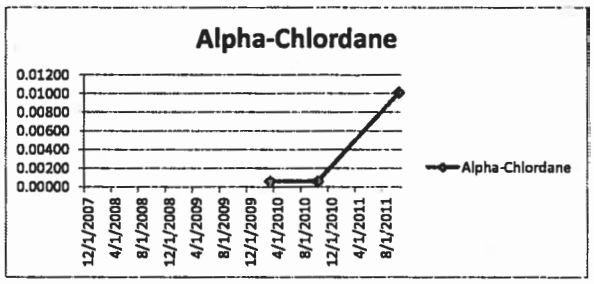
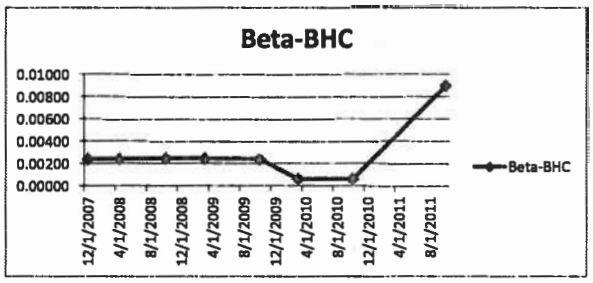
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0203	0.01015	U

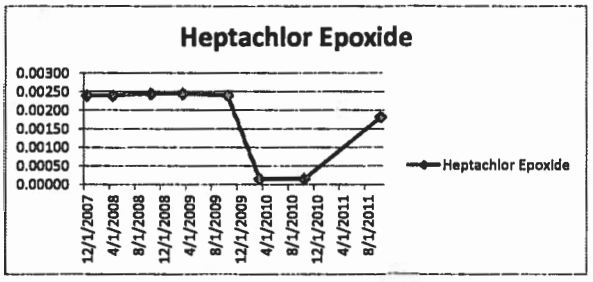
NA = Not Analyzed



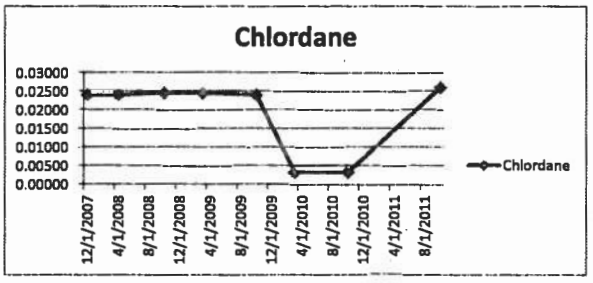
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0048	0.00240	U
10/13/2008	0.0049	0.00245	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0180	0.00900	U



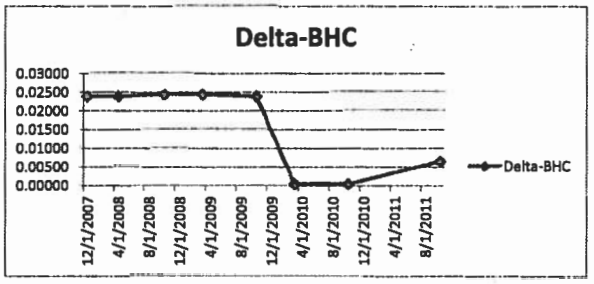
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0048	0.00240	U
10/13/2008	0.0049	0.00245	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00365	0.00183	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0518	0.02590	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0132	0.00660	U



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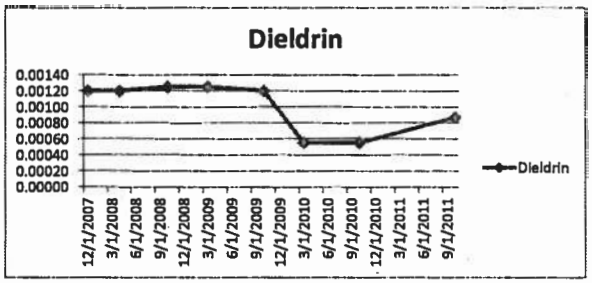
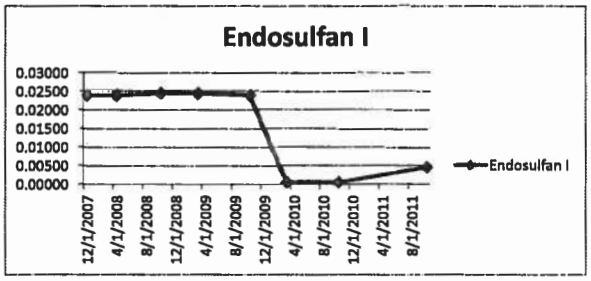
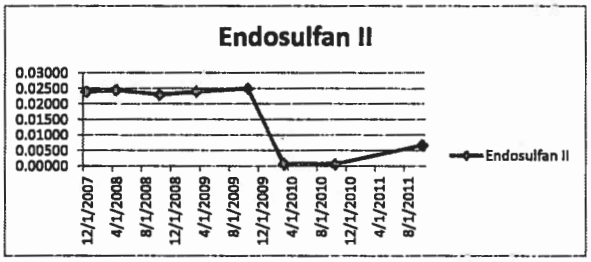
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0025	0.00125	U
3/30/2009	0.0025	0.00125	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00173	0.00087	U



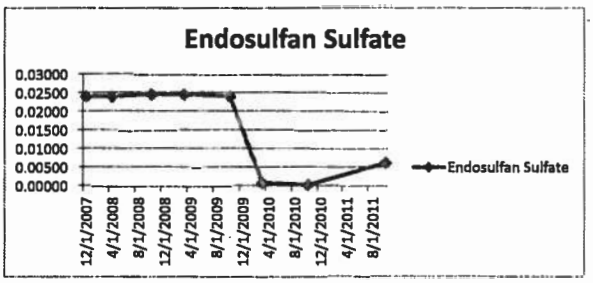
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00914	0.00457	U



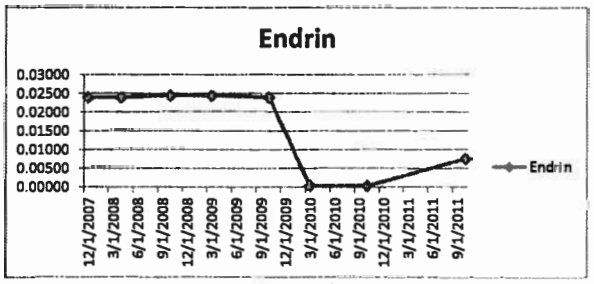
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0135	0.00675	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0122	0.00610	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0152	0.00760	U



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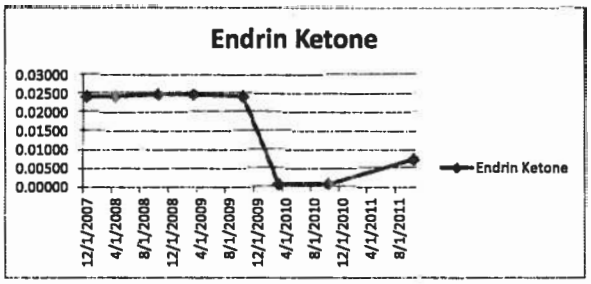
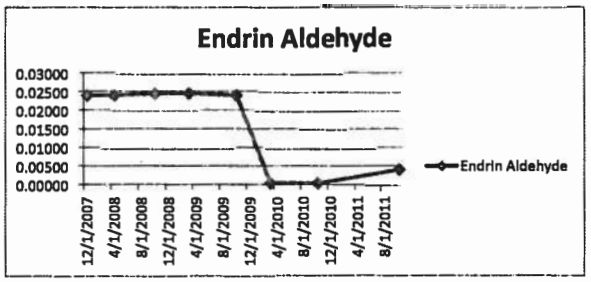
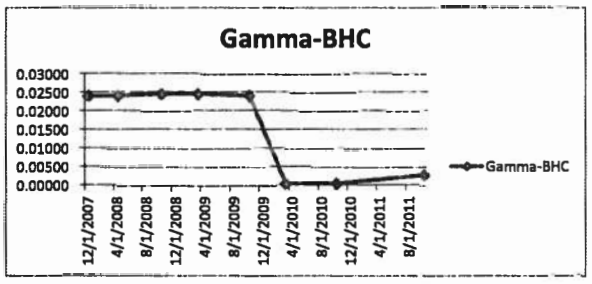
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0142	0.00710	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00812	0.00406	U

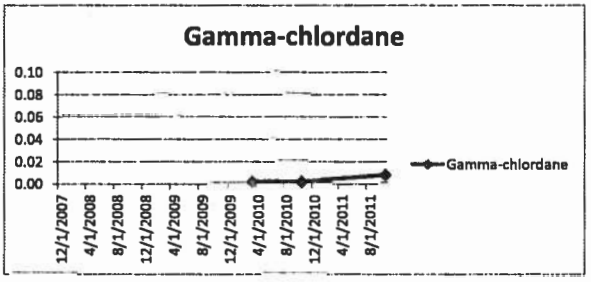


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00508	0.00254	U

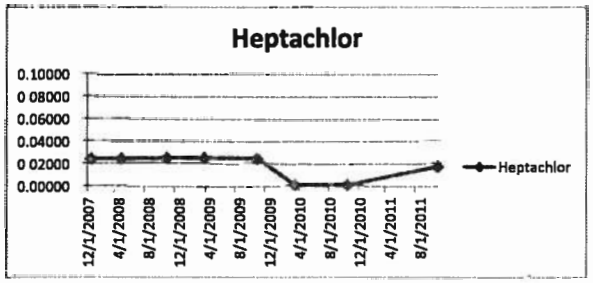


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0 00065	U
10/27/2011	0.0132	0 00660	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0 02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0335	0 01675	U



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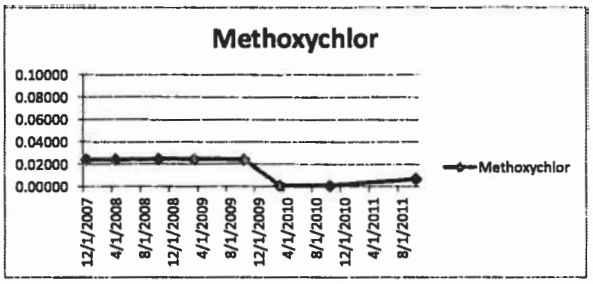
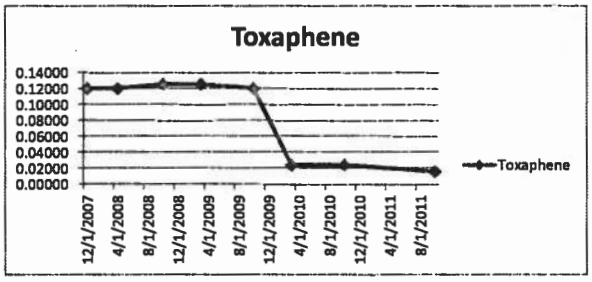
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0132	0.00660	U

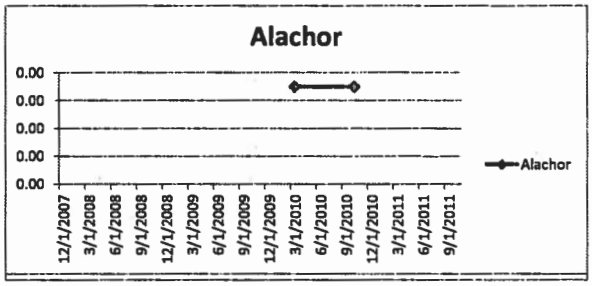


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.24	0.12000	U
4/24/2008	0.24	0.12000	U
10/13/2008	0.25	0.12500	U
3/30/2009	0.25	0.12500	U
10/15/2009	0.24	0.12000	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	0.0305	0.01525	U



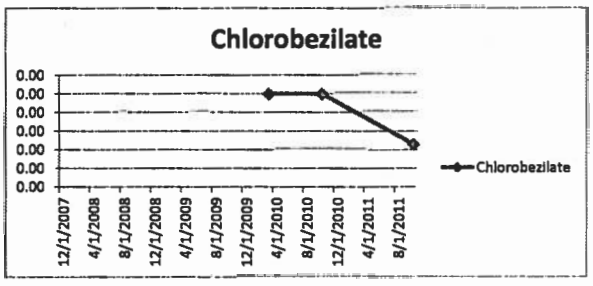
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



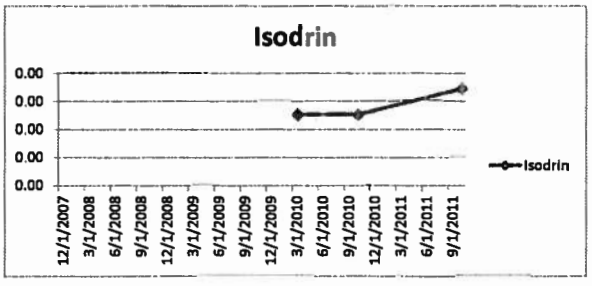
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0.00173	0.00087	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00137	0.00069	U

NA = Not Analyzed



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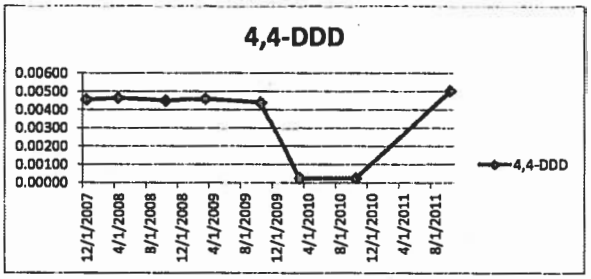
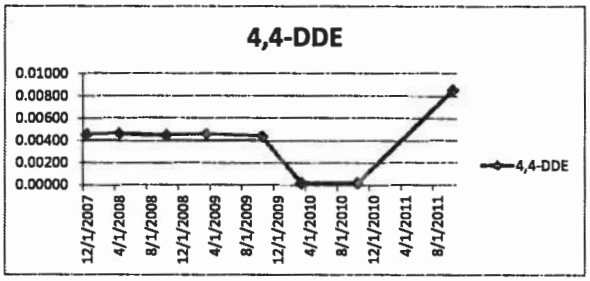
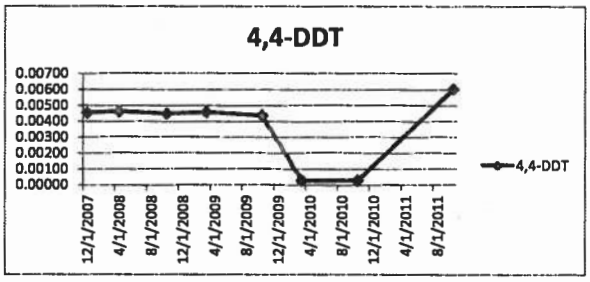
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0088	0.00440	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0101	0.00505	U



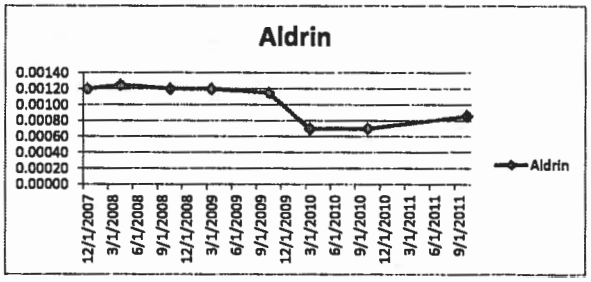
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0088	0.00440	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0172	0.00860	U



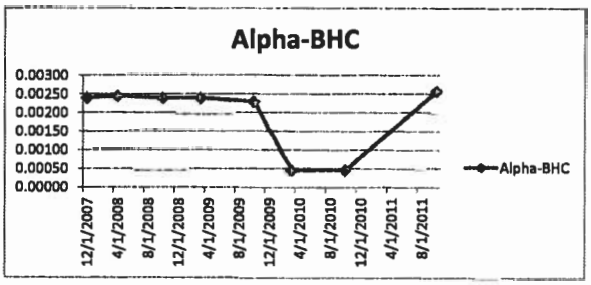
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0088	0.00440	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0121	0.00605	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0023	0.00115	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00172	0.00086	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0048	0.00240	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0046	0.00230	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.00515	0.00258	U



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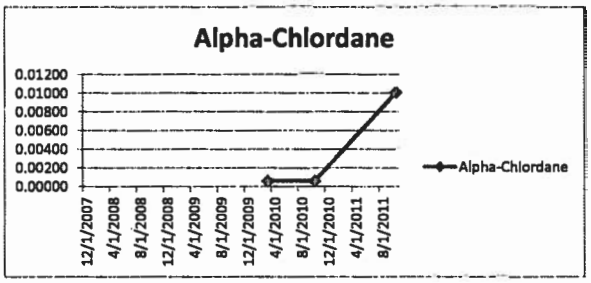
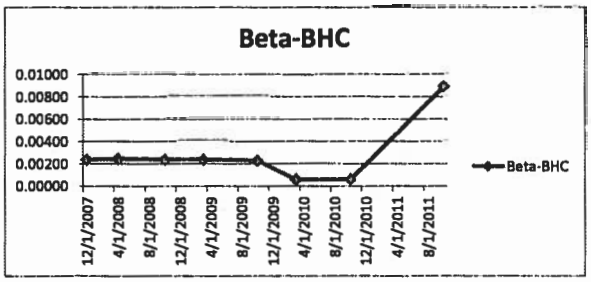
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0202	0.01010	U

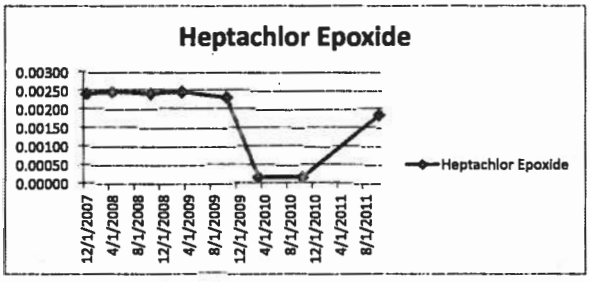
NA = Not Analyzed



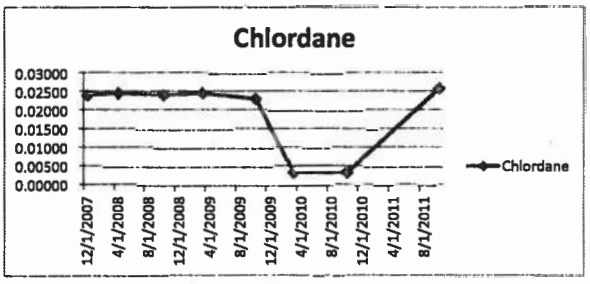
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0048	0.00240	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0046	0.00230	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0179	0.00895	U



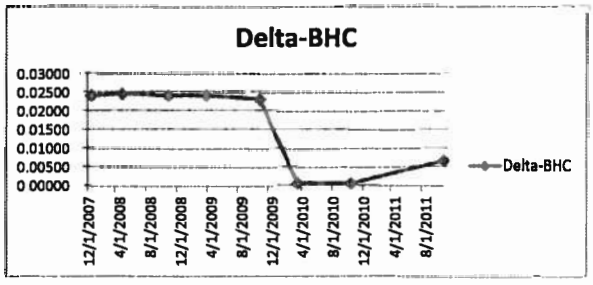
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0048	0.00240	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0046	0.00230	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00364	0.00182	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.046	0.02300	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0515	0.02575	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0 048	0 02400	U
10/15/2009	0 046	0.02300	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0 0009	0.00045	U
10/27/2011	0.0131	0 00655	U



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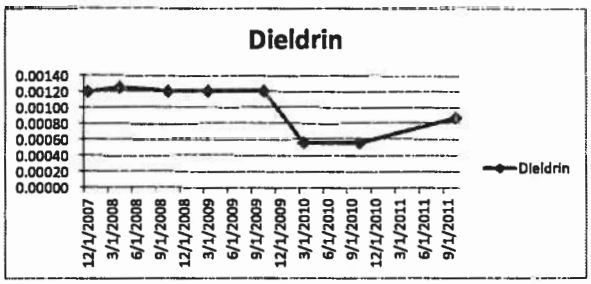
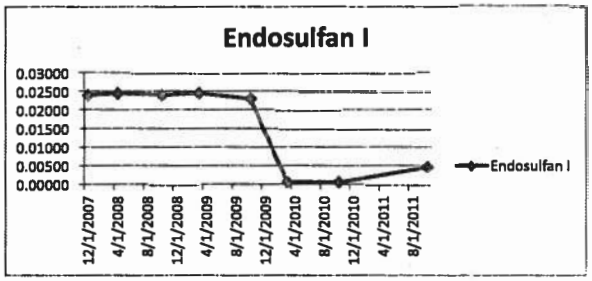
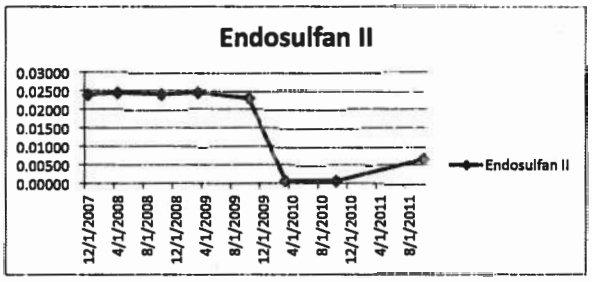
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00172	0.00086	U



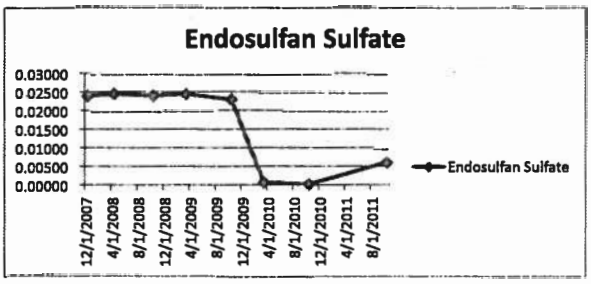
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.046	0.02300	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00909	0.00455	U



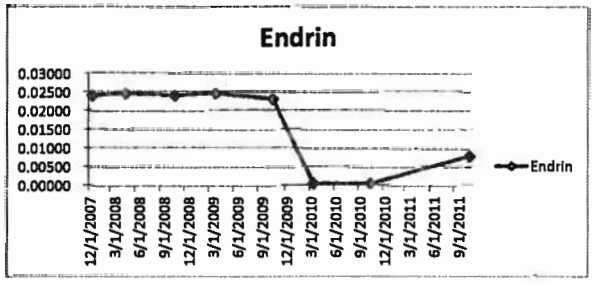
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.046	0.02300	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0131	0.00655	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.046	0.02300	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0121	0.00605	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.046	0.02300	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0152	0.00760	U



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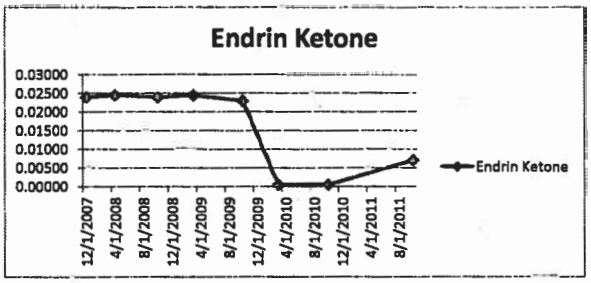
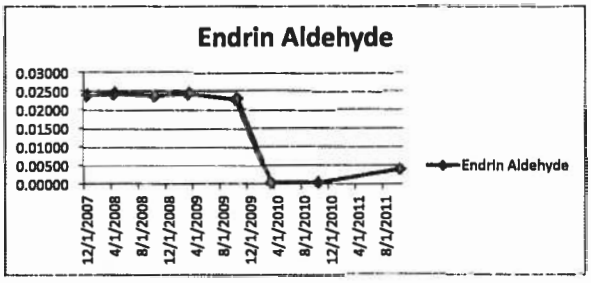
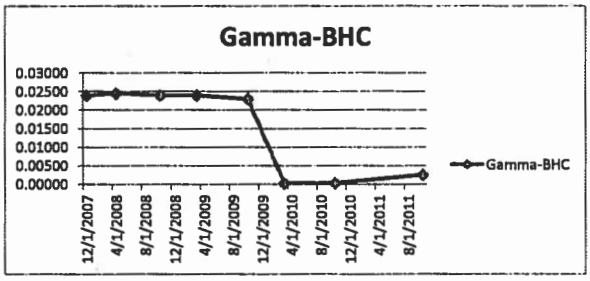
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.046	0.02300	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0141	0.00705	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02300	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00808	0.00404	U

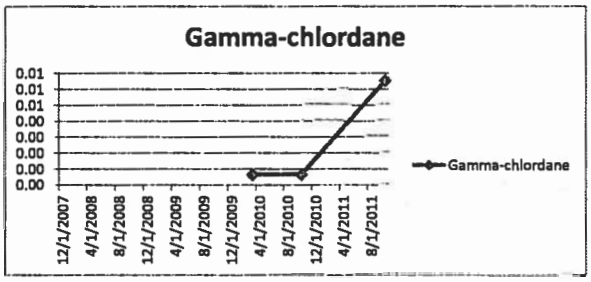


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.046	0.02300	U
3/16/2010	0.0008	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00505	0.00253	U

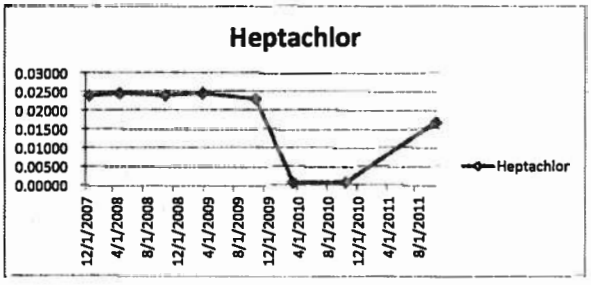


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0131	0.00655	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.046	0.02300	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0333	0.01665	U



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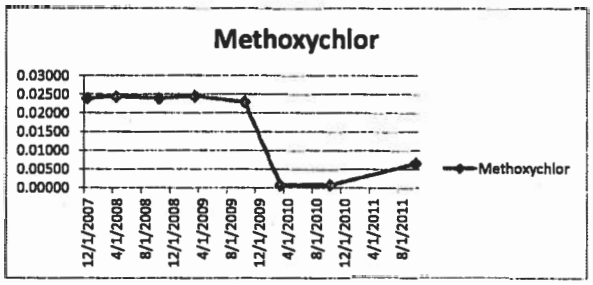
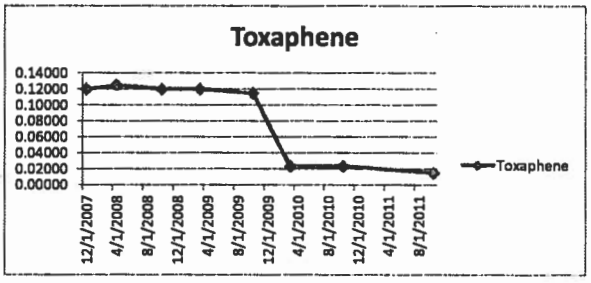
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.046	0.02300	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0131	0.00655	U

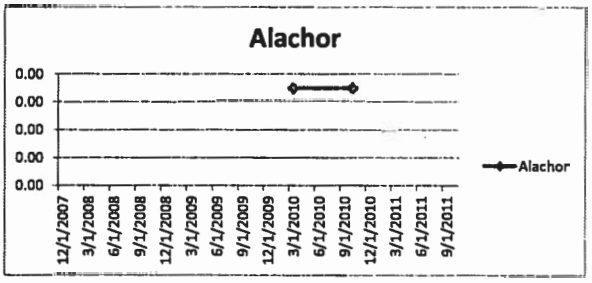


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.24	0.12000	U
4/24/2008	0.25	0.12500	U
10/13/2008	0.24	0.12000	U
3/30/2009	0.24	0.12000	U
10/15/2009	0.23	0.11500	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	0.0303	0.01515	U



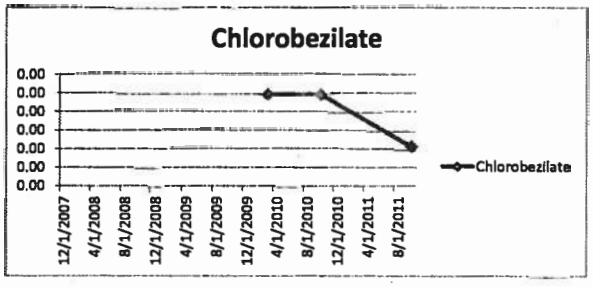
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



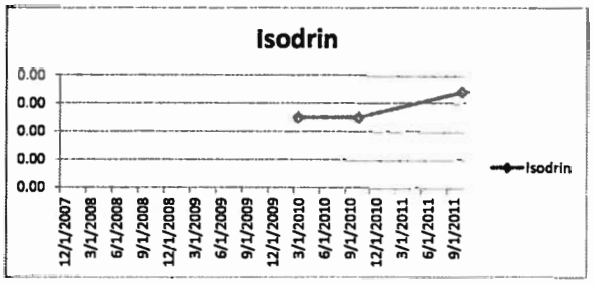
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0.00172	0.00086	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00136	0.00068	U

NA = Not Analyzed



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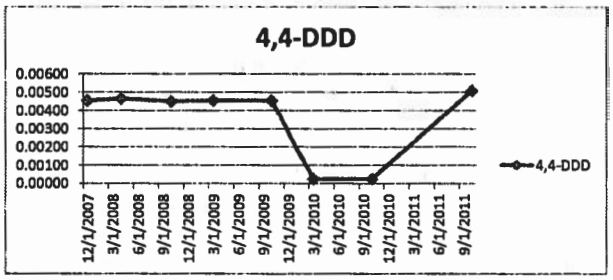
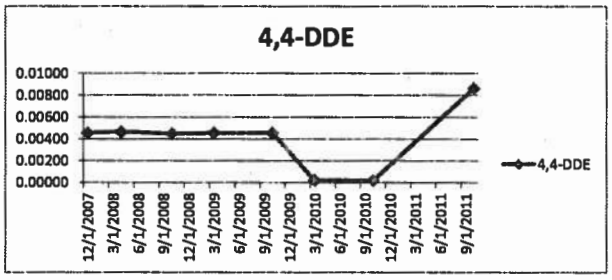
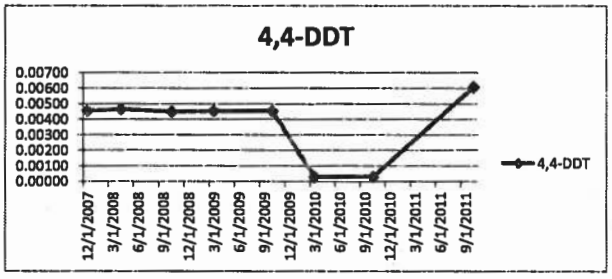
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0091	0.00455	U
10/15/2009	0.0091	0.00455	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0102	0.00510	U



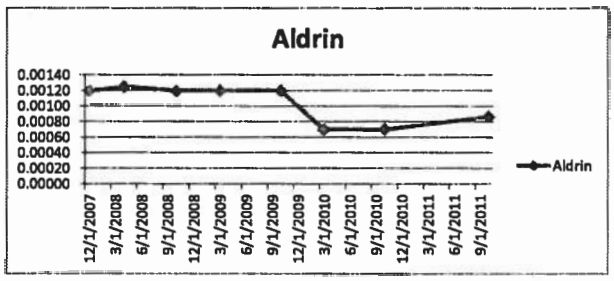
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0091	0.00455	U
10/15/2009	0.0091	0.00455	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0173	0.00865	U



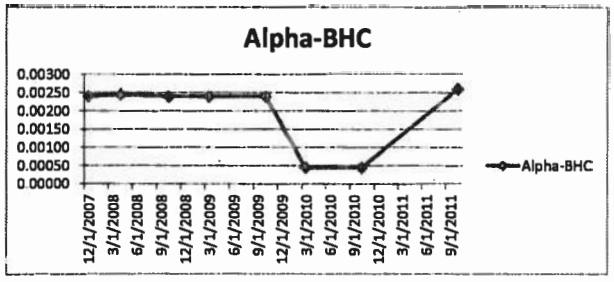
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0091	0.00455	U
10/15/2009	0.0091	0.00455	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0122	0.00610	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00173	0.00087	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0048	0.00240	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.00520	0.00260	U



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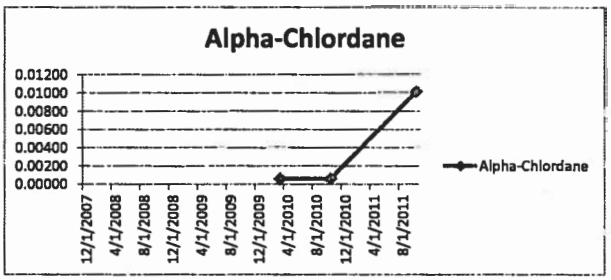
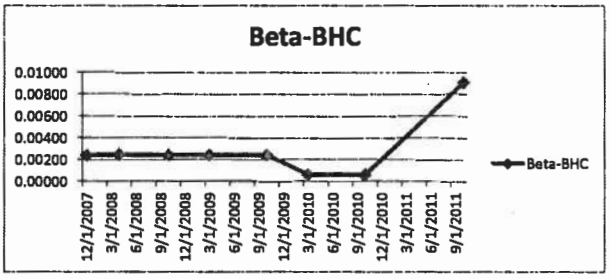
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0204	0.01020	U

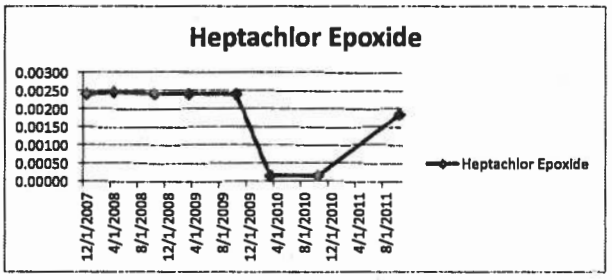
NA = Not Analyzed



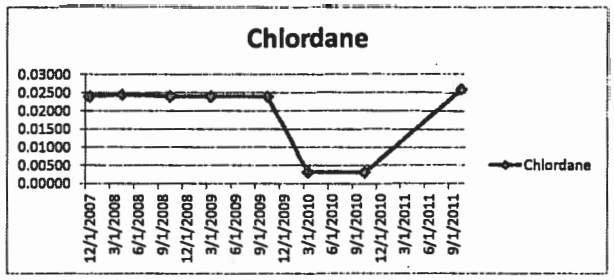
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0048	0.00240	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0181	0.00905	U



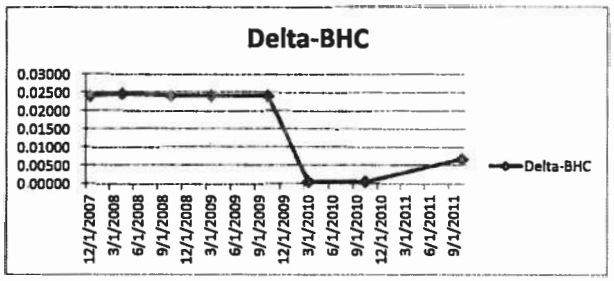
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0048	0.00240	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00367	0.00184	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0520	0.02600	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0133	0.00665	U



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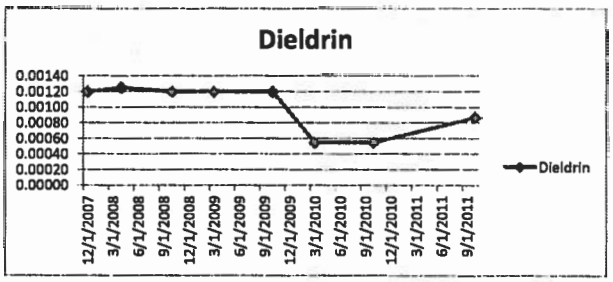
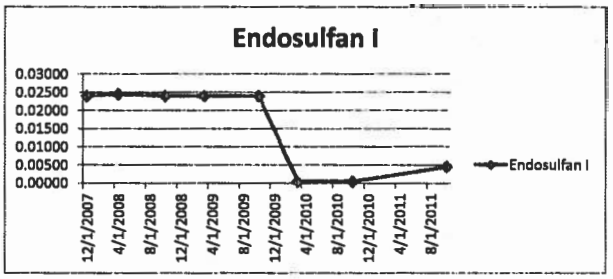
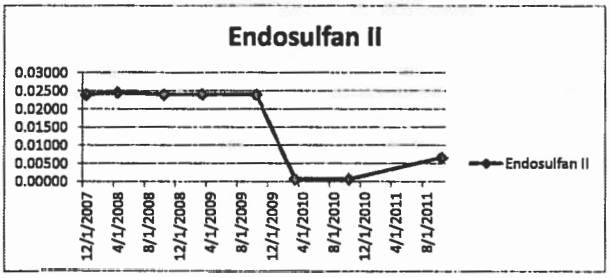
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00173	0.00087	U



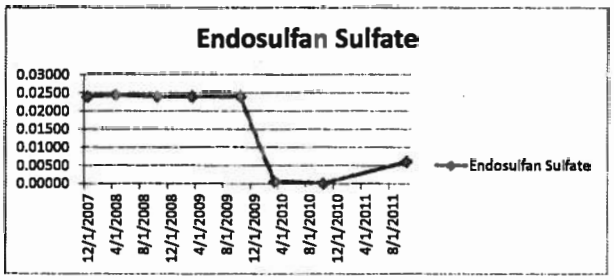
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00918	0.00459	U



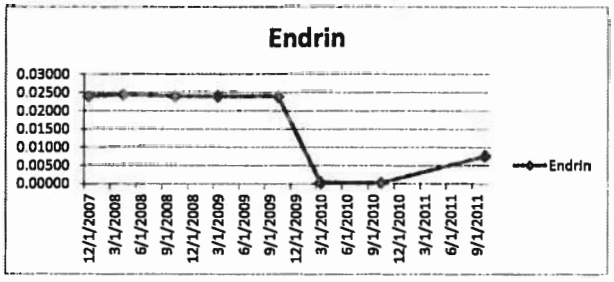
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0133	0.00665	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0122	0.00610	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0153	0.00765	U



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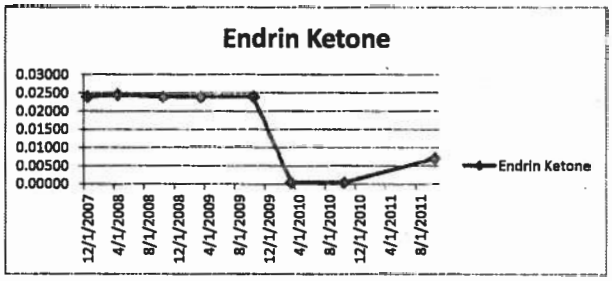
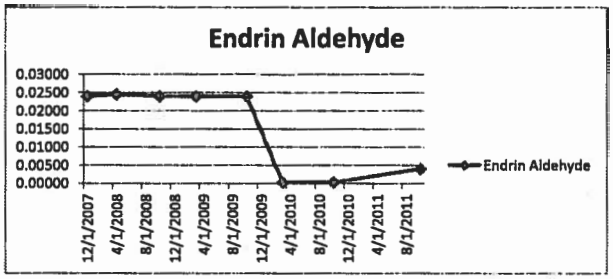
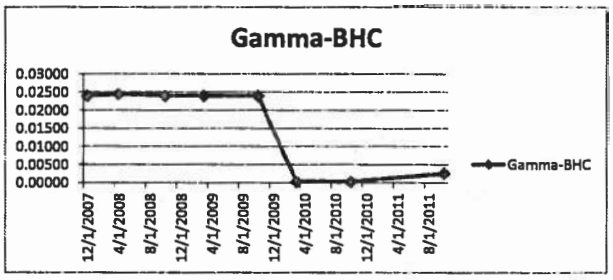
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0143	0.00715	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00816	0.00408	U

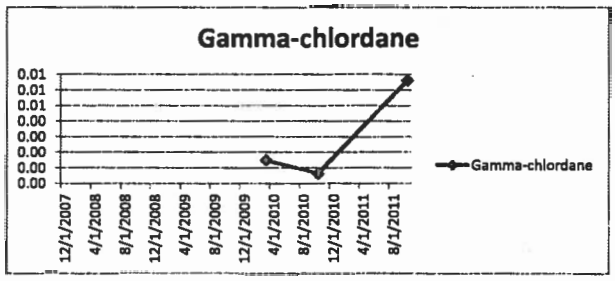


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00510	0.00255	U

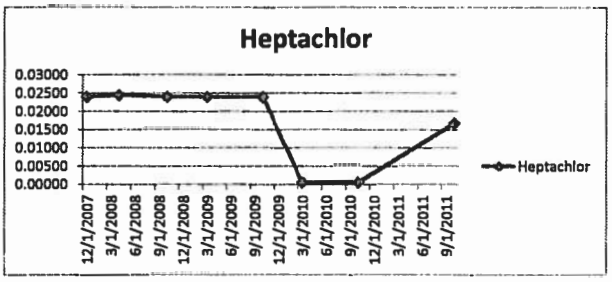


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0015	0.00150	I
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0133	0.00665	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0337	0.01685	U



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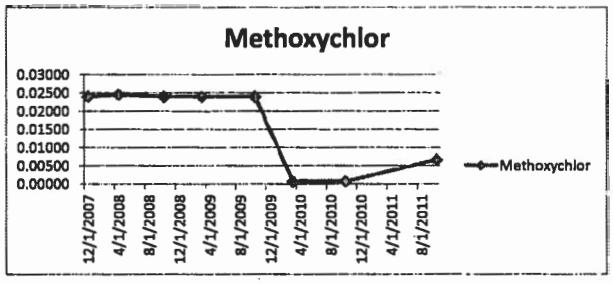
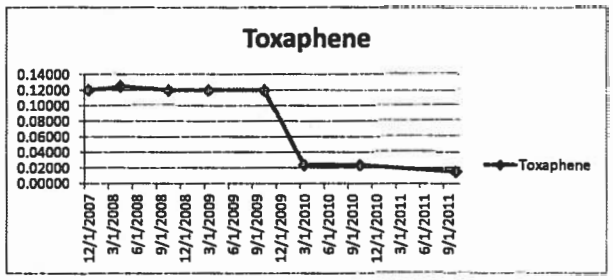
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0133	0.00665	U

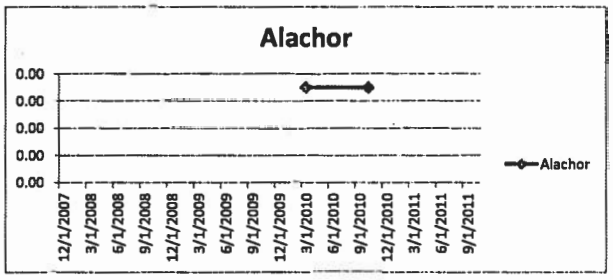


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.24	0.12000	U
4/24/2008	0.25	0.12500	U
10/13/2008	0.24	0.12000	U
3/30/2009	0.24	0.12000	U
10/15/2009	0.24	0.12000	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	0.0306	0.01530	U



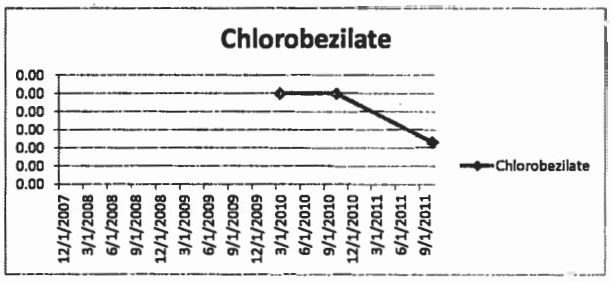
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



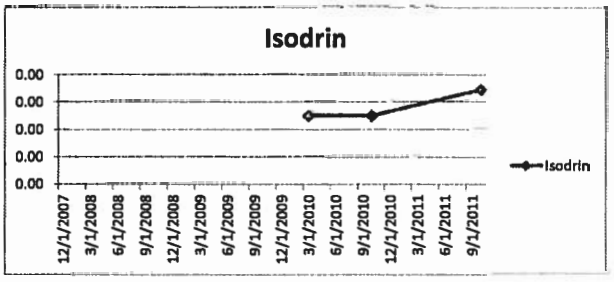
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0.00173	0.00087	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00138	0.00069	U

NA = Not Analyzed



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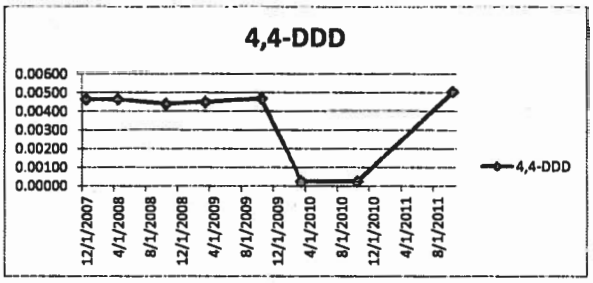
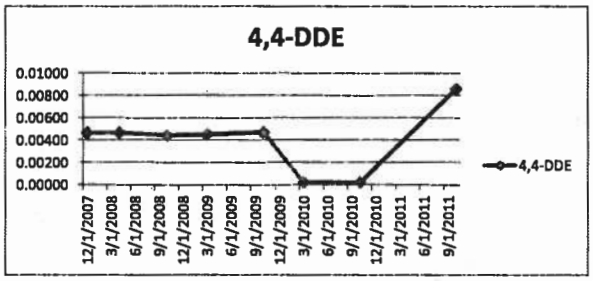
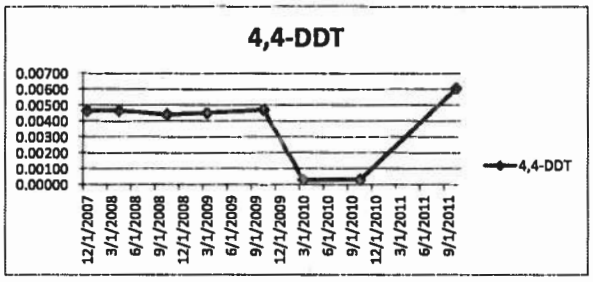
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0088	0.00440	U
3/30/2009	0.0090	0.00450	U
10/15/2009	0.0094	0.00470	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0101	0.00505	U



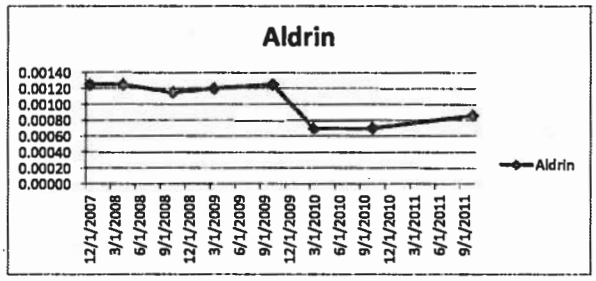
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0088	0.00440	U
3/30/2009	0.0090	0.00450	U
10/15/2009	0.0094	0.00470	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0172	0.00860	U



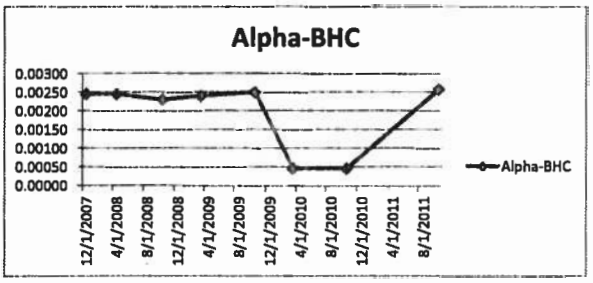
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0088	0.00440	U
3/30/2009	0.0090	0.00450	U
10/15/2009	0.0094	0.00470	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0121	0.00605	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0025	0.00125	U
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0 0024	0.00120	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00172	0.00086	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049	0.00245	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0046	0.00230	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0050	0.00250	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.00515	0.00258	U



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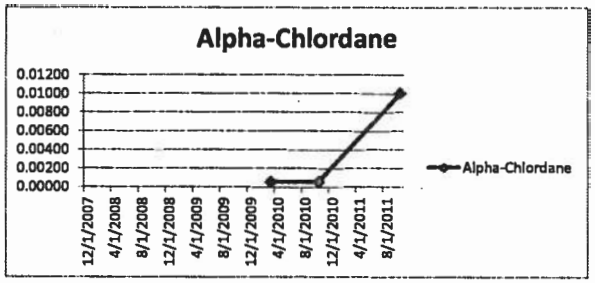
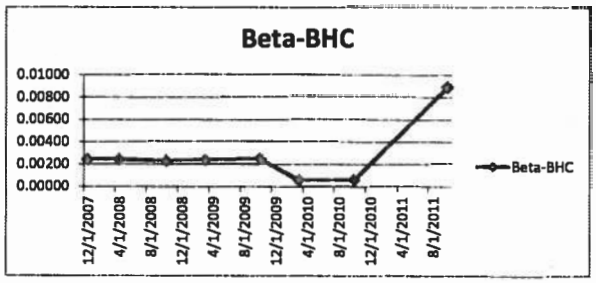
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0202	0.01010	U

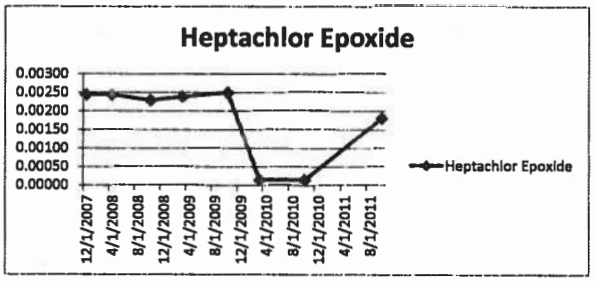
NA = Not Analyzed



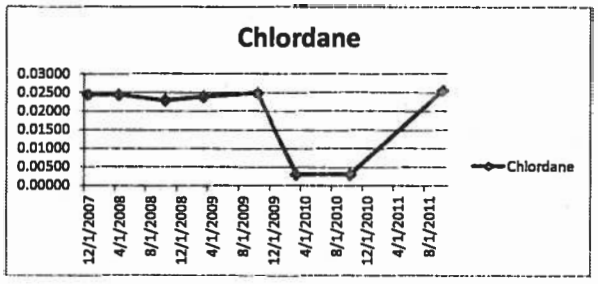
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049	0.00245	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0046	0.00230	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0050	0.00250	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0179	0.00895	U



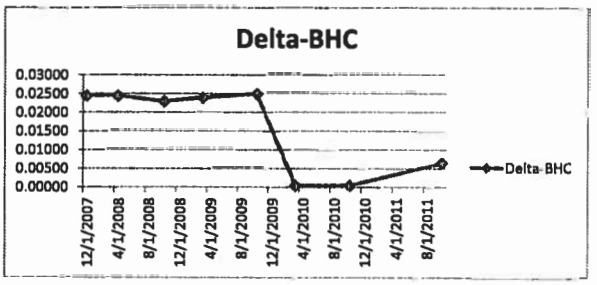
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049	0.00245	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0046	0.00230	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0050	0.00250	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00364	0.00182	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0515	0.02575	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0131	0.00655	U



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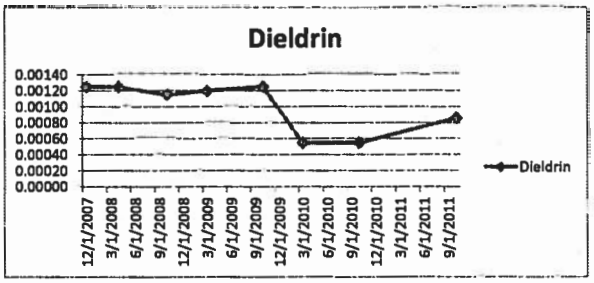
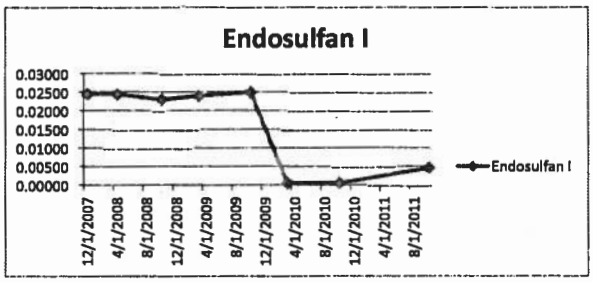
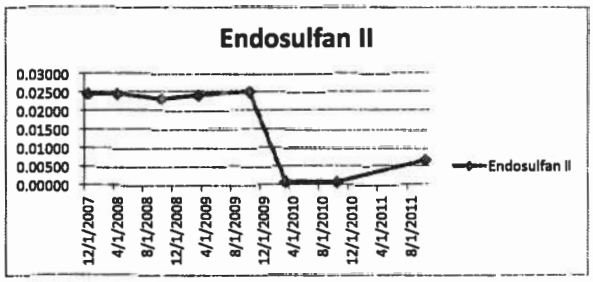
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0025	0.00125	U
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00172	0.00086	U



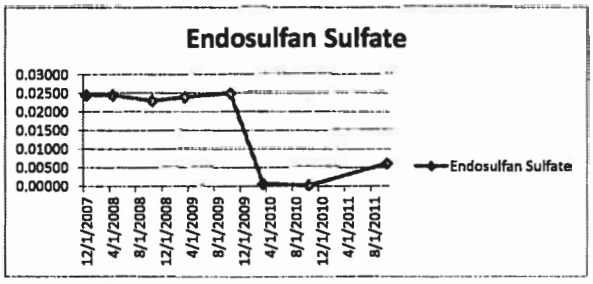
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00909	0.00455	U



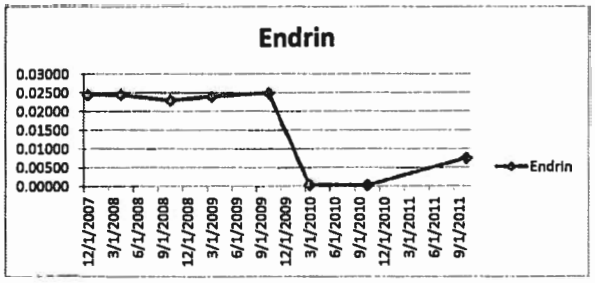
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0131	0.00655	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0121	0.00605	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0152	0.00760	U



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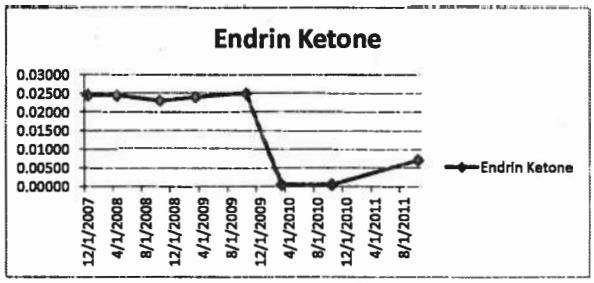
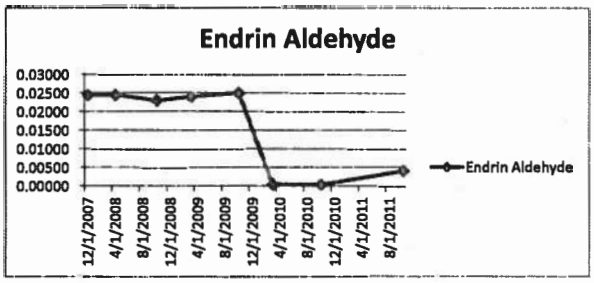
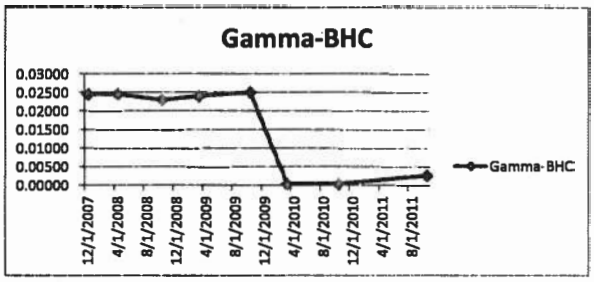
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0141	0.00705	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00808	0.00404	U

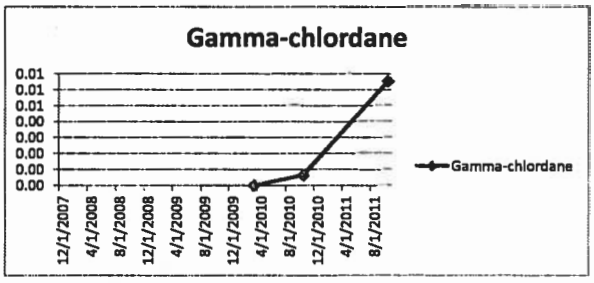


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00505	0.00253	U

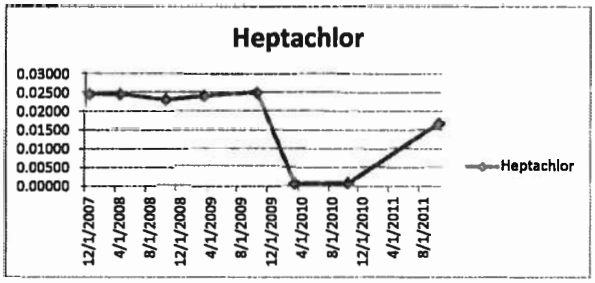


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.0013	I
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0131	0.00655	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0333	0.01665	U



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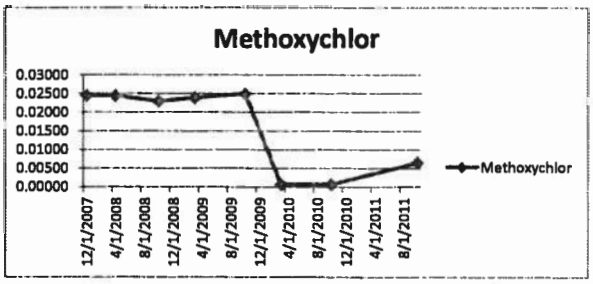
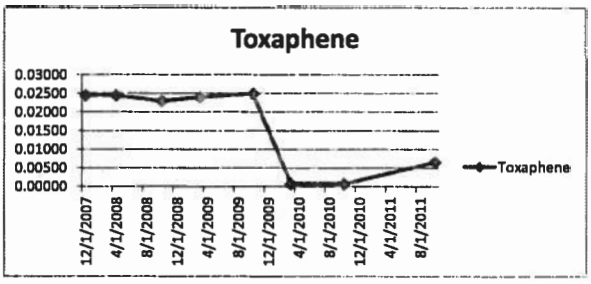
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0131	0.00655	U

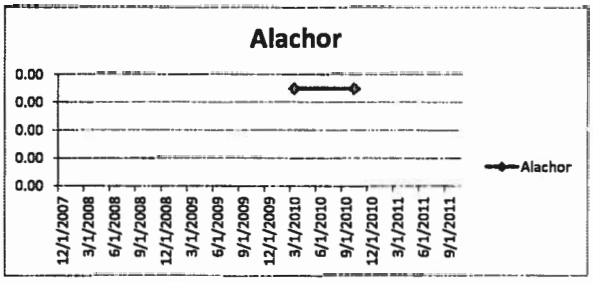


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	.049	0.02450	U
4/24/2008	.049	0.02450	U
10/13/2008	.046	0.02300	U
3/30/2009	.048	0.02400	U
10/15/2009	.050	0.02500	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0131	0.00655	U



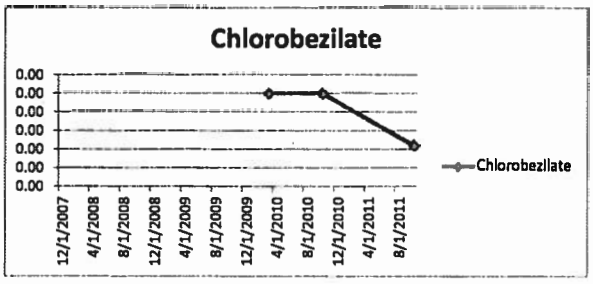
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



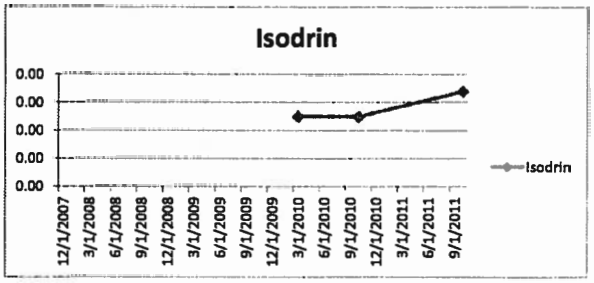
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0.00172	0.00086	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00136	0.00068	U

NA = Not Analyzed



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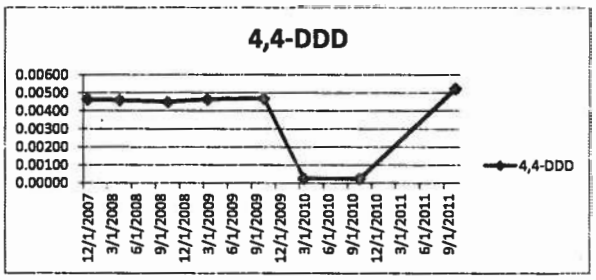
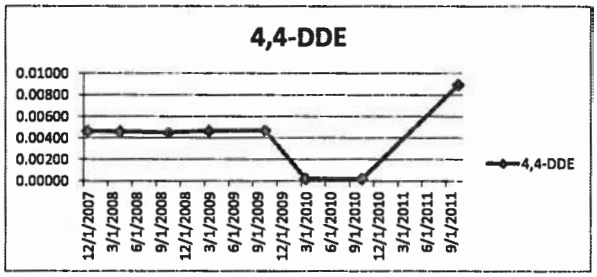
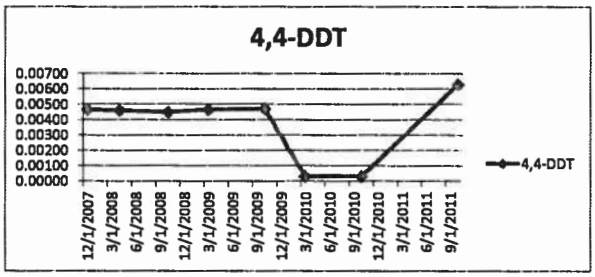
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	0.0092	0.00460	U
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0093	0.00465	U
10/15/2009	0.0094	0.00470	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0105	0.00525	U



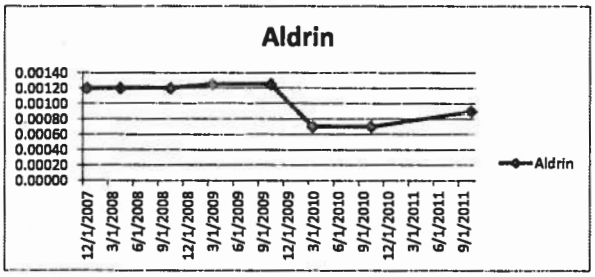
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	0.0092	0.00460	U
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0093	0.00465	U
10/15/2009	0.0094	0.00470	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0179	0.00895	U



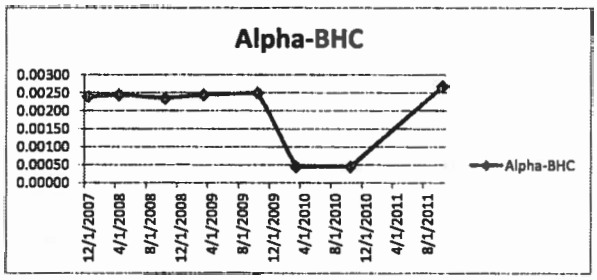
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	0.0092	0.00460	U
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0093	0.00465	U
10/15/2009	0.0094	0.00470	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0126	0.00630	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0025	0.00125	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00179	0.00090	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0050	0.00250	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.00537	0.00269	U



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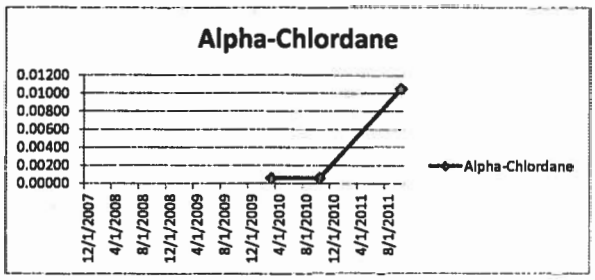
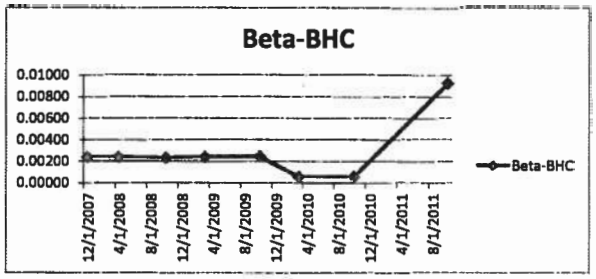
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0211	0.01055	U

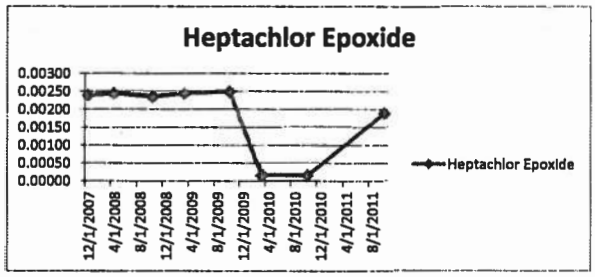
NA = Not Analyzed



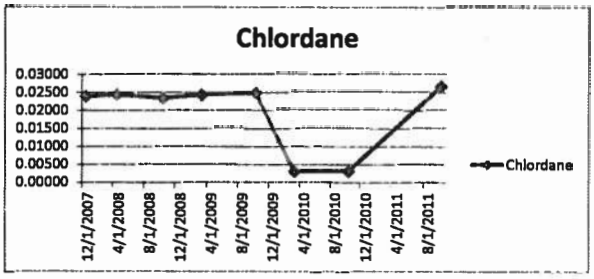
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0050	0.00250	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0186	0.00930	U



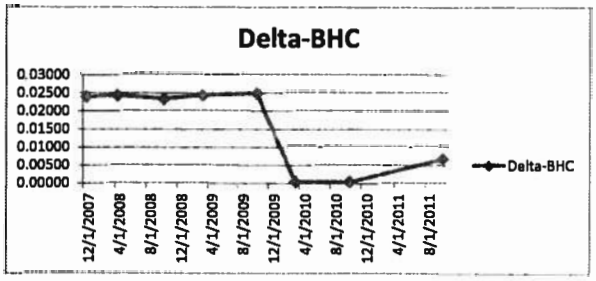
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0050	0.00250	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00379	0.00190	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0537	0.02685	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0137	0.00685	U



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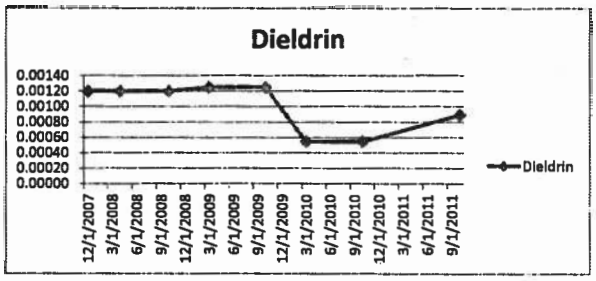
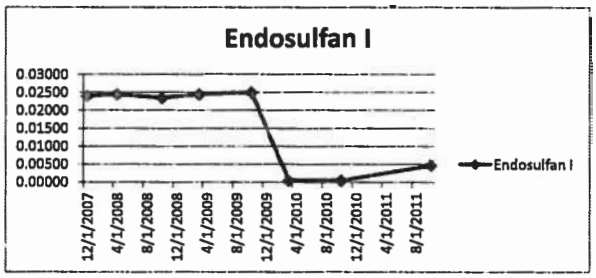
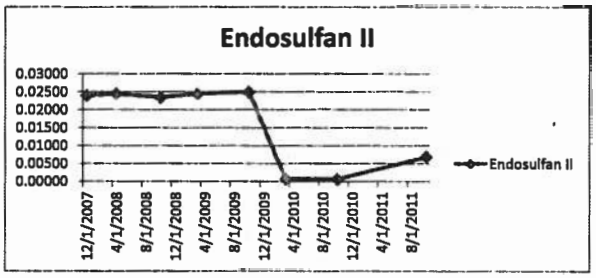
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0025	0.00125	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00179	0.00090	U



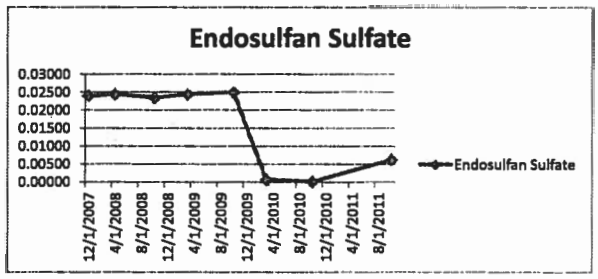
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00947	0.00474	U



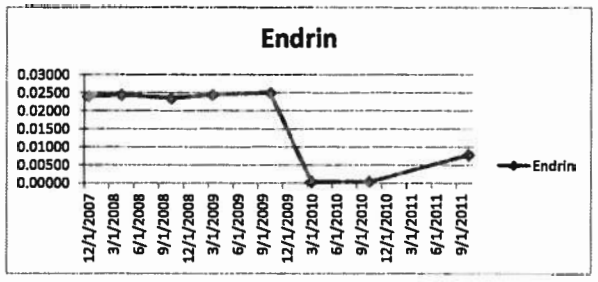
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0137	0.00685	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0126	0.00630	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0158	0.00790	U



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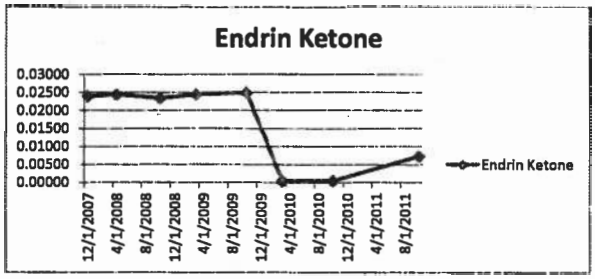
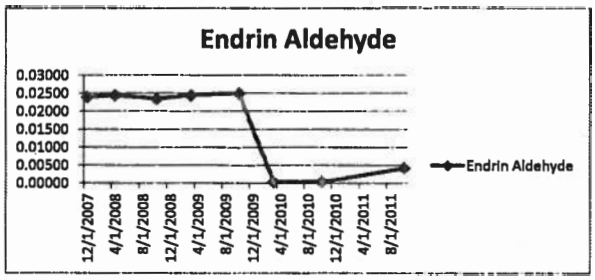
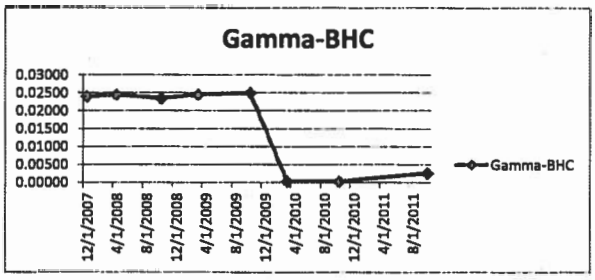
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0147	0.00735	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00842	0.00421	U

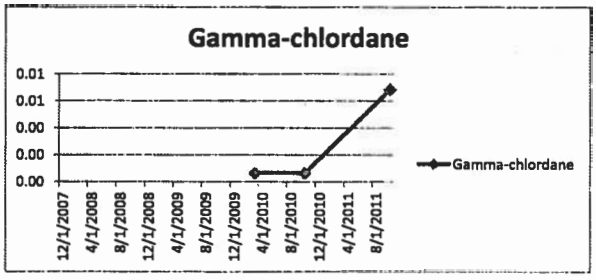


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0008	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00526	0.00263	U

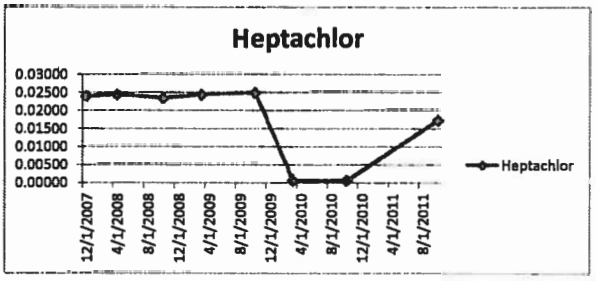


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.00085	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0137	0.00685	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0347	0.01735	U



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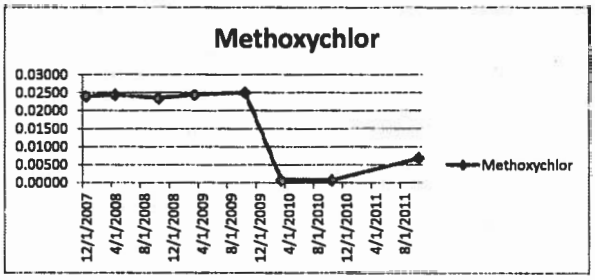
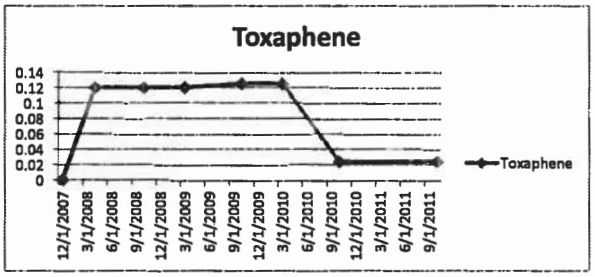
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.050	0.02500	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0137	0.00685	U

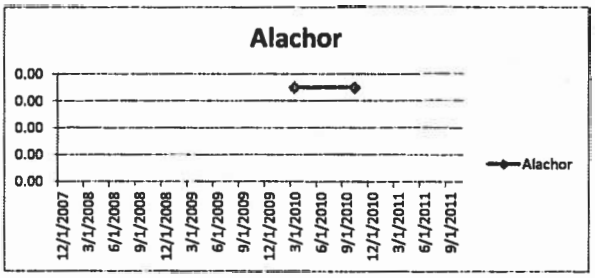


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.24	0.12000	U
4/24/2008	0.24	0.12000	U
10/13/2008	0.24	0.12000	U
3/30/2009	0.25	0.12500	U
10/15/2009	0.25	0.12500	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	0.0316	0.01580	U



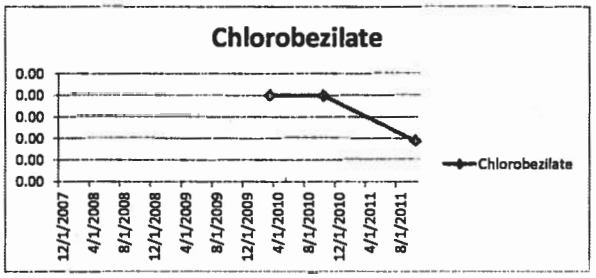
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



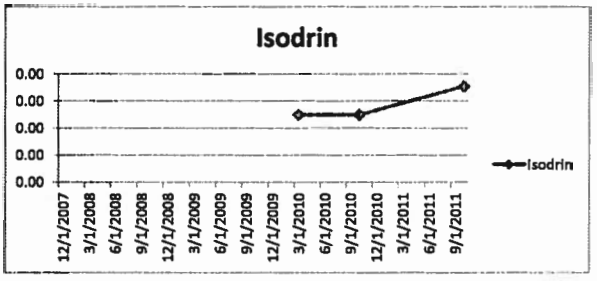
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0.00179	0.00090	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00142	0.00071	U

NA = Not Analyzed



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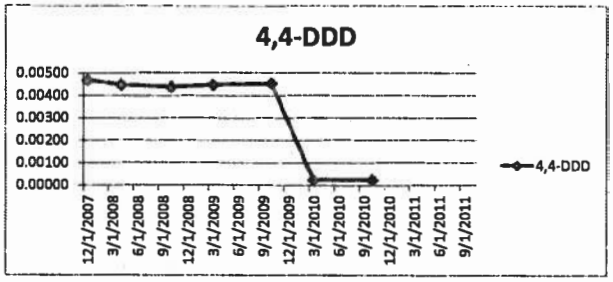
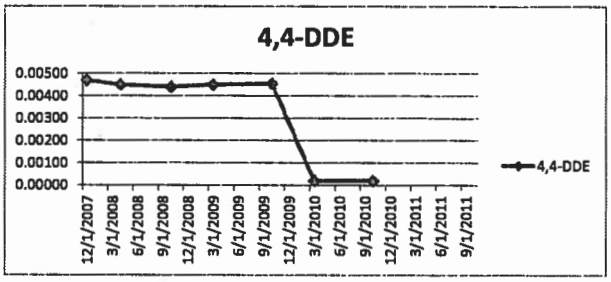
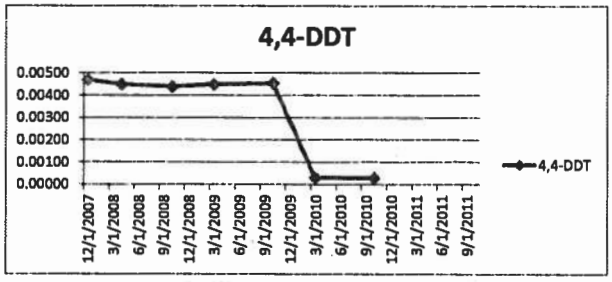
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0094	0.00470	U
4/24/2008	0.0090	0.00450	U
10/13/2008	0.0088	0.00440	U
3/30/2009	0.0090	0.00450	U
10/15/2009	0.0091	0.00455	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	NS		



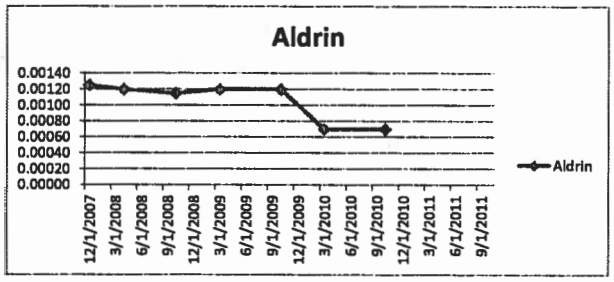
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0094	0.00470	U
4/24/2008	0.0090	0.00450	U
10/13/2008	0.0088	0.00440	U
3/30/2009	0.0090	0.00450	U
10/15/2009	0.0091	0.00455	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	NS		



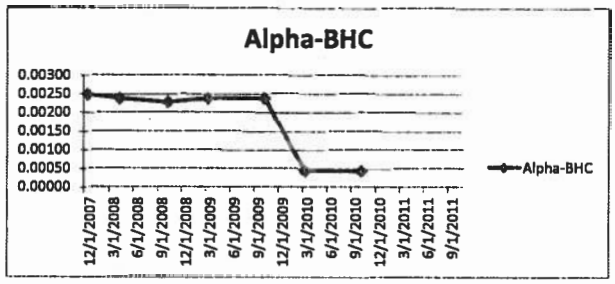
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0094	0.00470	U
4/24/2008	0.0090	0.00450	U
10/13/2008	0.0088	0.00440	U
3/30/2009	0.0090	0.00450	U
10/15/2009	0.0091	0.00455	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	NS		



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0025	0.00125	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NS		



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.005	0.00250	U
4/24/2008	0.0048	0.00240	U
10/13/2008	0.0046	0.00230	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	NS		



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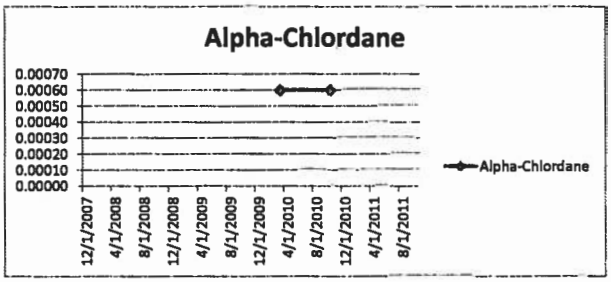
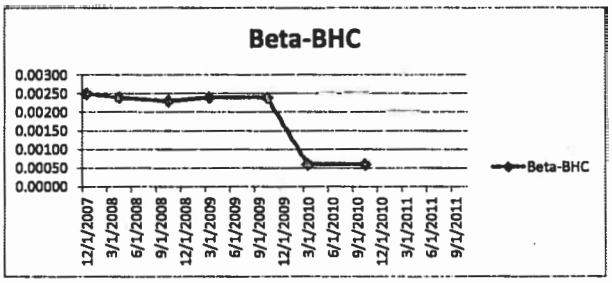
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	NS		

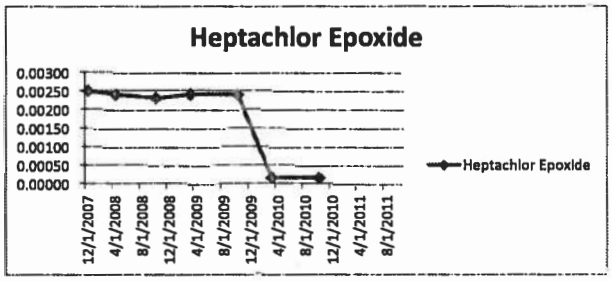
NA = Not Analyzed



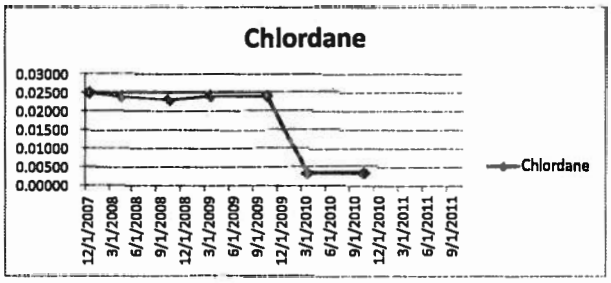
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.005	0.00250	U
4/24/2008	0.0048	0.00240	U
10/13/2008	0.0048	0.00230	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0046	0.00240	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	NS		



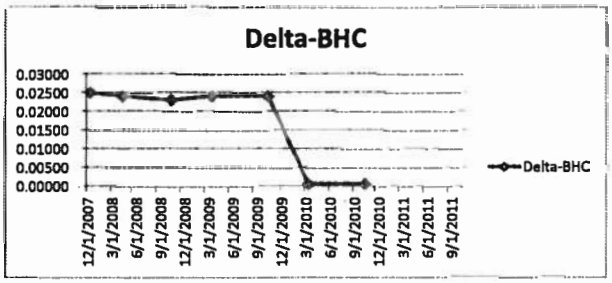
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.005	0.00250	U
4/24/2008	0.0048	0.00240	U
10/13/2008	0.0046	0.00230	U
3/30/2009	0.0048	0.00240	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	NS		



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	NS		



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	NS		



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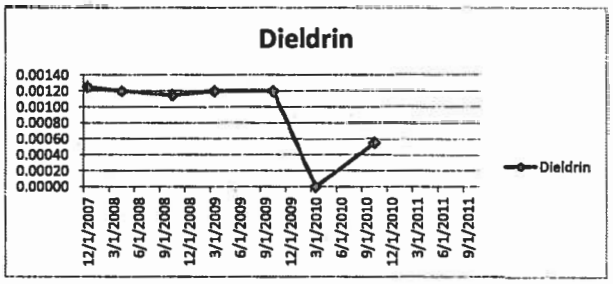
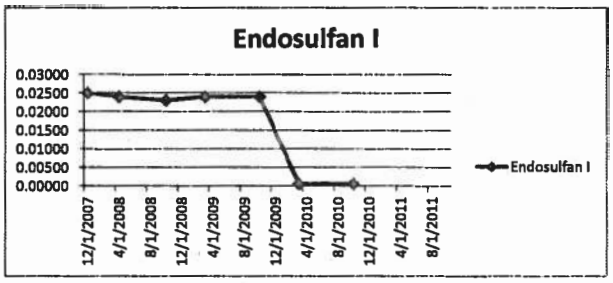
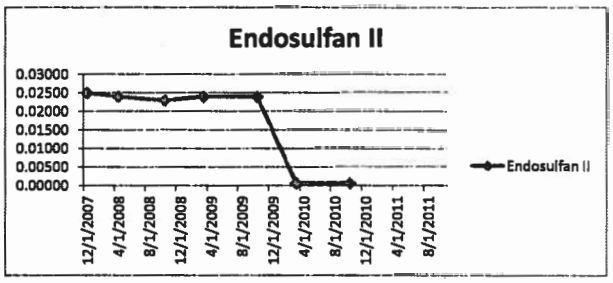
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0025	0.00125	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0012 I	0012 I	I
10/13/2010	0.0011	0.00055	U
10/27/2011	NS		



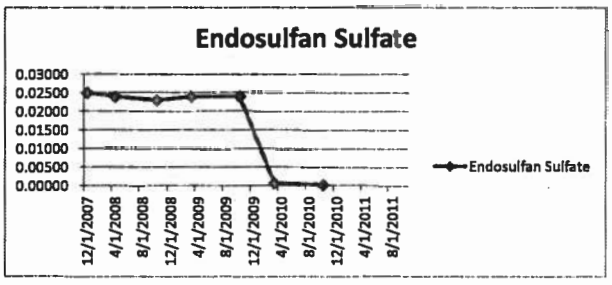
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.048	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	NS		



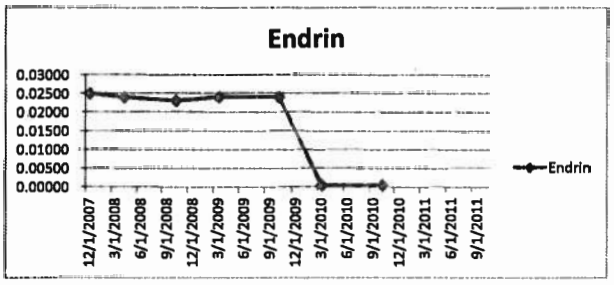
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	NS		



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	NS		



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.046	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.046	0.02400	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	NS		



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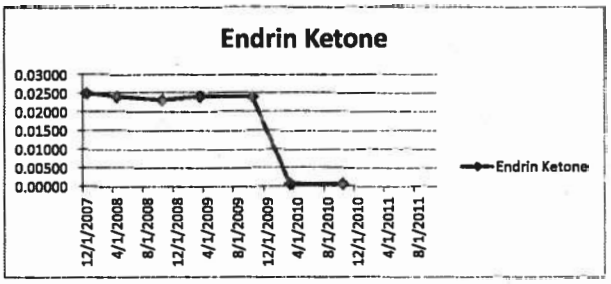
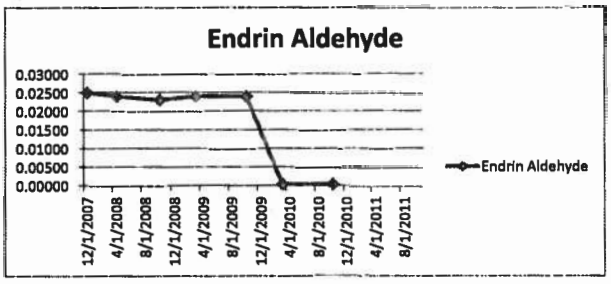
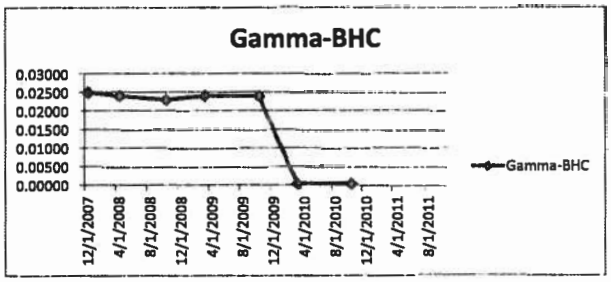
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	NS		



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	NS		

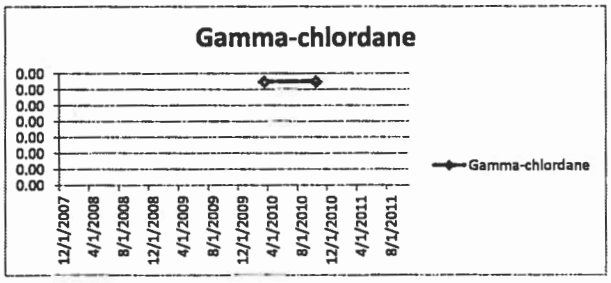


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	NS		

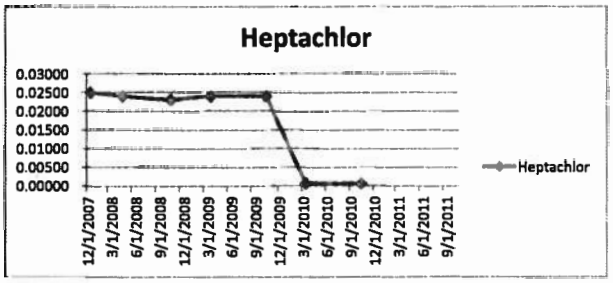


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	NS		

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	NS		



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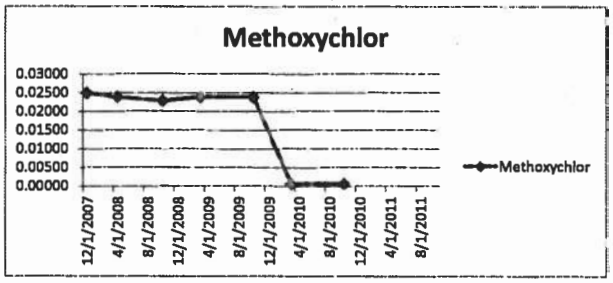
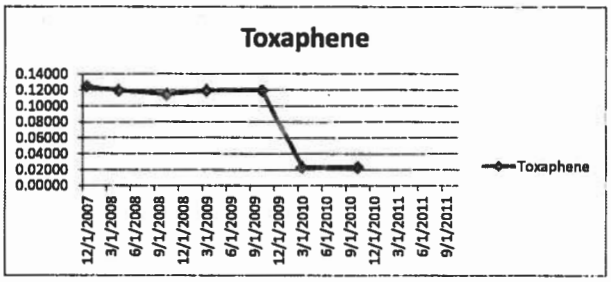
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.05	0.02500	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.046	0.02300	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	NS		

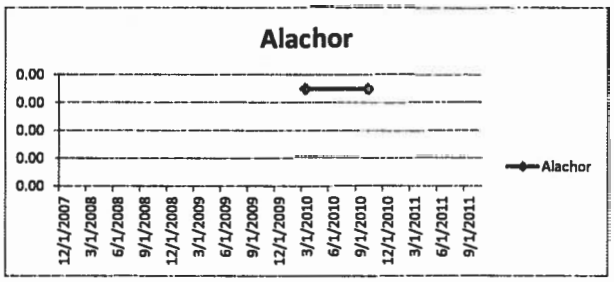


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.25	0.12500	U
4/24/2008	0.24	0.12000	U
10/13/2008	0.23	0.11500	U
3/30/2009	0.24	0.12000	U
10/15/2009	0.24	0.12000	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	NS		



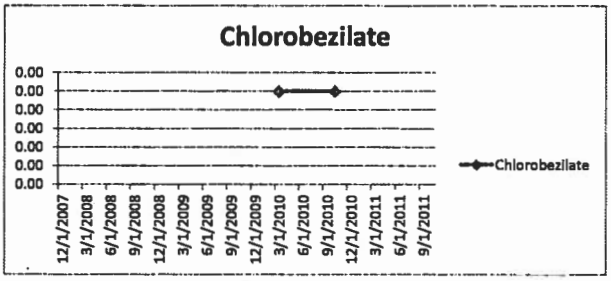
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NS		

NA = Not Analyzed



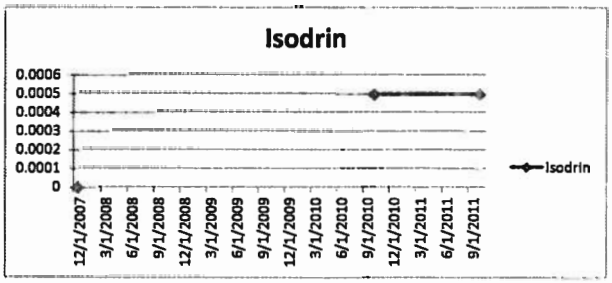
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	NS		

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	NS		

NA = Not Analyzed



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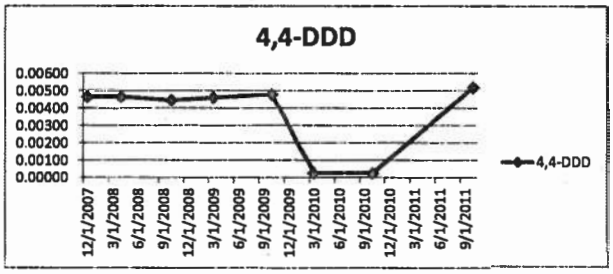
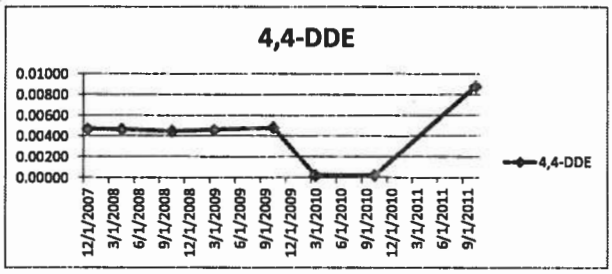
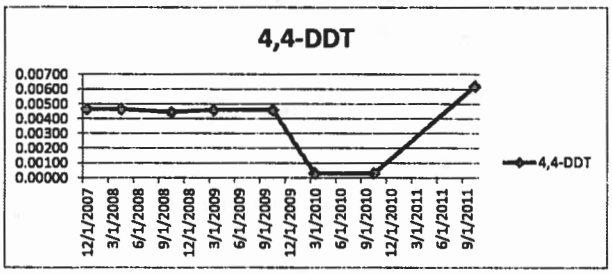
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0089	0.00445	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0096	0.00480	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0104	0.00520	U



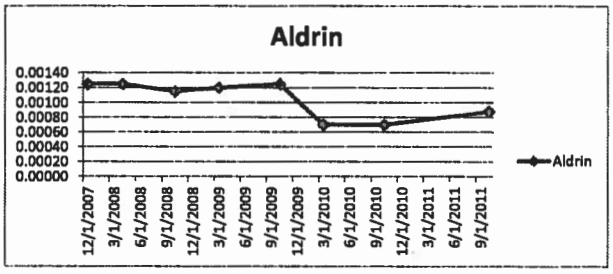
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0089	0.00445	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0096	0.00480	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0176	0.00880	U



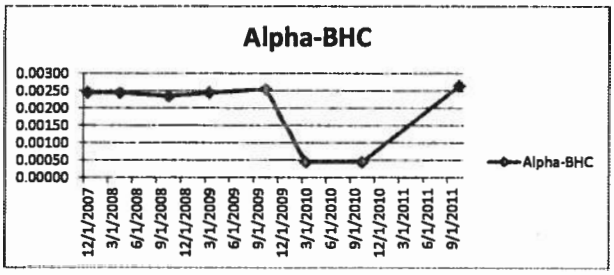
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	0.0093	0.00465	U
10/13/2008	0.0089	0.00445	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0092	0.00460	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0124	0.00620	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0025	0.00125	U
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00176	0.00088	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049	0.00245	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0051	0.00255	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.00529	0.00265	U



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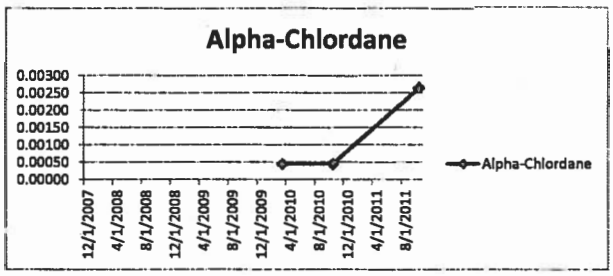
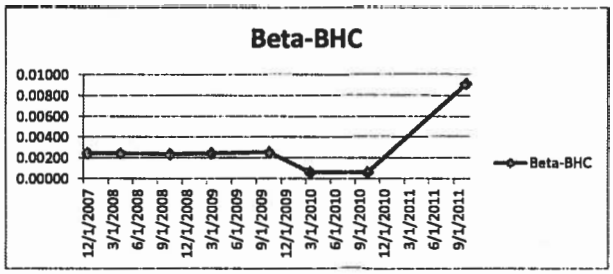
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049		
4/24/2008	0.0049		
10/13/2008	0.0047		
3/30/2009	0.0049		
10/15/2009	0.0051		
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	.00529	0.00265	U

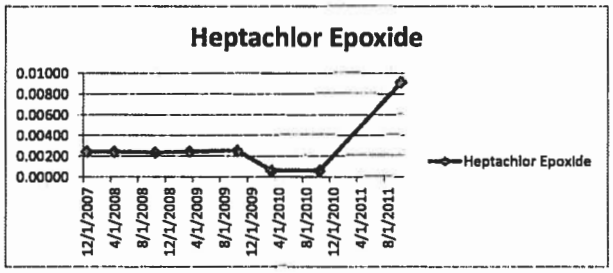
NA = Not Analyzed



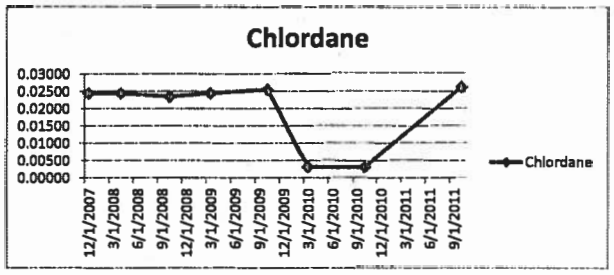
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049	0.00245	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0051	0.00255	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0183	0.00915	U



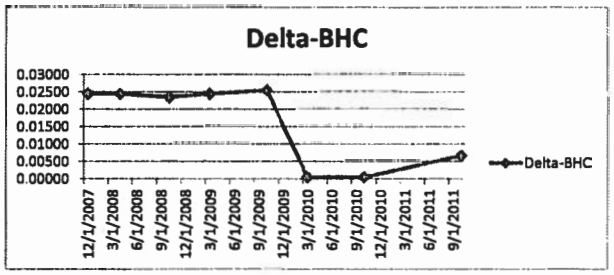
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049	0.00245	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0051	0.00255	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0183	0.00915	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0528	0.02640	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0135	0.00675	U



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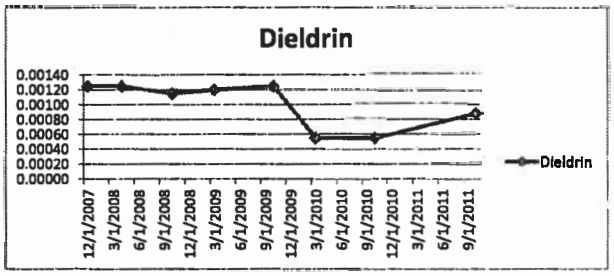
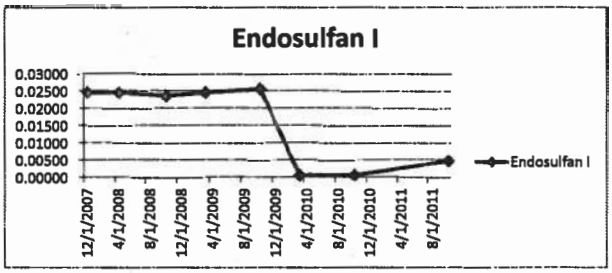
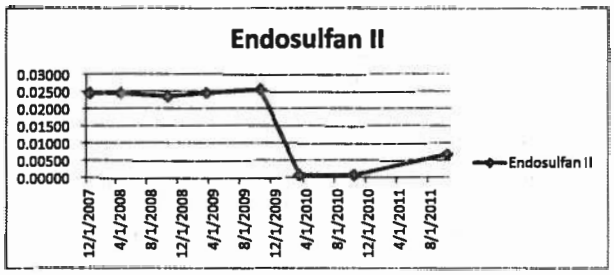
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0025	0.00125	U
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00176	0.00088	U



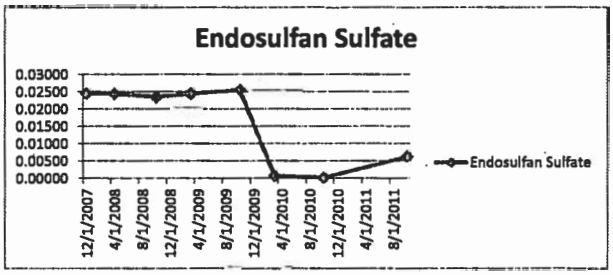
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00933	0.00467	U



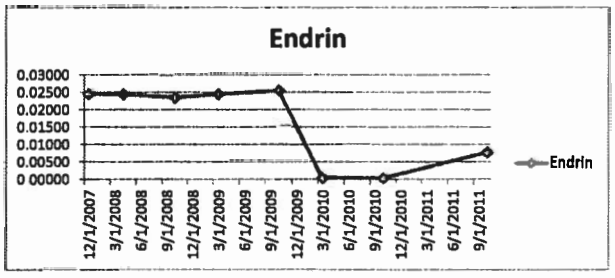
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0135	0.00675	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0124	0.00620	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0155	0.00775	U



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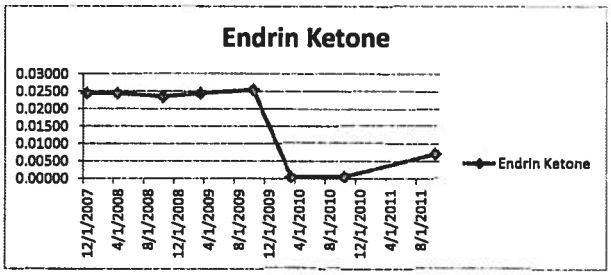
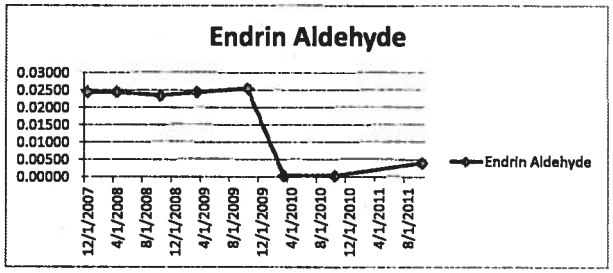
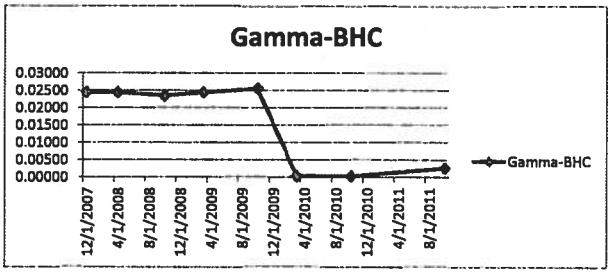
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0145	0.00725	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00829	0.00415	U

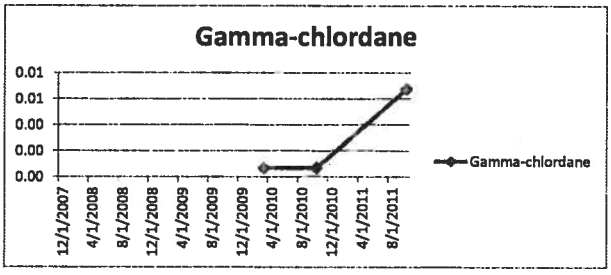


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00518	0.00259	U

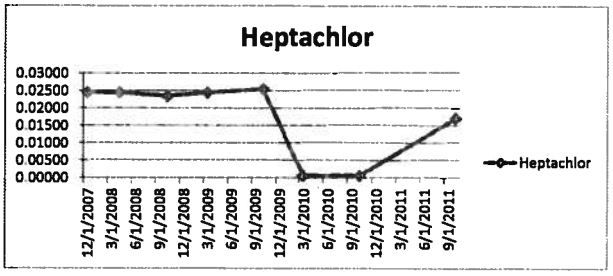


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0135	0.00675	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0342	0.01710	U



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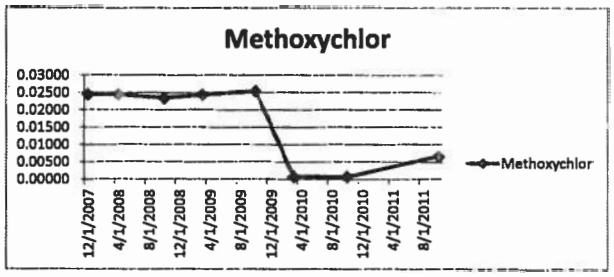
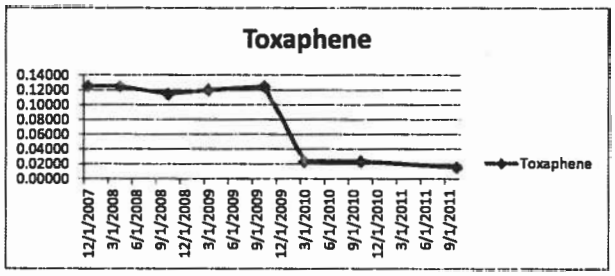
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.051	0.02550	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0135	0.00675	U

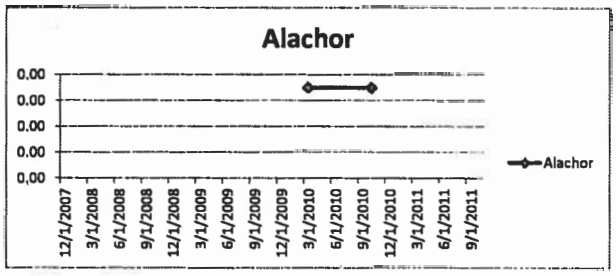


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.25	0.12500	U
4/24/2008	0.25	0.12500	U
10/13/2008	0.23	0.11500	U
3/30/2009	0.24	0.12000	U
10/15/2009	0.25	0.12500	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	0.0311	0.01555	U



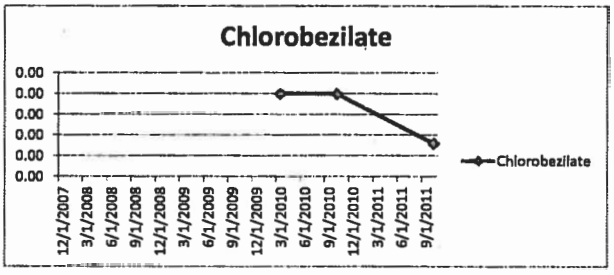
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



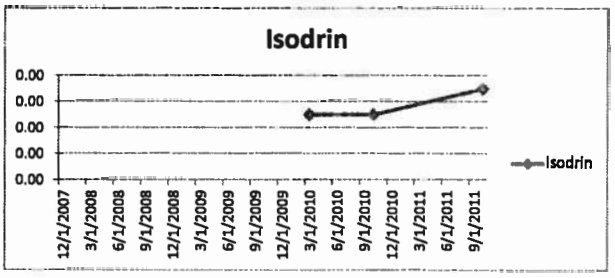
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0.00176	0.00088	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00140	0.00070	U

NA = Not Analyzed



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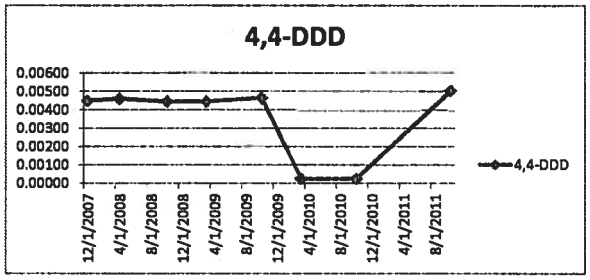
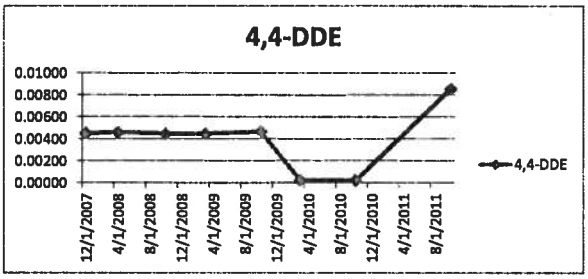
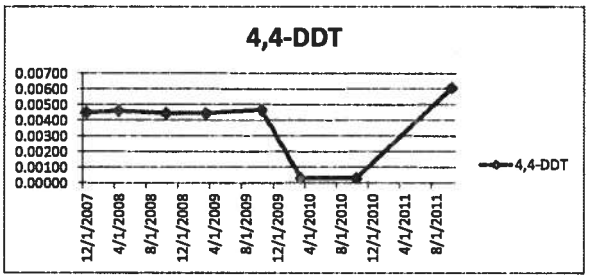
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0090	0.00450	U
4/24/2008	0.0092	0.00460	U
10/13/2008	0.0089	0.00445	U
3/30/2009	0.0089	0.00445	U
10/15/2009	0.0093	0.00465	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0101	0.00505	U



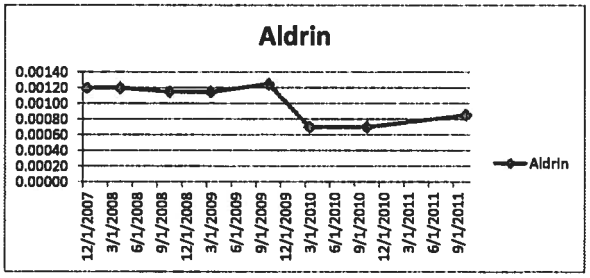
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0090	0.00450	U
4/24/2008	0.0092	0.00460	U
10/13/2008	0.0089	0.00445	U
3/30/2009	0.0089	0.00445	U
10/15/2009	0.0093	0.00465	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0171	0.00855	U



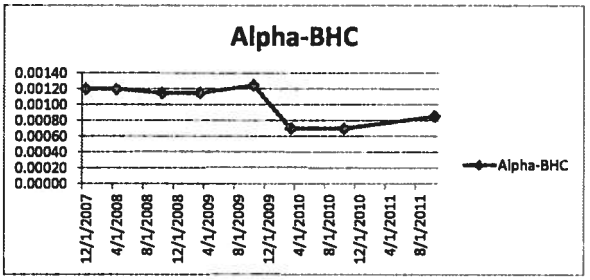
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0090	0.00450	U
4/24/2008	0.0092	0.00460	U
10/13/2008	0.0089	0.00445	U
3/30/2009	0.0089	0.00445	U
10/15/2009	0.0093	0.00465	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0121	0.00605	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0.0023	0.00115	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00171	0.00086	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0.0023	0.00115	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00171	0.00086	U



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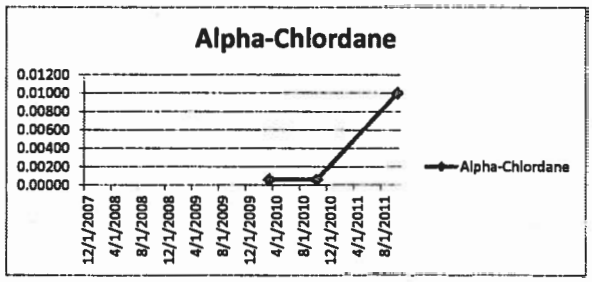
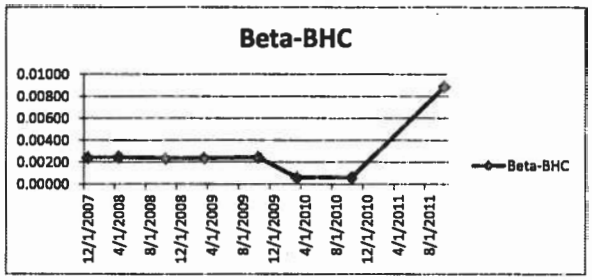
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0201	0.01005	U

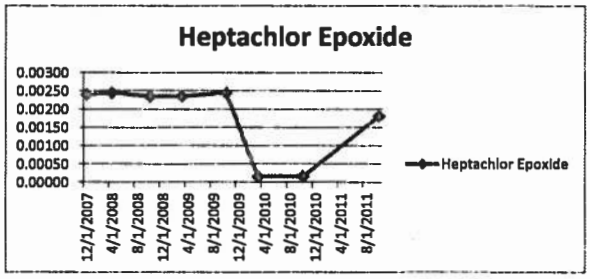
NA = Not Analyzed



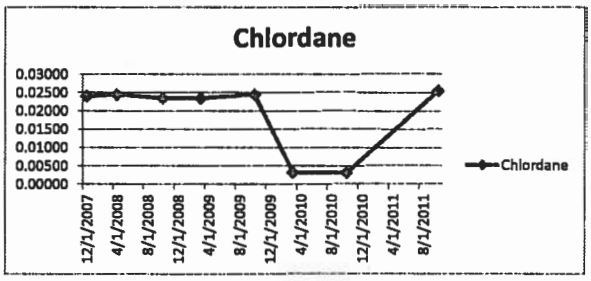
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0047	0.00235	U
10/15/2009	0.0049	0.00245	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0178	0.00890	U



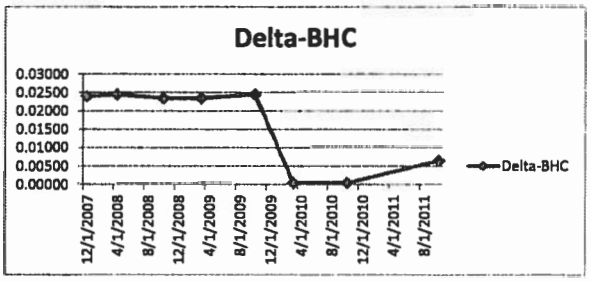
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0049	0.00245	U
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0047	0.00235	U
10/15/2009	0.0049	0.00245	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00362	0.00181	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0513	0.02585	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0131	0.00655	U



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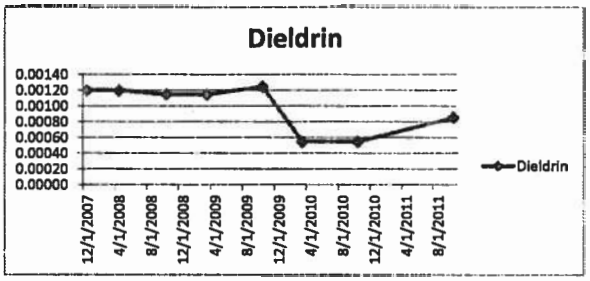
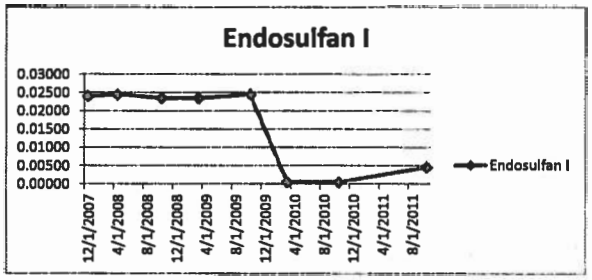
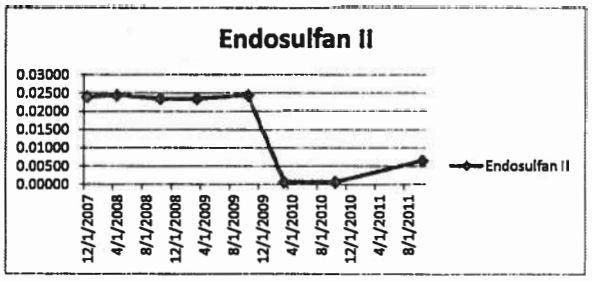
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0023	0.00115	U
3/30/2009	0.0023	0.00115	U
10/15/2009	0.0025	0.00125	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00171	0.00086	U



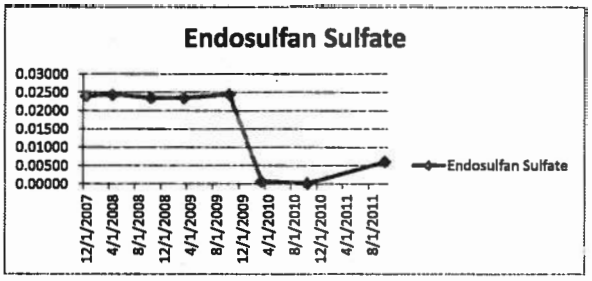
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00905	0.00453	U



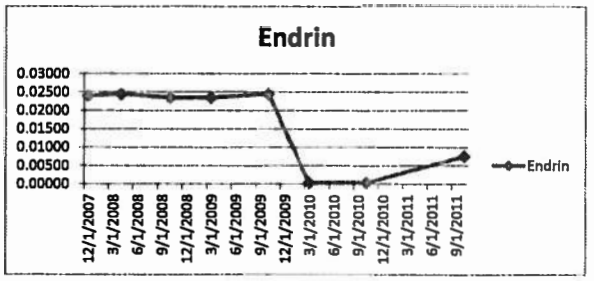
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0131	0.00655	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0121	0.00605	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0151	0.00755	U



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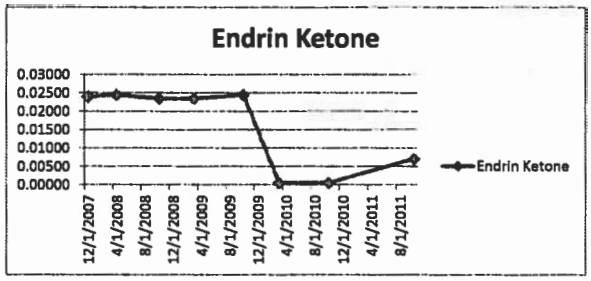
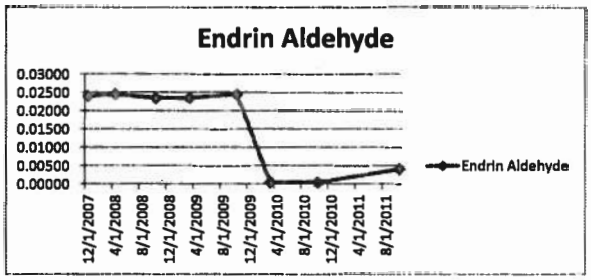
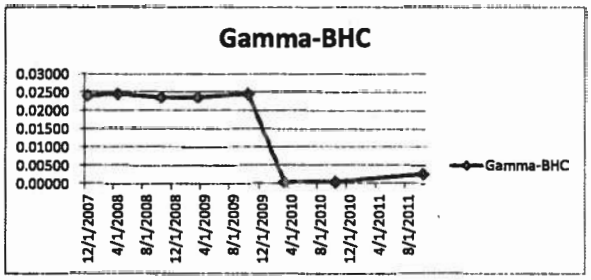
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0141	0.00705	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00804	0.00402	U

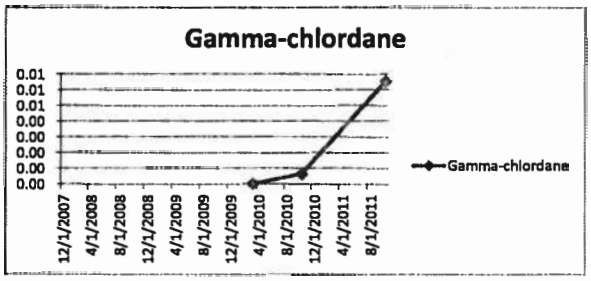


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00503	0.00252	U

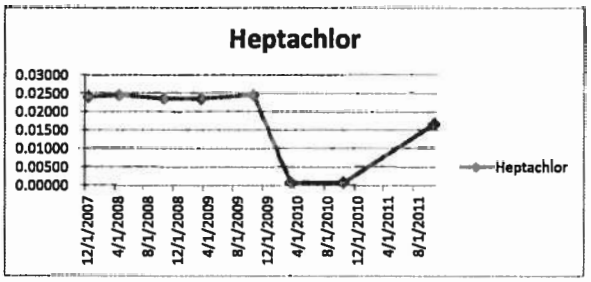


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.0013	I
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0131	0.00655	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0332	0.01660	U



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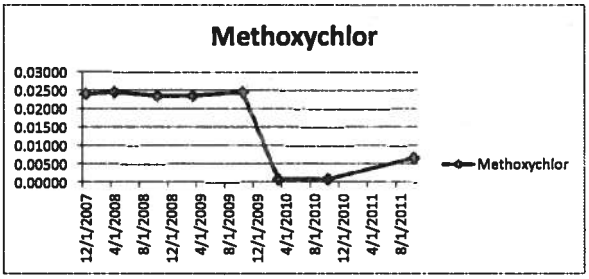
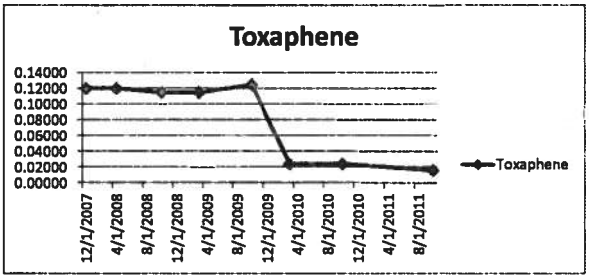
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.049	0.02450	U
10/13/2008	0.047	0.02350	U
3/30/2009	0.047	0.02350	U
10/15/2009	0.049	0.02450	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0131	0.00655	U

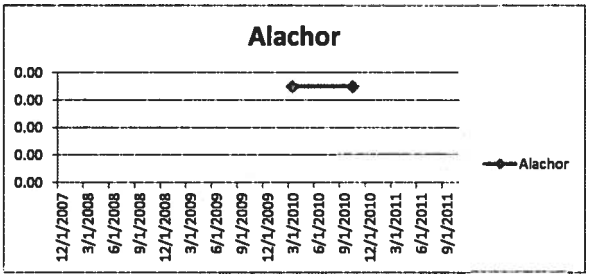


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.24	0.12000	U
4/24/2008	0.24	0.12000	U
10/13/2008	0.23	0.11500	U
3/30/2009	0.23	0.11500	U
10/15/2009	0.25	0.12500	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	0.0302	0.01510	U



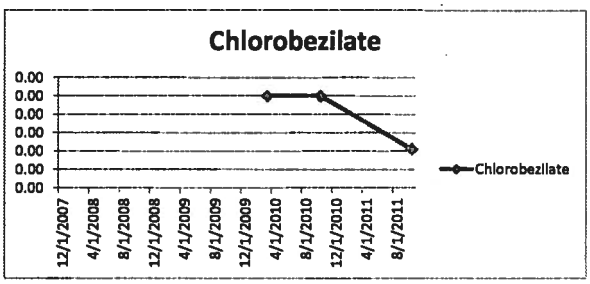
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



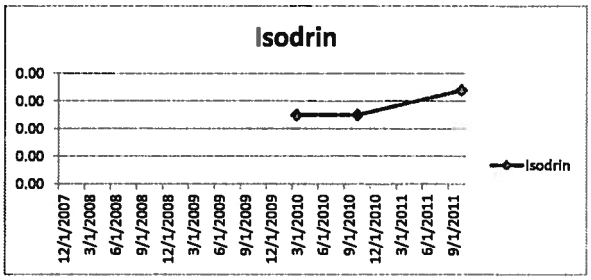
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0 002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0.00171	0.00086	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00136	0.00068	U

NA = Not Analyzed



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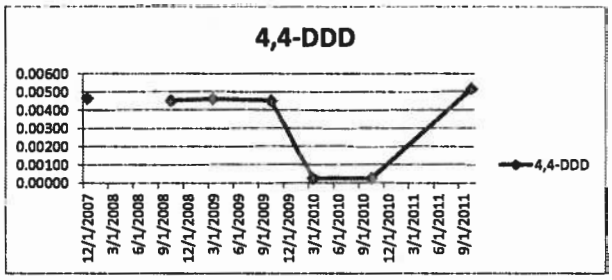
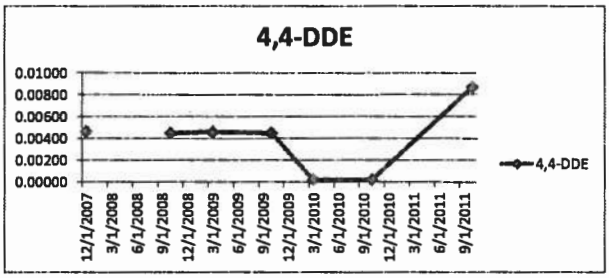
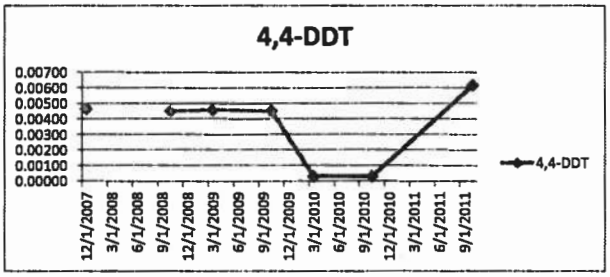
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	NS		
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0103	0.00515	U



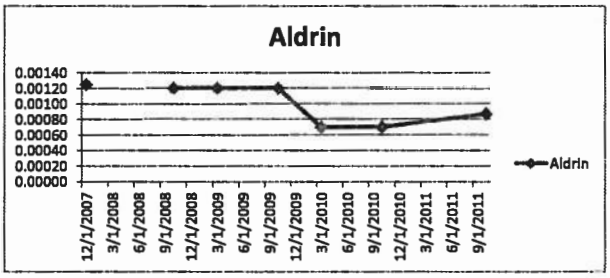
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	NS		
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0174	0.00870	U



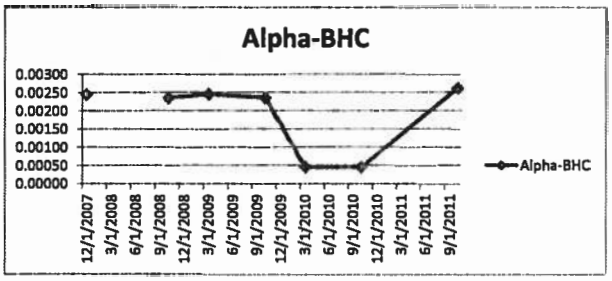
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0093	0.00465	U
4/24/2008	NS		
10/13/2008	0.0090	0.00450	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0123	0.00615	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0025	0.00125	U
4/24/2008	NS		
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00174	0.00087	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049	0.00245	U
4/24/2008	NS		
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0047	0.00235	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.00523	0.00262	U



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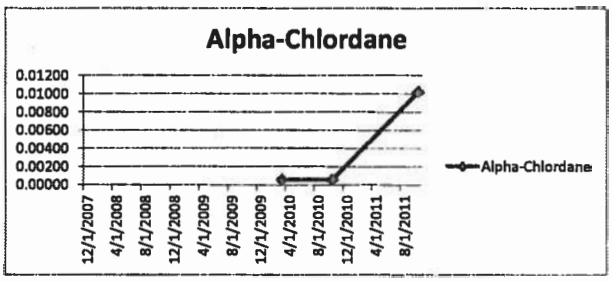
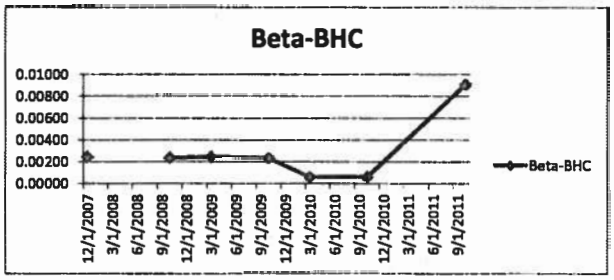
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NS		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0205	0.01025	U

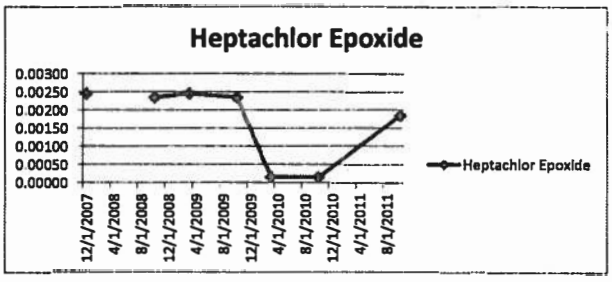
NA = Not Analyzed



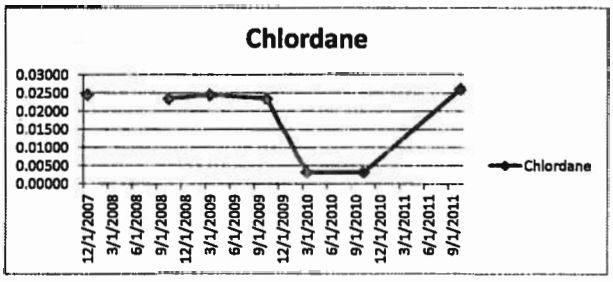
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049	0.00245	U
4/24/2008	NS		
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0047	0.00235	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0182	0.00910	U



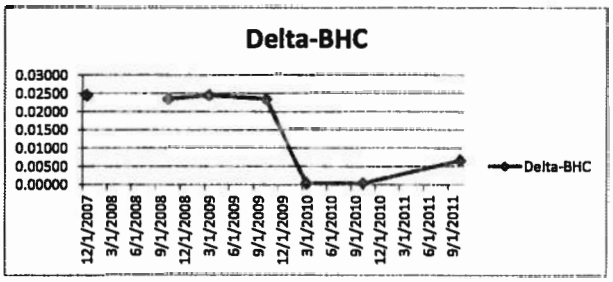
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0049	0.00245	U
4/24/2008	NS		
10/13/2008	0.0047	0.00235	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0047	0.00235	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00369	0.00185	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0523	0.02615	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0133	0.00665	U



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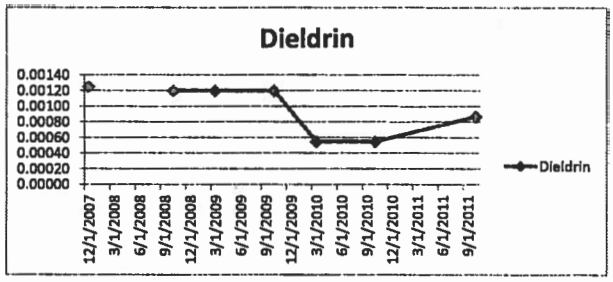
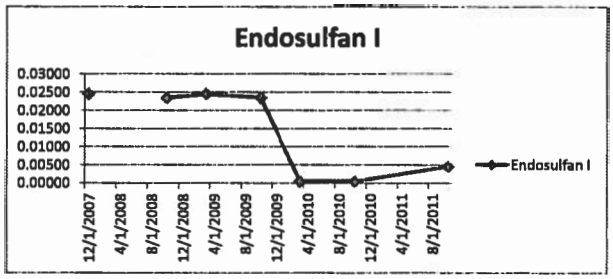
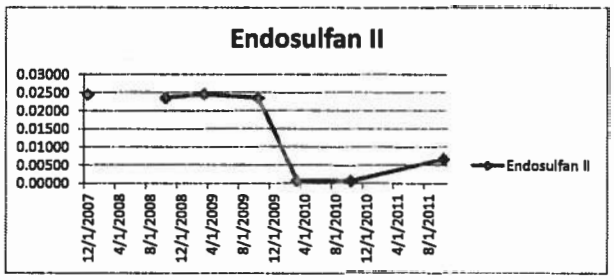
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0025	0.00125	U
4/24/2008	NS		
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00174	0.00087	U



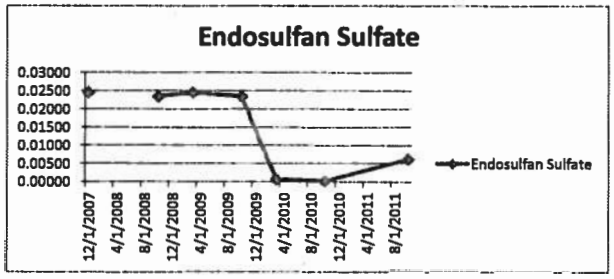
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00923	0.00462	U



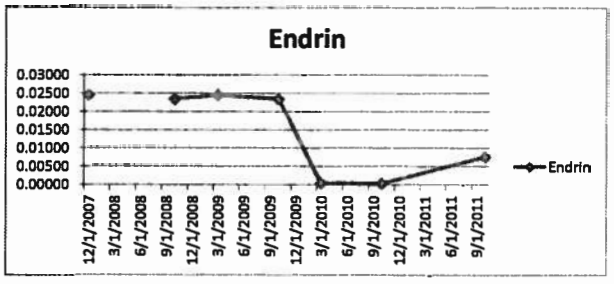
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0133	0.00665	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0123	0.00615	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0154	0.00770	U



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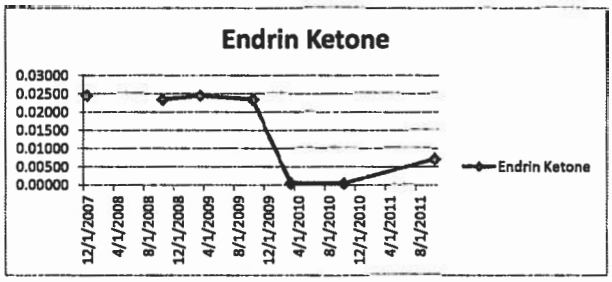
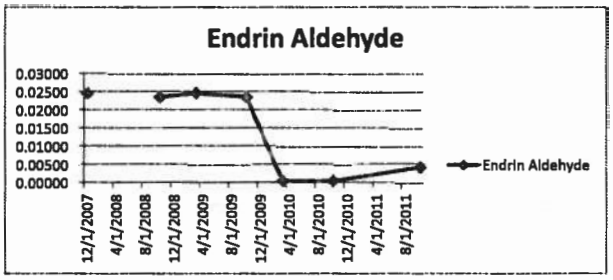
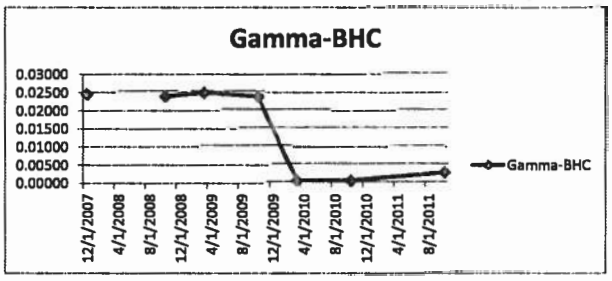
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0144	0.00720	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00821	0.00411	U

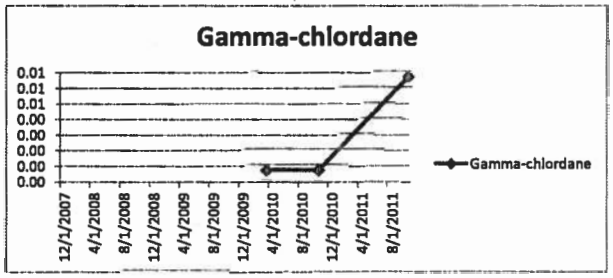


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00513	0.00257	U

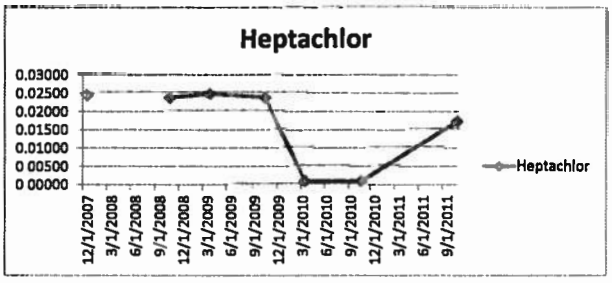


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NS		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0133	0.00665	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0338	0.01690	U



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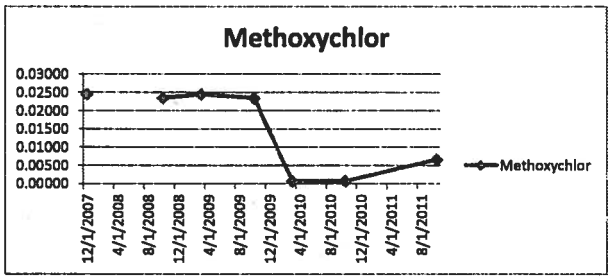
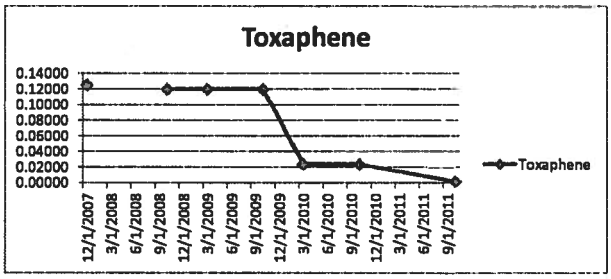
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.049	0.02450	U
4/24/2008	NS		
10/13/2008	0.047	0.02350	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0133	0.00665	U

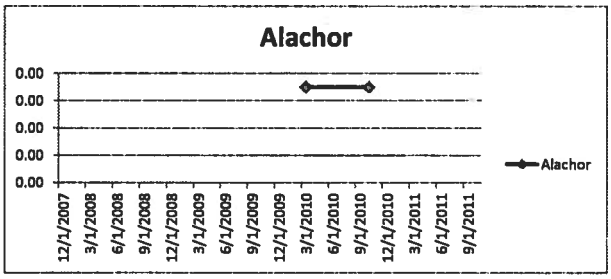


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.25	0.12500	U
4/24/2008	NS		
10/13/2008	0.24	0.12000	U
3/30/2009	0.24	0.12000	U
10/15/2009	0.24	0.12000	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	.00308	0.00154	U



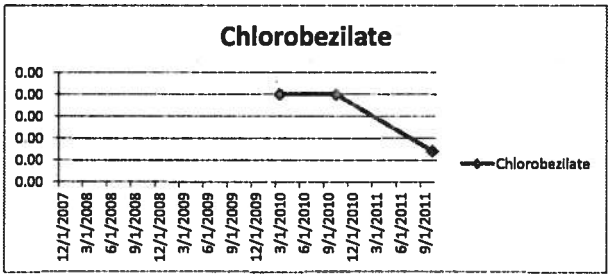
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NS		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



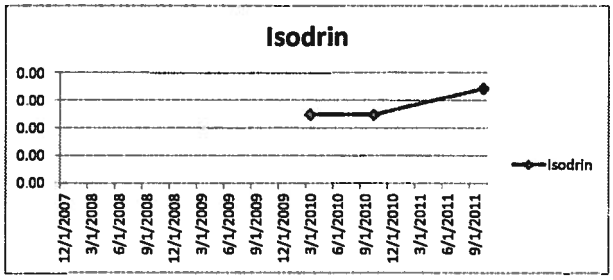
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NS		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0.00174	0.00087	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NS		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00138	0.00069	U

NA = Not Analyzed



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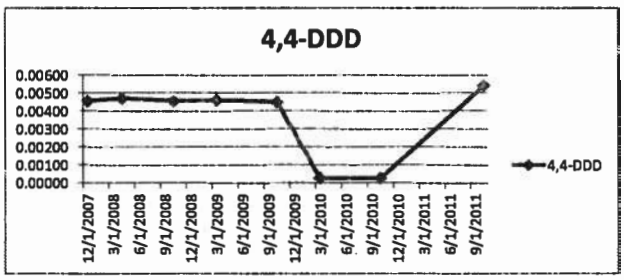
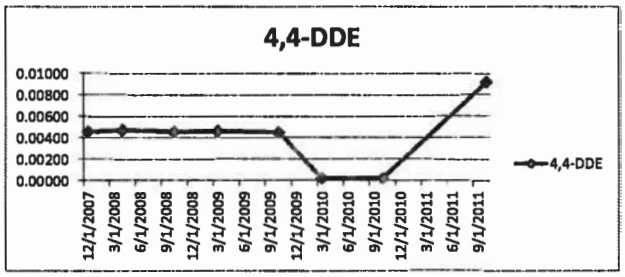
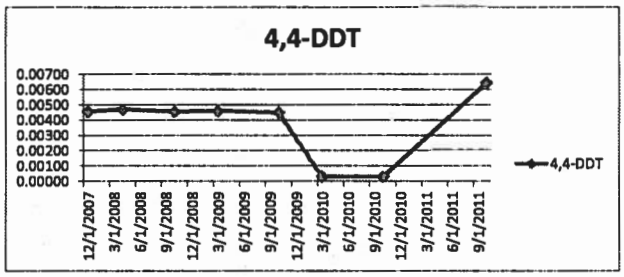
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0094	0.00470	U
10/13/2008	0.0091	0.00455	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0108	0.00540	U



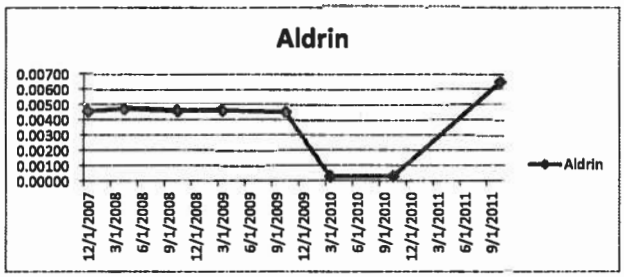
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0094	0.00470	U
10/13/2008	0.0091	0.00455	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0183	0.00915	U



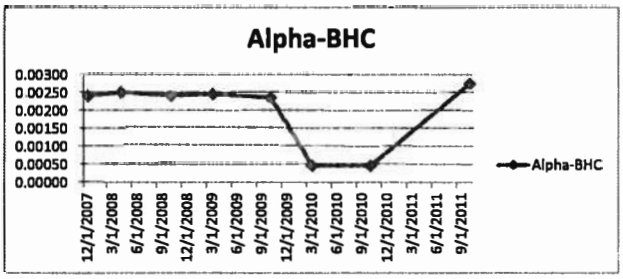
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0094	0.00470	U
10/13/2008	0.0091	0.00455	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0129	0.00645	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0091	0.00455	U
4/24/2008	0.0094	0.00470	U
10/13/2008	0.0091	0.00455	U
3/30/2009	0.0092	0.00460	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0008	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.0129	0.00645	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.005	0.00250	U
10/13/2008	0.0048	0.00240	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0047	0.00235	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.00548	0.00274	U



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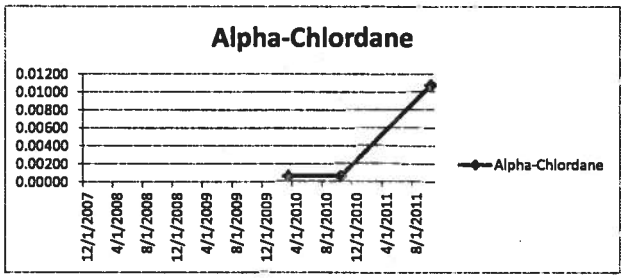
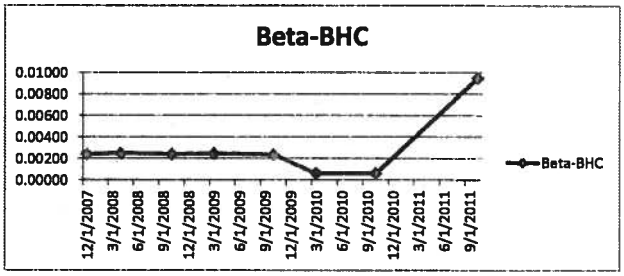
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0215	0.01075	U

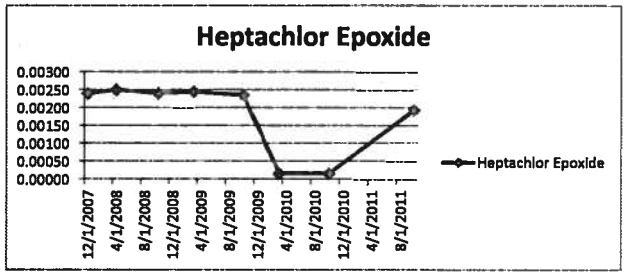
NA = Not Analyzed



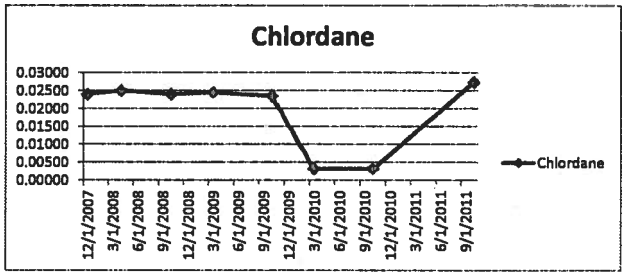
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.005	0.00250	U
10/13/2008	0.0048	0.00240	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0047	0.00235	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0190	0.00950	U



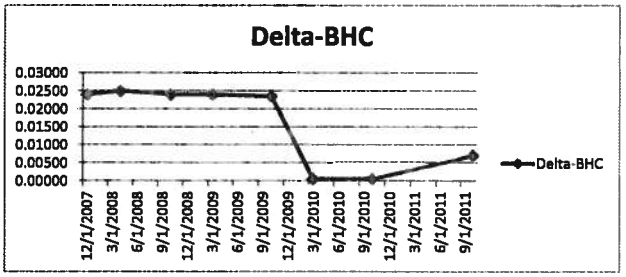
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.005	0.00250	U
10/13/2008	0.0048	0.00240	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0047	0.00235	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00387	0.00194	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0063	0.00315	U
10/13/2010	0.0063	0.00315	U
10/27/2011	0.0548	0.02740	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.048	0.02400	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0140	0.00700	U



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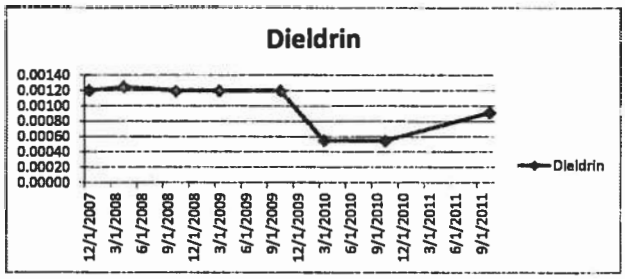
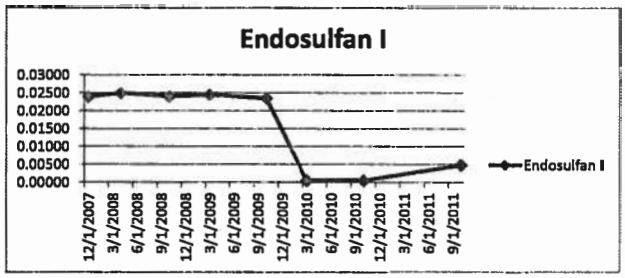
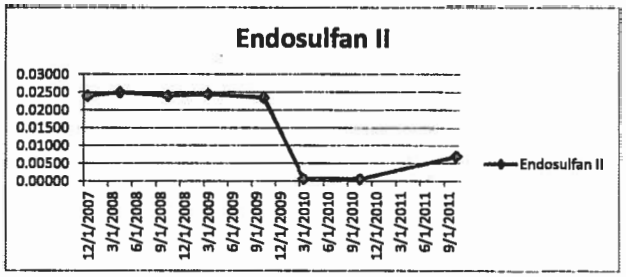
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0025	0.00125	U
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0024	0.00120	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00183	0.00092	U



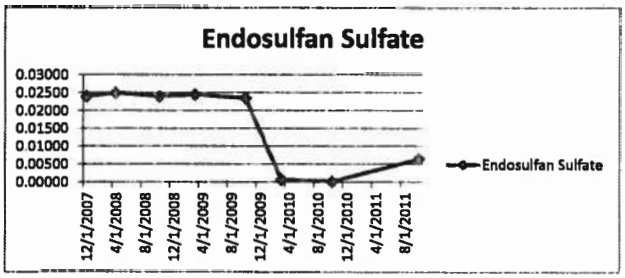
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00968	0.00484	U



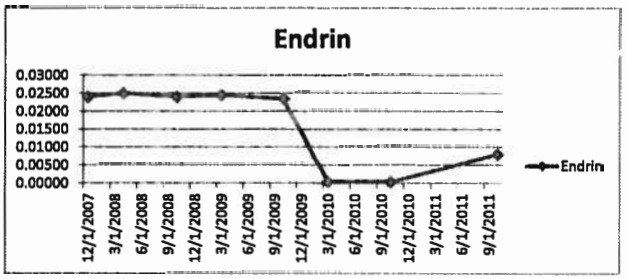
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0140	0.00700	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0129	0.00645	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0161	0.00805	U



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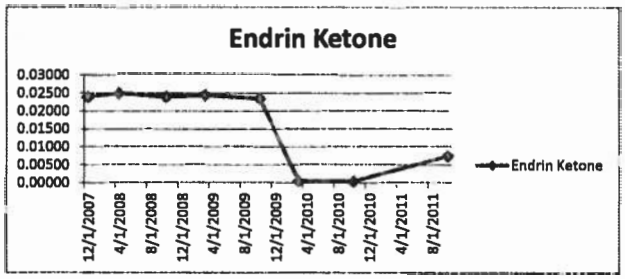
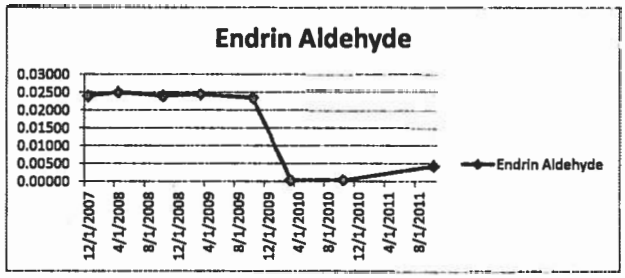
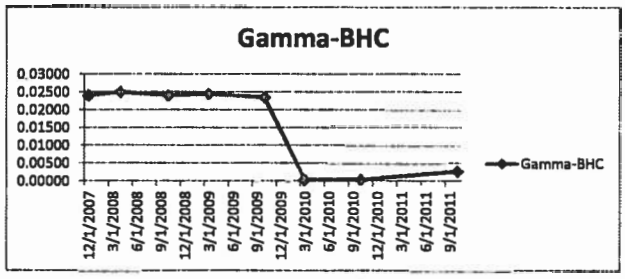
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0151	0.00755	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00860	0.00430	U

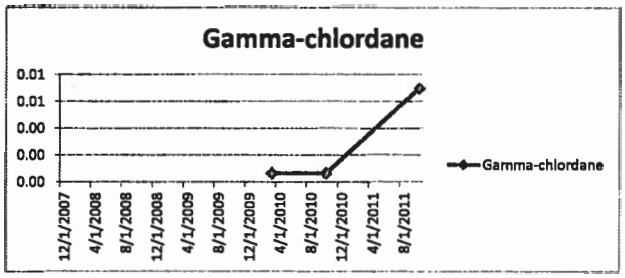


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00538	0.00269	U

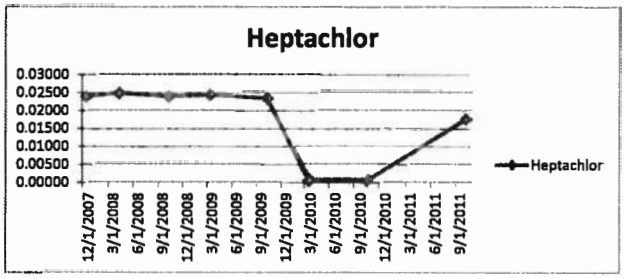


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0140	0.00700	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0355	0.01775	U



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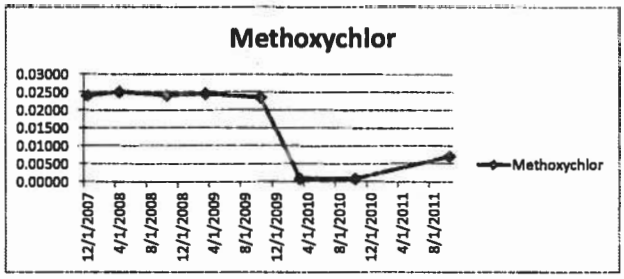
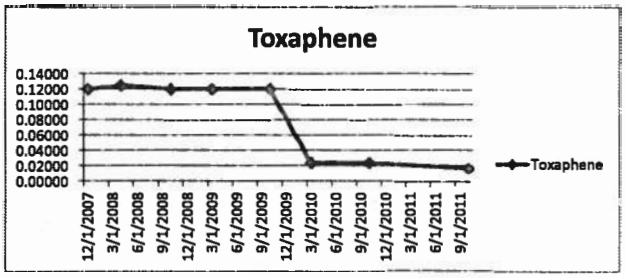
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.05	0.02500	U
10/13/2008	0.048	0.02400	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.047	0.02350	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0140	0.00700	U

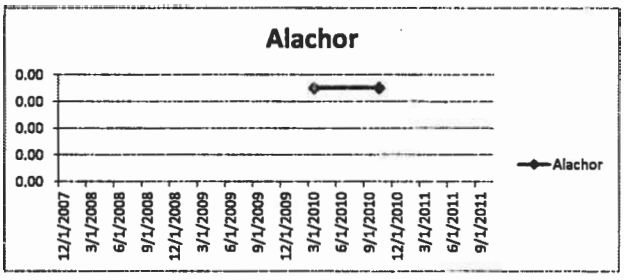


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.24	0.12000	U
4/24/2008	0.25	0.12500	U
10/13/2008	0.24	0.12000	U
3/30/2009	0.24	0.12000	U
10/15/2009	0.24	0.12000	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	0.0323	0.01615	U



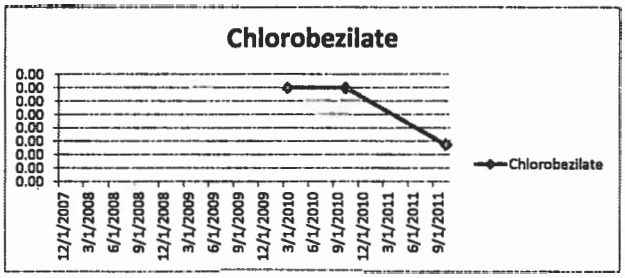
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



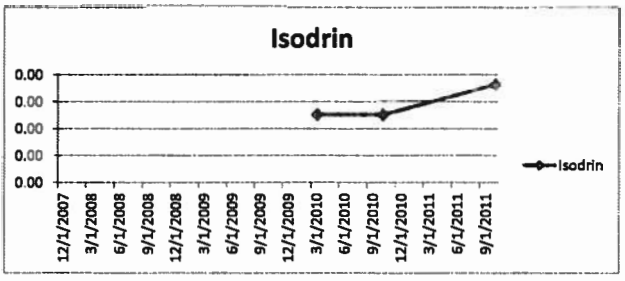
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0.00183	0.00092	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00145	0.00073	U

NA = Not Analyzed



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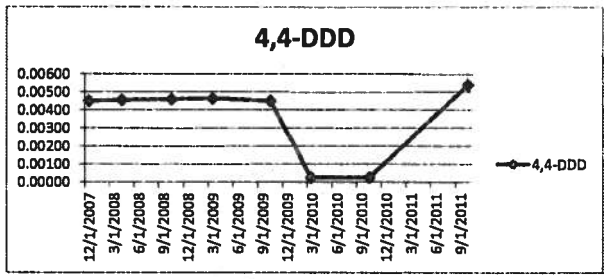
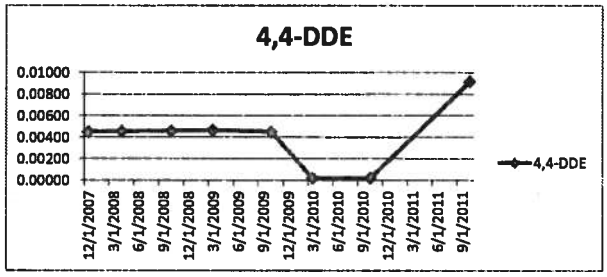
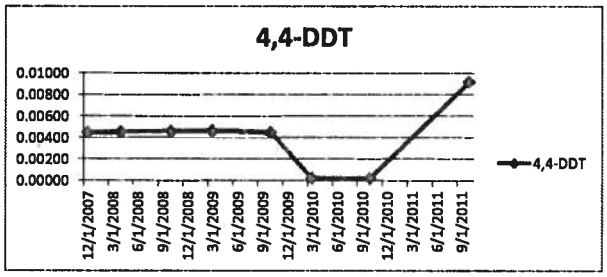
4,4-DDD Date	Validated Result	Censored Result	Qual
12/19/2007	0.0090	0.00450	U
4/24/2008	0.0091	0.00455	U
10/13/2008	0.0092	0.00460	U
3/30/2009	0.0093	0.00465	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0005	0.00025	U
10/13/2010	0.0005	0.00025	U
10/27/2011	0.0108	0.00540	U



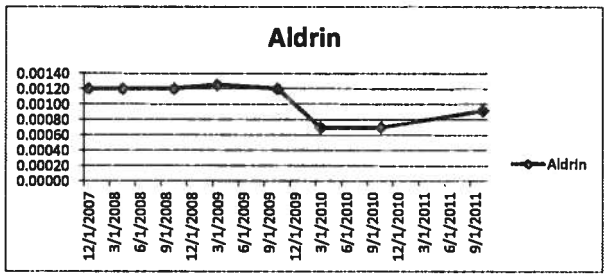
4,4-DDE Date	Validated Result	Censored Result	Qual
12/19/2007	0.0090	0.00450	U
4/24/2008	0.0091	0.00455	U
10/13/2008	0.0092	0.00460	U
3/30/2009	0.0093	0.00465	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0183	0.00915	U



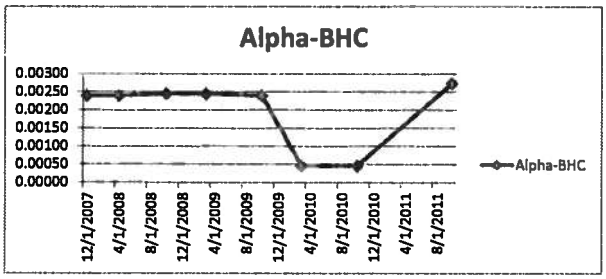
4,4-DDT Date	Validated Result	Censored Result	Qual
12/19/2007	0.0090	0.00450	U
4/24/2008	0.0091	0.00455	U
10/13/2008	0.0092	0.00460	U
3/30/2009	0.0093	0.00465	U
10/15/2009	0.0090	0.00450	U
3/16/2010	0.0004	0.00020	U
10/13/2010	0.0004	0.00020	U
10/27/2011	0.0183	0.00915	U



Aldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0025	0.00125	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	0.00183	0.00092	U



Alpha-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0048	0.00240	U
10/13/2008	0.0049	0.00245	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.00548	0.00274	U



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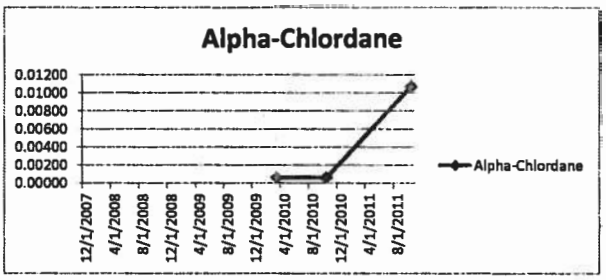
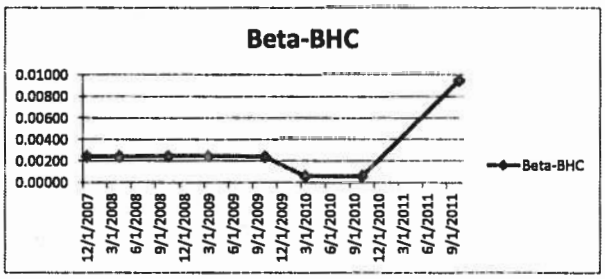
Alpha-Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0215	0.01075	U

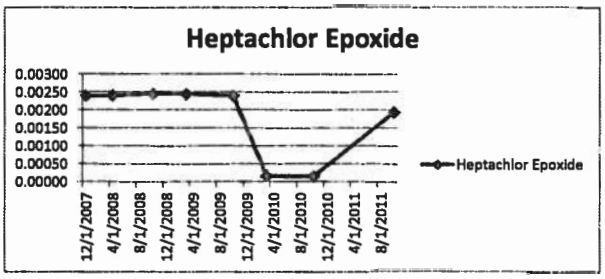
NA = Not Analyzed



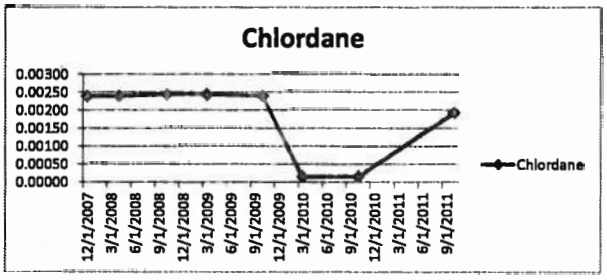
Beta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0048	0.00240	U
10/13/2008	0.0049	0.00245	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0190	0.00950	U



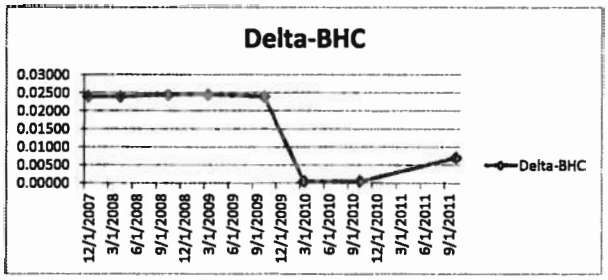
Heptachlor Epoxide Date	Validated Result	Censored Result	Qual
12/19/2007	0.0048	0.00240	U
4/24/2008	0.0048	0.00240	U
10/13/2008	0.0049	0.00245	U
3/30/2009	0.0049	0.00245	U
10/15/2009	0.0048	0.00240	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.00387	0.00194	U



Chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	.0048	0.00240	U
4/24/2008	.0048	0.00240	U
10/13/2008	.0049	0.00245	U
3/30/2009	.0049	0.00245	U
10/15/2009	.0048	0.00240	U
3/16/2010	0.0003	0.00015	U
10/13/2010	0.0003	0.00015	U
10/27/2011	.00387	0.00194	U



Delta-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0009	0.00045	U
10/13/2010	0.0009	0.00045	U
10/27/2011	0.0140	0.00700	U



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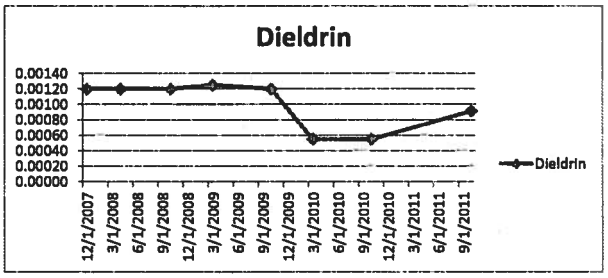
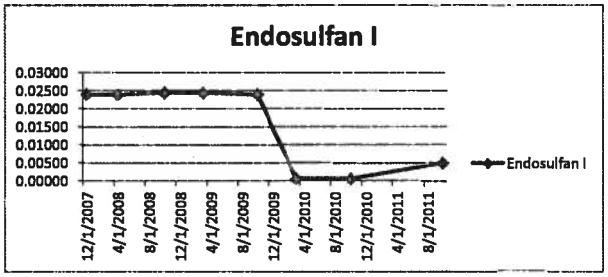
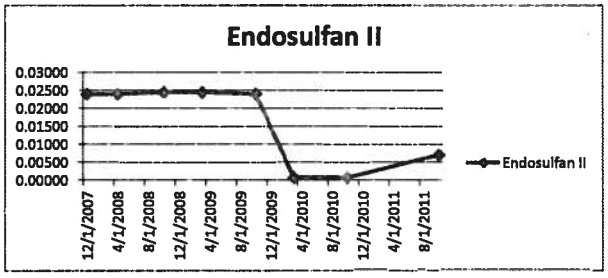
Dieldrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.0024	0.00120	U
4/24/2008	0.0024	0.00120	U
10/13/2008	0.0024	0.00120	U
3/30/2009	0.0025	0.00125	U
10/15/2009	0.0024	0.00120	U
3/16/2010	0.0011	0.00055	U
10/13/2010	0.0011	0.00055	U
10/27/2011	0.00183	0.00092	U



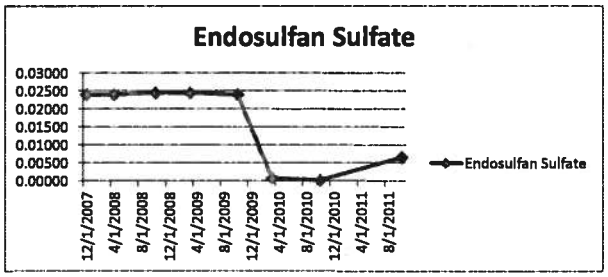
Endosulfan I Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.00968	0.00484	U



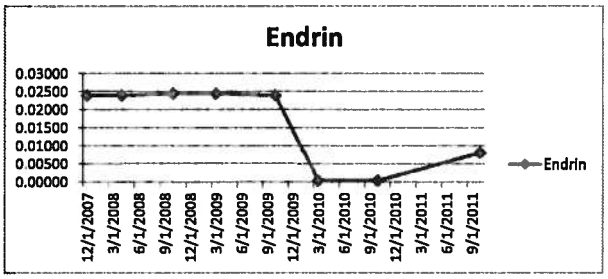
Endosulfan II Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0140	0.00700	U



Endosulfan Sulfate Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0003	0.00015	U
10/27/2011	0.0129	0.00645	U



Endrin Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.0161	0.00805	U



Monitoring Well 24GS15
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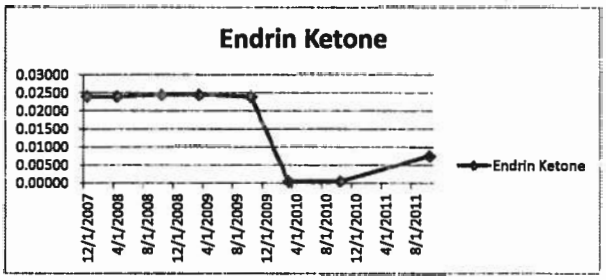
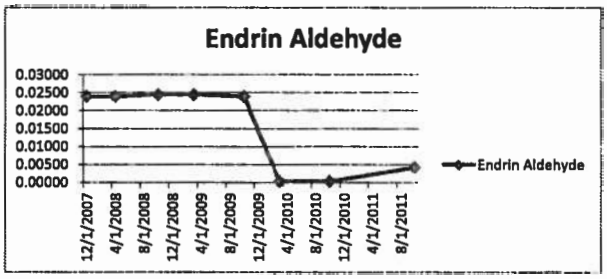
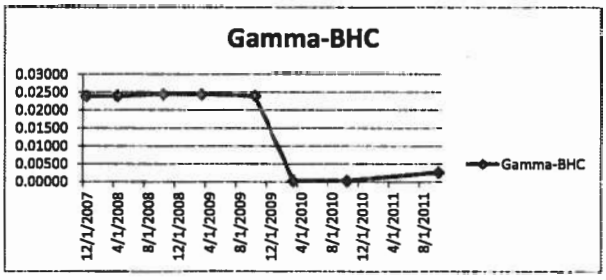
Endrin Ketone Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.001	0.00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0.0151	0.00755	U



Endrin Aldehyde Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0007	0.00035	U
10/13/2010	0.0007	0.00035	U
10/27/2011	0.00860	0.00430	U

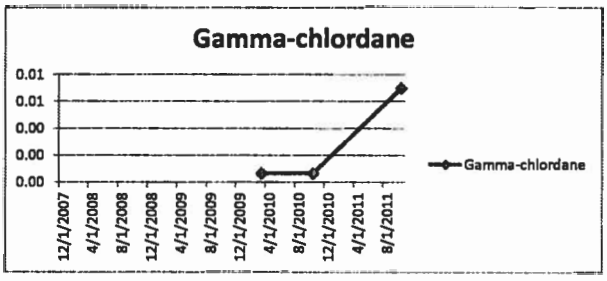


Gamma-BHC Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0006	0.00030	U
10/13/2010	0.0006	0.00030	U
10/27/2011	0.00538	0.00269	U

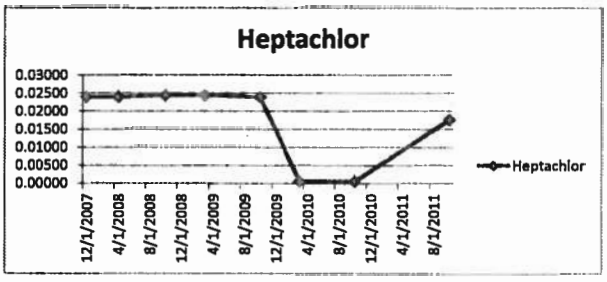


Gamma-chlordane Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0013	0.00065	U
10/13/2010	0.0013	0.00065	U
10/27/2011	0.0140	0.00700	U

NA = Not Analyzed



Heptachlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0012	0.00060	U
10/13/2010	0.0012	0.00060	U
10/27/2011	0.0355	0.01775	U



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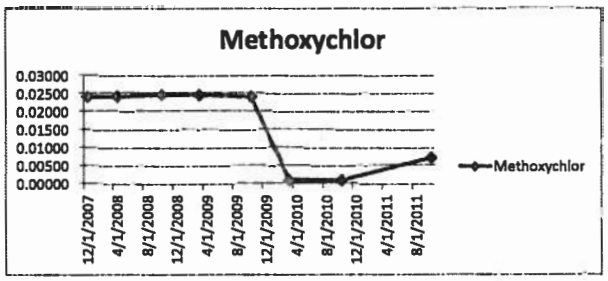
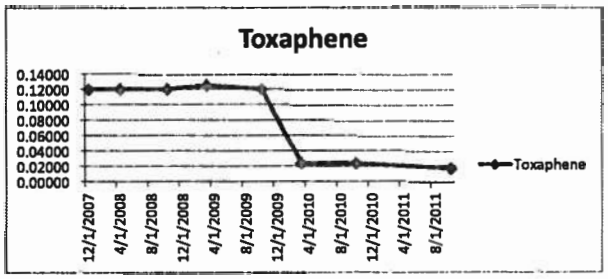
Methoxychlor Date	Validated Result	Censored Result	Qual
12/19/2007	0.048	0.02400	U
4/24/2008	0.048	0.02400	U
10/13/2008	0.049	0.02450	U
3/30/2009	0.049	0.02450	U
10/15/2009	0.048	0.02400	U
3/16/2010	0.0015	0.00075	U
10/13/2010	0.0015	0.00075	U
10/27/2011	0.0140	0.00700	U

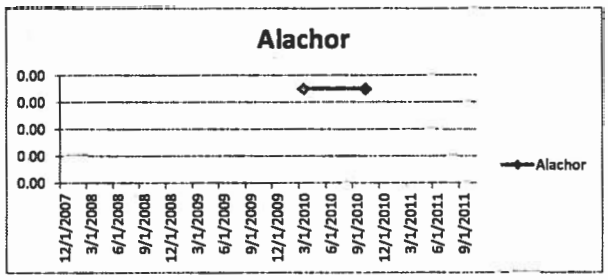


Toxaphene Date	Validated Result	Censored Result	Qual
12/19/2007	0.24	0.12000	U
4/24/2008	0.24	0.12000	U
10/13/2008	0.24	0.12000	U
3/30/2009	0.25	0.12500	U
10/15/2009	0.24	0.12000	U
3/16/2010	0.0471	0.02355	U
10/13/2010	0.0471	0.02355	U
10/27/2011	0.0323	0.01815	U



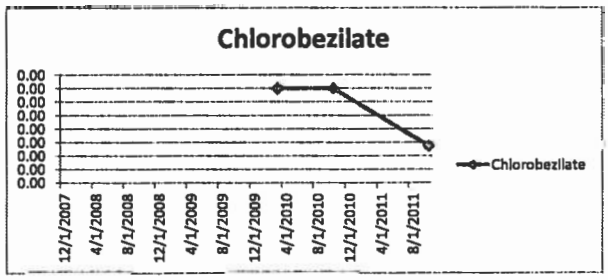
Alachor Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0.0014	0.00070	U
10/13/2010	0.0014	0.00070	U
10/27/2011	NA		

NA = Not Analyzed



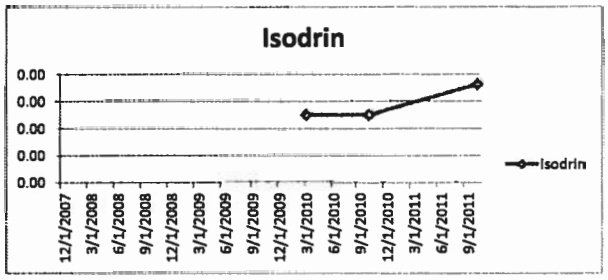
Chlorobezilate Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0 002	0.00100	U
10/13/2010	0.002	0.00100	U
10/27/2011	0 00183	0.00092	U

NA = Not Analyzed



Isodrin Date	Validated Result	Censored Result	Qual
12/19/2007	NA		
4/24/2008	NA		
10/13/2008	NA		
3/30/2009	NA		
10/15/2009	NA		
3/16/2010	0 001	0 00050	U
10/13/2010	0.001	0.00050	U
10/27/2011	0 00145	0 00073	U

NA = Not Analyzed



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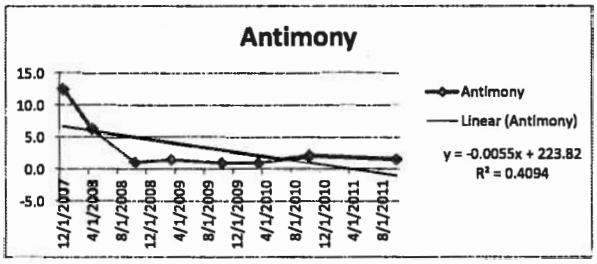
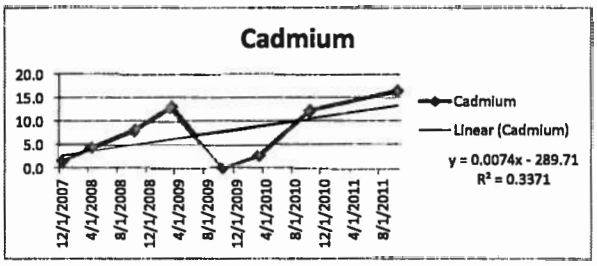
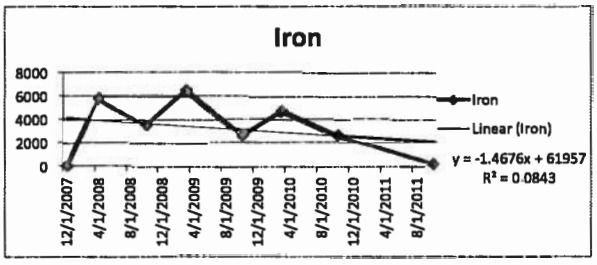
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	25.0	12.5	U
4/24/2008	8.3	8.3	V
10/13/2008	1.1	1.1	IV
3/30/2009	1.5	1.5	IV
10/15/2009	2.0	1.0	U
3/16/2010	2.0	1.0	U
10/13/2010	4.1	2.1	U
10/27/2011	3	1.5	U



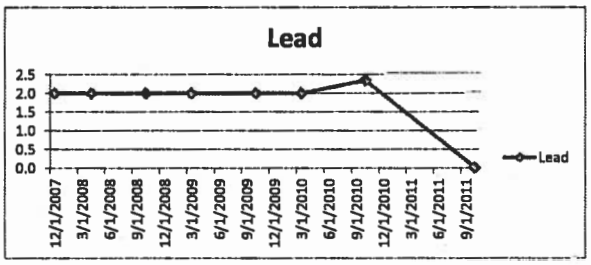
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	1.5	I
4/24/2008	4.3	4.3	I
10/13/2008	8.1	8.1	
3/30/2009	13.0	13.0	
10/15/2009	9.7	9.7	
3/16/2010	2.6	2.6	I
10/13/2010	12.2	12.2	
10/27/2011	16.4	16.4	



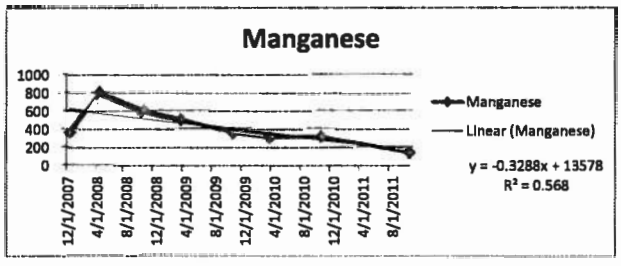
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	2600	2600	
4/24/2008	5800	5800	
10/13/2008	3500	3500	
3/30/2009	6500	6500	
10/15/2009	2600	2600	
3/16/2010	4700	4700	
10/13/2010	2572	2572	
10/27/2011	141	141	I



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	4.0	2.0	U
4/24/2008	4.0	2.0	U
10/13/2008	4.0	2.0	U
3/30/2009	4.0	2.0	U
10/15/2009	4.0	2.0	U
3/16/2010	4.0	2.0	U
10/13/2010	4.7	2.4	U
10/27/2011	0.0434	0.0217	U



Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	360	360	
4/24/2008	800	800	
10/13/2008	600	600	
3/30/2009	500	500	
10/15/2009	350	350	
3/16/2010	300	300	
10/13/2010	310	310	
10/27/2011	133	133	



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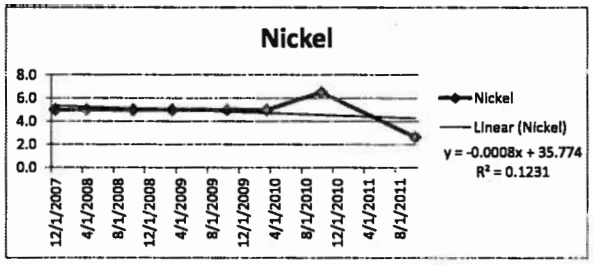
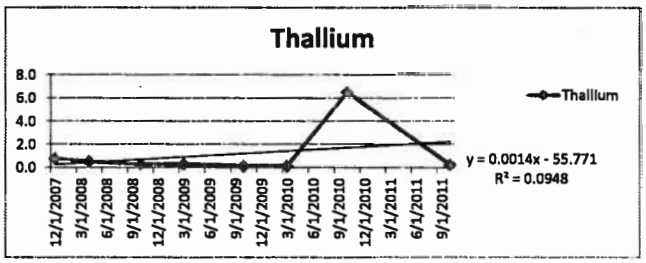
Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0 U	
4/24/2008	10.0	5.0 U	
10/13/2008	10.0	5.0 U	
3/30/2009	10.0	5.0 U	
10/15/2009	10.0	5.0 U	
3/16/2010	10.0	5.0 U	
10/13/2010	6.5	6.5 I	
10/27/2011	2.7	2.7 I	



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8 U	
4/24/2008	1.0	0.5 U	
10/13/2008	0.55	0.3 U	
3/30/2009	0.55	0.3 U	
10/15/2009	0.25	0.1 U	
3/16/2010	0.25	0.1 U	
10/13/2010	6.5	6.5 I	
10/27/2011	0.3	0.3 I	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	1
Maximum	12.5
Mean	3.369
Geometric Mean	2.114
Median	1.5
Standard Deviation	4.089
SEM	1.446
Mann-Kendall Test	
Test Value (S)	-10
Tabulated p-value	0.138
Standard Deviation of S	7.958
Standardized Value of S	-1.131
Approximate p-value	0.129

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	7
Minimum	1.5
Maximum	16.4
Mean	8.3
Geometric Mean	6.203
Median	8.1
Standard Deviation	5.74
SEM	2.169
Mann-Kendall Test	
Test Value (S)	13
Tabulated p-value	0.035
Standard Deviation of S	6.858
Standardized Value of S	1.802
Approximate p-value	0.0358

Statistically significant evidence of an increasing trend at the specified level of significance.

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Mann-Kendall Trend Test Analysis

User Selected Options	
Date/Time of Computation	########
From File	C:\USEPA\PROUCL\Mann Kendall data sets.xls.wst
Full Precision	OFF
Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	7
Minimum	141
Maximum	6500
Mean	3688
Geometric Mean	2485
Median	3500
Standard Deviation	2177
SEM	822.9
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.035
Standard Deviation of S	6.658
Standardized Value of S	-1.802
Approximate p-value	0.0358

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	133
Maximum	800
Mean	419.1
Geometric Mean	372.9
Median	355
Standard Deviation	207.2
SEM	73.27
Mann-Kendall Test	
Test Value (S)	-20
Tabulated p-value	0.007
Standard Deviation of S	8.083
Standardized Value of S	-2.351
Approximate p-value	0.00937

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	8
Minimum	2.66
Maximum	6.5
Mean	4.895
Geometric Mean	4.775
Median	5
Standard Deviation	1.045
SEM	0.369
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.548
Standard Deviation of S	8.083
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR01R
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Thallium

General Statistics	
Number of Values	8
Minimum	0.125
Maximum	6.5
Mean	1.1
Geometric Mean	0.405
Median	0.275
Standard Deviation	2.192
SEM	0.775
Mann-Kendall Test	
Test Value (S)	-10
Tabulated p-value	0.138
Standard Deviation of S	7.958
Standardized Value of S	-1.131
Approximate p-value	0.129

Insufficient evidence to identify a significant trend at the specified level of significance.

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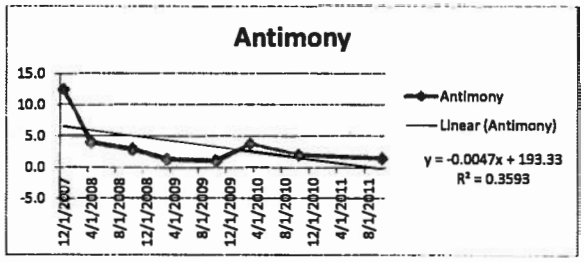
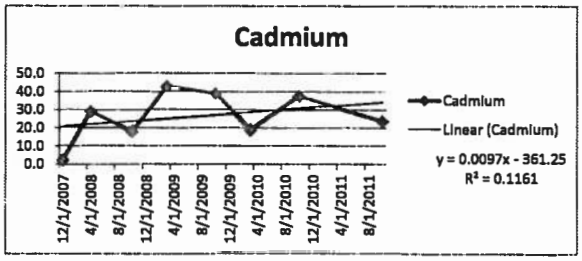
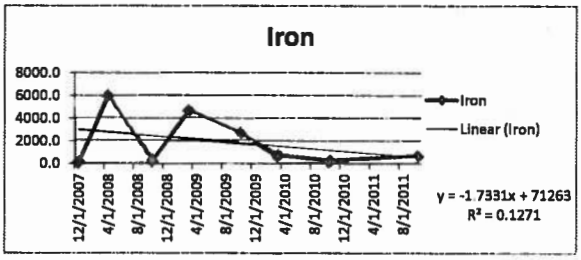
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	25.0	12.5	U
4/24/2008	4.0	4.0	IV
10/13/2008	2.9	2.9	V
3/30/2009	1.3	1.3	IV
10/15/2009	2.0	1.0	U
3/16/2010	3.8	3.8	I
10/13/2010	4.1	2.1	U
10/27/2011	3	1.5	U



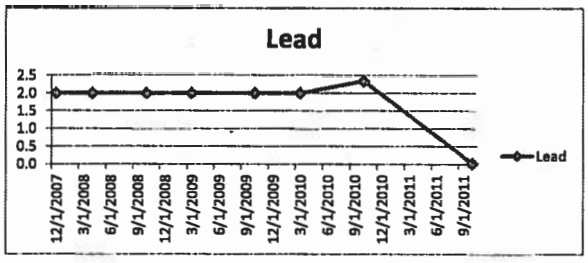
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	2.3	2.3	I
4/24/2008	29.0	29.0	
10/13/2008	18.0	18.0	
3/30/2009	43.0	43.0	
10/15/2009	39.0	39.0	
3/16/2010	19.0	19.0	
10/13/2010	37.5	37.5	
10/27/2011	23.8	23.8	



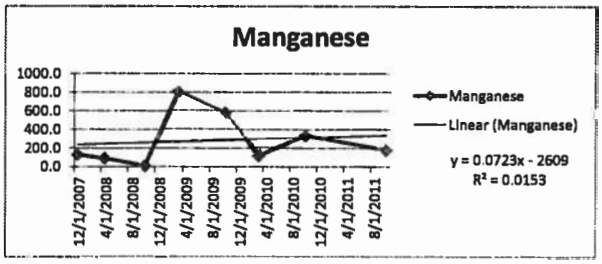
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	96.0	96.0	I
4/24/2008	6000	6000	
10/13/2008	230	230	
3/30/2009	4700	4700	
10/15/2009	2700	2700	
3/16/2010	680	680	
10/13/2010	177	177	I
10/27/2011	668	668	



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	4.0	2.0	U
4/24/2008	4.0	2.0	U
10/13/2008	4.0	2.0	U
3/30/2009	4.0	2.0	U
10/15/2009	4.0	2.0	U
3/16/2010	4.0	2.0	U
10/13/2010	4.7	2.4	U
10/27/2011	0.0434	0.0217	U



Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	130.0	130.0	
4/24/2008	92.0	92.0	
10/13/2008	12.0	12.0	
3/30/2009	810.0	810.0	
10/15/2009	580.0	580.0	
3/16/2010	120.0	120.0	
10/13/2010	337.7	337.7	
10/27/2011	181.0	181.0	



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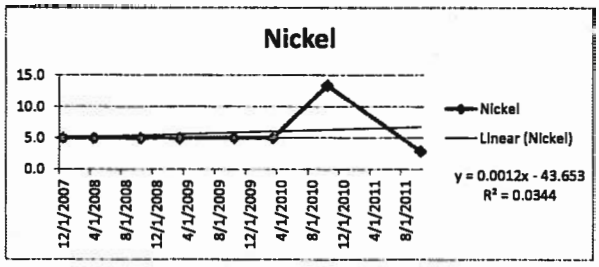
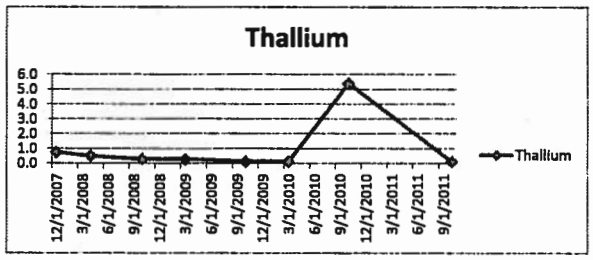
Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	13.4	13.4	
10/27/2011	2.9	2.9	I



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8	U
4/24/2008	1.0	0.5	U
10/13/2008	0.55	0.3	U
3/30/2009	0.55	0.3	U
10/15/2009	0.25	0.1	U
3/16/2010	0.25	0.1	U
10/13/2010	5.4	5.4	I
10/27/2011	0.12	0.1	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	1
Maximum	12.5
Mean	3.631
Geometric Mean	2.617
Median	2.475
Standard Deviation	3.756
SEM	1.328
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	8.083
Standardized Value of S	-1.608
Approximate p-value	0.0539

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	8
Minimum	2.3
Maximum	43
Mean	28.45
Geometric Mean	20.73
Median	26.4
Standard Deviation	13.51
SEM	4.776
Mann-Kendall Test	
Test Value (S)	8
Tabulated p-value	0.274
Standard Deviation of S	8.083
Standardized Value of S	0.619
Approximate p-value	0.268

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR02R
OU 13
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	96
Maximum	6000
Mean	1906
Geometric Mean	778.4
Median	874
Standard Deviation	2309
SEM	816.2
Mann-Kendall Test	
Test Value (S)	-4
Tabulated p-value	0.36
Standard Deviation of S	8.083
Standardized Value of S	-0.371
Approximate p-value	0.355

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	12
Maximum	810
Mean	282.8
Geometric Mean	182.8
Median	155.5
Standard Deviation	277.5
SEM	98.13
Mann-Kendall Test	
Test Value (S)	4
Tabulated p-value	0.36
Standard Deviation of S	8.083
Standardized Value of S	0.371
Approximate p-value	0.355

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	8
Minimum	2.88
Maximum	13.4
Mean	5.785
Geometric Mean	5.279
Median	5
Standard Deviation	3.165
SEM	1.119
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.548
Standard Deviation of S	6.083
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR02R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

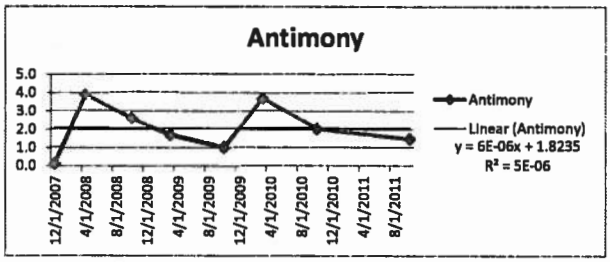
Thallium

General Statistics	
Number of Values	8
Minimum	0.12
Maximum	5.4
Mean	0.946
Geometric Mean	0.361
Median	0.275
Standard Deviation	1.813
SEM	0.641
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	7.958
Standardized Value of S	-1.634
Approximate p-value	0.0512

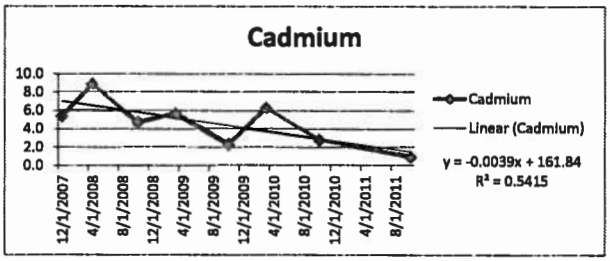
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR03R
OU 13
NAS Pensacola, Pensacola Florida

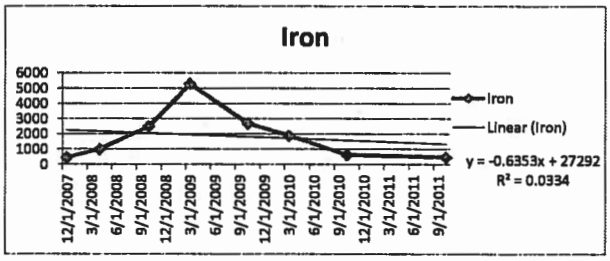
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	0.25	0.1	U
4/24/2008	3.9	3.9	IV
10/13/2008	2.6	2.6	V
3/30/2009	1.7	1.7	IV
10/15/2009	2.0	1.0	U
3/16/2010	3.7	3.7	I
10/13/2010	4.1	2.1	U
10/27/2011	3.0	1.5	U



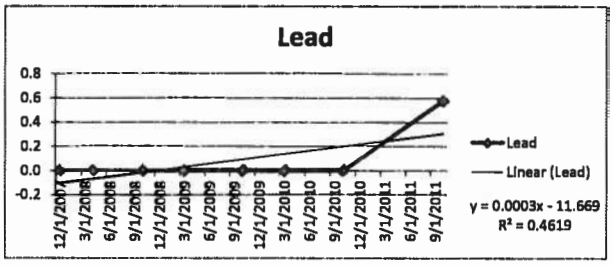
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	5.4	5.4	
4/24/2008	8.9	8.9	
10/13/2008	4.7	4.7	I
3/30/2009	5.7	5.7	
10/15/2009	2.3	2.3	I
3/16/2010	6.3	6.3	
10/13/2010	2.8	2.8	I
10/27/2011	1.0	1.0	



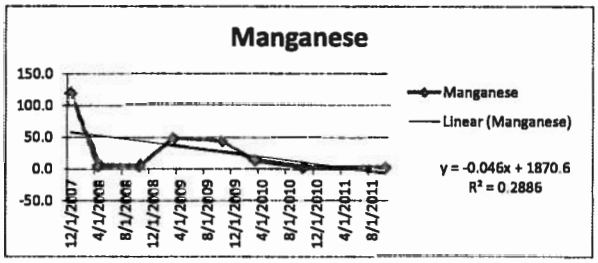
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	450	450	
4/24/2008	1000	1000	
10/13/2008	2500	2500	
3/30/2009	5300	5300	
10/15/2009	2700	2700	
3/16/2010	1900	1900	
10/13/2010	638	638	
10/27/2011	470	470	



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	4.0	4.0	
4/24/2008	4.0	4.0	
10/13/2008	4.0	4.0	
3/30/2009	4.0	4.0	
10/15/2009	4.0	4.0	
3/16/2010	4.0	4.0	
10/13/2010	4.7	4.7	
10/27/2011	0.58	0.58	I



Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	120.0	120.0	
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	49.0	49.0	
10/15/2009	44.0	44.0	
3/16/2010	14.0	14.0	
10/13/2010	6.4	3.2	U
10/27/2011	3.77	3.77	



Monitoring Well 08GR03R
OU 13
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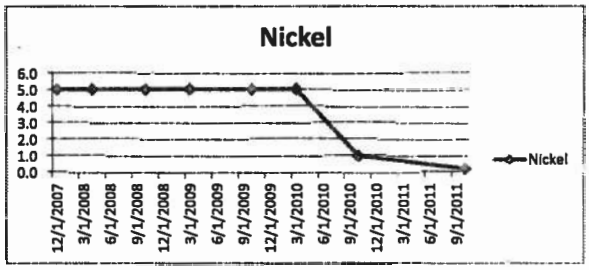
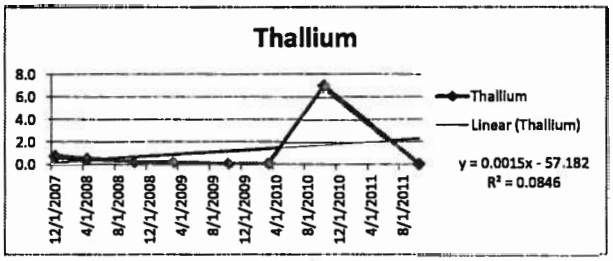
Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	1.9	1.0	U
10/27/2011	0.344	0.172	U



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8	U
4/24/2008	1.0	0.5	U
10/13/2008	0.55	0.3	U
3/30/2009	0.55	0.3	U
10/15/2009	0.25	0.1	U
3/16/2010	0.25	0.1	U
10/13/2010	7.0	7.0	I
10/27/2011	0.1	0.05	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	0.125
Maximum	3.9
Mean	2.072
Geometric Mean	1.492
Median	1.875
Standard Deviation	1.292
SEM	0.457
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.452
Standard Deviation of S	8.063
Standardized Value of S	-0.124
Approximate p-value	0.451

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	8
Minimum	0.96
Maximum	8.9
Mean	4.633
Geometric Mean	3.868
Median	5.05
Standard Deviation	2.536
SEM	0.897
Mann-Kendall Test	
Test Value (S)	-12
Tabulated p-value	0.089
Standard Deviation of S	8.083
Standardized Value of S	-1.361
Approximate p-value	0.0868

Insufficient evidence to identify a significant trend at the specified level of significance.

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OU 13
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	450
Maximum	5300
Mean	1870
Geometric Mean	1319
Median	1450
Standard Deviation	1652
SEM	584.1
Mann-Kendall Test	
Test Value (S)	-2
Tabulated p-value	0.452
Standard Deviation of S	8.083
Standardized Value of S	-0.124
Approximate p-value	0.451

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	1
Minimum	0.58
Maximum	0.58
Mean	0.58
Geometric Mean	0.58
Median	0.58
Standard Deviation	N/A
SEM	N/A
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	N/A
Standard Deviation of S	0
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	3.2
Maximum	120
Mean	30.5
Geometric Mean	13.48
Median	9.5
Standard Deviation	40.65
SEM	14.37
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.089
Standard Deviation of S	8.021
Standardized Value of S	-1.496
Approximate p-value	0.0673

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR03R
OU 13
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Thallium

General Statistics	
Number of Values	8
Minimum	0.05
Maximum	7
Mean	1.138
Geometric Mean	0.334
Median	0.275
Standard Deviation	2.38
SEM	0.841
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	7.958
Standardized Value of S	-1.634
Approximate p-value	0.0512

Insufficient evidence to identify a significant trend at the specified level of significance.

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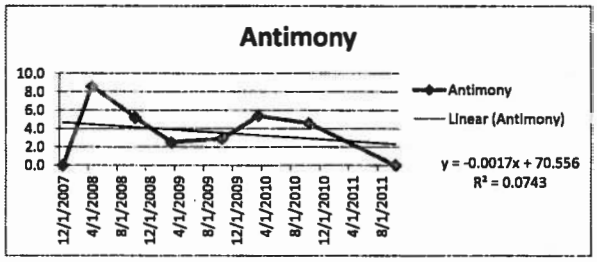
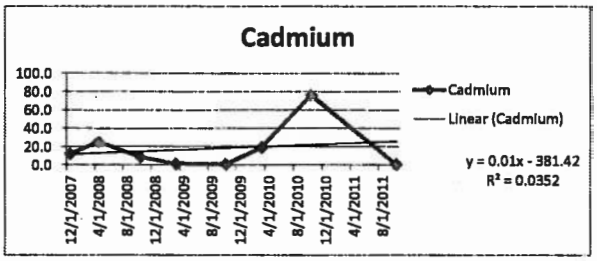
OU 13
NAS Pensacola, Pensacola Florida

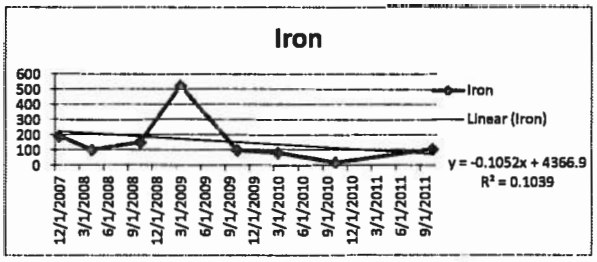
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	0.25	0.25	
4/24/2008	8.6	8.6	V
10/13/2008	5.2	5.2	V
3/30/2009	2.5	2.5	V
10/15/2009	2.9	2.9	I
3/16/2010	5.4	5.4	
10/13/2010	4.6	4.6	I
10/27/2011	3.0	3.0	



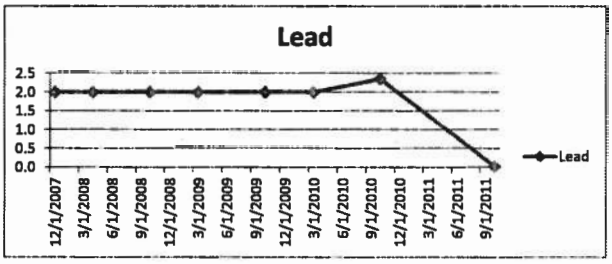
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	12.0	12.0	
4/24/2008	25.0	25.0	
10/13/2008	8.4	8.4	
3/30/2009	1.2	1.2	I
10/15/2009	1.0	0.5	U
3/16/2010	19.0	19.0	
10/13/2010	76.2	76.2	
10/27/2011	0.42	0.42	I



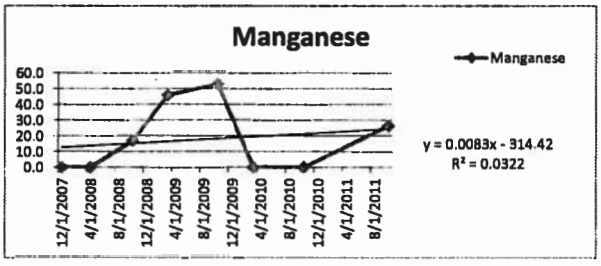
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	190	190	
4/24/2008	100	100	
10/13/2008	150	150	
3/30/2009	520	520	
10/15/2009	97	97.0	I
3/16/2010	80	80.0	I
10/13/2010	32	16.0	U
10/27/2011	106	106	I



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	4.0	2.0	U
4/24/2008	4.0	2.0	U
10/13/2008	4.0	2.0	U
3/30/2009	4.0	2.0	U
10/15/2009	4.0	2.0	U
3/16/2010	4.0	2.0	U
10/13/2010	4.7	2.4	U
10/27/2011	0.0434	0.0217	U



Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	17.0	17.0	
3/30/2009	48.0	46.0	
10/15/2009	53.0	53.0	
3/16/2010	10.0	5.0	U
10/13/2010	6.4	3.2	U
10/27/2011	26.5	26.5	



Monitoring Well 08GR05
OU 13
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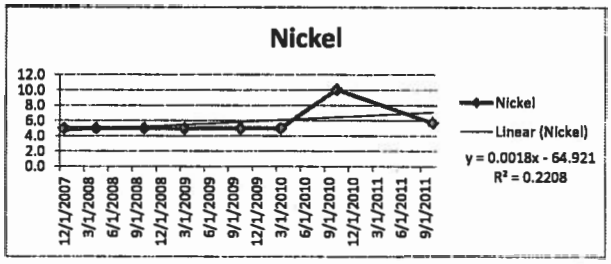
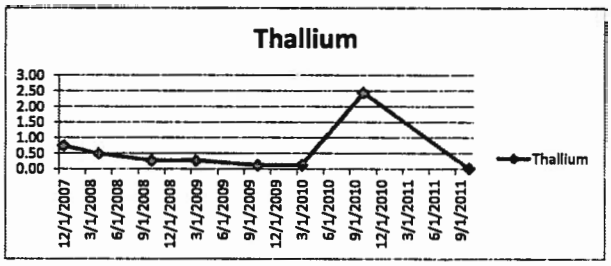
Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	10.1	10.1	
10/27/2011	5.72	5.72	



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.75	U
4/24/2008	1.0	0.50	U
10/13/2008	0.55	0.28	U
3/30/2009	0.55	0.28	U
10/15/2009	0.25	0.13	U
3/16/2010	0.25	0.13	U
10/13/2010	4.9	2.45	U
10/27/2011	0.0475	0.0238	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	6
Minimum	2.5
Maximum	8.6
Mean	4.867
Geometric Mean	4.477
Median	4.9
Standard Deviation	2.185
SEM	0.892
Mann-Kendall Test	
Test Value (S)	-3
Tabulated p-value	0.36
Standard Deviation of S	5.323
Standardized Value of S	-0.376
Approximate p-value	0.354

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Cadmium

General Statistics	
Number of Values	8
Minimum	0.42
Maximum	76.2
Mean	17.84
Geometric Mean	5.565
Median	10.2
Standard Deviation	25.25
SEM	8.927
Mann-Kendall Test	
Test Value (S)	-6
Tabulated p-value	0.274
Standard Deviation of S	8.083
Standardized Value of S	-0.619
Approximate p-value	0.268

Insufficient evidence to identify a significant trend at the specified level of significance.

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OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	0.42
Maximum	78.2
Mean	17.84
Geometric Mean	5.565
Median	10.2
Standard Deviation	25.25
SEM	8.927
Mann-Kendall Test	
Test Value (S)	-8
Tabulated p-value	0.274
Standard Deviation of S	8.083
Standardized Value of S	-0.619
Approximate p-value	0.268

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	3.2
Maximum	53
Mean	20.09
Geometric Mean	12.03
Median	11
Standard Deviation	19.9
SEM	7.037
Mann-Kendall Test	
Test Value (S)	3
Tabulated p-value	0.452
Standard Deviation of S	7.853
Standardized Value of S	0.255
Approximate p-value	0.399

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	8
Minimum	5
Maximum	10.1
Mean	5.728
Geometric Mean	5.552
Median	5
Standard Deviation	1.785
SEM	0.631
Mann-Kendall Test	
Test Value (S)	11
Tabulated p-value	0.138
Standard Deviation of S	6.083
Standardized Value of S	1.644
Approximate p-value	0.0501

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR05
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

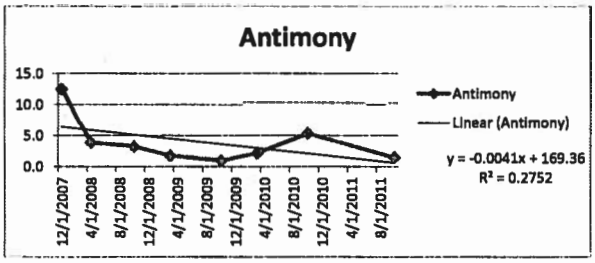
Thallium

General Statistics		
Number of Values		0
Minimum	N/A	
Maximum	N/A	
Mean	N/A	
Geometric Mean	N/A	
Median	N/A	
Standard Deviation	N/A	
SEM	N/A	
Mann-Kendall Test		
Test Value (S)		0
Tabulated p-value	N/A	
Standard Deviation of S		0
Standardized Value of S	N/A	
Approximate p-value	N/A	

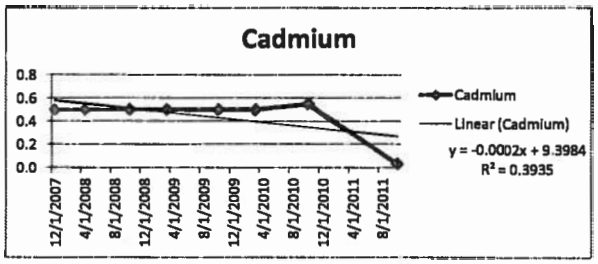
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR06R
OU 13
NAS Pensacola, Pensacola Florida

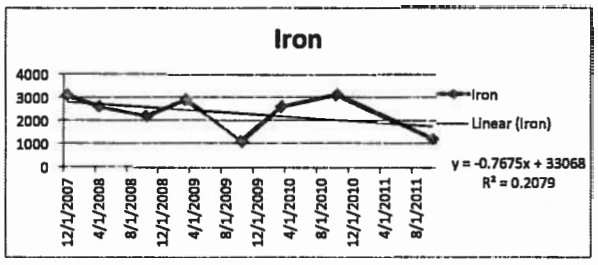
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	25.0	12.5	U
4/24/2008	3.9	3.9	IV
10/13/2008	3.3	3.3	V
3/30/2009	1.8	1.8	IV
10/15/2009	2.0	1.0	U
3/16/2010	2.2	2.2	I
10/13/2010	5.4	5.4	I
10/27/2011	3.0	1.5	U



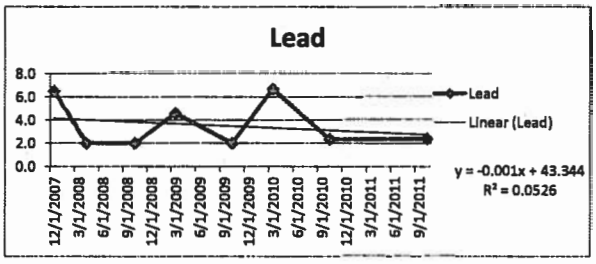
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	1.0	0.5	U
4/24/2008	1.0	0.5	U
10/13/2008	1.0	0.5	U
3/30/2009	1.0	0.5	U
10/15/2009	1.0	0.5	U
3/16/2010	1.0	0.5	U
10/13/2010	1.1	0.6	U
10/27/2011	0.0614	0.0307	U



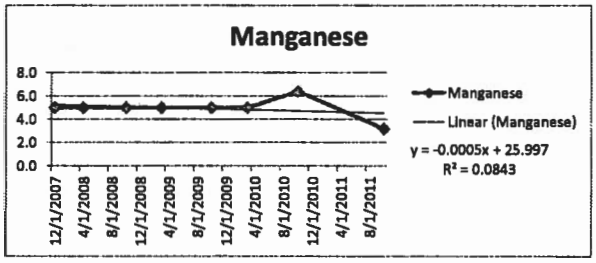
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	3100	3100	
4/24/2008	2600	2600	
10/13/2008	2200	2200	
3/30/2009	2900	2900	
10/15/2009	1100	1100	
3/16/2010	2600	2600	
10/13/2010	3124	3124	
10/27/2011	1210	1210	



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	6.5	6.5	
4/24/2008	4.0	2.0	U
10/13/2008	4.0	2.0	U
3/30/2009	4.6	4.6	I
10/15/2009	4.0	2.0	U
3/16/2010	6.7	6.7	
10/13/2010	4.7	2.4	U
10/27/2011	2.41	2.41	



Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	6.4	6.4	I
10/27/2011	3.2	3.2	



Monitoring Well 08GR06R
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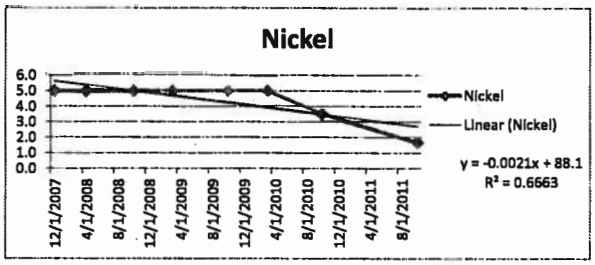
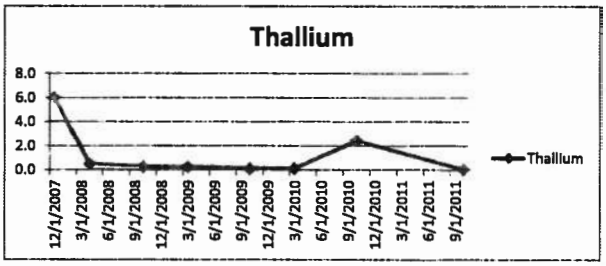
Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	3.5	3.5	I
10/27/2011	1.68	1.68	I



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	12	6.0	U
4/24/2008	1.0	0.5	U
10/13/2008	0.55	0.3	U
3/30/2009	0.55	0.3	U
10/15/2009	0.25	0.1	U
3/16/2010	0.25	0.1	U
10/13/2010	4.9	2.5	U
10/27/2011	0.05	0.05	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	1
Maximum	12.5
Mean	3.95
Geometric Mean	2.911
Median	2.75
Standard Deviation	3.742
SEM	1.323
Mann-Kendall Test	
Test Value (S)	-12
Tabulated p-value	0.089
Standard Deviation of S	8.083
Standardized Value of S	-1.361
Approximate p-value	0.0868

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	1100
Maximum	3124
Mean	2354
Geometric Mean	2204
Median	2600
Standard Deviation	799.4
SEM	282.6
Mann-Kendall Test	
Test Value (S)	-5
Tabulated p-value	0.36
Standard Deviation of S	8.021
Standardized Value of S	-0.499
Approximate p-value	0.309

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 08GR06R
OU 13
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	2
Maximum	6.7
Mean	3.57
Geometric Mean	3.124
Median	2.38
Standard Deviation	2.059
SEM	0.728
Mann-Kendall Test	
Test Value (S)	3
Tabulated p-value	0.452
Standard Deviation of S	7.853
Standardized Value of S	0.255
Approximate p-value	0.399

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	2
Maximum	6.7
Mean	3.57
Geometric Mean	3.124
Median	2.38
Standard Deviation	2.059
SEM	0.728
Mann-Kendall Test	
Test Value (S)	3
Tabulated p-value	0.452
Standard Deviation of S	7.653
Standardized Value of S	0.255
Approximate p-value	0.399

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

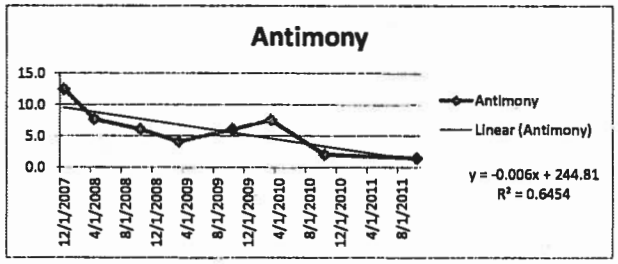
Nickel

General Statistics	
Number of Values	8
Minimum	1.68
Maximum	5
Mean	4.398
Geometric Mean	4.173
Median	5
Standard Deviation	1.217
SEM	0.43
Mann-Kendall Test	
Test Value (S)	-13
Tabulated p-value	0.089
Standard Deviation of S	6.083
Standardized Value of S	-1.973
Approximate p-value	0.0243

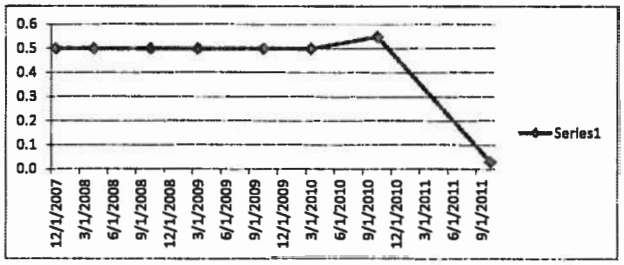
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS01
OU 13
NAS Pensacola, Pensacola Florida

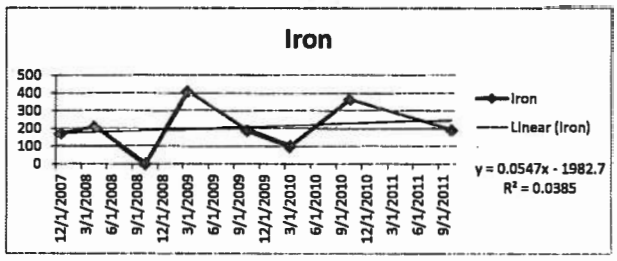
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	25.0	12.5	U
4/24/2008	7.7	7.7	V
10/13/2008	6.1	6.1	V
3/30/2009	4.1	4.1	V
10/15/2009	6.1	6.1	
3/16/2010	7.6	7.6	
10/13/2010	4.1	2.1	U
10/27/2011	3.0	1.5	U



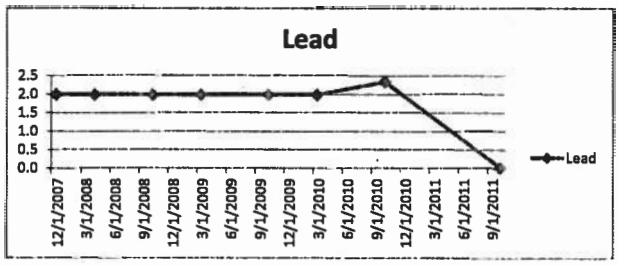
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	1.0	0.5	U
4/24/2008	1.0	0.5	U
10/13/2008	1.0	0.5	U
3/30/2009	1.0	0.5	U
10/15/2009	1.0	0.5	U
3/16/2010	1.0	0.5	U
10/13/2010	1.1	0.6	U
10/27/2011	0.0614	0.0307	U



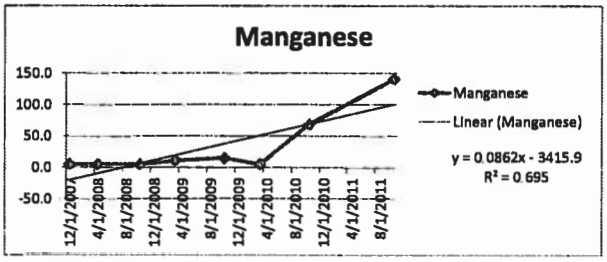
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	170	170	
4/24/2008	210	210	
10/13/2008	60.0	60.0	
3/30/2009	410	410	
10/15/2009	190	190	
3/16/2010	100	100	
10/13/2010	366	366	
10/27/2011	194	194	



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	4.0	2.0	U
4/24/2008	4.0	2.0	U
10/13/2008	4.0	2.0	U
3/30/2009	4.0	2.0	U
10/15/2009	4.0	2.0	U
3/16/2010	4.0	2.0	U
10/13/2010	4.7	2.4	U
10/27/2011	0.0434	0.0217	U



Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	11.0	11.0	
10/15/2009	15.0	15.0	
3/16/2010	10.0	5.0	U
10/13/2010	68.6	68.6	
10/27/2011	141	141	



Monitoring Well 24GS01
OU 13
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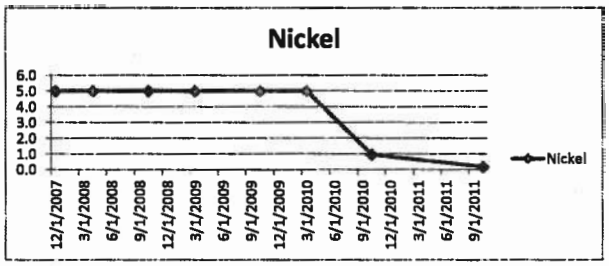
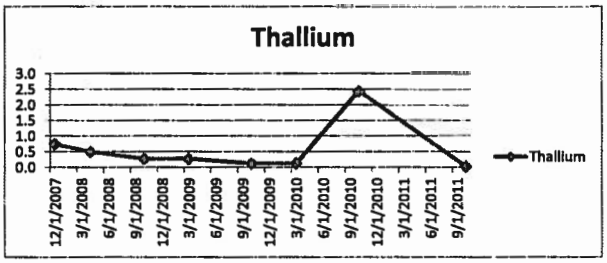
Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	1.9	0.95	U
10/27/2011	0.344	0.172	U



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8	U
4/24/2008	1.0	0.5	U
10/13/2008	0.55	0.3	U
3/30/2009	0.55	0.3	U
10/15/2009	0.25	0.1	U
3/16/2010	0.25	0.1	U
10/13/2010	4.9	2.5	U
10/27/2011	0.0475	0.0	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	1.5
Maximum	12.5
Mean	5.956
Geometric Mean	4.92
Median	6.1
Standard Deviation	3.529
SEM	1.248
Mann-Kendall Test	
Test Value (S)	-19
Tabulated p-value	0.016
Standard Deviation of S	8.021
Standardized Value of S	-2.244
Approximate p-value	0.0124

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	7
Minimum	100
Maximum	410
Mean	234.2
Geometric Mean	212.7
Median	194
Standard Deviation	111.4
SEM	42.1
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.5
Standard Deviation of S	6.658
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS01
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

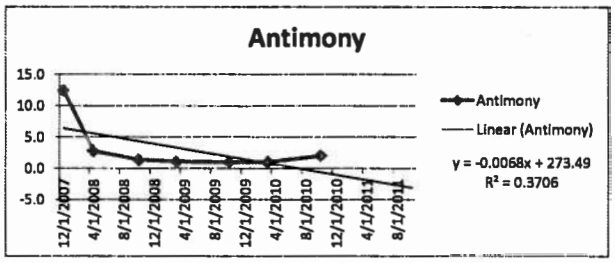
Manganese

General Statistics	
Number of Values	8
Minimum	5
Maximum	141
Mean	31.95
Geometric Mean	13.33
Median	8
Standard Deviation	49.09
SEM	17.35
Mann-Kendall Test	
Test Value (S)	18
Tabulated p-value	0.016
Standard Deviation of S	7.528
Standardized Value of S	2.258
Approximate p-value	0.012

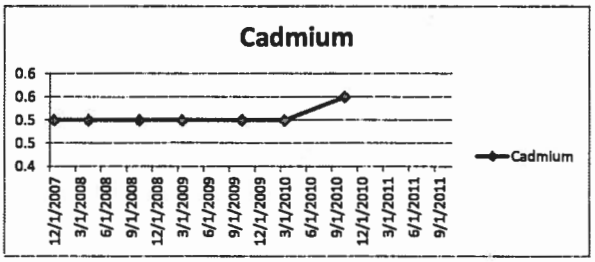
Statistically significant evidence of an increasing trend at the specified level of significance.

Monitoring Well 24GS02R
OU 13
NAS Pensacola, Pensacola Florida

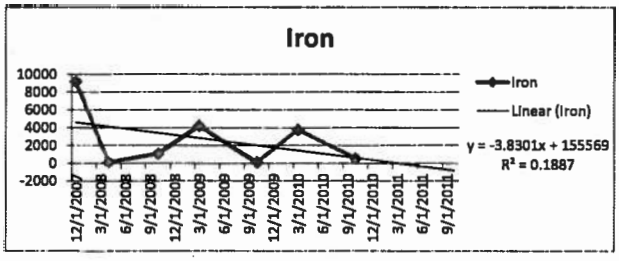
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	25.0	12.5	U
4/24/2008	2.8	2.8	IV
10/13/2008	1.4	1.4	IV
3/30/2009	1.1	1.1	IV
10/15/2009	2.0	1.0	U
3/16/2010	2.0	1.0	U
10/13/2010	4.1	2.1	U
10/27/2011	NS		



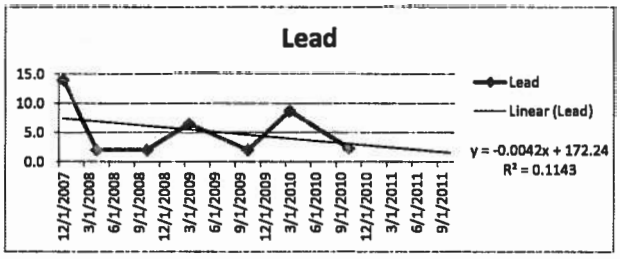
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	1.0	0.5	U
4/24/2008	1.0	0.5	U
10/13/2008	1.0	0.5	U
3/30/2009	1.0	0.5	U
10/15/2009	1.0	0.5	U
3/16/2010	1.0	0.5	U
10/13/2010	1.1	0.55	U
10/27/2011	NS		



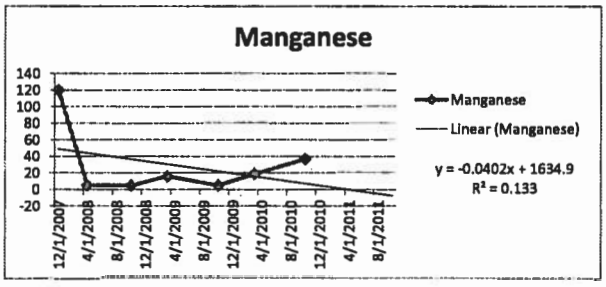
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	9200	9200	
4/24/2008	130	130	
10/13/2008	1100	1100	
3/30/2009	4200	4200	
10/15/2009	120	120	
3/16/2010	3800	3800	
10/13/2010	570	570	
10/27/2011	NS		



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	14.0	14.0	
4/24/2008	4.0	2.0	U
10/13/2008	4.0	2.0	U
3/30/2009	6.5	6.5	
10/15/2009	4.0	2.0	U
3/16/2010	8.7	8.7	
10/13/2010	4.7	2.4	U
10/27/2011	NS		

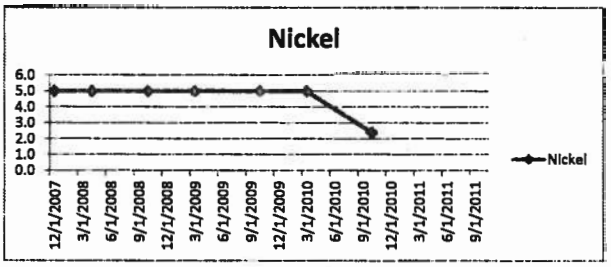


Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	120	120	
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	16.0	16.0	
10/15/2009	10.0	5.0	U
3/16/2010	19.0	19.0	
10/13/2010	36.9	36.9	
10/27/2011	NS		

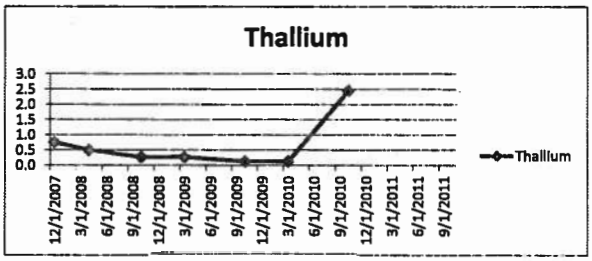


Monitoring Well 24GS02R
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	2.4	2.4	
10/27/2011	NS		



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8	U
4/24/2008	1.0	0.5	U
10/13/2008	0.55	0.3	U
3/30/2009	0.55	0.3	U
10/15/2009	0.25	0.1	U
3/16/2010	0.25	0.1	U
10/13/2010	4.9	2.5	U
10/27/2011	NS		



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	7
Minimum	1
Maximum	12.5
Mean	3.121
Geometric Mean	1.958
Median	1.4
Standard Deviation	4.188
SEM	1.583
Mann-Kendall Test	
Test Value (S)	-12
Tabulated p-value	0.035
Standard Deviation of S	6.583
Standardized Value of S	-1.671
Approximate p-value	0.0474

Statistically significant evidence of a decreasing trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	7
Minimum	120
Maximum	9200
Mean	2731
Geometric Mean	1053
Median	1100
Standard Deviation	3318
SEM	1254
Mann-Kendall Test	
Test Value (S)	-5
Tabulated p-value	0.281
Standard Deviation of S	6.658
Standardized Value of S	-0.601
Approximate p-value	0.274

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS02R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	7
Minimum	2
Maximum	14
Mean	5.364
Geometric Mean	3.946
Median	2.35
Standard Deviation	4.655
SEM	1.76
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.5
Standard Deviation of S	6.377
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

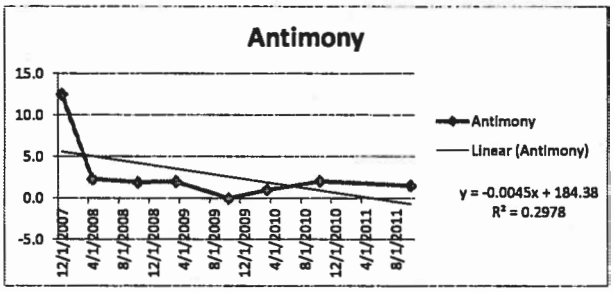
Manganese

General Statistics	
Number of Values	7
Minimum	5
Maximum	120
Mean	29.56
Geometric Mean	14.97
Median	16
Standard Deviation	41.51
SEM	15.69
Mann-Kendall Test	
Test Value (S)	4
Tabulated p-value	0.281
Standard Deviation of S	6.377
Standardized Value of S	0.47
Approximate p-value	0.319

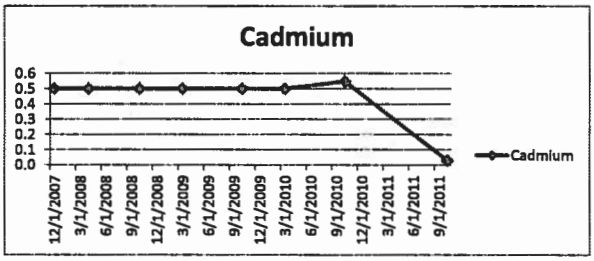
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS06R
OU 13
NAS Pensacola, Pensacola Florida

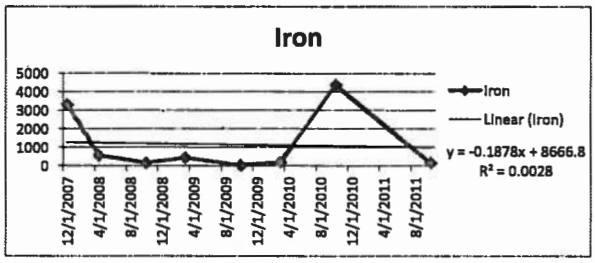
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	25.0	12.5	U
4/24/2008	2.3	2.3	IV
10/13/2008	1.9	1.9	IV
3/30/2009	2.0	2.0	IV
10/15/2009	6	6	I
3/16/2010	2.0	1.0	U
10/13/2010	4.1	2.1	U
10/27/2011	3.0	1.5	U



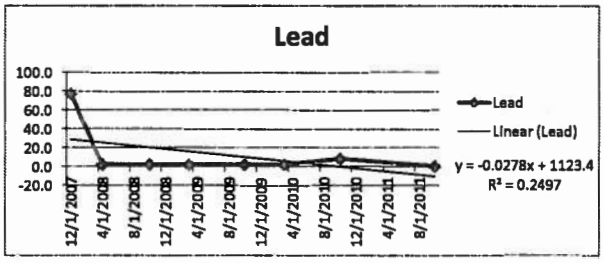
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	1.0	0.5	U
4/24/2008	1.0	0.5	U
10/13/2008	1.0	0.5	U
3/30/2009	1.0	0.5	U
10/15/2009	1.0	0.5	U
3/16/2010	1.0	0.5	U
10/13/2010	1.1	0.6	U
10/27/2011	0.0614	0.0307	U



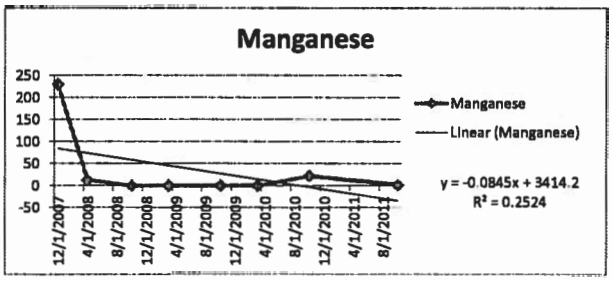
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	3300	3300	
4/24/2008	560	560	
10/13/2008	170	170	
3/30/2009	430	430	
10/15/2009	60	30	U
3/16/2010	190	190	
10/13/2010	4373	4373	
10/27/2011	159	159	



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	77.0	77.0	
4/24/2008	4.0	2.0	U
10/13/2008	4.0	2.0	U
3/30/2009	4.0	2.0	U
10/15/2009	4.0	2.0	U
3/16/2010	4.0	2.0	U
10/13/2010	8.1	8.1	I
10/27/2011	0.22	0.22	I



Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	230	230	
4/24/2008	13.0	13.0	
10/13/2008	10.0	10.0	
3/30/2009	10.0	10.0	
10/15/2009	10.0	10.0	
3/16/2010	10.0	10.0	
10/13/2010	22.1	22.1	
10/27/2011	1.86	1.86	I



Monitoring Well 24GS06R
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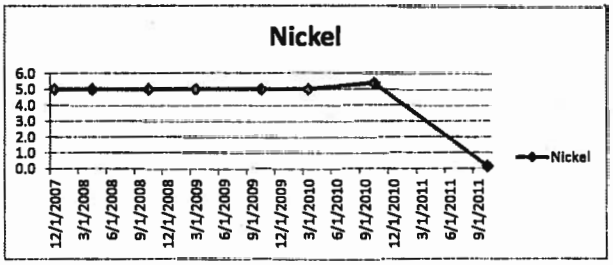
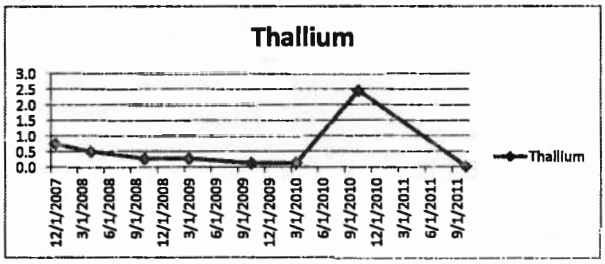
Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	5.4	5.4	
10/27/2011	0.344	0.172	U



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8	U
4/24/2008	1.0	0.5	U
10/13/2008	0.55	0.3	U
3/30/2009	0.55	0.3	U
10/15/2009	0.25	0.1	U
3/16/2010	0.25	0.1	U
10/13/2010	4.9	2.5	U
10/27/2011	0.0475	0.0	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	7
Minimum	1
Maximum	12.5
Mean	3.321
Geometric Mean	2.296
Median	2
Standard Deviation	4.07
SEM	1.538
Mann-Kendall Test	
Test Value (S)	-11
Tabulated p-value	0.068
Standard Deviation of S	6.658
Standardized Value of S	-1.502
Approximate p-value	0.0666

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	30
Maximum	4373
Mean	1152
Geometric Mean	390
Median	310
Standard Deviation	1690
SEM	597.5
Mann-Kendall Test	
Test Value (S)	-8
Tabulated p-value	0.119
Standard Deviation of S	8.083
Standardized Value of S	-0.866
Approximate p-value	0.193

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS06R
OU 13
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	0.22
Maximum	77
Mean	11.92
Geometric Mean	2.853
Median	2
Standard Deviation	26.4
SEM	9.334
Mann-Kendall Test	
Test Value (S)	-8
Tabulated p-value	0.119
Standard Deviation of S	6.976
Standardized Value of S	-1.003
Approximate p-value	0.158

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	4
Minimum	1.86
Maximum	230
Mean	66.74
Geometric Mean	18.72
Median	17.55
Standard Deviation	109.2
SEM	54.58
Mann-Kendall Test	
Test Value (S)	-4
Tabulated p-value	0.167
Standard Deviation of S	2.944
Standardized Value of S	-1.019
Approximate p-value	0.154

Insufficient evidence to identify a significant trend at the specified level of significance.

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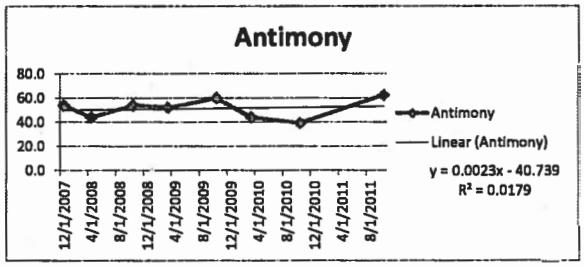
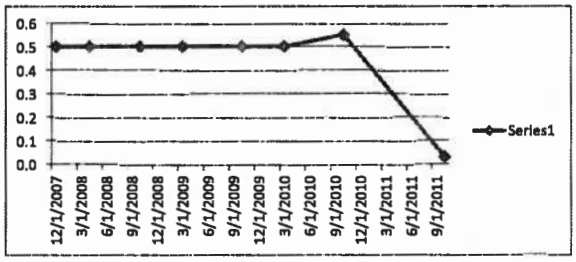
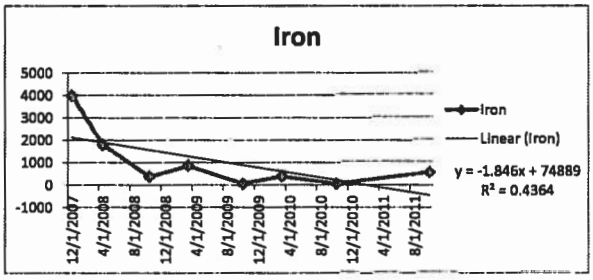
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	54.0	54.0	
4/24/2008	44.0	44.0	V
10/13/2008	54.0	54.0	V
3/30/2009	52.0	52.0	V
10/15/2009	60.0	60.0	
3/16/2010	44.0	44.0	
10/13/2010	39.3	39.3	
10/27/2011	62.4	62.4	



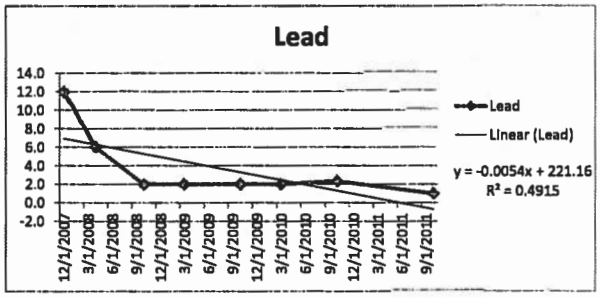
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	1.0	0.5	U
4/24/2008	1.0	0.5	U
10/13/2008	1.0	0.5	U
3/30/2009	1.0	0.5	U
10/15/2009	1.0	0.5	U
3/16/2010	1.0	0.5	U
10/13/2010	1.1	0.6	U
10/27/2011	0.0614	0.0	U



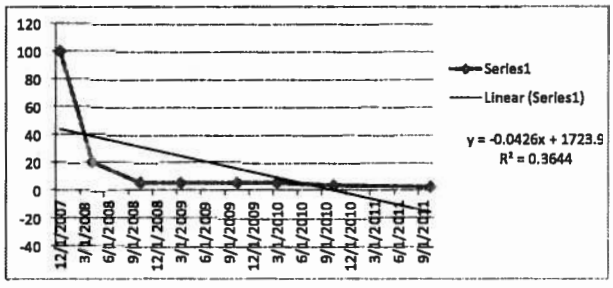
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	4000	4000	
4/24/2008	1800	1800	
10/13/2008	370	370	
3/30/2009	860	860	
10/15/2009	70	70	I
3/16/2010	390	390	
10/13/2010	68.8	68.8	I
10/27/2011	583	583	



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	12.0	12.0	
4/24/2008	6.0	6.0	
10/13/2008	4.0	2.0	U
3/30/2009	4.0	2.0	U
10/15/2009	4.0	2.0	U
3/16/2010	4.0	2.0	U
10/13/2010	4.7	2.4	U
10/27/2011	0.99	0.99	I



Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	100	100	
4/24/2008	20.0	20.0	
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	6.4	3.2	U
10/27/2011	2.2	2.2	I



Monitoring Well 24GS09R
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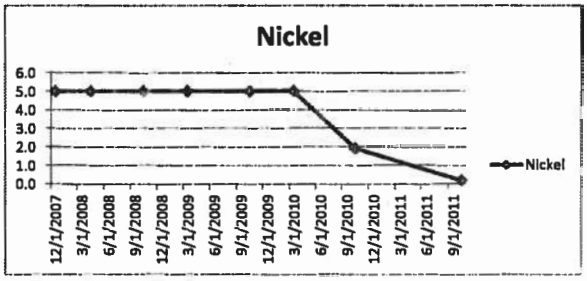
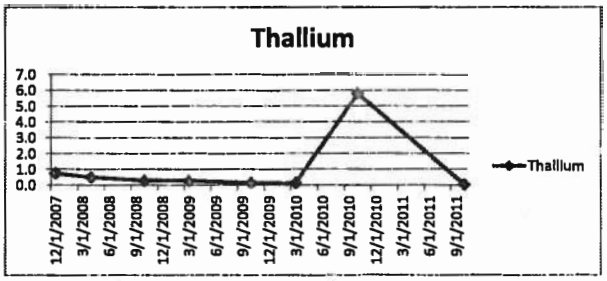
Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	1.9	1.9	I
10/27/2011	0.344	0.172	U



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8	U
4/24/2008	1.0	0.5	U
10/13/2008	0.55	0.3	U
3/30/2009	0.55	0.3	U
10/15/2009	0.25	0.1	U
3/16/2010	0.25	0.1	U
10/13/2010	5.8	5.8	I
10/27/2011	0.0475	0.0238	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	39.3
Maximum	62.4
Mean	51.21
Geometric Mean	50.63
Median	53
Standard Deviation	8.146
SEM	2.88
Mann-Kendall Test	
Test Value (S)	0
Tabulated p-value	0.548
Standard Deviation of S	7.958
Standardized Value of S	N/A
Approximate p-value	N/A

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	68.8
Maximum	4000
Mean	1018
Geometric Mean	473.1
Median	486.5
Standard Deviation	1327
SEM	469.3
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	8.083
Standardized Value of S	-1.608
Approximate p-value	0.0539

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS09R
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Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	0.99
Maximum	12
Mean	3.668
Geometric Mean	2.682
Median	2
Standard Deviation	3.682
SEM	1.302
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	7.528
Standardized Value of S	-1.727
Approximate p-value	0.0421

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	2.2
Maximum	100
Mean	18.18
Geometric Mean	7.38
Median	5
Standard Deviation	33.54
SEM	11.86
Mann-Kendall Test	
Test Value (S)	-22
Tabulated p-value	0.002
Standard Deviation of S	7.528
Standardized Value of S	-2.79
Approximate p-value	0.00264

Statistically significant evidence of a decreasing trend at the specified level of significance.

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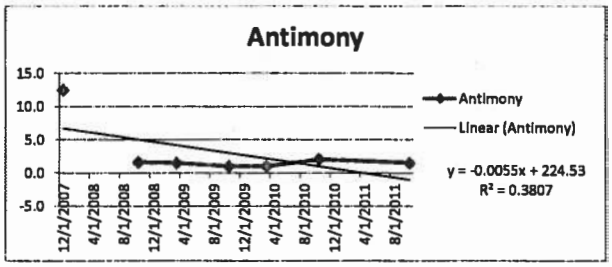
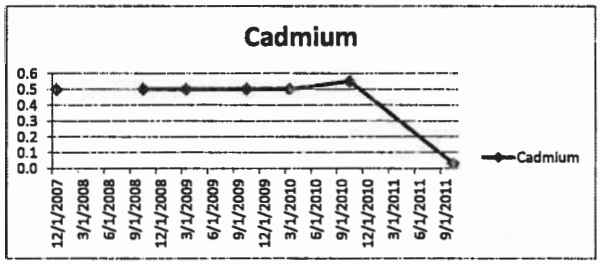
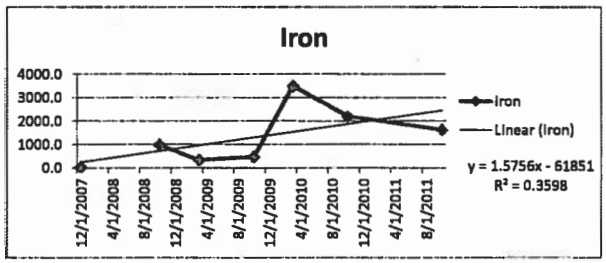
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	25.0	12.5	U
4/24/2008	NS		
10/13/2008	1.6	1.6	IV
3/30/2009	1.5	1.5	IV
10/15/2009	2.0	1.0	U
3/16/2010	2.0	1.0	U
10/13/2010	4.1	2.1	U
10/27/2011	3.0	1.5	U



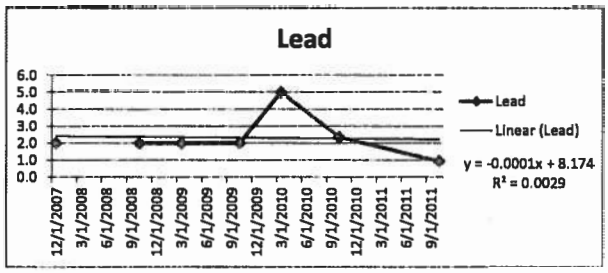
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	1.0	0.5	U
4/24/2008	NS		
10/13/2008	1.0	0.5	U
3/30/2009	1.0	0.5	U
10/15/2009	1.0	0.5	U
3/16/2010	1.0	0.5	U
10/13/2010	1.1	0.6	U
10/27/2011	0.0614	0.0307	U



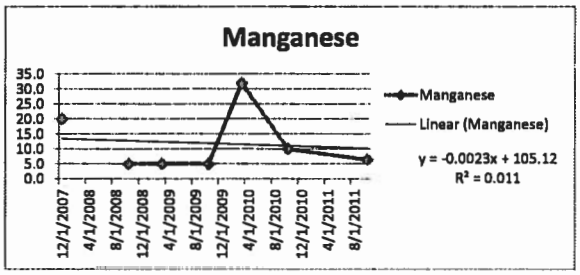
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	60	30.0	U
4/24/2008	NS		
10/13/2008	980	980	
3/30/2009	340	340	
10/15/2009	470	470	
3/16/2010	3500	3500	
10/13/2010	2200	2200	
10/27/2011	1630	1630	J



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	4.0	2.0	U
4/24/2008	NS		
10/13/2008	4.0	2.0	U
3/30/2009	4.0	2.0	U
10/15/2009	4.0	2.0	U
3/16/2010	5.0	5.0	I
10/13/2010	4.7	2.4	U
10/27/2011	0.94	0.94	I



Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	40.0	20.0	U
4/24/2008	NS		
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	32.0	32.0	
10/13/2010	10.0	10.0	I
10/27/2011	6.5	6.5	



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OU 13
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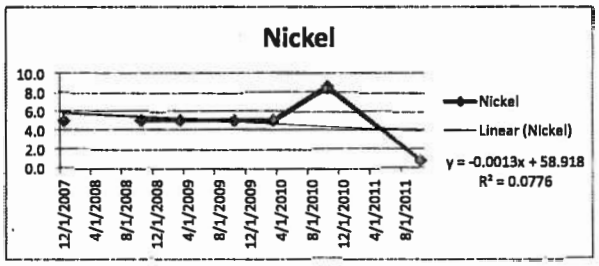
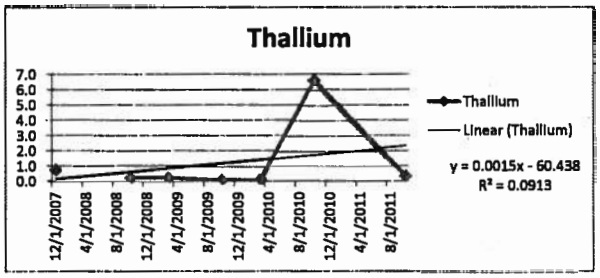
Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	NS		
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	8.6	8.6	I
10/27/2011	0.77	0.77	I



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8	U
4/24/2008	NS		
10/13/2008	0.55	0.3	U
3/30/2009	0.55	0.3	U
10/15/2009	0.25	0.1	U
3/16/2010	0.25	0.1	U
10/13/2010	6.6	6.6	I
10/27/2011	0.35	0.35	I



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	7
Minimum	1
Maximum	12.5
Mean	3.021
Geometric Mean	1.909
Median	1.5
Standard Deviation	4.195
SEM	1.586
Mann-Kendall Test	
Test Value (S)	-7
Tabulated p-value	0.191
Standard Deviation of S	6.506
Standardized Value of S	-0.922
Approximate p-value	0.178

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	7
Minimum	30
Maximum	3500
Mean	1307
Geometric Mean	667.4
Median	980
Standard Deviation	1230
SEM	465.1
Mann-Kendall Test	
Test Value (S)	11
Tabulated p-value	0.068
Standard Deviation of S	6.658
Standardized Value of S	1.502
Approximate p-value	0.0666

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS10R
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NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	7
Minimum	0.94
Maximum	5
Mean	2.327
Geometric Mean	2.094
Median	2
Standard Deviation	1.258
SEM	0.476
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.5
Standard Deviation of S	5.972
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	7
Minimum	5
Maximum	32
Mean	11.92
Geometric Mean	9.1
Median	8.46
Standard Deviation	10.37
SEM	3.921
Mann-Kendall Test	
Test Value (S)	2
Tabulated p-value	0.386
Standard Deviation of S	6.377
Standardized Value of S	0.157
Approximate p-value	0.438

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	7
Minimum	0.77
Maximum	8.6
Mean	4.91
Geometric Mean	4.136
Median	5
Standard Deviation	2.266
SEM	0.856
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.5
Standard Deviation of S	5.26
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS10R
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

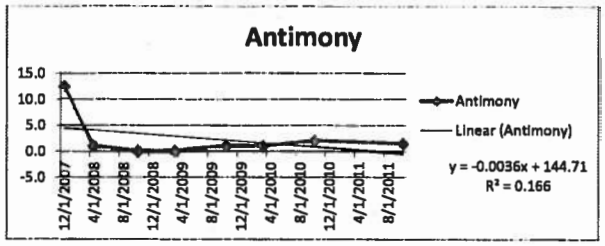
Thallium

General Statistics	
Number of Values	7
Minimum	0.125
Maximum	6.6
Mean	1.214
Geometric Mean	0.413
Median	0.275
Standard Deviation	2.384
SEM	0.901
Mann-Kendall Test	
Test Value (S)	-1
Tabulated p-value	0.5
Standard Deviation of S	6.506
Standardized Value of S	0
Approximate p-value	0.5

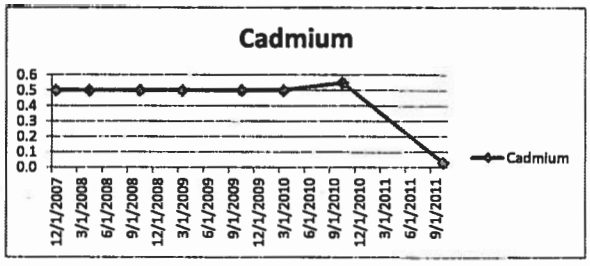
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS11
OU 13
NAS Pensacola, Pensacola Florida

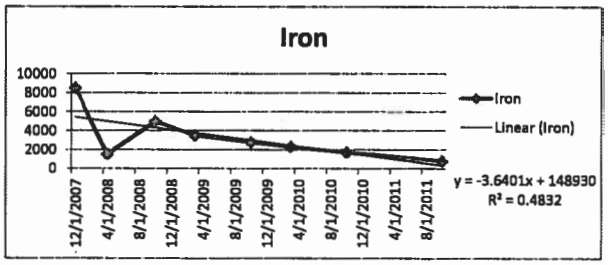
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	25.0	12.5	U
4/24/2008	2.0	1.0	U
10/13/2008	0.0	0.0	IV
3/30/2009	0.0	0.0	IV
10/15/2009	2.0	1.0	U
3/16/2010	2.0	1.0	U
10/13/2010	4.1	2.1	U
10/27/2011	3.0	1.5	U



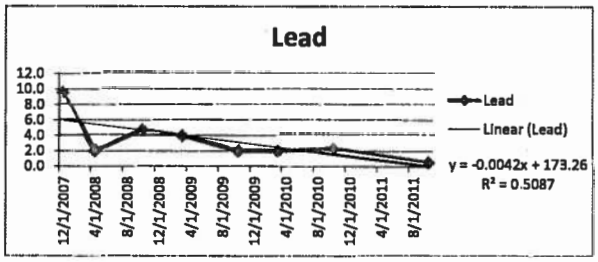
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	1.0	0.5	U
4/24/2008	1.0	0.5	U
10/13/2008	1.0	0.5	U
3/30/2009	1.0	0.5	U
10/15/2009	1.0	0.5	U
3/16/2010	1.0	0.5	U
10/13/2010	1.1	0.6	U
10/27/2011	0.0614	0.0	U



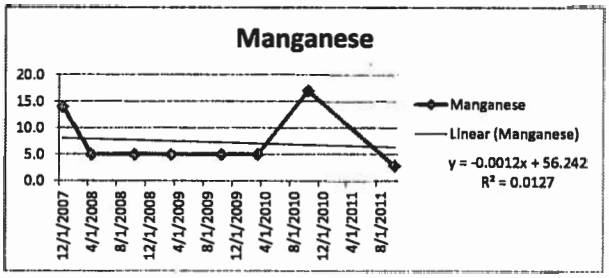
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	8500	8500	
4/24/2008	1500	1500	
10/13/2008	5000	5000	
3/30/2009	3500	3500	
10/15/2009	2800	2800	
3/16/2010	2300	2300	
10/13/2010	1699	1699	
10/27/2011	792	792	



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	9.6	9.6	
4/24/2008	4.0	2.0	U
10/13/2008	4.8	4.8	I
3/30/2009	4.0	4.0	I
10/15/2009	4.0	2.0	U
3/16/2010	4.0	2.0	U
10/13/2010	4.7	2.4	U
10/27/2011	0.5	0.5400	I

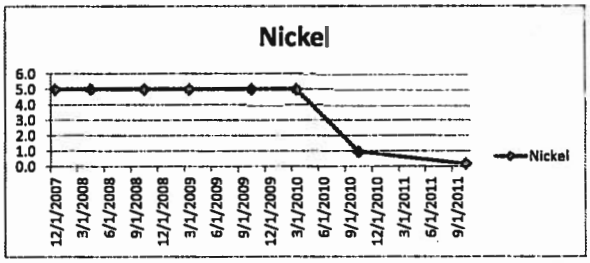


Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	14.0	14.0	
4/24/2006	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	17.0	17.0	I
10/27/2011	2.84	2.84	I

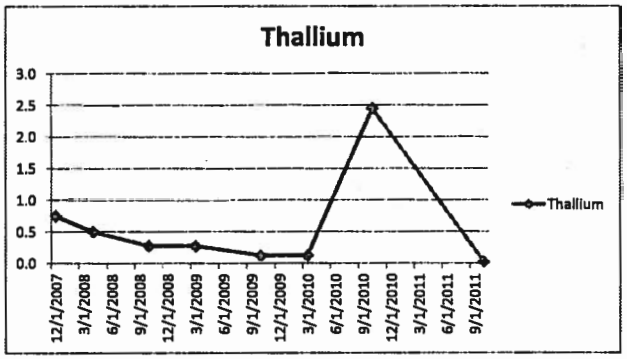


Monitoring Well 24GS11
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	1.9	1.0	U
10/27/2011	0.344	0.2	U



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8	U
4/24/2008	1.0	0.5	U
10/13/2008	0.55	0.3	U
3/30/2009	0.55	0.3	U
10/15/2009	0.25	0.1	U
3/16/2010	0.25	0.1	U
10/13/2010	4.9	2.5	U
10/27/2011	0.0475	0.0	U



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	0
Maximum	12.5
Mean	2.381
Geometric Mean	0
Median	1
Standard Deviation	4.146
SEM	1.466
Mann-Kendall Test	
Test Value (S)	4
Tabulated p-value	0.36
Standard Deviation of S	7.789
Standardized Value of S	0.385
Approximate p-value	0.35

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	6
Minimum	792
Maximum	8500
Mean	3261
Geometric Mean	2575
Median	2550
Standard Deviation	2487
SEM	879.3
Mann-Kendall Test	
Test Value (S)	-18
Tabulated p-value	0.016
Standard Deviation of S	8.083
Standardized Value of S	-2.103
Approximate p-value	0.0177

Statistically significant evidence of a decreasing trend at the specified level of significance.

Monitoring Well 24GS11
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	0.54
Maximum	9.6
Mean	3.411
Geometric Mean	2.565
Median	2.175
Standard Deviation	2.826
SEM	0.999
Mann-Kendall Test	
Test Value (S)	-15
Tabulated p-value	0.054
Standard Deviation of S	7.853
Standardized Value of S	-1.783
Approximate p-value	0.0373

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

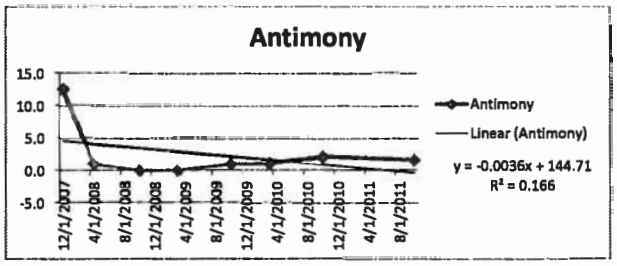
Manganese

General Statistics	
Number of Values	6
Minimum	2.84
Maximum	17
Mean	7.355
Geometric Mean	6.174
Median	5
Standard Deviation	5.145
SEM	1.819
Mann-Kendall Test	
Test Value (S)	-6
Tabulated p-value	0.274
Standard Deviation of S	6.976
Standardized Value of S	-0.717
Approximate p-value	0.237

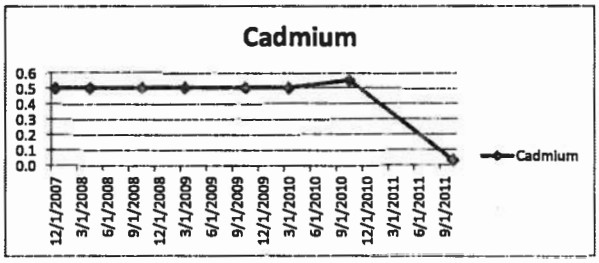
Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS15
OU 13
NAS Pensacola, Pensacola Florida

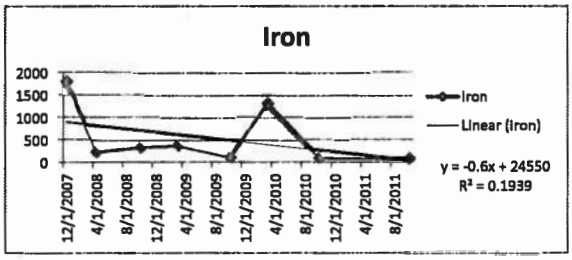
Antimony Date	Validated Result	Censored Result	Qual
12/19/2007	25.0	12.5	U
4/24/2008	2.0	1.0	U
10/13/2008	0.0	0.0	IV
3/30/2009	0.0	0.0	IV
10/15/2009	2.0	1.0	U
3/16/2010	2.0	1.0	U
10/13/2010	4.1	2.1	U
10/27/2011	3.0	1.5	U



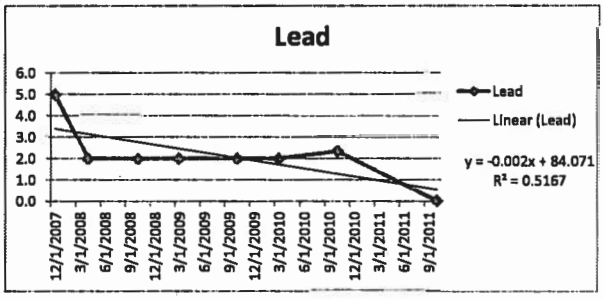
Cadmium Date	Validated Result	Censored Result	Qual
12/19/2007	1.0	0.5	U
4/24/2008	1.0	0.5	U
10/13/2008	1.0	0.5	U
3/30/2009	1.0	0.5	U
10/15/2009	1.0	0.5	U
3/16/2010	1.0	0.5	U
10/13/2010	1.1	0.6	U
10/27/2011	0.0614	0.0307	U



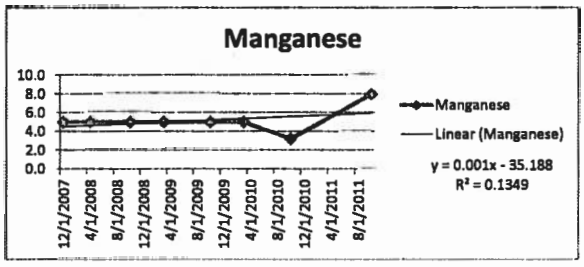
Iron Date	Validated Result	Censored Result	Qual
12/19/2007	1600	1600	
4/24/2008	230	230	
10/13/2008	330	330	
3/30/2009	370	370	
10/15/2009	110	110	
3/16/2010	1300	1300	
10/13/2010	94.6	94.6	I
10/27/2011	77.2	77.2	I



Lead Date	Validated Result	Censored Result	Qual
12/19/2007	5.0	5.0	
4/24/2008	4.0	2.0	U
10/13/2008	4.0	2.0	U
3/30/2009	4.0	2.0	U
10/15/2009	4.0	2.0	U
3/16/2010	4.0	2.0	U
10/13/2010	4.7	2.4	U
10/27/2011	0.0434	0.0217	U

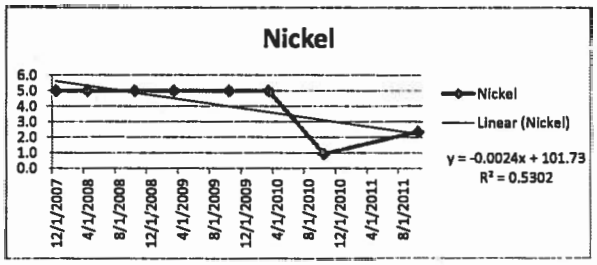


Manganese Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0	U
4/24/2008	10.0	5.0	U
10/13/2008	10.0	5.0	U
3/30/2009	10.0	5.0	U
10/15/2009	10.0	5.0	U
3/16/2010	10.0	5.0	U
10/13/2010	6.4	3.2	U
10/27/2011	7.97	7.97	

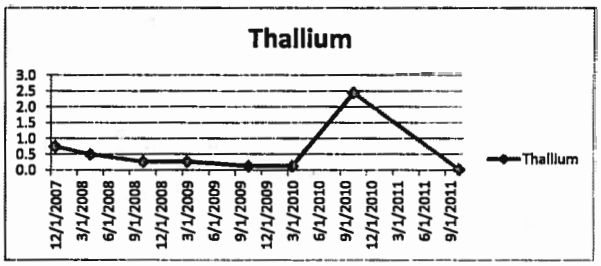


Monitoring Well 24GS15
OU 13
NAS Pensacola, Pensacola Florida

Nickel Date	Validated Result	Censored Result	Qual
12/19/2007	10.0	5.0 U	
4/24/2008	10.0	5.0 U	
10/13/2008	10.0	5.0 U	
3/30/2009	10.0	5.0 U	
10/15/2009	10.0	5.0 U	
3/16/2010	10.0	5.0 U	
10/13/2010	1.9	1.0 U	
10/27/2011	2.38	2.38 I	



Thallium Date	Validated Result	Censored Result	Qual
12/19/2007	1.5	0.8 U	
4/24/2008	1.0	0.5 U	
10/13/2008	0.55	0.3 U	
3/30/2009	0.55	0.3 U	
10/15/2009	0.25	0.1 U	
3/16/2010	0.25	0.1 U	
10/13/2010	4.9	2.5 U	
10/27/2011	0.0475	0.0238 U	



Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Antimony

General Statistics	
Number of Values	8
Minimum	0
Maximum	12.5
Mean	2.381
Geometric Mean	0
Median	1
Standard Deviation	4.146
SEM	1.466
Mann-Kendall Test	
Test Value (S)	4
Tabulated p-value	0.36
Standard Deviation of S	7.789
Standardized Value of S	0.385
Approximate p-value	0.35

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Iron

General Statistics	
Number of Values	8
Minimum	77.2
Maximum	1800
Mean	539
Geometric Mean	292
Median	280
Standard Deviation	647.2
SEM	228.8
Mann-Kendall Test	
Test Value (S)	-14
Tabulated p-value	0.054
Standard Deviation of S	8.083
Standardized Value of S	-1.608
Approximate p-value	0.0539

Insufficient evidence to identify a significant trend at the specified level of significance.

Monitoring Well 24GS15
OU 13
NAS Pensacola, Pensacola Florida

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Lead

General Statistics	
Number of Values	8
Minimum	0.0217
Maximum	5
Mean	2.171
Geometric Mean	1.3
Median	2
Standard Deviation	1.352
SEM	0.478
Mann-Kendall Test	
Test Value (S)	-8
Tabulated p-value	0.119
Standard Deviation of S	6.976
Standardized Value of S	-1.003
Approximate p-value	0.158

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Manganese

General Statistics	
Number of Values	8
Minimum	3.2
Maximum	7.97
Mean	5.146
Geometric Mean	5.012
Median	5
Standard Deviation	1.303
SEM	0.461
Mann-Kendall Test	
Test Value (S)	1
Tabulated p-value	0.548
Standard Deviation of S	6.083
Standardized Value of S	0
Approximate p-value	0.5

Insufficient evidence to identify a significant trend at the specified level of significance.

Mann-Kendall Trend Test Analysis

Confidence Coefficient	0.95
Level of Significance	0.05

Nickel

General Statistics	
Number of Values	8
Minimum	0.95
Maximum	5
Mean	4.166
Geometric Mean	3.703
Median	5
Standard Deviation	1.59
SEM	0.562
Mann-Kendall Test	
Test Value (S)	-11
Tabulated p-value	0.138
Standard Deviation of S	6.083
Standardized Value of S	-1.644
Approximate p-value	0.0501

Insufficient evidence to identify a significant trend at the specified level of significance.

APPENDIX H

OU13 INTERVIEW FORMS, SITE INSPECTION FORM

Provided on CD

INTERVIEW RECORD

Site Name: OU 13 Sites 8 and 24	**EPA ID No.:**	
Subject:	**Time: 1506**	**Date: 5/2/12**
Type: Telephone Ξ Visit Other **Location of Visit: NAS Pensacola**	Incoming Outgoing	

Contact Made By:

Name: Peggy Churchill	**Title:** Project Manager	**Organization:** Tetra Tech Inc.
Name: Amber Igoe	**Title:** Environmental Specialist II	**Organization:** Tetra Tech Inc.

Individual Contacted:

Name: Greg Campbell	**Title:** Environmental Engineer	**Organization:** NAVFAC
Telephone No: (850) 452-3131 ext 3007 **Fax No:** **E-Mail Address:** gregory.campbell@navy.mil	**Street Address:** 310 John Tower Road **City, State, Zip:** Pensacola FL, 32508	

Summary Of Conversation

The overall impression of the project is that it is going well. Site operations have not affected the surrounding community and there has not been any reported community concerns. Local authorities have not received reports of vandalism, trespassing or any emergency responses occurring at the Site. The base is well informed of Site activity, progress and Land Use Control (LUC) inspections are conducted annually.

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Greg Campbell	Envir. Engr.	PWD Pensacola	5-2-12

OU13
Site 8 & 24

Appendix C
Five-Year Review Interviews

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Five-Year Review Interviews

Information gathered from interviews during the site inspection may be key to understanding site status. Interviews should be conducted with various individuals or groups, including the operation and maintenance (O&M) site manager, O&M staff, local regulatory authorities and response agencies, community action groups or associations, site neighbors, and other stakeholders.

When conducting an interview, the interviewer should note the date of the interview, and the name, title, and affiliation of the person interviewed. The interviewer should also indicate whether the interview was conducted at the site, the office, or by phone. Written documentation of the interview should briefly summarize the discussion, address any problems or successes with the implementation of the remedy, and provide suggestions for future reference. Forms to use during interviews are provided at the end of this appendix.

The following tables provide lists of potential individuals to interview and the type of information which may be obtained during the interviews. The potential individuals to be interviewed are categorized by their ability to provide the following types of information:

- Background information;
- State and local considerations;
- Construction considerations; and
- Performance, Operation and maintenance problems.

All of these individuals may be contacted during the five-year review. In most cases interviewing only a few key individuals will provide sufficient information for the review.

Background Information

The individuals listed below may provide information concerning previous and current concerns about the site, influences that affected the remedy decision, and further clarification on decisions made during remedy selection.

Interview	Information Sought
Previous EPA Staff/Management	– staff members may offer insight and clarification on decisions made during remedy selection and implementation
Nearest Neighbors	– neighbors may provide insight into the enforcement of institutional controls, changes in land use, trespassing, and unusual or unexpected activity at the site

Interview	Information Sought
Community Representatives*	– members of the community may provide a broader view of site activities and issues than can be obtained during the site inspection

* Several types of individuals may be interviewed: residents/businesses adjacent to or on the site; residents/businesses within the path of migration; local civic leaders, local officials, Community Advisory Group (CAG), Technical Assistance Grant (TAG) group, and local environmental groups; and other audiences listed in the community profile in the Community Involvement Plan.

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment) Good
2. What effects have site operations had on the surrounding community? no
3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. nope
4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. none
5. Do you feel well informed about the site's activities and progress? yes
6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? no

State and Local Considerations

State and local authorities may provide you with information about changes in State laws and regulations and present and prospective land uses and restrictions.

Interview	Information Sought
State Contacts (including those responsible for State water quality, hazardous waste, and environmental health issues)	– changes in State laws and regulations that may impact protectiveness – whether the site has been in compliance with permitting or reporting requirements – information on site activities, status, and issues
Local Authorities (such as police, emergency response or fire departments, and local environmental or planning offices)	– status of institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed, and unusual activities at the site

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results. Annual LUC inspections

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses. no

4. Do you feel well informed about the site's activities and progress? yes

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Construction Considerations

It is important for you to determine the status of construction at the site and to ensure that health and safety concerns are addressed.

Interview	Information Sought
Construction Contractor	– progress of project and changes in design due to field conditions – revisions to the O&M Manual, implementation of the Health and Safety Plan/Contingency Plan – insight into potential O&M problems
Construction Manager	– overview of all contractor construction activities at the site, health and safety issues, site protectiveness during construction, and the quality of the construction
Local Emergency Response Officials	– adequacy of contractor's Health and Safety Plan and the contractor's implementation of the Plan – adequacy of contractor's emergency response duties as outlined in the Contingency Plan or Emergency Response Plan of the Health and Safety Plan

Some example interview questions for remedial actions still under construction are given below.

1. What is your overall impression of the project? (general sentiment)

2. What is the current status of construction (*e.g.*, budget and schedule)?

3. Have any problems been encountered which required, or will require, changes to this remedial design or this ROD?

4. Have any problems or difficulties been encountered which have impacted construction progress or implementability?

5. Do you have any comments, suggestions, or recommendations regarding the project (i.e., design, construction documents, constructability, management, regulatory agencies, etc.)?

Performance, Operation And Maintenance Problems

The following individuals may provide information to you regarding the performance of the remedy and status of O&M at the site so that the team can assess the progress of the implementation and effectiveness of the remedy, and any O&M problems.

Interview	Information Sought
O&M Manager/Operating Contractor	– O&M status of the remedy, compliance with permit and reporting requirements, and complaints filed – effectiveness of the O&M Plan – information about any potential causes for concern about the remedy – progress and performance of the remedy
O&M Staff	– effectiveness of the O&M Manual – information about any potential causes for concern about the remedy – Recommendations for adjusting the mode of operation or optimizing the operations protocol
Remedial Design/Remedial Action Consultant	– original concepts behind the O&M of the remedy – questions about remedial design parameters, expected performance and cost, and changes that have occurred during implementation

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Is the remedy functioning as expected? How well is the remedy performing?

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

8. Do you have any comments, suggestions, or recommendations regarding the project?

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
Greg Campbell	Envir. Engr.	PWD Pensacola	5-2-12

INTERVIEW RECORD

Site Name:	**EPA ID No.:**	
Subject:	**Time:**	**Date:**
Type: ☐ Telephone ☐ Visit ☐ Other **Location of Visit:**	☐ Incoming ☐ Outgoing	

Contact Made By:

Name:	**Title:**	**Organization:**

Individual Contacted:

Name:	**Title:**	**Organization:**
Telephone No: **Fax No:** **E-Mail Address:**	**Street Address:** **City, State, Zip:**	

Summary Of Conversation

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OU13
Site 8+13

Appendix D
Five-Year Review Site Inspection Checklist

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Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: OU3 Sites 8&24	**Date of inspection:** 5/3/12
Location and Region:	**EPA ID:**
Agency, office, or company leading the five-year review:	**Weather/temperature:** 80° rainy, cloudy

Remedy Includes: (Check all that apply)

- Landfill cover/containment
- Access controls
- Institutional controls
- ~~Groundwater pump and treatment~~
- Surface water collection and treatment
- Other _____
- Monitored natural attenuation
- Groundwater containment
- Vertical barrier walls

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

O&M manual	Readily available	Up to date	N/A
As-built drawings	Readily available	Up to date	N/A
Maintenance logs	Readily available	Up to date	N/A

Remarks

2. **Site-Specific Health and Safety Plan** — Readily available — Up to date — N/A
   Contingency plan/emergency response plan — Readily available — Up to date — N/A
   Remarks for quarterly and annual sampling events

3. **O&M and OSHA Training Records** — Readily available — Up to date — N/A
   Remarks ~~Quarterly and annual sampling events~~

4. **Permits and Service Agreements**

Air discharge permit	Readily available	Up to date	N/A
Effluent discharge	Readily available	Up to date	N/A
Waste disposal, POTW	Readily available	Up to date	N/A
Other permits	Readily available	Up to date	N/A

Remarks

5. **Gas Generation Records** — Readily available — Up to date — N/A
   Remarks

6. **Settlement Monument Records** — Readily available — Up to date — N/A
   Remarks

7. **Groundwater Monitoring Records** — Readily available — Up to date — ~~N/A~~
   Remarks monitoring reports available

8. **Leachate Extraction Records** — Readily available — Up to date — N/A
   Remarks

9. **Discharge Compliance Records**

Air	Readily available	Up to date	N/A
Water (effluent)	Readily available	Up to date	N/A

Remarks

10. **Daily Access/Security Logs** — Readily available — Up to date — N/A
    Remarks

IV. O&M COSTS

1. **O&M Organization**
   State in-house — Contractor for State
   PRP in-house — Contractor for PRP
   Federal Facility in-house — Contractor for Federal Facility
   Other _____

2. **O&M Cost Records**
   Readily available — Up to date
   Funding mechanism/agreement in place
   Original O&M cost estimate _____ Breakdown attached

   Total annual cost by year for review period if available

   From _____ To _____ _____ Breakdown attached
   Date — Date — Total cost
   From _____ To _____ _____ Breakdown attached
   Date — Date — Total cost
   From _____ To _____ _____ Breakdown attached
   Date — Date — Total cost
   From _____ To _____ _____ Breakdown attached
   Date — Date — Total cost
   From _____ To _____ _____ Breakdown attached
   Date — Date — Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**
   Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS — Applicable — N/A

A. Fencing

1. **Fencing damaged** — Location shown on site map — Gates secured — N/A
   Remarks In place for cemetary and Bldg 3561

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — (N/A)
   Remarks _____

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self
Frequency Annual
Responsible party/agency Navy
Contact Greg Campbell

Name	Title	Date	Phone no.

Reporting is up-to-date — Yes No N/A
Reports are verified by the lead agency — Yes No N/A

Specific requirements in deed or decision documents have been met — Yes No N/A
Violations have been reported — Yes No N/A
Other problems or suggestions: Report attached

2. **Adequacy** (ICs are adequate) ICs are inadequate N/A
Remarks

D. General

1. **Vandalism/trespassing** Location shown on site map (No vandalism evident)
Remarks

2. **Land use changes on site** (N/A)
Remarks

3. **Land use changes off site** (N/A)
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads (Applicable) N/A

1. **Roads damaged** Location shown on site map (Roads adequate) N/A
Remarks

B. Other Site Conditions

Remarks_____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS Applicable (N/A)

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** (N/A)
   Remarks_____
   _____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** Wet areas/water damage not evident
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** Slides — Location shown on site map — No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches Applicable N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** Location shown on site map N/A or okay
   Remarks_____

2. **Bench Breached** Location shown on site map N/A or okay
   Remarks_____

3. **Bench Overtopped** Location shown on site map N/A or okay
   Remarks_____

C. Letdown Channels Applicable N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** Location shown on site map No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** Location shown on site map No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** Location shown on site map No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment Applicable N/A

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable N/A

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable N/A

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable N/A

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable N/A

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES	Applicable	N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable N/A

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System Applicable N/A

1. **Treatment Train** (Check components that apply)
   - Metals removal — Oil/water separation — Bioremediation
   - Air stripping — Carbon adsorbers
   - Filters_____
   - Additive (*e.g.*, chelation agent, flocculent)_____
   - Others_____
   - Good condition — Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually_____
   - Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A — Good condition — Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   N/A — Good condition — Proper secondary containment — Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   N/A — Good condition — Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   N/A — Good condition (esp. roof and doorways) — Needs repair
   Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   Properly secured/locked — Functioning — Routinely sampled — Good condition
   All required wells located — Needs Maintenance — N/A

   Remarks_____

D. Monitoring Data

1. Monitoring Data
   Is routinely submitted on time — Is of acceptable quality

2. Monitoring data suggests:
   Groundwater plume is effectively contained — Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
Properly secured/locked Functioning Routinely sampled Good condition
All required wells located Needs Maintenance N/A
Remarks _____

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future.

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

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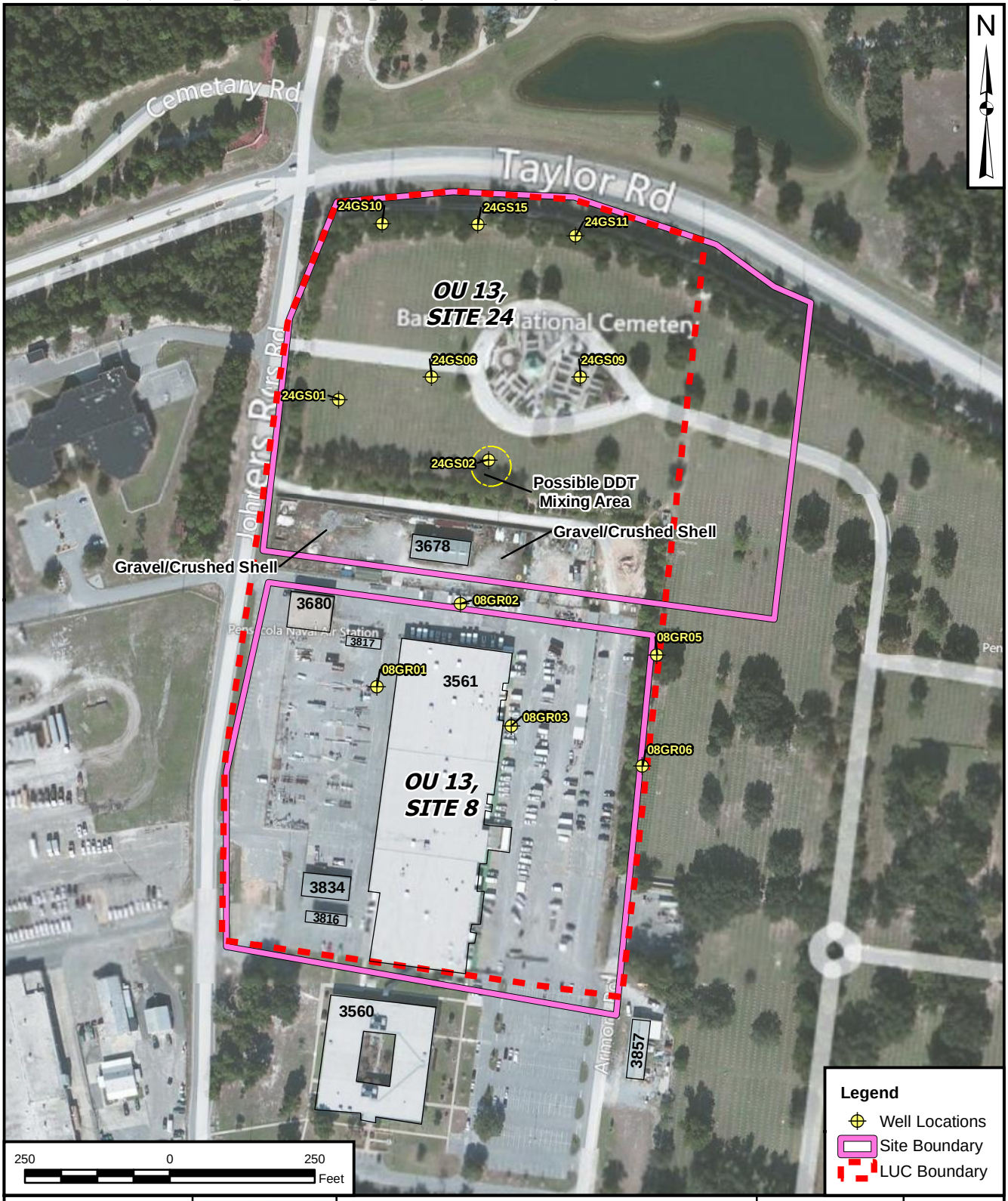

DRAWN BY: GIS	DATE: 7/18/2012	SITE MAP - OPERABLE UNIT 13 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00702 / CTO NUMBER: 067
CHECKED BY: A.I.	DATE: 7/18/2012		APPROVED BY: ___ / DATE: ___
REVISED BY:	DATE:		APPROVED BY: ___ / DATE: ___
SCALE: AS NOTED			FIGURE NO.: 7 - 1 / REV: 0

APPENDIX I

OU18 INTERVIEW FORMS, SITE INSPECTION FORM

Provided on CD

INTERVIEW RECORD

Site Name: OU 18 Site 43 Demolition Debris Disposal Area	**EPA ID No.:**	
Subject:	**Time: 1312**	**Date: 5/2/12**
Type: Telephone Ξ Visit Other **Location of Visit: NAS Pensacola**	Incoming Outgoing	

Contact Made By:

Name: Peggy Churchill	**Title:** Project Manager	**Organization:** Tetra Tech Inc.
Name: Amber Igoe	**Title:** Environmental Specialist II	**Organization:** Tetra Tech Inc.

Individual Contacted:

Name: Greg Campbell	**Title:** Environmental Engineer	**Organization:** NAVFAC
Telephone No: (850) 452-3131 ext 3007 **Fax No:** **E-Mail Address:** gregory.campbell@navy.mil	**Street Address:** 310 John Tower Road **City, State, Zip:** Pensacola FL, 32508	

Summary Of Conversation

The overall impression of the project is that is going fine. Site operations have not affected the surrounding community and there has not been any reported community concerns. Local authorities have not received reports of vandalism, trespassing or any emergency responses occurring at the Site. The site does have proper signage informing the community that the site is a Land Use Control (LUC) area and that access is restricted and digging is prohibited. There have been no reports of vandalism, trespassing or any emergency responses from local authorities. The base is well informed of Site activity, progress and LUC inspections are conducted annually.

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
GREG CAMPBELL	ENVR. ENGR.	PWD. PENSACOLA	5-2-12

OU 10 Site 43

Appendix C
Five-Year Review Interviews

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Five-Year Review Interviews

Information gathered from interviews during the site inspection may be key to understanding site status. Interviews should be conducted with various individuals or groups, including the operation and maintenance (O&M) site manager, O&M staff, local regulatory authorities and response agencies, community action groups or associations, site neighbors, and other stakeholders.

When conducting an interview, the interviewer should note the date of the interview, and the name, title, and affiliation of the person interviewed. The interviewer should also indicate whether the interview was conducted at the site, the office, or by phone. Written documentation of the interview should briefly summarize the discussion, address any problems or successes with the implementation of the remedy, and provide suggestions for future reference. Forms to use during interviews are provided at the end of this appendix.

The following tables provide lists of potential individuals to interview and the type of information which may be obtained during the interviews. The potential individuals to be interviewed are categorized by their ability to provide the following types of information:

- Background information;
- State and local considerations;
- Construction considerations; and
- Performance, Operation and maintenance problems.

All of these individuals may be contacted during the five-year review. In most cases interviewing only a few key individuals will provide sufficient information for the review.

Background Information

The individuals listed below may provide information concerning previous and current concerns about the site, influences that affected the remedy decision, and further clarification on decisions made during remedy selection.

Interview	Information Sought
Previous EPA Staff/Management	– staff members may offer insight and clarification on decisions made during remedy selection and implementation
Nearest Neighbors	– neighbors may provide insight into the enforcement of institutional controls, changes in land use, trespassing, and unusual or unexpected activity at the site

Interview	Information Sought
Community Representatives*	– members of the community may provide a broader view of site activities and issues than can be obtained during the site inspection

* Several types of individuals may be interviewed: residents/businesses adjacent to or on the site; residents/businesses within the path of migration; local civic leaders, local officials, Community Advisory Group (CAG), Technical Assistance Grant (TAG) group, and local environmental groups; and other audiences listed in the community profile in the Community Involvement Plan.

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)
   Fine
2. What effects have site operations had on the surrounding community?
   none
3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. nope
4. Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities? If so, please give details. nope no dig sign
5. Do you feel well informed about the site's activities and progress? yes
6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? nope

State and Local Considerations

State and local authorities may provide you with information about changes in State laws and regulations and present and prospective land uses and restrictions.

Interview	Information Sought
State Contacts (including those responsible for State water quality, hazardous waste, and environmental health issues)	– changes in State laws and regulations that may impact protectiveness – whether the site has been in compliance with permitting or reporting requirements – information on site activities, status, and issues
Local Authorities (such as police, emergency response or fire departments, and local environmental or planning offices)	– status of institutional controls, site access controls, new ordinances in place, changes in actual or projected land use, complaints being filed, and unusual activities at the site

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results. Annual LUC inspection

3. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? If so, please give details of the events and results of the responses.

4. Do you feel well informed about the site's activities and progress?

5. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?

Construction Considerations

It is important for you to determine the status of construction at the site and to ensure that health and safety concerns are addressed.

Interview	Information Sought
Construction Contractor	– progress of project and changes in design due to field conditions – revisions to the O&M Manual, implementation of the Health and Safety Plan/Contingency Plan – insight into potential O&M problems
Construction Manager	– overview of all contractor construction activities at the site, health and safety issues, site protectiveness during construction, and the quality of the construction
Local Emergency Response Officials	– adequacy of contractor's Health and Safety Plan and the contractor's implementation of the Plan – adequacy of contractor's emergency response duties as outlined in the Contingency Plan or Emergency Response Plan of the Health and Safety Plan

Some example interview questions for remedial actions still under construction are given below.

1. What is your overall impression of the project? (general sentiment)

2. What is the current status of construction (*e.g.*, budget and schedule)?

3. Have any problems been encountered which required, or will require, changes to this remedial design or this ROD?

4. Have any problems or difficulties been encountered which have impacted construction progress or implementability?

5. Do you have any comments, suggestions, or recommendations regarding the project (i.e., design, construction documents, constructability, management, regulatory agencies, etc.)?

Performance, Operation And Maintenance Problems

The following individuals may provide information to you regarding the performance of the remedy and status of O&M at the site so that the team can assess the progress of the implementation and effectiveness of the remedy, and any O&M problems.

Interview	Information Sought
O&M Manager/Operating Contractor	– O&M status of the remedy, compliance with permit and reporting requirements, and complaints filed – effectiveness of the O&M Plan – information about any potential causes for concern about the remedy – progress and performance of the remedy
O&M Staff	– effectiveness of the O&M Manual – information about any potential causes for concern about the remedy – Recommendations for adjusting the mode of operation or optimizing the operations protocol
Remedial Design/Remedial Action Consultant	– original concepts behind the O&M of the remedy – questions about remedial design parameters, expected performance and cost, and changes that have occurred during implementation

Some example interview questions are given below.

1. What is your overall impression of the project? (general sentiment)

2. Is the remedy functioning as expected? How well is the remedy performing?

3. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?

4. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.

5. Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts.

6. Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years? If so, please give details.

7. Have there been opportunities to optimize O&M, or sampling efforts? Please describe changes and resultant or desired cost savings or improved efficiency.

8. Do you have any comments, suggestions, or recommendations regarding the project?

INTERVIEW DOCUMENTATION FORM

The following is a list of individual interviewed for this five-year review. See the attached contact record(s) for a detailed summary of the interviews.

Name	Title/Position	Organization	Date
GREG CAMPBELL	ENVR. ENGR.	PWD. PENSACOLA	5-2-12

INTERVIEW RECORD

Site Name:		**EPA ID No.:**	
Subject:		**Time:**	**Date:**
Type: ☐ Telephone ☐ Visit ☐ Other **Location of Visit:**		☐ Incoming ☐ Outgoing	
Contact Made By:			
Name:	**Title:**	**Organization:**	
Individual Contacted:			
Name:	**Title:**	**Organization:**	
Telephone No: **Fax No:** **E-Mail Address:**		**Street Address:** **City, State, Zip:**	
Summary Of Conversation			

Page 1 of ____

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6 of 8
Site 43

Appendix D
Five-Year Review Site Inspection Checklist

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Five-Year Review Site Inspection Checklist

Purpose of the Checklist

The site inspection checklist provides a useful method for collecting important information during the site inspection portion of the five-year review. The checklist serves as a reminder of what information should to be gathered and provides the means of checking off information obtained and reviewed, or information not available or applicable. The checklist is divided into sections as follows:

I. Site Information
II. Interviews
III. On-site Documents & Records Verified
IV. O&M Costs
V. Access and Institutional Controls
VI. General Site Conditions
VII. Landfill Covers
VIII. Vertical Barrier Walls
IX. Groundwater/Surface Water Remedies
X. Other Remedies
XI. Overall Observations

Some data and information identified in the checklist may or may not be available at the site depending on how the site is managed. Sampling results, costs, and maintenance reports may be kept on site or may be kept in the offices of the contractor or at State offices. In cases where the information is not kept at the site, the item should not be checked as "not applicable," but rather it should be obtained from the office or agency where it is maintained. If this is known in advance, it may be possible to obtain the information before the site inspection.

This checklist was developed by EPA and the U.S. Army Corps of Engineers (USACE). It focuses on the two most common types of remedies that are subject to five-year reviews: landfill covers, and groundwater pump and treat remedies. Sections of the checklist are also provided for some other remedies. The sections on general site conditions would be applicable to a wider variety of remedies. The checklist should be modified to suit your needs when inspecting other types of remedies, as appropriate.

The checklist may be completed and attached to the Five-Year Review report to document site status. Please note that the checklist is not meant to be completely definitive or restrictive; additional information may be supplemented if the reviewer deems necessary. Also note that actual site conditions should be documented with photographs whenever possible.

Using the Checklist for Types of Remedies

The checklist has sections designed to capture information concerning the main types of remedies which are found at sites requiring five-year reviews. These remedies are landfill covers (Section VII of the checklist) and groundwater and surface water remedies (Section IX of the checklist). The primary elements and appurtenances for these remedies are listed in sections which can be checked off as the facility is inspected. The opportunity is also provided to note site conditions, write comments on the facilities, and attach any additional pertinent information. If a site includes remedies beyond these, such as soil vapor extraction or soil landfarming, the information should be gathered in a similar manner and attached to the checklist.

Considering Operation and Maintenance Costs

Unexpectedly widely varying or unexpectedly high O&M costs may be early indicators of remedy problems. For this reason, it is important to obtain a record of the original O&M cost estimate and of annual O&M costs during the years for which costs incurred are available. Section IV of the checklist provides a place for documenting annual costs and for commenting on unanticipated or unusually high O&M costs. A more detailed categorization of costs may be attached to the checklist if available. Examples of categories of O&M costs are listed below.

Operating Labor - This includes all wages, salaries, training, overhead, and fringe benefits associated with the labor needed for operation of the facilities and equipment associated with the remedial actions.

Maintenance Equipment and Materials - This includes the costs for equipment, parts, and other materials required to perform routine maintenance of facilities and equipment associated with a remedial action.

Maintenance Labor - This includes the costs for labor required to perform routine maintenance of facilities and for equipment associated with a remedial action.

Auxiliary Materials and Energy - This includes items such as chemicals and utilities which can include electricity, telephone, natural gas, water, and fuel. Auxiliary materials include other expendable materials such as chemicals used during plant operations.

Purchased Services - This includes items such as sampling costs, laboratory fees, and other professional services for which the need can be predicted.

Administrative Costs - This includes all costs associated with administration of O&M not included under other categories, such as labor overhead.

Insurance, Taxes and Licenses - This includes items such as liability and sudden and accidental insurance, real estate taxes on purchased land or right-of-way, licensing fees for certain technologies, and permit renewal and reporting costs.

Other Costs - This includes all other items which do not fit into any of the above categories.

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Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program.

Five-Year Review Site Inspection Checklist (Template)

(Working document for site inspection. Information may be completed by hand and attached to the Five-Year Review report as supporting documentation of site status. "N/A" refers to "not applicable.")

I. SITE INFORMATION	
Site name: OU 18 Site 43	**Date of inspection:** 5/2/12
Location and Region: NASP R4	**EPA ID:**
Agency, office, or company leading the five-year review: Tt	**Weather/temperature:** Rainy 83° humid

Remedy Includes: (Check all that apply)

- Landfill cover/containment
- Access controls
- Institutional controls
- Groundwater pump and treatment
- Surface water collection and treatment
- Monitored natural attenuation
- Groundwater containment
- Vertical barrier walls
- Other _____

Attachments: Inspection team roster attached Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

2. **O&M staff** _____ _____ _____
   Name Title Date
   Interviewed at site at office by phone Phone no. _____
   Problems, suggestions; Report attached _____

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency _____
Contact _____ _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

Agency _____
Contact _____ _____ _____ _____ _____
Name Title Date Phone no.
Problems; suggestions; Report attached _____
_____

4. **Other interviews** (optional) Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

O&M manual	Readily available	Up to date	N/A
As-built drawings	Readily available	Up to date	N/A
Maintenance logs	Readily available	Up to date	N/A

Remarks

2. **Site-Specific Health and Safety Plan** — Readily available — Up to date — N/A
   Contingency plan/emergency response plan — Readily available — Up to date — N/A

Remarks

3. **O&M and OSHA Training Records** — Readily available — Up to date — N/A

Remarks

4. **Permits and Service Agreements**

Air discharge permit	Readily available	Up to date	N/A
Effluent discharge	Readily available	Up to date	N/A
Waste disposal, POTW	Readily available	Up to date	N/A
Other permits	Readily available	Up to date	N/A

Remarks

5. **Gas Generation Records** — Readily available — Up to date — N/A

Remarks

6. **Settlement Monument Records** — Readily available — Up to date — N/A

Remarks

7. **Groundwater Monitoring Records** — Readily available — Up to date — N/A

Remarks not yet implemented

8. **Leachate Extraction Records** — Readily available — Up to date — N/A

Remarks

9. **Discharge Compliance Records**

Air	Readily available	Up to date	N/A
Water (effluent)	Readily available	Up to date	N/A

Remarks

10. **Daily Access/Security Logs** — Readily available — Up to date — N/A

Remarks

IV. O&M COSTS

1. **O&M Organization**

State in-house — Contractor for State
PRP in-house — Contractor for PRP
Federal Facility in-house — Contractor for Federal Facility
Other_____

2. **O&M Cost Records**

Readily available — Up to date
Funding mechanism/agreement in place
Original O&M cost estimate_____ — Breakdown attached

Total annual cost by year for review period if available

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

From_____ To_____ _____ — Breakdown attached
Date — Date — Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS — Applicable — N/A

A. Fencing

1. **Fencing damaged** — Location shown on site map — Gates secured — (N/A)

Remarks_____

B. Other Access Restrictions

1. **Signs and other security measures** — Location shown on site map — N/A

Remarks Signage is functioning and in place

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented — Yes (No) N/A
Site conditions imply ICs not being fully enforced — Yes (No) N/A

Type of monitoring (*e.g.*, self-reporting, drive by) Self reporting
Frequency Annual
Responsible party/agency Navy
Contact _____ _____ _____ _____
Name Title Date Phone no.

Reporting is up-to-date Luc Inspections — (Yes) No N/A
Reports are verified by the lead agency — (Yes) No N/A

Specific requirements in deed or decision documents have been met — Yes (No) N/A
Violations have been reported — Yes No (N/A)
Other problems or suggestions: Report attached
Monitoring has not been implemented
Soil removal has not been implemented. RD has not been approved?

2. **Adequacy** ICs are adequate (ICs are inadequate) N/A
Remarks

D. General

1. **Vandalism/trespassing** Location shown on site map (No vandalism evident)
Remarks

2. **Land use changes on site** N/A
Remarks

3. **Land use changes off site** N/A
Remarks

VI. GENERAL SITE CONDITIONS

A. Roads Applicable N/A

1. **Roads damaged** (Location shown on site map) (Roads adequate) N/A
Remarks

B. Other Site Conditions

Remarks_____

_____

_____

_____

_____

_____

VII. LANDFILL COVERS Applicable (N/A)

A. Landfill Surface

1. **Settlement** (Low spots) Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

2. **Cracks** Location shown on site map Cracking not evident
   Lengths_____ Widths_____ Depths_____
   Remarks_____
   _____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

4. **Holes** Location shown on site map Holes not evident
   Areal extent_____ Depth_____
   Remarks_____
   _____

5. **Vegetative Cover** Grass Cover properly established No signs of stress
   Trees/Shrubs (indicate size and locations on a diagram)
   Remarks_____
   _____

6. **Alternative Cover (armored rock, concrete, etc.)** N/A
   Remarks_____
   _____

7. **Bulges** Location shown on site map Bulges not evident
   Areal extent_____ Height_____
   Remarks_____
   _____

8. **Wet Areas/Water Damage** — Wet areas/water damage not evident
   - Wet areas — Location shown on site map — Areal extent_____
   - Ponding — Location shown on site map — Areal extent_____
   - Seeps — Location shown on site map — Areal extent_____
   - Soft subgrade — Location shown on site map — Areal extent_____

   Remarks_____

9. **Slope Instability** — Slides — Location shown on site map — No evidence of slope instability
   Areal extent_____
   Remarks_____

B. Benches — Applicable — N/A

(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)

1. **Flows Bypass Bench** — Location shown on site map — N/A or okay
   Remarks_____

2. **Bench Breached** — Location shown on site map — N/A or okay
   Remarks_____

3. **Bench Overtopped** — Location shown on site map — N/A or okay
   Remarks_____

C. Letdown Channels — Applicable — N/A

(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)

1. **Settlement** — Location shown on site map — No evidence of settlement
   Areal extent_____ Depth_____
   Remarks_____

2. **Material Degradation** — Location shown on site map — No evidence of degradation
   Material type_____ Areal extent_____
   Remarks_____

3. **Erosion** — Location shown on site map — No evidence of erosion
   Areal extent_____ Depth_____
   Remarks_____

4. **Undercutting** Location shown on site map No evidence of undercutting
Areal extent_____ Depth_____
Remarks_____

5. **Obstructions** Type_____ No obstructions
Location shown on site map Areal extent_____
Size_____
Remarks_____

6. **Excessive Vegetative Growth** Type_____
No evidence of excessive growth
Vegetation in channels does not obstruct flow
Location shown on site map Areal extent_____
Remarks_____

D. Cover Penetrations Applicable N/A

1. **Gas Vents** Active Passive
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance
N/A
Remarks_____

2. **Gas Monitoring Probes**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

3. **Monitoring Wells** (within surface area of landfill)
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

4. **Leachate Extraction Wells**
Properly secured/locked Functioning Routinely sampled Good condition
Evidence of leakage at penetration Needs Maintenance N/A
Remarks_____

5. **Settlement Monuments** Located Routinely surveyed N/A
Remarks_____

E. Gas Collection and Treatment Applicable N/A

1. **Gas Treatment Facilities**
   Flaring Thermal destruction Collection for reuse
   Good condition Needs Maintenance
   Remarks_____

2. **Gas Collection Wells, Manifolds and Piping**
   Good condition Needs Maintenance
   Remarks_____

3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings)
   Good condition Needs Maintenance N/A
   Remarks_____

F. Cover Drainage Layer Applicable N/A

1. **Outlet Pipes Inspected** Functioning N/A
   Remarks_____

2. **Outlet Rock Inspected** Functioning N/A
   Remarks_____

G. Detention/Sedimentation Ponds Applicable N/A

1. **Siltation** Areal extent_____ Depth_____ N/A
   Siltation not evident
   Remarks_____

2. **Erosion** Areal extent_____ Depth_____
   Erosion not evident
   Remarks_____

3. **Outlet Works** Functioning N/A
   Remarks_____

4. **Dam** Functioning N/A
   Remarks_____

H. Retaining Walls Applicable N/A

1. **Deformations** Location shown on site map Deformation not evident
   Horizontal displacement_____ Vertical displacement_____
   Rotational displacement_____
   Remarks_____

2. **Degradation** Location shown on site map Degradation not evident
   Remarks_____

I. Perimeter Ditches/Off-Site Discharge Applicable N/A

1. **Siltation** Location shown on site map Siltation not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Vegetative Growth** Location shown on site map N/A
   Vegetation does not impede flow
   Areal extent_____ Type_____
   Remarks_____

3. **Erosion** Location shown on site map Erosion not evident
   Areal extent_____ Depth_____
   Remarks_____

4. **Discharge Structure** Functioning N/A
   Remarks_____

VIII. VERTICAL BARRIER WALLS Applicable N/A

1. **Settlement** Location shown on site map Settlement not evident
   Areal extent_____ Depth_____
   Remarks_____

2. **Performance Monitoring** Type of monitoring_____
   Performance not monitored
   Frequency_____ Evidence of breaching
   Head differential_____
   Remarks_____

IX. GROUNDWATER/SURFACE WATER REMEDIES	Applicable	N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines Applicable N/A

1. **Pumps, Wellhead Plumbing, and Electrical**
   Good condition All required wells properly operating Needs Maintenance N/A
   Remarks_____

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

B. Surface Water Collection Structures, Pumps, and Pipelines Applicable N/A

1. **Collection Structures, Pumps, and Electrical**
   Good condition Needs Maintenance
   Remarks_____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**
   Good condition Needs Maintenance
   Remarks_____

3. **Spare Parts and Equipment**
   Readily available Good condition Requires upgrade Needs to be provided
   Remarks_____

C. Treatment System Applicable N/A

1. **Treatment Train** (Check components that apply)
   - Metals removal — Oil/water separation — Bioremediation
   - Air stripping — Carbon adsorbers
   - Filters_____
   - Additive (*e.g.*, chelation agent, flocculent)_____
   - Others_____
   - Good condition — Needs Maintenance
   - Sampling ports properly marked and functional
   - Sampling/maintenance log displayed and up to date
   - Equipment properly identified
   - Quantity of groundwater treated annually_____
   - Quantity of surface water treated annually_____

   Remarks_____

2. **Electrical Enclosures and Panels** (properly rated and functional)
   N/A — Good condition — Needs Maintenance

   Remarks_____

3. **Tanks, Vaults, Storage Vessels**
   N/A — Good condition — Proper secondary containment — Needs Maintenance

   Remarks_____

4. **Discharge Structure and Appurtenances**
   N/A — Good condition — Needs Maintenance

   Remarks_____

5. **Treatment Building(s)**
   N/A — Good condition (esp. roof and doorways) — Needs repair
   Chemicals and equipment properly stored

   Remarks_____

6. **Monitoring Wells** (pump and treatment remedy)
   Properly secured/locked — Functioning — Routinely sampled — Good condition
   All required wells located — Needs Maintenance — N/A

   Remarks_____

D. Monitoring Data

1. Monitoring Data
   Is routinely submitted on time — Is of acceptable quality

2. Monitoring data suggests:
   Groundwater plume is effectively contained — Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)
Properly secured/locked Functioning Routinely sampled Good condition
All required wells located Needs Maintenance N/A
Remarks PEN-43-GW10S Was unlocated during well inspection.

Is monitoring Plan in RD?

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

Double check status,

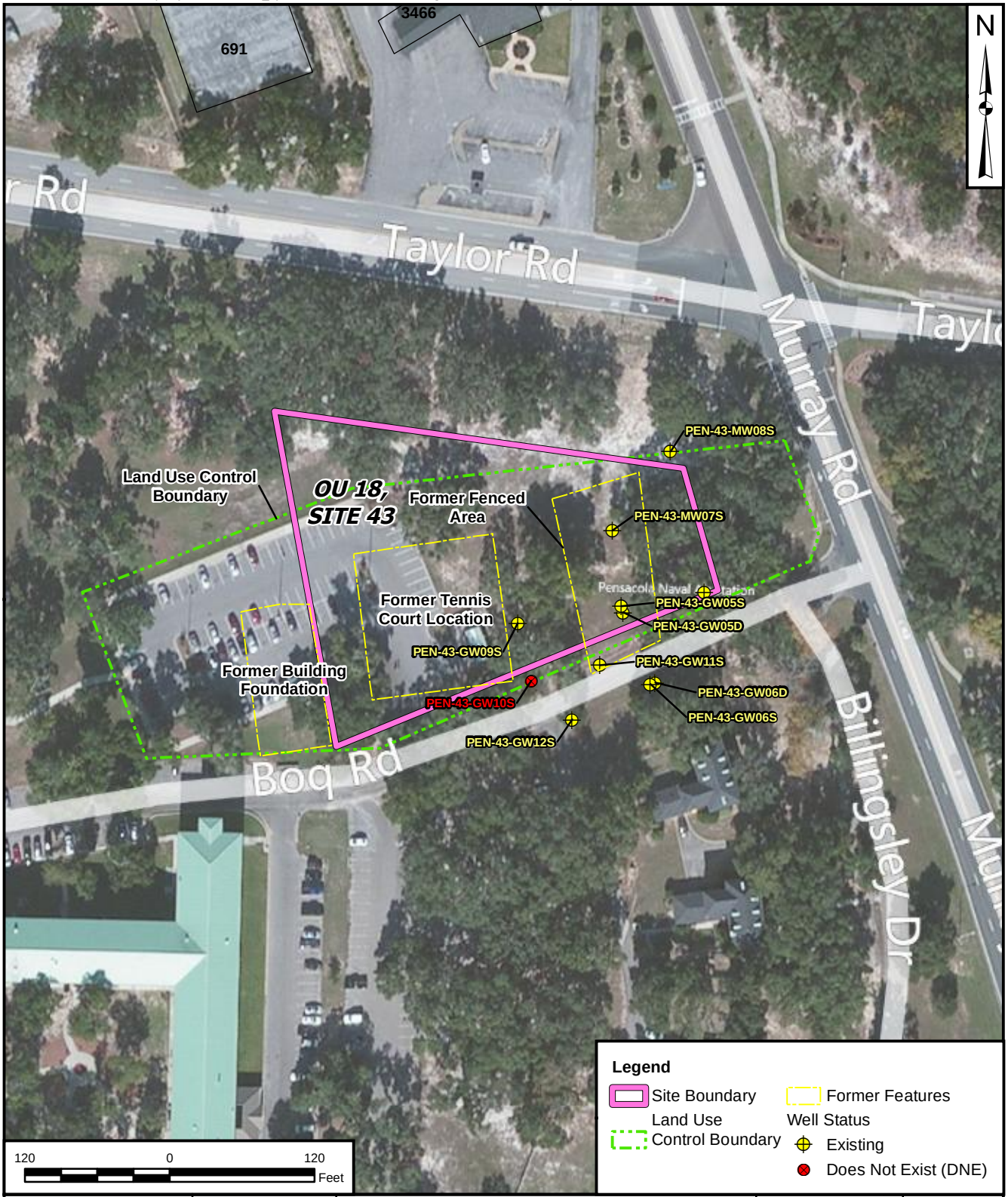
B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

C.	**Early Indicators of Potential Remedy Problems**
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. N/A

D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. N/A

P:\NUS\112G02722\GIS\maps\5yrFormatted\AP_5yearReviewOU18Site43.mxd [alex.montalvo 9/18/2012]



DRAWN BY: GIS	DATE: 9/18/2012	SITE MAP - OPERABLE UNIT 18 5 YEAR REVIEW NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER: 112G00390
CHECKED BY: A.I.	DATE: 9/18/2012		CTO NUMBER: 067
REVISED BY:	DATE:		APPROVED BY: ___ DATE: ___
SCALE: AS NOTED			APPROVED BY: ___ DATE: ___
			FIGURE NO.: 8 - 1 REV: 0

APPENDIX J

RECENT ANNUAL REPORTS FOR NAS PENSACOLA MNA SITES

Provided on CD

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-94-D-0888

Rev. 4
April 2013

Final
2010 Annual Groundwater Monitoring Report
for
Long-Term Monitoring Operable Unit 1

Naval Air Station Pensacola
Pensacola, Florida

Contract Task Order 0067

April 2013

NAVFAC Naval Facilities Engineering Command
NAS Jacksonville
Jacksonville, Florida 32212-0030

TETRA TECH

FINAL
2010 ANNUAL GROUNDWATER MONITORING REPORT
FOR
LONG-TERM MONITORING

OPERABLE UNIT 1

NAVAL AIR STATION PENSCOLA
PENSACOLA, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command
Southeast
Building 103
Naval Air Station Jacksonville
Jacksonville, Florida 32212

Submitted by:
Tetra Tech, Inc. 661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220-2745

CONTRACT NUMBER N62467-04-D-0055
CONTRACT TASK ORDER 0067

April 2013

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FINAL

PROFESSIONAL CERTIFICATION

2010 Annual Monitoring Report for Groundwater Monitoring
Operable Unit 1

Naval Air Station Pensacola
Pensacola, Florida

This 2010 Annual Monitoring Report was prepared under the direct supervision of the undersigned geologist using geologic and hydrogeologic principles standard to the profession at the time the report was prepared. If conditions are determined to exist that differ from those described, the undersigned geologist should be notified to evaluate the effects of additional information on the assessment described in this report. This report was developed specifically for the referenced site and should not be construed to apply to any other site.

Gerald A. Walker

Gerald A. Walker, P.G.
Florida License No. PG-0001180

April 18 2013
Date

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ACRONYMS AND ABBREVIATIONS

1,1,2,2-PCA	1,1,2,2-tetrachloroethane
bgs	Below Ground Surface
BTOC	Below Top of Casing
°C	Degrees Celsius
CLEAN	Comprehensive Long-Term Environmental Action, Navy
COC	Chemicals of Concern
CTL	Cleanup Target Level
CTO	Contract Task Order
E/A&H	Ensafe/Allen & Hoshall, Inc.
ESD	Explanation of Significant Difference
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
GCTL	groundwater cleanup target level
ITRC	Interstate Technology & Regulatory Council
ITS	Interceptor Trench System
LTM	Long-Term Monitoring
LUC	Land Use Control
MCL	Maximum Contaminant Level
MDL	Method Detection Limit
mg/L	milligrams per liter
msl	mean sea level
mV	millivolt
NADC	Natural Attenuation Default Concentration
NAS	Naval Air Station
NAVFAC SE	Naval Facilities Engineering Command, Southeast
NS	Not Sampled
NTU	Nephelometric Trubidity Unit
ORP	oxidation-reduction potential
OU	Operable Unit
PCA	Tetrachloroethane
PCE	Tetrachloroethene
POC	Point of Compliance
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RI	Remedial Investigation

ACRONYMS AND ABBREVIATIONS (Continued)

ROD	Record of Decision
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound
TCE	Trichloroethene
TOC	Total Organic Carbon
Tetra Tech	Tetra Tech NUS, Inc.
µg/L	micrograms per liter
µS/cm	microsiemens per centimeter
UFP	Uniform Federal Policy
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

This Annual Long-term Monitoring (LTM) Report for Operable Unit (OU) 1 at Naval Air Station (NAS) Pensacola has been prepared by Tetra Tech, Inc. (Tetra Tech) on behalf of Naval Facilities Engineering Command Southeast (NAVFAC SE) under the Comprehensive Long-Term Environmental Action Navy (CLEAN) Contract Number N62467-04-D-0055, Contract Task Order (CTO) 0067.

Based on the findings of the Remedial Investigations (RI) (E/A&H, 1994 and 1996) at OU 1, concentrations of contaminants of concern at some of the OU 1 monitoring well locations are greater than their applicable Record of Decision (ROD) defined Performance Criteria or Florida Groundwater Cleanup Target Levels (GCTLs) (E/A&H, 1998). Therefore, LTM, as required by the ROD, is being conducted to monitor the nature and extent of selected volatile organic compounds (VOCs) and metals contaminants exceeding Florida criteria until levels are reduced to below the applicable criteria. The LTM program requires the collection of groundwater samples from the OU 1 monitoring wells to be analyzed for the chemicals of concern (COCs) identified in the ROD and Proposed Plan that include VOCs and metals and surface water samples to be analyzed only for total iron. Semiannual sampling events have been conducted since March 2000, but were not conducted from November 2003 through May 2010. LTM was not conducted from 2004 to 2005 due to extensive hurricane damage throughout the facility. Later, an Optimization Study was conducted (final report submitted April 2008) causing further delays. In addition, the Reconnaissance Phase Flow Control Pilot Study was not completed until 2009 adding to the inability to perform LTM. After review and approval of the Data Quality Objectives and Uniform Federal Policy Sampling and Analysis Plan (UFP-SAP) (submitted in July 2010 and approved in November 2010), LTM continued.

This report presents the results of the semiannual groundwater monitoring events for the LTM program that were conducted in May and November 2010 in accordance with the UFP-SAP , Long-term Monitoring Plan, Operable Unit 1 (Tetra Tech, 2010).

2010 ANNUAL MONITORING

The activities supporting the LTM monitoring field events included the decommissioning of the interceptor trench pump system, the collection of surface water samples, the installation of monitoring wells, and collection of groundwater samples from existing and new monitoring wells. Two new monitoring wells and four replacement monitoring wells were installed in May 2010. Environmental sampling included the collection of 3 surface water samples, two rounds of groundwater samples from the 6 newly installed wells, 8 existing piezometers, and 11 existing monitoring wells. The surface water samples were analyzed

for total iron and groundwater samples were analyzed for VOCs and metals that are required by the ROD and identified in the Proposed Plan.

SURFACE WATER

Surface water samples were collected at three locations as part of two semiannual sampling events. Two of the surface water sample locations are in Wetland 3, which is located adjacent to and downstream of OU 1. Surface water sample, 01SW01, is located in the southwestern portion of Wetland 3 (which is approximately 250 feet south of the previous location) and 01SW02 is located prior to the culvert that connects Wetland 3 to Wetland 4. The third surface water sample location, 01SW03, is the Point of Compliance (POC) sample location in Wetland 4D.

Surface water samples collected from Wetland 3 during these two sampling events continued to have iron concentrations exceeding FDEP surface water standards. However, the iron concentrations remained considerably lower than the 700,000 to 1,800,000 micrograms per liter (µg/L) concentrations reported in 2000. Additionally, when evaluating historical sampling results for 01SW02 using the Mann-Kendall statistical analysis, these results indicate a downward trend.

GROUNDWATER

During the May and November 2010 groundwater sampling events, 17 monitoring wells and 8 piezometers were sampled and analyzed for the 12 groundwater COCs. Only seven of the COCs were detected in groundwater samples exceeding their respective GCTLs. Manganese, aluminum, cadmium, and iron were the only metals that exceeded their GCTLs. Based on the locations sampled, aluminum, iron and manganese exceedances appeared to be distributed across the study area. Three VOCs (benzene, chlorobenzene, and vinyl chloride) were detected at concentrations exceeding their respective GCTLs.

Comparison of the 2010 groundwater sampling data with previous groundwater sampling data suggests that the trends in the concentrations of the COCs observed in May and November 2010 are consistent with the long-term concentration trends for most of the monitoring wells.

CONCLUSIONS AND RECOMMENDATIONS

The results of applying the three decision rules that were presented in the UFP-SAP (Tetra Tech, 2010) to govern data use are as follows:

- **Decision Rule 1** Determine whether any contaminant concentration in groundwater exceeds the Performance Criteria for the four ROD-specified contaminants (benzene, chlorobenzene, vinyl

chloride, and nickel) for the two most recent rounds of monitoring. If any ROD-specified contaminant concentration does not exceed the Performance Criteria in both rounds the planning team will convene to optimize the monitoring strategy (i.e., reduce sampling frequency, reduce number of wells). If all contaminants exceed the Performance Criteria in at least one of the two rounds, no change will be made to the monitoring program and land use controls (LUCs).

  - Three of the four ROD-specified COCs (benzene, chlorobenzene, and vinyl chloride) had concentrations that exceed the Performance Criteria. Nickel was not detected in the two most recent sampling events above the Performance Criteria.

- **Decision Rule 2** Determine whether each contaminant concentration in groundwater exceeds the greater of the GCTL and the upgradient concentration (for the metals contaminants listed in the Proposed Plan) for the two most recent rounds of monitoring. If any Proposed Plan-listed contaminant concentration does not exceed the applicable value in both results, the planning team will convene to optimize the monitoring strategy (i.e., reduce sampling frequency, reduce number of wells, reduce number of contaminants). If all contaminants exceed the applicable value in at least one of the two results, no change will be made to the monitoring program and LUCs.

  - Four of the eight Proposed Plan contaminants (aluminum, cadmium, iron, and manganese) had concentrations above their GCTLs. Seven of the 12 COCs were detected in groundwater samples above their GCTLs.

- **Decision Rule 3** Determine whether iron concentrations in surface water exceed the background threshold value of 5,862 µg/L at the surface water POC. If they do exceed at the surface water POC, reconvene the planning team to evaluate and select a remedial action. Otherwise, continue monitoring iron concentrations in surface water.

  - One of the three surface water samples, 01SW02, which is on the northwest side of Wetland 3, contained iron at concentrations that exceeded the fresh surface water background concentration threshold of 4,720 µg/L (Tetra Tech, 2009). However, the surface water sampling location near the POC was an order of magnitude below the marine surface water background concentration threshold.

Following the decision rules in the UFP SAP (Tetra Tech, 2010) continuing the LTM program is recommended for OU 1. However, based on the results from the recent sampling events, the trends in the groundwater COCs, and applying the decision rules in the UFP SAP, a refinement of the monitoring wells to be selected for the LTM program may be warranted. Additionally, the implementation,

monitoring, and enforcement of LUCs are completed by the Nay in conjunction with the annual groundwater monitoring program at OU 1. The enforcement is currently being met through the following actions:

- The NAS Pensacola IR Manager is responsible to coordinate inspections of this site. Any discrepancies will be forwarded to NAS Pensacola Facilities Officer for correction to maintain the objectives.
- Institutional controls are imposed to restrict groundwater use of the surficial zone of the sand and gravel aquifer within 300 feet of the site boundaries.
- No intrusive activities are permitted within the site boundaries without prior approval from the NAS Pensacola Environmental Office.
- The NAS Pensacola IR Manager submits an annual review of the institutional controls and certification that the controls should remain in place or be modified to reflect changing site conditions.

Along with the monitoring activities, this annual inspection is conducted typically in November or December each year to ensure the LUC objectives are being met. The results from the most recent annual LUC inspection indicate no deficiencies in the current objectives and implementation to achieve objectives [Letters to Julie Corkran (USEPA) and David Grabka (FDEP), from William Taylor, Jr. (NAS Pensacola Public Works Department), February 2011 – provided in Appendix D].

1.0 INTRODUCTION

Tetra Tech has prepared this Annual Monitoring Report to document the results of two semiannual sampling events as part of the Long-term Monitoring (LTM) program for Operable Unit (OU) 1, located at Naval Air Station (NAS) Pensacola, Florida. This Annual LTM Report was prepared for Naval Facilities Engineering Command Southeast (NAVFAC SE) under Contract Task Order (CTO) 0067, for the Comprehensive Long-Term Environmental Action Navy (CLEAN) IV Contract Number N62467-04-D-0055. This document contains data collected during the May and November 2010 semiannual monitoring activities, following the Uniform Federal Policy (UFP) Sampling and Analysis Plan (SAP) for the Long-Term Groundwater Monitoring of OU 1 – Site 1 Sanitary Landfill (Tetra Tech, 2010) [approved by the United States Environmental Protection Agency (USEPA) and Florida Department of Environmental Protection (FDEP) on November 1, 2010 and July 12, 2009, respectively].

1.1 SITE SETTING

The area surrounding and adjacent to OU 1, which encompasses approximately 80 acres, was used as a sanitary landfill from the mid -1950's until 1976. A list of important historical events and relevant dates in the site chronology was presented in the UFP SAP (Tetra Tech, 2010). Figure 1-1 shows the location of OU 1 and Figure 1-2 shows the site features.

Nearly all waste developed at NAS Pensacola during this time period was disposed of in the OU 1 landfill. The landfill ranges in elevation from 8 to 20 feet above mean sea level (msl) and is heavily wooded with trees and natural shrub vegetation. OU 1 is bordered to the north by an estuary of Pensacola Bay, named Bayou Grande, to the east by the Navy's A.C. Reed Golf Course, to the west by Navy property covered with vegetation, and to the south by the Barrancas Cemetery.

Bayou Grande is classified by the Florida Department of Environmental Protection (FDEP) as a Class III Water body, indicating its use for recreation and maintaining a well-balanced fish and wildlife population. Surface water from OU 1 drains to the Bayou Grande through two wetlands, Wetland 3, located on the northeast side of the site, and Wetland 4D, located east from Wetland 3 across John Tower Road and the Navy's A.C. Reed Golf Course.

Wetland 3 is a freshwater wetland that receives shallow groundwater and surface water runoff from OU 1 and appears to be primarily fed by a visible seep at the north end of the wetland. Wetland 3 is bordered by OU 1 to the north, south, and west, and by John Tower Road and the golf course to the east. As reported in the Site 41 Remedial Investigation (RI) (EnSafe, 2005), a narrow surface water channel in this wetland is approximately 4 inches deep, and 1 to 2 feet wide. The remaining Wetland 3 area is from 3 to 500 feet wide, is relatively flat topographically, and consists of saturated sediment drained by a narrow

and shallow stream. Sediment in most of the wetland is highly organic, with total organic carbon (TOC) detected up to 24 percent. The shallow, open water portion contains several freshwater vegetative species such as lizard tail and cattails. The area surrounding the wetland consists of pine trees, and some oaks and other species. The lower section of this wetland flows into a drainage culvert that discharges into Wetland 4D. This culvert runs east under John Tower Road and a golf course fairway prior to discharging into Wetland 4D.

Wetland 4D is an estuarine open water body fed by Wetland 3 from the west and by Wetland 4C from the south. Wetland 4D discharges north into Bayou Grande through a culvert beneath an unnamed dirt road. Wetland 4D is surrounded by the golf course. The open water portion of Wetland 4D ranges from 1 foot to approximately 8 feet deep and has a maximum width of approximately 700 feet. Sediment in the Wetland 4D is sandy, with TOC detected up to 7 percent. A small area of spartina is located within the northwestern corner of Westland 4D. The steep topographic gradient surrounding the wetland makes the transition from upland to open water obvious. The vegetation surrounding Wetland 4D is both mowed grass and tall grasses, with a small stand of pine trees. The presence of mowed grass around a portion of this wetland limits its potential to provide habitat for most species.

1.2 SITE BACKGROUND

In 1974, landfill leachate was discovered to discharge from an abandoned drainage field into a nearby golf course pond. Analysis of groundwater samples indicated that phenol and several metals were present. Further investigations (verification and confirmation studies) detected volatile organic compounds (VOCs) and trace concentrations of semivolatile organic compounds (SVOCs) in the groundwater. It was determined that contamination (VOCs, SVOCs, and metals) was limited to the areas within and around the landfill's perimeter.

Based on the OU 1 RI, soil inside the landfill boundary was impacted by past activities but soil outside the landfill area was similar in concentration to background. The surficial aquifer in the vicinity of OU 1 has been classified by the United States Environmental Protection Agency (USEPA) as IIA and by the FDEP as G-2 and is therefore considered a potential source of drinking water. Groundwater in the shallow and intermediate aquifer zones were found to be impacted by metals and was limited to the center of OU 1 and the landfills eastern western and northwestern boundaries. Based on background data, aluminum, iron, and manganese were determined to occur naturally in groundwater at concentration exceeding regulatory limits and were generally limited to areas within and around the landfill perimeter. Organic constituents were detected in monitoring wells located downgradient from the landfill to area along the Bayou Grande coastline, adjacent wetlands, and east-northeast beneath the golf course. The highest detected concentrations of organics were detected at monitoring well locations at the golf course; however, organics that exceeded regulatory criteria appeared to be limited to the landfill perimeter.

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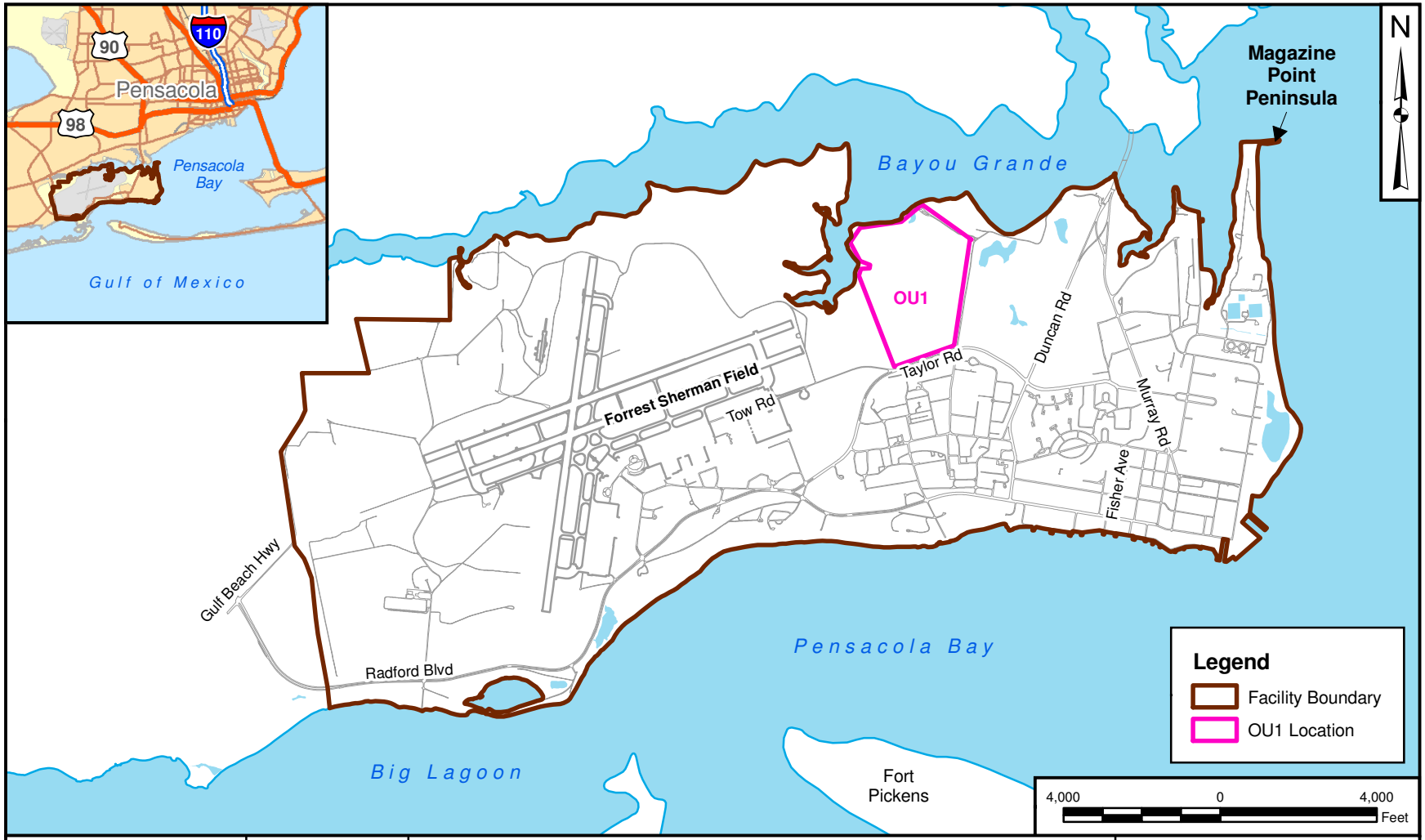

DRAWN BY S. STROZ	DATE 01/25/11	SITE LOCATION MAP OU 1 NAS PENSACOLA PENSACOLA, FLORIDA	CONTRACT NUMBER CTO 067
CHECKED BY Y. MARTINEZ	DATE 01/28/11		APPROVED BY ___ DATE ___
COST/SCHED AREA			APPROVED BY ___ DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 1-1 / REV 0

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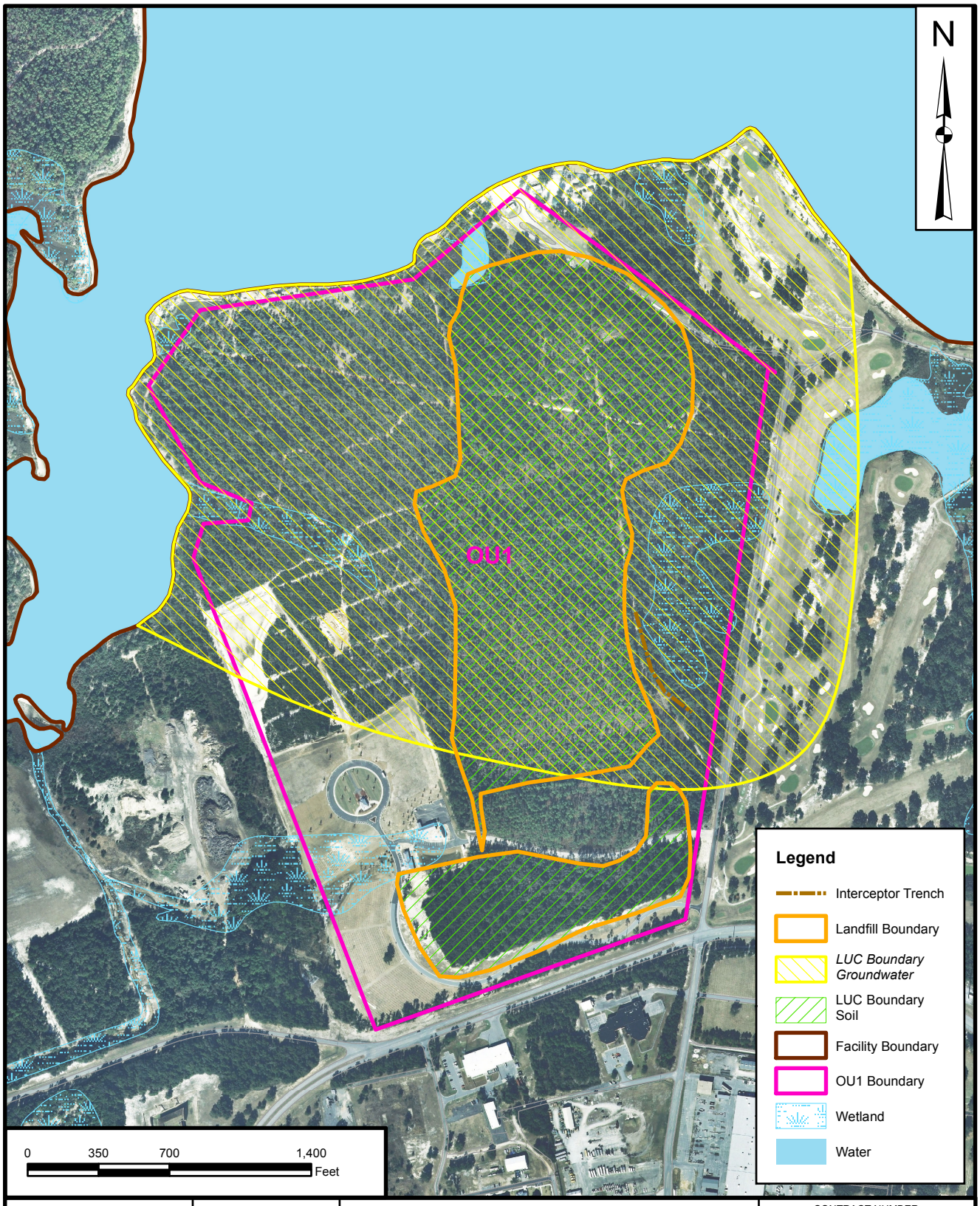

DRAWN BY S. STROZ	DATE 01/25/11	SITE FEATURES MAP OU1 NAS PENSACOLA PENSACOLA, FL	CONTRACT NUMBER 067
CHECKED BY Y. MARTINEZ	DATE 01/28/11		APPROVED BY ___ DATE ___
REVISED BY J. NOVAK	DATE 01/23/12		APPROVED BY ___ DATE ___
SCALE AS NOTED			FIGURE NO. FIGURE 1-2 REV 0

NAVFAC

Based on the findings of the OU 1 RI, the OU 1 Record of Decision (ROD) (Ensafe, 1998) and Long-Term Monitoring Plan (Bechtel, 1999) established chemicals of concern (COCs) for groundwater as benzene, naphthalene, xylene, chlorobenzene, vinyl chloride, 1,1,2,2-tetrachloroethane (1,1,2,2-PCA), aluminum, cadmium, chromium, iron, nickel, and manganese. However, the ROD-specified COCs (benzene, chlorobenzene, vinyl chloride, and nickel) are treated differently than Proposed Plan-listed parameters because the ROD requires monitoring only as long as the four parameter concentrations exceed the ROD-specified criteria. Monitoring of selected constituents was described in the ROD (Ensafe, 1998) in Sections 9.2 Monitoring and 9.3 Compliance Testing which state: "Groundwater monitoring will be implemented at OU 1 to record contaminant movement to nearby surface water bodies. The major components of groundwater monitoring to be implemented are: Placement of institutional controls to preclude usage of groundwater in the surficial zone of the Sand-and-Gravel Aquifer within 300 feet of the site Implementation of a groundwater monitoring program to monitor compliance with the performance standards listed in Table 9-1 (from the ROD) and Table 1-1 below. Groundwater and surface water will be monitored at this site in accordance with the monitoring plan to be completed during the remedial design. After demonstration of compliance with performance standards for two consecutive sampling events and continued attainment through the five-year review at the designated compliance points, sampling and monitoring may be discontinued. If sampling or monitoring indicates that the performance standards set forth in Section 9.2 are being exceeded at any time after monitoring has been discontinued, groundwater sampling may recommence until the performance standards are once again achieved." The OU 1 ROD specified groundwater concentration criteria are provided in Table 1-1 and the Proposed Plan parameters valuation criteria are the Florida Groundwater Cleanup Target Levels (GCTLs) per Chapter 62-550, Florida Administrative Code (F.A.C.) (and specified in Chapter 62-777, F.A.C.) provided in Table 1-2. The performance criteria in the enforceable ROD and the Proposed Plan, as well as Chapter 62-777, F.A.C., are applicable and relevant and appropriate requirements for the groundwater remedy to attain for groundwater COCs. The Navy will evaluate the current OU 1 COCs and update the list as appropriate in an explanation of significant difference (ESD) and in the Five Year Review.

TABLE 1-1

ROD PERFORMANCE CRITERIA FOR GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Contaminant	Florida Drinking Water Standards (µg/L)
Nickel	100
Benzene	1
Chlorobenzene	100
Vinyl chloride	1

Notes:
µg/L - micrograms per liter

TABLE 1-2

PROPOSED PLAN GROUNDWATER PARAMETERS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Contaminant	Florida Groundwater Cleanup Target Level (µg/L)
Naphthalene	14*
1,1,2,2-PCA	0.2*
Total Xylenes	20
Aluminum	200
Cadmium	5
Chromium	100
Iron	300
Manganese	50

Notes:
µg/L - micrograms per liter
*corrected according to current GCTL

Because concentrations of iron were found during the RI to exceed its Florida secondary Maximum Contaminant Level (MCL) of 300 µg/L per Chapter 62-550, F.A.C. and it surface water quality criteria of 1,000 µg/L, and to discharge from groundwater to surface water at Wetland 3, the remedy selected for OU 1 included a groundwater Interceptor Trench System (ITS) to treat the groundwater prior to its discharge to Wetland 3 and LTM be conducted to evaluate the effectiveness of the remedy.

The ITS was constructed in 1999 and is approximately 670 feet long, 16 inches wide, and 18 feet deep and is filled with limestone. A slotted pipe was also placed at the bottom of the trench. Groundwater with dissolved phase ferrous iron passes through and reacts with the alkaline limestone to form insoluble ferric iron which settles out (precipitates) from the groundwater. It was originally planned to discharge groundwater from the ITS to Wetland 3; however, a modification to the selected remedy was presented in the ROD and was incorporated during the installation of the interceptor trench system. This modification consisted of redirecting treated effluent into the Navy's wastewater system, in lieu of discharging into the adjacent wetland. The USEPA and FDEP concurred with the modification to the remedy for OU 1 since it did not affect the protectiveness of human health and the environment, it was cost effective and it complied with all the Applicable Appropriate and Relevant Requirements identified in the ROD.

After the ROD (Ensafe, 1998) was finalized, LTM was initiated in 2000. Based on data collected through 2002, in the third Annual Groundwater Monitoring Report for OU 1 it was recommended that monitoring only be continued for benzene, xylenes, vinyl chloride, aluminum, cadmium, iron, and manganese. The

other contaminants (nickel, chlorobenzene, 1,1,2,2-PCA, and chromium) were determined to no longer exceed their applicable standards and were dropped from LTM.

After the Fifth Annual LTM Report, an Optimization Study (Tetra Tech, 2006) was conducted to evaluate efficiency and cost-effectiveness of the ITS. In the Optimization Study report it was stated that based on the human and ecological risk assessments conducted during the RI, the ITS is not required to protect human health and the environment based on toxicity studies and risk assessments that showed iron concentrations in Wetland 3 surface water do not pose a threat to human health and the environment.

The Optimization Study also found that although the ITS may contribute to reducing the iron concentrations within shallow groundwater, surface water data indicate that the ITS is not having an appreciable effect on the iron concentrations within Wetland 3. The Optimization Study also stated that even if the ITS was effectively capturing and treating the local groundwater, the prevalence of iron within the shallow groundwater upgradient, side-gradient, and downgradient to the ITS would make achievement of the Remedial Action Objectives (RAOs) for surface water in Wetland 3 unattainable.

Furthermore, the Optimization Study found that Wetland 3 is naturally treating the effluent iron concentrations. The mechanisms by which this is occurring are believed to be physical, chemical, and biological. Based upon field observations, physical processes including natural sedimentation appear to be occurring where the iron flocculent is dropping out of suspension. The field observations also indicate that the vegetation in Wetland 3 appears to be growing with little to no stress. This is a good indication that, as identified in the ROD and documented by the Interstate Technology & Regulatory Council (ITRC) the native vegetation is likely contributing to the reduction of the iron via several mechanisms including sedimentation, adsorption, oxidation, biological, and phytodegradation of the iron (ITRC, 2003). The vegetation also provides an unspecified amount of evapotranspiration in the wetland which aids in treatment.

For groundwater, the Optimization Study determined that the intermediate aquifer zone is mildly or moderately reducing, whereas the geochemistry is generally oxidizing in shallow wells at the same cluster. Oxidizing conditions in the shallow aquifer zone likely persist due to direct recharge of oxygenated water via precipitation infiltration. The persistence of these organic contaminants in the intermediate aquifer zone is likely due to the slow degradation rates of benzene, xylenes, and vinyl chloride under reducing conditions. The natural attenuation evaluation suggested that there is not sufficient evidence for widespread occurrence of reductive dechlorination (Tetra Tech, 2006) at the site. Current site conditions suggest, however, that reductive dechlorination of source materials (i.e., chlorinated ethanes and ethenes) from the landfill has occurred, as evidenced by the lack of detectable parent compounds [e.g., 1,1,2,2-PCA, tetrachloroethene (PCE), trichloroethene (TCE), etc.], or the

presence of daughter or breakdown products, the Optimization Study concluded for groundwater that based upon the historical analytical and geochemistry data there is little evidence that reductive dechlorination is effectively reducing the organic contaminants (e.g., vinyl chloride) in groundwater. Other USEPA accepted natural attenuation mechanisms including aerobic oxidation, anaerobic oxidation, volatilization, dilution, advection, and others may be effective in reducing the concentrations of these contaminants.

The Optimization Study recommended discontinuing the pumping operation of the ITS and to modify the monitoring program related to the ITS and Wetland 3 area because iron concentrations were below risk-based levels. The Optimization Study also recommended natural attenuation of organic constituents in groundwater is to continue to perform LTM of OU 1 groundwater on a site-wide basis. To demonstrate that natural aerobic oxidation is effectively reducing the organic contaminants, additional data was collected. These additional data was provided through the installation of additional wells along the groundwater flow path and a staff gauge near Bayou Grande. To date, five monitoring wells were installed to address these recommendations [three replacement wells and two wells hydraulically downgradient] in 2009. Additionally, the staff gauge was installed at Wetland 4D near Bayou Grande; identified as Staff Gauge (SG) 3. Measurements were collected in May and November 2010 from all staff gauges onsite (see Figure 1-3 for locations). The readings were as follows:

STAFF GAUGE READINGS (in feet below land surface)		
MAY 2010		
SG 1	SG 2	SG 3
3.41	3.50	2.60
NOVEMBER 2010		
SG 1	SG 2	SG 3
3.42	3.46	3.32

In 2008, Tetra Tech completed a Five-year Review for NAS Pensacola to determine if the selected remedy at the OU's is protective of human health and the environment. The Five-year Review found that the detected concentrations of iron in groundwater samples collected from monitoring wells located down gradient from the ITS continue to exceed both the Florida surface water quality criteria of 1,000 µg/L and the MCL for iron of 300 µg/L as specified in 62-550, F.A.C., as well as the NAS Pensacola basewide freshwater surface water background reference concentration for freshwater wetlands of 2,360 µg/L.

The Five-year Review concurred with the Optimization Study and it is stated that: “The design and subsequent performance of the trench does not appear to be sufficient to capture and extract the iron contamination migrating to the wetland. Furthermore, even if the ITS was effectively capturing and treating the local groundwater (which it does not appear to do based upon the elevated iron concentrations in groundwater immediately down gradient of the ITS) the prevalence of iron within the shallow groundwater upgradient, side-gradient, and down gradient to the ITS would make achievement of the RAOs for surface water in Wetland 3 impractical with the existing system. In summary, the system is not currently meeting, or expected to meet, the reductions necessary for cleanup.” The Five-year Review determined that because the ITS is not meeting the RAOs, modification of the existing remedy is necessary. Two alternative modifications were developed: 1) increase the influence and capacity of the capture and treatment system to address the magnitude of the iron contamination discharging into Wetland 3; or 2) discontinue active pumping in the ITS coupled with monitoring and the modification of the remedial goals for the existing remedy. The Five-year Review also indicated that monitoring for iron should continue considering that Wetland 3 is already an integral part of the treatment process for iron, it is expected that iron concentrations in Wetland 3 will remain stable and may decrease over time.

A Reconnaissance Phase Flow Control Pilot Study for Operable Unit 1 (Tetra Tech, 2009) was conducted to evaluate the effectiveness and impacts of blocking the culvert that connects Wetland 3 and 4D. The intent of blocking the culvert would be to effectively isolate Wetland 3 from Wetland 4D, thereby protecting Wetland 4D by creating an infiltration area within Wetland 3 for groundwater and surface water previously discharging to Wetland 4D through the culvert. The primary purpose of the Pilot Study was to determine if blockage of the culvert would be effective in creating this infiltration gallery in Wetland 3. In addition, the Pilot Study also evaluated whether blocking the culvert would cause detrimental effects such as localized flooding in Wetland 3 or the surrounding area.

The Reconnaissance Phase Flow Control Pilot Study concluded that groundwater currently discharges to surface water in Wetland 3. The groundwater-surface water interaction pattern cannot be changed unless the water level is increased to 7.07 feet at the inlet of the culvert. Water levels required for the upstream area would be even higher. Even if the water level can be sufficiently increased to change the current gaining situation, it is not clear whether a losing situation can be created in the area because of the high groundwater elevations southeast of the culvert. The high groundwater elevations will keep groundwater discharging to the surface water from the southeastern side. Considering the relatively low elevation of John Tower Road near the culvert, blocking the culvert would result in flooding over the road and golf course. Based on these conclusions, it is recommended that no further flow control evaluation be conducted.

Additionally, iron background concentrations were updated as part of the Reconnaissance Phase Flow Control Pilot Study because "pristine" wetlands (Wetlands 27 and 33) were originally used to established background values for all wetlands at NAS Pensacola as part of the Site 41 RI. The background iron concentration for fresh water wetlands at NAS Pensacola was established as 2,360 µg/L and 1,352 µg/L for estuarine wetlands.

The background iron concentration for freshwater and estuarine wetlands were reevaluated because the original data set was small and potentially non-representative, the highly variable iron concentrations that have been detected in the over 80 freshwater and estuarine wetlands at NAS Pensacola, and that it was determined that many of the wetlands contained iron at naturally occurring concentrations that exceeded the original background value. The background analysis was conducted using the Navy's guidance document Procedural Guidance for Statistically Analyzing Environmental Background Data (NAVFAC, 1998). The background values were set at two times the average concentrations of a four-sample data set. The freshwater wetland background threshold was determined to be 4,720 µg/L and the estuarine wetland background threshold was determined to be 5,862 µg/L. This background concentration was reevaluated in the Technical Memorandum for the Reconnaissance Phase Flow Control Pilot Study (Tetra Tech, 2009) which evaluated the feasibility of implementing flow control at Wetland 3. (Regulatory approval of the Reconnaissance Phase Flow Control Pilot Study was received from EPA and FDEP on August 4, 2009 and July 12, 2009, respectively.)

The Reconnaissance Phase Flow Control Pilot Study indicated that the ITS should be stopped because: the optimization and flow control studies for OU 1 (Tetra Tech 2006 and 2009) have demonstrated that this system is not effectively reducing iron concentrations; Wetland 3 naturally treats iron, and iron concentrations in Wetland 3 do not adversely affect human or ecological receptors.

Therefore, it was recommended that because all surface water iron concentrations in Wetland 4D are less than or nearly equal to the proposed estuarine wetland background threshold (5,862 µg/L), monitoring on an annual basis is recommended at a new Point of Compliance (POC) to be established in Wetland 4D. Wetland 4D receives water from the southwestern side of Wetland 3 and from Wetlands 4A-4B-4C at the southeastern side of Wetland 4D. The POC location was selected to represent surface water quality in Wetland 4D prior to where it drains to Bayou Grande through a culvert near the northern corner of the wetland. The POC location is approximately midway between the mixing point of the two water sources and the culvert.

Following the recommendations of the various technical documents (Optimization Study, Five-year Review, and Reconnaissance Phase Flow Control Pilot Study) the groundwater interception system was decommissioned in May 2010. The decision to decommission the ITS was jointly made by the NAS

Pensacola Partnering Team members who included Patty Marajh-Whittemore for NAVFAC SE, Tracie Bolanos for FDEP, Brian Caldwell and Gerry Walker for Tetra tech, Greg Campbell for Navy Public Works, Greg Wilfley for CH2M Hill, and Greg Fraley for the USEPA (recorded in the meeting minutes as Consensus Item 05) during the NAS Partnering Team Meeting held September 16 and 17, 2008 for the following reasons: The ITS was not effectively treating the iron contaminated groundwater migrating from the OU1 landfill and discharging into Wetland 3 as was evident by the elevated iron concentrations present in Wetland 3 surface water. It is possible that the capture area of the trench was not sufficient to prevent iron migration. A compounding factor to this is that iron concentrations are elevated across OU1, both upgradient and downgradient of the ITS. In addition, iron concentrations in groundwater and surface water exceed regulatory criteria in many background locations, in the interior of the landfill, and along the downgradient perimeter of OU1. Interpretation of monitoring results suggests that the performance of the trench was not sufficient to capture and extract the iron contamination migrating to the wetland, and even if the ITS was, the prevalence of iron within the shallow groundwater upgradient, side-gradient, and downgradient to the ITS would make achievement of the RAOs for surface water in Wetland 3 impractical with the existing system (Tetra Tech, 2006).

Additionally, monitoring data favorably suggest that the pH is being buffered slightly by the ITS. The pH for the shallow aquifer typically ranges from 4.9 to 8.8 in the interior of the landfill, while the effluent pH is between 6.6 and 6.8. Because the anoxic limestone is only expected to buffer the pH, the iron concentrations should be similar to those on the upgradient side of the ITS. While several unknown factors may be affecting this result (e.g., diluted concentrations in the effluent versus point samples taken from monitoring wells), it unclear why the effluent concentrations are so low. One possible reason may be that iron is oxidizing and precipitating out inside the trench. This is supported by the fact that the oxygen and oxidation-reduction potential levels in monitoring wells hydraulically upgradient (01MW01 and 01MW02) and downgradient (01PZ07, 01PZ06, and 01PZ08) of the trench suggest aerobic conditions (TtNUS, 2004). If iron precipitation is occurring inside the trench, the longevity of the limestone's buffering capacity in the trench will be negatively impacted because the limestone will become coated with iron precipitate.

Changes in groundwater flow and groundwater and surface water iron concentrations in the vicinity of the ITS trench since it's decommission (May 2010) include the following findings:

- Groundwater flow has not been affected since the trench decommission. Groundwater flow continues to flow toward the Bayou in a northern direction.
- Groundwater from monitoring wells hydraulically upgradient (01MW01 and 01MW02) have iron concentrations that continue to exceed the Florida groundwater cleanup criteria of 300 ug/L. The

Mann-Kendall analysis indicates no trend in iron concentrations in upgradient groundwater (See Section 3.0 for details).

- Groundwater from piezometers hydraulically downgradient (01PZ07, 01PZ06, and 01PZ08) have iron concentrations that continue to exceed the Florida groundwater cleanup criteria of 300 ug/L. The Mann-Kendall analysis indicates no trend in iron concentrations in downgradient piezometers (See Section 3.0 for details).
- Surface water in Wetland 3 have iron concentrations that continue to exceed the Florida fresh surface water criteria of 4,270 ug/L.

It appears that no changes have occurred since the trench's decommission as predicted in the discussion above. The ITS was an impractical system to treat the iron concentrations to meet the RAOs. Section 3.0 details iron concentrations from the time of the installation of the trench through the May and November 2010 sampling events (see Mann-Kendall trends for trend analysis).

1.3 DECISION RULES

As part of the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP) (USEPA, 2005) process Decision Rules were determined and approved by the Project Stakeholders prior to the initiation of the LTM fieldwork. The Decisions Rules were recorded in the regulatory agency approved UFP SAP and include:

Decision Rule #1:
Determine whether any contaminant concentration in groundwater exceeds the Performance Criteria (for the four ROD-specified contaminants) for the two most recent rounds of monitoring. If any ROD-specified contaminant concentration does not exceed the Performance Criteria in both rounds the planning team will convene to optimize the monitoring strategy (i.e., reduce sampling frequency, reduce number of wells). If all contaminants exceed the Performance Criteria in at least one of the two rounds, no change will be made to the monitoring program and LUCs.

Decision Rule #2:
Determine whether each contaminant concentration in groundwater exceeds the greater of the GCTL and the upgradient concentration (for the metals contaminants listed in the Proposed Plan) for the two most recent rounds of monitoring. If any Proposed Plan-listed contaminant concentration does not exceed the applicable value in both results, the planning team will convene to optimize the monitoring strategy (i.e., reduce sampling frequency, reduce number of wells, reduce number of contaminants). If all contaminants exceed the applicable value in at least one of the two results, no change will be made to the monitoring program and LUCs.

Decision Rule #3:

Determine whether iron concentrations in surface water exceed the background threshold value of 5,862 µg/L at the surface water POC. If they do exceed at the surface water POC, reconvene the planning team to evaluate and select a remedial action. Otherwise, continue monitoring iron concentrations in surface water.

The decision statements were expanded to compile rules for data use that reflect various combinations of contaminants, environmental media, and applicable criteria.

Groundwater Monitoring Decision Rules

Statistical trend analysis using the Mann-Kendall test is discussed in the Navy optimization guidance document (Battelle, 2008) and was used in the Five-Year Review (Tetra Tech, 2008b).

Decision Rule #1:

If a Mann-Kendall test at 10 percent significance level indicates that the concentration of any monitored parameter increases significantly by January 2011 in any groundwater monitoring well, the Project Team will convene to determine an appropriate course of action (e.g., increase frequency of monitoring or review groundwater geochemical data); otherwise, continue scheduled monitoring for that well. This rule was established to protect against the potential that parameter concentrations are increasing, regardless of whether the concentrations are greater than or less than the applicable criteria (Performance Criteria or GCTLs). Even if parameter concentrations are less than the applicable criteria, an increasing trend could indicate that the concentrations will eventually become greater than the applicable criteria.

Decision Rules #2:

If any ROD parameter concentration in any groundwater well is less than or equal to the Performance Criteria in groundwater for two or more consecutive rounds of semiannual (or less frequent) sampling, and the concentration trend is not increasing (as determined by a Mann-Kendall trend test at 10 percent significance), stop monitoring for that chemical in the well; otherwise, continue the scheduled monitoring for that parameter in the well. This rule was established to comply with the ROD.

Decision Rules #3:

If any Proposed Plan parameter concentration is less than or equal to the greater of its GCTL and the upgradient concentration in any groundwater well for two or more consecutive semiannual (or less frequent) sampling rounds, and the concentration trend is not increasing (as determined by a Mann-Kendall trend test at 10 percent significance), optimize the monitoring program to reduce the frequency of

monitoring for that parameter; otherwise, continue the scheduled monitoring for that parameter in the well. Optimization shall be conducted in accordance with current Navy groundwater optimization guidance. This rule was established to comply with 62-780.690 F.A.C., Contaminated Site Cleanup Criteria – Natural Attenuation and Monitoring.

Surface Water Monitoring Decision Rules

Decision Rule #4:

If a Mann-Kendall trend test at 10 percent significance indicates that the iron concentration trend is increasing at any monitored surface water location by January 2011, the Project Team will convene to determine an appropriate course of action (e.g., increase frequency of monitoring at the surface water POC and other points, review groundwater geochemistry data); otherwise, continue scheduled monitoring for that location. This rule was established to protect against the potential that iron concentrations are increasing and potentially will increase at the surface water POC, regardless of whether the concentrations are greater than or less than the surface water cleanup target level (CTL). Even if iron concentrations are less than the applicable criterion, an increasing trend could indicate that the concentrations will eventually become greater than the criterion.

Decision Rule #5:

If the iron concentration at the surface water POC located immediately upgradient of Bayou Grande exceeds the background threshold of 5,862 µg/L for two consecutive semiannual (or less frequent) sampling rounds, and the concentration trend is not increasing (as determined by a Mann-Kendall trend test at 10 percent significance), the Project Team will convene to evaluate and select a remedial action; otherwise, continue the scheduled monitoring at that location. This rule was established to comply with 62-780, F.A.C. and is designed to protect against a future unacceptable site condition with respect to iron concentrations.

Decision Rules #6:

If the iron concentration is less than the iron surface water CTL at any surface water location for two or more consecutive semiannual (or less frequent) rounds of sampling, optimize the monitoring program to reduce the frequency of monitoring for that chemical; otherwise, continue the scheduled monitoring at that location. Optimization shall be conducted in accordance with current Navy groundwater optimization guidance to the extent that it is applicable to surface water. This rule was established to comply with 62-780, F.A.C.

The LTM Program will attempt to address each of these decisions rules.

1.4 SUMMARY OF FIELD WORK

The semiannual LTM sampling events at OU 1 were conducted during May and November 2010. The activities supporting these LTM monitoring field events included the decommissioning of the interceptor trench pump system, the collection of surface water samples, the installation of monitoring wells, and collection of groundwater samples from existing and new monitoring wells. Two new monitoring wells and four replacement monitoring wells were installed in May 2010. Environmental sampling included the collection of 3 surface water samples, and two rounds of groundwater samples from the 6 newly installed wells, 8 existing piezometers, and 11 existing monitoring wells (Figure 1-3). The surface water samples were analyzed for total iron and groundwater samples were analyzed for VOCs and metals that are required by the ROD and identified in the Proposed Plan.

Field work associated with these sampling events was performed in accordance with the site specific SAP (Tetra Tech, 2010) which includes requirements for the UFP-QAPP (USEPA, 2005).

1.4.1 Surface Water Sampling

The surface water samples were collected using the FDEP Standard Operating Procedure (SOP) 2100. During each semiannual LTM sampling event, surface water samples were collected at three locations (01SW01, 01SW02, and 01SW03) which are located between the landfill and Bayou Grande to provide representative coverage for Wetland 3 and Wetland 4D. Surface water sample, 01SW01, is located in the southwestern portion of Wetland 3 and 01SW02 is located prior to the culvert that connects Wetland 3 to Wetland 4. The third surface water sample location, 01SW03, is at the POC sample location in Wetland 4D.

The surface water samples were placed in coolers with wet ice and transported under chain of custody protocol to Empirical Laboratories for analysis of iron by SW-846 Method 6010B. Sample log sheets are included in Appendix A.

1.4.2 Monitoring Well Installation

Two new monitoring wells, 01GS73 (shallow aquifer zone) and 01GI74 (deep aquifer zone), and four replacement wells (01GS57, 01GS62, 01GS71, and 01GI72) were installed using hollow stem augers in May 2010 following the procedures provided in the approved UFP SAP (Tetra Tech, 2010). The 2-inch diameter shallow wells were installed to an approximate depth of 20 feet below ground surface (bgs) with a 10-foot well screen bracketing the water table, and the intermediate well was installed to an approximate depth of 30 feet. The monitoring wells were developed by over pumping.

The newly installed wells were surveyed by a Florida licensed surveyor in October 2010. The horizontal location, elevation, and top-of-riser elevations for each of the new or replacement monitoring wells was surveyed. The top-of-riser elevations were surveyed to the nearest 0.01 foot. The monitoring well locations were surveyed relative to the existing site datum (North American Vertical Datum 1988) for the other monitoring wells located at the site.

1.4.3 Groundwater Sampling

Groundwater samples were collected from the 2 newly installed monitoring wells, 4 newly installed replacement wells, 11 existing monitoring wells, and 8 piezometers. The monitoring well and surface water sampling locations are shown on Figure 1-3 and are listed below for the shallow and intermediate aquifer zones and the shallow piezometers.

OU 1 MONITORING WELLS MAY AND NOVEMBER 2010	
Shallow Wells	01GS57, 01GS62, 01GS64, 01GS71, 01GS73 01GGM33 and 01UPGW01
Intermediate Wells	01GI32, 01GI36, 01GI41, 01GI43, 01GI44, 01GI46 , 01GI59, 01GI65, 01GI74 and 01GI72
Piezometers	01PZ1, 01PZ6, 01PZ6A, 01PZ7, 01PZ7A. 01PZ7B, 01PZ8, and 01PZ10

The groundwater samples were collected using low-flow purging techniques (discharge rate of less than 1 liter per minute) with a peristaltic pump using Teflon™ tubing dedicated to each well. The groundwater samples were collected using the procedures specified in FS 2200, Groundwater Sampling (FDEP, 2008). Field parameters were measured during the groundwater sampling activities to ensure that representative groundwater samples were collected. Field parameters included pH, specific conductance, temperature, turbidity, dissolved oxygen and oxidation/reduction potential (ORP). Groundwater sample log sheets are included in Appendix A.

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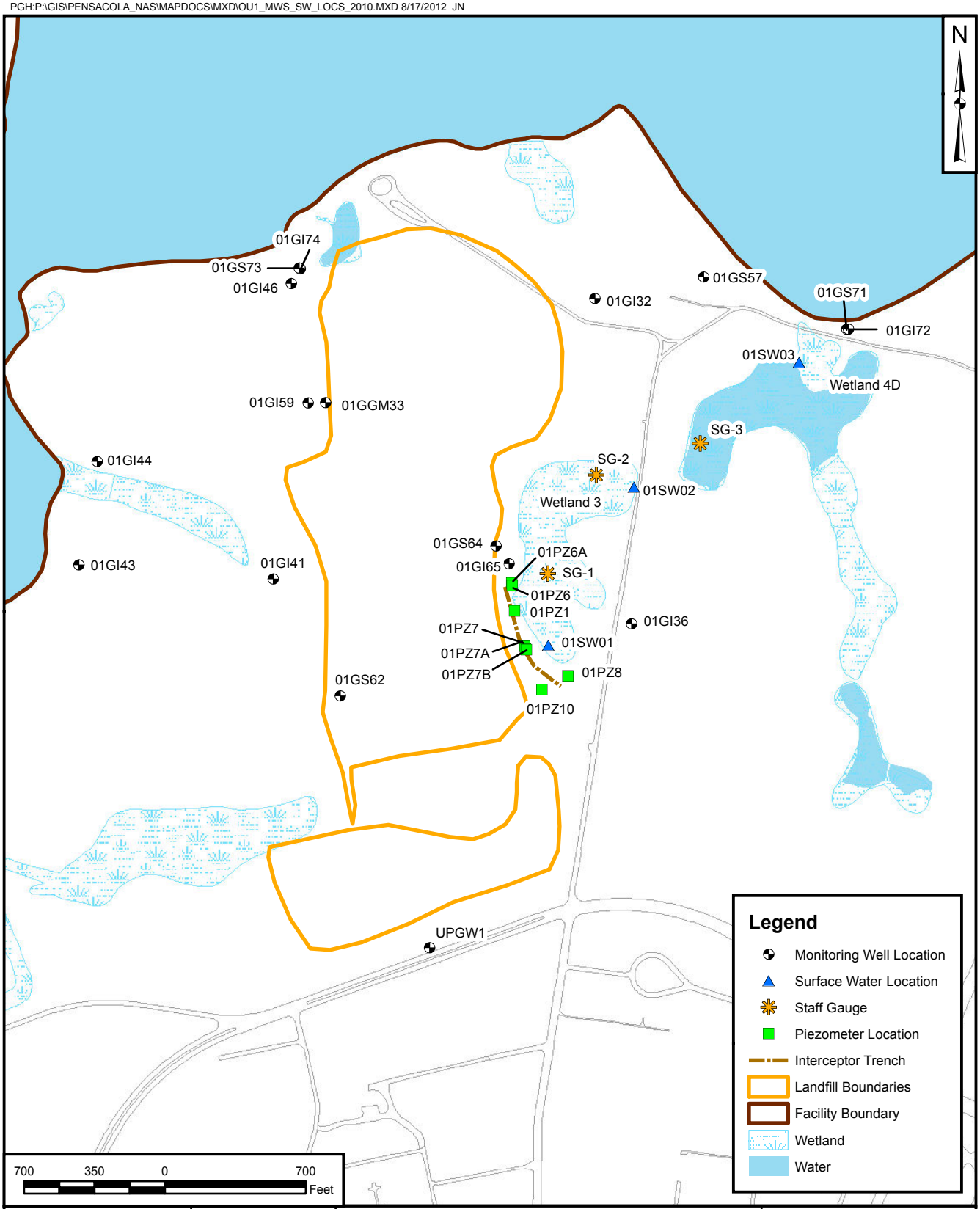

DRAWN BY: S. STROZ	DATE: 1/25/11	2010 SURFACE WATER AND MONITORING WELL SAMPLING LOCATIONS OU1 NAS PENSACOLA PENSACOLA, FL	CONTRACT NUMBER: 067
CHECKED BY: M. JAYNES	DATE: 8/17/2012		APPROVED BY: ___ DATE: ___
REVISED BY: J. NOVAK	DATE: 8/17/2012		APPROVED BY: ___ DATE: ___
SCALE: AS NOTED			FIGURE NO.: FIGURE 1-3 REV: 0

Due to site conditions 2 of the 17 monitoring wells were not sampled in November 2010. The background monitoring well 01UPGW1, installed upgradient of the former landfill, was sampled for selected organic and inorganic parameters during the May 2010 sampling event. However, 01UPGW1 was dry during the November 2010 sampling event and therefore a groundwater sample could not be collected.

Also, the posts protecting monitoring well 01GI44 were apparently impacted prior to the May 2010 sampling events; however, the well was not compromised and a groundwater sample was collected. During the November 2010 sampling event, this well was compromised and a groundwater sample was not collected.

The groundwater samples were placed in coolers with wet ice and transported under chain of custody protocol to Empirical Laboratories for analysis. The groundwater samples collected from monitoring wells were analyzed for select VOCs (vinyl chloride, 1,1,2,2-PCA, benzene, chlorobenzene, and total xylenes) and the SVOC naphthalene by USEPA Method 8260B, and select metals (aluminum, iron, manganese, cadmium, chromium, and nickel) by USEPA Method 6010B. Groundwater samples collected from the piezometers and monitoring wells were analyzed for total iron by USEPA Method 6010B.

One synoptic round of water-level measurements was conducted at the site as part of each groundwater sampling event to provide information regarding groundwater flow patterns and gradients. Water level measurements were recorded to the nearest 0.01 foot and referenced to a top of casing notch or north side of the well casing. The measurement instrument was decontaminated prior to conducting the measurement event and between each monitoring well. Groundwater sampling and water level measurement field data sheets are included in Appendix A.

2.0 DATA PRESENTATION

This section presents the results of the surface water and groundwater sampling activities that were performed in May and November 2010.

2.1 SURFACE WATER SAMPLING RESULTS

Table 2-1 and Figure 2-1 summarizes the laboratory analytical results reported for the surface water samples and includes the historical concentrations reported. Surface water sampling results for iron are compared to the NAS Pensacola freshwater background concentration of 4,720 μg/L and the estuarine surface water background concentration threshold of 5,862 μg/L (Tetra Tech, 2009).

May 2010 Sampling Event

The concentration of total iron at surface water sample location 01SW01 was 1,690 µg/L and 4,850 µg/L for the duplicate sample. The duplicate surface water sample contained total iron at a concentration that exceeded the freshwater background concentration of 4,720 μg/L; the original sample did not exceed the value. Surface water sampling location 01SW02 contained total iron at 6,890 µg/L, which exceeds the freshwater background concentration 4,720 μg/L. The POC surface water sample location 01SW03 contained total iron at 345 µg/L, which is less than the estuarine background concentration of 5,862 μg/L.

November 2010 Sampling Event

Surface water sample location 01SW01 contained total iron at 5,220 µg/L, and surface water sample location 01SW02 contained total iron at 7,050 µg/L. Both locations contained total iron at concentrations that exceed the freshwater background concentration of 4,720 μg/L. The POC surface water sampling location 01SW03 contained total iron at 427 µg/L; which is less than the estuarine background concentration of 5,862 μg/L.

The concentrations of total iron for the May and November 2010 sampling events at surface water sample locations 01SW01 and 01SW02 at Wetland 3 exceeded the Class III surface water quality criteria of 1,000 μg/L per Chapter 62-302, F.A.C., and surface water sample locations 01SW03 exceeded the Class III Marine surface water quality criteria of 300 μg/L per Chapter 62-302, F.A.C.

TABLE 2-1

HISTORICAL SUMMARY OF ANALYTES DETECTED IN SURFACE WATER SAMPLES
OPERABLE UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA
PAGE 1 OF 2

	Sample Location	**01SW001 (seep)**								
	Sample ID	01W0101	01W00102	01W00103	01W00104	01W00105	01W00106	01W00107	OU1-W001-06	OU1-01W01-12
	Collect Date	03/20/00	08/18/00	05/23/01	11/01/01	05/01/02	10/08/02	6/9/2003	11/17/03	6/1/2005
Metals[3] (ug/L)	Surface water criteria[1] / site-specific reference concentration[2] (ug/L)									
Iron	1,000 / 4,720	**28,000**	**700,000**	**9,190**	**6,710**	**7,930**	**7,310**	**42,400**	**39,800**	**5,470**
	Sample Location	**01SW002 (stream)**								
	Sample ID	01W0201	01W00202	01W00203	01W00204	01W02	01W00206	01W00207	OU1-W002-06	OU1-01W02-12
	Collect Date	03/20/00	08/18/00	05/23/01	11/01/01	04/30/02	10/08/02	06/09/03	11/17/2003	06/01/05
Metals[3] (ug/L)	Surface water criteria[1] / site-specific reference concentration[2] (ug/L)									
Iron	1,000 / 4,720	**19,500**	**1,800,000**	**57,300**	**36,800**	**816,000**	**19,700**	**1,570,000**	**15,600**	**5,620**
	Sample Location	**01SW03 (Point of Compliance)**								
	Sample ID	01SW03-0510	01SW03-1110							
	Collect Date	05/13/10	11/06/10							
Metals[3] (ug/L)	Surface water criteria[1] / site-specific reference concentration[2] (ug/L)									
Iron	1,000 / 5,862	345	427							

Notes:
[1] Class III Fresh Surface water criteria from Chapter 62-302.520, Florida Administrative Code (F.A.C.)
[2] The applicable reference concentration as described in the Technical Memorandum (Tetra Tech, 2009)
[3] Analytical Method, SW-846 6010B
Bold results are above the surface water criteria from Chapter 62-302.520, F.A.C.

TABLE 2-1

HISTORICAL SUMMARY OF ANALYTES DETECTED IN SURFACE WATER SAMPLES
OPERABLE UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA
PAGE 2 OF 2

	Sample Location	01SW001 (seep)			
	Sample ID	PEN-OU1-01W01-07	PEN-OU1-01W01-08	01SW01-0510	01SW01-1110
	Collection Method Collect Date	12/17/05	2/8/2006	05/13/10	11/06/10
Metals[3] (ug/L)	Surface water criteria[1] / site-specific reference concentration[2] (ug/L)				
Iron	1,000 / 4,720	**8,900**	**19,300**	**1,690 / 4,840 (DUP)**	**5,220**
	Sample Location	01SW002 (stream)			
	Sample ID	OU1-01W02-07	PEN-OU1-01W02-08	01SW02-0510	01SW02-1110
	Collection Method Collect Date	12/17/05	2/8/2006	05/13/10	11/06/10
Metals[3] (ug/L)	Surface water criteria[1] / site-specific reference concentration[2] (ug/L)				
Iron	1,000 / 4,720	**4,350**	**11,000**	**6,890**	**7,050**

[1] Class III Fresh Surface water criteria from Chapter 62-302.520, Florida Administrative Code (F.A.C.)

[2] The applicable reference concentration as described in the Technical Memorandum (Tetra Tech, 2009)

[3] Analytical Method, SW-846 6010B

Bold results are above the surface water criteria from Chapter 62-302.520, F.A.C.

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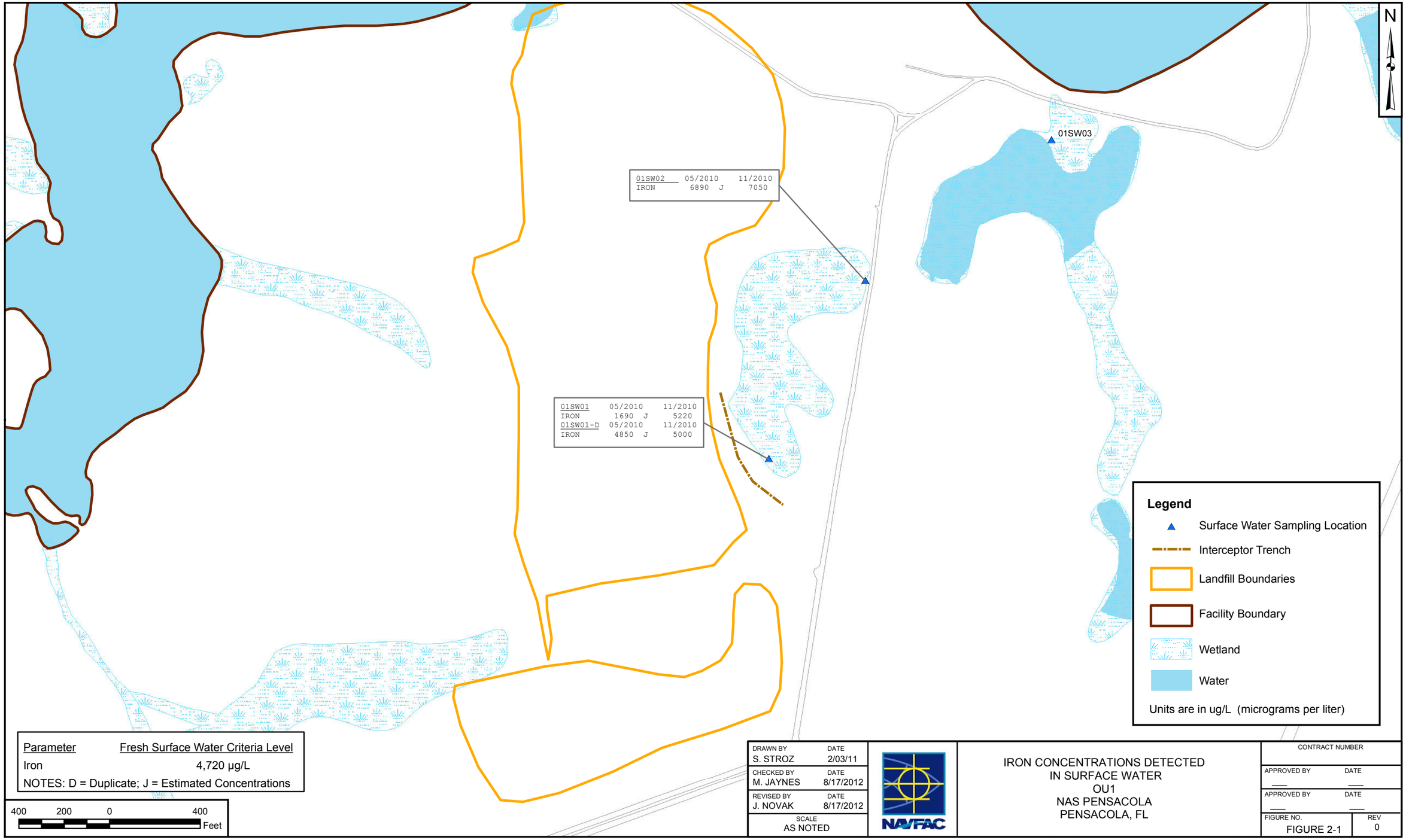

DRAWN BY S. STROZ	DATE 2/03/11
CHECKED BY M. JAYNES	DATE 8/17/2012
REVISED BY J. NOVAK	DATE 8/17/2012
SCALE AS NOTED	

NAVFAC

IRON CONCENTRATIONS DETECTED
IN SURFACE WATER
OU1
NAS PENSACOLA
PENSACOLA, FL

CONTRACT NUMBER	
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FIGURE NO. FIGURE 2-1	REV 0

2.2 GROUNDWATER SAMPLING

2.2.1 Groundwater Elevations and Flow Direction

Tables 2-2 and 2-3 present the depth to water measurements and groundwater elevations for the monitoring wells and piezometers (respectively) selected for groundwater sampling during these two field events. Table 2-4 presents the historical depth to water measurements and water levels for all monitoring wells at OU 1. Figures 2-2 and 2-3 present graphically the groundwater elevations and groundwater flow direction at the Site for May and November 2010, respectively.

Groundwater level data collected during the May and November 2010 sampling events indicate that groundwater flow in the shallow aquifer in the vicinity of OU 1 is generally north toward Bayou Grande. The groundwater data for the intermediate depth monitoring wells indicated a similar trend. The reported groundwater flow from the May and November 2010 monitoring events is consistent with historic groundwater flow trends.

As part of the hydrogeology assessment, Tetra Tech compared water levels in adjacent shallow and intermediate depth monitoring wells to determine the vertical groundwater flow gradient. At OU 1, there are four paired monitoring wells and one pair of piezometers to determine vertical gradients including: monitoring well pairs: 01GS64/01GI65, 01GM33/01GGI59, 01GS73/01GI46, and 01GS71/01GI72 and piezometers pair 01PZ06/01PZ06A. A summary of the depth to water measurement and vertical groundwater gradient calculations for May and November 2010 is presented in Table 2-5.

Comparison of data from adjacent shallow and intermediate zone monitoring wells indicates that the vertical groundwater gradient is consistently downward in the piezometer and two well pairs (01GS64/01GI65 and 01GM33/01GGI59) in the central area of the Site. The two well pairs located adjacent to Bayou Grande (01GS71/01GI72 and 01GS73/01GI46) indicated variable results; 01GS71/01GI72 indicated a consistent upward trend whereas well pair 01GS73/01GI46 indicated a downward trend in May 2010 but a very slight upward trend in November 2010.

2.2.2 Field Parameters

Groundwater field parameters measured during the LTM groundwater sampling events included pH, specific conductance, turbidity, temperature, dissolved oxygen, and ORP (Tables 2-6 and 2-7). Additionally, sample log sheets are included in Appendix A.

TABLE 2-2

GROUNDWATER ELEVATIONS - MONITORING WELLS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Well Designation	Top of Casing Elevation (feet msl)	Total Well Depth (feet bgs) May 2010	Screened Interval (feet bgs)	May 13, 2010		November 8, 2010	
				Depth to Water (feet, BTOC)	Groundwater Elevation (feet msl)	Depth to Water (feet, BTOC)	Groundwater Elevation (feet msl)
01GS64	18.55	16.60	unknown	6.26	12.29	6.65	11.90
01GGM33	16.18	12.90	9 to 11	6.02	10.16	6.10	10.08
01GS62	17.62	19.55	10 to 20	8.86	8.76	8.25	9.37
01GS57	13.37	19.53	unknown	11.77	1.60	11.90	1.47
01GS71	7.14	14.51	unknown	6.05	1.09	6.95	0.19
01GI32	20.49	37.60	25 to 35	17.23	3.26	17.42	3.07
01GI36	17.83	32.87	unknown	6.30	11.53	6.41	11.42
01GI41	18.42	42.60	29.5 to 39.5	6.53	11.89	6.75	11.67
01GI43	16.07	44.80	31.6 to 41.6	12.85	3.22	12.83	3.24
01GI44	5.89	31.40	18.9 to 28.9	4.16	1.73	Destroyed	
01GI46	9.49	31.99	19 to 29	7.37	2.12	7.43	2.06
01GI59	15.24	30.76	18.1 to 28.1	7.78	7.46	7.95	7.29
01GI65	18.50	40.10	27.5 to 37.2	7.71	10.79	8.25	10.25
01GI72	6.63	24.55	unknown	5.67	0.96	6.63	0.00
01GS73	4.56	12.40	3 to 13	3.22	1.34	3.48	1.08
01GI74	4.69	29.40	25 to 30	3.19	1.50	3.85	0.84

Notes:
msl = Mean Sea Level
bgs = Below Ground Surface
BTOC = Below Top of Casing

TABLE 2-3

GROUNDWATER ELEVATIONS - PIEZOMETERS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Well Designation	Top of Casing Elevation (feet msl)	Total Well Depth (feet bgs) May 2010	Screened Interval (feet bgs)	May 13, 2010		November 13, 2010	
				Depth to Water (feet, BTOC)	Groundwater Elevation (feet msl)	Depth to Water (feet, BTOC)	Groundwater Elevation (feet msl)
01PZ01	20.48	16.27	11 to 16	6.89	13.59	6.97	13.51
01PZ06	20.92	11.75	7 to 12	8.68	12.24	8.79	12.13
01PZ06A	17.72	38.62	35 to 40	6.57	11.15	7.01	10.71
01PZ07	20.57	25.87	21 to 26	5.52	15.05	5.62	14.95
01PZ07A	18.69	14.20	9 to 14	3.59	15.10	3.70	14.99
01PZ07B	17.85	39.30	35 to 40	2.68	15.17	3.30	14.55
01PZ08	22.16	26.15	21 to 26	5.81	16.35	5.95	16.21
01PZ10	22.19	26.00	21 to 26	5.25	16.94	5.39	16.80

Notes:

bgs = Below Ground Surface
BTOC = Below Top of Casing
msl = Mean Sea Level

TABLE 2-4

HISTORICAL GROUNDWATER ELEVATIONS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Monitoring Event				May 2001		November 2001		April 2002		October 2002		June 9, 2003		November 17, 2003		June 2, 2005		December 13, 2005		May 13, 2010		November 8, 2010	
Well ID	Total Depth of Well	Top of Casing Elevation	New Top of Casing Elevation (2010)	Depth to Water	Ground Water Elevation	Depth to Water	Ground Water Elevation	Depth to Water	Ground Water Elevation	Depth to Water	Ground Water Elevation	Depth to Water	Ground Water Elevation	Depth to Water	Ground Water Elevation	Depth to Water	Ground Water Elevation	Depth to Water	Ground Water Elevation	Depth to Water	Ground Water Elevation	Depth to Water	Ground Water Elevation
01UPGW1	19.47	NS		NR	NR	NR	NR	NR	NR	14.41	NA	15.35	NA	DRY	NA	10.60	NA	13.47	NA	12.82	NA	Dry	NA
01GS42	16.70	NS		Dry	Dry	Dry	Dry	Dry	Dry	7.17	NA	8.94	NA	8.78	NA	4.64	NA	7.53	NA	6.72	NA	6.91	NA
01GS53	20.10	NS																		12.36	NA	12.92	NA
01GS57	21.50	12.37	13.37	NR	NA	10.95	1.42	11.09	1.28	9.66	2.71	10.29	2.08	10.65	1.72	destroyed	---	destroyed	---	11.77	1.60	11.9	1.47
01GS62	16.42	20.51	17.62	9.54	10.97	9.77	10.74	9.45	11.06	6.24	14.27	7.79	12.72	7.47	13.04	3.39	17.12	6.29	14.22	8.86	8.76	8.25	9.37
01GS64	16.75	18.55		8.64	9.91	8.99	9.56	9.14	9.41	6.76	11.79	7.78	10.77	7.87	10.68	4.80	13.75	6.60	11.95	6.26	12.29	6.65	11.90
01GS71	13.29	5.83	7.14	NR	NA	4.93	0.90	4.86	0.97	4.18	1.65	4.79	1.04	4.49	1.34	destroyed	---	destroyed	---	6.05	1.09	6.95	0.19
01GS73	12.40	4.56	4.56	Monitor well installed in 2010																3.22	1.34	3.48	1.08
01GGM04	18.73	11.05		NR	NA	10.05	1.00	10.03	1.02	NR	NA	9.89	1.16	9.45	1.60	9.34	1.71	9.97	1.08	9.48	1.57	9.73	1.32
01GGM05	12.65	8.03		6.84	1.19	6.70	1.33	6.60	1.43	5.62	2.41	6.61	1.42	6.17	1.86	4.98	3.05	6.15	1.88	5.7	2.33	5.7	2.33
01GGM33	13.03	16.18		8.45	7.73	8.70	7.48	8.41	7.77	6.25	9.93	7.79	8.39	7.57	8.61	4.48	11.70	6.31	9.87	6.02	10.16	6.1	10.08
01GGM38	18.00	20.34		NR	NA	11.12	9.22	11.12	9.22	9.41	10.93	9.33	11.01	10.09	10.25	8.41	11.93	8.95	11.39	8.51	11.83	8.55	11.79
01GGM41	17.87	5.24		4.12	1.12	4.16	1.08	3.88	1.36	3.53	1.71	4.00	1.24	3.79	1.45	3.26	1.98	4.29	0.95	3.55	1.69	4.4	0.84
01GI32	37.45	20.49		NR	NA	18.48	2.01	18.45	2.04	16.59	3.90	18.00	2.49	18.33	2.16	16.34	4.15	17.72	2.77	17.23	3.26	17.46	3.03
01GI36	35.05	17.83		NR	NA	8.80	9.03	8.79	9.04	7.19	10.64	7.03	10.80	7.82	10.01	6.12	11.71	7.02	10.81	6.3	11.53	6.41	11.42
01GI41	42.06	18.42		10.12	8.30	10.37	8.05	9.87	8.55	6.99	11.43	8.78	9.64	8.56	9.86	4.49	13.93	7.32	11.10	6.53	11.89	6.75	11.67
01GI43	42.50	16.07		13.88	2.19	13.99	2.08	13.55	2.52	12.77	3.30	13.60	2.47	13.35	2.72	12.74	3.33	13.51	2.56	12.85	3.22	12.83	3.24
01GI44	31.59	5.89		7.41	-1.52	4.79	1.10	4.52	1.37	4.17	1.72	4.66	1.23	4.15	1.74	3.91	1.98	4.9	0.99	4.16	1.73	destroyed	
01GI46	32.20	9.49		8.36	1.13	8.26	1.23	8.09	1.40	7.30	2.19	8.00	1.49	7.74	1.75	6.74	2.75	7.75	1.74	7.37	2.12	7.43	2.06
01GI48	30.05	11.50		NR	NA	10.48	1.02	10.40	1.10	9.51	1.99	10.19	1.31	9.88	1.62	9.74	1.76	10.37	1.13	9.89	1.61	10.07	1.43
01GI59	30.89	15.24		10.13	5.11	10.42	4.82	10.12	5.12	8.00	7.24	9.57	5.67	9.32	5.92	6.35	8.89	8.17	7.07	7.78	7.46	7.95	7.29
01GI65	38.50	18.50		10.32	8.18	10.56	7.94	10.64	7.86	8.33	10.17	9.45	9.05	9.40	9.10	6.24	12.26	8.26	10.24	7.71	10.79	8.25	10.25
01GI72	25.31	NS	6.63	NR	NA	4.85	NA	4.77	NA	4.14	NA	4.73	NA	4.41	NA	destroyed				5.67	0.96	6.63	0.00
01GI74	29.40	4.69	4.69	Monitor well installed in 2010																3.19	1.50	3.85	0.84

Notes:
Depths are in feet below top of casing
Elevations are in feet MSL (mean sea level)
NS = Top of casing not surveyed, therefore elevations are not available
NR = Not recorded
NA = Not available

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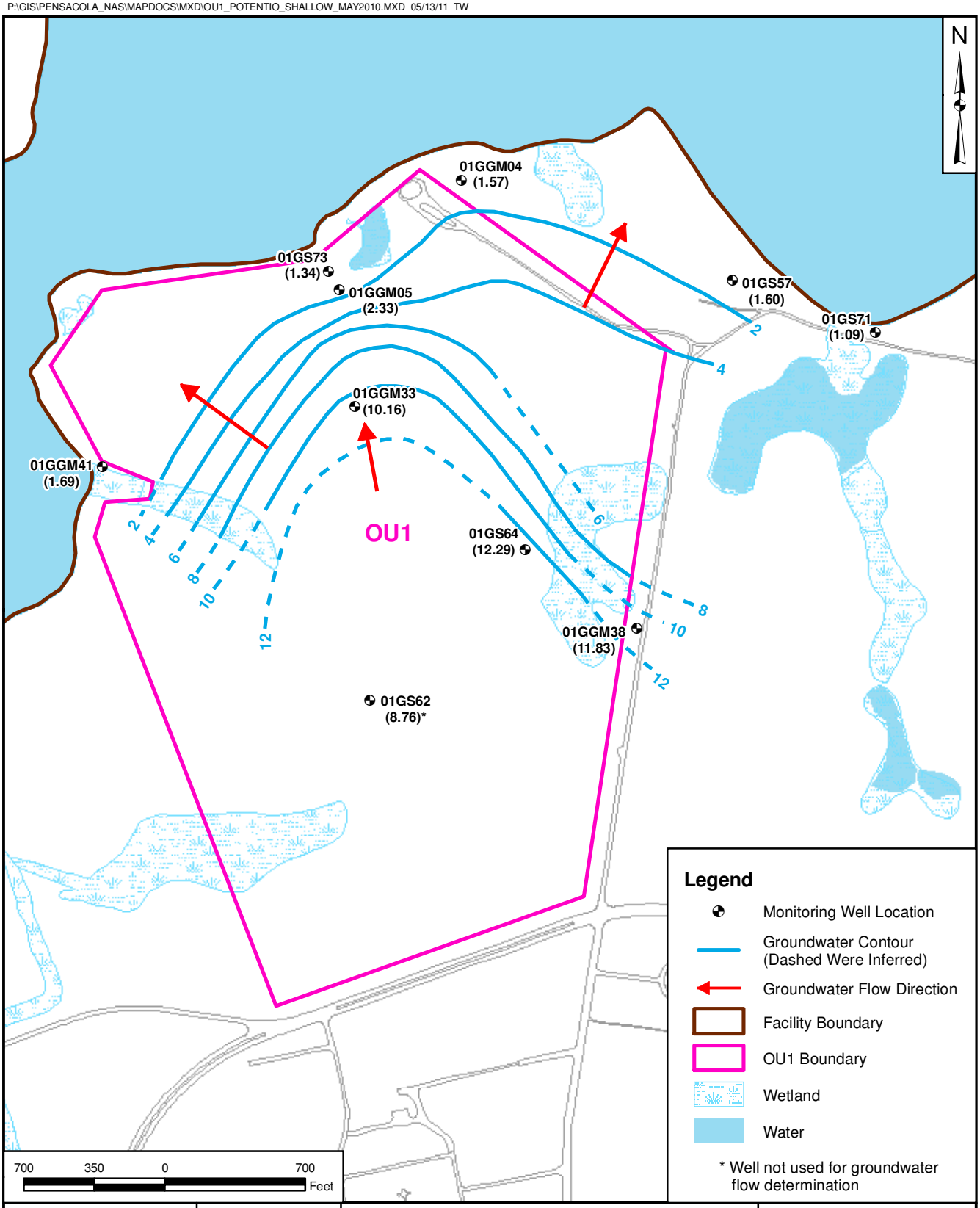

DRAWN BY: T. WHEATON	DATE: 05/13/11	SHALLOW ZONE GROUNDWATER - MAY 2010 POTENTIOMETRIC SURFACE OPERABLE UNIT 1 NAS PENSACOLA PENSACOLA, FL	CONTRACT NUMBER: CTO 067
CHECKED BY: G. WALKER	DATE: 05/13/11		APPROVED BY: ___ DATE: ___
REVISED BY: ___	DATE: ___		APPROVED BY: ___ DATE: ___
SCALE: AS NOTED			FIGURE NO.: FIGURE 2-2 REV: 0

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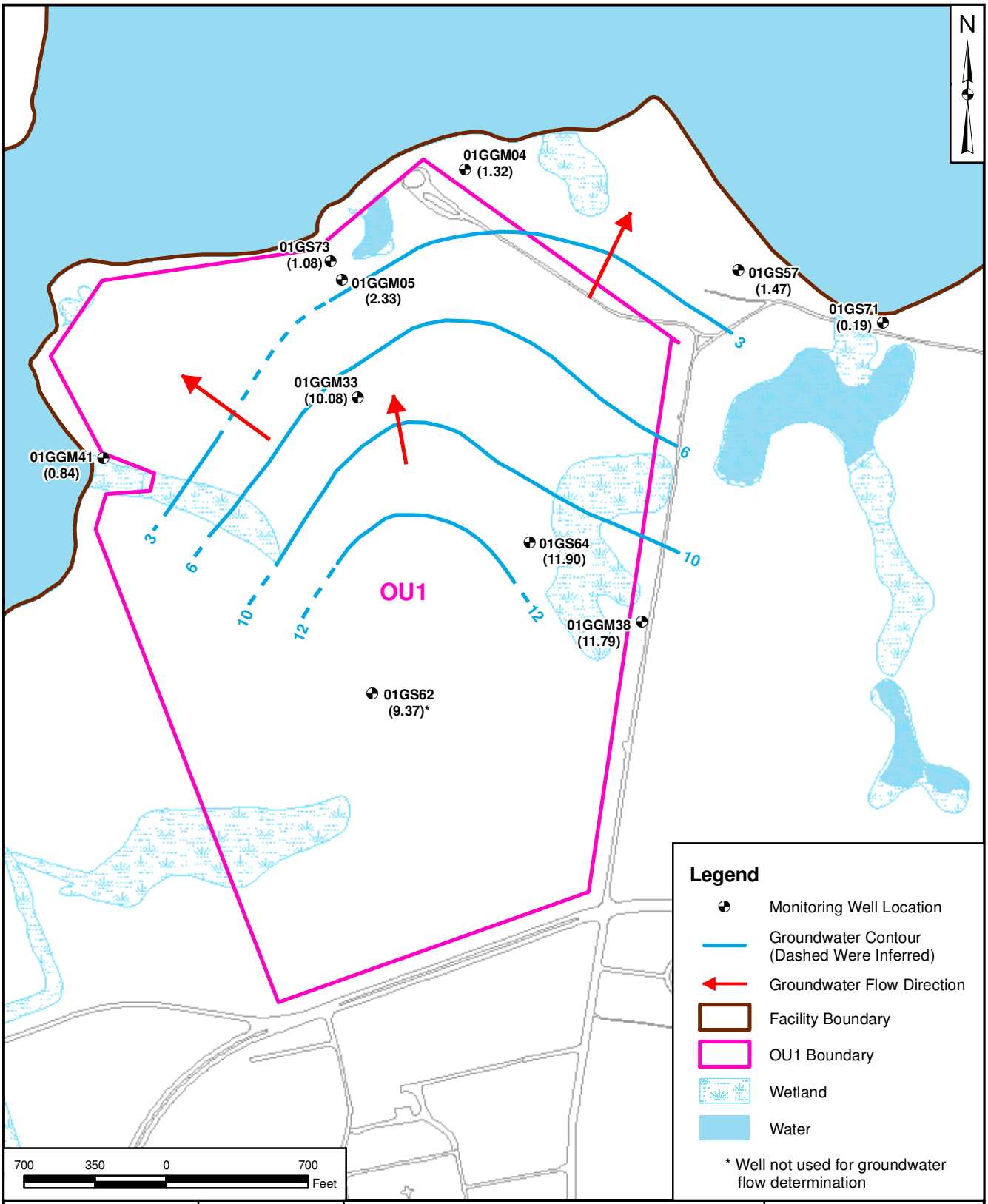

DRAWN BY: T. WHEATON	DATE: 05/13/11	SHALLOW ZONE GROUNDWATER - NOVEMBER 2010 POTENTIOMETRIC SURFACE OPERABLE UNIT 1 NAS PENSACOLA PENSACOLA, FL	CONTRACT NUMBER: CTO 067
CHECKED BY: G. WALKER	DATE: 05/13/11		APPROVED BY / DATE: ___ / ___
REVISED BY: ___	DATE: ___		APPROVED BY / DATE: ___ / ___
SCALE: AS NOTED			FIGURE NO.: FIGURE 2-3 / REV: 0

TABLE 2-5

GROUNDWATER VERTICAL HYDRAULIC GRADIENT - 2010
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA FLORIDA

May 2010

	01PZ06	01PZ06A	01GS64	01GI65	01GM33	01GI59
Groundwater Elevation (feet)	12.24	11.15	12.29	10.79	10.16	7.95
Well Depth (feet)	11.75	38.62	16.75	38.50	13.03	30.89
Vertical Distance (feet)	26.87		21.75		17.86	
Vertical Gradient (feet/foot) 2011	0.041 downward		0.068 downward		0.123 downward	

	01GS73	01GI46	01GS71	01GI72
Groundwater Elevation (feet)	1.34	2.12	1.16	0.96
Well Depth (feet)	12.40	32.20	13.29	25.31
Vertical Distance (feet)	19.80		12.02	
Vertical Gradient (feet/foot) 2011	- 0.039 upward		0.017 downward	

November 2010

	01PZ06	01PZ06A	01GS64	01GI65	01GM33	01GI59
Groundwater Elevation (feet)	12.13	10.71	11.90	10.25	10.08	7.29
Well Depth (feet)	11.75	38.62	16.75	38.50	13.03	30.89
Vertical Distance (feet)	26.87		21.75		17.86	
Vertical Gradient (feet/foot) 2011	0.053 downward		0.076 downward		0.156 downward	

	01GS73	01GI46	01GS71	01GI72
Groundwater Elevation (feet)	1.08	2.06	0.26	0.27
Well Depth (feet)	12.40	32.20	13.29	25.31
Vertical Distance (feet)	19.80		12.02	
Vertical Gradient (feet/foot) 2011	- 0.049 upward		0.0008 upward	

TABLE 2-6

FIELD PARAMETERS - MAY 2010
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

SHALLOW MONITORING WELLS	Units	01UPGW1	01GGM33	01GS57	01GS62	01GS64	01GS71	01GS73	01GS74
pH	None	6.32	6.09	5.86	4.83	6.42	6.30	5.75	6.23
Specific Conductivity	uS/cm	0.007	430	0.21	38.0	0.37	0.89	66.0	1,410
Temperature	Celsius	18.04	22.64	18.33	22.78	18.42	19.34	22.13	22.99
Turbidity	NTU	33.0	0.97	6.16	2.86	1.01	19.8	101	9.86
Dissolved Oxygen	mg/L	5.5	4.40	7.85	7.03	0.00	0.00	4.92	4.67
Oxidation Reduction Potential (ORP)	mV	NC	NC	111	NC	-101	-207	NC	NC

INTERMEDIATE MONITORING WELLS	Units	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI72	01GI59	01GI65
pH	None	6.24	5.11	5.80	5.49	5.81	5.94	6.56	5.91	5.41
Specific Conductivity	uS/cm	714	0.37	317	129	166	333	40.1	439	260
Temperature	Celsius	22.23	18.63	23.71	23.33	21.91	21.68	19.27	21.79	22.03
Turbidity	NTU	3.23	1.20	3.07	3.9	6.3	1.0	3.67	1.09	1.79
Dissolved Oxygen	mg/L	4.45	0.00	4.22	4.9	4.40	5.3	0.00	4.40	4.51
Oxidation Reduction Potential (ORP)	mV	NC	175	NC	NC	NC	NC	-308	NC	NC

PIEZOMETERS	Units	01PZ1	01PZ6	01PZ6A	01PZ7	01PZ7A	01PZ7B	01PZ8	01PZ10
pH	None	6.55	6.55	5.31	6.44	6.45	4.97	6.04	5.31
Specific Conductivity	uS/cm	0.69	6.32	0.10	0.32	0.42	82.0	197	0.33
Temperature	Celsius	17.37	23.11	19.89	18.58	17.63	22.04	20.76	17.32
Turbidity	NTU	18.1	5.32	6.47	0.93	8.29	4.20	5.02	8.00
Dissolved Oxygen	mg/L	0.00	4.25	0.00	0.00	3.28	4.26	4.66	0.00
Oxidation Reduction Potential (ORP)	mV	-121	NC	-38	-127	-115	NC	NC	-14

Notes:

NS - Not sampled, well was dry during sampling event

NC = Parameter inadvertently not collected

mg/L - milligrams per liter

NTU = nephelometric turbidity units

mV - millivolts

uS/cm - microsiemens per centimeter

TABLE 2-7

FIELD PARAMETERS - NOVEMBER 2010
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

SHALLOW MONITORING WELLS	Units	01UPGW1	01GGM33	01GS57	01GS62	01GS64	01GS71	01GS73	01GS74
pH	None	NS	6.00	6.18	4.69	6.02	6.30	5.89	6.07
Specific Conductivity	uS/cm	NS	507	162	67.0	448	684	66.0	637
Temperature	Celsius	NS	20.78	24.22	24.60	22.72	25.29	23.38	22.27
Turbidity	NTU	NS	1.58	8.41	4.24	8.51	4.29	10.1	9.60
Dissolved Oxygen	mg/L	NS	0.35	6.02	27%	0.23	0.22	0.16	0.41
Oxidation Reduction Potential (ORP)	mV	NS	-65.5	115.3	144.6	-43.2	44.6	5.80	-39.1

INTERMEDIATE MONITORING WELLS	Units	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI72	01GI59	01GI65
pH	None	6.25	4.86	5.76	5.39	NS	5.98	6.22	6.23	5.52
Specific Conductivity	uS/cm	799	175	369	139	NS	326	30,608	438	266
Temperature	Celsius	20.46	22.76	22.26	21.33	NS	21.45	24.54	21.01	22.04
Turbidity	NTU	3.11	0.00	1.98	0.00	NS	4.82	5.01	0.00	0.97
Dissolved Oxygen	mg/L	0.58	0.21	0.31	0.31	NS	0.29	0.1	0.38	0.20
Oxidation Reduction Potential (ORP)	mV	-49.3	223.7	-12.5	88.2	NS	-6.2	-202.1	-57.6	-85.7

PIEZOMETERS	Units	01PZ1	01PZ6	01PZ6A	01PZ7	01PZ7A	01PZ7B	01PZ8	01PZ10
pH	None	6.43	6.56	4.92	6.15	6.16	5.44	5.95	6.40
Specific Conductivity	uS/cm	621	556	114	424	556	108	187	406
Temperature	Celsius	22.20	21.70	21.52	21.94	22.20	20.90	21.68	21.25
Turbidity	NTU	12.6	2.79	15.2	3.92	19.3	16.1	9.02	0.14
Dissolved Oxygen	mg/L	0.27	1.42	0.28	0.34	0.38	1.19	0.48	0.64
Oxidation Reduction Potential (ORP)	mV	-77.6	-62.2	-61.7	-97.9	-86.5	-150.6	4.10	-3.90

Notes:

NS - Not sampled, well was dry during sampling event

mg/L - milligrams per liter

mV - millivolts

uS/cm - microsiemens per centimeter

NTU = nephelometric turbidity units

pH values measured (Standard Units) for the shallow aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 4.83 to 6.32 and for the November 2010 sampling event ranged from 4.69 to 6.18. pH values measured for the piezometers sampled during the May 2010 sampling event ranged from 4.97 to 6.55 and for the November 2010 sampling event ranged from 4.92 to 6.56. pH values measured for the intermediate aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 4.86 to 6.25 and for the November 2010 sampling event ranged from 4.69 to 6.18. All of the reported values were within the acidic range.

Specific conductance values measured for the shallow aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 0.007 to 1,410 microsiemens per centimeter (uS/cm) and for the November 2010 sampling event ranged from 66.0 to 337 uS/cm. Specific conductance values measured for the piezometers sampled during the May 2010 sampling event ranged from 0.010 to 197 uS/cm and for the November 2010 sampling event ranged from 108 to 621 uS/cm. Specific conductance values measured for the intermediate aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 0.37 to 333 uS/cm and for the November 2010 sampling event ranged from 139 to 30,608 uS/cm.

Groundwater temperatures measured for the shallow aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 18.04 to 22.64 degrees Celsius (°C) and for the November 2010 sampling event ranged from 20.78 to 25.29 °C. Groundwater temperatures measured for the piezometers sampled during the May 2010 sampling event ranged from 17.32 to 23.11 °C and for the November 2010 sampling event ranged from 22.20 to 20.90 °C. Groundwater temperatures measured for the intermediate aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 18.63 to 23.71 °C and for the November 2010 sampling event ranged from 20.46 to 24.54 °C.

Turbidity measured for the shallow aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 0.97 to 101.10 nephelometric turbidity units (NTUs) and for the November 2010 sampling event ranged from 1.58 to 10.1 NTUs. Turbidity temperatures measured for the piezometers sampled during the May 2010 sampling event ranged from 0.93 to 18.1 NTUs and for the November 2010 sampling event ranged from 0.14 to 16.1 NTUs. Turbidity temperatures measured for the intermediate aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 1.0 to 6.3 NTUs and for the November 2010 sampling event ranged from 0.00 to 5.01 NTUs.

Dissolved oxygen concentrations for the shallow aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 0.00 to 7.85 milligrams per liter (mg/L) and for the November 2010 sampling event ranged from 0.16 to 6.02 mg/L. Dissolved oxygen concentrations for the piezometers sampled during the May 2010 sampling event ranged from 0.00 to 4.66 mg/L and for the November 2010

sampling event ranged from 0.27 to 1.42 mg/L. Dissolved oxygen concentrations for the intermediate aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from 0.00 to 4.51 mg/L and for the November 2010 sampling event ranged from 0.01 to 0.58 mg/L.

ORP values for the shallow aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from -101 to 111 millivolts (mV) and for the November 2010 sampling event ranged from -65.50 to 115.3 mV. It should be noted that ORP measurements during the May 2010 sampling event in several wells were inadvertently not collected. Corrective measures to prevent field personnel from inadvertanly not collecting this parameter have been taken by adding a column for ORP onto the groundwater sample log sheets. ORP values for the piezometers sampled during the May 2010 sampling event ranged from -127 to -14 mV and for the November 2010 sampling event ranged from -150.6 to 4.10 mV. ORP values for the intermediate aquifer zone monitoring wells sampled during the May 2010 sampling event ranged from -308 to 175 mV and for the November 2010 sampling event ranged from -202.1 to 223.7 mV.

2.2.3 Laboratory Analytical Results

Analytical Results for Iron from Piezometers

Groundwater samples were collected from eight piezometers (some of which were previously designated treatment system monitoring locations - 01PZ6, 01PZ7, 01PZ8, and 01PZ10) and the upgradient shallow well location (01UPGW1) during the 2010 sampling events. During the November 2010 sampling event, a groundwater sample was not collected from upgradient well (01UPGW1) because it was dry. The analytical results for total iron of the samples collected in May and November 2010 at the sampling piezometers is included in Table 2-8 and presented on Figures 2-4 and 2-5, respectively.

Previous reports (Tetra Tech, 2008a) included a comparison between the piezometers located upgradient and downgradient to monitor the effects of the treatment system. However, the treatment system was decommissioned in May 2010. During these sampling events only one pair representing upgradient/downgradient piezometers (PZ10 / PZ08) were sampled.

The May 2010 analytical result for iron at the background sampling location 01UPGW1 was 2,140 µg/L (Figure 2-4), which exceeded the surface water quality criteria but not the freshwater background value. The May 2010 analytical result for iron at the sampling location (01PZ10) upgradient of the interceptor trench was 1,740 µg/L. The November 2010 analytical result for iron at the sampling location (01PZ10) upgradient of the interceptor trench was 945 µg/L (Figure 2-5). The May 2010 iron concentration exceeded the surface water quality criteria (1,000 µg/L) but not the freshwater background value (4,720 µg/L).

TABLE 2-8

TREATMENT SYSTEM IRON MONITORING SUMMARY
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

	Sample Location (Screened Interval)	01PZ1 (unknown)						01PZ10 (21 to 26 ft.)					
	Sample No.	01PZ1	01PZ1					01PZ10	01PZ10	01PZ10	01PZ10	01PZ10	01PZ10
	Collect Date	5/10/10	11/7/10					06/09/03	11/18/03	6/1/05	12/20/05	5/10/10	11/7/10
UPGRADIENT	Surface water criteria[1] / site-specific reference concentration[2] (µg/L)												
	Metals[3] (ug/L)												
	Iron 1,000 / 4,720	**46,300**	**35,500**					**1,900**	**2,810**	**1,920**	**2,670**	**1,740**	945
	Sample Location (Screened Interval)	01PZ07A (9 to 14 ft.)						01PZ07 (21 to 26 ft.)					
	Sample No.	01PZ07A	01PZ07A	01PZ07A	01PZ07A	01PZ07A	01PZ07A	01PZ07	01PZ07	01PZ07	01PZ07	01PZ07	01PZ07
	Collect Date	6/9/2003	11/18/2003	6/1/05	12/16/05	5/10/10	11/7/10	6/9/03	11/18/03	6/1/05	12/16/05	5/10/10	11/7/2010
DOWNGRADIENT	Surface water criteria[1] / site-specific reference concentration[2] (µg/L)												
	Metals[3] (ug/L)												
	Iron 1,000 / 4,720	NA	**61,600**	NS	**78,100**	**17,900**	**16,800**	**17,500**	**5,200**	**45,600**	**46,800**	**11,200**	**9,830**

See notes at end of table.

TABLE 2-8

TREATMENT SYSTEM IRON MONITORING SUMMARY
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

	Sample Location (Screened Interval)	01PZ07B (35 to 40 ft.)						01PZ08 (21 to 26 ft.)					
	Sample No.	01PZ07B	01PZ07B	01PZ07B	01PZ07B	01PZ07B	01PZ07B	01PZ08	01PZ08	01PZ08	01PZ08	01PZ08	01PZ08
	Collect Date	6/9/03	11/18/03	6/1/05	12/16/05	5/10/10	11/710	6/9/03	11/18/03	6/1/05	12/16/05	5/10/10	11/7/10
DOWNGRADIENT	Surface water criteria[1] / site-specific reference concentration[2] (µg/L)												
	Metals[3] (µg/L)												
	Iron 1,000 / 4,720	NA	**3,660**	NS	**1,180**	**1,090**	**1,070**	**2,620**	**4,410**	**3,460**	**1,870**	**2,940**	**1,170**

	Sample Location (Screened Interval)	01PZ06 (7 to 12 ft.)						01PZ06A (35 to 40 ft.)					
	Sample No.	01PZ06	01PZ06	01PZ06	01PZ06	01PZ06	01PZ06	01PZ06A	01PZ06A	01PZ06A	01PZ06A	01PZ06A	01PZ06A
	Collect Date	6/9/03	11/18/03	6/1/05	12/16/05	5/11/10	11/7/10	6/9/03	11/18/03	6/2/05	12/16/05	5/11/10	11/7/10
DOWNGRADIENT	Surface water criteria[1] / site-specific reference concentration[2] (µg/L)												
	Metals[3] (µg/L)												
	Iron 1,000 / 4,720	**19,200**	**36,200**	**35,000**	**16,800**	**28,600**	**19,600**	NA	**2,540**	NS	952	820	**1,350**

Notes:

Upgradient wells in table are located above their actual treatment system downgradient equivalents

[1] Surface water criteria from Chapter 62-777, F.A.C.

[2] The reference concentration is the performance standard for iron in freshwater wetlands on NAS Pensacola

[3] SW-846 6010B

Bold results are greater than the surface water criteria from Chapter 62-777, F.A.C.
ft = feet
µg/L = micrograms per liter

NA = Well was not sampled because it did not exist for that event.
NS = Well was not sampled during monitoring event.

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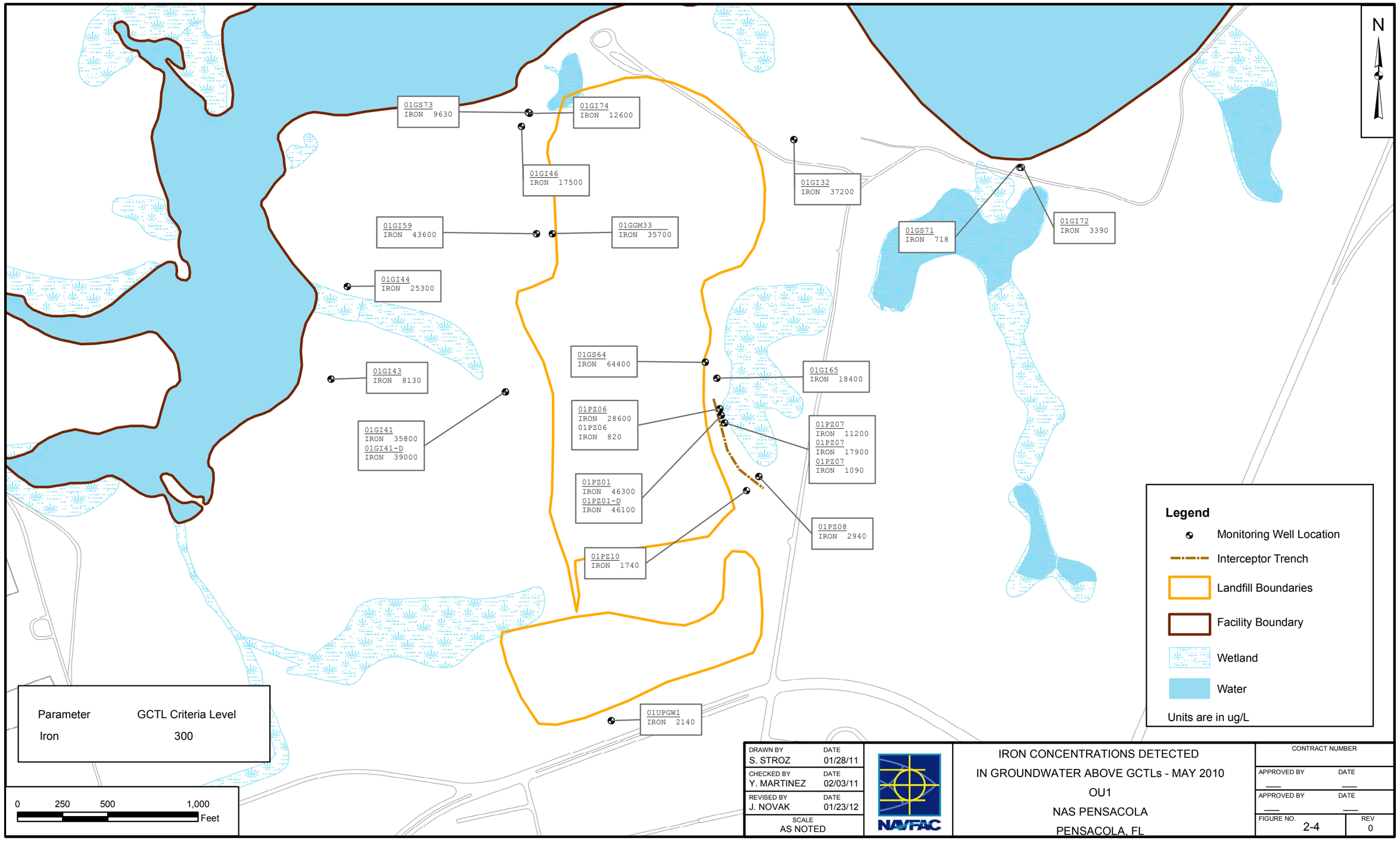

DRAWN BY	S. STROZ
DATE	01/28/11
CHECKED BY	Y. MARTINEZ
DATE	02/03/11
REVISED BY	J. NOVAK
DATE	01/23/12
SCALE	AS NOTED

NAVFAC

IRON CONCENTRATIONS DETECTED
IN GROUNDWATER ABOVE GCTLs - MAY 2010
OU1
NAS PENSACOLA
PENSACOLA, FL

CONTRACT NUMBER	
APPROVED BY	DATE
APPROVED BY	DATE
FIGURE NO.	REV
2-4	0

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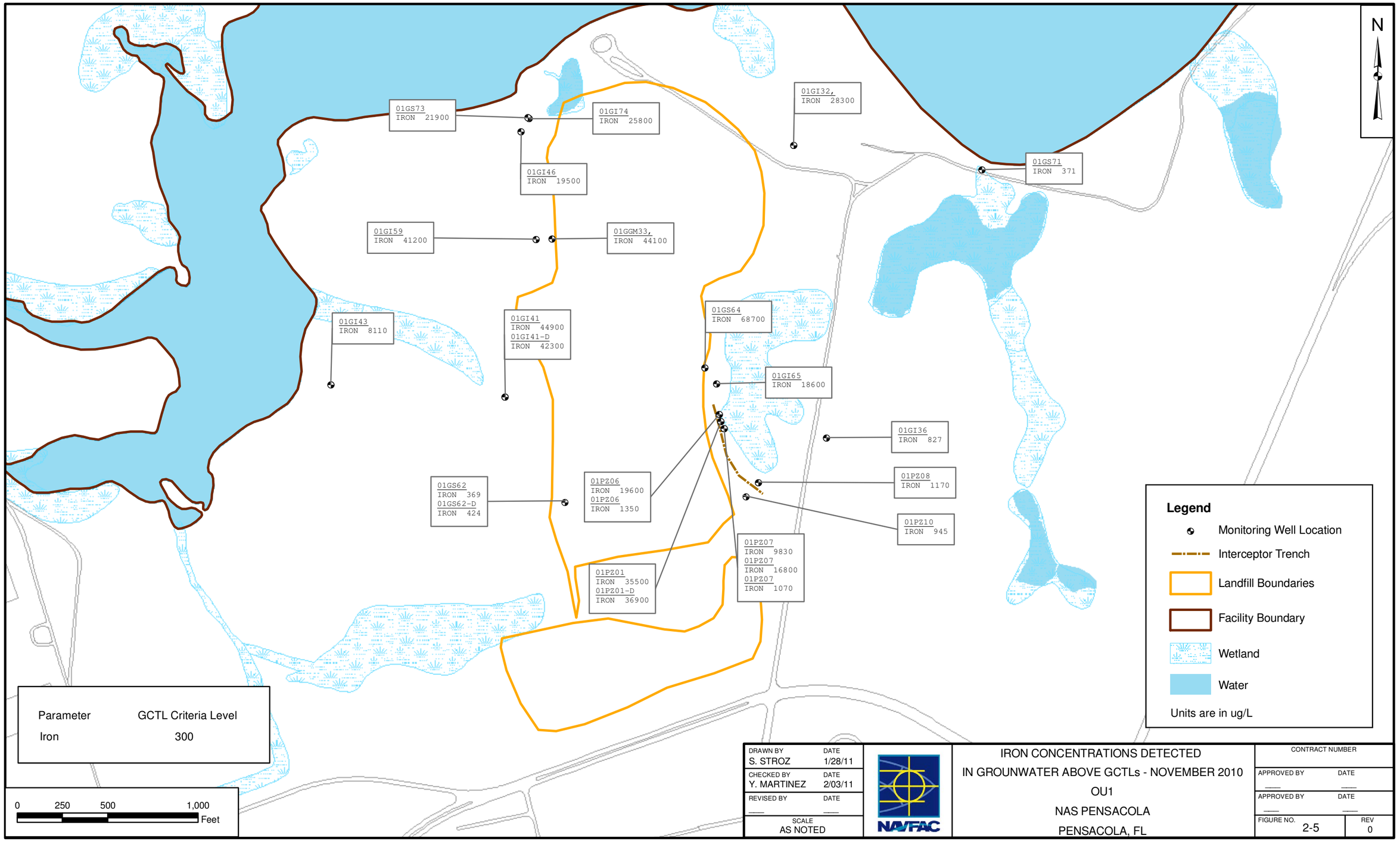

DRAWN BY	S. STROZ
DATE	1/28/11
CHECKED BY	Y. MARTINEZ
DATE	2/03/11
REVISED BY	___
DATE	___
SCALE	AS NOTED

IRON CONCENTRATIONS DETECTED
IN GROUNWATER ABOVE GCTLs - NOVEMBER 2010
OU1
NAS PENSACOLA
PENSACOLA, FL

CONTRACT NUMBER	
APPROVED BY	DATE
___	___
APPROVED BY	DATE
___	___
FIGURE NO.	REV
2-5	0

The November 2010 iron concentration was below both the surface water quality criteria and the freshwater background value. The May 2010 analytical results for iron at the sampling locations 01PZ06, 01PZ07, and 01PZ08 downgradient of the treatment system was 820, 11,200 and 2,940 µg/L, respectively. The November 2010 analytical results for iron at the sampling locations 01PZ06, 01PZ07, and 01PZ08 downgradient of the treatment system was 1,350, 9,830, and 1,170 µg/L, respectively.

The May 2010 iron concentrations for downgradient sample location 01PZ06 were below both the surface water quality criteria and the freshwater background value, but the November 2010 concentration exceeded the surface water quality criteria but not the freshwater background value. The May 2010 iron concentrations for downgradient sample location 01PZ07 exceeded both the surface water quality criteria and the freshwater background value in the May and November 2010 samples. The May 2010 iron concentrations for downgradient sample location 01PZ08 exceeded the surface water quality criteria but not the freshwater background value in the May and November 2010 samples.

Analytical Results for ROD COCs

Groundwater samples collected from 17 monitoring wells at OU 1 were analyzed for three VOCs (benzene, chlorobenzene, and vinyl chloride) and one inorganic (nickel) that were specified in the ROD. The qualified analytical results and data validation reports for the semiannual sampling events are included as Appendix B. The OU 1 ROD specified groundwater concentration criteria for four groundwater COCs including benzene (1 µg/L), chlorobenzene (100 µg/L), vinyl chloride (1 µg/L), and nickel (100 µg/L). The groundwater COC criteria are the Florida GCTLs for each parameter. Table 2-9 provides a historical summary of the COC detections (as specified in the ROD) for groundwater samples from OU 1. Table 2-10 provides the summary of analytical results for May 2010 and Table 2-11 provides the summary of analytical results for November 2010.

Benzene was detected in the groundwater samples collected for the May 2010 sampling event at concentrations exceeding its ROD specified criteria in two shallow aquifer zone monitoring wells and eight intermediate aquifer zone monitoring wells. Benzene concentrations in the groundwater sample collected from the shallow aquifer zone monitoring wells ranged from 1.45 to 2.62 µg/L. Benzene concentrations in the groundwater sample collected from the intermediate aquifer zone monitoring wells ranged from 4.87 to 11.7 µg/L (Figure 2-6).

Benzene was detected in the groundwater samples collected for the November 2010 sampling event at concentrations exceeding its ROD specified criteria in two shallow aquifer zone monitoring wells and five intermediate aquifer zone monitoring wells. Benzene concentrations in the groundwater sample collected from the shallow aquifer zone monitoring wells ranged from 2.91 to 3.23 µg/L. Benzene concentrations in

TABLE 2-9

HISTORICAL GROUNDWATER COC CONCENTRATIONS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Well ID	Date	Elapsed Time[1]	Benzene	Chlorobenzene	Vinyl chloride	Nickel
Criteria			**1**	**100**	**1**	**100**
01GS57						
	7/93	0	ND	ND	ND	**158 J**
	7/94	1.0	NS	NS	NS	NS
	3/00	6.66	ND	ND	ND	ND
	8/00	7.08	ND	ND	ND	ND
	5/01	7.83	ND	ND	ND	ND
	11/01	8.33	ND	ND	ND	ND
	5/02	8.83	ND	ND	ND	ND
	10/02	9.25	ND	ND	ND	ND
	6/03	9.92	ND	ND	ND	ND
	11/03	10.33	ND	ND	ND	ND
	5/10	16.83	ND	ND	ND	1.13 J
	11/10	17.33	ND	ND	ND	ND
01GS62						
	7/93	0	**12**	6 J	ND	43.2
	7/94	1.0	**12**	7 J	ND	ND
	3/00	6.66	**20**	15	**1.3**	ND
	8/00	7.08	**19**	15	**1.1**	ND
	5/01	7.83	**21**	18.8	ND	1.6 J
	11/01	8.33	**19.2**	23	0.94 J	1.2 J
	5/02	8.83	**18**	20	ND	ND
	10/02	9.25	**17**	25	ND	ND
	6/03	9.92	**14**	28.6	ND	ND
	11/03	10.33	**16**	40	ND	ND
	5/10	16.83	ND	0.38 J	ND	0.849 J
	11/10	17.33	ND	ND	ND	ND
01GS64						
	7/93	0	**13**	**120**	ND	63.4
	7/94	1.0	**3 J**	31	ND	ND
	3/00	6.66	NS	NS	NS	NS
	8/00	7.08	NS	NS	NS	NS
	5/01	7.83	**1.9**	10	**1.4**	13.8 J
	11/01	8.33	**2.4**	8.5	**1.9**	5.6 J
	5/02	8.83	**1.8 J**	8.3	ND	ND
	10/02	9.25	**5.1**	22	ND	13.0
	6/03	9.92	**7.4**	89	ND	24.5
	11/03	10.33	**6.0**	31	ND	22.3
	5/10	16.83	**1.45**	16.5	1 J	45.1
	11/10	17.33	ND	13.30	ND	58.5

TABLE 2-9

HISTORICAL GROUNDWATER COC CONCENTRATIONS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Well ID	Date	Elapsed Time[1]	Benzene	Chlorobenzene	Vinyl chloride	Nickel
Criteria			**1**	**100**	**1**	**100**
01GS71						
	7/93	0	NS	NS	NS	NS
	7/94	1.0	ND	ND	ND	ND
	3/00	6.66	ND	ND	ND	ND
	8/00	7.08	ND	ND	ND	ND
	5/01	7.83	ND	ND	ND	ND
	11/01	8.33	ND	ND	ND	ND
	5/02	8.83	ND	ND	ND	ND
	10/02	9.25	ND	ND	ND	ND
	6/03	9.92	ND	ND	ND	ND
	11/03	10.33	ND	ND	ND	ND
	5/10	16.83	ND	ND	ND	2.02 J
	11/10	17.33	ND	ND	ND	0.88
01GGM33						
	7/93	0	**3 J**	35	ND	ND
	7/94	1.0	**2 J**	31	ND	ND
	3/00	6.66	ND	3.8	ND	ND
	8/00	7.08	ND	4.7	ND	ND
	5/01	7.83	0.75 J	22.6	ND	ND
	11/01	8.33	ND	7.7	ND	ND
	5/02	8.83	ND	19	ND	ND
	10/02	9.25	**5**	52	ND	ND
	6/03	9.92	**1.3**	70.1	ND	ND
	11/03	10.33	0.8 J	66	ND	ND
	5/10	16.83	**2.62**	76.4	0.701 J	ND
	11/10	17.33	**3.23**	**109**	0.56	ND
01UPG1						
	7/93	0	NS	NS	NS	NS
	7/94	1.0	NS	NS	NS	NS
	3/00	6.66	NS	NS	NS	NS
	8/00	7.08	NS	NS	NS	NS
	5/01	7.83	NA	NA	NA	NA
	11/01	8.33	ND	ND	ND	ND
	5/02	8.83	ND	ND	ND	1.6
	10/02	9.25	ND	ND	ND	ND
	6/03	9.92	ND	ND	ND	ND
	11/03	10.33	NS	NS	NS	NS
	5/10	16.83	ND	ND	1	9.83
	11/10	17.33	NS	NS	NS	NS

TABLE 2-9

HISTORICAL GROUNDWATER COC CONCENTRATIONS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Well ID	Date	Elapsed Time[1]	Benzene	Chlorobenzene	Vinyl chloride	Nickel
Criteria			**1**	**100**	**1**	**100**
01GI32						
	7/93	0	**2 J**	4 J	ND	32
	7/94	1.0	NS	NS	NS	NS
	3/00	6.66	**1.6**	6.3	**3**	ND
	8/00	7.08	0.82 J	3.5	**1.5**	ND
	5/01	7.83	0.86 J	4.3	**1.9**	ND
	11/01	8.33	0.67 J	ND	**1.2**	ND
	5/02	8.83	ND	5J	ND	ND
	10/02	9.25	0.88 J	2.5	0.7 J	ND
	6/03	9.92	0.78 J	4.8	ND	ND
	11/03	10.33	**1**	7	**1**	ND
	5/10	16.83	ND	10.7	**2.06 J**	ND
	11/10	17.33	ND	9.83	0.71	ND
01GI36						
	7/93	0	**2 J**	ND	ND	**219 J**
	7/94	1.0	ND	ND	ND	NA
	3/00	6.66	0.6	ND	**3.7**	ND
	8/00	7.08	0.85 J	ND	**3.9**	ND
	5/01	7.83	0.79 J	ND	**3.6**	ND
	11/01	8.33	ND	ND	**3.0**	ND
	5/02	8.83	ND	ND	ND	ND
	10/02	9.25	0.59 J	ND	**2.2 J**	ND
	6/03	9.92	ND	ND	ND	ND
	11/03	10.33	0.3 J	ND	**1 J**	ND
	5/10	16.83	ND	ND	1 J	ND
	11/10	17.33	ND	ND	0.37	ND
01GI41						
	7/93	0	**74**	**120**	ND	24.1
	7/94	1.0	**80**	**110**	**3**	NA
	3/00	6.66	**69**	**130**	**6.4**	ND
	8/00	7.08	**57**	95	**3.3**	ND
	5/01	7.83	**33.1**	49.6	**4.2**	ND
	11/01	8.33	**32.7**	47.4	**6.8**	ND
	5/02	8.83	**18**	68	**2.2 J**	ND
	10/02	9.25	**22**	48	**1.4**	ND
	6/03	9.92	**27.7**	86.6	0.66 J	ND
	11/03	10.33	**31**	**100**	ND	ND
	5/10	16.83	**10.9**	**173**	0.3 J	ND
	11/10	17.33	**13.4**	**124**	ND	ND

TABLE 2-9

HISTORICAL GROUNDWATER COC CONCENTRATIONS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Well ID	Date	Elapsed Time[1]	Benzene	Chlorobenzene	Vinyl chloride	Nickel
Criteria			**1**	**100**	**1**	**100**
01GI43						
	7/93	0	**3 J**	2 J	ND	ND
	7/94	1.0	NS	NS	NS	NS
	3/00	6.66	NS	NS	NS	NS
	8/00	7.08	**6.6**	10	**2.3**	ND
	5/01	7.83	**7.7**	13.3	**1.7**	ND
	11/01	8.33	**5.6**	11.5	**2**	ND
	5/02	8.83	**5.2**	12	**1.9 J**	ND
	10/02	9.25	**7.2**	14	**3.4**	ND
	6/03	9.92	**5**	12.8	**1.7**	ND
	11/03	10.33	**6**	15	ND	ND
	5/10	16.83	**4.87**	27.3	**1.28 J**	ND
	11/10	17.33	**4.08**	24.10	0.68	ND
01GI44						
	7/93	0	**3 J**	32	ND	59.2
	7/94	1.0	NS	NS	NS	NS
	3/00	6.66	**5.3**	58	**2.6**	ND
	8/00	7.08	**4.1 J**	77	**4.4 J**	ND
	5/01	7.83	0.81 J	36.7	ND	ND
	11/01	8.33	**1.2**	36.4	0.96 J	ND
	5/02	8.83	ND	27	ND	ND
	10/02	9.25	ND	2.2	ND	ND
	6/03	9.92	**6.3**	41.2	0.63 J	ND
	11/03	10.33	**3**	58	**1 J**	ND
	5/10	16.83	**6.58**	48.5	**1.21 J**	ND
	11/10	17.33	NS	NS	NS	NS
01GI46						
	7/93	0	**3 J**	18	**19**	ND
	7/94	1.0	**3 J**	18	**12**	NA
	3/00	6.66	**2**	17	**17**	ND
	8/00	7.08	ND	18	**19**	ND
	5/01	7.83	**3.9**	33.6	**23.2**	ND
	11/01	8.33	**4.2**	35.6	**25.6**	ND
	5/02	8.83	**3J**	29	**13**	ND
	10/02	9.25	**5.1**	35	**42**	ND
	6/03	9.92	**3.3**	30.9	**27.1**	ND
	11/03	10.33	**4**	36	**34**	ND
	5/10	16.83	**3.36**	48.7	**11.3 J**	ND
	11/10	17.33	**1.36**	18.50	**3.44**	ND

TABLE 2-9

HISTORICAL GROUNDWATER COC CONCENTRATIONS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Well ID	Date	Elapsed Time[1]	Benzene	Chlorobenzene	Vinyl chloride	Nickel
Criteria			**1**	**100**	**1**	**100**
01GI59						
	7/93	0	**8**	45	ND	ND
	7/94	1.0	ND	19	ND	NA
	3/00	6.66	**11**	55	**11**	ND
	8/00	7.08	**9.7**	51	**7.7**	ND
	5/01	7.83	**10.7**	72.4	**6.8**	ND
	11/01	8.33	**8.9**	72.2	**3.6**	ND
	5/02	8.83	**9**	66	**3.5 J**	ND
	10/02	9.25	**15 J**	84 J	**1.6 J**	ND
	6/03	9.92	**6.7**	87.5	0.59 J	ND
	11/03	10.33	**5**	98	0.3 J	ND
	5/10	16.83	**3.08**	91.10	1	ND
	11/10	17.33	**3.62**	109	0.66	ND
01GI65						
	7/93	0	**11**	7	**23**	49.5
	7/94	1.0	**10**	23	**7 J**	NA
	3/00	6.66	**15**	49	**4.9**	ND
	8/00	7.08	**13**	39	**4.1**	ND
	5/01	7.83	**11.7**	40.6	**4.4**	ND
	11/01	8.33	**10**	37.1	**3.4**	ND
	5/02	8.83	**8.3**	26	**3.5 J**	ND
	10/02	9.25	**11**	27	**5.5**	ND
	6/03	9.92	**14.4**	43.6	**2**	ND
	11/03	10.33	**14**	38	**4**	ND
	5/10	16.83	**11.70**	37	**4.85**	0.844 J
	11/10	17.33	**12.60**	37.40	ND	ND
01GI72						
	7/93	0	NS	NS	NS	NS
	7/94	1.0	ND	ND	ND	NA
	3/00	6.66	ND	ND	ND	ND
	8/00	7.08	ND	ND	ND	ND
	5/01	7.83	ND	ND	ND	ND
	11/01	8.33	ND	ND	ND	ND
	5/02	8.83	ND	ND	ND	ND
	10/02	9.25	ND	ND	ND	ND
	6/03	9.92	ND	ND	ND	ND
	11/03	10.33	ND	ND	ND	ND
	5/10	16.83	ND	ND	ND	1.23 J
	11/10	17.33	ND	ND	ND	ND
01GS73						
	5/10	16.83	ND	ND	ND	3.16
	11/10	17.33	ND	ND	ND	ND

TABLE 2-9

HISTORICAL GROUNDWATER COC CONCENTRATIONS
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Well ID	Date	Elapsed Time[1]	Benzene	Chlorobenzene	Vinyl chloride	Nickel
Criteria			**1**	**100**	**1**	**100**
01GI74						
	5/10	16.83	**1.22**	15.10	**9.15**	1.74
	11/10	17.33	0.9	20.50	**3.77**	ND

Notes:
Concentrations are in micrograms per liter.
ND = not detected
NS = not sampled
NA = not analyzed for parameter
J = estimated quantity between the instrument detection limit and the practical quantitation limit
Bold results are above the groundwater criteria from Chapter 62-777, F.A.C.

TABLE 2-10

SUMMARY OF ANALYTICAL DATA - MAY 2010
OPERABLE UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA
PAGE 1 OF 3

LOCATION SAMPLE ID SAMPLE DATE WELL DEPTH	GCTL	NADC	01GGM33 01GW01GGM33-0510 05/11/10 Shallow	01GI32 01GW01GI32-0510 05/11/10 Intermediate	01GI36 01GW01GI36-0510 05/11/10 Intermediate	01GI41 01GW01GI41-0510 05/11/10 Shallow	01GW01GI41-0510- 05/11/10 AVG	01GW01GI41-0510-D 05/11/10 Duplicate	01GI43 01GW01GI43-0510 05/12/10 Intermediate
METALS (UG/L)									
ALUMINUM	200	2000	67.6	36.4 J	100	100	97.35	94.7	103
CADMIUM	5	50	0.25 U	0.25 U	0.567 J	0.25 U	0.25 U	0.25 U	0.251 J
CHROMIUM	100	1000	1.01 J	0.641 J	0.5 U	1.3	1.355	1.41	0.892 J
IRON	300	3000	**35700**	**37200**	234	**35800**	**37400**	**39000**	**8130**
MANGANESE	50	500	**257**	**395**	**62**	**271**	**283**	**295**	44.9
NICKEL	100	1000	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
VOLATILES (UG/L)									
BENZENE	1	100	**2.62**	1 U	1 U	**10.9**	**10.9**	**10.9**	**4.87**
CHLOROBENZENE	100	1000	76.4	10.7	1 U	**173**	**178.5**	**184**	27.3
NAPHTHALENE	14	140	2 U	2 U	2 U	7.9	7.755	7.61	0.5 U
TOTAL XYLENES	20	200	3 U	3 U	3 U	1.14 J	1.19	1.24 J	0.22 U
VINYL CHLORIDE	1	100	0.701 J	**2.06 J**	1 UJ	0.3 J	0.3145	0.329 J	**1.28 J**

LOCATION SAMPLE ID SAMPLE DATE WELL DEPTH	GCTL	NADC	01GI44 01GW01GI44-0510 05/11/10 Intermeidate	01GI46 01GW01GI46-0510 05/12/10 Intermediate	01GI59 01GW01GI59-0510 05/11/10 Intermediate	01GI65 01GW01GI65-0510 05/10/10 Intermediate	01GI72 01GW01GI720510 05/12/10 Intermediate	01GI74 01GW01GI74-0510 05/12/10 Intermediate	01GS57 01GW01GS570510 05/12/10 Shallow
METALS (UG/L)									
ALUMINUM	200	2000	92.2	65	75.3	94.2	188	**202**	**393**
CADMIUM	5	50	0.25 U	0.34 J	0.296 J	0.276 J	0.937 J	0.657 J	0.723 J
CHROMIUM	100	1000	0.789 J	1.15 J	0.723 J	1.01 J	5 U	0.743 J	0.5 U
IRON	300	3000	**25300**	**17500**	**43600**	**18400**	**3390**	**12600**	228
MANGANESE	50	500	**229**	**169**	**472**	**129**	**94.8**	**152**	5.48
NICKEL	100	1000	0.75 U	0.75 U	0.75 U	0.844 J	1.23 J	1.74 J	1.13 J
VOLATILES (UG/L)									
BENZENE	1	100	**6.58**	**3.36**	**3.08**	**11.7**	0.14 U	**1.22**	0.14 U
CHLOROBENZENE	100	1000	48.5	48.7	91.1	37	0.21 U	15.1	0.21 U
NAPHTHALENE	14	140	2 U	0.5 U	2 U	2 U	0.5 U	0.5 U	0.5 U
TOTAL XYLENES	20	200	3 U	0.22 U	3 U	6.51	0.22 U	0.22 U	0.22 U
VINYL CHLORIDE	1	100	**1.21 J**	**11.3 J**	1 UJ	**4.83 J**	0.2 UJ	**9.15 J**	0.2 UJ

EXCEEDS GCTL AND NADC
EXCEEDS GCTL ONLY

GTCL = Groundwater Cleanup Target Level
NADC = Natural Attenuation Default Concentrations
U = analyte was not detected
UG/L = Micrograms per liter
J = Estimated Concentration
NA = Not analyzed

TABLE 2-10

SUMMARY OF ANALYTICAL DATA - MAY 2010
OPERABLE UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA
PAGE 2 OF 3

LOCATION SAMPLE ID SAMPLE DATE WELL DEPTH	GCTL	NADC	01GS62 01GW01GS62-0510 05/12/10 Shallow	01GW01GS62-0510- 05/12/10 Average	01GW01GS62-0510-D 05/12/10 Duplicate	01GS64 01GW01GS64-0510 05/10/10 Shallow	01GS71 01GW01GS710510 05/12/10 Shallow
METALS (UG/L)							
ALUMINUM	200	2000	**506**	**462**	**418**	164	**1200**
CADMIUM	5	50	0.284 J	0.2745	0.265 J	2.02	0.63 J
CHROMIUM	100	1000	0.614 J	0.568	0.522 J	1.51	1.99
IRON	300	3000	259	233.5	208	**64400**	**718**
MANGANESE	50	500	46	44.95	43.9	**1450**	**57.8**
NICKEL	100	1000	0.849 J	0.808	0.767 J	45.1	2.02 J
VOLATILES (UG/L)							
BENZENE	1	100	0.14 U	0.14 U	0.14 U	**1.45**	0.14 U
CHLOROBENZENE	100	1000	0.38 J	0.3965	0.413 J	16.5	0.21 U
NAPHTHALENE	14	140	0.5 U	0.5 U	0.5 U	2 U	0.5 U
TOTAL XYLENES	20	200	0.22 U	0.22 U	0.22 U	3 U	0.22 U
VINYL CHLORIDE	1	100	0.2 UJ	0.2 U	0.2 UJ	1 UJ	0.2 UJ

LOCATION SAMPLE ID SAMPLE DATE WELL DEPTH	GCTL	NADC	01GS73 01GW01GS73-0510 05/12/10 Shallow	01PZ01 01GW01PZ1-0510 05/11/10 Shallow	01GW01PZ1-0510- 05/11/10 Average	01GW01PZ1-0510-D 05/11/10 Duplicate
METALS (UG/L)						
ALUMINUM	200	2000	**8260**	NA	NA	NA
CADMIUM	5	50	0.321 J	NA	NA	NA
CHROMIUM	100	1000	6.01	NA	NA	NA
IRON	300	3000	**9630**	**46300**	**46200**	**46100**
MANGANESE	50	500	**102**	NA	NA	NA
NICKEL	100	1000	3.16	NA	NA	NA
VOLATILES (UG/L)						
BENZENE	1	100	0.14 U	NA	NA	NA
CHLOROBENZENE	100	1000	0.21 U	NA	NA	NA
NAPHTHALENE	14	140	0.5 U	NA	NA	NA
TOTAL XYLENES	20	200	0.22 U	NA	NA	NA
VINYL CHLORIDE	1	100	0.2 UJ	NA	NA	NA

EXCEEDS GCTL AND NADC
EXCEEDS GCTL ONLY

GTCL = Groundwater Cleanup Target Level
NADC = Natural Attenuation Default Concentrations
U = analyte was not detected

UG/L = Micrograms per liter
J = Estimated Concentration
NA = Not analyzed

TABLE 2-10

SUMMARY OF ANALYTICAL DATA - MAY 2010
OPERABLE UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA
PAGE 3 OF 3

LOCATION SAMPLE ID SAMPLE DATE WELL DEPTH	GCTL	NADC	01PZ06 01GW01PZ6-0510 05/11/10 Shallow	 01GW01PZ6A-0510 05/11/10 Shallow	01PZ07 01GW01PZ07-0510 05/10/10 Shallow	 01GW01PZ7A-0510 05/10/10 Shallow	 01GW01PZ7B-0510 05/10/10 Shallow
METALS (UG/L)							
ALUMINUM	200	2000	NA	NA	NA	NA	NA
CADMIUM	5	50	NA	NA	NA	NA	NA
CHROMIUM	100	1000	NA	NA	NA	NA	NA
IRON	300	3000	**28600**	**820**	**11200**	**17900**	**1090**
MANGANESE	50	500	NA	NA	NA	NA	NA
NICKEL	100	1000	NA	NA	NA	NA	NA
VOLATILES (UG/L)							
BENZENE	1	100	NA	NA	NA	NA	NA
CHLOROBENZENE	100	1000	NA	NA	NA	NA	NA
NAPHTHALENE	14	140	NA	NA	NA	NA	NA
TOTAL XYLENES	20	200	NA	NA	NA	NA	NA
VINYL CHLORIDE	1	100	NA	NA	NA	NA	NA

LOCATION SAMPLE ID SAMPLE DATE WELL DEPTH	GCTL	NADC	01PZ08 01GW01PZ8-0510 05/10/10 Shallow	01PZ10 01GW01PZ10-0510 05/10/10 Shallow	01UPGW1 01GWUPG10510 05/11/10 Shallow
METALS (UG/L)					
ALUMINUM	200	2000	NA	NA	**3740**
CADMIUM	5	50	NA	NA	0.334 J
CHROMIUM	100	1000	NA	NA	6.61
IRON	300	3000	**2940**	**1740**	**2140**
MANGANESE	50	500	NA	NA	9.91
NICKEL	100	1000	NA	NA	9.83
VOLATILES (UG/L)					
BENZENE	1	100	NA	NA	1 U
CHLOROBENZENE	100	1000	NA	NA	1 U
NAPHTHALENE	14	140	NA	NA	2 U
TOTAL XYLENES	20	200	NA	NA	3 U
VINYL CHLORIDE	1	100	NA	NA	1 UJ

EXCEEDS GCTL AND NADC
EXCEEDS GCTL ONLY

GTCL = Groundwater Cleanup Target Level
NADC = Natural Attenuation Default Concentrations
U = analyte was not detected
UG/L = Micrograms per liter
J = Estimated Concentration
NA = Not analyzed

TABLE 2-11

SUMMARY ANALYTICAL DATA - NOVEMBER 2010
OPERABLE UNIT 1
NAS PENSACOLA,
PENSACOLA, FLORIDA
PAGE 1 OF 3

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE	GCTL	NADC	01GGM33 01GW01GSM33-1110 11/10/2010	01GI32 01GW01GI32-1110 11/10/2010	01GI36 01GW01GI36-1110 11/9/2010	01GI41 01GW01GI41-1110 11/10/2010 ORIGINAL	01GI41 01GW01GI41-1110- 11/10/2010 AVERAGE	01GI41 01GW01GI41-1110-D 11/10/2010 DUPLICATE
METALS (UG/L)								
ALUMINUM	200	2000	58.6	25 U	93.7	**268 J**	172.75	77.5 J
CADMIUM	5	50	0.25 U	0.5 U	0.25 U	0.25 U	0.25 U	0.25 U
CHROMIUM	100	1000	1.01 J	0.552 J	0.5 U	1.82 J	1.705	1.59 J
IRON	300	3000	**44100**	**28300**	**827**	**44900**	**43600**	**42300**
MANGANESE	50	500	**300**	**350**	40.2	**314**	**316**	**318**
NICKEL	100	1000	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
VOLATILES (UG/L)								
BENZENE	1	100	**3.23**	0.25 U	0.25 U	**13.4**	**13.7**	**14**
CHLOROBENZENE	100	1000	**109**	9.83	0.25 U	**124**	**125**	**126**
NAPHTHALENE	14	140	0.25 U	0.25 U	0.25 U	7.43	7.695	7.96
TOTAL XYLENES	20	200	6.33	0.75 U	0.75 U	2.79 J	2.67	2.55 J
VINYL CHLORIDE	1	100	0.561 J	0.708 J	0.367 J	0.25 U	0.25 U	0.25 U

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE	GCTL	NADC	01GI43 01GW01GI43-1110 11/9/2010	01GI46 01GW01GI46-1110 11/10/101110	01GI59 01GW01GI59-1110 11/10/2010	01GI65 01GW01GI65-1110 11/8/2010	01GI72 01GW01GI72-1110 11/9/2010	01GI74 01GW01GI74-1110 11/10/2010
METALS (UG/L)								
ALUMINUM	200	2000	48.4 J	49.7 J	50.5	60.6	**536**	**266**
CADMIUM	5	50	0.25 U	0.25 U	0.25 U	0.25 U	2.5 U	0.25 U
CHROMIUM	100	1000	0.679 J	0.861 J	0.857 J	0.919 J	5 U	1.41 J
IRON	300	3000	**8110**	**19500**	**41200**	**18600**	233 J	**25800**
MANGANESE	50	500	42.9	**173**	**340**	**111**	**80.7**	**169**
NICKEL	100	1000	0.75 U	0.75 U	0.75 U	0.75 U	7.5 U	0.75 U
VOLATILES (UG/L)								
BENZENE	1	100	**4.08**	**1.36**	**3.62**	**12.6**	0.25 U	0.901 J
CHLOROBENZENE	100	1000	24.1	18.5	**109**	37.4	0.25 U	20.5
NAPHTHALENE	14	140	0.25 U	0.25 U	0.25 U	0.294 J	0.25 U	0.25 U
TOTAL XYLENES	20	200	0.75 U	0.75 U	0.75 U	13.7	0.75 U	0.75 U
VINYL CHLORIDE	1	100	0.678 J	**3.44**	0.662 J	0.25 U	0.25 U	**3.77**

EXCEEDS GCTL AND NADC
EXCEEDS GCTL ONLY

GTCL = Groundwater Cleanup Target Level
NADC = Natural Attenuation Default Concentrations
U = analyte was not detected

UG/L = Micrograms per liter
J = Estimated Concentration
NA = Not analyzed

TABLE 2-11

SUMMARY ANALYTICAL DATA - NOVEMBER 2010
OPERABLE UNIT 1
NAS PENSACOLA,
PENSACOLA, FLORIDA
PAGE 2 OF 3

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE	GCTL	NADC	01GS57 01GW01GS57-1110 11/10/2010	01GS62 01GW01GS62-1110 11/9/2010 ORIGINAL	01GW01GS62-1110- 11/9/2010 AVERAGE	01GW01GS62-1110-D 11/9/2010 DUPLICATE	01GS64 01GW01GS64-1110 11/9/2010	01GS71 01GW01GS71-1110 11/9/2010
METALS (UG/L)								
ALUMINUM	200	2000	**332**	**408**	**401**	**394**	**823**	**478**
CADMIUM	5	50	2.28	0.25 U	0.25 U	0.25 U	**11.1**	0.25 U
CHROMIUM	100	1000	0.5 U	0.5 U	0.5 U	0.5 U	2.1 J	1.17 J
IRON	300	3000	212	**369**	**396.5**	**424**	**68700**	**371**
MANGANESE	50	500	3.9 J	48.9	47.25	45.6	**1140**	29.1
NICKEL	100	1000	0.75 U	0.75 U	0.75 U	0.75 U	58.5	0.881 J
VOLATILES (UG/L)								
BENZENE	1	100	0.25 U	0.25 U	0.25 U	0.25 U	**2.91**	0.25 U
CHLOROBENZENE	100	1000	0.25 U	0.25 U	0.198	0.271 J	13.3	0.25 U
NAPHTHALENE	14	140	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U
TOTAL XYLENES	20	200	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U
VINYL CHLORIDE	1	100	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U	0.25 U

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE	GCTL	NADC	01GS73 01GW01GS73-1110 11/10/2010	01PZ01 01GW01PZ1-1110 11/7/2010 ORIG	01GW01PZ1-1110- 11/7/2010 AVG	01GW01PZ1-1110-D 11/7/2010 DUP	01PZ06 01GW01PZ6-1110 11/7/2010	01GW01PZ6A-1110 11/7/2010
METALS (UG/L)								
ALUMINUM	200	2000	**15100**	NA	NA	NA	NA	NA
CADMIUM	5	50	0.25 U	NA	NA	NA	NA	NA
CHROMIUM	100	1000	11.1	NA	NA	NA	NA	NA
IRON	300	3000	**21900**	**35500**	**36200**	**36900**	**19600**	**1350**
MANGANESE	50	500	**111**	NA	NA	NA	NA	NA
NICKEL	100	1000	5.94	NA	NA	NA	NA	NA
VOLATILES (UG/L)								
BENZENE	1	100	0.25 U	NA	NA	NA	NA	NA
CHLOROBENZENE	100	1000	0.25 U	NA	NA	NA	NA	NA
NAPHTHALENE	14	140	0.25 U	NA	NA	NA	NA	NA
TOTAL XYLENES	20	200	0.75 U	NA	NA	NA	NA	NA
VINYL CHLORIDE	1	100	0.25 U	NA	NA	NA	NA	NA

EXCEEDS GCTL AND NADC
EXCEEDS GCTL ONLY

GTCL = Groundwater Cleanup Target Level
NADC = Natural Attenuation Default Concentrations
U = analyte was not detected
UG/L = Micrograms per liter
J = Estimated Concentration
NA = Not analyzed

TABLE 2-11

SUMMARY ANALYTICAL DATA - NOVEMBER 2010
OPERABLE UNIT 1
NAS PENSACOLA,
PENSACOLA, FLORIDA
PAGE 3 OF 3

LOCATION SAMPLE ID SAMPLE DATE SAMPLE CODE	GCTL	NADC	01PZ07 01GW01PZ7-1110 11/7/2010	01PZ07 01GW01PZ7A-1110 11/7/2010	01PZ07 01GW01PZ7B-1110 11/7/2010	01PZ08 01GW01PZ08-1110 11/7/2010	01PZ10 01GW01PZ10-1110 11/7/2010
METALS (UG/L)							
ALUMINUM	200	2000	NA	NA	NA	NA	NA
CADMIUM	5	50	NA	NA	NA	NA	NA
CHROMIUM	100	1000	NA	NA	NA	NA	NA
IRON	300	3000	**9830**	**16800**	**1070**	**1170**	**945**
MANGANESE	50	500	NA	NA	NA	NA	NA
NICKEL	100	1000	NA	NA	NA	NA	NA
VOLATILES (UG/L)							
BENZENE	1	100	NA	NA	NA	NA	NA
CHLOROBENZENE	100	1000	NA	NA	NA	NA	NA
NAPHTHALENE	14	140	NA	NA	NA	NA	NA
TOTAL XYLENES	20	200	NA	NA	NA	NA	NA
VINYL CHLORIDE	1	100	NA	NA	NA	NA	NA

EXCEEDS GCTL AND NADC
EXCEEDS GCTL ONLY

GTCL = Groundwater Cleanup Target Level
NADC = Natural Attenuation Default Concentrations
U = analyte was not detected

UG/L = Micrograms per liter
J = Estimated Concentration
NA = Not analyzed

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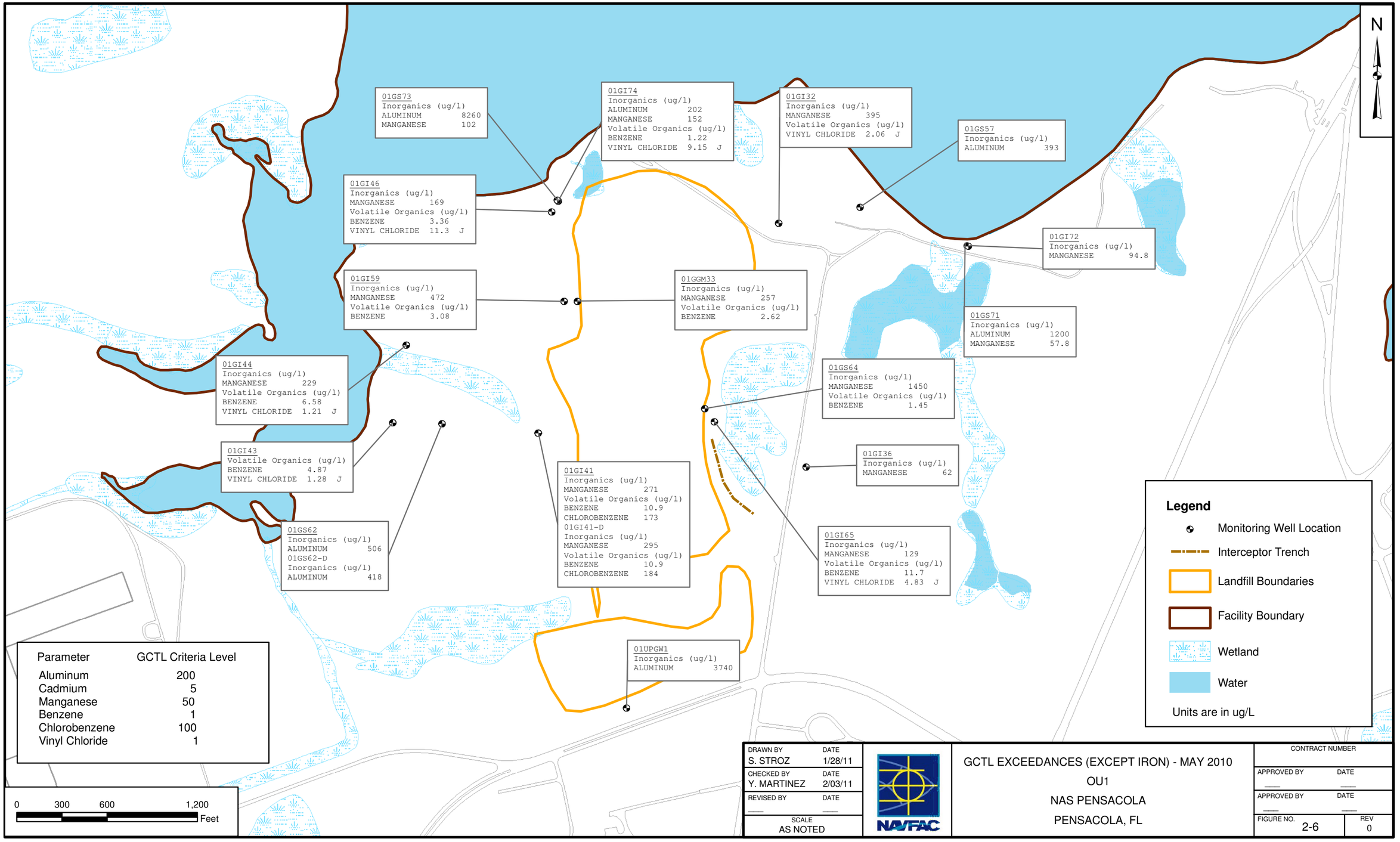

DRAWN BY S. STROZ	DATE 1/28/11	GCTL EXCEEDANCES (EXCEPT IRON) - MAY 2010	CONTRACT NUMBER
CHECKED BY Y. MARTINEZ	DATE 2/03/11	OU1	APPROVED BY ____ DATE ____
REVISED BY ____	DATE ____	NAS PENSACOLA	APPROVED BY ____ DATE ____
SCALE AS NOTED		PENSACOLA, FL	FIGURE NO. 2-6 REV 0

the groundwater sample collected from the intermediate aquifer zone monitoring wells ranged from 1.36 to 13.4 µg/L (Figure 2-7).

Chlorobenzene was detected in one groundwater sample and its duplicate collected for the May 2010 from intermediate aquifer zone monitoring well (01GI41) at concentrations that exceeds its ROD specified criteria. The groundwater sample from monitoring well 01GI41 had a concentration of 173 µg/L and its duplicate was 184 µg/L. Chlorobenzene concentrations in the groundwater sample collected from the shallow aquifer zone monitoring wells ranged from an estimated concentration of 0.38 µg/L to 76.4 µg/L. Chlorobenzene concentrations in the groundwater sample collected from the intermediate aquifer zone monitoring wells ranged from 10.7 to 184 µg/L.

Chlorobenzene was detected in the groundwater samples collected for the November 2010 sampling event at concentrations exceeding its ROD specified criteria in one shallow aquifer zone monitoring well (01GGM33 at 109 µg/L) and two intermediate aquifer zone monitoring wells (01GI41 at 124 µg/L and its duplicate sample at 126 µg/L; and 01GI59 at 109 µg/L). Chlorobenzene concentrations in the groundwater sample collected from the shallow aquifer zone monitoring wells ranged from an estimated 0.271 µg/L to 109 µg/L. Chlorobenzene concentrations in the groundwater sample collected from the intermediate aquifer zone monitoring wells ranged from 9.83 to 126 µg/L.

Vinyl chloride was detected in the groundwater samples collected for the May 2010 sampling event at concentrations exceeding its ROD specified criteria in six intermediate aquifer zone monitoring wells. Vinyl chloride was detected at only shallow aquifer zone monitoring well location (01GGM33) at an estimated concentration of 0.701 µg/L. Vinyl chloride concentrations in the groundwater sample collected from the intermediate aquifer zone monitoring wells ranged from an estimated concentration of 0.3 µg/L to 11.3 µg/L.

Vinyl chloride was detected in the groundwater samples collected for the November 2010 sampling event at concentrations exceeding its ROD specified criteria in two intermediate aquifer zone monitoring wells. Vinyl chloride was detected at only one shallow aquifer zone monitoring well location (01GGM33) at an estimated concentration of 0.561 µg/L. Vinyl chloride concentrations in the groundwater sample collected from the intermediate aquifer zone monitoring wells ranged from an estimated concentration of 0.367 µg/L to 3.77 µg/L.

Nickel was not detected at concentrations exceeding its ROD specified criteria in the groundwater samples collected from the shallow and intermediate aquifer zone monitoring wells for the May and November 2010 sampling events.

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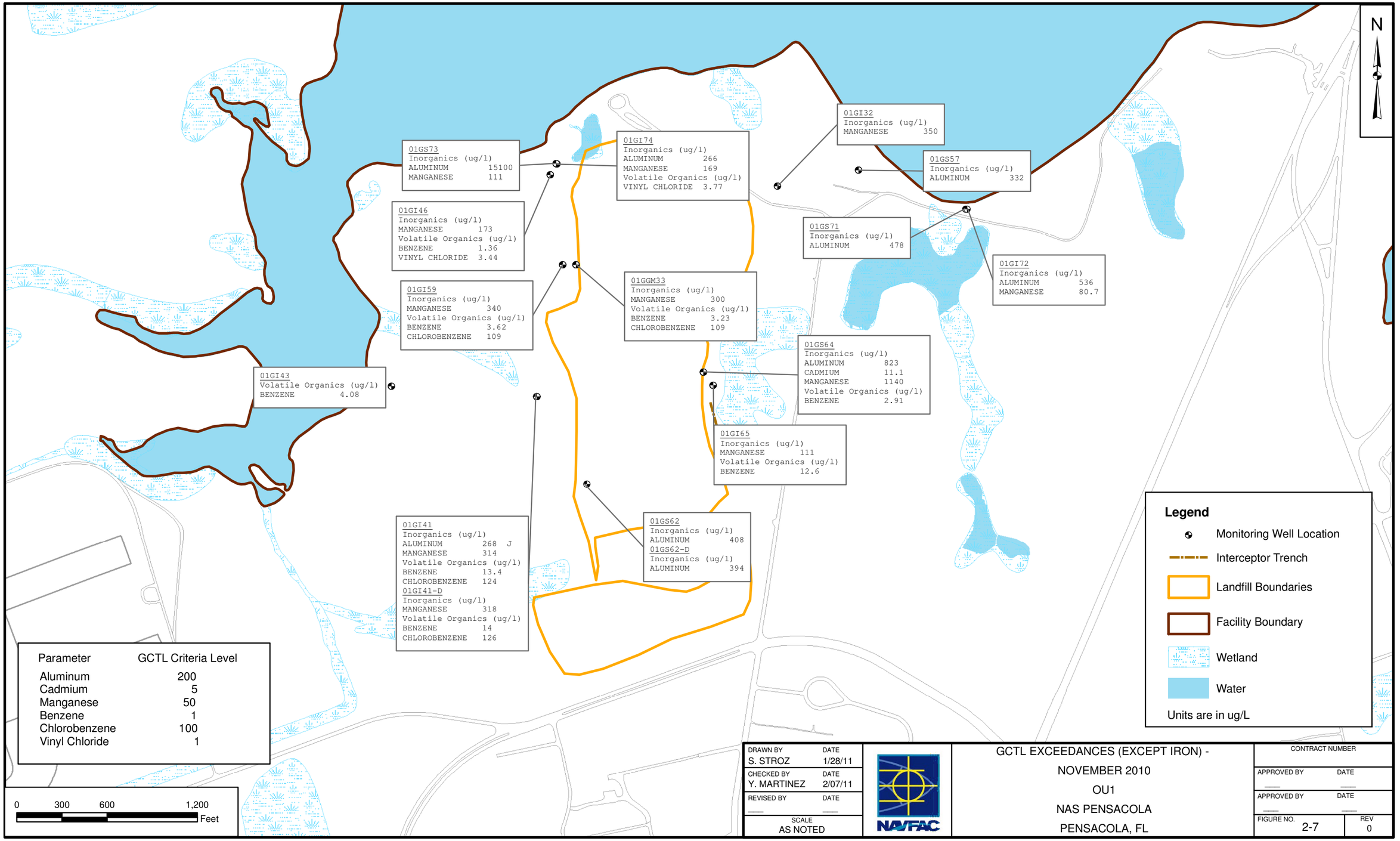

DRAWN BY S. STROZ	DATE 1/28/11	GCTL EXCEEDANCES (EXCEPT IRON) - NOVEMBER 2010 OU1 NAS PENSACOLA PENSACOLA, FL	CONTRACT NUMBER
CHECKED BY Y. MARTINEZ	DATE 2/07/11		APPROVED BY ___ DATE ___
REVISED BY ___	DATE ___		APPROVED BY ___ DATE ___
SCALE AS NOTED			FIGURE NO. 2-7 REV 0

Nickel concentrations in the groundwater sample collected in May 2010 from the shallow aquifer zone monitoring wells ranged from an estimated 0.767 µg/L to 45.1 µg/L. Nickel concentrations in the groundwater sample collected in May 2010 from the intermediate aquifer zone monitoring wells ranged from an estimated 0.844 µg/L to an estimated 1.74 µg/L. Nickel concentrations in the groundwater sample collected in November 2010 from the shallow aquifer zone monitoring wells ranged from an estimated 0.881 µg/L to 58.5 µg/L. Nickel was not detected in the groundwater sample collected in November 2010 from the intermediate aquifer zone monitoring wells.

Benzene, chlorobenzene, vinyl chloride, and nickel were not detected at concentrations that exceed their Florida Natural Attenuation Default Concentrations (NADCs) in the groundwater samples collected for the May and November 2010 sampling events.

Analytical Results for Proposed Plan Parameters

Eight analytes including two VOCs, one SVOC, and five inorganics were identified in the Proposed Plan as exceeding their cleanup goals. These eight additional compounds had been detected previously in OU 1 groundwater samples at concentrations exceeding the Florida GCTLs. These parameters included the VOCs total xylenes and 1,1,2,2-PCA; the SVOC naphthalene; and inorganics aluminum, cadmium, chromium, iron, and manganese.

Total xylenes, 1,1,2,2-PCA, naphthalene, and chromium were not detected at concentrations that exceed their Florida GCTLs in the groundwater samples collected in May and November 2010.

Aluminum was detected at concentrations exceeding its Florida GCTL (200 µg/L) in the groundwater samples collected from five shallow aquifer zone monitoring wells and one intermediate aquifer zone monitoring well for the May 2010 sampling event. Aluminum exceeded its NADC (2000 µg/L) in the groundwater samples collected from shallow aquifer zone monitoring wells 01GS73 at 8,260 µg/L and 01UPGW1 at 3,740 µg/L. Aluminum concentrations in the groundwater samples collected in May 2010 from the shallow aquifer zone monitoring wells ranged from 67.6 to 8,260 µg/L. Aluminum concentrations in the groundwater samples collected in May 2010 from the intermediate aquifer zone monitoring wells ranged from an estimated 36.4 µg/L to 393 µg/L.

Aluminum was detected at concentrations exceeding its Florida GCTL in the groundwater samples collected from five shallow aquifer zone monitoring wells and three intermediate aquifer zone monitoring wells for the November 2010 sampling event. Aluminum exceeded its NADC in the groundwater sample collected from shallow aquifer zone monitoring well 01GS73 at 15,100 µg/L (Figure 2-8). Aluminum concentrations in the groundwater samples collected in November 2010 from the shallow aquifer zone monitoring wells

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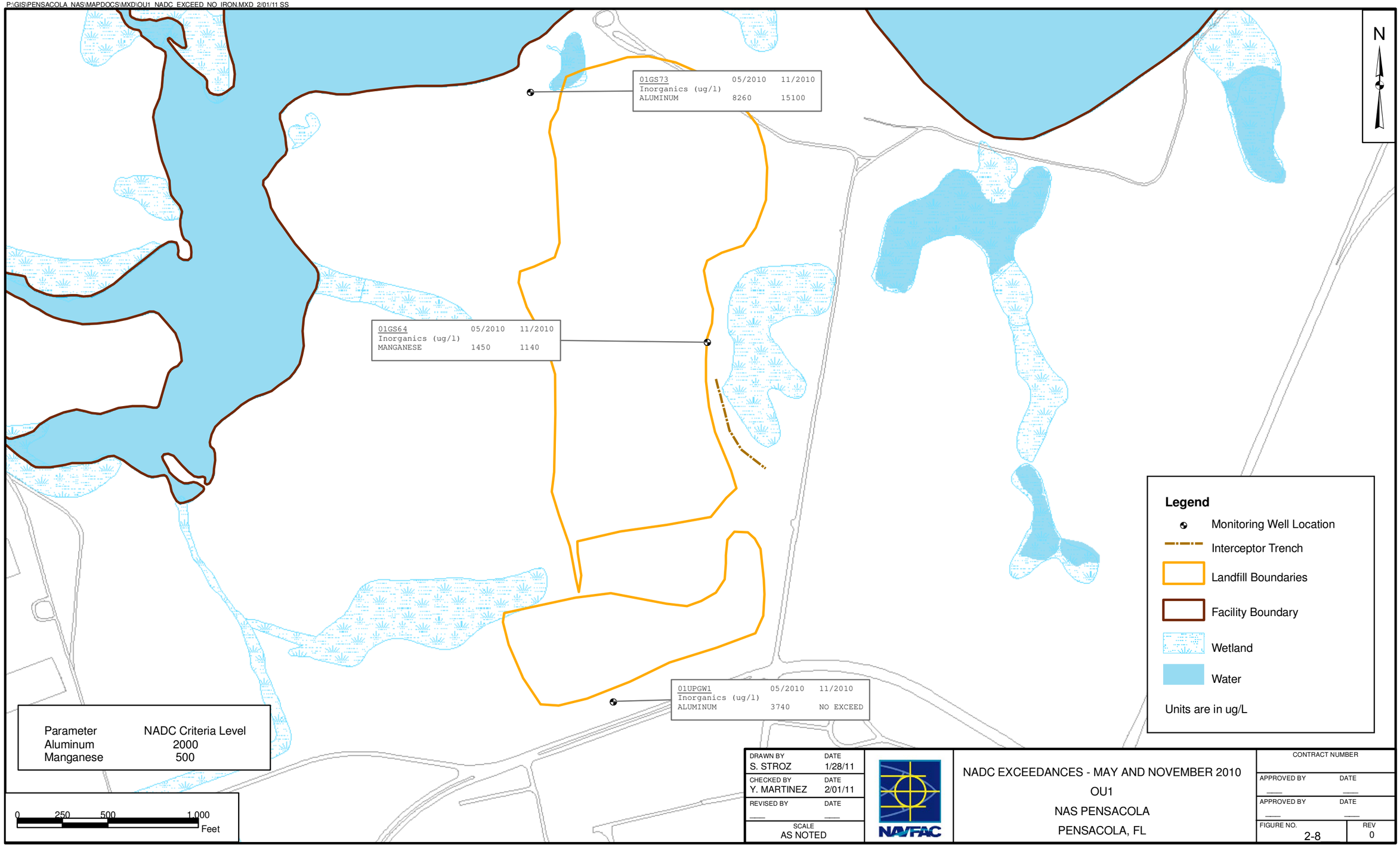

DRAWN BY S. STROZ	DATE 1/28/11	NADC EXCEEDANCES - MAY AND NOVEMBER 2010	CONTRACT NUMBER
CHECKED BY Y. MARTINEZ	DATE 2/01/11	OU1	APPROVED BY ____ DATE ____
REVISED BY ____	DATE ____	NAS PENSACOLA	APPROVED BY ____ DATE ____
SCALE AS NOTED		PENSACOLA, FL	FIGURE NO. 2-8 REV 0

ranged from 58.6 to 15,100 µg/L. Aluminum concentrations in the groundwater samples collected in November 2010 from the intermediate aquifer zone monitoring wells ranged from an estimated 77.5 µg/L to 536 µg/L.

Cadmium was not detected at concentrations exceeding its Florida GCTL (5 µg/L) in the groundwater samples collected from the shallow and intermediate aquifer zone monitoring wells for the May 2010 sampling event and the shallow aquifer zone for the November 2010 sampling event. The groundwater sample from intermediate aquifer zone monitoring well 01GI41 contained cadmium at 11.1 µg/L and exceeded its Florida GCTL but not its NADC (50 µg/L).

Iron was detected at concentrations exceeding its Florida GCTL (300 µg/L) in the groundwater samples collected in May 2010 from 15 shallow aquifer zone monitoring wells and its Florida NADC (3,000 µg/L) in the groundwater samples collected from 9 shallow aquifer zone monitoring wells. Iron exceeded its Florida GCTL and NADC in groundwater samples collected from nine intermediate aquifer zone monitoring wells for the May 2010 sampling event. Iron concentrations in the groundwater samples collected in May 2010 from the shallow aquifer zone monitoring wells ranged from 233.5 to 64,400 µg/L. Iron concentrations in the groundwater samples collected in May 2010 from the intermediate aquifer zone monitoring wells ranged from an estimated 234 µg/L to 43,600 µg/L.

Iron was detected at concentrations exceeding its Florida GCTL in the groundwater samples collected in November 2010 from 17 shallow aquifer zone monitoring wells and its Florida NADC in the groundwater samples collected from 9 shallow aquifer zone monitoring wells. Iron exceeded its Florida GCTL in groundwater samples collected from eight intermediate aquifer zone monitoring wells for the November 2010 sampling event and its Florida NADC in groundwater samples collected from seven intermediate aquifer zone monitoring wells. Iron concentrations in the groundwater samples collected in November 2010 from the shallow aquifer zone monitoring wells ranged from 212 to 68,700 µg/L. Iron concentrations in the groundwater samples collected in November 2010 from the intermediate aquifer zone monitoring wells ranged from an estimated 827 µg/L to 44,900 µg/L.

Manganese was detected at concentrations exceeding its Florida GCTL (50 µg/L) in the groundwater samples collected in May 2010 from four shallow aquifer zone monitoring wells and its Florida NADC (500 µg/L) in the groundwater samples collected from one shallow aquifer zone monitoring well (Figure 2-8). Manganese only exceeded its Florida GCTL in groundwater samples collected from nine intermediate aquifer zone monitoring wells for the May 2010 sampling event. Manganese concentrations in the groundwater samples collected in May 2010 from the shallow aquifer zone monitoring wells ranged from 5.48 to 1,450 µg/L. Manganese concentrations in the groundwater samples collected in May 2010 from the intermediate aquifer zone monitoring wells ranged from 62 to 472 µg/L.

Manganese was detected at concentrations exceeding its Florida GCTL (50 µg/L) in the groundwater samples collected in November 2010 from three shallow aquifer zone monitoring wells and its Florida NADC (500 µg/L) in the groundwater samples collected from one shallow aquifer zone monitoring well. Manganese exceeded only its Florida GCTL in groundwater samples collected from seven intermediate aquifer zone monitoring wells for the November 2010 sampling event. Manganese concentrations in the groundwater samples collected in November 2010 from the shallow aquifer zone monitoring wells ranged from an estimated 3.9 µg/L to 1,140 µg/L. Manganese concentrations in the groundwater samples collected in November 2010 from the intermediate aquifer zone monitoring wells ranged from 40.2 to 350 µg/L.

3.0 DATA ASSESSMENT

This data assessment summarizes the laboratory analytical results for the May and November 2010 LTM events, compares the sample results to regulatory criteria, and evaluates overall trends in analytical results for the site.

3.1 SURFACE WATER DATA ASSESSMENT

Based on the LTM results (Table 2-1), since 2000 the concentration of iron detected in surface water samples (seep and stream samples) appear to be highly variable, sometimes changing in concentration by a factor of 100. The data demonstrates that iron continues to be detected in the surface water samples collected from Wetland 3 at concentrations that exceed the Florida Surface Water Quality Criteria of 1,000 µg/L per Chapter 62-302, F.A.C. and the freshwater background concentration of 4,720 µg/L. However, the concentration of iron at the new POC location (01SW03) appears to be less than the Florida Surface Water Quality Criteria and the estuarine background concentration of 5,862 µg/L.

3.2 GROUNDWATER DATA ASSESSMENT

Changes in contaminant concentrations for the groundwater analytes over time were evaluated using the Mann-Kendall statistical test at 10 percent significance. Data for selected analytes were entered into a spreadsheet that determined the trends in the contaminant data at a 90 percent confidence level. For consistency, the Method Detection Limits (MDLs) as included in Worksheet #15, were used for non-detects. Also, for two (01GS73 and 01GI74) of the 17 monitoring wells, which were installed in 2010, there is no previous data and therefore there is not sufficient data sets (at least four sampling events) for these monitoring well locations to be evaluated by the Mann-Kendall statistics test. The data entry sheets for the Mann-Kendall test are included in Appendix C.

3.2.1 Statistical Procedure

The Mann-Kendall statistical test was selected to evaluate trends in the data. The Mann-Kendall test is considered well-suited to the dataset because the test can be used on data that are non-parametric (i.e., no specific statistical distribution, such as normal or log-normal), the dataset can be missing data or contain data at irregularly spaced intervals, and missing data are allowed. In addition, data that are reported below the detection limit can be used since the Mann-Kendall test uses only the relative magnitudes of the data for the comparison, not the measured values. As with many statistical tests, the validity of the results is increased when the sample size is larger; however, the test may be performed on as few as four values.

The Mann-Kendall test is performed as follows:

- An appropriate significance ($\alpha = 0.1$) level was chosen. A 10 percent level of significance indicates there is no more than a 10 percent probability that a data set with no real underlying trend would be misjudged by this test as displaying a trend.
- The data are listed in the order in which they were collected.
- Each data point is compared to the points that follow in time.
- The number of times the data increase is compared to the number of times the data decrease.
- The greater the number of increases or decreases, the more evidence there is for an upward or downward trend.
- Because we do not know the actual concentration values below the detection limit, assigning the detection limit as a proxy value may mask a trend that is occurring below the detection limit. This introduces some uncertainty in the Mann-Kendall trend analysis, particularly if there are any samples with higher detection limits than the lowest of the positive values in all other samples.

3.2.2 Data Assessment Results

Table 3-1 shows the historical summary of the concentrations of chlorobenzene detected in the groundwater samples from OU 1 monitoring wells. Chlorobenzene has not been detected (therefore there is no trend) in the groundwater samples from five of the OU 1 monitoring well locations including: upgradient monitoring well 01UPGW1, shallow aquifer zone monitoring wells 01GS57, 01GS71, and 01GS72, and intermediate aquifer zone monitoring well 01GI36. No trend is apparent for chlorobenzene at five monitoring well locations including: shallow aquifer zone monitoring wells locations 01GS64 and 01GS62 and intermediate aquifer zone monitoring wells 01GI44, 01GI46, and 01GI65. An increasing trend is apparent for chlorobenzene at five monitoring well locations including: shallow aquifer zone monitoring well location 01GGM33 and intermediate aquifer zone monitoring wells 01GI32, 01GI41, 01GI43, and 01GI59.

Table 3-2 shows the historical summary of the concentrations of benzene detected in the groundwater samples from OU 1 monitoring wells. Benzene has not been detected (therefore there is no trend) in the groundwater samples from four of the OU 1 monitoring well locations including: upgradient monitoring well 01UPGW1, shallow aquifer zone monitoring wells 01GS57, 01GS71, and 01GS72. No trend is apparent for benzene at intermediate aquifer zone monitoring well locations including: 01GI32, 01GI44, 01GI46, and 01GI65. A decreasing tend is apparent for benzene at shallow aquifer zone monitoring well locations including: 01GS64 and 01GS62, and intermediate aquifer zone monitoring wells 01GI36,

TABLE 3-1

SUMMARY OF CHLOROBENZENE CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL																
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01UPGW1	01GS57	01GS62	01GS71	01GS72	01GS73	01GI74
Aug-00	NS	4.7	3.5	ND	95.0	10.0	77.0	18.0	51.0	39.0	ND	ND	15.0	ND	ND	Wells Installed in 2010	
May-01	10.00	22.6	4.3	ND	49.6	13.3	37.0	34.0	72.0	41.0	ND	ND	19.0	ND	ND		
Nov-01	9.00	7.7	ND	ND	47.4	11.5	36.0	36.0	72.0	37.0	ND	ND	23.0	ND	ND		
Apr-02	8.00	19.0	5.0	ND	68.0	12.0	27.0	29.0	66.0	26.0	ND	ND	20.0	ND	ND		
Oct-02	22.00	52.0	2.5	ND	48.0	14.0	2.0	35.0	84.0	27.0	ND	ND	25.0	ND	ND		
Jun-03	89.00	70.1	4.8	ND	86.6	12.8	41.0	31.0	88.0	44.0	ND	ND	29.0	ND	ND		
Nov-03	31.00	66.0	7.0	ND	**100.0**	15.0	58.0	36.0	98.0	38.0	ND	ND	40.0	ND	ND		
May-10	16.50	76.4	10.7	ND	**173.0**	27.3	48.5	48.7	91.1	37.0	ND	ND	0.4	ND	ND	ND	15.10
Nov-10	13.30	**109.0**	9.8	ND	**124.0**	24.1	NS	18.5	**109.0**	37.4	ND	ND	ND	ND	ND	ND	20.50
MANN -KENDALL TREND	No Trend	Increasing	Increasing	No Trend	Increasing	Increasing	No Trend	No Trend	Increasing	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend		

Notes:
ND = not detected
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 100 µg/L per Chapter 62-777, Florida Administrative Code

TABLE 3-2

SUMMARY OF BENZENE CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL																
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01UPGW1	01GS57	01GS62	01GS71	01GS72	01GS73	01GI74
Aug-00	**19.00**	0.30	0.82	0.85	**57.00**	**6.60**	**4.30**	**2.40**	**9.70**	**13.00**		0.30	**19.00**	0.30	0.30		
May-01	**21.00**	0.75	0.86	0.79	**33.10**	**7.70**	0.81	**3.90**	**10.70**	**11.70**		0.30	**21.00**	0.30	0.30		
Nov-01	**19.20**	0.30	0.67	0.30	**32.70**	**5.60**	**1.20**	**4.20**	**8.90**	**10.00**	0.30	0.30	**19.20**	0.30	0.30		
Apr-02	**18.00**	0.30	0.30	0.30	**18.00**	**5.20**	0.50	**3.00**	**9.00**	**8.30**	0.30	0.30	**18.00**	0.30	0.30	Wells Installed in	
Oct-02	**17.00**	**5.00**	0.88	0.59	**22.00**	**7.20**	0.50	**5.10**	**15.00**	**11.00**	0.30	0.30	**17.00**	0.30	0.30	2010	
Jun-03	**14.00**	**1.00**	0.78	0.30	**27.70**	**5.00**	**6.30**	**3.30**	**6.70**	**14.40**	0.30	0.30	**14.00**	0.30	0.30		
Nov-03	**15.00**	0.80	**1.00**	0.30	**31.00**	**6.00**	**3.00**	**4.00**	**5.00**	**14.00**		0.30	**16.00**	0.30	0.30		
Dec-05	**16.00**	**8.00**			**55.00**	**7.00**	0.90	**2.00**	**9.00**	**12.00**			**16.00**				
May-10	**1.45**	**2.62**	0.30	0.30	**10.90**	**4.87**	**6.58**	**3.36**	**3.08**	**11.70**	0.30	0.30	0.30	0.30	0.30	0.30	**1.22**
Nov-10	**2.31**	**3.23**	0.30	0.30	**13.40**	**4.08**		**1.36**	**3.62**	**12.60**		0.30	0.30	0.30	0.30	0.30	0.90
MANN -KENDALL TREND	Decreasing	Increasing	No Trend	Decreasing	Decreasing	Decreasing	No Trend	No Trend	Decreasing	No Trend	No Trend	No Trend	Decreasing	No Trend	No Trend		

Notes:
NS = not sampled
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 1 µg/L per Chapter 62-777, Florida Administrative Code

01GI41, 01GI43, and 01GI59. An increasing tend is apparent for benzene at shallow aquifer zone monitoring well location 01GM33.

Table 3-3 shows the historical summary of the concentrations of vinyl chloride detected in the groundwater samples from OU 1 monitoring wells. Vinyl chloride has not been detected (therefore there is no trend) in the groundwater samples from four of the OU 1 monitoring well locations including: shallow aquifer zone monitoring wells 01GS57, 01GS62, 01GS71, and 01GS72. No trend is apparent for vinyl chloride at seven monitoring well locations including: 01UPGW1, shallow aquifer zone monitoring wells 01GS64, 01GGM33, and intermediate aquifer zone monitoring wells 01GI32, 01GI44, 01GI46, and 01GI65. A decreasing trend is apparent for vinyl chloride at four intermediate aquifer zone monitoring well locations including: 01GI36, 01GI41, 01GI43, and 01GI59.

Table 3-4 shows the historical summary of the concentrations of aluminum detected in the groundwater samples from OU 1 monitoring wells. Aluminum has not been detected (therefore there is no trend) or has had a low frequency of detection in the groundwater samples from nine of the OU 1 monitoring well locations including: shallow aquifer zone monitoring wells 01GS57, and 01GS62, 01GS71, and 01GS72 and intermediate aquifer zone monitoring wells 01GI32, 01GI36, 01GI41, 01GI43, 01GI44, 01GI46, and 01GI65. An increasing trend is apparent for aluminum at five monitoring well locations including: shallow aquifer zone monitoring wells 01GS64 and 01GGM33 intermediate aquifer zone monitoring wells 01GI36, 01GI41, 01GI43, and 01GI59.

Table 3-5 shows the historical summary of the concentrations of iron detected in the groundwater samples from OU 1 monitoring wells. No trend is apparent for iron at four monitoring well locations including: upgradient monitoring well 01UPGW1, shallow aquifer zone monitoring well 01GS64, and intermediate aquifer zone monitoring wells 01GI32, and 01GI41. A decreasing trend is apparent for iron at five intermediate aquifer zone monitoring well locations including: 01GI36, 01GI41, 01GI44, 01GI46, and 01GI65. A increasing trend is apparent for iron at six monitoring well locations including: shallow aquifer zone monitoring wells 01GGM33, 01GS57, 01GS71, and 01GS72 and intermediate aquifer zone monitoring wells: 01GI36, 01GI43, 01GI44, 01GI46, and 01GI65.

Table 3-6 shows the historical summary of the concentrations of manganese detected in the groundwater samples from OU 1 monitoring wells. No trend is apparent for manganese at five monitoring well locations including: shallow aquifer zone monitoring well 01GS64, and intermediate aquifer zone monitoring wells 01GI32, 01GI36, 01GI41, and 01GI46. A decreasing trend is apparent for manganese at three monitoring well locations including: shallow aquifer zone monitoring well 01GS57, and intermediate aquifer zone monitoring wells: 01GI44, and 01GI65. An increasing trend is apparent for manganese at six

TABLE 3-3

SUMMARY OF VINYL CHLORIDE CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL																
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01UPGW1	01GS57	01GS62	01GS71	01GS72	01GS73	01GI74
Aug-00	NS	ND	**1.50**	**3.90**	**3.30**	**2.90**	4.40	**19.00**	**7.70**	**4.10**		ND	1.10	ND	ND		
May-01	**1.40**	ND	**1.90**	**3.60**	**4.20**	**1.70**	ND	**23.20**	**6.80**	**4.40**		ND	ND	ND	ND		
Nov-01	**1.90**	ND	**1.20**	**3.00**	**6.80**	**2.00**	0.96	**25.60**	**3.60**	**3.40**	ND	ND	0.94	ND	ND		
Apr-02	0.50	ND	ND	ND	**2.20**	**1.90**	ND	**13.00**	**3.50**	**3.50**	ND	ND	ND	ND	ND	Wells Installed in 2010	
Oct-02	0.50	ND	0.70	**2.20**	**1.40**	**3.40**	ND	**42.00**	**1.60**	**5.50**	ND	ND	ND	ND	ND		
Jun-03	0.50	ND	ND	**0.30**	0.70	**1.70**	0.63	**27.10**	0.59	**2.00**	ND	ND	ND	ND	ND		
Nov-03	0.50	ND	**1.00**	**1.00**	ND	ND	**1.00**	**34.00**	ND	**4.00**		ND	ND	ND	ND		
Dec-05	0.50	NA	**2.00**	**2.00**	0.40	ND		**5.00**	**3.00**	**3.00**							
May-10	**1.00**	0.70	**2.06**	**1.00**	ND	**1.28**	**1.21**	**11.30**	**1.00**	**4.83**	**1.00**	0.20	0.20	0.20	0.20	0.20	**9.15**
Nov-10	0.50	0.56	0.71	0.37	ND	0.68		**3.44**	0.66	**1.00**		ND	ND	ND	ND	ND	**3.77**
MANN -KENDALL TREND	No Trend	No Trend	No Trend	Decreasing	Decreasing	Decreasing	No Trend	No Trend	Decreasing	No Trend	No Trend	No Trend	Decreasing	No Trend	No Trend		

Notes:
ND = not detected
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 1 µg/L per Chapter 62-777, Florida Administrative Code

TABLE 3-4

SUMMARY OF ALUMINUM CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL															
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01GS57	01GS62	01GS71	01GS72	01GS73	01GI74
Aug-00	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	Wells Installed in 2010	
May-01	ND	ND	ND	**276.0**	91.3	ND	ND	ND	ND	79.2	180.0	ND	139.0	85.9		
Nov-01	22.6	ND	ND	113.0	ND	28.6	ND	ND	ND	118.0	110.0	ND	**316.0**	ND		
Apr-02	ND	ND	ND	ND	287.0	ND	ND	ND	ND	ND	ND	ND	**689.0**	ND		
Oct-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Jun-03	64	60	83	142	54	34	18	41	64	67	209	34	**4400**	131		
Nov-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	**2,900**	ND		
Dec-05	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA		
May-10	164	68	36	100	100	103	65	65	75	94	**393**	**506**	**1200**	188	**8260**	**202**
Nov-10	**823**	59	50	94	**268**	48	NS	50	51	61	**332**	**408**	**478**	**536**	**15100**	**266**
MANN -KENDALL TREND	Increasing	Increasing	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	Increasing	No Trend	No Trend	No Trend	Increasing	Increasing		

Notes:
NA = not analyzed
ND = not detected
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 200 µg/L per Chapter 62-777, Florida Administrative Code

TABLE 3-5

SUMMARY OF IRON CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL																
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01UPGW1	01GS57	01GS62	01GS71	01GS72	01GS73	01GI74
Aug-00	NS	**8500.0**	**41300.0**	**2200.0**	**37000.0**	**15000.0**	**100000.0**	**37000.0**	**19000.0**	**31000.0**	ND	160.0		ND	100.0		
May-01	**39100.0**	**14500.0**	**22000.0**	**1540.0**	**34900.0**	**15800.0**	**53700.0**	**43000.0**	**19000.0**	**33700.0**	64.7	192.0		85.6	200.0		
Nov-01	**46700.0**	**15200.0**	**22600.0**	**1550.0**	**39600.0**	**17700.0**	**55900.0**	**49200.0**	**20600.0**	**30500.0**	43.0	225.0		167.0	**501.0**		
Apr-02	**34100.0**	**1700.0**	**36000.0**	**1150.0**	**21300.0**	**15100.0**	**41100.0**	**41000.0**	**18600.0**	**29100.0**	ND	ND		293.0	12.2	Wells Installed in 2010	
Oct-02	**24700.0**	**25400.0**	**33300.0**	**777.0**	**21300.0**	**14700.0**	**34200.0**	**44600.0**	**23300.0**	**29400.0**	ND	170.0		246.0	**342.0**		
Jun-03	**62800.0**	**47200.0**	**36700.0**	**452.0**	**29600.0**	**16400.0**	**36600.0**	**43100.0**	**32700.0**	**30300.0**	21.6	201.0		**1720.0**	**528.0**		
Nov-03	**98500.0**	**52700.0**	**31400.0**	**947.0**	**24500.0**	**14300.0**	**57300.0**	**40200.0**	**42200.0**	**22500.0**	ND	182.0		**1500.0**	**915.0**		
Dec-05	**1410.0**		**39200.0**	**1840.0**	**39300.0**	**12800.0**	**28700.0**	**36400.0**	**44600.0**	**22500.0**							
May-10	**64400.0**	**35700.0**	**37200.0**	234.0	**35800.0**	**8130.0**	**25300.0**	**17500.0**	**43600.0**	**18400.0**	**2140.0**	228.0	259.0	**718.0**	**3390.0**	**9630.0**	**12600.0**
Nov-10	**68700.0**	**44180.0**	**28300.0**	**827.0**	**44900.0**	**8110.0**	NS	**19500.0**	**41200.0**	**18600.0**	NS	212.0	**369.0**	**371.0**	233.0	**21900.0**	**25800.0**
MANN -KENDALL TREND	No Trend	Increasing	No Trend	Decreasing	No Trend	Decreasing	Decreasing	Decreasing	Increasing	Decreasing	No Trend	Increasing	Increasing	Increasing	Increasing		

Notes:
ND = analyte was not detected above instrument detection limits
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 3000 µg/L per Chapter 62-777, Florida Administrative Code

TABLE 3-6

SUMMARY OF MANGANESE CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL															
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01GS57	01GS62	01GS71	01GS72	01GS73	01GI74
Aug-00	NS	**88.0**	**501.0**	24.0	**260.0**	23.0	**550.0**	**270.0**	**230.0**	**190.0**	10.0	ND	4.5	13.0	Wells Installed in 2010	
Apr-02	**401.0**	**205.0**	**334.0**	26.3	**188.0**	26.6	**295.0**	**294.0**	**238.0**	**186.0**	13.2	1.3	5.1	ND		
Jun-03	**1300.0**	**351.0**	**372.0**	40.0	**234.0**	29.7	**345.0**	**323.0**	**330.0**	**202.0**	12.3	2.5	10.9	17.5		
Nov-03	**1640.0**	**351.0**	**323.0**	25.9	**211.0**	29.3	**359.0**	**285.0**	**395.0**	**151.0**	8.9	2.5	8.8	19.8		
Dec-05	**1410.0**	**330.0**	**522.0**	NS	**304.0**	NS	NS	**1410.0**	**415.0**	**141.0**	NS	NS	NS	NS		
May-10	**1450.0**	**257.0**	**395.0**	**62.0**	**271.0**	42.9	**229.0**	**169.0**	**472.0**	**129.0**	5.5	46.0	**57.8**	**94.8**	**102.0**	**152.0**
Nov-10	**1140.0**	**300.0**	**350.0**	40.2	**314.0**	44.9	NS	**173.0**	**340.0**	**111.0**	3.9	48.9	29.1	**80.7**	**111.0**	**169.0**
MANN -KENDALL TREND	Increasing	Increasing	No Trend	No Trend	No Trend	Increasing	Decreasing	No Trend	Increasing	Decreasing	Decreasing	No Trend	Increasing	Increasing		

Notes:
ND = analyte was not detected above instrument detection limits
NS = not sampled
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 50 µg/L per Chapter 62-777, Florida Administrative Code

monitoring well locations including: shallow aquifer zone monitoring wells 01GS64, 01GGM33, 01GS71, and 01GS72, and intermediate aquifer zone monitoring wells 01GI43 and 01GI59.

Table 3-7 shows the historical summary of the concentrations of cadmium detected in the groundwater samples from OU 1 monitoring wells. Cadmium has not been detected (therefore there is no trend) or has had a low frequency of detection in the groundwater samples from 13 of the OU 1 monitoring well locations including: shallow aquifer zone monitoring wells 01GGM33, 01GS57, 01GS62, 01GS71, and 01GS72 and intermediate aquifer zone monitoring wells 01GI32, 01GI36, 01GI41, 01GI43, 01GI44, 01GI46, 01GI59, and 01GI65. No trend is apparent for cadmium at one shallow aquifer zone monitoring well, 01GS64.

Table 3-8 shows the historical summary of the concentrations of total xylenes detected in the groundwater samples from OU 1 monitoring wells. Total xylenes has not been detected (therefore there is no trend) or has had a low frequency of detection in the groundwater samples from 11 of the OU 1 monitoring well locations including: upgradient monitoring well 01UPGW1, shallow aquifer zone monitoring wells 01GS64, 01GGM33, 01GS57, 01GS71, and 01GS72 and intermediate aquifer zone monitoring wells 01GI32, 01GI36, 01GI43, 01GI44, and 01GI46. A decreasing trend is apparent for total xylenes at three monitoring well locations including: shallow aquifer zone monitoring wells 01GS62, and intermediate aquifer zone monitoring wells 01GI41 and 01GI59.

Table 3-9 shows the historical summary of the concentrations of naphthalene detected in the groundwater samples from OU 1 monitoring wells. Naphthalene has not been detected (therefore there is no trend) or has had a low frequency of detection in the groundwater samples from 14 of the OU 1 monitoring well locations including: shallow aquifer zone monitoring wells 01GS64, 01GGM33, 01GS57, 01GS62, 01GS71, and 01GS72 and intermediate aquifer zone monitoring wells 01GI32, 01GI36, 01GI41, 01GI43, 01GI44, 01GI46, and 01GI59. A decreasing trend is apparent for naphthalene at one intermediate aquifer zone monitoring well, 01GI65.

Table 3-10 shows the historical summary of the concentrations of nickel detected in the groundwater samples from OU 1 monitoring wells. Nickel has not been detected (therefore there is no trend) or has had a low frequency of detection in the groundwater samples from 14 of the OU 1 monitoring well locations including: upgradient monitoring well 01UPGW1, shallow aquifer zone monitoring wells 01GGM33, 01GS57, 01GS62, 01GS71, and 01GS72 and intermediate aquifer zone monitoring wells 01GI32, 01GI36, 01GI41, 01GI43, 01GI44, 01GI46, 01GI59, and 01GI65. An increasing trend is apparent for nickel at one shallow aquifer zone monitoring well, 01GS64.

TABLE 3-7

SUMMARY OF CADMIUM CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL															
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01GS57	01GS62	01GS71	01GS72	01GS73	01GS74
Aug-00	NS	6.00	3.50	6.20	5.80	3.30	3.50	ND	5.50	2.80	8.20	6.20	6.20	6.50	Wells Installed in 2010	
May-01	**46.90**	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.33	ND	1.20	0.36		
Nov-01	3.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Apr-02	2.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Oct-02	**30.00**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Jun-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.51	ND		
Nov-03	4.80	ND	ND	ND	ND	ND	0.62	0.47	ND	ND	ND	ND	ND	ND		
May-10	2.00	0.25	ND	0.57	ND	0.25	0.25	0.34	0.30	0.28	0.72	0.28	0.63	0.94	0.32	0.66
Nov-10	**11.00**	ND	ND	ND	ND	ND	NS	0.50	ND	ND	2.28	ND	ND	ND	ND	ND
MANN -KENDALL TREND	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend		

Notes:
ND = analyte was not detected above instrument detection limits
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 5 µg/L per Chapter 62-777, Florida Administrative Code

TABLE 3-8

SUMMARY OF TOTAL XYLENE CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL																
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01UPGW1	01GS57	01GS62	01GS71	01GS72	01GS73	01GS74
Aug-00		ND	ND	ND	13.00	ND	ND	ND	4.80	ND		ND	**65.00**	ND	ND	Wells Installed in 2010	
May-01	ND	ND	ND	ND	**46.10**	ND	ND	ND	3.40	ND		ND	**73.80**	ND	ND		
Nov-01	ND	ND	ND	ND	**52.40**	ND	ND	ND	2.50	ND	ND	ND	**69.10**	ND	ND		
Apr-02	ND	ND	ND	ND	**40.00**	ND	ND	ND	2.40	ND	ND	ND	**62.00**	ND	ND		
Oct-02	ND	ND	ND	ND	**29.00**	ND	ND	ND	1.70	3.00	ND	ND	**65.00**	ND	ND		
Jun-03	ND	ND	ND	ND	**27.20**	ND	ND	ND	ND	3.30	ND	ND	**48.40**	ND	ND		
Nov-03	ND	ND	ND	ND	**28.00**	ND	ND	ND	ND	12.00		ND	**52.00**	ND	ND		
May-10	ND	ND	ND	ND	1.14	ND	ND	ND	ND	6.51	ND	ND	ND	ND	ND	ND	ND
Nov-10	ND	6.33	ND	ND	2.79	ND	NS	ND	ND	13.70	NS	ND	ND	ND	ND	ND	ND
MANN -KENDALL TREND	No Trend	No Trend	No Trend	No Trend	Decreasing	No Trend	No Trend	No Trend	Decreasing	Increasing	No Trend	No Trend	Decreasing	No Trend	No Trend		

Notes:
ND = analyte was not detected above instrument detection limits
NS = not sampled
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 20 µg/L per Chapter 62-777, Florida Administrative Code

TABLE 3-9

SUMMARY OF NAPHTHALENE CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL																
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01UPGW1	01GS57	01GS62	01GS71	01GS72	01GS73	01GS74
Aug-00		ND	ND	ND	12.00	0.59	ND	ND	1.20	2.10		ND	ND	ND	ND	Wells Installed in 2010	
May-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND		
Nov-01	ND	ND	ND	ND	4.20	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Apr-02	ND	ND	ND	ND	3.70	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Oct-02	ND	ND	ND	ND	2.40	ND	ND	ND	2.10	ND	ND	ND	1.2 J	ND	ND		
Jun-03	5.80	ND	ND	ND	5.10	ND	ND	ND	ND	0.93	1.00	ND	ND	ND	ND		
Nov-03	**14.00**	ND	ND	ND	6.00	ND	ND	ND	ND	ND		ND	7.00	ND	ND		
May-10	ND	ND	ND	ND	7.90	ND	ND	ND	ND	ND	1.00	ND	ND	ND	ND	ND	ND
Nov-10	ND	ND	ND	ND	7.43	ND	NS	ND	ND	0.29	NS	ND	ND	ND	ND	ND	ND
MANN -KENDALL TREND	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	Decreasing	No Trend	No Trend	No Trend	No Trend	No Trend		

Notes:
ND = analyte was not detected above instrument detection limits
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 14 µg/L per Chapter 62-777, Florida Administrative Code

TABLE 3-10

SUMMARY OF NICKEL CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL																
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01UPGW1	01GS57	01GS62	01GS71	01GS72	01GS73	01GI74
Aug-00	NS	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	Wells Installed in 2010	
May-01	13.80	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	1.60	ND	ND		
Nov-01	5.60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.20	ND	ND		
Apr-02	5.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	1.60	ND	ND	ND	ND		
Oct-02	13.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Jun-03	24.50	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Nov-03	22.30	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND		
May-10	45.10	ND	ND	ND	ND	ND	ND	ND	ND	0.84	9.83	1.13	0.85	2.02	1.23	3.16	1.74
Nov-10	58.50	ND	ND	ND	ND	ND	NS	ND	ND	ND	NS	ND	ND	0.88	ND	5.94	ND
MANN -KENDALL TREND	Increasing	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend		

Notes:
ND = analyte was not detected above instrument detection limits
NS = not sampled
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 100 µg/L per Chapter 62-777, Florida Administrative Code

Table 3-11 shows the historical summary of the concentrations of 1,1,2,2-PCA for the groundwater samples from OU 1 monitoring wells. 1,1,2,2-PCA has not been detected (therefore there is no trend) in the groundwater samples collected from the monitoring wells in the LTM program.

Table 3-12 shows the historical summary of the concentrations of chromium detected in the groundwater samples from OU 1 monitoring wells. Chromium has not been detected (therefore there is no trend) or has had a low frequency of detection in the groundwater samples from 12 of the OU 1 monitoring well locations including: upgradient monitoring well 01UPGW1, shallow aquifer zone monitoring wells 01GS64, 01GS57, 01GS62, and 01GS72 and intermediate aquifer zone monitoring wells 01GI32, 01GI36, 01GI43, 01GI44, 01GI46, 01GI59, and 01GI65. A decreasing trend is apparent for chromium at three monitoring well locations including: shallow aquifer zone monitoring wells 01GGM33 and 01GS71, and intermediate aquifer zone monitoring well 01GI41.

TABLE 3-11

SUMMARY OF 1,1,2,2-TETRACHLOROETHANE CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL																
	01GS64	01GGM33	01GI32	01GI36	01GI41	01GI43	01GI44	01GI46	01GI59	01GI65	01UPGW1	01GS57	01GS62	01GS71	01GS72	01GS73	01GS74
Aug-00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND	Wells Installed in 2010	
May-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND		
Nov-01	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Apr-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Oct-02	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Jun-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Nov-03	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		ND	ND	ND	ND		
May-10	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Nov-10	ND	ND	ND	ND	ND	ND	NS	ND	ND	ND	NS	ND	ND	ND	ND	ND	ND
MANN-KENDALL TREND	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend		

Notes:
ND = analyte was not detected above instrument detection limits
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 0.2 µg/L per Chapter 62-777, Florida Administrative Code

TABLE 3-12

SUMMARY OF CHROMIUM CONCENTRATIONS IN GROUNDWATER
OPERABLE UNIT 1
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA

Sampling Period	MONITORING WELL																
	01GS64	**01GGM33**	**01GI32**	**01GI36**	**01GI41**	**01GI43**	**01GI44**	**01GI46**	**01GI59**	**01GI65**	**01UPGW1**	**01GS57**	**01GS62**	**01GS71**	**01GS72**	**01GS73**	**01GI74**
Aug-00	NS	ND	0.44	ND	3.20	ND	ND	0.30	ND	ND		ND	ND	ND	ND	Wells Installed in 2010	
May-01	ND	ND	ND	ND	ND	ND	0.79	1.40	ND	ND		0.44	ND	0.49	2.50		
Nov-01	0.41	ND	ND	ND	ND	0.69	ND	ND	ND	1.10	0.58	ND	ND	ND	ND		
Apr-02	ND	ND	ND	ND	4.00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Oct-02	ND	ND	ND	ND	3.60	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND		
Jun-03	ND	ND	ND	ND	2.41	ND	ND	ND	ND	ND	ND	ND	ND	2.99	ND		
Nov-03	ND	ND	ND	ND	1.30	ND	ND	ND	ND	ND		ND	ND	1.90	ND		
May-10	1.51	1.01	0.64	ND	1.30	0.89	0.79	1.15	0.72	1.01	6.61	ND	0.61	1.99	ND	6.01	0.74
Nov-10	2.10	0.86	0.55	ND	1.82	0.68	NS	0.86		0.92	NS	ND	ND	1.17	ND	11.10	1.41
MANN -KENDALL TREND	No Trend	Decreasing	No Trend	No Trend	Decreasing	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	Decreasing	No Trend		

Notes:
ND = analyte was not detected above instrument detection limits
µg/L = micrograms per liter
Bold values exceed the Groundwater Cleanup Target Level of 100 µg/L per Chapter 62-777, Florida Administrative Code

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 SURFACE WATER

The concentrations of total iron at surface water sample locations 01SW01 and 01SW02 at Wetland 3 exceeded the freshwater background concentration of 4,720 μg/L in the samples collected in May and November 2010. The concentrations of total iron at the POC surface water sample location 01SW03 at Wetland 4D was less than the estuarine background concentration of 5,862 μg/L in the samples collected in May and November 2010. The concentrations of total iron for the May and November 2010 sampling events at surface water sample locations 01SW01 and 01SW02 at Wetland 3 exceeded the Class III surface water quality criteria of 1,000 μg/L per Chapter 62-302, F.A.C., and surface water sample location 01SW03 exceeded the Class III Marine surface water quality criteria of 300 μg/L per Chapter 62-302, F.A.C.

Because the source for total iron in surface water that discharges to Wetland 3 is a seep discharging from the former OU 1 landfill, it is recommended that the surface water sample locations 01SW01, 01SW02, and 01SW03 should continue to be monitored. The semiannual sampling schedule should be preserved. The additional monitoring would help ensure that potential sources of known and unknown contaminants are encountered before they are dispersed.

Additionally, according to the SAP (Tetra Tech, 2010), the following decision rules have been addressed:

Decision Rule #4:
Mann-Kendall trend needs at least four data sets; therefore, only one surface water sample location 01SW02 was used to run the Mann-Kendall (test at 10 percent significance). For this sampling location the evaluation of the data indicates that the iron concentration trend is decreasing. Surface water location 01SW03 sampling has only been sampled in March and November 2010; therefore, there is no data to compare against. Lastly, 01SW01 sampling location, which was approximately 250 feet south of the previous 01W01 location, when compared with the previous data from the nearby location, is within the lower range. This rule was established to protect against the potential that iron concentrations are increasing and potentially will increase at the surface water POC, regardless of whether the concentrations are greater than or less than the surface water CTL. Even if iron concentrations are less than the applicable criterion, an increasing trend could indicate that the concentrations will eventually become greater than the criterion.

Decision Rule #5:

The iron concentration at the surface water sampling location located immediately upgradient of Bayou Grande does not exceed the estuarine background threshold of 5,862 µg/L. Iron concentrations for 01SW03 ranged from 345 µg/L (May, 2010) to 427 µg/L (November, 2010). This rule was established to comply with 62-780 F.A.C. and is designed to protect against a future unacceptable site condition with respect to iron concentrations.

Decision Rules #6:

Iron concentration is less than the iron surface water CTL (1,000 iron µg/L) at one surface water location (01SW03) for two consecutive semi-annual rounds of sampling. This rule was established to comply with 62-780 F.A.C.

4.2 GROUNDWATER

Three decision rules were presented in the SAP (Tetra Tech, 2010) for the groundwater data.

Decision Rule #1:

The Mann-Kendall test at 10 percent significance level indicated that the concentration of benzene, iron, manganese, nickel, total xylenes, chromium, aluminum and/or chlorobenzene had significant upward trends in 12 of 17 wells sampled. Mann-Kendall test at 10 percent significance level indicated downward or no trend for the following parameters: vinyl chloride, cadmium, naphthalene, and 1,1,2,2-PCA.

Decision Rules #2:

Out of the four COCs mentioned in the ROD, only nickel had concentrations below the Performance Criteria in groundwater for two or more consecutive rounds of the semiannual sampling, but the concentration trend is increasing (as determined by a Mann-Kendall trend test at 10 percent significance), in one well (01GS64). Therefore, monitoring for nickel should only continue in monitoring well 01GS64. This rule was established to comply with the ROD.

Decision Rules #3:

Four (naphthalene, 1,1,2,2-PCA, xylenes, and chromium) of the eight parameters included in the expanded contaminant list in the Proposed Plan had concentrations below its GCTL for two consecutive semi-annual sampling rounds. However, of those four parameters below its GCTL, two parameters (chromium and xylenes) had a significant upward trend (as determined by a Mann-Kendall trend test at 10 percent significance) in one well each. It should be noted that the upgradient well (01UPGW1) was the monitoring well that had a significant upward trend for chromium. This rule was established to comply with 62-780.690 F.A.C., Contaminated Site Cleanup Criteria – Natural Attenuation and Monitoring.

The overall behavior of the contaminant plumes was evaluated in light of the changes in the number of monitoring wells with exceedances, the contaminant concentration trends in wells with exceedances, and the changes in contaminant concentrations in individual monitoring wells with time.

Based on the analytical results for the 2010 sampling events, 1,1,2,2-PCA, xylenes, chromium, and nickel were detected at concentrations below their Florida GCTLs.

Comparison of the 2010 groundwater sampling data with previous groundwater sampling data suggests that the COC concentration trends observed in 2010 are consistent with the long-term concentration trends for most of the monitoring well locations.

One monitoring well in the area of study was destroyed (01GI44). Analytical results from previous sampling events indicate this well location had exceedances of GCTLs for iron, manganese, vinyl chloride, and benzene.

Based on the results of the groundwater sampling conducted during 2010, it is recommended that LTM of the groundwater at the facility be continued using the analysis specified in Table 4-1. The sample analysis changes are triggered by comparison of the current and historical analysis as specified by the SAP (Tetra Tech, 2010). As indicated in Table 4-1, LTM groundwater sample collection and analysis for all COCs should continue at monitoring wells 01UPGW1, 01GS73, and 01GI74. In addition, monitoring well 01GI44 which was were apparently compromised during 2010 should be further evaluated and repaired or replaced if necessary.

TABLE 4-1

PROPOSED GROUNDWATER SAMPLING
OPERABLE UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Monitoring Well	Proposed Analysis							Changed Proposed	Reason
	Cadmium	Iron	Manganese	Aluminum	Vinyl Chloride	Chlorobenzene	Benzene		
01GS64	x	x	x	x			x	No sampling for 1,1,2,2-PCA, xylenes, chromium, vinyl chloride, naphthalene, chlorobenzene.	Below GCTL and no significant upward trend
01GGM33		x	x	x		x	x	No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, vinyl chloride, naphthalene.	Below GCTL and no significant upward trend
01GI32		x	x		x	x		No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, naphthalene, benzene and aluminium.	Below GCTL and no significant upward trend
01GI36		x						No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, vinyl chloride, naphthalene, aluminum, manganese, chlorobenzene and benzene. Only for iron	Below GCTL and no significant upward trend
01GI41		x	x	x		x	x	No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, vinyl chloride, naphthalene	Below GCTL and no significant upward trend
01GI43		x	x		x	x	x	No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, naphthalene, aluminum.	Below GCTL and no significant upward trend
01GI44		x	x		x		x	No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, naphthalene, aluminum and chlorobenzene.	Below GCTL and no significant upward trend
01GI46		x	x		x		x	No sampling for nickel, 1,1,2,2-PCA, chromium, cadmium, naphthalene, chlorobenzene, aluminum.	Below GCTL and no significant upward trend
01GI59		x	x	x		x	x	No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, vinyl chloride, naphthalene	Below GCTL and no significant upward trend
01GI65		x	x		x		x	No sampling for nickel, 1,1,2,2-PCA, chromium, cadmium, naphthalene, aluminum and chlorobenzene	Below GCTL and no significant upward trend
01UPGW1	x	x	x	x	x	x	x	Used as upgradient well	
01GS57		x		x				No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, vinyl chloride, naphthalene, manganese, chlorobenzene and benzene.	Below GCTL and no significant upward trend
01GS62		x		x				No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, vinyl chloride, naphthalene, manganese, chlorobenzene and benzene.	Below GCTL and no significant upward trend
01GS71		x	x	x				No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, vinyl chloride, naphthalene, chlorobenzene and benzene.	Below GCTL and no significant upward trend
01GS72		x	x	x				No sampling for nickel, 1,1,2,2-PCA, xylenes, chromium, cadmium, vinyl chloride, naphthalene, chlorobenzene and benzene.	Below GCTL and no significant upward trend
01GS73	x	x	x	x	x	x	x	Not enough data to calculate trends.	
01GS74	x	x	x	x	x	x	x		

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APPENDIX A

FIELD SAMPLING LOGS AND DATA SHEETS
(provided on the enclosed CD)

DEP-SOP-001/01
Form FD 9000-24

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GI65**	SAMPLE ID: **01GW01PZ8-0510**	DATE: **05** / **10** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **27.2** feet to **37.2** feet	STATIC DEPTH TO WATER (feet): **7.59**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.75 Liters **(0.005 L/Ft. x 50 Ft.) + 0.5 L = 0.75 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **37.2**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **37.2**	PURGING INITIATED AT: **1240**	PURGING ENDED AT: **1310**	TOTAL VOLUME PURGED (Liters): **3.5**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1250	**1.5**	**1.5**	**150**	**7.85**	**5.41**	**21.97**	**264**	**4.88**	**1.94**	**Clear**	**NONE**
1255	**0.5**	**2.0**	**100**	**7.75**	**5.42**	**21.95**	**261**	**4.64**	**1.87**	**Clear**	**NONE**
1305	**1.0**	**3.0**	**100**	**7.64**	**5.47**	**21.99**	**260**	**4.50**	**1.87**	**Clear**	**NONE**
1310	**0.5**	**3.5**	**100**	**7.64**	**5.46**	**22.03**	**260**	**4.51**	**1.79**	**Clear**	**NONE**
1315	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1315**	SAMPLING ENDED AT: **1325**
PUMP OR TUBING DEPTH IN WELL (feet):	SAMPLE PUMP FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) Filtration Equipment Type: FILTER SIZE: _____ µm	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP
	3	CG	40 Ml	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01PZ8**	SAMPLE ID: **01GW01PZ8-0510**	DATE: **05** / **10** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: feet to feet ?	STATIC DEPTH TO WATER (feet): **5.67**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

0.68 Liters **(0.005 L/Ft. x 35 Ft.) + 0.5 L = 0.68 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT: **1420**	PURGING ENDED AT: **1445**	TOTAL VOLUME PURGED (Liters): **3**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1430	**1.5**	**1.5**	**150**	**5.72**	**6.00**	**20.51**	**195**	**4.74**	**20.1**	**Clear**	**NONE**
1435	**0.5**	**2.0**	**100**	**5.71**	**6.02**	**20.78**	**195**	**4.67**	**8.82**	**Clear**	**NONE**
1440	**0.5**	**2.5**	**100**	**5.71**	**6.03**	**20.75**	**196**	**4.68**	**6.49**	**Clear**	**NONE**
1445	**0.5**	**3.0**	**100**	**5.71**	**6.04**	**20.76**	**197**	**4.66**	**5.02**	**Clear**	**NONE**
1450	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **11450**	SAMPLING ENDED AT: **1455**
PUMP OR TUBING DEPTH IN WELL (feet):	SAMPLE PUMP FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type:	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION				
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – IRON	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01PZ7B**	SAMPLE ID: **01GW01PZ7B-0510**	DATE: **05** / **10** / **2010**

PURGING DATA

WELL DIAMETER (inches): **1**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL ? DEPTH: **35** feet to **40** feet	STATIC DEPTH TO WATER (feet): **2.34**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
0.70 Liters **(0.005 L/Ft. x 45 Ft.) + 0.5 L = 0.70 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **36.8**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **36.8**	PURGING INITIATED AT: **1555**	PURGING ENDED AT: **1715**	TOTAL VOLUME PURGED (Liters): **8.5**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1605	**1.5**	**1.5**	**150**	**3.24**	**5.07**	**22.66**	**83**	**4.57**	**141**	**Turbid**	**NONE**
1610	**0.5**	**2.0**	**100**	**3.17**	**5.08**	**22.84**	**83**	**4.58**	**128**	**Turbid**	**NONE**
1615	**0.5**	**2.5**	**100**	**3.67**	**5.05**	**22.73**	**83**	**4.43**	**124**	**Turbid**	**NONE**
1625	**1.0**	**3.5**	**100**	**3.51**	**5.02**	**22.50**	**83**	**4.31**	**88.0**	**Turbid**	**NONE**
1635	**1.0**	**4.5**	**100**	**3.58**	**5.00**	**22.27**	**83**	**4.35**	**68.0**	**Clear**	**NONE**
1645	**1.0**	**5.5**	**100**	**3.56**	**4.98**	**22.15**	**82**	**4.34**	**47.2**	**Clear**	**NONE**
1655	**1.0**	**6.5**	**100**	**3.35**	**4.98**	**22.07**	**82**	**4.30**	**38.4**	**Clear**	**NONE**
1705	**1.0**	**7.5**	**100**	**3.41**	**4.96**	**22.04**	**82**	**4.27**	**36.7**	**Clear**	**NONE**
1715	**1.0**	**8.5**	**100**	**3.35**	**4.97**	**22.04**	**82**	**4.26**	**34.2**	**Clear**	**NONE**
1720	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1720**	SAMPLING ENDED AT: **1725**
PUMP OR TUBING DEPTH IN WELL (feet): **36.8**	SAMPLE PUMP FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: _____ µm Filtration Equipment Type:	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – IRON	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GI59**	SAMPLE ID: **01GW01GI59-0510**	DATE: **05** / **11** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **18.1** feet to **28.1** feet	STATIC DEPTH TO WATER (feet): **7.67**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
0.67 Liters **(0.005 L/Ft. x 33 Ft.) + 0.5 L = 0.67 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **23.1**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **23.1**	PURGING INITIATED AT: **0910**	PURGING ENDED AT: **0935**	TOTAL VOLUME PURGED (Liters): **3.0**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
0920	**1.5**	**1.5**	**150**	**7.72**	**5.85**	**21.26**	**441**	**4.72**	**1.87**	**Clear**	**NONE**
0925	**0.5**	**2.0**	**100**	**7.70**	**5.88**	**21.59**	**439**	**4.68**	**1.41**	**Clear**	**NONE**
0930	**1.0**	**2.5**	**100**	**7.70**	**5.89**	**21.63**	**439**	**4.60**	**1.23**	**Clear**	**NONE**
0935	**0.5**	**3.0**	**100**	**7.70**	**5.91**	**21.79**	**439**	**4.40**	**1.09**	**Clear**	**NONE**
0940	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **0940**	SAMPLING ENDED AT: **0950**
PUMP OR TUBING DEPTH IN WELL (feet): **23.1**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: _____ µm Filtration Equipment Type:	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	3	CG	40 Ml	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GM33**	SAMPLE ID: **01GW01GGM33-0510**	DATE: **05** / **11** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **9** feet to **11.5** feet	STATIC DEPTH TO WATER (feet): **5.93**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.63 Liters **(0.005 L/Ft. x 25 Ft.) + 0.5 L = 0.63L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **10.25**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **10.25**	PURGING INITIATED AT: **1000**	PURGING ENDED AT: **1020**	TOTAL VOLUME PURGED (Liters): **2.0**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1010	**1.0**	**1.0**	**100**	**6.12**	**6.08**	**22.57**	**428**	**4.64**	**1.41**	**Clear**	**NONE**
1015	**0.5**	**1.5**	**100**	**6.10**	**6.09**	**22.63**	**429**	**4.52**	**1.08**	**Clear**	**NONE**
1020	**0.5**	**2.0**	**100**	**6.11**	**6.09**	**22.64**	**430**	**4.40**	**0.97**	**Clear**	**NONE**
1025	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1025**	SAMPLING ENDED AT: **1035**
PUMP OR TUBING DEPTH IN WELL (feet): **10.25**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type:	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	3	CG	40 Ml	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GI32**	SAMPLE ID: **01GW01GI32-0510**	DATE: **05** / **11** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **25** feet to **35** feet	STATIC DEPTH TO WATER (feet): **17.14**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.71 Liters **(0.005 L/Ft. x 41 Ft.) + 0.5 L = 0.71 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **30**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **30**	PURGING INITIATED AT: **1055**	PURGING ENDED AT: **1120**	TOTAL VOLUME PURGED (Liters): **3.0**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1105	**1.5**	**1.5**	**150**	**17.17**	**6.21**	**21.76**	**714**	**4.71**	**18.5**	**Clear**	**NONE**
1110	**0.5**	**2.0**	**100**	**17.17**	**6.23**	**22.06**	**711**	**4.44**	**4.01**	**Clear**	**NONE**
1115	**0.5**	**2.5**	**100**	**17.17**	**6.24**	**22.14**	**713**	**4.45**	**3.74**	**Clear**	**NONE**
1120	**0.5**	**3.0**	**100**	**17.17**	**6.24**	**22.23**	**714**	**4.45**	**3.23**	**Clear**	**NONE**
1125	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1125**	SAMPLING ENDED AT: **1135**
PUMP OR TUBING DEPTH IN WELL (feet): **30**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) Filtration Equipment Type: FILTER SIZE: ____ µm	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	3	CG	40 Ml	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01PZ6**	SAMPLE ID: **01GW01PZ6-0510**	DATE: **05 / 11 / 2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL ? DEPTH: feet to feet	STATIC DEPTH TO WATER (feet): **8.65**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

2.04 Liters **(9 Ft. BLS – 5.65 Ft. BLS) x 0.61 L/Ft. = 2. 04**

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.78 Liters **(0.005 L/Ft. x 55 Ft.) + 0.5 L = 0.78 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **7.4**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **7.4**	PURGING INITIATED AT: **1210**	PURGING ENDED AT: **1240**	TOTAL VOLUME PURGED (Liters): **6.5**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1220	**2.5**	**2.5**	**250**	**8.68**	**6.50**	**22.44**	**657**	**4.66**	**14.5**	**Clear**	**NONE**
1225	**1.0**	**3.5**	**200**	**8.67**	**6.55**	**22.38**	**642**	**4.44**	**17.8**	**Clear**	**NONE**
1230	**1.0**	**4.5**	**200**	**8.67**	**6.53**	**22.92**	**635**	**4.27**	**9.71**	**Clear**	**NONE**
1235	**1.0**	**5.5**	**200**	**8.67**	**6.54**	**23.09**	**633**	**4.22**	**7.43**	**Clear**	**NONE**
1240	**1.0**	**6.5**	**200**	**8.67**	**6.55**	**23.11**	**6.32**	**4.25**	**5.32**	**Clear**	**NONE**
1245	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden /TTNUS**	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1245**	SAMPLING ENDED AT: **1250**
PUMP OR TUBING DEPTH IN WELL (feet): **7.4**	SAMPLE PUMP FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type:	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – IRON	PP

REMARKS:
9' TD BLS 12' TD BTOC

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GI41**	SAMPLE ID: **01GW01GI41-0510**	DATE: **05** / **11** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **29.5** feet to **39.5** feet	STATIC DEPTH TO WATER (feet): **6.44**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____ Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.73 Liters **(0.005 L/Ft. x 45 Ft.) + 0.5 L = 0.73 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **34.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **34.5**	PURGING INITIATED AT: **1320**	PURGING ENDED AT: **1350**	TOTAL VOLUME PURGED (Liters): **3.5**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1330	**1.5**	**1.5**	**150**	**6.48**	**5.83**	**22.46**	**317**	**4.77**	**4.19**	**Clear**	**NONE**
1335	**0.5**	**2.0**	**100**	**6.47**	**5.81**	**23.09**	**315**	**4.36**	**4.19**	**Clear**	**NONE**
1340	**0.5**	**2.5**	**100**	**6.47**	**5.80**	**23.76**	**316**	**4.23**	**3.21**	**Clear**	**NONE**
1345	**0.5**	**3.0**	**100**	**6.47**	**5.80**	**23.73**	**316**	**4.22**	**3.34**	**Clear**	**NONE**
1350	**0.5**	**3.5**	**100**	**6.47**	**5.80**	**23.71**	**317**	**4.22**	**3.07**	**Clear**	**NONE**
1355	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1355**	SAMPLING ENDED AT: **1405**
PUMP OR TUBING DEPTH IN WELL (feet): **34.5**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) Filtration Equipment Type: _____	FILTER SIZE: _____ µm	DUPLICATE: (Y) N

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION				
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
	3	CG	40 MI	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GI44**	SAMPLE ID: **01GW01GI44-0510**	DATE: **05** / **11** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **18.9** feet to **28.9** feet	STATIC DEPTH TO WATER (feet): **4.30**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____ Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.68 Liters **(0.005 L/Ft. x 35 Ft.) + 0.5 L = 0.68 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **23.9**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **23.9**	PURGING INITIATED AT: **1445**	PURGING ENDED AT: **1510**	TOTAL VOLUME PURGED (Liters): **3.0**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1455	**1.5**	**1.5**	**150**	**4.38**	**5.81**	**21.92**	**162**	**4.70**	**13.5**	**Clear**	**NONE**
1500	**0.5**	**2.0**	**100**	**4.35**	**5.81**	**21.89**	**164**	**4.51**	**9.87**	**Clear**	**NONE**
1505	**0.5**	**2.5**	**100**	**4.35**	**5.81**	**21.90**	**164**	**4.48**	**8.42**	**Clear**	**NONE**
1510	**0.5**	**3.0**	**100**	**4.35**	**5.81**	**21.91**	**166**	**4.40**	**6.33**	**Clear**	**NONE**
1515	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1515**	SAMPLING ENDED AT: **1525**
PUMP OR TUBING DEPTH IN WELL (feet): **23.9**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) Filtration Equipment Type: _____ FILTER SIZE: _____ µm	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	3	CG	40 MI	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GI43**	SAMPLE ID: **01GW01GI43-0510**	DATE: **05** / **12** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **31.6** feet to **41.6** feet	STATIC DEPTH TO WATER (feet): **12.85**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____ Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.75 Liters **(0.005 L/Ft. x 50 Ft.) + 0.5 L = 0.75 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **36.6**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **36.6**	PURGING INITIATED AT: **1140**	PURGING ENDED AT: **11205**	TOTAL VOLUME PURGED (Liters): **3.0**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1150	**1.5**	**1.5**	**150**	**12.88**	**5.50**	**23.27**	**134**	**5.15**	**9.87**	**Clear**	**NONE**
1155	**0.5**	**2.0**	**100**	**12.88**	**5.49**	**23.31**	**134**	**5.00**	**7.23**	**Clear**	**NONE**
1200	**0.5**	**2.5**	**100**	**12.88**	**5.49**	**23.31**	**130**	**4.90**	**4.61**	**Clear**	**NONE**
1205	**0.5**	**3.0**	**100**	**12.88**	**5.49**	**23.33**	**129**	**4.88**	**3.94**	**Clear**	**NONE**
1210	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: **1210**	SAMPLING ENDED AT: **1220**
PUMP OR TUBING DEPTH IN WELL (feet): **36.6**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type: _____	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	3	CG	40 MI	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GS62**	SAMPLE ID: **01GW01GS62-0510**	DATE: **05** / **12** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **10** feet to **20** feet	STATIC DEPTH TO WATER (feet): **9.82**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.63 Liters **(0.005 L/Ft. x 26 Ft.) + 0.5 L = 0.63 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **15**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **15**	PURGING INITIATED AT: **1300**	PURGING ENDED AT: **1335**	TOTAL VOLUME PURGED (Liters): **3.5**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1310	**1.5**	**1.5**	**150**	**9.83**	**4.86**	**22.39**	**38**	**7.47**	**6.16**	**Clear**	**NONE**
1315	**0.5**	**2.0**	**100**	**9.83**	**4.77**	**22.73**	**38**	**7.30**	**4.27**	**Clear**	**NONE**
1320	**0.5**	**2.5**	**100**	**9.83**	**4.82**	**22.96**	**38**	**7.07**	**3.93**	**Clear**	**NONE**
1325	**0.5**	**3.0**	**100**	**9.83**	**4.84**	**22.89**	**38**	**7.03**	**3.92**	**Clear**	**NONE**
1330	**0.5**	**3.5**	**100**	**9.83**	**4.83**	**22.78**	**38**	**7.03**	**2.86**	**Clear**	**NONE**
1335	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1335**	SAMPLING ENDED AT: **1345**
PUMP OR TUBING DEPTH IN WELL (feet): **15**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: _____ µm Filtration Equipment Type: _____	DUPLICATE: (Y) N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION				
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
	3	CG	40 MI	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; T = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GI46**	SAMPLE ID: **01GW01GI46-0510**	DATE: **05** / **12** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **19** feet to **29** feet	STATIC DEPTH TO WATER (feet): **7.32**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.67 Liters **(0.005 L/Ft. x 33 Ft.) + 0.5 L = 0.67 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **24**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **24**	PURGING INITIATED AT: **1405**	PURGING ENDED AT: **1435**	TOTAL VOLUME PURGED (Liters): **3.5**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1415	**1.5**	**1.5**	**150**	**7.34**	**5.89**	**21.52**	**329**	**5.66**	**1.97**	**Clear**	**NONE**
1420	**0.5**	**2.0**	**100**	**7.34**	**5.91**	**21.41**	**332**	**5.34**	**1.31**	**Clear**	**NONE**
1425	**0.5**	**2.5**	**100**	**7.34**	**5.91**	**21.77**	**331**	**5.32**	**1.04**	**Clear**	**NONE**
1430	**0.5**	**3.0**	**100**	**7.34**	**5.93**	**21.80**	**332**	**5.36**	**1.03**	**Clear**	**NONE**
1435	**0.5**	**3.5**	**100**	**7.34**	**5.94**	**21.68**	**333**	**5.25**	**0.95**	**Clear**	**NONE**
1440	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1440**	SAMPLING ENDED AT: **1450**
PUMP OR TUBING DEPTH IN WELL (feet): **24**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type: _____	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	3	CG	40 Ml	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GS73**	SAMPLE ID: **01GW01GS73-0510**	DATE: **05** / **12** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **3** feet to **13** feet	STATIC DEPTH TO WATER (feet): **3.18**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

5.99 Liters **(13 ft. -3.18 ft.) X 0.61 L/ft. = 5.99**

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY **X** TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

_____ Liters

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **8.1**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **8.1**	PURGING INITIATED AT: **1500**	PURGING ENDED AT: **1625**	TOTAL VOLUME PURGED (Liters): **17**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1515	**6.0**	**6.0**	**400**	**3.20**	**5.77**	**20.93**	**63**	**5.30**	**99.6**	**Cloudy**	**NONE**
1525	**2.0**	**8.0**	**200**	**3.19**	**5.74**	**21.55**	**63**	**5.05**	**100.8**	**Cloudy**	**NONE**
1535	**2.0**	**10.0**	**200**	**3.19**	**5.72**	**21.70**	**64**	**5.03**	**103.5**	**Cloudy**	**NONE**
1545	**2.0**	**12.0**	**200**	**3.19**	**5.71**	**21.85**	**65**	**5.03**	**101.5**	**Cloudy**	**NONE**
1555	**2.0**	**14.0**	**200**	**3.19**	**5.71**	**21.66**	**65**	**4.99**	**101.5**	**Cloudy**	**NONE**
1605	**1.0**	**15.**	**100**	**3.19**	**5.67**	**22.02**	**65**	**4.90**	**101.0**	**Cloudy**	**NONE**
1615	**1.0**	**16.0**	**100**	**3.19**	**5.73**	**22.15**	**64**	**4.93**	**99.3**	**Cloudy**	**NONE**
1625	**1.0**	**17.0**	**100**	**3.19**	**5.75**	**22.13**	**66**	**4.92**	**101.1**	**Cloudy**	**NONE**
1630	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1630**	SAMPLING ENDED AT: **1640**
PUMP OR TUBING DEPTH IN WELL (feet): **8.1**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) Filtration Equipment Type: FILTER SIZE: _____ µm	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION				
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
	3	CG	40 Ml	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GS74**	SAMPLE ID: **01GW01GS74-0510**	DATE: **05** / **12** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **25** feet to **30** feet	STATIC DEPTH TO WATER (feet): **3.50**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

_____ Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

0.67 Liters **(0.005 L/Ft. x 33 Ft.) + 0.5 L = 0.67 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **27.5**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **27.5**	PURGING INITIATED AT: **1640**	PURGING ENDED AT: **1715**	TOTAL VOLUME PURGED (Liters): **4.0**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1650	**1.5**	**1.5**	**150**	**3.53**	**6.18**	**22.88**	**1380**	**4.90**	**15.7**	**Clear**	**NONE**
1655	**0.5**	**2.0**	**100**	**3.53**	**6.21**	**22.82**	**1390**	**4.73**	**11.2**	**Clear**	**NONE**
1700	**0.5**	**2.5**	**100**	**3.53**	**6.21**	**22.92**	**1400**	**4.73**	**9.60**	**Clear**	**NONE**
1705	**0.5**	**3.0**	**100**	**3.53**	**6.22**	**23.15**	**1420**	**4.68**	**12.3**	**Clear**	**NONE**
1710	**0.5**	**3.5**	**100**	**3.54**	**6.23**	**23.04**	**1410**	**4.68**	**9.86**	**Clear**	**NONE**
1715	**0.5**	**4.0**	**100**	**3.55**	**6.23**	**22.99**	**1410**	**4.67**	**9.86**	**Clear**	**NONE**
1720	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1720**	SAMPLING ENDED AT: **1730**
PUMP OR TUBING DEPTH IN WELL (feet): **27.5**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): 180	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type:	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	3	CG	40 Ml	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:	
WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (feet – feet) X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 ^{o}C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:	
WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (feet – feet) X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 ^{o}C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:	
WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (feet – feet) X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 ^{o}C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:	
WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (feet – feet) X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 ^{o}C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:	
WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (feet – feet) X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 ^{o}C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

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GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:	
WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (feet – feet) X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
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SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

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GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:	
WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

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(only fill out if applicable)

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(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
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SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

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GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:	
WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

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= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

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PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

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GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:	
WELL NO:	SAMPLE ID:	DATE:

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: feet to feet	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
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= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
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PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

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GROUNDWATER SAMPLING LOG

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TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

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PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

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GROUNDWATER SAMPLING LOG

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TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (^{O}C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)

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TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

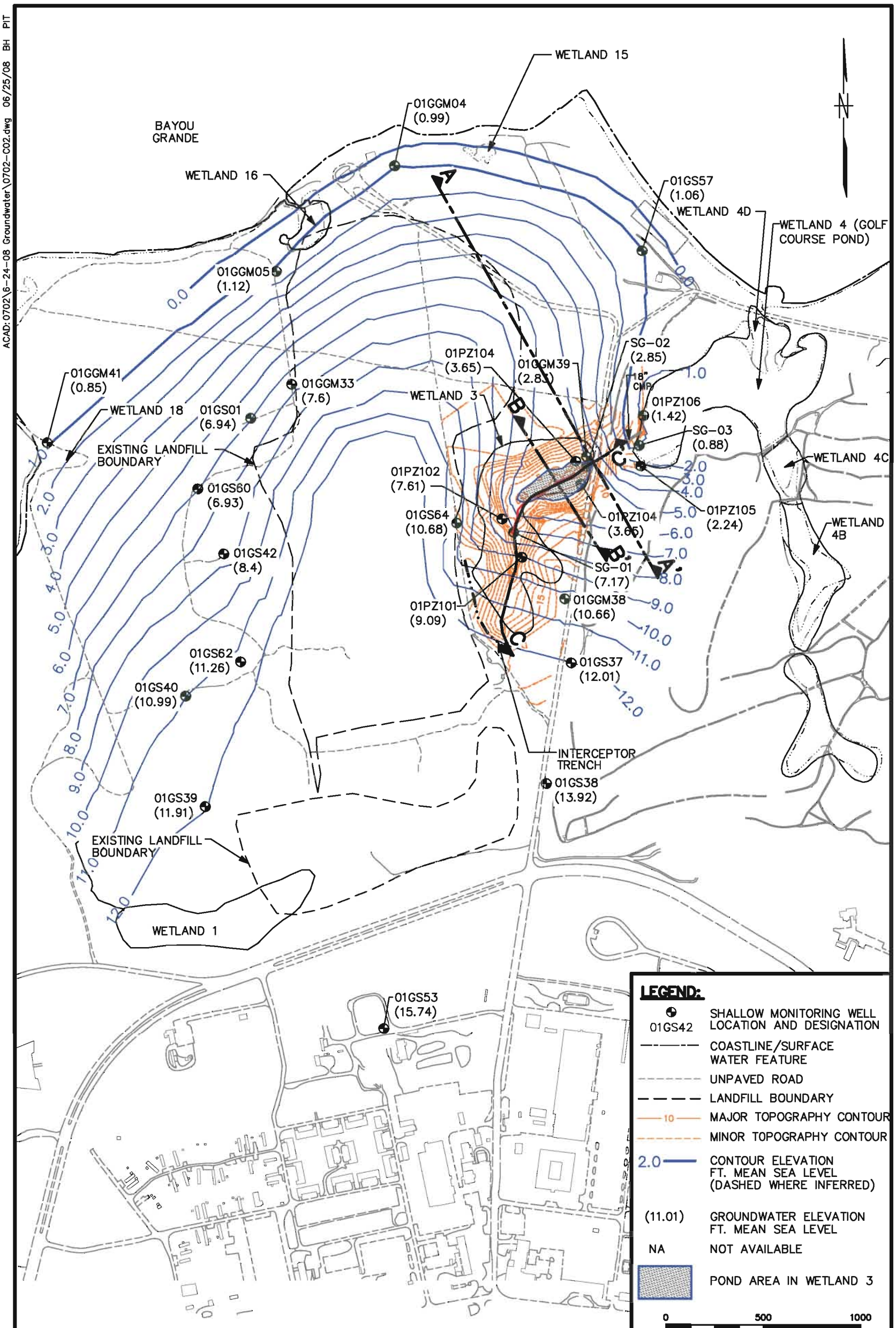
NOTES: 1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 ^{o}C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

ACAD: 0702\6-24-08 Groundwater\0702-C02.dwg 06/25/08 BH PIT



DRAWN BY BH	DATE 6/25/08	PREDICTED SHALLOW ZONE GROUNDWATER POTENTIOMETRIC SURFACE (AFTER PONDING WETLAND 3) OPERABLE UNIT 1 – JUNE 2008 NAVAL AIR STATION PENSACOLA PENSACOLA, FLORIDA	CONTRACT NO. 0702
CHECKED BY	DATE		APPROVED BY DATE
COST/SCHED-AREA			APPROVED BY DATE
SCALE AS NOTED			DRAWING NO. FIGURE 8 REV. 0

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: OU 1 **Project No.:** 112G00702

Location: NAS Pensacola **Personnel:** Bill Olson, Chuck Sorden & Yarissa Martínez

Weather Conditions: Sunny 83° **Measuring Devic** Water Level Indicator

Tidally Influenced: Yes _X__ No ____ **Remarks:**

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth Below TOC (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
01UPGW1	5/13/2010	1327		13.30	12.82			Could be blocked @ 13 ft
01GS42	5/13/2010	930		16.51	6.72			Bee at well cap
01GS53	5/13/2010	1305		20.10	12.36			Bollards.
01GS57	5/13/2010	1439		19.55	11.77			NEW (5/2010). Locked
01GS62	5/13/2010	830		19.59	8.86			NEW (5/2010). Locked
01GS64	5/13/2010	957		16.60	6.26			Bollards. Locked
01GS71	5/13/2010	1430		14.51	6.05			NEW (5/2010). Locked
01GS73	5/13/2010	1355		12.40	3.22			NEW (5/2010). Locked
01GGM04	5/13/2010	1415		18.60	9.48			Bees nest @ well cap. Locked
01GGM05	5/13/2010	1025		12.52	5.70			Very corroded (rusted). No lock.
01GGM33	5/13/2010	1005		12.90	6.02			
01GGM38	5/13/2010	1335		17.70	8.51			Locked but can be opened
01GGM39	5/13/2010	830		25.00	5.76			Bollards.
01GGM41	5/13/2010	1125		17.71	3.55			No lock.
01GI32	5/13/2010	1330		37.60	17.23			Bollards.
01GI36	5/13/2010	1329		32.87	6.30			at golf course
01GI41	5/13/2010	935		42.60	6.53			Locked but can be opened
01GI43	5/13/2010	900		44.80	12.85			Bollards.
01GI44	5/13/2010	1120		31.40	4.16			Damaged (see picture) Top is off
01GI46	5/13/2010	1020		31.99	7.37			Locked but can be opened
01GI48	5/13/2010	1410		30.08	9.89			Bollards.
01GI59	5/13/2010	955		30.76	7.78			Locked but can be opened. Bollards
01GI65	5/13/2010	1100		40.10	7.71			
01GI66	5/13/2010	1310		67.40	14.84			Bollards.
01GI72	5/13/2010	1435		24.55	5.67			NEW (5/2010). Locked
01GI74	5/13/2010	1400		29.40	3.19			NEW (5/2010). Locked
01PZ1	5/13/2010	1055		16.27	6.89			No lock.
01PZ101	5/13/2010	1225		13.65	4.69			PVC 2" stick-up.
01PZ102	5/13/2010	1300			5.51			in water
01PZ103	5/13/2010	1229		14.80	4.04			PVC 2" stick-up.
01PZ104	5/13/2010	1230		14.75	4.90			PVC 2" stick-up.
01PZ105	5/13/2010	1240		9.95	0.73			Near pond @ golf course. Entire manhole came off. Flush on metal plate.
01PZ106	5/13/2010	1250		9.30	2.15			
01PZ6	5/13/2010	1045		11.75	8.68			
01PZ6A	5/13/2010	1050		38.62	6.57			
01PZ7	5/13/2010	1030		25.87	5.52			
01PZ7A	5/13/2010	1035		14.20	3.59			PVC 4" stick-up. Locked but can be opened.
01PZ7B	5/13/2010	1040		39.30	2.68			PVC 4" stick-up.
01PZ8	5/13/2010	1105		26.15	5.81			Bollards.
01PZ10	5/13/2010	1110		26.00	5.25			Bollards.
SG1	5/13/2010	1220			3.41			in water
SG2	5/13/2010	1302			3.50			in water
SG3	5/13/2010	1338			2.60			in water
01MW01	5/13/2010	1045		6.75	3.85			Possible block or obstruction by roots
01MW01A	5/13/2010	1050		24.70	3.95			PVC 4"stick-up
01MW01B	5/13/2010	1100		38.30	3.66			Locked but can be opened. PVC 4"stick-up.
01MW02	5/13/2010	1105		13.60	5.71			Roots came up with the water level indicator
01MW02A	5/13/2010	1106		38.25	6.23			PVC 4"stick-up

* All measurements to the nearest 0.01 foot

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : ______________________ INSTRUMENT NAME/MODEL: ______________________

SITE NAME: ______________________ MANUFACTURER: ______________________

PROJECT No.: ______________________ SERIAL NUMBER: ______________________

Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		

Tetra Tech NUS, Inc.

EQUIPMENT CALIBRATION LOG

PROJECT NAME : ______________________

SITE NAME: ______________________

PROJECT No.: ______________________

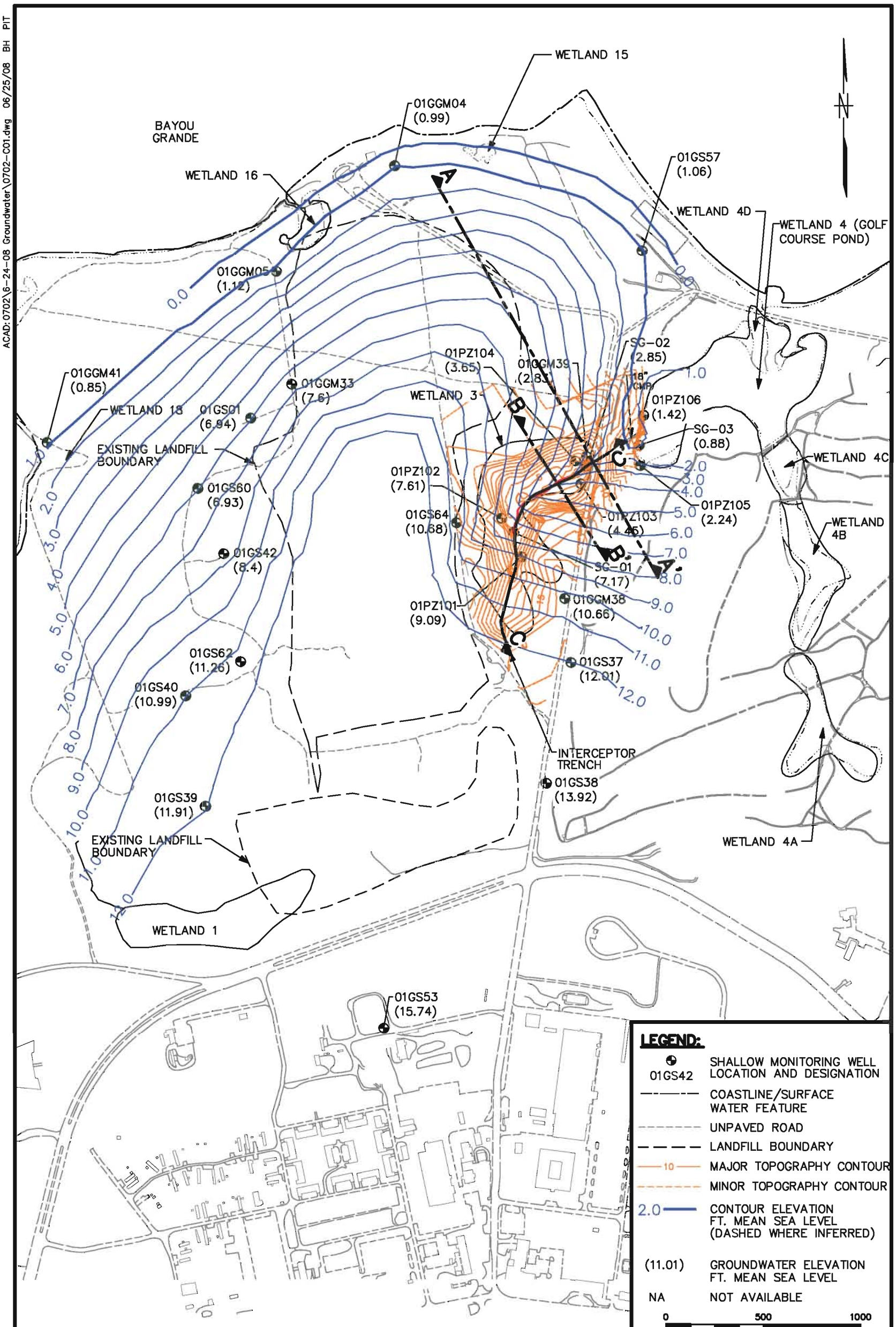
INSTRUMENT NAME/MODEL: ______________________

MANUFACTURER: ______________________

SERIAL NUMBER: ______________________

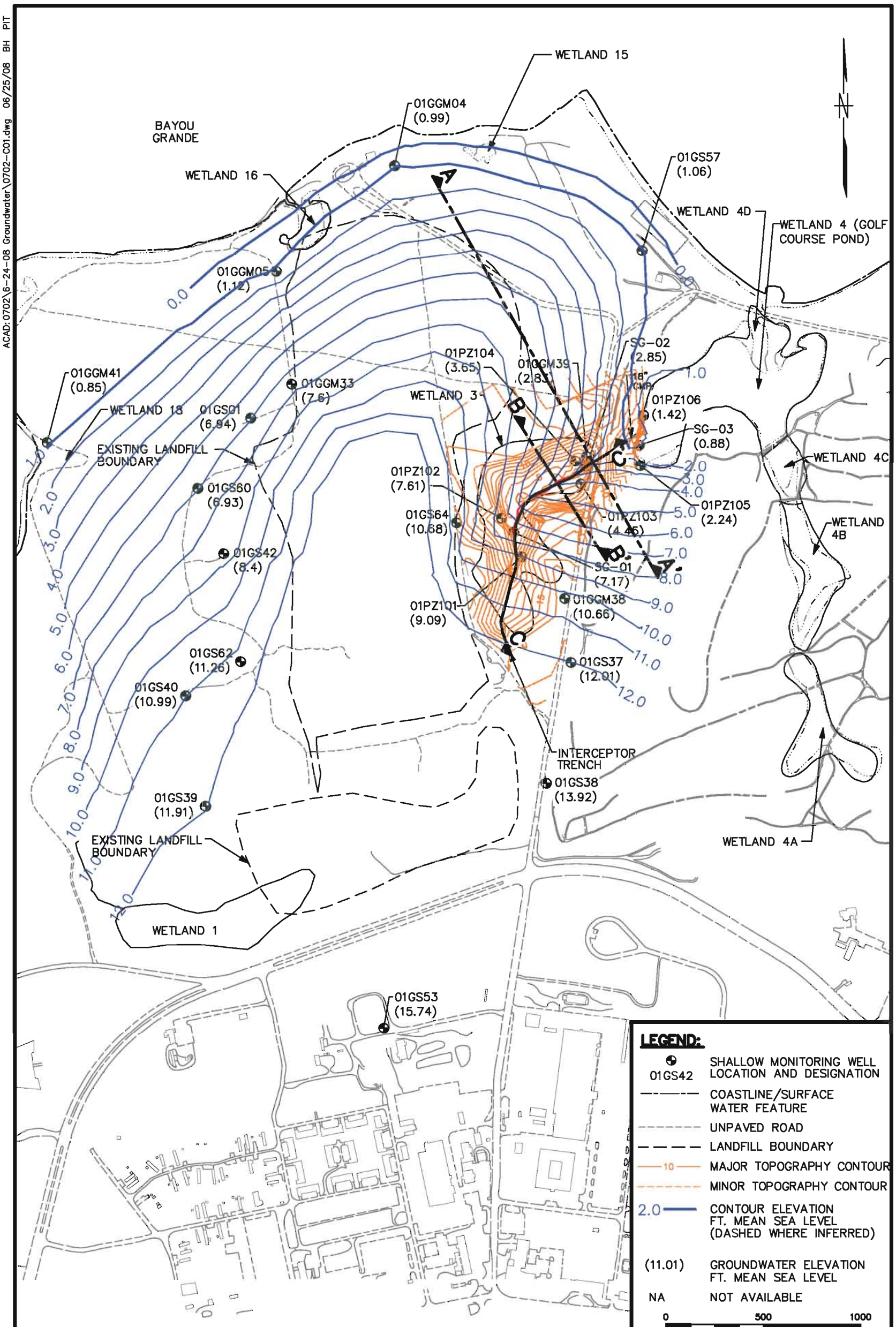
Date of Calibration	Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot No.)	Remarks and Comments
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		

ACAD: 0702\6-24-08 Groundwater\0702-C01.dwg 06/25/08 BH PIT



DRAWN BY DATE BH 6/25/08	SHALLOW ZONE GROUNDWATER POTENTIOMETRIC SURFACE OPERABLE UNIT 1 – JUNE 2008 NAVAL AIR STATION PENSACOLA PENSACOLA, FLORIDA	CONTRACT NO. 0702
CHECKED BY DATE		APPROVED BY DATE
COST/SCHED-AREA		APPROVED BY DATE
SCALE AS NOTED	NAVFAC	DRAWING NO. FIGURE 4 REV. 0

ACAD: 0702\6-24-08 Groundwater\0702-C01.dwg 06/25/08 BH PIT



DRAWN BY DATE BH 6/25/08	SHALLOW ZONE GROUNDWATER POTENTIOMETRIC SURFACE OPERABLE UNIT 1 – JUNE 2008 NAVAL AIR STATION PENSACOLA PENSACOLA, FLORIDA	CONTRACT NO. 0702
CHECKED BY DATE		APPROVED BY DATE
COST/SCHED-AREA		APPROVED BY DATE
SCALE AS NOTED	NAVFAC	DRAWING NO. FIGURE 4 REV. 0

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: OU1
Project No.: 112G00702

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: Wetland
[] QA Sample Type:

Sample ID No.:
Sample Location:
Sampled By:
C.O.C. No.: 27017

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

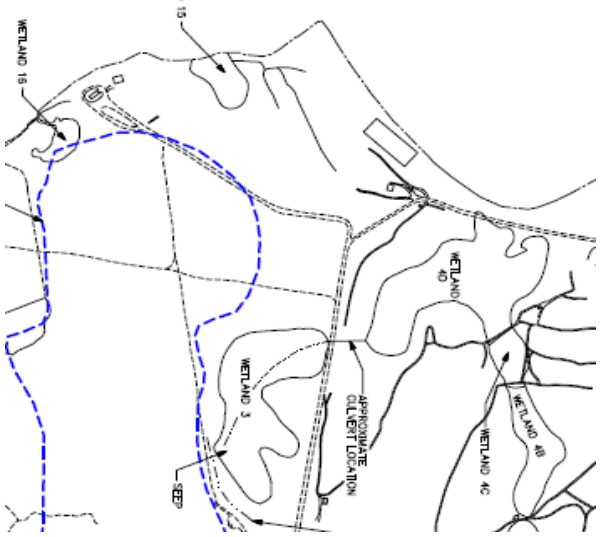
Date: 5/13/2010	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Time:								
Depth:								
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
6010 B - Iron	HNO3	250 ml Plastic	X

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: OU1
Project No.: 112G00702

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: Wetland
[] QA Sample Type:

Sample ID No.:
Sample Location:
Sampled By:
C.O.C. No.: 27017

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

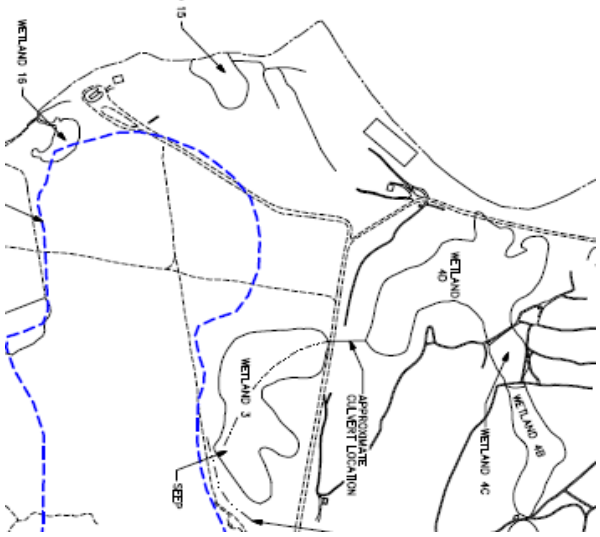
Date: 5/13/2010	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Time:								
Depth:								
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
6010 B - Iron	HNO3	250 ml Plastic	X

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Tetra Tech NUS, Inc.

SURFACE WATER SAMPLE LOG SHEET

Project Site Name: OU1
Project No.: 112G00702

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: Wetland
[] QA Sample Type:

Sample ID No.:
Sample Location:
Sampled By:
C.O.C. No.: 27017

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

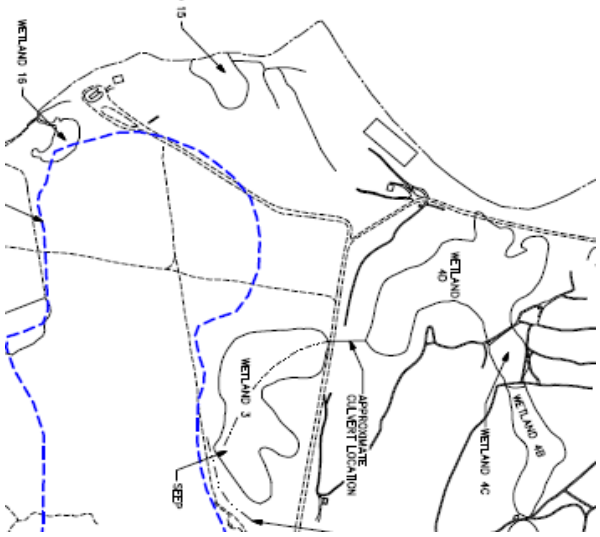
Date: 5/13/2010	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (^{0}C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	Other
Time:								
Depth:								
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
6010 B - Iron	HNO3	250 ml Plastic	X

OBSERVATIONS / NOTES:

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

DEP-SOP-001/01
Form FD 9000-24

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GI65**	SAMPLE ID: **01GW01PZ8-0510**	DATE: **05** / **10** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **27.2** feet to **37.2** feet	STATIC DEPTH TO WATER (feet): **7.59**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.75 Liters **(0.005 L/Ft. x 50 Ft.) + 0.5 L = 0.75 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **32.2**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **32.2**	PURGING INITIATED AT: **1240**	PURGING ENDED AT: **1310**	TOTAL VOLUME PURGED (Liters): **3.5**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1250	**1.5**	**1.5**	**150**	**7.85**	**5.41**	**21.97**	**264**	**4.88**	**1.94**	**Clear**	**NONE**
1255	**0.5**	**2.0**	**100**	**7.75**	**5.42**	**21.95**	**261**	**4.64**	**1.87**	**Clear**	**NONE**
1305	**1.0**	**3.0**	**100**	**7.64**	**5.47**	**21.99**	**260**	**4.50**	**1.87**	**Clear**	**NONE**
1310	**0.5**	**3.5**	**100**	**7.64**	**5.46**	**22.03**	**260**	**4.51**	**1.79**	**Clear**	**NONE**
1315	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1315**	SAMPLING ENDED AT: **1325**
PUMP OR TUBING DEPTH IN WELL (feet): **32.2**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: _____ µm Filtration Equipment Type: _____	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH		
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP
	3	CG	40 MI	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Revision Date: February 1, 2004

Tetra tech NUS / FDEP Groundwater Sampling Sheet

SITE NAME: OU1 – Site 1	SITE LOCATION: Naval Air Station (NAS) Pensacola, Florida	
WELL NO: **01GS62**	SAMPLE ID: **01GW01GS62-0510**	DATE: **05** / **12** / **2010**

PURGING DATA

WELL DIAMETER (inches): **2**	TUBING DIAMETER (inches): **3/16**	WELL SCREEN INTERVAL DEPTH: **10** feet to **20** feet	STATIC DEPTH TO WATER (feet): **9.82**	PURGE PUMP TYPE OR BAILER: **Peristaltic Pump**

WELL VOLUMEPURGE: (only fill out if applicable) 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

_____Liters

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

0.63 Liters **(0.005 L/Ft. x 26 Ft.) + 0.5 L = 0.63 L**

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): **15**	FINAL PUMP OR TUBING DEPTH IN WELL (feet): **15**	PURGING INITIATED AT: **1300**	PURGING ENDED AT: **1330**	TOTAL VOLUME PURGED (Liters): **3.5**

TIME	VOLUME PURGED (Liters)	CUMUL. VOLUME PURGED (Liters)	PURGE RATE (ml)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR (describe)	ODOR
1310	**1.5**	**1.5**	**150**	**9.83**	**4.86**	**22.39**	**38**	**7.47**	**6.16**	**Clear**	**NONE**
1315	**0.5**	**2.0**	**100**	**9.83**	**4.77**	**22.73**	**38**	**7.30**	**4.27**	**Clear**	**NONE**
1320	**0.5**	**2.5**	**100**	**9.83**	**4.82**	**22.96**	**38**	**7.07**	**3.93**	**Clear**	**NONE**
1325	**0.5**	**3.0**	**100**	**9.83**	**4.84**	**22.89**	**38**	**7.03**	**3.92**	**Clear**	**NONE**
1330	**0.5**	**3.5**	**100**	**9.83**	**4.83**	**22.78**	**38**	**7.03**	**2.86**	**Clear**	**NONE**
1335	**Sample Collected**										

WELL CAPACITY (Liters Per Foot): **0.75"** = 0.076; **1"** = 0.15; **1.25"** = 0.23; **2"** = 0.61; **3"** = 1.40; **4"** = 2.46; **5"** = 3.86; **6"** = 5.57; **12"** = 22.26
TUBING INSIDE DIA. CAPACITY (Liters/Ft.): **1/8"** = 0.002; **3/16"** = 0.005; **1/4"** = 0.0098; **5/16"** = 0.015; **3/8"** = 0.023; **1/2"** = 0.038; **5/8"** = 0.06

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: **Charles Sorden** /TTNUS	SAMPLER(S) SIGNATURES:	SAMPLING INITIATED AT: **1335**	SAMPLING ENDED AT: **1345**
PUMP OR TUBING DEPTH IN WELL (feet): **15**	SAMPLE PUMP **SM** FLOW RATE (mL per minute): **100**	TUBING MATERIAL CODE: Teflon	
FIELD DECONTAMINATION: Y (N)	FIELD-FILTERED: Y (N) FILTER SIZE: ____ µm Filtration Equipment Type:	DUPLICATE: (Y) N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION				
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE
	3	CG	40 Ml	HCL	NONE	< 2	SW-846 8260B – Select VOCs	SM
	1	PE	250 mL	HNO3	NONE		SW-846 6010B – Select Metals	PP

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING/PURGING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **VT** = Vacuum Trap; **O** = Other (Specify)

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name: OU 1 **Project No.:** 112G00702

Location: NAS Pensacola **Personnel:** Bill Olson, Chuck Sorden & Yarissa Martínez

Weather Conditions: Sunny 83° **Measuring Devic** Water Level Indicator

Tidally Influenced: Yes _X__ No ____ **Remarks:**

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth Below TOC (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
01UPGW1	5/13/2010	1327		13.30	12.82			Could be blocked @ 13 ft
01GS42	5/13/2010	930		16.51	6.72			Bee at well cap
01GS53	5/13/2010	1305		20.10	12.36			Bollards.
01GS57	5/13/2010	1439		19.55	11.77			NEW (5/2010). Locked
01GS62	5/13/2010	830		19.59	8.86			NEW (5/2010). Locked
01GS64	5/13/2010	957		16.60	6.26			Bollards. Locked
01GS71	5/13/2010	1430		14.51	6.05			NEW (5/2010). Locked
01GS73	5/13/2010	1355		12.40	3.22			NEW (5/2010). Locked
01GGM04	5/13/2010	1415		18.60	9.48			Bees nest @ well cap. Locked
01GGM05	5/13/2010	1025		12.52	5.70			Very corroded (rusted). No lock.
01GGM33	5/13/2010	1005		12.90	6.02			
01GGM38	5/13/2010	1335		17.70	8.51			Locked but can be opened
01GGM39	5/13/2010	830		25.00	5.76			Bollards.
01GGM41	5/13/2010	1125		17.71	3.55			No lock.
01GI32	5/13/2010	1330		37.60	17.23			Bollards.
01GI36	5/13/2010	1329		32.87	6.30			at golf course
01GI41	5/13/2010	935		42.60	6.53			Locked but can be opened
01GI43	5/13/2010	900		44.80	12.85			Bollards.
01GI44	5/13/2010	1120		31.40	4.16			Damaged (see picture) Top is off
01GI46	5/13/2010	1020		31.99	7.37			Locked but can be opened
01GI48	5/13/2010	1410		30.08	9.89			Bollards.
01GI59	5/13/2010	955		30.76	7.78			Locked but can be opened. Bollards
01GI65	5/13/2010	1100		40.10	7.71			
01GI66	5/13/2010	1310		67.40	14.84			Bollards.
01GI72	5/13/2010	1435		24.55	5.67			NEW (5/2010). Locked
01GI74	5/13/2010	1400		29.40	3.19			NEW (5/2010). Locked
01PZ1	5/13/2010	1055		16.27	6.89			No lock.
01PZ101	5/13/2010	1225		13.65	4.69			PVC 2" stick-up.
01PZ102	5/13/2010	1300			5.51			in water
01PZ103	5/13/2010	1229		14.80	4.04			PVC 2" stick-up.
01PZ104	5/13/2010	1230		14.75	4.90			PVC 2" stick-up.
01PZ105	5/13/2010	1240		9.95	0.73			Near pond @ golf course. Entire manhole came off. Flush on metal plate.
01PZ106	5/13/2010	1250		9.30	2.15			
01PZ6	5/13/2010	1045		11.75	8.68			
01PZ6A	5/13/2010	1050		38.62	6.57			
01PZ7	5/13/2010	1030		25.87	5.52			
01PZ7A	5/13/2010	1035		14.20	3.59			PVC 4" stick-up. Locked but can be opened.
01PZ7B	5/13/2010	1040		39.30	2.68			PVC 4" stick-up.
01PZ8	5/13/2010	1105		26.15	5.81			Bollards.
01PZ10	5/13/2010	1110		26.00	5.25			Bollards.
SG1	5/13/2010	1220			3.41			in water
SG2	5/13/2010	1302			3.50			in water
SG3	5/13/2010	1338			2.60			in water
01MW01	5/13/2010	1045		6.75	3.85			Possible block or obstruction by roots
01MW01A	5/13/2010	1050		24.70	3.95			PVC 4"stick-up
01MW01B	5/13/2010	1100		38.30	3.66			Locked but can be opened. PVC 4"stick-up.
01MW02	5/13/2010	1105		13.60	5.71			Roots came up with the water level indicator
01MW02A	5/13/2010	1106		38.25	6.23			PVC 4"stick-up

* All measurements to the nearest 0.01 foot

FedEx Express **US Airbill**

FedEx Tracking Number 8684 5094 5048

Form ID No. 0215 — Sender's Copy

From (Please print and press hard)

Date 11-8-10 Sender's FedEx Account Number 1525-8551-9

Sender's Name M. Brock Phone (850) 385-9899

Company TETRA TECH NUS INC/GOVT

Address 1538 VILLAGE SQUARE BLVD STE 2 Dept./Floor/Suite/Room

City TALLAHASSEE State FL ZIP 32309-2748

Your Internal Billing Reference (First 24 characters will appear on invoice.) 112G00702, 2nd Monitoring

To

Recipient's Name Sample Receiving Phone (615) 345-1115

Company Empirical laboratories

Recipient's Address 621 Mainstream Dr. Suit 270 Dept./Floor/Suite/Room

We cannot deliver to P.O. boxes or P.O. ZIP codes.

Address

To request a package be held at a specific FedEx location, print FedEx address here.

City Nashville State TN ZIP 37228

0395742118

Find drop-off locations at fedex.com
Simplify your shipping. Manage your account. Access all the tools you need.

4a Express Package Service — Packages up to 150 lbs.

- [X] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

FedEx Envelope rate not available. Minimum charge. One-pound rate. * To most locations.

4b Express Freight Service — Packages over 150 lbs.

- [ ] FedEx 1Day Freight* — Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 2Day Freight — Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 3Day Freight — Third business day.** Saturday Delivery NOT available.

* Call for Confirmation; ** To most locations.

5 Packaging

- [ ] FedEx Envelope*
- [ ] FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak.
- [ ] FedEx Box
- [ ] FedEx Tube
- [X] Other

* Declared value limit $500

6 Special Handling — Include FedEx address in Section 3.

- [ ] SATURDAY Delivery — NOT Available for FedEx Standard Overnight, FedEx First Overnight, FedEx Express Saver, or FedEx 3Day Freight.
- [ ] HOLD Weekday at FedEx Location — NOT Available for FedEx First Overnight.
- [ ] HOLD Saturday at FedEx Location — Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Does this shipment contain dangerous goods? One box must be checked.

- [ ] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging.

7 Payment Bill to: Enter FedEx Acct. No. or Credit Card No. below.

- [X] Sender — Acct. No. in Section 1 will be billed
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. / Credit Card No. ____ Exp. Date ____

Total Packages	Total Weight	Total Declared Value†
1	45	$ .00

†Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

8 Residential Delivery Signature Options If you require a signature, check Direct or Indirect.

- [ ] No Signature Required — Package may be left without obtaining a signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies.

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FedEx

5903 N W ST
PENSACOLA, FL 32505

ation: PNSCE
ice ID: PNSCE-POS1
loyee: 789450
nsaction: 75091922344

ORITY OVERNIGHT
3450945059 79.90 lb (S) 76.15
9752786162

eduled Delivery Date 11/11/2010

Shipment subtotal: 76.15

Total Due: 76.15

FedEx Account: 76.15
*****5519

N = Weight entered manually
S = Weight read from scale
T = Taxable item

ect to additional charges. See FedEx Service Guide
dex.com for details. All merchandise sales final.

Visit us at: fedex.com
Or call 1.800.GoFedEx
1.800.463.3339

November 10, 2010 3:21:06 PM

4 5094 5059

1525-8551-9

me (787)3009119

STE 2
Dept/Floor/Suite/Room

ZIP 32309-2748

2nd Field

me (615) 345-1115

nes

Suite 270
Dept/Floor/Suite/Room

ZIP 37228

0395742118

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Form ID No. 0215 Sender's Copy

4a Express Package Service — *Packages up to 150 lbs.*

- [x] FedEx Priority Overnight — Next business morning.* Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Standard Overnight — Next business afternoon.* Saturday Delivery NOT available.
- [ ] FedEx First Overnight — Earliest next business morning delivery to select locations.* Saturday Delivery NOT available.
- [ ] FedEx 2Day — Second business day.* Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx Express Saver — Third business day.* Saturday Delivery NOT available.

FedEx Envelope rate not available. Minimum charge: One-pound rate. * To most locations.

4b Express Freight Service — *Packages over 150 lbs.*

- [ ] FedEx 1Day Freight* — Next business day.** Friday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 2Day Freight — Second business day.** Thursday shipments will be delivered on Monday unless SATURDAY Delivery is selected.
- [ ] FedEx 3Day Freight — Third business day.** Saturday Delivery NOT available.

* Call for Confirmation: ** To most locations.

5 Packaging

- [ ] FedEx Envelope*
- [ ] FedEx Pak* — Includes FedEx Small Pak, FedEx Large Pak, and FedEx Sturdy Pak.
- [ ] FedEx Box
- [ ] FedEx Tube
- [x] Other

* Declared value limit $500.

6 Special Handling — Include FedEx address in Section 3.

- [ ] SATURDAY Delivery — NOT Available for FedEx Standard Overnight, FedEx First Overnight, FedEx Express Saver, or FedEx 3Day Freight.
- [ ] HOLD Weekday at FedEx Location — NOT Available for FedEx First Overnight.
- [ ] HOLD Saturday at FedEx Location — Available ONLY for FedEx Priority Overnight and FedEx 2Day to select locations.

Does this shipment contain dangerous goods? One box must be checked.

- [ ] No
- [ ] Yes — As per attached Shipper's Declaration.
- [ ] Yes — Shipper's Declaration not required.
- [ ] Dry Ice — Dry Ice, 9, UN 1845 ____ x ____ kg
- [ ] Cargo Aircraft Only

Dangerous goods (including dry ice) cannot be shipped in FedEx packaging.

7 Payment *Bill to:* — Enter FedEx Acct. No. or Credit Card No. below.

- [x] Sender — Acct. No. in Section 1 will be billed.
- [ ] Recipient
- [ ] Third Party
- [ ] Credit Card
- [ ] Cash/Check

FedEx Acct. No. or Credit Card No. Exp. Date

Total Packages: 1 | Total Weight: 80 | Total Declared Value†: $ .00

† Our liability is limited to $100 unless you declare a higher value. See back for details. By using this Airbill you agree to the service conditions on the back of this Airbill and in the current FedEx Service Guide, including terms that limit our liability.

8 Residential Delivery Signature Options — If you require a signature, check Direct or Indirect.

- [ ] No Signature Required — Package may be left without obtaining a signature for delivery.
- [ ] Direct Signature — Someone at recipient's address may sign for delivery. Fee applies.
- [ ] Indirect Signature — If no one is available at recipient's address, someone at a neighboring address may sign for delivery. Fee applies.

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TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 2829 | PAGE 1 OF 2

PROJECT NO: 126G0702	FACILITY: NAS Pensacola	PROJECT MANAGER Gerry Walker	PHONE NUMBER 850-385-9899	LABORATORY NAME AND CONTACT: Empirical
SAMPLERS (SIGNATURE) M Brock		FIELD OPERATIONS LEADER Larissa Martinez	PHONE NUMBER SAME	ADDRESS 56 Mainstream Ste 270
		CARRIER/WAYBILL NUMBER 8164 5094 5098		CITY, STATE Nashville TN 37228

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G): P	PRESERVATIVE USED: HNO3	TYPE OF ANALYSIS: IRON 6010B	COMMENTS
11/06	1315	01SW01-1110	SW01	—	—	SW	G	2	✓			
11/06	1355	01SW02-1110	SW02	—	—	SW	G	2	✓			
11/06	1420	01SW03-1110	SW03	—	—	SW	G	2	✓			
11/06	1315	SW01-110610	—	—	—	SW	G	2	✓			
11/07	0950	01GW01PZ7B-1110	PZ7B	—	—	GW	G	2	✓			
11/07	1025	01GW01PZ7A-1110	PZ7A	—	—	GW	G	2	✓			
11/07	1125	2201GW01PZ7-1110	PZ7	—	—	GW	G	2	✓			
11/07	1300	01GW01PZ6A-1110	PZ6A	—	—	GW	G	2	✓			
11/07	1140	01GW01PZ6-1110	PZ6	—	—	GW	G	2	✓			
11/07	1221	01GW01PZ1-1110	PZ1	—	—	GW	G	2	✓			
11/07	1221	PZ01-110710	PZ1	—	—	GW	G	2	✓			
11/07	1405	01GW01PZ08-1110	PZ8	—	—	GW	G	2	✓			
11/08	1410	01GW01PZ10-1110	PZ10	—	—	GW	G	2	✓			

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY M Brock	11-8-10	1800	1. RECEIVED BY		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TINUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 2825 | PAGE 2 OF 2

PROJECT NO: ~~112G02015~~ 112G00702	FACILITY: NAS Pensacola - 041	PROJECT MANAGER: Gerry Walker	PHONE NUMBER: 850-385-9899
LABORATORY NAME AND CONTACT: Empirical Laboratories			
SAMPLERS (SIGNATURE): M. Brock	FIELD OPERATIONS LEADER: Narissa Martinez	PHONE NUMBER: 850 385-9899	ADDRESS: 621 Mainstream Ste. 270
	CARRIER/WAYBILL NUMBER: 8684 5094 5048		CITY, STATE: Noshville TN 37228

STANDARD TAT ☑
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G): P, G
PRESERVATIVE USED: HNO3, HCL

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	TYPE OF ANALYSIS: 6010B-~~[illegible]~~	8260B-VOCs							COMMENTS
11-8	1030	01-GW-01-GI-65-1110	GI-65	-	-	GW	G	5	2	3							
	—	TripBlank #8344	—	—	—	W	—	2	2	—							

1. RELINQUISHED BY: M Brock	DATE: 11-8-10	TIME: 1800	1. RECEIVED BY	DATE	TIME
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS: select metals = aluminum, nickel, iron, manganese, cadmium, chromium
VOC's = vinyl chloride, benzene, chlorobenzene, total xylenes, 1,1,2,2-Tetrachloroethane, naphthalene

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4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 2820 | PAGE 1 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G00702	NAS Pensacola	Gerry Walker	850-385-9899	Empirical Labs
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER	PHONE NUMBER	ADDRESS
N. Brock / Tt		Yarrisa Martinez	Same	621 Mainstream Dr. Ste 270
		CARRIER/WAYBILL NUMBER		CITY, STATE
		8684 5094 5059		Nashville TN 37228

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

CONTAINER TYPE PLASTIC (P) or GLASS (G)

PRESERVATIVE USED

TYPE OF ANALYSIS: 8260 B HCl; 6010 B HNO3

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	8260 B	6010 B							COMMENTS
11-9	0836	~~01GS~~ 01GW 01GS64-1110	GS64	–	–	GW	G	5	3	2							
—	—	Trip Blank #8343	–	–	–	W	–	2	✓	—							
11-9	1025	01GW01GI36-1110	GI36	–	–	GW	G	5	3	2							
11-9	1320	01GW01GS71-1110	GS71	–	–	GW	G	5	3	2							
11-9	1355	01GW01GI72-1110	GI72	–	–	GW	G	5	3	2							
11-9	1425	01GW01GS62-1110	GS62	–	–	GW	G	5	3	2							
11-9	1425	~~01GW01G~~ GW01-1110	—	–	–	GW	G	5	3	2							
11-9	1535	01GW01GI43-1110	GI43	–	–	GW	G	5	3	2							
11-10	0813	01GW01GGM33-1110	GGM33	–	–	GW	G	5	3	2							GGM33
11-10	0815	01GW01GI59-1110	GI59	–	–	GW	G	5	3	2							
11-10	0900	01GW01GI32-1110	GI32	–	–	GW	G	5	3	2							
11-10	0952	~~01~~ 01GW01GS57-1110	GS57	–	–	GW	G	5	3	2							
11-10	1030	01GW01GI74-1110	GI74	–	–	GW	G	5	3	2							

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY: N. Brock	11-10-10	1500	1. RECEIVED BY		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS select metals: aluminum, nickel, iron, manganese, cadmium, chromium
VOC's: vinyl chloride, benzene, chlorobenzene, total xylenes 1122 TCE naphthalene

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4/02R
FORM NO. TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 2832 | PAGE 2 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G00702	NAS Pensacola	Gerry Walker	850 385 7899	Empirical Labs.
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Yarissa Martinez	PHONE NUMBER: same?	ADDRESS: 621 Mainstream Dr. Ste 270
		CARRIER/WAYBILL NUMBER: 8684 5094 5059		CITY, STATE: Nashville TN 37228

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE / YEAR	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)		PRESERVATIVE USED		TYPE OF ANALYSIS: 8260 B	TYPE OF ANALYSIS: 6010 B	COMMENTS
									G	P	HCl	HNO3			
11-10 / 2010	1110	01GW01GS73-1110	GS73	-	-	GW	G	5		3		2			
11-10	1140	01GW01GI46-1110	GI46	-	-	GW	G	5		3		2			
~~11-10~~		~~01GW01GI44-1110~~	~~GI44~~	~~-~~	~~-~~	~~GW~~	~~G~~	~~5~~		~~3~~		~~2~~			
11-10	1310	01GW01GI41-1110	GI41	-	-	GW	G	5		3		2			
11-10	-	TripBlankK*8342	-	-	-	W	G	2		2		-			
11-10	1310	MS	GI41	-	-	GW	G	5		3		2			
11-10	1310	MSD	GI41	-	-	GW	G	5		3		2			
11-10	1310	GW02-1110	GI41	-	-	GW	G	5		3		2			

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	11-10-10	1500	1. RECEIVED BY		
2. RELINQUISHED BY			2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY		

COMMENTS: see page 1 of 1 for notes

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4/02R
FORM NO TtNUS-001

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 2828 | PAGE 1 OF 1

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G00702	NAS Pensacola	Gerry Walker	850-385-9899	Empirical Labs
SAMPLERS (SIGNATURE)		**FIELD OPERATIONS LEADER**	**PHONE NUMBER**	**ADDRESS**
		Yarissa Martinez	same	621 Mainstream Ste 270
		CARRIER/WAYBILL NUMBER 8735-965-6871 ~~8684 5091 5105~~		**CITY, STATE** Nashville TN 37228

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS 8260 B	6010 B						COMMENTS
									G									
									P	HCl								
										HNO3								
11.13	0900	01RB01-1110	RB	—	—	QC	G	4	3	1								

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	11.13.10	0926	1. RECEIVED BY		
2. RELINQUISHED BY	DATE	TIME	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE	TIME

COMMENTS

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FORM NO. TINUS-001

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	OU1 - Long Term Monitoring	Project No.:	112G00702 Task
Location:	~~[illegible]~~	Personnel:	Jared Shelburne, Melissa Srock, Dave Giddens & Yarissa Mar
Weather Conditions:		Measuring Device:	Water Level Indicator
Tidally Influenced:	Yes __ No X	Remarks:	

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth Below TOC (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
01UPGW1	11-8-10	0900	—	—	DRY	Ø		
01GS42		1541		16.50	6.91	—		
01GS53		1603		20.03	12.92	—		(3.17-13.17 screen)
01GS57		1305		19.53	11.90	—		
01GS62		1510		19.55	8.25	—		
~~01GS[illegible]~~								
~~01GS71~~								
~~01GS75~~								
01GGM04		1610		18.53	9.73	—		
01GGM05		1446		12.61	5.70	—		
01GGM33		1458		12.90	6.10	—		
01GGM38		1555		17.60	8.55	—		
01GGM39								
~~01GGM41~~		~~unable to locate~~						
01GI32		1310		38.00	17.46	—		
01GI35		1600		32.81	6.41	—		directly off road in line w/ wash statio
01GI44				DESTROYED				18.9 - 28.9 screen
01GI43		1512		27.90	12.83	—		
01GGM41		1530		19.70	4.40	—		
01GI46		1435		31.95	7.43	—		
01GI48		1420		25.85	10.07	—		
01GI59		1459		30.75	7.95	—		
01GI65		1035		40.00	8.25	—		
01GI66		1602		67.39	15.29	—		
01GI72		1300		24.53	6.63	—		
01GI74		1305		29.38	3.85	—		
01PZ1		1640		16.23	6.97	—		
01PZ101		1202		9.79	0.67	—		
01PZ102		1158		9.80	2.50	Ø		
01PZ103		1207		13.77	3.89	Ø		
01PZ104		1145		14.70	4.92	Ø		
01PZ105		1215		13.63	4.65	Ø		
01PZ106		1112		14.10	5.60	Ø		
01PZ6		1130		12.00	8.79	Ø		
01PZ6A		1126		38.60	7.01	Ø		
01PZ7		1631		25.83	5.62	—		
01PZ7B		1630		39.25	3.30	—		
01PZ7A		1625		14.15	3.70	—		
01PZ8		1616		26.03	5.95	—		
01PZ10		1617		25.87	5.39	—		
01GS64		1030		16.60	6.65			
SG1		1120		—	3.42	—		
SG2		1146		—	3.46	—		
SG3				—	3.32	—		
GGM39	~~GM36~~	1148		25.10	5.86	—		
01GI71		1301		14.50	6.95	—		
01GS73		1440		12.35	3.48	—		
01GI41		1540		42.51	6.75	—		42.6 = 29.5-39.5 screen TD

other side Taylor

see below

(key) needed

across way GC

on courset

OST

Page ___ of ___

EQUIPMENT CALIBRATION LOG

Tetra Tech NUS, Inc.

PROJECT NAME : OU1 - Long Term Monitoring

SITE NAME: NAS Pensacola

PROJECT No.: 112G00702 Task 05.130

INSTRUMENT NAME/MODEL: YSI 556

MANUFACTURER: YSI

SERIAL NUMBER: 09G100115

Date of Calibration	Instrument I.D. Number PINE	Person Performing Calibration	Conductivity Pre-Post calibration	ORP Pre-Post calibration	pH7 Pre-Post calibration	~~pH10~~ pH4 Pre-Post calibration	Calibration Standard (Lot No.)	Remarks and Comments
11/7	14825	MB	1.346	248.3	7.04		See Below	
11/7	"	end of day check		240.2	7.01	4.11		
							See Below	
11/9	"	MB	70/1412	254/240	6.5/7.01	3.6/4.10		
11/10	"	JS	1291/1413	241/240	6.99/7.00	3.96/4.00	See Below	
11.10	"	MB end of day ✓	1420	248	6.89	3.96		

CALIBRATION STANDARDS INFORMATION

Solution	Lot #					Expiration Date
ORP	24597	240				4/2015
Conductivity	7470	1.413 ms/cm				10/2010
pH 7	4003078	7				3/2012
pH 10	1002035	10				7/2011

EQUIPMENT CALIBRATION LOG

Tetra Tech NUS, Inc.

PROJECT NAME : OU1 - Long Term Monitoring

INSTRUMENT NAME/MODEL: LaMotte 2020e

SITE NAME: NAS Pensacola

MANUFACTURER: LaMotte

PROJECT No.: 112G00702 Task 05.130

SERIAL NUMBER: ME-11955

Date of Calibration	Instrument I.D. Number PINE	Person Performing Calibration	1 NTU Pre-calibration	1 NTU Post-calibration	10 NTU Pre-calibration	10 NTU Post-calibration	Remarks and Comments
11/7/10	9918	M. Brock	-0.6	1.04		10.08	
		Y. Martinez	end of day reading				
			1.16			10.50	ok
11/8/10	"	M. Brock	-0.64	1.01	14.62	10.04	
11/9/10	"	J. Shelburne					
11/10/10	"	J. Shelburne	0.94	0.94	16.4	9.77	
11.10.10	"	MBrock EOD	—	0.92	—	9.37	

CALIBRATION STANDARDS INFORMATION

Solution	Lot #	Batch	Expiration Date
10NTU	C033300	6/22/10	10/2011
1 NTU	P999108	5/17/10	9/2011
0	C034709	4/29/10	10/2011

EQUIPMENT CALIBRATION LOG

Tetra Tech NUS, Inc.

PROJECT NAME : OU1 - Long Term Monitoring

SITE NAME: NAS Pensacola

PROJECT No.: 112G00702 Task 05.130

INSTRUMENT NAME/MODEL: LaMotte 2020e

MANUFACTURER: LaMotte

SERIAL NUMBER: M.F - 18743

Date of Calibration	Instrument I.D. Number PINE	Person Performing Calibration	1 NTU		10 NTU		Remarks and Comments	
			Pre-calibration	Post-calibration	Pre-calibration	Post-calibration		
11-6-10	#12384	T.S.	2.017	0.99	4.57	9.93		
11-7-10	12384	Y.M	1.79	0.93	6.38	9.18		
11.7.10	"	MB	End of day	1.11	End of Day 9.96			
11.9.10	"	MB	0.46	0.97	11.4	9.80		
11.10.10	"	MB	1.80	0.99	11.8	9.92		
11.10.10	"	mbEODV	—	0.89	—	10.18		

CALIBRATION STANDARDS INFORMATION

Solution	Lot #	Batch	Expiration Date
10NTU	P99L394	2/18/10	9/11
0 NTU	C03479	4/24/10	10/11

EQUIPMENT CALIBRATION LOG

Tetra Tech NUS, Inc.

PROJECT NAME : OU1 - Long Term Monitoring

SITE NAME: NAS Pensacola

PROJECT No.: 112G00702 Task 05.130

INSTRUMENT NAME/MODEL: YSI 556 MPS

MANUFACTURER: YSI

SERIAL NUMBER: SN: 02H07047A

Date of Calibration	Instrument I.D. Number PINE	Person Performing Calibration	Conductivity Pre-Post calibration	ORP Pre-Post calibration	pH7 Pre-Post calibration	~~pH10~~ pH4 Pre-Post calibration	Calibration Standard (Lot No.)	Remarks and Comments
11/7/10	OH13	y m	1.363	289.1	7.02		See Below	
11/7/10	end of day Check			238.8	6.84	4.20		
11/9/10		T.S.	1.423	262/240.1	6.98/7.00	4.16/4.00	See Below	
11/10/10	"	MB	432/1431	300/24.0	4.62/7.00	3.21/4.01		
11/10/10	"	PNB EOD ✓	1440	254	6.85	3.92	See Below	

CALIBRATION STANDARDS INFORMATION

Solution	Lot #					Expiration Date
ORP	1857	240mV				01/2014
Conductivity	8099	1.413us/cm				6/2011
pH 7	8091171	7				8/2011
pH 10						

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION:	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GI65	SAMPLE ID:	01GW 01GI65 -1110	DATE: 11-8-10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet) to (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16		8.25	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

= (40)FT - (8.25)FT x 0.16 gallons/foot = 5.08 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
9.25	9.25	910	~~1025~~ 1027	7.62

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS
								% / mg/L				ORP
1001	5.08	5.08	0.1	8.48	5.55	21.98	272	21 / 0.20	0.25	clear	petroleum	-83.6
1014	1.27	6.35			5.52	22.00	266	2.1 / 0.18	1.10		(strong)	-84.6
1027	1.27	7.62			5.52	22.04	266	2.3 / 0.20	0.97			-85.7

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
Thomas Shelburne	Thomas Shelburne	1030	1037

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
9.25	PE		N/A

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (Replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph					
01GW 01GI65 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	~~APP~~ RFPP	100	
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)				
	1	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP		
							(aluminum, nickel, iron, manganese, cadmium, chromium)				

REMARKS: $\frac{55 ml}{15 s} \times \frac{60 s}{min} \times \frac{1 L}{1000 ml} \times \frac{1 gal}{3.79 L} = 0.06 gal/min$

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01UPGW1	SAMPLE ID:	01GW 01UPGW1 -1110	DATE: 11-8-10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet) to (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
1.0	3/16			PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= ( )FT - ( )FT X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS

Dry

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT	SAMPLING ENDED AT:
M Brock FT	M Brock		

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
	PE		NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION			SAMPLE PRESERVATION							
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)	
01GW 01UPGW1 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	~~APP~~ RFPP	100	
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)				
	1	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP	100	
							(aluminum, nickel, iron, manganese, cadmium, chromium)				

REMARKS:
1/4 WV = Dry and unable to sample

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:
1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GI36	SAMPLE ID:	01GW 01GI36 -1110	DATE: 11/9/10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	1/4	? to ?	7.45	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH − STATIC DEPTH TO WATER) X WELL CAPACITY (only fill out if applicable)

(35.5)FT - (7.45)FT x 0.16 gallons/foot = 4.488 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
8.45	8.45	0911	1020	

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
0956	4.488	4.488	0.1	7.60	4.87	22.84	177	2.5 / 0.22	8	clear	none	218.9
1005	1.122	5.61			4.85	22.83	175	2.0 / 0.17	8			222.9
1020	1.122	6.732			4.86	22.76	175	2.4 / 0.21	8			223.7

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
M. Brock / FT	M Brock	1025	

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
8.45	PE		

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) D&d DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION			SAMPLE PRESERVATION							
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)	
01GW 01GI36 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	~~APP~~ RFPP	100	
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)				
	1	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP	100	
							(aluminum, nickel, iron, manganese, cadmium, chromium)				

REMARKS: 1/4 WV = 1.122 gal, or 12 min

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GS73	SAMPLE ID:	01GW 01GS73 -1110	DATE: 11-10-10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet) 3 to 13 (feet)	STATIC DEPTH TO WATER (ft) 3.48	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (13)FT - (3.48)FT x .16 gallons/foot = 1.5 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
9	9	1041	1107	2.6

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (uS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	W/COLOR	ODOR	COMMENTS
1101	2.0	2.0	.10	3.48	5.87	23.41	610	2.27/.18	18.1	Strawyellow	NA	ORP 8.5
1104	.3	2.3	"	"	5.87	23.42	605	2.01/.17	12.2	"	"	7.5
1107	.3	2.6	"	"	5.89	23.38	616	1.81/.16	10.1	"	"	5.8

SAMPLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT	SAMPLING ENDED AT:
M. Brock / FT	M Brock	1110	1115

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
9	PE		NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N (replaced)) Ded DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION			SAMPLE PRESERVATION				INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph					
01GW 01GS73 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	~~APP~~ RFPP	100	
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)				
	2	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP	100	
							(aluminum, nickel, iron, manganese, cadmium, chromium)				

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)
SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:
1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GS71	SAMPLE ID:	01GW 01GS71 -1110	DATE: 11/9/10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16	5 to 15 (feet)	6.85	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (15)FT - (6.85)FT X 0.16 gallons/foot = 1.3 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT: 1331	PURGING ENDED AT: 1350	TOTAL VOLUME PURGED (gal): 1.90
11	11			

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
1344	1.3	1.3	.10	7.01	6.30	25.30	685	2.7%/.22	6.17	Slightly yellow	NA	-50.8
1347	.3	1.6	↓	↓	6.29	25.30	680	2.7%/.22	5.01	↓	↓	-45.8
1350	.3	1.9	↓	↓	6.30	25.29	684	2.7%/.22	4.29	↓	↓	-44.6

START

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1355	SAMPLING ENDED AT: 1400
M. Brack / T			

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
11	PE		NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N (replaced)) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION						
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)
01GW 01GS71 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	~~APP~~ RFPP	100
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)			
	1	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP	100
							(aluminum, nickel, iron, manganese, cadmium, chromium)			

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)
SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:
1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GS72	SAMPLE ID:	01GW 01GS72 -1110	DATE: 11/9/10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16	? to ? (feet)	6.55	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

= (25.5)FT - (6.55)FT X 0.16 gallons/foot = 3.03 gallons

.8 l/min

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
8	8	1230	1317	4.7

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	% DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS
1301	3.1	3.1	.10	6.108	6.20	24.50	30605	3.9% / 0.14	8.64	Slight yellow	NA	ORP = 185.6
1309	.8	3.9	↓	↓	6.20	24.57	30600	2.0% / 0.14	5.44	↓	NA	= 193.2
1317	.8	4.7	↓	↓	6.22	24.54	30608	1.8% / 0.13	5.01	↓	NA	= 202.1

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./FT.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT	SAMPLING ENDED AT:
M. Brock/TT		1320	1330

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
8	PE		NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION						
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)
01GW 01GS72 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	~~APP~~ RFPP	100
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)			
	1	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP	100
							(aluminum, nickel, iron, manganese, cadmium, chromium)			

REMARKS:

.75 or 8 min = 1/4 WV

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GS62	SAMPLE ID:	01GW 01GS62 -1110	DATE: 11/9/10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet):	STATIC DEPTH TO WATER (ft):	PURGE PUMP TYPE OR BAILER:
2	3/16	10 to 20	8.36	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (19.55)FT - ( )FT X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = (0.15)gallons + (0.004 gallons/ft X 15 feet) + 0.132 gallons = 0.16 (.153) gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
15 mp 18	15 mp 18	1410	1423	0.65

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	PH	TEMP (°C)	COND (uS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
1414	.20	.20	.05	8.42	5.11	24.75	67	27.5%	5.31	clear	NA	62.9
1417	.15	.35	"	"	4.74	24.71	67	26.8%	5.01	clear	"	108.1
1420	.15	.50	"	"	4.73	24.63	67	27.3%	4.93	"	"	123.8
1423	.15	.65	"	"	4.69	24.60	67	27.0	4.24	"	"	144.6

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./FL): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT	SAMPLING ENDED AT:
M. Brock/TT	M Brock	1425	1430

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
15 mp 18	PE		NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N (replaced)) DUPLICATE: (Y) N 10 (ADD DATE)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION		INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL) FINAL Ph					
01GW 01GS62 -1110	3	CG	40 mL	HCL		SELECT VOCs	8260 B	~~APP~~ RFPP APP	100	
	2	PE	250 mL	HNO_3		METALS	6010 B		100	
GW01-11 10	3	CG	40 mL	HCL		SELECT VOCs	8260 B	~~APP~~ RFPP APP	100	
	2	PE	250 mL	HNO_3		METALS	6010 B		100	

REMARKS: Select VOCs (Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethene, Naphthalene) & Select Metals (aluminum, nickel, iron, manganese, cadmium, chromium)

1/4 WVE

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	DATE:	11.10.10
WELL NO:	01GI32	SAMPLE ID:	01GW 01GI32 -1110		

PURGING DATA

WELL DIAMETER (inches):	2	TUBING DIAMETER (inches):	3/16	WELL SCREEN INTERVAL (feet)	25 to 35	STATIC DEPTH TO WATER (ft)	17.55	PURGE PUMP TYPE OR BAILER:	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (38.00)FT - ( )FT X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = (0)gallons + (30.0014 gallons/ft X 30 feet) + 0.132 gallons = 0.2 gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	30	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	30	PURGING INITIATED AT:	0846	PURGING ENDED AT:	0859	TOTAL VOLUME PURGED (gal):	0.65

TIME	VOLUME PURGED (gal)	COMUL VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
0850	0.2	0.2	0.05	17.56	6.26	20.44	796	11.0 / 0.98	10.63	cloudy yellow	odorless	-41.3
0853	0.15	0.35	↓	↓	6.25	20.41	798	9.4/0.85	2.78	↓	↓	-44.0
0856	0.15	0.50	↓	↓	6.25	20.45	799	6.8/0.61	5.59	↓	↓	-47.9
0859	0.15	0.65	↓	↓	6.25	20.46	799	6.5/0.58	3.11	↓	↓	-49.3

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	WBrock/TT	SAMPLER(S) SIGNATURE(S):		SAMPLING INITIATED AT	0900	SAMPLING ENDED AT:	0910
PUMP OR TUBING DEPTH IN WELL (feet):	30	TUBING MATERIAL CODE:	PE	FIELD-FILTERED: Y / N	N	FILTER SIZE: (µm)	NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y N (replaced) Dedi DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph					
01GW 01GI32 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	APP RFPP	100	
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)				
	2	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP	100	
							(aluminum, nickel, iron, manganese, cadmium, chromium)				

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	~~01GW~~ 01GW59	SAMPLE ID:	01GW 01GW59 -1110	DATE: 11/10/11

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16	feet ? to ? feet	8.51	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY (only fill out if applicable)

= (30.75)FT - (8.51)FT X .16 gallons/foot = 3.55 gallons

36 min

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME (only fill out if applicable)

= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
10	10	0717	0811	5.4

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	% DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
0753	3.6	3.6	.10	8.82	6.22	20.97	438	4.3/1.43	0	Clear	NA	-57.0
0802	.9	4.5	↓	↓	6.22	21.01	439	4.3/1.39	↓	↓	↓	-57.8
0811	.9	5.4	↓	↓	6.23	21.01	438	4.3/1.38	↓	↓	↓	-57.6
						STABLE						

3.6 + 1.7 = 5.3

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT	SAMPLING ENDED AT:
M. Brock / FT		0815	0825

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
10	PE		NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y ~~N (replaced)~~ Yes DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION			SAMPLE PRESERVATION			INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph					
01GW 01GW59 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	APP		
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)				
	1	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP		
							(aluminum, nickel, iron, manganese, cadmium, chromium)				

REMARKS:

1/4 wv = .8875, or 9 min

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida
WELL NO:	01GI41	SAMPLE ID:	01GW 01GI41 -1110
DATE:	11-10-10		

PURGING DATA

WELL DIAMETER (inches):	2	TUBING DIAMETER (inches):	3/1.0	WELL SCREEN INTERVAL (feet):	29.5 to 39.5
STATIC DEPTH TO WATER (ft):	6.77	PURGE PUMP TYPE OR BAILER:	PP		

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

)FT - ( )FT X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= ( )gallons + (0.0014 gallons/ft X 30 feet) + 0.132 gallons = 0.174 gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	30	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	30	PURGING INITIATED AT:	1251
PURGING ENDED AT:	1305	TOTAL VOLUME PURGED (gal):	.6		

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
1255	.2	.2	.05	6.89	5.74	22.34	372	5.0%/.43	2.81	clear	NA	-8.4
1300	.2	.4			5.75	22.28	369	4.2%/.36	2.01	clear		-11.2
1305	.2	.6			5.76	22.26	369	3.6%/.31	1.98	clear		-12.5

STABILIZED

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	M. Barock Tt.	SAMPLER(S) SIGNATURE(S):	
SAMPLING INITIATED AT:	1310	SAMPLING ENDED AT:	1325

PUMP OR TUBING DEPTH IN WELL (feet):	30	TUBING MATERIAL CODE:	PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: (µm) PE

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUPLICATE: (Y) N ID (ADD DATE)

SAMPLE ID CODE	SAMPLE CONTAINER SPECIFICATION # CONTAINERS	MATERIAL CODE	VOLUME	SAMPLE PRESERVATION PRESERVATIVE USED	TOTAL VOL. ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)
01GW 01GI41 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	~~APP~~ RPPP	100
	2	PE	250 mL	HNO_3			METALS	6010 B	APP	
GW02-11 10	3	CG	40 mL	HCL			SELECT VOCs	8260 B	~~APP~~ RPPP	100
	2	PE	250 mL	HNO_3			METALS	6010 B	APP	

REMARKS: Select VOCs (Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene) & Select Metals (aluminum, nickel, iron, manganese, cadmium, chromium)

MS/MSD 3/2 / 3/2 VOCs/metals / VOCs/metals

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RPPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GI44	SAMPLE ID:	01GW 01GI44 -1110	DATE: 11-10-10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet) to (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16			

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH − STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

= ( )FT - ( )FT X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= ( )gallons + (gallons/ft X (feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS

DESTROYED

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT	SAMPLING ENDED AT:

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y N Filtration Equipment Type:	FILTER SIZE: (µm)

FIELD DECONTAMINATION: PUMP Y N TUBING Y N (replaced) DUPLICATE: Y N

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION						
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)	
01GW 01GI44 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	APP	
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)			
	1	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP	
							(aluminum, nickel, iron, manganese, cadmium, chromium)			

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GI74	SAMPLE ID:	01GW 01GI74 -1110	DATE: 11-10-10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16	(feet) 25 to 30 (feet)	6.95	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

= ( )FT - ( )FT X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= (0)gallons + (.0014 gallons/ft X 27.5 feet) + .132 gallons = .17 gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
27.5	27.5	1015	1028	.65

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS
1019	.2	.2	.05	6.98	6.06	22.16	6.20	5.71/5.49	8.31	very slight yellow	NA	ORP -34.1
1022	.15	.35	↓	↓	6.07	22.21	6.35	3.71/3.32	12.7	↓	↓	-36.2
1025	.15	.50	↓	↓	6.03	22.28	6.36	4.37/4.37	10.8	↓	↓	-38.6
1028	.15	.65	↓	↓	6.07	22.27	6.37	4.71/4.41	9.6	↓	↓	-39.1

STOP

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
M. Brock / FT	MBrock	1030	1040

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
27.5	PE		NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N (replaced) Dedi DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph					
01GW 01GI74 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B (Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)	~~APP~~ RFPP		
	1 2	PE	250 mL	HNO_3			SELECT METALS	6010 B (aluminum, nickel, iron, manganese, cadmium, chromium)	APP		

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

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2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida
WELL NO:	01GI43	SAMPLE ID:	01GW 01GI43 -1110
DATE:	11-9-10		

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL (feet): 31 to 46 (feet)	STATIC DEPTH TO WATER (ft): 12.80	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (27.90)FT - (12.80)FT x .16 gallons/foot = 2.416 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 14	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 14	PURGING INITIATED AT: 1455	PURGING ENDED AT: 1534	TOTAL VOLUME PURGED (gal): 3.9

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
1520	2.5	2.5	.10	12.88	5.40	21.32	139	4.67/.49	0	clear	NA	-101.1
1527	.7	3.2	↓	↓	5.39	21.32	139	3.84/1.34	0	↓	↓	-95.5
1534	.7	3.9	↓	↓	5.39	21.33	139	3.54/1.31	0	↓	↓	-88.2

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: M. Brock / FT	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1535	SAMPLING ENDED AT: 1540
PUMP OR TUBING DEPTH IN WELL (feet): 14	TUBING MATERIAL CODE: PE	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm) NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y N (Replaced) Ded DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION						
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)
01GW 01GI43 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	APP RFPP	100
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)			
	1	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP	100
							(aluminum, nickel, iron, manganese, cadmium, chromium)			

REMARKS: 1/4 WV = .625 or 7 min

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida
WELL NO:	01GI48	SAMPLE ID:	01GW 01GI48 -1110
DATE:	11-10-10		

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL (feet): 19 to 29 (feet)	STATIC DEPTH TO WATER (ft): 7.48	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

= ( )FT - ( )FT X gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= (0)gallons + (.0014 gallons/ft X 24 feet) + .132 gallons = .1656 gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 24	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 24	PURGING INITIATED AT: 1122	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
1126	.2	.2	.05	7.56	5.99	21.44	326	4.2%/.37	16.61	clear	NA	-5.2
1129	.15	.35	"	"	5.99	21.41	326	3.8%/.34	5.29	"	"	-5.3
1132	.15	.50	"	"	5.98	21.46	326	3.3%/.29	5.01	"	"	-5.7
1135	.15	.65	"	"	5.98	21.45	326	3.3%/.29	4.82	"	"	-6.2
					STABLE							

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: M. Brock / Tt	SAMPLER(S) SIGNATURE(S): M Brock	SAMPLING INITIATED AT: 1133 (1140)	SAMPLING ENDED AT: 1150
PUMP OR TUBING DEPTH IN WELL (feet): 24	TUBING MATERIAL CODE: PE	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm) NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUPLICATE: Y (N)

SAMPLE ID CODE	SAMPLE CONTAINER SPECIFICATION # CONTAINERS	MATERIAL CODE	VOLUME	SAMPLE PRESERVATION PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/min)	
01GW 01GI48 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B	~~APP~~ RFPP	100	
							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)				
	1/2	PE	250 mL	HNO_3			SELECT METALS	6010 B	APP	100	
							(aluminum, nickel, iron, manganese, cadmium, chromium)				

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GS57	SAMPLE ID:	01GW 01GS57 -1110	DATE: 11.10.10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16	10 to 20 feet	12.02	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH − STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (19.53)FT - (12.02)FT x .16 gallons/foot = 1.2016 gallons 25 min

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
16	16	0920	0951	1.55

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	% DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	Odor -COLOR	color -COLOR	COMMENTS ORP
0945	1.25	1.25	.05	12.24	6.20	24.20	161	73%/6.92	10.98	faint musty/petroleum	light yellow	104.9
0948	.15	1.40	↓	↓	6.19	24.17	161	72%/6.88	10.02	↓	↓	111.2
0951	.15	1.55	↓	↓	6.18	24.22	162	71.7%/6.86	8.41	↓	↓	115.3

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT	SAMPLING ENDED AT:
M. Brock/Tt	M Brock	0952	0959

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
16	PE		NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N (replaced)) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION			SAMPLE PRESERVATION						
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)
01GW 01GS57 -1110	3	CG	40 mL	HCL			SELECT VOCs 8260 B (Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)	~~APP~~ RFPP	100
	1 2	PE	250 mL	HNO_3			SELECT METALS 6010 B (aluminum, nickel, iron, manganese, cadmium, chromium)	APP	100

REMARKS:
TOC elev. = 9.417

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)
SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:
1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	~~01GI60~~ 01GW33	SAMPLE ID:	01GW 01GI59 -1110	DATE: 11-10-10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet)	to (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2.0	3/16			6.17	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (~~6.17~~ 12.9 FT) FT - (6.17 FT) FT x 0.16 gallons/foot = 1.0768 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = ( ) gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
7.17	7.17	0734	0809	3.3868

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	pH	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS
								%/mg/L				ORP
0750	1.0768	1.0768	0.1	6.40	5.97	20.39	523	9.5/0.85	6.30	clear	Petroleum	-76.6
0753	0.3	2.0768			6.00	20.62	514	8.0/0.70	3.33		(strong)	-76.9
0756	0.3	2.3768			6.01	20.82	510	7.3/0.65	2.40			-72.8
0759	0.3	2.6768			6.01	21.06	508	4.9/0.42	1.65			-67.7
0803	0.3	2.9768			6.01	20.85	504	3.2/0.29	2.08			-66.0
0806	0.3	3.2768			6.01	20.81	508	2.3/0.21	1.42			-67.3
0809	0.3	3.5768			6.00	20.78	507	3.9/0.35	1.58			-65.5
					STABLE							

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
Thomas Shelburne	Thomas Shelburne	0813	0818

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
7.17	PE		

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION			SAMPLE PRESERVATION				INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL PH					
01GW 01GI59 -1110	3	CG	40 mL	HCL			SELECT VOCs	8260 B (Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)	~~APP~~ RFPP	400	
	1	PE	250 mL	HNO_3			SELECT METALS	6010 B (aluminum, nickel, iron, manganese, cadmium, chromium)	APP	400	

REMARKS: Screen Interval not known. Therefore, will take readings at 1/4 well volume.

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01GI64	SAMPLE ID:	-1110	DATE: 11-9-10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16	3.4 feet to 13.4 feet	6.65	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

= (16.60)FT - (6.65)FT x 0.16 gallons/foot = 1.592 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
11.625	11.625	0809	0834	2.492

TIME	VOLUME PURGED (gal)	COMUL VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
0825	1.592	1.592	0.1	6.70	6.03	22.72	436	4.21.36	24.9	clear	petroleum	-64.2
0828	0.3	1.892	↓	↓	6.03	22.70	442	3.11.26	13.9	↓	(slight)	-52.2
0831	0.3	2.192			6.01	22.71	445	2.81.24	9.166		↓	-44.2
0834	0.3	2.492			6.02	22.72	448	2.61.23	8.51			-43.2
						STABLE						

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
Thomas Shelburne		0836	

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
11.625	PE		

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUPLICATE: Y (N)

SAMPLE ID CODE	SAMPLE CONTAINER SPECIFICATION # CONTAINERS	MATERIAL CODE	VOLUME	SAMPLE PRESERVATION PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)	
0	3	CG	40 mL	HCL			SELECT	8260 B	RFPP		
0							VOCs				
-1110							(Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2-Tetrachloroethane, Naphthalene)				
	1	PE	250 mL	HNO_3			SELECT	6010 B	APP		
							METALS				
							(aluminum, nickel, iron, manganese, cadmium, chromium)				

REMARKS: $\frac{100\ mL}{15\ s} \times \frac{60\ s}{min} \times \frac{1\ L}{1000\ ml} \times \frac{1\ gal}{3.7\ L} = 0.10\ gal/min$

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: OU1 - Long Term Monitoring		SITE LOCATION NAS Pensacola, Pensacola, Florida	
WELL NO: 01PZ6	SAMPLE ID: 01GW 01PZ6 -1110		DATE:

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL (feet) to (feet)	STATIC DEPTH TO WATER (ft) 8.74	PURGE PUMP TYPE OR BAILER: PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH − STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (11.79)FT - (8.74)FT X 0.16 gallons/foot = 0.488 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT: 1110	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP	DO mg/l
1123	1	1	0.1/m	8.80	6.65	21.83	576	26.3%	10.51	clear	leony	-87.5	2.27
1127	0.5	1.5	0.1	8.80	6.58	21.87	563	23.%	4.63	clear		-68.5	1.95
1133	0.5	2	0.1	8.80	6.57	21.76	556	17.7%	3.49	clear		-64.0	1.49
1136	0.3	2.3	0.1	8.80	6.56	21.68	559	16.3%	3.80	clear		-62.9	1.44
1139	0.3	2.6	0.1	8.80	6.56	21.70	556	16.2%	2.79	clear		-62.2	1.42

Stable

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT 1140	SAMPLING ENDED AT:
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y N Filtration Equipment Type:	FILTER SIZE: (µm)

FIELD DECONTAMINATION: PUMP Y N TUBING Y N (replaced) DUPLICATE: Y N

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/min)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph				
01GW 01PZ6 -1110	1	PE	250 mL	HNO_3			IRON	6010B	APP	

REMARKS: 0.1 gal/min rate clogged at bottom of tubbing

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01PZ10	SAMPLE ID:	01GW 01PZ10 -1110	DATE: 11/7/10

PURGING DATA

WELL DIAMETER (inches):	2	TUBING DIAMETER (inches):	3/16	WELL SCREEN INTERVAL (feet)	? to ? (feet)	STATIC DEPTH TO WATER (ft)	5.35	PURGE PUMP TYPE OR BAILER:	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

= (26)FT - (5.35)FT X .16 gallons/foot = 3.3 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	22	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	22	PURGING INITIATED AT:	1315	PURGING ENDED AT:	1406	TOTAL VOLUME PURGED (gal):	5.1

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
1348	3.3	3.3	.10	5.55	6.41	21.18	407	5.32/.45	10.01	clear	stagnant	-4.0
1357	.9	4.2	"	"	6.41	21.24	406	7.22/1.03	2.60	"	"	-3.9
1406	.9	5.1	"	"	6.40	21.25	410	7.27/1.04	0.14	"	"	

SAMPLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 6" = 1.02; 8" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	M. Brock/PC	SAMPLER(S) SIGNATURE(S):		SAMPLING INITIATED AT:	1410	SAMPLING ENDED AT:	1415
PUMP OR TUBING DEPTH IN WELL (feet):	22	TUBING MATERIAL CODE:	PE	FIELD-FILTERED Y (N) Filtration Equipment Type:		FILTER SIZE: (µm)	NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) Ded. DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE		SAMPLE PUMP FLOW RATE (mL/ min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph						
01GW 01PZ10 -1110	1	PE	250 mL	HNO_3			IRON	6010B	APP		100	

REMARKS:

1/4 WV = .82 or 9 min

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida
WELL NO:	01PZ1	SAMPLE ID:	01GW 01PZ1 -1110
DATE:	11/7/10		

PURGING DATA

WELL DIAMETER (inches):	2	TUBING DIAMETER (inches):	3/16	WELL SCREEN INTERVAL (feet): ? to ? (feet)	STATIC DEPTH TO WATER (ft): 6.95
PURGE PUMP TYPE OR BAILER:	PP				

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH − STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (16.50)FT -(16.95)FT X 0.16 gallons/foot = 1.528 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
13	13	1133	1220	2.35

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
1204	1.55	1.55	.05	7.01	6.43	22.18	1620	3.0% / 0.26	18.8	clear	stale	-81.9
1212	.40	1.95	↓	↓	6.43	22.20	1621	2.8% / 0.24	12.7	↓	↓	-79.6
1220	.40	2.35	↓	↓	6.43	22.20	1621	3.0% / 0.27	12.6	↓	↓	

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0008; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	M. Brock / FT	SAMPLER(S) SIGNATURE(S):	M Brock
SAMPLING INITIATED AT:	1221	SAMPLING ENDED AT:	1226
PUMP OR TUBING DEPTH IN WELL (feet):	13	TUBING MATERIAL CODE:	PE
FIELD-FILTERED: Y (N)	Filtration Equipment Type:	FILTER SIZE: (µm)	N/A
FIELD DECONTAMINATION: PUMP Y (N)	TUBING Y (N) (replaced)	DUPLICATE: (Y) N	PZ01-11 10 (ADD DATE)

SAMPLE ID CODE	SAMPLE CONTAINER SPECIFICATION: # CONTAINERS	MATERIAL CODE	VOLUME	SAMPLE PRESERVATION: PRESERVATIVE USED	TOTAL VOL. ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)
01GW 01PZ1 -1110	1	PE	250 mL	HNO_3	prepreserved		IRON	6010B	APP	100
PZ01-11 10	1	PE	250 mL	HNO_3	"		IRON	6010B	APP	100

REMARKS: 1/4 WV = .38 or 8min

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)
SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:
1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01PZ7A	SAMPLE ID:	01GW 01PZ7A -1110	DATE: 11/7/10

PURGING DATA

WELL DIAMETER (inches):	1	TUBING DIAMETER (inches):	3/16	WELL SCREEN INTERVAL	9 feet to 14 feet	STATIC DEPTH TO WATER (ft)	3.97	PURGE PUMP TYPE OR BAILER:	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= ( )FT - ( )FT X 0.04 gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= (Ø)gallons + (0.0014 gallons/ft X 12 feet) + 0.132 gallons = 0.148 ≈0.15 gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	12	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	12	PURGING INITIATED AT:	1000	PURGING ENDED AT:	1021	TOTAL VOLUME PURGED (gal):	1.05

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS	ORP
1003	.15	0.15	.05	4.71	6.12	21.99	563	12.0%/1.03	74.5	murky	Stagnant	Stable	119.2
1006	.15	0.30			6.13	22.01	561	9.6%/0.83	55.5				119.0
1009	.15	0.45			6.14	22.03	559	8.9%/0.75	52.0				107.1
1012	.15	0.60			6.17	22.04	555	6.5%/0.73	36.1				97.6
1015	.15	0.75			6.16	22.17	551	6.0%/0.60	30.8				95.1
1018	.15	0.90			6.15	22.18	554	5.5%/0.47	24.7				106.1
1021	.15	1.05			6.16	22.20	552	4.4%/.38	19.3				86.5

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	M. Brock/Tt	SAMPLER(S) SIGNATURE(S):	M Brock	SAMPLING INITIATED AT:	1025 1005 MMB	SAMPLING ENDED AT:	1030
PUMP OR TUBING DEPTH IN WELL (feet):	12	TUBING MATERIAL CODE:	PE	FIELD-FILTERED Y / Filtration Equipment Type:		FILTER SIZE: (µm)	NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) Ded. DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE		SAMPLE PUMP FLOW RATE (mL/min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL PH						
01GW 01PZ7A -1110	1	PE	250 mL	HNO_3			IRON	6010B	APP		100	

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)
SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:
1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01PZ7	SAMPLE ID:	01GW 01PZ7 -1110	DATE: 11/7/10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16	? to ?	5.61	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (26.09)FT - (5.61)FT X .16 gallons/foot = 3.28 gallons (.33 mi

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):
23	23	1033	1124	5.1

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°c)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS
												ORP
1101e	3.3	3.3	0.10	5.66	6.18	22.06	428	3.3%/0.28	6.51	clear	Stale	-99.2
1115	0.9	4.2	↓	↓	6.17	21.96	433	3.1%/0.28	5.08	clear	Stale	-100.6
1124	0.9	5.1	↓	↓	6.15	21.94	424	3.9%/0.34	2.92	clear	Stale	-97.9

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016
PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT	SAMPLING ENDED AT:
M. Brock / FT		1125	1130

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)
23	PE		NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y N (replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION						
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)
01GW 01PZ7 -1110	1	PE	250 mL	HNO_3			IRON	6010B	APP	100

REMARKS: 1/4 = .82 gal. or 9 min

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida
WELL NO:	01PZ7B	SAMPLE ID:	01GW 01PZ7B -1110
DATE:	11/7/18		

PURGING DATA

WELL DIAMETER (inches):	1	TUBING DIAMETER (inches):	3/16	WELL SCREEN INTERVAL	35 feet to 40 feet
STATIC DEPTH TO WATER (ft)	2.79	PURGE PUMP TYPE OR BAILER:	PP		

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

= ( )FT - ( )FT X 0.04 gallons/foot = gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= (0)gallons + (0.004 gallons/ft X 38 feet) + 0.132 gallons = 0.185 gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	38	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	38	PURGING INITIATED AT:	0934
PURGING ENDED AT:	0947	TOTAL VOLUME PURGED (gal):	0.65		

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	PH	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP
0938	.2	.2	.05	3.96	5.75	21.31	105	11.57% 1.09	10.66	clear	none	-140.5
0941	.15	.35	↓	4.13	5.59	20.88	108	10.6% 1.05	15.5	clear	↓	-140.9
0944	.15	.50	↓	4.29	5.49	20.90	108	10.3% 1.16	14.9	clear	↓	-141.4
0947	.15	.65	↓	4.44	5.44	20.90	108	13.4% 1.19	16.1	clear	↓	-150.6

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	M. Brock/ TT	SAMPLER(S) SIGNATURE(S):	
SAMPLING INITIATED AT	0950	SAMPLING ENDED AT:	0955
PUMP OR TUBING DEPTH IN WELL (feet):	38	TUBING MATERIAL CODE:	PE
FIELD-FILTERED Y (N) Filtration Equipment Type:		FILTER SIZE: (µm)	NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUP. DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION						
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL PH	INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)
01GW 01PZ7B -1110	1	PE	250 mL	HNO_3			IRON	6010B	APP	100

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01PZ8	SAMPLE ID:	01GW 01PZ8 -1110	DATE: 11/7/10

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL (feet) to (feet)	STATIC DEPTH TO WATER (ft)	PURGE PUMP TYPE OR BAILER:
2	3/16		5,89	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH − STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable)

= (26,15)FT -(5,89)FT x 0,16 gallons/foot = 3,25 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable)

= ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT: 1323	PURGING ENDED AT:	TOTAL VOLUME PURGED (gal):

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS
1350	3,5	3,5	0,15	5,88	5,96	21,72	189	0,6	11,7	clear	organic	ORP 8,9
1355	0,8	4,3	0,15	5,88	5,95	21,72	188	0,49	8,19	clear		7,6
1400	0,8	5,1	0,1	5,87	5,95	21,68	187	0,48	9,02	clear		4,1

80% 6,7 5,6 5,5

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT	SAMPLING ENDED AT:
Yavissa Martinez, TNUS		1402	1405

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED Y (N) Filtration Equipment Type:	FILTER SIZE: (µm)

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE		SAMPLE PUMP FLOW RATE (gal./min)	
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph						
01GW 01PZ8 -1110	2	PE	250 mL	HNO_3			IRON	6010B	APP		0,1	

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	OU1 - Long Term Monitoring	SITE LOCATION	NAS Pensacola, Pensacola, Florida	
WELL NO:	01PZ8A	SAMPLE ID:	01GW 01PZ8A -1110	DATE: 11/7/10

PURGING DATA

WELL DIAMETER (inches):	1	TUBING DIAMETER (inches):	3/16	WELL SCREEN INTERVAL (feet)	to (feet)	STATIC DEPTH TO WATER (ft)	6.79	PURGE PUMP TYPE OR BAILER:	PP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH - STATIC DEPTH TO WATER) X WELL CAPACITY

(only fill out if applicable) = (38.58)FT -(6.79)FT x 0.04 gallons/foot = 1.27 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME

(only fill out if applicable) = ( )gallons + (gallons/ft X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	35	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	35	PURGING INITIATED AT:	1229	PURGING ENDED AT:	1255	TOTAL VOLUME PURGED (gal):	2.6

TIME	VOLUME PURGED (gal)	COMUL. VOLUME PURGED (gal)	PURGED RATE (gal)	DEPTH TO WATER (ft)	Ph	TEMP (°C)	COND (µS/cm)	DISSOLVED OXYGEN (mg/L)	TURBIDITY (NTUs)	COLOR	ODOR	COMMENTS ORP	
1242	1.3	1.3	0.1 gal/min	6.82	4.94	21.54	115	4.1	30.4	Clear	Petrified	-42.9	0.36
1247	0.5	1.8	0.1	6.82	4.92	21.53	115	3.8	32.1	Clear		-47.6	0.33
1252	0.5	2.3	0.1	6.82	4.92	21.52	115	2.8	18.8	Clear		-54.2	0.25
1255	0.3	2.6	0.1	6.82	4.92	21.52	114	2.16	15.2	Clear		-61.1	0.28

STABLE

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88

TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	M. Brock Y. Marshall	SAMPLER(S) SIGNATURE(S):		SAMPLING INITIATED AT	1300	SAMPLING ENDED AT:	1305

PUMP OR TUBING DEPTH IN WELL (feet):	35	TUBING MATERIAL CODE:	PE	FIELD-FILTERED Y (N) Filtration Equipment Type:		FILTER SIZE: (µm)	NA

FIELD DECONTAMINATION: PUMP Y (N) TUBING Y (N) (replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS / METHOD		SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL/ min)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL Ph				
01GW 01PZ8A -1110	1	PE	250 mL	HNO_3			IRON	6010B	APP	100

REMARKS: ~~400 ml/min~~ stagnant odor 0.1 gal/min

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES:

1. The above do not constitute all of the information required by Chapter 62-160, F.A.C.
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3) pH: ± 0.2 units Temperature: ± 0.2 °C Specific Conductance: ± 5% Dissolved Oxygen: all readings ≤ 20% saturation (see Table FS 2200-2); optionally, + 0.2 mg/L or + 10% (whichever is greater) Turbidity: all readings ≤ 20 NTU; optionally + 5 NTU or + 10% (whichever is greater)

Revision Date: February 12, 2009

m^3/sec = 0.0158 g/min

Tetra Tech NUS, Inc. **SURFACE WATER SAMPLE LOG SHEET**

Page___ of ___

Project Site Name: OU1 - Long Term Monitoring
Project No.: 112G00702 Task

[] Stream
[] Spring
[] Pond
[] Lake
[X] Other: WETLAND
[X] QA Sample Type: DUP - SW01-11 10 (ADD DATE)

Sample ID No.: 01SW01-1110
Sample Location: WETLAND 3
Sampled By: M. Brock
C.O.C. No.:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11/6/10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP
Time: 1345								
Depth: 2-6"	tan/brown clay	6.55	0.306	~~20.15~~ 20.69	6.73	32.2% 2.96mg		-59.8
Method: grab								

SAMPLE COLLECTION INFORMATION:

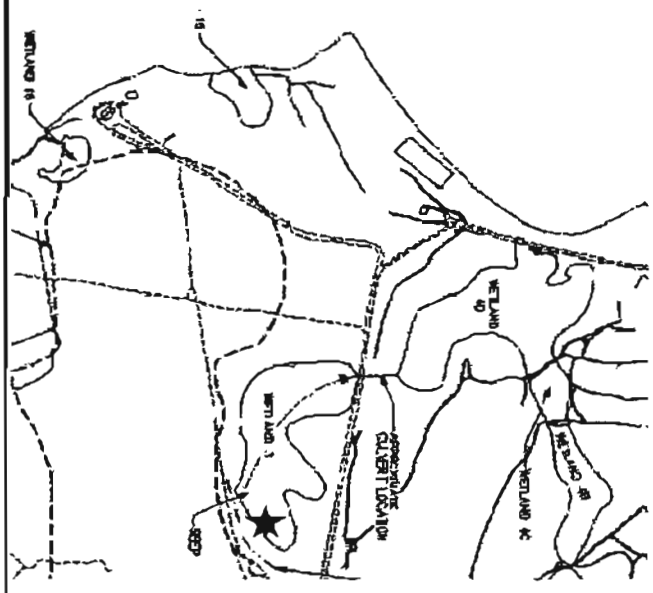
Analysis	Preservative	Container Requirements	Collected
IRON / 6010B	HNO_3	250 mL Plastic	

OBSERVATIONS / NOTES:

Remember LOW TIDE

Acc. 28ft
N 30°21'43.2"
W087°17'23.0"
49ft elev

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:
	SW01 11 0610

Signature(s):

M Brock

Tetra Tech NUS, Inc. **SURFACE WATER SAMPLE LOG SHEET**

Page___ of ___

Project Site Name: OU1 - Long Term Monitoring
Project No.: 112G00702 Task 05.130

Sample ID No.: 01SW02-1110
Sample Location: WETLAND 3
Sampled By: Melissa Brock
C.O.C. No.: 2529

[] Stream
[] Spring
[] Pond.
[] Lake
[x] Other: WETLAND
[] QA Sample Type:

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11/6/10	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP
Time: 1355								
Depth: 0-6"	Clear	6.74	0.283	17.20	8.55	56.5% 5.43mg/l	—	-72.1
Method: Grab								

SAMPLE COLLECTION INFORMATION:

Analysis	Preservative	Container Requirements	Collected
IRON / 6010B	HNO_3	250 mL Plastic	

OBSERVATIONS / NOTES:

Remember LOW TIDE @ 9 am

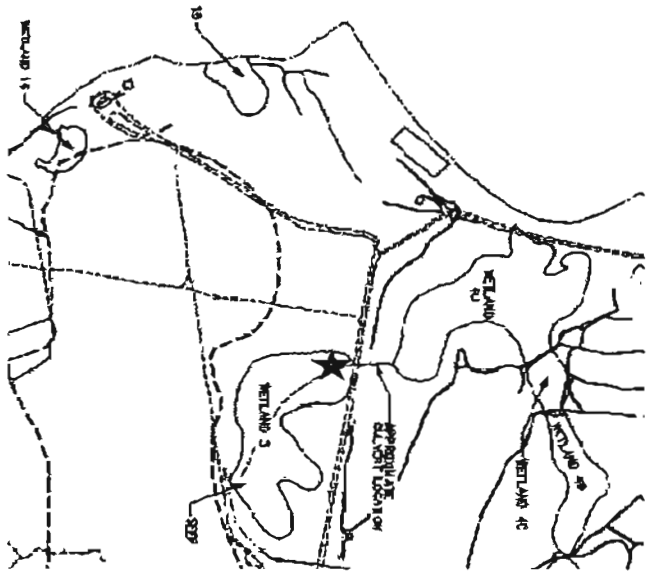
Outfall from north end of Wetland 3 into Wetland 4D

± 15 ft

N 30°21'51.5"
W087°17'18.2"

15 ft

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

Melissa Brock

Tetra Tech NUS, Inc. **SURFACE WATER SAMPLE LOG SHEET**

Page___ of ___

Project Site Name: OU1 - Long Term Monitoring
Project No.: 112G00702 Task 05.130

[] Stream
[] Spring
[] Pond
[] Lake
(x) Other: WETLAND
[] QA Sample Type:

Sample ID No.: 01SW03-1110
Sample Location: Wetland 4D
Sampled By: M. Brock
C.O.C. No.: 2829

Type of Sample:
[] Low Concentration
[] High Concentration

SAMPLING DATA:

Date: 11/6/10 Time: 1420	Color (Visual)	pH (S.U.)	S.C. (mS/cm)	Temp. (°C)	Turbidity (NTU)	DO (mg/l)	Salinity (%)	ORP
Depth: 0-6" Method: grab	clear	7.16	9.631	16.85	3.37	87.7% 8.21mg/L	—	9.3

SAMPLE COLLECTION INFORMATION:

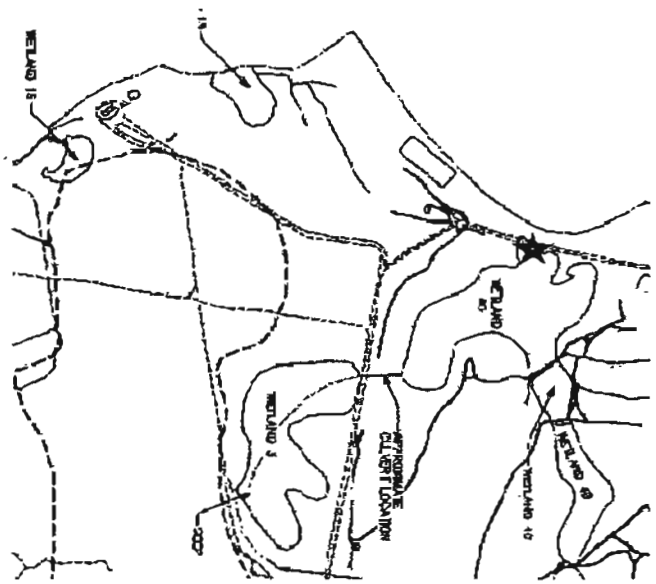
Analysis	Preservative	Container Requirements	Collected
IRON / 6010B	HNO_3	250 mL Plastic	

OBSERVATIONS / NOTES:

Remember LOW TIDE @ 9am

N 30°21' 59.0"
W 087°17' 08.6"
Elev. 7ft
±7ft

MAP:



Circle if Applicable:

MS/MSD	Duplicate ID No.:

Signature(s):

M Brock

Tetra Tech NUS, Inc.

GROUNDWATER LEVEL MEASUREMENT SHEET

Project Name:	OU1 - Long Term Monitoring	Project No.:	112G00702 Task
Location:	~~[illegible]~~	Personnel:	Jared Shelburne, Melissa Srock, Dave Giddens & Yarissa Mar
Weather Conditions:		Measuring Device:	Water Level Indicator
Tidally Influenced:	Yes __ No X	Remarks:	

Well or Piezometer Number	Date	Time	Elevation of Reference Point (feet)*	Total Well Depth Below TOC (feet)*	Water Level Indicator Reading (feet)*	Thickness of Free Product (feet)*	Groundwater Elevation (feet)*	Comments
01UPGW1	11-8-10	0900	—	—	DRY	Ø		
01GS42		1541		16.50	6.91	—		
01GS53		1603		20.03	12.92	—		(3.17-13.17 screen)
01GS57		1305		19.53	11.90	—		
01GS62		1510		19.55	8.25	—		
~~01GS[illegible]~~								
~~01GS71~~								
~~01GS75~~								
01GGM04		1610		18.53	9.73	—		
01GGM05		1446		12.61	5.70	—		
01GGM33		1458		12.90	6.10	—		
01GGM38		1555		17.60	8.55	—		
01GGM39								
~~01GGM41~~		~~unable to locate~~						
01GI32		1310		38.00	17.46	—		
01GI35		1600		32.81	6.41	—		directly off road in line w/ wash statio
01GI44				DESTROYED				18.9 - 28.9 screen
01GI43		1512		27.90	12.83	—		
01GGM41		1530		19.70	4.40	—		
01GI46		1435		31.95	7.43	—		
01GI48		1420		25.85	10.07	—		
01GI59		1459		30.75	7.95	—		
01GI65		1035		40.00	8.25	—		
01GI66		1602		67.39	15.29	—		
01GI72		1300		24.53	6.63	—		
01GI74		1305		29.38	3.85	—		
01PZ1		1640		16.23	6.97	—		
01PZ101		1202		9.79	0.67	—		
01PZ102		1158		9.80	2.50	Ø		
01PZ103		1207		13.77	3.89	Ø		
01PZ104		1145		14.70	4.92	Ø		
01PZ105		1215		13.63	4.65	Ø		
01PZ106		1112		14.10	5.60	Ø		
01PZ6		1130		12.00	8.79	Ø		
01PZ6A		1126		38.60	7.01	Ø		
01PZ7		1631		25.83	5.62	—		
01PZ7B		1630		39.25	3.30	—		
01PZ7A		1625		14.15	3.70	—		
01PZ8		1616		26.03	5.95	—		
01PZ10		1617		25.87	5.39	—		
01GS64		1030		16.60	6.65			
SG1		1120		—	3.42	—		
SG2		1146		—	3.46	—		
SG3				—	3.32	—		
GGM39	~~GM36~~	1148		25.10	5.86	—		
01GI71		1301		14.50	6.95	—		
01GS73		1440		12.35	3.48	—		
01GI41		1540		42.51	6.75	—		42.6 = 29.5-39.5 screen TD

other side Taylor

see below

(key) needed

across way GC

on courset

OST

Page ___ of ___

APPENDIX B

LABORATORY ANALYTICAL REPORTS
(provided on the enclosed CD)

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO: **G.WALKER** **DATE:** **AUGUST 9, 2010**

FROM: **DANIELLE M. BAUGHMAN** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – SELECT METALS**
CTO 067 NAS PENSACOLA
SAMPLE DELIVERY GROUP (SDG) – CTO067_P001

SAMPLES: 19/Aqueous/

01GW01GGM33-0510	01GW01GI32-0510	01GW01GI36-0510
01GW01GI41-0510	01GW01GI44-0510	01GW01GI59-0510
01GW01GI65-0510	01GW01GS64-0510	01GW01PZ07-0510
01GW01PZ1-0510	01GW01PZ10-0510	01GW01PZ6-0510
01GW01PZ6A-0510	01GW01PZ7A-0510	01GW01PZ7B-0510
01GW01PZ8-0510	01GWUPG10510	GW02-051110
PZ01051110		

Overview

The sample set for NAS Pensacola, CTO 067, SDG CTO067P_001, consists of nineteen (19) aqueous environmental samples. Samples 01GW01PZ07-0510, 01GW01PZ10-0510, 01GW01PZ1-0510, 01GW01PZ6-0510, 01GW01PZ6A-0510, 01GW01PZ7A-0510, 01GW01PZ7B-0510, 01GW01PZ8-0510, 01GWUPG10510, GW02-051110, and PZ01051110 analyzed for iron only. No field duplicate pairs were included within this SDG.

All samples except 01GW01PZ07-0510, 01GW01PZ10-0510, 01GW01PZ1-0510, 01GW01PZ6-0510, 01GW01PZ6A-0510, 01GW01PZ7A-0510, 01GW01PZ7B-0510, 01GW01PZ8-0510, 01GWUPG10510, GW02-051110, and PZ01051110 were analyzed for aluminum, cadmium, chromium, iron, manganese, and nickel. The samples were collected by Tetra Tech NUS on May 10 and 11, 2010 and analyzed by Empirical Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. Metal analyses were conducted using SW-846 6010B.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial / Continuing Calibration Verification Results
* • Laboratory Method/Preparation Blank Analyses
* • Detection Limits

* - All quality control criteria were met for this parameter.

Executive Summary

Laboratory Performance: No issues were noted.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", October 2004 and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories", January 2006.

The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS
Danielle M. Baughman
Process Engineer

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS-GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O - Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DOT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 00702	NSAMPLE	01GW01GGM33-0510			01GW01GI32-0510			01GW01GI36-0510			01GW01GI41-0510		
SDG: CTO067P_001	LAB_ID	1005086-05			1005086-06			1005086-16			1005086-08		
FRACTION: M	SAMP_DATE	5/11/2010			5/11/2010			5/11/2010			5/11/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		67.6			36.4	J	P	100			100		
CADMIUM		0.25	U		0.25	U		0.567	J	P	0.25	U	
CHROMIUM		1.01	J	P	0.641	J	P	0.5	U		1.3		
IRON		35700			37200			234			35800		
MANGANESE		257			395			62			271		
NICKEL		0.75	U		0.75	U		0.75	U		0.75	U	

PROJ_NO: 00702	NSAMPLE	01GW01GI44-0510			01GW01GI59-0510			01GW01GI65-0510			01GW01GS64-0510		
SDG: CTO067P_001	LAB_ID	1005086-10			1005086-04			1005086-01			1005086-12		
FRACTION: M	SAMP_DATE	5/11/2010			5/11/2010			5/10/2010			5/10/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		92.2			75.3			94.2			164		
CADMIUM		0.25	U		0.296	J	P	0.276	J	P	2.02		
CHROMIUM		0.789	J	P	0.723	J	P	1.01	J	P	1.51		
IRON		25300			43600			18400			64400		
MANGANESE		229			472			129			1450		
NICKEL		0.75	U		0.75	U		0.844	J	P	45.1		

PROJ_NO: 00702	NSAMPLE	01GW01PZ07-0510			01GW01PZ10-0510			01GW01PZ1-0510			01GW01PZ6-0510		
SDG: CTO067P_001	LAB_ID	1005086-14			1005086-13			1005086-17			1005086-07		
FRACTION: M	SAMP_DATE	5/10/2010			5/10/2010			5/11/2010			5/11/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM													
CADMIUM													
CHROMIUM													
IRON		11200			1740			46300			28600		
MANGANESE													
NICKEL													

PROJ_NO: 00702	NSAMPLE	01GW01PZ6A-0510			01GW01PZ7A-0510			01GW01PZ7B-0510			01GW01PZ8-0510		
SDG: CTO067P_001	LAB_ID	1005086-19			1005086-15			1005086-03			1005086-02		
FRACTION: M	SAMP_DATE	5/11/2010			5/10/2010			5/10/2010			5/10/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM													
CADMIUM													
CHROMIUM													
IRON		820			17900			1090			2940		
MANGANESE													
NICKEL													

PROJ_NO: 00702	NSAMPLE	01GWUPG10510			GW02-051110			PZ01051110		
SDG: CTO067P_001	LAB_ID	1005086-20			1005086-09			1005086-18		
FRACTION: M	SAMP_DATE	5/11/2010			5/11/2010			5/11/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		3740			94.7					
CADMIUM		0.334	J	P	0.25	U				
CHROMIUM		6.61			1.41					
IRON		2140			39000			46100		
MANGANESE		9.91			295					
NICKEL		9.83			0.75	U				

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

ANALYSIS DATA SHEET

01GW01GGM33-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 10:25
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-05
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	67.6	12.5	50.0	1		SW6010B	0F10002	06/18/10 14:09
7440-43-9	Cadmium		0.250	1.25	1	U	SW6010B	0F10002	06/18/10 14:09
7440-47-3	Chromium	1.01	0.500	1.25	1	I	SW6010B	0F10002	06/18/10 14:09
7439-89-6	Iron	35700	7.50	25.0	1		SW6010B	0F10002	06/18/10 14:09
7439-96-5	Manganese	257	0.750	3.75	1		SW6010B	0F10002	06/18/10 14:09
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	0F10002	06/18/10 14:09

ANALYSIS DATA SHEET

01GW01GI32-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 11:32
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-06
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	36.4	12.5	50.0	1	I	SW6010B	0F10002	06/18/10 14:14
7440-43-9	Cadmium		0.250	1.25	1	U	SW6010B	0F10002	06/18/10 14:14
7440-47-3	Chromium	0.641	0.500	1.25	1	I	SW6010B	0F10002	06/18/10 14:14
7439-89-6	Iron	37200	7.50	25.0	1		SW6010B	0F10002	06/18/10 14:14
7439-96-5	Manganese	395	0.750	3.75	1		SW6010B	0F10002	06/18/10 14:14
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	0F10002	06/18/10 14:14

ANALYSIS DATA SHEET

01GW01GI36-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 08:50
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-16
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	100	12.5	50.0	1		SW6010B	0F10002	06/18/10 15:13
7440-43-9	Cadmium	0.567	0.250	1.25	1	I	SW6010B	0F10002	06/18/10 15:13
7440-47-3	Chromium		0.500	1.25	1	U	SW6010B	0F10002	06/18/10 15:13
7439-89-6	Iron	234	7.50	25.0	1		SW6010B	0F10002	06/18/10 15:13
7439-96-5	Manganese	62.0	0.750	3.75	1		SW6010B	0F10002	06/18/10 15:13
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	0F10002	06/18/10 15:13

ANALYSIS DATA SHEET

01GW01GI41-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 13:55
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-08
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	100	12.5	50.0	1		SW6010B	0F10002	06/18/10 14:24
7440-43-9	Cadmium		0.250	1.25	1	U	SW6010B	0F10002	06/18/10 14:24
7440-47-3	Chromium	1.30	0.500	1.25	1		SW6010B	0F10002	06/18/10 14:24
7439-89-6	Iron	35800	7.50	25.0	1		SW6010B	0F10002	06/18/10 14:24
7439-96-5	Manganese	271	0.750	3.75	1		SW6010B	0F10002	06/18/10 14:24
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	0F10002	06/18/10 14:24

ANALYSIS DATA SHEET

01GW01GI44-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 15:15
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-10
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	92.2	12.5	50.0	1		SW6010B	0F10002	06/18/10 14:34
7440-43-9	Cadmium		0.250	1.25	1	U	SW6010B	0F10002	06/18/10 14:34
7440-47-3	Chromium	0.789	0.500	1.25	1	I	SW6010B	0F10002	06/18/10 14:34
7439-89-6	Iron	25300	7.50	25.0	1		SW6010B	0F10002	06/18/10 14:34
7439-96-5	Manganese	229	0.750	3.75	1		SW6010B	0F10002	06/18/10 14:34
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	0F10002	06/18/10 14:34

ANALYSIS DATA SHEET

01GW01GI59-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 09:40
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-04
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	75.3	12.5	50.0	1		SW6010B	0F10002	06/18/10 14:04
7440-43-9	Cadmium	0.296	0.250	1.25	1	J	SW6010B	0F10002	06/18/10 14:04
7440-47-3	Chromium	0.723	0.500	1.25	1	J	SW6010B	0F10002	06/18/10 14:04
7439-89-6	Iron	43600	7.50	25.0	1		SW6010B	0F10002	06/18/10 14:04
7439-96-5	Manganese	472	0.750	3.75	1		SW6010B	0F10002	06/18/10 14:04
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	0F10002	06/18/10 14:04

ANALYSIS DATA SHEET

01GW01GI65-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/10/10 13:15
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-01
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	94.2	12.5	50.0	1		SW6010B	0F10002	06/18/10 13:33
7440-43-9	Cadmium	0.276	0.250	1.25	1	1	SW6010B	0F10002	06/18/10 13:33
7440-47-3	Chromium	1.01	0.500	1.25	1	1	SW6010B	0F10002	06/18/10 13:33
7439-89-6	Iron	18400	7.50	25.0	1		SW6010B	0F10002	06/18/10 13:33
7439-96-5	Manganese	129	0.750	3.75	1		SW6010B	0F10002	06/18/10 13:33
7440-02-0	Nickel	0.844	0.750	2.50	1	1	SW6010B	0F10002	06/18/10 13:33

ANALYSIS DATA SHEET

01GW01GS64-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/10/10 13:15
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-12
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	164	12.5	50.0	1		SW6010B	0F10002	06/18/10 14:52
7440-43-9	Cadmium	2.02	0.250	1.25	1		SW6010B	0F10002	06/18/10 14:52
7440-47-3	Chromium	1.51	0.500	1.25	1		SW6010B	0F10002	06/18/10 14:52
7439-89-6	Iron	64400	7.50	25.0	1		SW6010B	0F10002	06/18/10 14:52
7439-96-5	Manganese	1450	0.750	3.75	1		SW6010B	0F10002	06/18/10 14:52
7440-02-0	Nickel	45.1	0.750	2.50	1		SW6010B	0F10002	06/18/10 14:52

ANALYSIS DATA SHEET

01GW01PZ07-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/10/10 16:40
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-14
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	11200	7.50	25.0	1		SW6010B	0F10002	06/18/10 15:02

ANALYSIS DATA SHEET

01GW01PZ1-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 11:20
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-17
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	46300	7.50	25.0	1		SW6010B	0F10002	06/18/10 15:18

ANALYSIS DATA SHEET

01GW01PZ10-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/10/10 15:15
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-13
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	1740	7.50	25.0	1		SW6010B	0F10002	06/18/10 14:57

ANALYSIS DATA SHEET

01GW01PZ6-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 12:45
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-07
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	28600	7.50	25.0	1		SW6010B	0F10002	06/18/10 14:19

ANALYSIS DATA SHEET

01GW01PZ6A-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 12:55
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-19
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	820	7.50	25.0	1		SW6010B	0F10002	06/18/10 15:28

ANALYSIS DATA SHEET

01GW01PZ7A-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/10/10 17:10
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-15
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	17900	7.50	25.0	1		SW6010B	0F10002	06/18/10 15:07

ANALYSIS DATA SHEET

01GW01PZ7B-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/10/10 17:20
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-03
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	1090	7.50	25.0	1		SW6010B	0F10002	06/18/10 13:59

ANALYSIS DATA SHEET

01GW01PZ8-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/10/10 14:50
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-02
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	2940	7.50	25.0	1		SW6010B	0F10002	06/18/10 13:54

ANALYSIS DATA SHEET

01GWUPG10510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 16:00
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-20
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	3740	12.5	50.0	1		SW6010B	0F10002	06/18/10 15:33
7440-43-9	Cadmium	0.334	0.250	1.25	1	J	SW6010B	0F10002	06/18/10 15:33
7440-47-3	Chromium	6.61	0.500	1.25	1		SW6010B	0F10002	06/18/10 15:33
7439-89-6	Iron	2140	7.50	25.0	1		SW6010B	0F10002	06/18/10 15:33
7439-96-5	Manganese	9.91	0.750	3.75	1		SW6010B	0F10002	06/18/10 15:33
7440-02-0	Nickel	9.83	0.750	2.50	1		SW6010B	0F10002	06/18/10 15:33

ANALYSIS DATA SHEET

GW02-051110

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 14:05
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-09
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	94.7	12.5	50.0	1		SW6010B	0F10002	06/18/10 14:29
7440-43-9	Cadmium		0.250	1.25	1	U	SW6010B	0F10002	06/18/10 14:29
7440-47-3	Chromium	1.41	0.500	1.25	1		SW6010B	0F10002	06/18/10 14:29
7439-89-6	Iron	39000	7.50	25.0	1		SW6010B	0F10002	06/18/10 14:29
7439-96-5	Manganese	295	0.750	3.75	1		SW6010B	0F10002	06/18/10 14:29
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	0F10002	06/18/10 14:29

ANALYSIS DATA SHEET

PZ01051110

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/11/10 11:22
% Solids: 0.00

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Laboratory ID: 1005086-18
Received: 05/12/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	46100	7.50	25.0	1		SW6010B	0F10002	06/18/10 15:23

APPENDIX C
SUPPORT DOCUMENTATION

Sample Delivery Group Case Narrative

Receipt Information
The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Sample 1005086-13 was corrected to reflect the sample ID as 01GW01PZ100510, sampled 5/10/10 at 15:15. Per the client the correct sampling time for 1005086-06 was logged in as 11:32. A trip blank was not received with this shipment.

Changes to the Revision
This is an original submittal of the final report package.

Analytical Information
All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:
The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:
The continuing calibration standard failed criteria in 0E14408-CCV1 for Vinyl Chloride, in 0E14206-CCV1 for Naphthalene and Vinyl chloride. The blank spike failed criteria for Vinyl Chloride in batch 0E16002 and 0E19014.

No additional anomalies or deviations are noted and the data is properly qualified.

SW6010B:
No anomalies or deviations are noted.

Data Qualifiers

As applicable and where required, the following general qualifiers are associated with the sample results. Additional qualifiers will be specified within the reporting sections of the data package or within the body of the Case Narrative.

Analytical Report Terms and Qualifiers

MDL: The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The MDL is determined from analysis of a sample containing the analyte in a given matrix.

EQL: The estimated quantitation limit (EQL), also known as Reporting Limit **(RL),** is defined as the estimated concentration above which quantitative results can be obtained with a specific degree of confidence. Empirical Laboratories defines the EQL to be at or near the lowest standard of the calibration curve.

*: A failing quality control criteria is associated with the reported result.

B: The presence of a "B" to the right of an analytical value indicates that this compound was also detected in the method blank and the data should be interpreted with caution. One should consider the possibility that the correct sample result might be less than the reported result and, perhaps, zero. **For Florida DEP reports this qualifier is "V".**

D: When a sample (or sample extract) is rerun diluted because one of the compound concentrations exceeded the highest concentration range for the standard curve, all of the values obtained in the dilution run will be flagged with a "D".

E: The concentration for any compound found which exceeds the highest concentration level on the standard curve for that compound will be flagged with an "E". Usually the sample will be rerun at a dilution to quantitate the flagged compound. **For Florida DEP reports this qualifier is "L".**

H1: The result was analyzed outside of the EPA recommended holding time.

H2: The result was extracted outside of the EPA recommended holding time

J: The presence of a "J" to the right of an analytical result indicates that the reported result is estimated. The mass spectral data pass the identification criteria showing that the compound is present, but the calculated result is less than the EQL. One should feel confident that the result is greater than zero and less than the EQL. **For Florida DEP reports this qualifier is "I".**

M: Indicates that the sample matrix interfered with the quantitation of the analyte. In dual column analysis the result is reported from the column with the lower

concentration. In metals, the qualifier indicates that the parameters MDL/RL has been raised.

N: The MS/MSD accuracy and/or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter.

P: The associated numerical value is an estimated quantity. There is greater than a 40% difference between the two GC columns for the detected concentrations. The higher of the two values is reported unless matrix interference is obvious or for HPLC analysis where the primary column is reported.

Q: The RPD and/or percent recovery failed in the associated Blank Spike and/or Blank Spike Duplicate.

S: The Internal Standard failed criteria.

U: The presence of a "U" indicates that the analyte was analyzed for but was not detected or the concentration of the analyte quantitated below the MDL.

X: The parameter shows a potential positive bias on a reported concentration due to an ICV or CCV exceeding the upper control limit on the high side.

Y: The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side.

LIMS Definitions / Naming Conventions:

The following are general naming conventions that are used throughout the laboratory; however, on a method by method basis, there are additional QAQC items that are named in a consistent format.

BLK: LIMS assigns a unique identifier to the Method Blank by naming it as the letters BLK appended to the Batch ID. A Method Blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The Method Blank is used to assess for possible contamination during preparation and/or analysis steps. Method Blanks within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally.

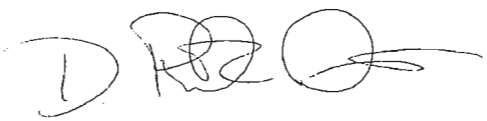
BS: LIMS assigns a unique identifier to the Blank Spike by naming it as the letters BS appended to the Batch ID. The Blank Spike or Lab Control Sample is a controlled analyte-free matrix, which is spiked with known and verified concentrations of target analytes. Spiking concentrations can be referenced in the method SOP. The BS is used to evaluate the viability of analytes taken through the entire prep (when applicable) and analytical process. Blank Spikes within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally. A duplicate Blank Spike will

be designated as a BSD.

MS: The LIMS assigns each Client sample with a unique identifier. The Matrix Spike is designated with a MS at the end of the sample's unique identifier. The Matrix Spike sample is used to assess the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. A duplicate Matrix Spike will be designated as a MSD.

IDs: The LIMS assigns each Client sample with a unique identifier. The letter "RE" may potentially be appended to the end of the LIMS Sample ID. And "**RE"** implies that the sample was either re-prepped, re-analyzed straight, or re-analyzed at a dilution. Subsequent re-analysis for the sample will be appended with a numerical value beginning with 1 that will increase incrementally. Eg: RE1, RE2, RE3, etc.

Statement of Data Authenticity:
I certify that, based upon my inquiry of those individuals immediately responsible for obtaining the information and to the best of my knowledge, the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, with the exception of the conditions detailed in this Case Narrative, as verified by my signature below. During absences, Ms. Marcia K. McGinnity is authorized to sign this Statement of Data Authenticity.



Mr. Rick D. Davis
Laboratory Technical Director / VP Operations

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 27016 | PAGE 1 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G00702	OU1-NAS Pensacola	Gerry Walker	(850) 385-9899	Empirical - Kim Kostzer
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Bill Olson	PHONE NUMBER: (850) 385-9899	ADDRESS: 621 Mainstream Drive Ste. 270
		CARRIER/WAYBILL NUMBER: 951597482765 FedEx		CITY, STATE: Nashville, TN 37228

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS: 8260B Vinyl chloride; 8260B Benzene; 8260B Chlorobenzene; 8260B Total Xylenes; 8260B 1,2,4-Trichlorobenzene; 8260B Naphthalene; 6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	COMMENTS
05/10	1315	01GW01GI65-0510		27.2	37.2	GW	G	4	G	HCL	X X X X X X X X X X X X	Cool to 4°C -01
05/10	1450	01GW01PZ8-0510				GW	G	1	P	HNO3	X	1005086 -02
05/10	1720	01GW01PZ7B-0510				GW	G	1	P	HNO3	X	-03
05/11	0940	01GW01GI59-0510		18.1	28.1	GW	G	4	G	HCL	X X X X X X X X X X X X	-04
05/11	1025	01GW01GGM83-0510		9	11.5	GW	G	4	G	HCL	X X X X X X X X X X X X	-05
05/11	1125	01GW01GI32-0510		25	35	GW	G	4	G	HCL	X X X X X X X X X X X X	-06
05/11	1245	01GW01PZ6-0510				GW	G	1	P	HNO3	X	-07
05/11	1355	01GW01GI41-0510		29.5	39.5	GW	G	4	G	HCL	X X X X X X X X X X X X	-08
05/11	1405	GW02-051110				GW	G	4	G	HCL	X X X X X X X X X X X X	-09
05/11	1515	01GW01GI44-0510		18.9	28.9	GW	G	4	G	HCL	X X X X X X X X X X X X	-10
		Trip Blank				QC			G	HCL	X X X X X X ← NO ANALYSIS	-11

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	05/11/10	1605	1. RECEIVED BY	5/11/10	1610
2. RELINQUISHED BY	05/11/10	1650	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE 5/12/10	TIME 09:15

COMMENTS: 4.4°C

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

9

CTO067P_001 Summ Package

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 ♦ Nashville, TN 37228 ♦ 615-345-1115 ♦ (fax) 615-846-5426

10272 2 of 2

Send Results to:	Send Invoice to:
Name	Name Sandy D'Alessandris
Company TTNUS	Company TTNUS
Address 661 Anderson Dr	Address 661 Anderson Dr
City Pittsburgh	City Pittsburgh
State, Zip PA, 15220	State, Zip PA, 15220
Phone (412) 921-7273	Phone (412) 921-7090
Fax	Fax
E-mail	E-mail
Project No./Name: OU1 CTO 067 NAS Pensacola	Sampler's (Signature):

Analysis Requirements: Select VOCs* 8260 | Select Metals+ 6010 Iron 6010

Lab Use Only:

VOA Headspace	Y	(N)	NA
Field Filtered	Y	(N)	NA
Correct Containers	(Y)	N	NA
Discrepancies	Y	(N)	NA
Cust. Seals Intact	(Y)	N	NA
Containers Intact	(Y)	N	NA

Airbill #: 2765

CAR #: -

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	cool 4°C	cool 4°C	cool 4°C	Comments	No. of Bottles	Lab Use Only Containers/Pres.
1005086-12	5/10/2010 13:15	01GW01GI364 0510	AQ	X	X			4	3J-HY, 1C-NI
-13	5/10/2010 15:15	01GW01PZ10 0510	AQ			X		1	
-14	5/10/2010 16:40	01GW01PZ01 0510	AQ			X		1	
-15	5/10/2010 17:10	01GW01PZ7A0510	AQ			X		1	
-16	5/11/2010 8:50	01GW01GI36 0510	AQ	X	X		sheen @ purge water	4	3J-HY
-17	5/11/2010 11:20	01GW01PZ1 0510	AQ			X	sheen @ purge water	1	
-18	5/11/2010 11:22	PZ01 051110	AQ			X		1	
-19	5/11/2010 1955	01GW01PZ6A 0510	AQ			X	strong smell to petrol.	1	
-20	5/11/2010 1600	01GW4PGW1 0510	AQ	X	X				3J-HY

	Date/Time		
Sample Kit Prep'd by: (Signature)	5/10/2010	Received By: (Signature)	
Relinquished by: (Signature)	5/11/2010 1650	Received By: (Signature)	
Relinquished by: (Signature)	Date/Time	Received By: (Signature)	
Received for Laboratory by: (Signature)	5/12/10 09:15	Temperature 4.4°C	

REMARKS:

+Select metals are: Aluminum, Cadmium, Chromium, Iron, Manganese, Nickel

* Select VOCs are: Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2 Tetrachloroethane, Naphthalene

Details:

Page 2 of 2

Cooler No. ____ of ____

Date Shipped 5/11/10

Shipped By Y. Martinez

Turnaround ____

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

CTO067P_001 Summ Package 10

HOLDTIME

SDG CTO067P_001

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	01GW01PZ8-0510	1005086-02	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01GI32-0510	1005086-06	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI36-0510	1005086-16	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI41-0510	1005086-08	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI44-0510	1005086-10	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI59-0510	1005086-04	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI65-0510	1005086-01	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01GS64-0510	1005086-12	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01PZ07-0510	1005086-14	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01PZ10-0510	1005086-13	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01PZ1-0510	1005086-17	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01PZ6-0510	1005086-07	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01PZ6A-0510	1005086-19	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GGM33-0510	1005086-05	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01PZ7B-0510	1005086-03	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	01GWUPG10510	1005086-20	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	GW02-051110	1005086-09	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	PZ01051110	1005086-18	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01PZ7A-0510	1005086-15	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
OV	UG/L	GW02-051110	1005086-09	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GGM33-0510	1005086-05	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI32-0510	1005086-06	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI36-0510	1005086-16	NM	05/11/2010	05/19/2010	05/19/2010	8	0	8
OV	UG/L	01GW01GI41-0510	1005086-08	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI41-0510	1005086-08RE1	NM	05/11/2010	05/25/2010	05/25/2010	14	0	14
OV	UG/L	01GW01GI44-0510	1005086-10	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI59-0510	1005086-04	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI65-0510	1005086-01	NM	05/10/2010	05/17/2010	05/19/2010	7	2	9
OV	UG/L	01GW01GS64-0510	1005086-12	NM	05/10/2010	05/19/2010	05/19/2010	9	0	9
OV	UG/L	01GWUPG10510	1005086-20	NM	05/11/2010	05/19/2010	05/19/2010	8	0	8

INITIAL AND CONTINUING CALIBRATION CHECK

SW6010B

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Instrument ID: ME-ICP

SDG: CTO067P_001
Project: CTO067 NAS Pensacola
Calibration: 0171001
Sequence: 0F17035

Lab Sample ID	Analyte	True	Found	%R	Units	Control Limit
0F17035-ICV1	Aluminum	10000	9986	99.9	ug/L	+/- 10.00%
	Cadmium	1000	1067	107	ug/L	+/- 10.00%
	Chromium	1000	1010	101	ug/L	+/- 10.00%
	Iron	10000	9888	98.9	ug/L	+/- 10.00%
	Manganese	1000	1016	102	ug/L	+/- 10.00%
	Nickel	1000	996.1	99.6	ug/L	+/- 10.00%
0F17035-CCV1	Aluminum	10000	10000	100	ug/L	+/- 10.00%
	Cadmium	1000	1082	108	ug/L	+/- 10.00%
	Chromium	1000	1004	100	ug/L	+/- 10.00%
	Iron	10000	9770	97.7	ug/L	+/- 10.00%
	Manganese	1000	1016	102	ug/L	+/- 10.00%
	Nickel	1000	1020	102	ug/L	+/- 10.00%
0F17035-CCV2	Aluminum	10000	10080	101	ug/L	+/- 10.00%
	Cadmium	1000	1075	107	ug/L	+/- 10.00%
	Chromium	1000	980.9	98.1	ug/L	+/- 10.00%
	Iron	10000	9495	95.0	ug/L	+/- 10.00%
	Manganese	1000	995.8	99.6	ug/L	+/- 10.00%
	Nickel	1000	1017	102	ug/L	+/- 10.00%
0F17035-CCV3	Aluminum	10000	10060	101	ug/L	+/- 10.00%
	Cadmium	1000	1066	107	ug/L	+/- 10.00%
	Chromium	1000	971.7	97.2	ug/L	+/- 10.00%
	Iron	10000	9385	93.9	ug/L	+/- 10.00%
	Manganese	1000	988.0	98.8	ug/L	+/- 10.00%
	Nickel	1000	1010	101	ug/L	+/- 10.00%
0F17035-CCV4	Aluminum	10000	10130	101	ug/L	+/- 10.00%
	Cadmium	1000	1063	106	ug/L	+/- 10.00%
	Chromium	1000	961.0	96.1	ug/L	+/- 10.00%
	Iron	10000	9550	95.5	ug/L	+/- 10.00%
	Manganese	1000	988.9	98.9	ug/L	+/- 10.00%
	Nickel	1000	1007	101	ug/L	+/- 10.00%

CRDL STANDARD

SW6010B

Laboratory: Empirical Laboratories, LLC

SDG: CTO067P_001

Client: Tetra Tech NUS, Inc. (T010)

Project: CTO067 NAS Pensacola

Instrument ID: ME-ICP

Calibration: 0171001

Sequence: 0F17035

Lab Sample ID	Analyte	True	Found	%R	Units	QC Limts
0F17035-CRL1	Aluminum	100.0	110.6	111	ug/L	80 - 120
	Cadmium	2.000	2.298	115	ug/L	80 - 120
	Chromium	4.000	4.011	100	ug/L	80 - 120
	Iron	60.00	61.32	102	ug/L	80 - 120
	Manganese	6.000	6.424	107	ug/L	80 - 120
	Nickel	6.000	7.016	117	ug/L	80 - 120

BLANKS
SW6010B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_001
Client: Tetra Tech NUS, Inc. (T010)
Instrument ID: ME-ICP
Project: CTO067 NAS Pensacola
Sequence: 0F17035
Calibration: 0171001

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C	Method
0F17035-ICB1	Aluminum	-0.3937	50.0	200	ug/L	U	SW6010B
	Cadmium	0.3397	1.00	5.00	ug/L	U	SW6010B
	Chromium	-0.02464	2.00	5.00	ug/L	U	SW6010B
	Iron	-3.000	30.0	100	ug/L	U	SW6010B
	Manganese	0.08595	3.00	15.0	ug/L	U	SW6010B
	Nickel	0.6551	3.00	10.0	ug/L	U	SW6010B
0F17035-CCB1	Aluminum	-0.284	50.0	200	ug/L	U	SW6010B
	Cadmium	0.363	1.00	5.00	ug/L	U	SW6010B
	Chromium	0.269	2.00	5.00	ug/L	U	SW6010B
	Iron	1.62	30.0	100	ug/L	U	SW6010B
	Manganese	0.220	3.00	15.0	ug/L	U	SW6010B
	Nickel	1.49	3.00	10.0	ug/L	U	SW6010B
0F17035-CCB2	Aluminum	3.04	50.0	200	ug/L	U	SW6010B
	Cadmium	0.357	1.00	5.00	ug/L	U	SW6010B
	Chromium	0.112	2.00	5.00	ug/L	U	SW6010B
	Iron	-4.34	30.0	100	ug/L	U	SW6010B
	Manganese	0.0967	3.00	15.0	ug/L	U	SW6010B
	Nickel	1.46	3.00	10.0	ug/L	U	SW6010B
0F10002-BLK1	Aluminum	2.49	12.5	50.0	ug/L	U	SW6010B
	Cadmium	0.0811	0.250	1.25	ug/L	U	SW6010B
	Chromium	-0.0138	0.500	1.25	ug/L	U	SW6010B
	Iron	-0.584	7.50	25.0	ug/L	U	SW6010B
	Manganese	0.0450	0.750	3.75	ug/L	U	SW6010B
	Nickel	0.257	0.750	2.50	ug/L	U	SW6010B
0F17035-CCB3	Aluminum	3.24	50.0	200	ug/L	U	SW6010B
	Cadmium	0.580	1.00	5.00	ug/L	U	SW6010B
	Chromium	0.00706	2.00	5.00	ug/L	U	SW6010B
	Iron	-0.612	30.0	100	ug/L	U	SW6010B
	Manganese	0.0864	3.00	15.0	ug/L	U	SW6010B
	Nickel	1.07	3.00	10.0	ug/L	U	SW6010B
0F17035-CCB4	Aluminum	-0.849	50.0	200	ug/L	U	SW6010B
	Cadmium	0.759	1.00	5.00	ug/L	U	SW6010B
	Chromium	0.144	2.00	5.00	ug/L	U	SW6010B

BLANKS
SW6010B

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
SDG: CTO067P_001
Instrument ID: ME-ICP
Project: CTO067 NAS Pensacola
Sequence: 0F17035
Calibration: 0171001

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C	Method
0F17035-CCB4	Iron	-0.506	30.0	100	ug/L	U	SW6010B
	Manganese	0.0907	3.00	15.0	ug/L	U	SW6010B
	Nickel	0.687	3.00	10.0	ug/L	U	SW6010B

PREPARATION BATCH SUMMARY

SW6010B

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_001

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Batch: 0F10002 Batch Matrix: Water Preparation: MET_3005A_LOW

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT	FINAL VOL.
Blank	0F10002-BLK1	06/10/10 07:53	100.00	25.00
LCS	0F10002-BS1	06/10/10 07:53	100.00	25.00
01GW01GI65-0510	0F10002-DUP1	06/10/10 07:53	100.00	25.00
01GWUPG10510	0F10002-DUP2	06/10/10 07:53	100.00	25.00
01GW01GI65-0510	0F10002-MS1	06/10/10 07:53	100.00	25.00
01GW01GI65-0510	0F10002-PS1	06/10/10 07:53	100.00	25.00
01GW01GI65-0510	1005086-01	06/10/10 07:53	100.00	25.00
01GW01PZ8-0510	1005086-02	06/10/10 07:53	100.00	25.00
01GW01PZ7B-0510	1005086-03	06/10/10 07:53	100.00	25.00
01GW01GI59-0510	1005086-04	06/10/10 07:53	100.00	25.00
01GW01GGM33-0510	1005086-05	06/10/10 07:53	100.00	25.00
01GW01GI32-0510	1005086-06	06/10/10 07:53	100.00	25.00
01GW01PZ6-0510	1005086-07	06/10/10 07:53	100.00	25.00
01GW01GI41-0510	1005086-08	06/10/10 07:53	100.00	25.00
GW02-051110	1005086-09	06/10/10 07:53	100.00	25.00
01GW01GI44-0510	1005086-10	06/10/10 07:53	100.00	25.00
01GW01GS64-0510	1005086-12	06/10/10 07:53	100.00	25.00
01GW01PZ10-0510	1005086-13	06/10/10 07:53	100.00	25.00
01GW01PZ07-0510	1005086-14	06/10/10 07:53	100.00	25.00
01GW01PZ7A-0510	1005086-15	06/10/10 07:53	100.00	25.00
01GW01GI36-0510	1005086-16	06/10/10 07:53	100.00	25.00
01GW01PZ1-0510	1005086-17	06/10/10 07:53	100.00	25.00
PZ01051110	1005086-18	06/10/10 07:53	100.00	25.00
01GW01PZ6A-0510	1005086-19	06/10/10 07:53	100.00	25.00
01GWUPG10510	1005086-20	06/10/10 07:53	100.00	25.00

ANALYSIS SEQUENCE SUMMARY

SW6010B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0F17035	Instrument:	ME-ICP
Calibration:	0171001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
Cal Standard	0F17035-CAL1	061810A-001	06/18/10 09:40
Cal Standard	0F17035-CAL2	061810A-002	06/18/10 09:46
Cal Standard	0F17035-CAL3	061810A-003	06/18/10 09:52
Cal Standard	0F17035-CAL4	061810A-004	06/18/10 09:58
Cal Standard	0F17035-CAL5	061810A-005	06/18/10 10:05
Cal Standard	0F17035-CAL6	061810A-006	06/18/10 10:11
Initial Cal Check	0F17035-ICV1	061810B-001	06/18/10 11:03
Initial Cal Blank	0F17035-ICB1	061810B-002	06/18/10 11:10
Instrument RL Check	0F17035-CRL1	061810B-003	06/18/10 11:16
Interference Check A	0F17035-IFA1	061810B-006	06/18/10 11:34
Interference Check B	0F17035-IFB1	061810B-008	06/18/10 11:48
Calibration Check	0F17035-CCV1	061810B-010	06/18/10 12:01
Calibration Blank	0F17035-CCB1	061810B-011	06/18/10 12:07
Calibration Check	0F17035-CCV2	061810B-023	06/18/10 13:10
Calibration Blank	0F17035-CCB2	061810B-024	06/18/10 13:17
Blank	0F10002-BLK1	061810B-025	06/18/10 13:22
LCS	0F10002-BS1	061810B-026	06/18/10 13:27
01GW01GI65-0510	1005086-01	061810B-027	06/18/10 13:33
01GW01GI65-0510	0F10002-MS1	061810B-028	06/18/10 13:38
01GW01GI65-0510	0F10002-PS1	061810B-029	06/18/10 13:43
01GW01GI65-0510	0F10002-DUP1	061810B-030	06/18/10 13:49
01GW01PZ8-0510	1005086-02	061810B-031	06/18/10 13:54
01GW01PZ7B-0510	1005086-03	061810B-032	06/18/10 13:59
01GW01GI59-0510	1005086-04	061810B-033	06/18/10 14:04
01GW01GGM33-0510	1005086-05	061810B-034	06/18/10 14:09
01GW01GI32-0510	1005086-06	061810B-035	06/18/10 14:14
01GW01PZ6-0510	1005086-07	061810B-036	06/18/10 14:19
01GW01GI41-0510	1005086-08	061810B-037	06/18/10 14:24
GW02-051110	1005086-09	061810B-038	06/18/10 14:29
01GW01GI44-0510	1005086-10	061810B-039	06/18/10 14:34
Calibration Check	0F17035-CCV3	061810B-040	06/18/10 14:41
Calibration Blank	0F17035-CCB3	061810B-041	06/18/10 14:47

ANALYSIS SEQUENCE SUMMARY

SW6010B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0F17035	Instrument:	ME-ICP
Calibration:	0171001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
01GW01GS64-0510	1005086-12	061810B-042	06/18/10 14:52
01GW01PZ10-0510	1005086-13	061810B-043	06/18/10 14:57
01GW01PZ07-0510	1005086-14	061810B-044	06/18/10 15:02
01GW01PZ7A-0510	1005086-15	061810B-045	06/18/10 15:07
01GW01GI36-0510	1005086-16	061810B-046	06/18/10 15:13
01GW01PZ1-0510	1005086-17	061810B-047	06/18/10 15:18
PZ01051110	1005086-18	061810B-048	06/18/10 15:23
01GW01PZ6A-0510	1005086-19	061810B-049	06/18/10 15:28
01GWUPG10510	1005086-20	061810B-050	06/18/10 15:33
01GWUPG10510	0F10002-DUP2	061810B-051	06/18/10 15:38
Calibration Check	0F17035-CCV4	061810B-052	06/18/10 15:44
Calibration Blank	0F17035-CCB4	061810B-053	06/18/10 15:51

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. WALKER**	**DATE:**	**AUGUST 9, 2010**
FROM:	**DANIELLE BAUGHMAN**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION- VOCS CTO 067, NAS PENSACOLA SDG CTO067P_002**		

SAMPLES: 10/Waters/

01GW01GI43-0510	01GW01GI46-0510	01GW01GI720510
01GW01GI74-0510	01GW01GS570510	01GW01GS62-0510
01GW01GS710510	01GW01GS73-0510	GW01-051210
Trip Blank		

OVERVIEW

The sample set for CTO 067 NAS Pensacola, SDG CTO067P_002 consists of ten (10) aqueous samples. All samples were analyzed for volatile organic compounds (VOC).

The samples were collected by Tetra Tech NUS on May 12, 2010 analyzed by Empirical Laboratories, LLC. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using method 8260B analytical and reporting protocol. The data contained in this SDG were validated with regard to the following parameters:

*	• Data Completeness
*	• Holding times
	• Initial/continuing calibrations
*	• Laboratory method blank results
*	• Detection Limits

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A. Results as reported by the laboratory are presented in Appendix B.

VOA:

The continuing calibration standard analyzed on instrument MS-VOA3 on 5/18/10 at 22:28 had a percent difference >25% for vinyl chloride. Samples 01GW01GI43-0510, 01GW01GI46-0510, 01GW01GS62-0510, 01GW01GS73-0510, GW01-051210, 01GW01GI74-0510 were affected. Positive results reported for vinyl chloride in samples 01GW01GI43-0510, 01GW01GI46-0510, and 01GW01GI74-0510 were qualified as estimated (J). Non detected results reported for vinyl chloride in all other samples were qualified as estimated (UJ).

The continuing calibration standard analyzed on instrument MS-VOA3 on 5/19/10 at 11:12 had a percent difference >25% for vinyl chloride. Samples 01GW01GS710510, 01GW01GI720510, and 01GW01GS570510 were affected. Nondetected results reported for vinyl chloride were qualified as estimated (UJ).

- Positive results reported below the estimated quantitation limit (EQL) but above the method detection limit (MDL) were qualified as estimated, "J".

EXECUTIVE SUMMARY

Laboratory Performance Issues: Two CCVs for vinyl chloride were >25% quality control limit affecting several samples.

Other Factors Affecting Data Quality: Positive results reported below the estimated quantitation limit (EQL) but above the method detection limit (MDL) were qualified.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (10/99) and the Department of Defense (DoD) Quality Systems Manual (QSM) (January 2006). The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS
Danielle Baughman
Project Engineer

Tetra Tech NUS

Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS-GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O - Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DOT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 00702	NSAMPLE	01GW01GI43-0510			01GW01GI46-0510			01GW01GI720510			01GW01GI74-0510		
SDG: CTO067P_002	LAB_ID	1005107-01			1005107-04			1005107-13			1005107-06		
FRACTION: OV	SAMP_DATE	5/12/2010			5/12/2010			5/12/2010			5/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,2,2-TETRACHLOROETHANE		0.23	U		0.23	U		0.23	U		0.23	U	
BENZENE		4.87			3.36			0.14	U		1.22		
CHLOROBENZENE		27.3			48.7			0.21	U		15.1		
NAPHTHALENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOTAL XYLENES		0.22	U		0.22	U		0.22	U		0.22	U	
VINYL CHLORIDE		1.28	J	C	11.3	J	C	0.2	UJ	C	9.15	J	C

PROJ_NO: 00702	NSAMPLE	01GW01GS570510			01GW01GS62-0510			01GW01GS710510			01GW01GS73-0510		
SDG: CTO067P_002	LAB_ID	1005107-14			1005107-02			1005107-12			1005107-05		
FRACTION: OV	SAMP_DATE	5/12/2010			5/12/2010			5/12/2010			5/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,2,2-TETRACHLOROETHANE		0.23	U		0.23	U		0.23	U		0.23	U	
BENZENE		0.14	U		0.14	U		0.14	U		0.14	U	
CHLOROBENZENE		0.21	U		0.38	J	P	0.21	U		0.21	U	
NAPHTHALENE		0.5	U		0.5	U		0.5	U		0.5	U	
TOTAL XYLENES		0.22	U		0.22	U		0.22	U		0.22	U	
VINYL CHLORIDE		0.2	UJ	C	0.2	UJ	C	0.2	UJ	C	0.2	UJ	C

PROJ_NO: 00702	NSAMPLE	GW01-051210			Trip Blank		
SDG: CTO067P_002	LAB_ID	1005107-03			1005107-11		
FRACTION: OV	SAMP_DATE	5/12/2010			5/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM		
	UNITS	UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0		
	DUP_OF						
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,2,2-TETRACHLOROETHANE		0.23	U		0.23	U	
BENZENE		0.14	U		0.14	U	
CHLOROBENZENE		0.413	J	P	0.21	U	
NAPHTHALENE		0.5	U		0.5	U	
TOTAL XYLENES		0.22	U		0.22	U	
VINYL CHLORIDE		0.2	UJ	C	0.2	U	

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

ANALYSIS DATA SHEET

01GW01GI43-0510

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Ground Water Laboratory ID: 1005107-01 File ID: 0510701.D

Sampled: 05/12/10 12:10 Prepared: 05/18/10 15:46 Analyzed: 05/19/10 05:27

Solids: Preparation: 5030B Dilution: 1

Batch: 0E18022 Sequence: 0E14307 Calibration: 0128001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	4.87	0.140	1.00	
108-90-7	Chlorobenzene	27.3	0.210	1.00	
91-20-3	Naphthalene		0.500	2.00	U, Y
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride	1.28	0.200	1.00	X, Q
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.86	96.2	75 - 120	
Dibromofluoromethane	30.00	30.98	103	85 - 115	
1,2-Dichloroethane-d4	30.00	30.42	101	70 - 120	
Toluene-d8	30.00	31.60	105	85 - 120	

ANALYSIS DATA SHEET

01GW01GI46-0510

Laboratory:	Empirical Laboratories, LLC			SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)			Project:	CTO067 NAS Pensacola
Matrix:	Ground Water	Laboratory ID:	1005107-04	File ID:	0510704.D
Sampled:	05/12/10 14:40	Prepared:	05/18/10 15:46	Analyzed:	05/19/10 06:57
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E18022	Sequence:	0E14307	Calibration:	0128001
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	3.36	0.140	1.00	
108-90-7	Chlorobenzene	48.7	0.210	1.00	
91-20-3	Naphthalene		0.500	2.00	U, Y
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride	11.3	0.200	1.00	X, Q
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.98	96.6	75 - 120	
Dibromofluoromethane	30.00	30.52	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.33	97.8	70 - 120	
Toluene-d8	30.00	31.57	105	85 - 120	

ANALYSIS DATA SHEET

01GW01GI720510

Laboratory:	Empirical Laboratories, LLC			SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)			Project:	CTO067 NAS Pensacola
Matrix:	Ground Water	Laboratory ID:	1005107-13	File ID:	0510713.D
Sampled:	05/12/10 15:20	Prepared:	05/19/10 00:00	Analyzed:	05/19/10 17:05
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E19014	Sequence:	0E14206	Calibration:	0128001
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	U, Y
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	U, Q, X
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.52	102	75 - 120	
Dibromofluoromethane	30.00	30.32	101	85 - 115	
1,2-Dichloroethane-d4	30.00	30.19	101	70 - 120	
Toluene-d8	30.00	31.53	105	85 - 120	

ANALYSIS DATA SHEET

01GW01GI74-0510

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Ground Water Laboratory ID: 1005107-06 File ID: 0510706.D

Sampled: 05/12/10 17:20 Prepared: 05/18/10 15:46 Analyzed: 05/19/10 07:57

Solids: Preparation: 5030B Dilution: 1

Batch: 0E18022 Sequence: 0E14307 Calibration: 0128001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	1.22	0.140	1.00	
108-90-7	Chlorobenzene	15.1	0.210	1.00	
91-20-3	Naphthalene		0.500	2.00	U, Y
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride	9.15	0.200	1.00	X, Q
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.84	96.1	75 - 120	
Dibromofluoromethane	30.00	30.44	101	85 - 115	
1,2-Dichloroethane-d4	30.00	29.32	97.7	70 - 120	
Toluene-d8	30.00	32.02	107	85 - 120	

ANALYSIS DATA SHEET

01GW01GS570510

Laboratory:	Empirical Laboratories, LLC		SDG:	CTO067P_002	
Client:	Tetra Tech NUS, Inc. (T010)		Project:	CTO067 NAS Pensacola	
Matrix:	Ground Water	Laboratory ID:	1005107-14	File ID:	0510714.D
Sampled:	05/12/10 16:40	Prepared:	05/19/10 00:00	Analyzed:	05/19/10 17:35
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E19014	Sequence:	0E14206	Calibration:	0128001
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	U, Y
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	U, X, Q
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.14	100	75 - 120	
Dibromofluoromethane	30.00	29.92	99.7	85 - 115	
1,2-Dichloroethane-d4	30.00	29.71	99.0	70 - 120	
Toluene-d8	30.00	31.43	105	85 - 120	

ANALYSIS DATA SHEET

01GW01GS62-0510

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Ground Water Laboratory ID: 1005107-02 File ID: 0510702.D

Sampled: 05/12/10 13:35 Prepared: 05/18/10 15:46 Analyzed: 05/19/10 05:57

Solids: Preparation: 5030B Dilution: 1

Batch: 0E18022 Sequence: 0E14307 Calibration: 0128001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene	0.380	0.210	1.00	J
91-20-3	Naphthalene		0.500	2.00	U, Y
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	U, X, Q
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.65	95.5	75 - 120	
Dibromofluoromethane	30.00	29.90	99.7	85 - 115	
1,2-Dichloroethane-d4	30.00	29.37	97.9	70 - 120	
Toluene-d8	30.00	31.76	106	85 - 120	

ANALYSIS DATA SHEET

01GW01GS710510

Laboratory:	Empirical Laboratories, LLC			SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)			Project:	CTO067 NAS Pensacola
Matrix:	Ground Water	Laboratory ID:	1005107-12	File ID:	0510712.D
Sampled:	05/12/10 13:50	Prepared:	05/19/10 00:00	Analyzed:	05/19/10 16:35
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E19014	Sequence:	0E14206	Calibration:	0128001
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	U, Y
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	U, X, Q
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.29	101	75 - 120	
Dibromofluoromethane	30.00	29.95	99.8	85 - 115	
1,2-Dichloroethane-d4	30.00	29.52	98.4	70 - 120	
Toluene-d8	30.00	31.56	105	85 - 120	

ANALYSIS DATA SHEET

01GW01GS73-0510

Laboratory:	Empirical Laboratories, LLC			SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)			Project:	CTO067 NAS Pensacola
Matrix:	Ground Water	Laboratory ID:	1005107-05	File ID:	0510705.D
Sampled:	05/12/10 16:30	Prepared:	05/18/10 15:46	Analyzed:	05/19/10 07:27
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E18022	Sequence:	0E14307	Calibration:	0128001
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	U, Y
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	U, X, Q
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.51	95.0	75 - 120	
Dibromofluoromethane	30.00	30.06	100	85 - 115	
1,2-Dichloroethane-d4	30.00	29.90	99.7	70 - 120	
Toluene-d8	30.00	31.52	105	85 - 120	

ANALYSIS DATA SHEET

GW01-051210

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Ground Water Laboratory ID: 1005107-03 File ID: 0510703.D

Sampled: 05/12/10 13:50 Prepared: 05/18/10 15:46 Analyzed: 05/19/10 06:27

Solids: Preparation: 5030B Dilution: 1

Batch: 0E18022 Sequence: 0E14307 Calibration: 0128001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene	0.413	0.210	1.00	J
91-20-3	Naphthalene		0.500	2.00	U, Y
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	U, X, Q
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.89	96.3	75 - 120	
Dibromofluoromethane	30.00	30.70	102	85 - 115	
1,2-Dichloroethane-d4	30.00	29.91	99.7	70 - 120	
Toluene-d8	30.00	31.67	106	85 - 120	

ANALYSIS DATA SHEET

Trip Blank

Laboratory:	Empirical Laboratories, LLC			SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)			Project:	CTO067 NAS Pensacola
Matrix:	Water	Laboratory ID:	1005107-11	File ID:	0510711.D
Sampled:	05/12/10 00:00	Prepared:	05/21/10 15:57	Analyzed:	05/22/10 01:10
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E20007	Sequence:	0E14411	Calibration:	0134007
Instrument:	MS-VOA5				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U, Q, X
75-01-4	Vinyl chloride		0.200	1.00	U, Q
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.52	95.1	75 - 120	
Dibromofluoromethane	30.00	30.68	102	85 - 115	
1,2-Dichloroethane-d4	30.00	32.04	107	70 - 120	
Toluene-d8	30.00	32.76	109	85 - 120	

APPENDIX C
SUPPORT DOCUMENTATION

Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision

This is an original submittal of the final report package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:

The continuing calibration standard failed criteria in 0E14307-CCV1, 0E14206-CCV1 for Naphthalene and Vinyl chloride, in 0E14411-CCV1 for 1,1,2,2-Tetrachloroethane.

The blank spike failed criteria for Vinyl Chloride in batch 0E18022 and 0E19014, in batch 0E14411 for 1,1,2,2-Tetrachloroethane and Vinyl Chloride.

No additional anomalies or deviations are noted and the data is properly qualified.

SW6010B:
The continuing calibration standard failed criteria in 0F17035-CCV6 for Chromium and Iron. No additional anomalies or deviations are noted and the data is properly qualified.

Data Qualifiers

As applicable and where required, the following general qualifiers are associated with the sample results. Additional qualifiers will be specified within the reporting sections of the data package or within the body of the Case Narrative.

Analytical Report Terms and Qualifiers

MDL: The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The MDL is determined from analysis of a sample containing the analyte in a given matrix.

EQL: The estimated quantitation limit (EQL), also known as Reporting Limit **(RL),** is defined as the estimated concentration above which quantitative results can be obtained with a specific degree of confidence. Empirical Laboratories defines the EQL to be at or near the lowest standard of the calibration curve.

*****: A failing quality control criteria is associated with the reported result.

B: The presence of a "B" to the right of an analytical value indicates that this compound was also detected in the method blank and the data should be interpreted with caution. One should consider the possibility that the correct sample result might be less than the reported result and, perhaps, zero. **For Florida DEP reports this qualifier is "V".**

D: When a sample (or sample extract) is rerun diluted because one of the compound concentrations exceeded the highest concentration range for the standard curve, all of the values obtained in the dilution run will be flagged with a "D".

E: The concentration for any compound found which exceeds the highest concentration level on the standard curve for that compound will be flagged with an "E". Usually the sample will be rerun at a dilution to quantitate the flagged compound. **For Florida DEP reports this qualifier is "L".**

H1: The result was analyzed outside of the EPA recommended holding time.

H2: The result was extracted outside of the EPA recommended holding time

J: The presence of a "J" to the right of an analytical result indicates that the reported result is estimated. The mass spectral data pass the identification criteria showing that the compound is present, but the calculated result is less than the EQL. One should feel confident that the result is greater than zero and less than the EQL. **For Florida DEP reports this qualifier is "I".**

M: Indicates that the sample matrix interfered with the quantitation of the analyte. In dual column analysis the result is reported from the column with the lower

concentration. In metals, the qualifier indicates that the parameters MDL/RL has been raised.

N: The MS/MSD accuracy and/or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter.

P: The associated numerical value is an estimated quantity. There is greater than a 40% difference between the two GC columns for the detected concentrations. The higher of the two values is reported unless matrix interference is obvious or for HPLC analysis where the primary column is reported.

Q: The RPD and/or percent recovery failed in the associated Blank Spike and/or Blank Spike Duplicate.

S: The Internal Standard failed criteria.

U: The presence of a "U" indicates that the analyte was analyzed for but was not detected or the concentration of the analyte quantitated below the MDL.

X: The parameter shows a potential positive bias on a reported concentration due to an ICV or CCV exceeding the upper control limit on the high side.

Y: The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side.

LIMS Definitions / Naming Conventions:

The following are general naming conventions that are used throughout the laboratory; however, on a method by method basis, there are additional QAQC items that are named in a consistent format.

BLK: LIMS assigns a unique identifier to the Method Blank by naming it as the letters BLK appended to the Batch ID. A Method Blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The Method Blank is used to assess for possible contamination during preparation and/or analysis steps. Method Blanks within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally.

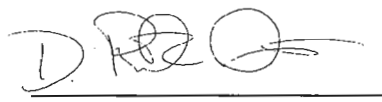
BS: LIMS assigns a unique identifier to the Blank Spike by naming it as the letters BS appended to the Batch ID. The Blank Spike or Lab Control Sample is a controlled analyte-free matrix, which is spiked with known and verified concentrations of target analytes. Spiking concentrations can be referenced in the method SOP. The BS is used to evaluate the viability of analytes taken through the entire prep (when applicable) and analytical process. Blank Spikes within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally. A duplicate Blank Spike will

be designated as a BSD.

MS: The LIMS assigns each Client sample with a unique identifier. The Matrix Spike is designated with a MS at the end of the sample's unique identifier. The Matrix Spike sample is used to assess the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. A duplicate Matrix Spike will be designated as a MSD.

IDs: The LIMS assigns each Client sample with a unique identifier. The letter "RE" may potentially be appended to the end of the LIMS Sample ID. And "**RE"** implies that the sample was either re-prepped, re-analyzed straight, or re-analyzed at a dilution. Subsequent re-analysis for the sample will be appended with a numerical value beginning with 1 that will increase incrementally. Eg: RE1, RE2, RE3, etc.

Statement of Data Authenticity:
I certify that, based upon my inquiry of those individuals immediately responsible for obtaining the information and to the best of my knowledge, the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, with the exception of the conditions detailed in this Case Narrative, as verified by my signature below. During absences, Ms. Marcia K. McGinnity is authorized to sign this Statement of Data Authenticity.



Mr. Rick D. Davis
Laboratory Technical Director / VP Operations

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 27017 | PAGE 1 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G00702	OU1 Site 1 Naval Pensacola	Gerry Walker	(850) 385-9899	Empirical Labs - Kim Kostzer
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Bill Olson	PHONE NUMBER: (850) 385-9899	ADDRESS: 621 Mainstream Dr. Ste 270
		CARRIER/WAYBILL NUMBER: 851597482776		CITY, STATE: Nashville, TN 37228

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS	COMMENTS
05/12	1210	01GW01GI43-0510	✓	31.6	41.6	GW	G	4	G	HCL	8260B Vinyl Chloride; 8260B Benzene; 8260B Chlorobenzene; 8260B Total Xylenes; 8260B 1,1,2,2-Tetrachloroethane; 8260B Naphthalene; 6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	-01
05/12	1335	01GW01GS62-0510	✓	10	20	GW	G	4	G	HCL	8260B Vinyl Chloride; 8260B Benzene; 8260B Chlorobenzene; 8260B Total Xylenes; 8260B 1,1,2,2-Tetrachloroethane; 8260B Naphthalene; 6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	Cool to 4°C -02
05/12	1350	GW01-051210	✓			GW	G	4	G	HCL	8260B Vinyl Chloride; 8260B Benzene; 8260B Chlorobenzene; 8260B Total Xylenes; 8260B 1,1,2,2-Tetrachloroethane; 8260B Naphthalene; 6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	-03
05/12	1440	01GW01GI46-0510	✓	19	29	GW	G	4	G	HCL	8260B Vinyl Chloride; 8260B Benzene; 8260B Chlorobenzene; 8260B Total Xylenes; 8260B 1,1,2,2-Tetrachloroethane; 8260B Naphthalene; 6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	1005107-04
05/12	1630	01GW01GS73-0510	✓	3	13	GW	G	4	G	HCL	8260B Vinyl Chloride; 8260B Benzene; 8260B Chlorobenzene; 8260B Total Xylenes; 8260B 1,1,2,2-Tetrachloroethane; 8260B Naphthalene; 6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	-05
05/12	1720	01GW01GI74-0510	✓	25	30	GW	G	4	G	HCL	8260B Vinyl Chloride; 8260B Benzene; 8260B Chlorobenzene; 8260B Total Xylenes; 8260B 1,1,2,2-Tetrachloroethane; 8260B Naphthalene; 6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	-06
05/13	1155	01SW01-0510				SW	G	1	P	HNO3	6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	-07
05/13	1205	SW01-051310				SW	G	1	P	HNO3	6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	-08
05/13	1240	01SW02-0510				SW	G	1	P	HNO3	6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	-09
05/13	1430	01SW03-0510				SW	G	1	P	HNO3	6010B Aluminum; 6010B Cadmium; 6010B Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	-10
		Trip Blank	✓			QC		2	P	HCL	8260B Vinyl Chloride; 8260B Benzene; 8260B Chlorobenzene; 8260B Total Xylenes; 8260B 1,1,2,2-Tetrachloroethane; 8260B Naphthalene	-11

5/14/10 W.J.

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	05/13/10	15:00	1. RECEIVED BY	05/13/10	15:02
2. RELINQUISHED BY	5/13/10	1605	2. RECEIVED BY		
3. RELINQUISHED BY			3. RECEIVED BY	5/14/10	09:15

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4.9°C

4/02R FORM NO. TtNUS-001

CTO067P_002 Summ Package

9

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 ♦ Nashville, TN 37228 ♦ 615-345-1115 ♦ (fax) 615-846-5426

10269

Send Results to:	Send Invoice to:
Name	Name Sandy D'Alessandris
Company TFNUS	Company TFNUS
Address 6161 Anderson Dr	Address 6161 Anderson Dr
City Pittsburgh	City Pittsburgh
State, Zip PA, 15220	State, Zip PA, 15220
Phone (412) 921-7273	Phone (412) 921-7090
Fax	Fax
E-mail	E-mail
Project No./Name: DU1 112900702	Sampler's (Signature):

Analysis Requirements: Select VOCs*; Select Metals+

Lab Use Only:

VOA Headspace	Y	(N)	NA
Field Filtered	Y	(N)	NA
Correct Containers	(Y)	N	NA
Discrepancies	Y	(N)	NA
Cust. Seals Intact	(Y)	N	NA
Containers Intact	(Y)	N	NA

Airbill #: 2776 — CAR #:

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottles	Lab Use Only Containers/Pres.
1005107-12	5/12/10 13:50	01GW01GS710510	Aq			3J-HY, 1C-HV
-13	5/12/10 15:20	01GW01GI720510	Aq			
-14	5/12/10 16:40	01GW01GS57090	Aq			

	Date/Time	Received By: (Signature)
Sample Kit Prep'd by: (Signature)	05/12/10	
Relinquished by: (Signature)	05/13/10 1006	Received By: (Signature)
Relinquished by: (Signature)	Date/Time	Received By: (Signature)
Received for Laboratory by: (Signature)	Date/Time 5/14/10 09:15	Temperature 4.9°C

REMARKS:

*Select VOC: Vinyl Chloride, Benzene, Naphthalene, Chlorobenzene, Total Xylenes and 1,1,2,2, Tetrachloroethane

+Select metals: Aluminum, Cadmium, Iron, Chromium, Manganese, Nickel

Details:

Page 2 of 2

Cooler No. ____ of ____

Date Shipped ____

Shipped By ____

Turnaround ____

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

CTO067P_002 Summ Package

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HOLDTIME

SDG CTO067P_002

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	GW01-051210	1005107-03	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GI46-0510	1005107-04	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GI720510	1005107-13	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GI720510	1005107-13RE1	NM	05/12/2010	06/11/2010	06/19/2010	30	8	38
M	UG/L	01GW01GI74-0510	1005107-06	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GS570510	1005107-14	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GS62-0510	1005107-02	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GS710510	1005107-12	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GS73-0510	1005107-05	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01SW01-0510	1005107-07	NM	05/13/2010	06/11/2010	06/18/2010	29	7	36
M	UG/L	01GW01GI43-0510	1005107-01	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01SW03-0510	1005107-10	NM	05/13/2010	06/11/2010	06/18/2010	29	7	36
M	UG/L	SW01-051310	1005107-08	NM	05/13/2010	06/11/2010	06/18/2010	29	7	36
M	UG/L	01SW02-0510	1005107-09	NM	05/13/2010	06/11/2010	06/18/2010	29	7	36
OV	UG/L	Trip Blank	1005107-11	NM	05/12/2010	05/21/2010	05/22/2010	9	1	10

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
OV	UG/L	01GW01GI43-0510	1005107-01	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	01GW01GI46-0510	1005107-04	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	01GW01GI720510	1005107-13	NM	05/12/2010	05/19/2010	05/19/2010	7	0	7
OV	UG/L	01GW01GI74-0510	1005107-06	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	01GW01GS570510	1005107-14	NM	05/12/2010	05/19/2010	05/19/2010	7	0	7
OV	UG/L	01GW01GS62-0510	1005107-02	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	01GW01GS710510	1005107-12	NM	05/12/2010	05/19/2010	05/19/2010	7	0	7
OV	UG/L	01GW01GS73-0510	1005107-05	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	GW01-051210	1005107-03	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN2.D	Injection Date:	05/07/10
Instrument ID:	MS-VOA3	Injection Time:	23:46
Sequence:	0E12804	Lab Sample ID:	0E12804-TUN2

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	20.1	PASS
75	30 - 60% of 95	49.7	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.39	PASS
173	Less than 2% of 174	0.632	PASS
174	50 - 200% of 95	71	PASS
175	5 - 9% of 174	7.33	PASS
176	95 - 101% of 174	98.7	PASS
177	5 - 9% of 176	5.91	PASS

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN1.D	Injection Date:	05/07/10
Instrument ID:	MS-VOA3	Injection Time:	13:11
Sequence:	0E12804	Lab Sample ID:	0E12804-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	21	PASS
75	30 - 60% of 95	48.9	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.32	PASS
173	Less than 2% of 174	0	PASS
174	50 - 200% of 95	70.9	PASS
175	5 - 9% of 174	6.93	PASS
176	95 - 101% of 174	98.2	PASS
177	5 - 9% of 176	7.81	PASS

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Sequence: 0E12804
Instrument: MS-VOA3
Calibration: 0128001

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E12804-TUN1	SEQ-TUN1.D	05/07/10 13:11
Cal Standard	0E12804-CAL1	SEQ-CAL1.D	05/07/10 13:41
Cal Standard	0E12804-CAL2	SEQ-CAL2.D	05/07/10 14:11
Cal Standard	0E12804-CAL3	SEQ-CAL3.D	05/07/10 14:42
Cal Standard	0E12804-CAL4	SEQ-CAL4.D	05/07/10 15:12
Cal Standard	0E12804-CAL5	SEQ-CAL5.D	05/07/10 15:42
Cal Standard	0E12804-CAL6	SEQ-CAL6.D	05/07/10 16:13
Cal Standard	0E12804-CAL7	SEQ-CAL7.D	05/07/10 16:43
Cal Standard	0E12804-CAL8	SEQ-CAL8.D	05/07/10 17:13
Cal Standard	0E12804-CAL9	SEQ-CAL9.D	05/07/10 17:43
Initial Cal Check	0E12804-ICV1	SEQ-ICV1.D	05/07/10 18:14
Cal Standard	0E12804-CALA	SEQ-CALA.D	05/07/10 18:44
Cal Standard	0E12804-CALB	SEQ-CALB.D	05/07/10 19:14
Cal Standard	0E12804-CALC	SEQ-CALC.D	05/07/10 19:45
Cal Standard	0E12804-CALD	SEQ-CALD.D	05/07/10 20:15
Cal Standard	0E12804-CALE	SEQ-CALE.D	05/07/10 20:45
Cal Standard	0E12804-CALF	SEQ-CALF.D	05/07/10 21:15
Cal Standard	0E12804-CALG	SEQ-CALG.D	05/07/10 21:45
Cal Standard	0E12804-CALH	SEQ-CALH.D	05/07/10 22:15
Cal Standard	0E12804-CALI	SEQ-CALI.D	05/07/10 22:46
MS Tune	0E12804-TUN2	SEQ-TUN2.D	05/07/10 23:46
Cal Standard	0E12804-CALJ	SEQ-CALJ.D	05/08/10 00:16
Cal Standard	0E12804-CALK	SEQ-CALK.D	05/08/10 00:46
Cal Standard	0E12804-CALL	SEQ-CALL.D	05/08/10 01:16
Cal Standard	0E12804-CALM	SEQ-CALM.D	05/08/10 01:46
Cal Standard	0E12804-CALN	SEQ-CALN.D	05/08/10 02:16
Cal Standard	0E12804-CALO	SEQ-CALO.D	05/08/10 02:46
Cal Standard	0E12804-CALP	SEQ-CALP.D	05/08/10 03:16
Cal Standard	0E12804-CALQ	SEQ-CALQ.D	05/08/10 03:46
Cal Standard	0E12804-CALR	SEQ-CALR.D	05/08/10 04:16

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Calibration: 0128001
Instrument: MS-VOA3
Matrix: Water
Calibration Date: 5/7/2010 3:51:54PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
Acetone	6.392465E-02	12.97931	5.645	0.1389461			15	
Acrolein	1.249117E-02	19.42736	5.475333	9.678328E-02	0.9973213		0.995	
Acrylonitrile	8.917726E-02	4.214244	6.356667	6.883235E-02			15	
Benzene	0.8513296	6.678909	12.36133	1.763584E-02			15	
Bromobenzene	0.6302335	4.860474	17.40189	7.46583E-03			15	
Bromochloromethane	0.1111916	14.2737	10.083	4.267067E-02			15	
Tert-Amyl Methyl Ether	0.7393959	30.41146	12.69233	0.0263267	0.9992581		0.995	
Bromodichloromethane	0.2762397	2.130832	13.33333	1.983408E-02			15	
Bromoform	0.3321782	18.56579	16.69	1.270906E-02	0.9994973		SPCC (0.1)	
Bromomethane	0.1558027	9.40424	4.607333	7.647505E-02			15	
Bromofluorobenzene	0.8488807	5.514613	17.231	2.208685E-02			15	
n-Butylbenzene	1.285873	8.434765	18.59533	1.038495E-02			15	
2-Butanone	8.784045E-02	13.43708	9.312625	0.4485282			15	
sec-Butylbenzene	1.675439	8.542345	18.14	1.856386E-02			15	
tert-Butylbenzene	1.459663	6.300852	18.26667	0.0151966			15	
Carbon disulfide	0.6272086	10.21249	6.919889	1.518417E-02			15	
Carbon tetrachloride	0.2425697	7.115983	12.324	3.015674E-02			15	
Chlorobenzene	1.36545	9.263947	16.28533	2.315512E-02			SPCC (0.3)	
Chloroethane	0.1684239	13.66591	4.778667	7.562152E-02			15	
Chloroform	0.3963755	9.474226	10.235	5.586952E-02			CCC (20)	
2-Chloroethyl vinyl ether	0.132268	6.739554	13.91333	4.988714E-02			15	
Chloromethane	0.2439782	13.54456	3.928556	0.1148554			SPCC (0.1)	
1-Chlorohexane	0.5981001	11.08132	16.24225	3.335839E-03			15	
2-Chlorotoluene	1.441616	10.01654	17.62089	1.930074E-02			15	
4-Chlorophenyl-phenylether	1.535488	9.884847	17.68044	2.536113E-02			15	
Cyclohexane	0.2734884	4.331117	12.21944	3.181187E-02			15	
Dibromochloromethane	0.4833603	6.859825	15.281	2.217809E-02			15	
1,2-Dibromo-3-chloropropane	0.1291907	11.8003	18.959	8.956841E-03			15	
1,2-Dibromoethane (EDB)	0.5265772	5.781451	15.51333	0.0165478			15	
Dibromomethane	0.1545597	3.942352	13.16033	1.775901E-02			15	
1,2-Dichlorobenzene	1.023735	4.641556	18.576	1.197095E-02			15	
1,3-Dichlorobenzene	1.060409	8.45233	18.223	2.242414E-02			15	

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Calibration: 0128001
Instrument: MS-VOA3
Matrix: Water
Calibration Date: 5/7/2010 3:51:54PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,4-Dichlorobenzene	1.16061	5.990904	18.27167	1.194414E-02			15	
Dichlorodifluoromethane	0.202545	5.356997	3.698333	8.647251E-02			15	
1,1-Dichloroethane	0.3847218	3.918511	8.282	5.113378E-02			SPCC (0.1)	
1,2-Dichloroethane	0.2909279	4.73019	11.56033	3.689135E-02			15	
1,1-Dichloroethene	0.1810459	7.408568	6.316333	3.090128E-02			CCC (20)	
cis-1,2-Dichloroethene	0.2491806	8.268029	9.693333	5.718375E-02			15	
trans-1,2-Dichloroethene	0.2166033	4.222177	7.748333	5.305986E-02			15	
1,2-Dichloroethene (total)	0.2328919	6.28001	0	0			15	
1,2-Dichloropropane	0.2343251	6.040209	13.21933	2.405015E-02			CCC (20)	
1,3-Dichloropropane	0.8275006	9.139689	15.03967	1.572642E-02			15	
2,2-Dichloropropane	0.2557617	9.293152	10.44133	6.659268E-02			15	
1,1-Dichloropropene	0.2756653	2.436473	12.08111	2.565211E-02			15	
cis-1,3-Dichloropropene	0.3336023	3.90331	14.151	1.992685E-02			15	
trans-1,3-Dichloropropene	0.6672308	4.598237	14.63433	2.048464E-02			15	
Diisopropyl Ether	0.6489996	3.648245	9.465222	0.1052134			15	
Ethylbenzene	2.118108	13.13578	16.44622	1.212614E-02			CCC (20)	
Ethyl tert-Butyl Ether	0.6166748	3.259488	10.51233	3.071805E-02			15	
Ethyl Methacrylate	0.6612875	6.418515	15.10533	7.916731E-02			15	
Hexachlorobutadiene	0.2659657	8.252218	20.55167	1.037684E-02			15	
2-Hexanone	0.2947969	21.07415	15.21662	0.1143159	0.999793		0.995	
Iodomethane	0.2033345	39.87961	6.358	4.476146E-02	0.9996908		0.995	
Isopropylbenzene	1.615648	8.339895	17.19767	0.0146951			15	
p-Isopropyltoluene	1.208727	6.13082	17.967	0.0140798			15	
Methylene chloride	0.2798913	26.81101	6.54125	2.516534E-02	0.9994534		0.995	
Methyl Acetate	0.1620765	5.318566	6.587	0.1363199			15	
Methylcyclohexane	0.232498	3.931094	13.946	1.141866E-02			15	
Naphthalene	1.667032	4.006895	20.51467	6.777849E-03			15	
Methyl Methacrylate	0.1777607	10.09673	13.5985	8.225799E-02			15	
4-Methyl-2-pentanone	0.1819818	12.20153	14.29525	7.467514E-02			15	
Methyl t-Butyl Ether	0.5965014	2.839457	8.019	6.343752E-02			15	
n-Propylbenzene	2.115723	12.98273	17.53511	1.393331E-02			15	
Styrene	1.409032	6.217907	16.85867	6.938597E-03			15	

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Calibration:	0128001	Instrument:	MS-VOA3
Matrix:	Water	Calibration Date:	5/7/2010 3:51:54PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,1,2,2-Tetrachloroethane	0.6520071	4.817003	16.92367	1.735102E-03			SPCC (0.3)	
1,1,1,2-Tetrachloroethane	0.4646979	4.807136	16.22722	2.476247E-02			15	
t-Butyl alcohol	2.641896E-02	7.322205	6.317	9.487985E-02			15	
Tetrachloroethene	0.5044643	3.595975	15.698	1.012467E-02			15	
Toluene	1.247637	7.830692	14.97533	1.596385E-02			CCC (20)	
1,2,3-Trichlorobenzene	0.5646116	4.512021	20.76133	9.586246E-03			15	
1,2,4-Trichlorobenzene	0.6137349	5.930749	20.24089	1.934272E-02			15	
1,1,2-Trichloroethane	0.4273489	8.142227	14.78667	1.982536E-02			15	
1,1,1-Trichloroethane	0.2938933	2.239795	11.75333	3.611599E-02			15	
Tetrahydrofuran	6.343919E-02	6.734125	10.98575	0.1795124			15	
Trichloroethene	0.2251778	3.749245	13.29833	0.0302045			15	
Trichlorofluoromethane	0.3084015	4.976415	5.523444	5.944283E-02			15	
1,2,3-Trichloropropane	0.1869629	4.311053	17.03056	1.161594E-02			15	
1,3,5-Trimethylbenzene	1.503271	7.544811	17.736	1.486751E-02			15	
1,2,4-Trimethylbenzene	1.576152	8.294678	18.04622	0.0192909			15	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.1704611	4.845664	6.646667	5.556678E-02			15	
Vinyl chloride	0.2254535	14.22332	4.13075	0.0738405			CCC (20)	
m,p-Xylene	1.675735	11.16825	16.59938	9.642842E-03			15	
o-Xylene	1.74272	10.38945	16.915	1.710043E-02			15	
Vinyl acetate	0.4414349	7.335954	8.587111	0.1878737			15	
Xylenes (total)	1.65548	14.07832	0	0			15	
Dibromofluoromethane	0.2645697	1.31402	10.50167	1.966633E-02			15	
1,2-Dichloroethane-d4	5.822815E-02	1.9858	11.42044	3.477841E-03			15	
Toluene-d8	2.233741	7.557731	14.901	1.850725E-02			15	

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0E14307	Instrument:	MS-VOA3
Calibration:	0128001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E14307-TUN1	SEQ-TUN2.D	05/18/10 21:59
Calibration Check	0E14307-CCV1	SEQ-CCV3.D	05/18/10 22:28
LCS	0E18022-BS1	V3LCS03.D	05/18/10 22:58
Blank	0E18022-BLK1	BLK04.D	05/19/10 00:28
01GW01GI43-0510	1005107-01	0510701.D	05/19/10 05:27
01GW01GS62-0510	1005107-02	0510702.D	05/19/10 05:57
GW01-051210	1005107-03	0510703.D	05/19/10 06:27
01GW01GI46-0510	1005107-04	0510704.D	05/19/10 06:57
01GW01GS73-0510	1005107-05	0510705.D	05/19/10 07:27
01GW01GI74-0510	1005107-06	0510706D	05/19/10 07:57
01GW01GI74-0510	1005107-06	0510706.D	05/19/10 07:57

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN2.D	Injection Date:	05/18/10
Instrument ID:	MS-VOA3	Injection Time:	21:59
Sequence:	0E14307	Lab Sample ID:	0E14307-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	18.6	PASS
75	30 - 60% of 95	48	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.16	PASS
173	Less than 2% of 174	0.569	PASS
174	50 - 200% of 95	86.7	PASS
175	5 - 9% of 174	7.25	PASS
176	95 - 101% of 174	95.7	PASS
177	5 - 9% of 176	6.59	PASS

CONTINUING CALIBRATION CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Instrument ID:	MS-VOA3	Calibration:	0128001
Lab File ID:	SEQ-CCV3.D	Calibration Date:	05/07/10 15:51
Sequence:	0E14307	Injection Date:	05/18/10
Lab Sample ID:	0E14307-CCV1	Injection Time:	22:28

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT		
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)	
Benzene	A	100.0	108.5	0.8513296	0.9240383		8.5	20	
Chlorobenzene	A	100.0	100.8	1.36545	1.376694	0.3	0.8	20	
Naphthalene	A	100.0	78.71	1.667032	1.312169		-21.3	20	*
1,1,2,2-Tetrachloroethane	A	100.0	95.27	0.6520071	0.6211767	0.3	-4.7	20	
Vinyl chloride	A	100.0	143.0	0.2254535	0.3224923		43.0	20	*
Xylenes (total)	A	300.0	306.4	1.65548	1.735106		4.8	20	
Bromofluorobenzene	A	30.00	27.66	0.8488807	0.7828095		-7.8	20	
Dibromofluoromethane	A	30.00	28.59	0.2645697	0.2521449		-4.7	20	
1,2-Dichloroethane-d4	A	30.00	27.66	5.822815E-02	5.368805E-02		-7.8	20	
Toluene-d8	A	30.00	27.62	2.233741	2.056173		-7.9	20	

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0E14206	Instrument:	MS-VOA3
Calibration:	0128001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E14206-TUN1	SEQ-TUN1.D	05/19/10 10:40
Calibration Check	0E14206-CCV1	SEQ-CCV1.D	05/19/10 11:12
LCS	0E19014-BS1	V3LCS01.D	05/19/10 11:42
Blank	0E19014-BLK1	V3BLK01.D	05/19/10 13:12
01GW01GS710510	1005107-12	0510712.D	05/19/10 16:35
01GW01GI720510	1005107-13	0510713.D	05/19/10 17:05
01GW01GS570510	1005107-14	0510714.D	05/19/10 17:35
LCS Dup	0E19014-BSD1	V3LCD01.D	05/19/10 21:35

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN1.D	Injection Date:	05/19/10
Instrument ID:	MS-VOA3	Injection Time:	10:40
Sequence:	0E14206	Lab Sample ID:	0E14206-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	22.5	PASS
75	30 - 60% of 95	52.6	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.61	PASS
173	Less than 2% of 174	0.594	PASS
174	50 - 200% of 95	67.5	PASS
175	5 - 9% of 174	7.36	PASS
176	95 - 101% of 174	97.7	PASS
177	5 - 9% of 176	6.77	PASS

CONTINUING CALIBRATION CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Instrument ID:	MS-VOA3	Calibration:	0128001
Lab File ID:	SEQ-CCV1.D	Calibration Date:	05/07/10 15:51
Sequence:	0E14206	Injection Date:	05/19/10
Lab Sample ID:	0E14206-CCV1	Injection Time:	11:12

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
Benzene	A	100.0	101.7	0.8513296	0.8656577		1.7	20
Chlorobenzene	A	100.0	93.62	1.36545	1.278364	0.3	-6.4	20
Naphthalene	A	100.0	78.57	1.667032	1.309819		-21.4	20 *
1,1,2,2-Tetrachloroethane	A	100.0	93.05	0.6520071	0.6067104	0.3	-6.9	20
Vinyl chloride	A	100.0	142.7	0.2254535	0.321818		42.7	20 *
Xylenes (total)	A	300.0	290.1	1.65548	1.642697		-0.8	20
Bromofluorobenzene	A	30.00	27.26	0.8488807	0.7715068		-9.1	20
Dibromofluoromethane	A	30.00	28.53	0.2645697	0.2515925		-4.9	20
1,2-Dichloroethane-d4	A	30.00	27.76	5.822815E-02	5.387313E-02		-7.5	20
Toluene-d8	A	30.00	26.85	2.233741	1.99934		-10.5	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS DATA SHEET

Blank

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Laboratory ID: 0E18022-BLK1 File ID: BLK04.D

Sampled: Prepared: Analyzed: 05/19/10 00:28

Solids: Preparation: 5030B Dilution:

Batch: 0E18022 Sequence: 0E14307 Calibration: 0128001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	Y, U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	Q, X, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.28	97.6	75 - 120	
Dibromofluoromethane	30.00	29.60	98.7	85 - 115	
1,2-Dichloroethane-d4	30.00	29.38	97.9	70 - 120	
Toluene-d8	30.00	31.40	105	85 - 120	

ANALYSIS DATA SHEET

Blank

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Laboratory ID: 0E19014-BLK1 File ID: V3BLK01.D

Sampled: Prepared: Analyzed: 05/19/10 13:12

Solids: Preparation: 5030B Dilution:

Batch: 0E19014 Sequence: 0E14206 Calibration: 0128001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	Y, U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	Q, X, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.39	98.0	75 - 120	
Dibromofluoromethane	30.00	30.87	103	85 - 115	
1,2-Dichloroethane-d4	30.00	30.41	101	70 - 120	
Toluene-d8	30.00	31.74	106	85 - 120	

ANALYSIS DATA SHEET

Blank

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Laboratory ID: 0E20007-BLK1 File ID: V5-BLK1.D

Sampled: Prepared: Analyzed: 05/21/10 16:09

Solids: Preparation: 5030B Dilution:

Batch: 0E20007 Sequence: 0E14411 Calibration: 0134007 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	Q, X, U
75-01-4	Vinyl chloride		0.200	1.00	Q, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.54	95.1	75 - 120	
Dibromofluoromethane	30.00	30.52	102	85 - 115	
1,2-Dichloroethane-d4	30.00	30.54	102	70 - 120	
Toluene-d8	30.00	32.59	109	85 - 120	

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN1.D	Injection Date:	05/08/10
Instrument ID:	MS-VOA5	Injection Time:	13:09
Sequence:	0E12805	Lab Sample ID:	0E12805-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	17.7	PASS
75	30 - 60% of 95	42.8	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.61	PASS
173	Less than 2% of 174	0	PASS
174	50 - 200% of 95	97.6	PASS
175	5 - 9% of 174	7.41	PASS
176	95 - 101% of 174	97.1	PASS
177	5 - 9% of 176	6.7	PASS

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN2.D	Injection Date:	05/09/10
Instrument ID:	MS-VOA5	Injection Time:	00:26
Sequence:	0E12805	Lab Sample ID:	0E12805-TUN2

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	24.3	PASS
75	30 - 60% of 95	48.9	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.21	PASS
173	Less than 2% of 174	0	PASS
174	50 - 200% of 95	83.7	PASS
175	5 - 9% of 174	7.82	PASS
176	95 - 101% of 174	98.1	PASS
177	5 - 9% of 176	7.09	PASS

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Sequence: 0E12805
Instrument: MS-VOA5
Calibration: 0134007

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E12805-TUN1	SEQ-TUN1.D	05/08/10 13:09
Cal Standard	0E12805-CAL1	SEQ-CAL1.D	05/08/10 13:43
Cal Standard	0E12805-CAL2	SEQ-CAL2.D	05/08/10 14:33
Cal Standard	0E12805-CAL3	SEQ-CAL3.D	05/08/10 15:53
Cal Standard	0E12805-CAL4	SEQ-CAL4.D	05/08/10 16:24
Cal Standard	0E12805-CAL5	SEQ-CAL5.D	05/08/10 16:53
Cal Standard	0E12805-CAL6	SEQ-CAL6.D	05/08/10 17:26
Cal Standard	0E12805-CAL7	SEQ-CAL7.D	05/08/10 17:56
Cal Standard	0E12805-CAL8	SEQ-CAL8.D	05/08/10 18:26
Cal Standard	0E12805-CAL9	SEQ-CAL9.D	05/08/10 18:56
Initial Cal Check	0E12805-ICV1	SEQ-ICV1.D	05/08/10 19:26
Cal Standard	0E12805-CALA	SEQ-CALA.D	05/08/10 19:56
Cal Standard	0E12805-CALB	SEQ-CALB.D	05/08/10 20:26
Cal Standard	0E12805-CALC	SEQ-CALC.D	05/08/10 20:56
Cal Standard	0E12805-CALD	SEQ-CALD.D	05/08/10 21:26
Cal Standard	0E12805-CALE	SEQ-CALE.D	05/08/10 21:56
Cal Standard	0E12805-CALF	SEQ-CALF.D	05/08/10 22:26
Cal Standard	0E12805-CALG	SEQ-CALG.D	05/08/10 22:56
Cal Standard	0E12805-CALH	SEQ-CALH.D	05/08/10 23:26
Cal Standard	0E12805-CALI	SEQ-CALI.D	05/08/10 23:56
MS Tune	0E12805-TUN2	SEQ-TUN2.D	05/09/10 00:26
Cal Standard	0E12805-CALJ	SEQ-CALJ.D	05/09/10 01:26
Cal Standard	0E12805-CALK	SEQ-CALK.D	05/09/10 01:56
Cal Standard	0E12805-CALL	SEQ-CALL.D	05/09/10 02:26
Cal Standard	0E12805-CALM	SEQ-CALM.D	05/09/10 02:56
Cal Standard	0E12805-CALN	SEQ-CALN.D	05/09/10 03:26
Cal Standard	0E12805-CALO	SEQ-CALO.D	05/09/10 03:56
Cal Standard	0E12805-CALP	SEQ-CALP.D	05/09/10 04:26
Cal Standard	0E12805-CALQ	SEQ-CALQ.D	05/09/10 04:56
Cal Standard	0E12805-CALR	SEQ-CALR.D	05/09/10 05:26

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Calibration: 0134007
Instrument: MS-VOA5
Matrix: Water
Calibration Date: 5/8/2010 3:40:08PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
Acetone	5.238476E-02	19.15053	6.9905	9.444361E-02	0.9994283		0.995	
Acrolein	2.520483E-02	51.28383	6.729111	9.368836E-02	0.9996098		0.995	
Acrylonitrile	0.0909455	20.56405	7.939375	0.1194936	0.9985561		0.995	
Benzene	1.247249	6.188391	13.73333	2.827717E-02			15	
Bromobenzene	1.002804	6.173738	18.38233	1.863737E-02			15	
Bromochloromethane	0.1985721	6.356347	11.96438	3.171568E-02			15	
Tert-Amyl Methyl Ether	0.9594432	15.74053	14.02638	3.456399E-02	0.9992891		0.995	
Bromodichloromethane	0.4898524	9.372995	14.58822	2.811553E-02			15	
Bromoform	0.6124822	9.988802	17.67944	2.095475E-02			SPCC (0.1)	
Bromomethane	0.2273189	12.07499	5.526778	8.692094E-02			15	
Bromofluorobenzene	0.8267954	9.811948	18.19756	1.561918E-02			15	
n-Butylbenzene	1.996385	13.72157	19.58244	1.329678E-02			15	
2-Butanone	0.1692204	31.23385	11.4875	0.1163059	0.9998638		0.995	
sec-Butylbenzene	2.671707	14.82944	19.11244	7.050123E-03			15	
tert-Butylbenzene	2.20326	12.57551	19.23811	7.41846E-03			15	
Carbon disulfide	1.062076	8.178008	8.625667	7.454269E-02			15	
Carbon tetrachloride	0.4199085	7.260258	13.704	2.568879E-02			15	
Chlorobenzene	2.019812	12.83353	17.27611	2.694582E-02			SPCC (0.3)	
Chloroethane	0.1826699	15.47544	5.764	9.213093E-02	0.9990811		0.995	
Chloroform	0.654407	9.296329	12.05888	2.346578E-02			CCC (20)	
2-Chloroethyl vinyl ether	0.1936709	11.00913	15.08656	2.799878E-02			15	
Chloromethane	0.3257038	10.08596	4.607444	8.629972E-02			SPCC (0.1)	
1-Chlorohexane	1.000747	17.01101	17.21267	1.589309E-02	0.9951034		0.995	
2-Chlorotoluene	2.229476	11.55886	18.59189	6.714239E-03			15	
4-Chlorophenyl-phenylether	2.375957	10.7515	18.64878	1.464079E-02			15	
Cyclohexane	0.4789897	8.92101	13.61311	3.492215E-02			15	
Dibromochloromethane	0.8895045	10.7247	16.35567	0.0170222			15	
1,2-Dibromo-3-chloropropane	0.184109	9.180321	19.98244	1.857088E-02			15	
1,2-Dibromoethane (EDB)	0.7767539	13.89922	16.56778	1.970337E-02			15	
Dibromomethane	0.2424485	7.073796	14.43533	0.0278618			15	
1,2-Dichlorobenzene	1.546126	5.555328	19.57811	1.871536E-02			15	
1,3-Dichlorobenzene	1.760097	10.13521	19.213	1.939489E-02			15	

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Calibration: 0134007
Instrument: MS-VOA5
Matrix: Water
Calibration Date: 5/8/2010 3:40:08PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,4-Dichlorobenzene	1.767108	10.42037	19.262	2.035883E-02			15	
Dichlorodifluoromethane	0.3079612	5.998622	4.325556	0.1123515			15	
1,1-Dichloroethane	0.6404133	7.468359	10.51433	6.188777E-02			SPCC (0.1)	
1,2-Dichloroethane	0.4689364	6.009006	13.05589	2.876157E-02			15	
1,1-Dichloroethene	0.237259	12.53446	7.849556	5.116829E-02			CCC (20)	
cis-1,2-Dichloroethene	0.3803055	6.452106	11.71144	0.0510054			15	
trans-1,2-Dichloroethene	0.3684619	13.74628	9.830222	4.358531E-02			15	
1,2-Dichloroethene (total)	0.3743837	9.434121	0	0			15	
1,2-Dichloropropane	0.3612511	5.961178	14.48322	2.723195E-02			CCC (20)	
1,3-Dichloropropane	1.161948	12.19093	16.11956	2.324187E-02			15	
2,2-Dichloropropane	0.4619466	9.940153	12.19878	3.306309E-02			15	
1,1-Dichloropropene	0.4596839	6.298667	13.48744	2.177147E-02			15	
cis-1,3-Dichloropropene	0.5626243	3.495755	15.314	2.040288E-02			15	
trans-1,3-Dichloropropene	1.097744	10.59458	15.74356	2.618353E-02			15	
Diisopropyl Ether	1.254393	4.457683	11.60311	6.825235E-02			15	
Ethylbenzene	3.349415	13.90669	17.4205	6.790657E-03			CCC (20)	
Ethyl tert-Butyl Ether	1.040987	3.50487	12.28278	7.442361E-02			15	
Ethyl Methacrylate	0.9449305	14.30866	16.15133	2.422963E-02			15	
Hexachlorobutadiene	0.3677814	11.86383	21.69844	1.669797E-02			15	
2-Hexanone	0.5774638	21.14357	16.271	3.124758E-02	0.9998099		0.995	
Iodomethane	0.3360427	27.60589	7.887286	7.967883E-02	0.997823		0.995	
Isopropylbenzene	2.494209	16.1397	18.15811	2.260212E-02	0.9955104		0.995	
p-Isopropyltoluene	1.910766	12.39102	18.93856	2.618166E-02			15	
Methylene chloride	0.4644191	27.98095	8.167	4.831629E-02	0.9993342		0.995	
Methyl Acetate	0.2751261	22.2525	8.285	5.968432E-02	0.9993492		0.995	
Methylcyclohexane	0.3837474	12.30218	15.14011	2.008505E-02			15	
Naphthalene	1.911635	11.83976	21.67011	1.550498E-02			15	
Methyl Methacrylate	0.3123349	15.23833	14.80467	0.0424575	0.9998213		0.995	
4-Methyl-2-pentanone	0.3187909	18.0896	15.44475	3.666023E-02	0.9994431		0.995	
Methyl t-Butyl Ether	0.8640902	10.14491	10.30122	0.1973546			15	
n-Propylbenzene	3.434776	14.85712	18.49478	1.591131E-02			15	
Styrene	2.052345	11.93191	17.82256	1.221684E-02			15	

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Calibration: 0134007
Instrument: MS-VOA5
Matrix: Water
Calibration Date: 5/8/2010 3:40:08PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,1,2,2-Tetrachloroethane	0.8415106	7.936326	17.89144	0.0117448			SPCC (0.3)	
1,1,1,2-Tetrachloroethane	0.8005544	11.79218	17.22144	1.587971E-02			15	
t-Butyl alcohol	2.755932E-02	24.60426	7.955286	0.177648	0.9987322		0.995	
Tetrachloroethene	0.8681995	14.3405	16.73067	2.060334E-02			15	
Toluene	1.855165	13.08201	16.06525	2.216442E-02			CCC (20)	
1,2,3-Trichlorobenzene	0.8580229	4.407042	21.94244	1.738218E-02			15	
1,2,4-Trichlorobenzene	0.9491041	7.915191	21.36622	1.974911E-02			15	
1,1,2-Trichloroethane	0.5972597	13.52011	15.8895	2.335001E-02			15	
1,1,1-Trichloroethane	0.5036942	8.934106	13.21756	1.920203E-02			15	
Tetrahydrofuran	9.041208E-02	15.77666	12.637	6.925057E-02	0.999439		0.995	
Trichloroethene	0.3487445	6.72321	14.55222	3.013863E-02			15	
Trichlorofluoromethane	0.4033409	8.290316	6.776111	6.693441E-02			15	
1,2,3-Trichloropropane	0.2367812	22.62616	17.99633	2.720879E-02	0.9967669		0.995	
1,3,5-Trimethylbenzene	2.304679	12.45385	18.69256	2.258813E-02			15	
1,2,4-Trimethylbenzene	2.403884	11.59619	19.01389	1.620209E-02			15	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.3209896	7.467249	8.331556	8.641603E-02			15	
Vinyl chloride	0.2779007	11.62373	4.892667	8.851202E-02			CCC (20)	
m,p-Xylene	2.516964	14.78612	17.56538	1.484503E-02			15	
o-Xylene	2.520615	14.31816	17.88056	2.117163E-02			15	
Vinyl acetate	0.7993974	14.29818	10.87178	7.595569E-02			15	
Xylenes (total)	2.540603	13.93638	0	0			15	
Dibromofluoromethane	0.312256	2.605853	12.24467	0.0241036			15	
1,2-Dichloroethane-d4	6.052881E-02	8.307731	12.94311	3.829748E-02			15	
Toluene-d8	2.129377	10.46941	15.99711	2.601099E-02			15	

INITIAL CALIBRATION CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Instrument ID:	MS-VOA3	Calibration:	0128001
Lab File ID:	SEQ-ICV1.D	Calibration Date:	05/07/10 15:51
Sequence:	0E12804	Injection Date:	05/07/10
Lab Sample ID:	0E12804-ICV1	Injection Time:	18:14

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	ICV	ICAL	ICV	MIN (#)	ICV	LIMIT (#)
Benzene	A	100.0	94.23	0.8513296	0.8022267		-5.8	20
Chlorobenzene	A	100.0	97.56	1.36545	1.332166	0.3	-2.4	20
Naphthalene	A	100.0	104.9	1.667032	1.748203		4.9	20
1,1,2,2-Tetrachloroethane	A	100.0	97.74	0.6520071	0.6372876	0.3	-2.3	20
Vinyl chloride	A	100.0	90.30	0.2254535	0.2035913		-9.7	20
Xylenes (total)	A	300.0	277.1	1.65548	1.569467		-5.2	20
Bromofluorobenzene	A	30.00	29.75	0.8488807	0.8417188		-0.8	20
Dibromofluoromethane	A	30.00	30.02	0.2645697	0.264731		0.06	20
1,2-Dichloroethane-d4	A	30.00	29.96	5.822815E-02	5.814867E-02		-0.1	20
Toluene-d8	A	30.00	29.03	2.233741	2.161863		-3.2	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0E14411	Instrument:	MS-VOA5
Calibration:	0134007		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E14411-TUN1	SEQ-TUN1.D	05/21/10 13:38
Calibration Check	0E14411-CCV1	SEQ-CCV1.D	05/21/10 14:08
LCS	0E20007-BS1	V5-LCS1.D	05/21/10 14:38
Blank	0E20007-BLK1	V5-BLK1.D	05/21/10 16:09
Trip Blank	1005107-11	0510711.D	05/22/10 01:10
LCS Dup	0E20007-BSD1	V5-LCSD1.D	05/22/10 01:40

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN1.D	Injection Date:	05/21/10
Instrument ID:	MS-VOA5	Injection Time:	13:38
Sequence:	0E14411	Lab Sample ID:	0E14411-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	34.2	PASS
75	30 - 60% of 95	58.3	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.62	PASS
173	Less than 2% of 174	0	PASS
174	50 - 200% of 95	53.7	PASS
175	5 - 9% of 174	7.57	PASS
176	95 - 101% of 174	95.4	PASS
177	5 - 9% of 176	6.71	PASS

CONTINUING CALIBRATION CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Instrument ID:	MS-VOA5	Calibration:	0134007
Lab File ID:	SEQ-CCV1.D	Calibration Date:	05/08/10 15:40
Sequence:	0E14411	Injection Date:	05/21/10
Lab Sample ID:	0E14411-CCV1	Injection Time:	14:08

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT		
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)	
Benzene	A	100.0	96.04	1.247249	1.197857		-4.0	20	
Chlorobenzene	A	100.0	89.35	2.019812	1.80472	0.3	-10.6	20	
Naphthalene	A	100.0	98.73	1.911635	1.887372		-1.3	20	
1,1,2,2-Tetrachloroethane	A	100.0	121.7	0.8415106	1.024534	0.3	21.7	20	*
Vinyl chloride	A	100.0	103.8	0.2779007	0.2883833		3.8	20	
Xylenes (total)	A	300.0	275.0	2.540603	2.308395		-9.1	20	
Bromofluorobenzene	A	30.00	27.14	0.8267954	0.7481293		-9.5	20	
Dibromofluoromethane	A	30.00	28.59	0.312256	0.2975536		-4.7	20	
1,2-Dichloroethane-d4	A	30.00	29.46	6.052881E-02	5.944246E-02		-1.8	20	
Toluene-d8	A	30.00	26.22	2.129377	1.860755		-12.6	20	

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO: **G.WALKER** **DATE:** **AUGUST 9, 2010**

FROM: **DANIELLE M. BAUGHMAN** **COPIES:** **DV FILE**

SUBJECT: **INORGANIC DATA VALIDATION – SELECT METALS**
CTO 067 NAS PENSACOLA
SAMPLE DELIVERY GROUP (SDG) – CTO067_P002

SAMPLES: 13/Aqueous/

01GW01GI43-0510	01GW01GI46-0510	01GW01GI720510
01GW01GI74-0510	01GW01GS570510	01GW01GS62-0510
01GW01GS710510	01GW01GS73-0510	GW01-051210
01SW01-0510	01SW02-0510	01SW03-0510
SW01-051310		

Overview

The sample set for NAS Pensacola, CTO 067, SDG CTO067P_002, consists of thirteen (13) aqueous environmental samples. Samples 01SW01-0510, 01SW02-0510, 01SW03-0510, GW01-051210, and SW01-051310 were analyzed for iron only. No field duplicate pairs were included within this SDG.

All samples, except for 01SW01-0510, 01SW02-0510, 01SW03-0510, GW01-051210, and SW01-051310, were analyzed for aluminum, cadmium, chromium, iron, manganese, and nickel. The samples were collected by Tetra Tech NUS on May 12 and 13, 2010 and analyzed by Empirical Laboratories under Naval Facilities Engineering Service Center (NFESC) Quality Assurance / Quality Control (QA/QC) criteria. Metal analyses were conducted using SW-846 6010B.

These data were evaluated based on the following parameters:

* • Data Completeness
* • Holding Times
* • Initial / Continuing Calibration Verification Results
• Laboratory Method/Preparation Blank Analyses
* • Detection Limits

* - All quality control criteria were met for this parameter.

Notes

The following contaminants were detected in the laboratory method/preparation blanks at the following maximum concentrations:

Analyte	Maximum Concentration	Action Level
Iron	41.0 ug/L	205 ug/L

An action level of 5X the maximum contaminant level has been used to evaluate sample data for blank contamination. Sample aliquot, percent solids and dilution factors, if applicable, were taken into consideration when evaluating for blank contamination. No validation actions were required as all sample results were greater than the action level.

Positive results reported below the estimated quantitation limit (EQL) but above the method detection limit (MDL) were qualified as estimated, "J".

Executive Summary

Laboratory Performance: Iron was detected in the laboratory method blanks.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the "National Functional Guidelines for Inorganic Review", October 2004 and the Department of Defense (DoD) document entitled "Quality Systems Manual (QSM) for Environmental Laboratories", January 2006.

The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS
Danielle M. Baughman
Process Engineer

Tetra Tech NUS
Joseph A. Samchuck
Quality Assurance Officer

Attachments:
1. Appendix A - Qualified Analytical Results
2. Appendix B - Results as reported by the Laboratory
3. Appendix C - Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS-GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O - Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DOT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 00702	NSAMPLE	01GW01GI43-0510			01GW01GI46-0510			01GW01GI720510			01GW01GI74-0510		
SDG: CTO067P_002	LAB_ID	1005107-01			1005107-04			1005107-13			1005107-06		
FRACTION: M	SAMP_DATE	5/12/2010			5/12/2010			5/12/2010			5/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		103			65			188			202		
CADMIUM		0.251	J	P	0.34	J	P	0.937	J	P	0.657	J	P
CHROMIUM		0.892	J	P	1.15	J	P	5	U		0.743	J	P
IRON		8130			17500			3390			12600		
MANGANESE		44.9			169			94.8			152		
NICKEL		0.75	U		0.75	U		1.23	J	P	1.74	J	P

PROJ_NO: 00702	NSAMPLE	01GW01GS570510			01GW01GS62-0510			01GW01GS710510			01GW01GS73-0510		
SDG: CTO067P_002	LAB_ID	1005107-14			1005107-02			1005107-12			1005107-05		
FRACTION: M	SAMP_DATE	5/12/2010			5/12/2010			5/12/2010			5/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM		393			506			1200			8260		
CADMIUM		0.723	J	P	0.284	J	P	0.63	J	P	0.321	J	P
CHROMIUM		0.5	U		0.614	J	P	1.99			6.01		
IRON		228			259			718			9630		
MANGANESE		5.48			46			57.8			102		
NICKEL		1.13	J	P	0.849	J	P	2.02	J	P	3.16		

PROJ_NO: 00702	NSAMPLE	01SW01-0510			01SW02-0510			01SW03-0510			GW01-051210		
SDG: CTO067P_002	LAB_ID	1005107-07			1005107-09			1005107-10			1005107-03		
FRACTION: M	SAMP_DATE	5/13/2010			5/13/2010			5/13/2010			5/12/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
ALUMINUM											418		
CADMIUM											0.265	J	P
CHROMIUM											0.522	J	P
IRON		1690			6890			345			208		
MANGANESE											43.9		
NICKEL											0.767	J	P

PROJ_NO: 00702	NSAMPLE	SW01-051310
SDG: CTO067P_002	LAB_ID	1005107-08
FRACTION: M	SAMP_DATE	5/13/2010
MEDIA: WATER	QC_TYPE	NM
	UNITS	UG/L
	PCT_SOLIDS	0.0
	DUP_OF	

PARAMETER	RESULT	VQL	QLCD
ALUMINUM			
CADMIUM			
CHROMIUM			
IRON	4850		
MANGANESE			
NICKEL			

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

ANALYSIS DATA SHEET

01GW01GI43-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/12/10 12:10
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-01
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	103	12.5	50.0	1		SW6010B	0F11005	06/18/10 16:07
7440-43-9	Cadmium	0.251	0.250	1.25	1	I	SW6010B	0F11005	06/18/10 16:07
7440-47-3	Chromium	0.892	0.500	1.25	1	I	SW6010B	0F11005	06/18/10 16:07
7439-89-6	Iron	8130	7.50	25.0	1		SW6010B	0F11005	06/18/10 16:07
7439-96-5	Manganese	44.9	0.750	3.75	1		SW6010B	0F11005	06/18/10 16:07
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	0F11005	06/18/10 16:07

ANALYSIS DATA SHEET

01GW01GI46-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/12/10 14:40
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-04
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	65.0	12.5	50.0	1		SW6010B	0F11005	06/18/10 16:38
7440-43-9	Cadmium	0.340	0.250	1.25	1	I	SW6010B	0F11005	06/18/10 16:38
7440-47-3	Chromium	1.15	0.500	1.25	1	I	SW6010B	0F11005	06/18/10 16:38
7439-89-6	Iron	17500	7.50	25.0	1		SW6010B	0F11005	06/18/10 16:38
7439-96-5	Manganese	169	0.750	3.75	1		SW6010B	0F11005	06/18/10 16:38
7440-02-0	Nickel		0.750	2.50	1	U	SW6010B	0F11005	06/18/10 16:38

ANALYSIS DATA SHEET

01GW01GI720510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/12/10 15:20
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-13
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	188	12.5	50.0	1		SW6010B	0F11005	06/18/10 17:41
7440-43-9	Cadmium	0.937	0.250	1.25	1	I	SW6010B	0F11005	06/18/10 17:41
7440-47-3	Chromium		5.00	12.5	10	U	SW6010B	0F11005	06/19/10 13:02
7439-89-6	Iron	3390	75.0	250	10	D	SW6010B	0F11005	06/19/10 13:02
7439-96-5	Manganese	94.8	0.750	3.75	1		SW6010B	0F11005	06/18/10 17:41
7440-02-0	Nickel	1.23	0.750	2.50	1	I	SW6010B	0F11005	06/18/10 17:41

ANALYSIS DATA SHEET

01GW01GI74-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/12/10 17:20
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-06
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	202	12.5	50.0	1		SW6010B	0F11005	06/18/10 16:48
7440-43-9	Cadmium	0.657	0.250	1.25	1	I	SW6010B	0F11005	06/18/10 16:48
7440-47-3	Chromium	0.743	0.500	1.25	1	I	SW6010B	0F11005	06/18/10 16:48
7439-89-6	Iron	12600	7.50	25.0	1		SW6010B	0F11005	06/18/10 16:48
7439-96-5	Manganese	152	0.750	3.75	1		SW6010B	0F11005	06/18/10 16:48
7440-02-0	Nickel	1.74	0.750	2.50	1	I	SW6010B	0F11005	06/18/10 16:48

ANALYSIS DATA SHEET

01GW01GS570510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/12/10 16:40
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-14
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	393	12.5	50.0	1		SW6010B	0F11005	06/18/10 17:47
7440-43-9	Cadmium	0.723	0.250	1.25	1	I	SW6010B	0F11005	06/18/10 17:47
7440-47-3	Chromium		0.500	1.25	1	Y U	SW6010B	0F11005	06/18/10 17:47
7439-89-6	Iron	228	7.50	25.0	1	Y	SW6010B	0F11005	06/18/10 17:47
7439-96-5	Manganese	5.48	0.750	3.75	1		SW6010B	0F11005	06/18/10 17:47
7440-02-0	Nickel	1.13	0.750	2.50	1	I	SW6010B	0F11005	06/18/10 17:47

ANALYSIS DATA SHEET

01GW01GS62-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/12/10 13:35
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-02
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	506	12.5	50.0	1		SW6010B	0F11005	06/18/10 16:28
7440-43-9	Cadmium	0.284	0.250	1.25	1	I	SW6010B	0F11005	06/18/10 16:28
7440-47-3	Chromium	0.614	0.500	1.25	1	I	SW6010B	0F11005	06/18/10 16:28
7439-89-6	Iron	259	7.50	25.0	1		SW6010B	0F11005	06/18/10 16:28
7439-96-5	Manganese	46.0	0.750	3.75	1		SW6010B	0F11005	06/18/10 16:28
7440-02-0	Nickel	0.849	0.750	2.50	1	I	SW6010B	0F11005	06/18/10 16:28

ANALYSIS DATA SHEET

01GW01GS710510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/12/10 13:50
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-12
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	1200	12.5	50.0	1		SW6010B	0F11005	06/18/10 17:37
7440-43-9	Cadmium	0.630	0.250	1.25	1	I	SW6010B	0F11005	06/18/10 17:37
7440-47-3	Chromium	1.99	0.500	1.25	1	Y	SW6010B	0F11005	06/18/10 17:37
7439-89-6	Iron	718	7.50	25.0	1	Y	SW6010B	0F11005	06/18/10 17:37
7439-96-5	Manganese	57.8	0.750	3.75	1		SW6010B	0F11005	06/18/10 17:37
7440-02-0	Nickel	2.02	0.750	2.50	1	I	SW6010B	0F11005	06/18/10 17:37

ANALYSIS DATA SHEET

01GW01GS73-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/12/10 16:30
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-05
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	8260	12.5	50.0	1		SW6010B	0F11005	06/18/10 16:43
7440-43-9	Cadmium	0.321	0.250	1.25	1	I	SW6010B	0F11005	06/18/10 16:43
7440-47-3	Chromium	6.01	0.500	1.25	1		SW6010B	0F11005	06/18/10 16:43
7439-89-6	Iron	9630	7.50	25.0	1		SW6010B	0F11005	06/18/10 16:43
7439-96-5	Manganese	102	0.750	3.75	1		SW6010B	0F11005	06/18/10 16:43
7440-02-0	Nickel	3.16	0.750	2.50	1		SW6010B	0F11005	06/18/10 16:43

ANALYSIS DATA SHEET

01SW01-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Water
Sampled: 05/13/10 11:55
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-07
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	1690	7.50	25.0	1		SW6010B	0F11005	06/18/10 16:53

ANALYSIS DATA SHEET

01SW02-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Water
Sampled: 05/13/10 12:40
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-09
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	6890	7.50	25.0	1		SW6010B	0F11005	06/18/10 17:03

ANALYSIS DATA SHEET

01SW03-0510

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Water
Sampled: 05/13/10 14:30
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-10
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	345	7.50	25.0	1		SW6010B	0F11005	06/18/10 17:08

ANALYSIS DATA SHEET

GW01-051210

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Ground Water
Sampled: 05/12/10 13:50
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-03
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7429-90-5	Aluminum	418	12.5	50.0	1		SW6010B	0F11005	06/18/10 16:33
7440-43-9	Cadmium	0.265	0.250	1.25	1	I	SW6010B	0F11005	06/18/10 16:33
7440-47-3	Chromium	0.522	0.500	1.25	1	I	SW6010B	0F11005	06/18/10 16:33
7439-89-6	Iron	208	7.50	25.0	1		SW6010B	0F11005	06/18/10 16:33
7439-96-5	Manganese	43.9	0.750	3.75	1		SW6010B	0F11005	06/18/10 16:33
7440-02-0	Nickel	0.767	0.750	2.50	1	I	SW6010B	0F11005	06/18/10 16:33

ANALYSIS DATA SHEET

SW01-051310

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Matrix: Water
Sampled: 05/13/10 12:05
% Solids: 0.00

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Laboratory ID: 1005107-08
Received: 05/14/10 09:15

CAS NO.	Analyte	Conc. (ug/L)	MDL	RL	D.F.	Q	Method	Batch	Analyzed
7439-89-6	Iron	4850	7.50	25.0	1		SW6010B	0F11005	06/18/10 16:58

APPENDIX C
SUPPORT DOCUMENTATION

Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Changes to the Revision

This is an original submittal of the final report package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:

The continuing calibration standard failed criteria in 0E14307-CCV1, 0E14206-CCV1 for Naphthalene and Vinyl chloride, in 0E14411-CCV1 for 1,1,2,2-Tetrachloroethane.

The blank spike failed criteria for Vinyl Chloride in batch 0E18022 and 0E19014, in batch 0E14411 for 1,1,2,2-Tetrachloroethane and Vinyl Chloride.

No additional anomalies or deviations are noted and the data is properly qualified.

SW6010B:
The continuing calibration standard failed criteria in 0F17035-CCV6 for Chromium and Iron. No additional anomalies or deviations are noted and the data is properly qualified.

Data Qualifiers

As applicable and where required, the following general qualifiers are associated with the sample results. Additional qualifiers will be specified within the reporting sections of the data package or within the body of the Case Narrative.

Analytical Report Terms and Qualifiers

MDL: The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The MDL is determined from analysis of a sample containing the analyte in a given matrix.

EQL: The estimated quantitation limit (EQL), also known as Reporting Limit **(RL),** is defined as the estimated concentration above which quantitative results can be obtained with a specific degree of confidence. Empirical Laboratories defines the EQL to be at or near the lowest standard of the calibration curve.

*: A failing quality control criteria is associated with the reported result.

B: The presence of a "B" to the right of an analytical value indicates that this compound was also detected in the method blank and the data should be interpreted with caution. One should consider the possibility that the correct sample result might be less than the reported result and, perhaps, zero. **For Florida DEP reports this qualifier is "V".**

D: When a sample (or sample extract) is rerun diluted because one of the compound concentrations exceeded the highest concentration range for the standard curve, all of the values obtained in the dilution run will be flagged with a "D".

E: The concentration for any compound found which exceeds the highest concentration level on the standard curve for that compound will be flagged with an "E". Usually the sample will be rerun at a dilution to quantitate the flagged compound. **For Florida DEP reports this qualifier is "L".**

H1: The result was analyzed outside of the EPA recommended holding time.

H2: The result was extracted outside of the EPA recommended holding time

J: The presence of a "J" to the right of an analytical result indicates that the reported result is estimated. The mass spectral data pass the identification criteria showing that the compound is present, but the calculated result is less than the EQL. One should feel confident that the result is greater than zero and less than the EQL. **For Florida DEP reports this qualifier is "I".**

M: Indicates that the sample matrix interfered with the quantitation of the analyte. In dual column analysis the result is reported from the column with the lower

concentration. In metals, the qualifier indicates that the parameters MDL/RL has been raised.

N: The MS/MSD accuracy and/or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter.

P: The associated numerical value is an estimated quantity. There is greater than a 40% difference between the two GC columns for the detected concentrations. The higher of the two values is reported unless matrix interference is obvious or for HPLC analysis where the primary column is reported.

Q: The RPD and/or percent recovery failed in the associated Blank Spike and/or Blank Spike Duplicate.

S: The Internal Standard failed criteria.

U: The presence of a "U" indicates that the analyte was analyzed for but was not detected or the concentration of the analyte quantitated below the MDL.

X: The parameter shows a potential positive bias on a reported concentration due to an ICV or CCV exceeding the upper control limit on the high side.

Y: The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side.

LIMS Definitions / Naming Conventions:
The following are general naming conventions that are used throughout the laboratory; however, on a method by method basis, there are additional QAQC items that are named in a consistent format.

BLK: LIMS assigns a unique identifier to the Method Blank by naming it as the letters BLK appended to the Batch ID. A Method Blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The Method Blank is used to assess for possible contamination during preparation and/or analysis steps. Method Blanks within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally.

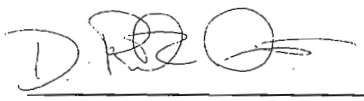
BS: LIMS assigns a unique identifier to the Blank Spike by naming it as the letters BS appended to the Batch ID. The Blank Spike or Lab Control Sample is a controlled analyte-free matrix, which is spiked with known and verified concentrations of target analytes. Spiking concentrations can be referenced in the method SOP. The BS is used to evaluate the viability of analytes taken through the entire prep (when applicable) and analytical process. Blank Spikes within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally. A duplicate Blank Spike will

be designated as a BSD.

MS: The LIMS assigns each Client sample with a unique identifier. The Matrix Spike is designated with a MS at the end of the sample's unique identifier. The Matrix Spike sample is used to assess the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. A duplicate Matrix Spike will be designated as a MSD.

IDs: The LIMS assigns each Client sample with a unique identifier. The letter "RE" may potentially be appended to the end of the LIMS Sample ID. And "**RE"** implies that the sample was either re-prepped, re-analyzed straight, or re-analyzed at a dilution. Subsequent re-analysis for the sample will be appended with a numerical value beginning with 1 that will increase incrementally. Eg: RE1, RE2, RE3, etc.

Statement of Data Authenticity:
I certify that, based upon my inquiry of those individuals immediately responsible for obtaining the information and to the best of my knowledge, the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, with the exception of the conditions detailed in this Case Narrative, as verified by my signature below. During absences, Ms. Marcia K. McGinnity is authorized to sign this Statement of Data Authenticity.



Mr. Rick D. Davis
Laboratory Technical Director / VP Operations

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 27017 | PAGE 1 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G00702	OU1 Site 1 Naval Pensacola	Gerry Walker	(850) 385-9899	Empirical Labs - Kim Kostzer
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Bill Olson	PHONE NUMBER: (850) 385-9899	ADDRESS: 621 Mainstream Dr. Ste 270
		CARRIER/WAYBILL NUMBER: 851597482776		CITY, STATE: Nashville, TN 37228

STANDARD TAT ☒
RUSH TAT ☐
☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE (YEAR 2010)	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	CONTAINER TYPE PLASTIC (P) or GLASS (G)	PRESERVATIVE USED	TYPE OF ANALYSIS	COMMENTS
									G G G G G P P P P P	HCL HCL HCL HCL HCL HNO3 HNO3 HNO3 HNO3 HNO3	8260B Vinyl Chloride; 8260B Benzene; 8260B chlorobenzene; 8260B Total Xylenes; 8260B 1,1,2,2-Tetrachloroethane; 8260B Naphthalene; 6010B Aluminum; 6010B Lead; 6010A Chromium; 6010B Iron; 6010B Manganese; 6010B Nickel	
05/12	1210	01GW01GI43-0510	✓	31.6	41.6	GW	G	4	X X X X X X X X X X X X			-01
05/12	1335	01GW01GS62-0510	✓	10	20	GW	G	4	X X X X X X X X X X X X			Cool to 4°C -02
05/12	1350	GW01-051210	✓			GW	G	4	X X X X X X X X X X X X			-03
05/12	1440	01GW01GI46-0510	✓	19	29	GW	G	4	X X X X X X X X X X X X			1005107-04
05/12	1630	01GW01GS73-0510	✓	3	13	GW	G	4	X X X X X X X X X X X X			-05
05/12	1720	01GW01GI74-0510	✓	25	30	GW	G	4	X X X X X X X X X X X X			-06
05/13	1155	01SW01-0510	✓			SW	G	1	X			-07
05/13	1205	SW01-051310	✓			SW	G	1	X			-08
05/13	1240	01SW02-0510	✓			SW	G	1	X			-09
05/13	1430	01SW03-0510	✓			SW	G	1	X			-10
		Trip Blank				QC		2	X X X X X X			-11

5/14/10

	DATE	TIME		DATE	TIME
1. RELINQUISHED BY	05/13/10	15:00	1. RECEIVED BY	05/13/10	15:02
2. RELINQUISHED BY	5/13/10	1605	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	5/14/10	09:15

COMMENTS

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4.9°C

4/02R FORM NO. TtNUS-001

9

CTO067P_002 Summ Package

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 ♦ Nashville, TN 37228 ♦ 615-345-1115 ♦ (fax) 615-846-5426

10269

Send Results to:	Send Invoice to:
Name	Name Sandy D'Alessandris
Company TTNUS	Company TTNUS
Address 6601 Anderson Dr	Address 601 Anderson Dr
City Pittsburgh	City Pittsburgh
State, Zip PA, 15220	State, Zip PA, 15220
Phone (412) 921-7273	Phone (412) 921-7090
Fax	Fax
E-mail	E-mail
Project No./Name: DU1 112600702	Sampler's (Signature):

Analysis Requirements: Select VOCs* | Select Metals+

Lab Use Only:

VOA Headspace	Y	(N)	NA
Field Filtered	Y	(N)	NA
Correct Containers	(Y)	N	NA
Discrepancies	Y	(N)	NA
Cust. Seals Intact	(Y)	N	NA
Containers Intact	(Y)	N	NA

Airbill #: 2776 –

CAR #:

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Comments	No. of Bottles	Lab Use Only Containers/Pres.
1005107-12	5/12/10 13:50	01GW01GS710510	AQ			3J-HY, 1C-HY
-13	5/12/10 15:20	01GW01GI720510	AQ			
-14	5/12/10 16:40	01GW01GS570510	AQ			

	Date/Time	Received By: (Signature)
Sample Kit Prep'd by: (Signature)	05/12/10	
Relinquished by: (Signature)	05/13/10 1006	Received By: (Signature)
Relinquished by: (Signature)	Date/Time	Received By: (Signature)
Received for Laboratory by: (Signature)	5/14/10 09:15	Temperature 4.9°C

REMARKS:

*Select VOC: Vinyl Chloride, Benzene, Naphthalene, Chlorobenzene, Total Xylenes and 1,1,2,2 Tetrachloroethane

+Select metals: Aluminum, Cadmium, Iron, Chromium, Manganese, Nickel

Details:

Page 2 of 2

Cooler No. ____ of ____

Date Shipped ____

Shipped By ____

Turnaround ____

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

CTO067P_002 Summ Package

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HOLDTIME

SDG CTO067P_002

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	GW01-051210	1005107-03	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GI46-0510	1005107-04	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GI720510	1005107-13	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GI720510	1005107-13RE1	NM	05/12/2010	06/11/2010	06/19/2010	30	8	38
M	UG/L	01GW01GI74-0510	1005107-06	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GS570510	1005107-14	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GS62-0510	1005107-02	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GS710510	1005107-12	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01GW01GS73-0510	1005107-05	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01SW01-0510	1005107-07	NM	05/13/2010	06/11/2010	06/18/2010	29	7	36
M	UG/L	01GW01GI43-0510	1005107-01	NM	05/12/2010	06/11/2010	06/18/2010	30	7	37
M	UG/L	01SW03-0510	1005107-10	NM	05/13/2010	06/11/2010	06/18/2010	29	7	36
M	UG/L	SW01-051310	1005107-08	NM	05/13/2010	06/11/2010	06/18/2010	29	7	36
M	UG/L	01SW02-0510	1005107-09	NM	05/13/2010	06/11/2010	06/18/2010	29	7	36
OV	UG/L	Trip Blank	1005107-11	NM	05/12/2010	05/21/2010	05/22/2010	9	1	10

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
OV	UG/L	01GW01GI43-0510	1005107-01	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	01GW01GI46-0510	1005107-04	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	01GW01GI720510	1005107-13	NM	05/12/2010	05/19/2010	05/19/2010	7	0	7
OV	UG/L	01GW01GI74-0510	1005107-06	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	01GW01GS570510	1005107-14	NM	05/12/2010	05/19/2010	05/19/2010	7	0	7
OV	UG/L	01GW01GS62-0510	1005107-02	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	01GW01GS710510	1005107-12	NM	05/12/2010	05/19/2010	05/19/2010	7	0	7
OV	UG/L	01GW01GS73-0510	1005107-05	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7
OV	UG/L	GW01-051210	1005107-03	NM	05/12/2010	05/18/2010	05/19/2010	6	1	7

INITIAL AND CONTINUING CALIBRATION CHECK

SW6010B

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Instrument ID: ME-ICP

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Calibration: 0171001
Sequence: 0F17035

Lab Sample ID	Analyte	True	Found	%R	Units	Control Limit
0F17035-ICV1	Aluminum	10000	9986	99.9	ug/L	+/- 10.00%
	Cadmium	1000	1067	107	ug/L	+/- 10.00%
	Chromium	1000	1010	101	ug/L	+/- 10.00%
	Iron	10000	9888	98.9	ug/L	+/- 10.00%
	Manganese	1000	1016	102	ug/L	+/- 10.00%
	Nickel	1000	996.1	99.6	ug/L	+/- 10.00%
0F17035-CCV1	Aluminum	10000	10000	100	ug/L	+/- 10.00%
	Cadmium	1000	1082	108	ug/L	+/- 10.00%
	Chromium	1000	1004	100	ug/L	+/- 10.00%
	Iron	10000	9770	97.7	ug/L	+/- 10.00%
	Manganese	1000	1016	102	ug/L	+/- 10.00%
	Nickel	1000	1020	102	ug/L	+/- 10.00%
0F17035-CCV4	Aluminum	10000	10130	101	ug/L	+/- 10.00%
	Cadmium	1000	1063	106	ug/L	+/- 10.00%
	Chromium	1000	961.0	96.1	ug/L	+/- 10.00%
	Iron	10000	9550	95.5	ug/L	+/- 10.00%
	Manganese	1000	988.9	98.9	ug/L	+/- 10.00%
	Nickel	1000	1007	101	ug/L	+/- 10.00%
0F17035-CCV5	Aluminum	10000	10210	102	ug/L	+/- 10.00%
	Cadmium	1000	1061	106	ug/L	+/- 10.00%
	Chromium	1000	913.4	91.3	ug/L	+/- 10.00%
	Iron	10000	9579	95.8	ug/L	+/- 10.00%
	Manganese	1000	965.4	96.5	ug/L	+/- 10.00%
	Nickel	1000	1005	100	ug/L	+/- 10.00%
0F17035-CCV6	Aluminum	10000	10390	104	ug/L	+/- 10.00%
	Cadmium	1000	1067	107	ug/L	+/- 10.00%
	Chromium	**1000**	**851.5**	**85.2**	**ug/L**	+/- 10.00%
	Iron	**10000**	**8705**	**87.0**	**ug/L**	+/- 10.00%
	Manganese	1000	905.7	90.6	ug/L	+/- 10.00%
	Nickel	1000	1002	100	ug/L	+/- 10.00%

INITIAL AND CONTINUING CALIBRATION CHECK

SW6010B

Laboratory: Empirical Laboratories, LLC
Client: Tetra Tech NUS, Inc. (T010)
Instrument ID: ME-ICP

SDG: CTO067P_002
Project: CTO067 NAS Pensacola
Calibration: 0172001
Sequence: 0F17106

Lab Sample ID	Analyte	True	Found	%R	Units	Control Limit
0F17106-ICV1	Chromium	1000	958.1	95.8	ug/L	+/- 10.00%
	Iron	10000	10150	102	ug/L	+/- 10.00%
0F17106-CCV1	Chromium	1000	959.3	95.9	ug/L	+/- 10.00%
	Iron	10000	10040	100	ug/L	+/- 10.00%
0F17106-CCV2	Chromium	1000	926.3	92.6	ug/L	+/- 10.00%
	Iron	10000	10070	101	ug/L	+/- 10.00%

CRDL STANDARD

SW6010B

Laboratory: Empirical Laboratories, LLC

SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010)

Project: CTO067 NAS Pensacola

Instrument ID: ME-ICP

Calibration: 0171001

Sequence: 0F17035

Lab Sample ID	Analyte	True	Found	%R	Units	QC Limts
0F17035-CRL1	Aluminum	100.0	110.6	111	ug/L	80 - 120
	Cadmium	2.000	2.298	115	ug/L	80 - 120
	Chromium	4.000	4.011	100	ug/L	80 - 120
	Iron	60.00	61.32	102	ug/L	80 - 120
	Manganese	6.000	6.424	107	ug/L	80 - 120
	Nickel	6.000	7.016	117	ug/L	80 - 120

CRDL STANDARD

SW6010B

Laboratory: Empirical Laboratories, LLC

SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010)

Project: CTO067 NAS Pensacola

Instrument ID: ME-ICP

Calibration: 0172001

Sequence: 0F17106

Lab Sample ID	Analyte	True	Found	%R	Units	QC Limts
0F17106-CRL1	Chromium	4.000	4.063	102	ug/L	80 - 120
	Iron	60.00	65.91	110	ug/L	80 - 120

BLANKS
SW6010B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Instrument ID: ME-ICP
Project: CTO067 NAS Pensacola
Sequence: 0F17035
Calibration: 0171001

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C	Method
0F17035-ICB1	Aluminum	-0.3937	50.0	200	ug/L	U	SW6010B
	Cadmium	0.3397	1.00	5.00	ug/L	U	SW6010B
	Chromium	-0.02464	2.00	5.00	ug/L	U	SW6010B
	Iron	-3.000	30.0	100	ug/L	U	SW6010B
	Manganese	0.08595	3.00	15.0	ug/L	U	SW6010B
	Nickel	0.6551	3.00	10.0	ug/L	U	SW6010B
0F17035-CCB1	Aluminum	-0.284	50.0	200	ug/L	U	SW6010B
	Cadmium	0.363	1.00	5.00	ug/L	U	SW6010B
	Chromium	0.269	2.00	5.00	ug/L	U	SW6010B
	Iron	1.62	30.0	100	ug/L	U	SW6010B
	Manganese	0.220	3.00	15.0	ug/L	U	SW6010B
	Nickel	1.49	3.00	10.0	ug/L	U	SW6010B
0F17035-CCB4	Aluminum	-0.849	50.0	200	ug/L	U	SW6010B
	Cadmium	0.759	1.00	5.00	ug/L	U	SW6010B
	Chromium	0.144	2.00	5.00	ug/L	U	SW6010B
	Iron	-0.506	30.0	100	ug/L	U	SW6010B
	Manganese	0.0907	3.00	15.0	ug/L	U	SW6010B
	Nickel	0.687	3.00	10.0	ug/L	U	SW6010B
0F11005-BLK1	Aluminum	3.06	12.5	50.0	ug/L	U	SW6010B
	Cadmium	0.141	0.250	1.25	ug/L	U	SW6010B
	Chromium	-0.00995	0.500	1.25	ug/L	U	SW6010B
	Iron	0.793	7.50	25.0	ug/L	U	SW6010B
	Manganese	0.143	0.750	3.75	ug/L	U	SW6010B
	Nickel	0.0356	0.750	2.50	ug/L	U	SW6010B
0F17035-CCB5	Aluminum	2.56	50.0	200	ug/L	U	SW6010B
	Cadmium	0.823	1.00	5.00	ug/L	U	SW6010B
	Chromium	0.105	2.00	5.00	ug/L	U	SW6010B
	Iron	-1.48	30.0	100	ug/L	U	SW6010B
	Manganese	0.0727	3.00	15.0	ug/L	U	SW6010B
	Nickel	0.0510	3.00	10.0	ug/L	U	SW6010B
0F17035-CCB6	Aluminum	1.02	50.0	200	ug/L	U	SW6010B
	Cadmium	0.680	1.00	5.00	ug/L	U	SW6010B
	Chromium	-0.129	2.00	5.00	ug/L	U	SW6010B

BLANKS
SW6010B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Instrument ID: ME-ICP
Project: CTO067 NAS Pensacola
Sequence: 0F17035
Calibration: 0171001

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C	Method
0F17035-CCB6	Iron	-0.100	30.0	100	ug/L	U	SW6010B
	Manganese	0.0207	3.00	15.0	ug/L	U	SW6010B
	Nickel	2.06	3.00	10.0	ug/L	U	SW6010B

BLANKS
SW6010B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Instrument ID: ME-ICP
Project: CTO067 NAS Pensacola
Sequence: 0F17106
Calibration: 0172001

Lab Sample ID	Analyte	Found	MDL	MRL	Units	C	Method
0F17106-ICB1	Chromium	0.2721	2.00	5.00	ug/L	U	SW6010B
	Iron	4.432	30.0	100	ug/L	U	SW6010B
0F17106-CCB1	Chromium	0.144	2.00	5.00	ug/L	U	SW6010B
	Iron	41.0	30.0	100	ug/L	J	SW6010B
0F17106-CCB2	Chromium	0.168	2.00	5.00	ug/L	U	SW6010B
	Iron	7.86	30.0	100	ug/L	U	SW6010B

PREPARATION BATCH SUMMARY

SW6010B

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_002

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Batch: 0F11005 Batch Matrix: Water Preparation: MET_3005A_LOW

SAMPLE NAME	LAB SAMPLE ID	DATE PREPARED	INITIAL VOL./WEIGHT	FINAL VOL.
Blank	0F11005-BLK1	06/11/10 09:15	100.00	25.00
LCS	0F11005-BS1	06/11/10 09:15	100.00	25.00
01GW01GI43-0510	0F11005-DUP1	06/11/10 09:15	100.00	25.00
01GW01GS570510	0F11005-DUP2	06/11/10 09:15	100.00	25.00
01GW01GI43-0510	0F11005-MS1	06/11/10 09:15	100.00	25.00
01GW01GI43-0510	0F11005-PS1	06/11/10 09:15	100.00	25.00
01GW01GI43-0510	1005107-01	06/11/10 09:15	100.00	25.00
01GW01GS62-0510	1005107-02	06/11/10 09:15	100.00	25.00
GW01-051210	1005107-03	06/11/10 09:15	100.00	25.00
01GW01GI46-0510	1005107-04	06/11/10 09:15	100.00	25.00
01GW01GS73-0510	1005107-05	06/11/10 09:15	100.00	25.00
01GW01GI74-0510	1005107-06	06/11/10 09:15	100.00	25.00
01SW01-0510	1005107-07	06/11/10 09:15	100.00	25.00
SW01-051310	1005107-08	06/11/10 09:15	100.00	25.00
01SW02-0510	1005107-09	06/11/10 09:15	100.00	25.00
01SW03-0510	1005107-10	06/11/10 09:15	100.00	25.00
01GW01GS710510	1005107-12	06/11/10 09:15	100.00	25.00
01GW01GI720510	1005107-13	06/11/10 09:15	100.00	25.00
01GW01GI720510	1005107-13RE1	06/11/10 09:15	100.00	25.00
01GW01GS570510	1005107-14	06/11/10 09:15	100.00	25.00

ANALYSIS SEQUENCE SUMMARY

SW6010B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_002
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Sequence: 0F17035
Instrument: ME-ICP
Calibration: 0171001

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
Cal Standard	0F17035-CAL1	061810A-001	06/18/10 09:40
Cal Standard	0F17035-CAL2	061810A-002	06/18/10 09:46
Cal Standard	0F17035-CAL3	061810A-003	06/18/10 09:52
Cal Standard	0F17035-CAL4	061810A-004	06/18/10 09:58
Cal Standard	0F17035-CAL5	061810A-005	06/18/10 10:05
Cal Standard	0F17035-CAL6	061810A-006	06/18/10 10:11
Initial Cal Check	0F17035-ICV1	061810B-001	06/18/10 11:03
Initial Cal Blank	0F17035-ICB1	061810B-002	06/18/10 11:10
Instrument RL Check	0F17035-CRL1	061810B-003	06/18/10 11:16
Interference Check A	0F17035-IFA1	061810B-006	06/18/10 11:34
Interference Check B	0F17035-IFB1	061810B-008	06/18/10 11:48
Calibration Check	0F17035-CCV1	061810B-010	06/18/10 12:01
Calibration Blank	0F17035-CCB1	061810B-011	06/18/10 12:07
Calibration Check	0F17035-CCV4	061810B-052	06/18/10 15:44
Calibration Blank	0F17035-CCB4	061810B-053	06/18/10 15:51
Blank	0F11005-BLK1	061810B-054	06/18/10 15:56
LCS	0F11005-BS1	061810B-055	06/18/10 16:01
01GW01GI43-0510	1005107-01	061810B-056	06/18/10 16:07
01GW01GI43-0510	0F11005-MS1	061810B-057	06/18/10 16:12
01GW01GI43-0510	0F11005-PS1	061810B-058	06/18/10 16:17
01GW01GI43-0510	0F11005-DUP1	061810B-059	06/18/10 16:23
01GW01GS62-0510	1005107-02	061810B-060	06/18/10 16:28
GW01-051210	1005107-03	061810B-061	06/18/10 16:33
01GW01GI46-0510	1005107-04	061810B-062	06/18/10 16:38
01GW01GS73-0510	1005107-05	061810B-063	06/18/10 16:43
01GW01GI74-0510	1005107-06	061810B-064	06/18/10 16:48
01SW01-0510	1005107-07	061810B-065	06/18/10 16:53
SW01-051310	1005107-08	061810B-066	06/18/10 16:58
01SW02-0510	1005107-09	061810B-067	06/18/10 17:03
01SW03-0510	1005107-10	061810B-068	06/18/10 17:08
Calibration Check	0F17035-CCV5	061810B-069	06/18/10 17:15
Calibration Blank	0F17035-CCB5	061810B-070	06/18/10 17:21

ANALYSIS SEQUENCE SUMMARY

SW6010B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0F17035	Instrument:	ME-ICP
Calibration:	0171001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
01GW01GS710510	1005107-12	061810C-001	06/18/10 17:37
01GW01GI720510	1005107-13	061810C-002	06/18/10 17:41
01GW01GS570510	1005107-14	061810C-003	06/18/10 17:47
01GW01GS570510	0F11005-DUP2	061810C-004	06/18/10 17:52
Calibration Check	0F17035-CCV6	061810C-012	06/18/10 18:35
Calibration Blank	0F17035-CCB6	061810C-013	06/18/10 18:42

ANALYSIS SEQUENCE SUMMARY

SW6010B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_002
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0F17106	Instrument:	ME-ICP
Calibration:	0172001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
Cal Standard	0F17106-CAL1	061910A-001	06/19/10 09:50
Cal Standard	0F17106-CAL2	061910A-002	06/19/10 09:56
Cal Standard	0F17106-CAL3	061910A-003	06/19/10 10:02
Cal Standard	0F17106-CAL5	061910A-005	06/19/10 10:15
Cal Standard	0F17106-CAL6	061910A-006	06/19/10 10:21
Initial Cal Check	0F17106-ICV1	061910B-001	06/19/10 11:10
Initial Cal Blank	0F17106-ICB1	061910B-002	06/19/10 11:17
Instrument RL Check	0F17106-CRL1	061910B-003	06/19/10 11:23
Interference Check A	0F17106-IFA1	061910B-007	06/19/10 11:49
Interference Check B	0F17106-IFB1	061910B-008	06/19/10 11:55
Calibration Check	0F17106-CCV1	061910B-010	06/19/10 12:06
Calibration Blank	0F17106-CCB1	061910B-011	06/19/10 12:13
01GW01GI720510	1005107-13RE1	061910C-009	06/19/10 13:02
Calibration Check	0F17106-CCV2	061910C-017	06/19/10 13:43
Calibration Blank	0F17106-CCB2	061910C-018	06/19/10 13:50

Tetra Tech NUS **INTERNAL CORRESPONDENCE**

TO:	**G. WALKER**	**DATE:**	**AUGUST 9, 2010**
FROM:	**DANIELLE BAUGHMAN**	**COPIES:**	**DV FILE**
SUBJECT:	**ORGANIC DATA VALIDATION- VOC CTO 067, NAS PENSACOLA SDG CTO067P_001**		

SAMPLES: 10/Aqueous/

01GW01GGM33-0510	01GW01GI32-0510	01GW01GI36-0510
01GW01GI41-0510	01GW01GI44-0510	01GW01GI59-0510
01GW01GI65-0510	01GW01GS64-0510	01GWUPG10510
GW02-051110		

OVERVIEW

The sample set for CTO 067 NAS Pensacola, SDG CTO067P_001 consists of twelve (12) aqueous samples. All samples were analyzed for select volatile organic compounds (VOC).

The samples were collected by TetraTech NUS on May 10 and 11, 2010 analyzed by Empirical Laboratories, LLC. All analyses were conducted in accordance with Naval Facilities Engineering Service Center (NFESC) Quality Assurance/Quality Control (QA/QC) criteria using method 8260B analytical and reporting protocol. The data contained in this SDG were validated with regard to the following parameters:

* • Data Completeness
* • Holding times
• Initial/continuing calibrations
* • Laboratory method blank results
* • Detection Limits

The symbol (*) indicates that quality control criteria were met for this parameter. Problems affecting data quality are discussed below; documentation supporting these findings is presented in Appendix C. Qualified Analytical results are presented in Appendix A. Results as reported by the laboratory are presented in Appendix B.

VOA:

The continuing calibration standard analyzed on instrument MS-VOA3 on 5/19/10 at 11:12 had a percent difference >25% for vinyl chloride. Samples 01GW01GS64-0510, 01GW01GI36-0510, and 01GWUPG10510 were affected. Nondetected results reported for vinyl chloride were qualified as estimated (UJ).

The continuing calibration standard analyzed on instrument MS-VOA3 on 5/25/10 at 15:51 had a percent difference >25% for vinyl chloride. Sample 01GW01GI41-0510 was affected. No action was required

because vinyl chloride was not reported from this analysis.

The continuing calibration standard analyzed on instrument MS-VOA5 on 5/18/10 at 18:37 had a percent difference >25% for vinyl chloride. Samples 01GW01GI65-0510, 01GW01GI59-0510, 01GW01GGM33-0510, 01GW01GI32-0510, 01GW01GI41-0510, GW02-051110, and 01GW01GI44-0510 were affected. Nondetected results reported for vinyl chloride for sample 01GW01GI59-0510 was qualified as estimated (UJ). Positive results reported for vinyl chloride for all other samples were qualified as estimated (J).

Sample 01GW01GI41-0510 was re-analyzed at a 2 fold dilution for chlorobenzene because the undiluted analysis concentration exceeded the linear calibration range. The result for chlorobenzene in the dilution analysis was used for validation.

EXECUTIVE SUMMARY

Laboratory Performance Issues: CCV's for vinyl chloride were >25% quality control limit affecting several samples.

Other Factors Affecting Data Quality: None.

The data for these analyses were reviewed with reference to the EPA Functional Guidelines for Organic Data Validation (10/99) and the Department of Defense (DoD) Quality Systems Manual (QSM) (January 2006). The text of this report has been formulated to address only those problem areas affecting data quality.

Tetra Tech NUS
Danielle Baughman
Project Engineer

TetraTech NUS
Joseph A. Samchuck
Data Validation Quality Assurance Officer

Attachments:

Appendix A – Qualified Analytical Results
Appendix B – Results as Reported by the Laboratory
Appendix C – Support Documentation

APPENDIX A
QUALIFIED ANALYTICAL RESULTS

Data Validation Qualifier Codes:

A = Lab Blank Contamination
B = Field Blank Contamination
C = Calibration Noncompliance (e.g. % RSDs, %Ds, ICVs, CCVs, RRFs, etc.)
C01 = GC/MS Tuning Noncompliance
D = MS/MSD Recovery Noncompliance
E = LCS/LCSD Recovery Noncompliance
F = Lab Duplicate Imprecision
G = Field Duplicate Imprecision
H = Holding Time Exceedance
I = ICP Serial Dilution Noncompliance
J = GFAA PDS-GFAA MSA's r < 0.995 / ICP PDS Recovery Noncompliance
K = ICP Interference - includes ICS % R Noncompliance
L = Instrument Calibration Range Exceedance
M = Sample Preservation Noncompliance
N = Internal Standard Noncompliance
N01 = Internal Standard Recovery Noncompliance Dioxins
N02 = Recovery Standard Noncompliance Dioxins
N03 = Clean-up Standard Noncompliance Dioxins
O - Poor Instrument Performance (e.g. base-line drifting)
P = Uncertainty near detection limit (< 2 x IDL for inorganics and <CRQL for organics)
Q = Other problems (can encompass a number of issues; e.g. chromatography,interferences, etc.)
R = Surrogates Recovery Noncompliance
S = Pesticide/PCB Resolution
T = % Breakdown Noncompliance for DOT and Endrin
U = % Difference between columns/detectors >25% for positive results determined via GC/HPLC
V = Non-linear calibrations; correlation coefficient r < 0.995
W = EMPC result
X = Signal to noise response drop
Y = Percent solids <30%
Z = Uncertainty at 2 sigma deviation is greater than sample activity

PROJ_NO: 00702	NSAMPLE	01GW01GGM33-0510			01GW01GI32-0510			01GW01GI36-0510			01GW01GI41-0510		
SDG: CTO067P_001	LAB_ID	1005086-05			1005086-06			1005086-16			1005086-08		
FRACTION: OV	SAMP_DATE	5/11/2010			5/11/2010			5/11/2010			5/11/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,2,2-TETRACHLOROETHANE		1	U		1	U		1	U		1	U	
BENZENE		2.62			1	U		1	U		10.9		
CHLOROBENZENE		76.4			10.7			1	U				
NAPHTHALENE		2	U		2	U		2	U		7.9		
TOTAL XYLENES		3	U		3	U		3	U		1.14	J	P
VINYL CHLORIDE		0.701	J	CP	2.06	J	C	1	UJ	C	0.3	J	CP

PROJ_NO: 00702	NSAMPLE	01GW01GI41-0510DL			01GW01GI44-0510			01GW01GI59-0510			01GW01GI65-0510		
SDG: CTO067P_001	LAB_ID	1005086-08RE1			1005086-10			1005086-04			1005086-01		
FRACTION: OV	SAMP_DATE	5/11/2010			5/11/2010			5/11/2010			5/10/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0			0.0		
	DUP_OF												
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,2,2-TETRACHLOROETHANE					1	U		1	U		1	U	
BENZENE					6.58			3.08			11.7		
CHLOROBENZENE		173			48.5			91.1			37		
NAPHTHALENE					2	U		2	U		2	U	
TOTAL XYLENES					3	U		3	U		6.51		
VINYL CHLORIDE					1.21	J	C	1	UJ	C	4.83	J	C

PROJ_NO: 00702	NSAMPLE	01GW01GS64-0510			01GWUPG10510			GW02-051110		
SDG: CTO067P_001	LAB_ID	1005086-12			1005086-20			1005086-09		
FRACTION: OV	SAMP_DATE	5/10/2010			5/11/2010			5/11/2010		
MEDIA: WATER	QC_TYPE	NM			NM			NM		
	UNITS	UG/L			UG/L			UG/L		
	PCT_SOLIDS	0.0			0.0			0.0		
	DUP_OF									
PARAMETER		RESULT	VQL	QLCD	RESULT	VQL	QLCD	RESULT	VQL	QLCD
1,1,2,2-TETRACHLOROETHANE		1	U		1	U		1	U	
BENZENE		1.45			1	U		10.9		
CHLOROBENZENE		16.5			1	U		184		
NAPHTHALENE		2	U		2	U		7.61		
TOTAL XYLENES		3	U		3	U		1.24	J	P
VINYL CHLORIDE		1	UJ	C	1	UJ	C	0.329	J	CP

APPENDIX B
RESULTS AS REPORTED BY THE LABORATORY

ANALYSIS DATA SHEET

01GW01GGM33-0510

Laboratory:	Empirical Laboratories, LLC		SDG:	CTO067P_001	
Client:	Tetra Tech NUS, Inc. (T010)		Project:	CTO067 NAS Pensacola	
Matrix:	Ground Water	Laboratory ID:	1005086-05	File ID:	0508605.D
Sampled:	05/11/10 10:25	Prepared:	05/17/10 14:44	Analyzed:	05/19/10 01:06
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E16002	Sequence:	0E14408	Calibration:	0134007
Instrument:	MS-VOA5				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	2.62	0.140	1.00	
108-90-7	Chlorobenzene	76.4	0.210	1.00	
91-20-3	Naphthalene		0.500	2.00	U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride	0.701	0.200	1.00	X, Q, I
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.02	96.7	75 - 120	
Dibromofluoromethane	30.00	32.21	107	85 - 115	
1,2-Dichloroethane-d4	30.00	32.03	107	70 - 120	
Toluene-d8	30.00	30.85	103	85 - 120	

ANALYSIS DATA SHEET

01GW01GI32-0510

Laboratory:	Empirical Laboratories, LLC			SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)			Project:	CTO067 NAS Pensacola
Matrix:	Ground Water	Laboratory ID:	1005086-06	File ID:	0508606.D
Sampled:	05/11/10 11:32	Prepared:	05/17/10 14:44	Analyzed:	05/19/10 01:36
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E16002	Sequence:	0E14408	Calibration:	0134007
Instrument:	MS-VOA5				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene	10.7	0.210	1.00	
91-20-3	Naphthalene		0.500	2.00	U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride	2.06	0.200	1.00	Q, X
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.16	97.2	75 - 120	
Dibromofluoromethane	30.00	32.38	108	85 - 115	
1,2-Dichloroethane-d4	30.00	32.78	109	70 - 120	
Toluene-d8	30.00	31.64	105	85 - 120	

ANALYSIS DATA SHEET

01GW01GI36-0510

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_001

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Ground Water Laboratory ID: 1005086-16 File ID: 0508616.D

Sampled: 05/11/10 08:50 Prepared: 05/19/10 00:00 Analyzed: 05/19/10 20:05

Solids: Preparation: 5030B Dilution: 1

Batch: 0E19014 Sequence: 0E14206 Calibration: 0128001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	Y, U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	Q, X, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.53	98.4	75 - 120	
Dibromofluoromethane	30.00	30.25	101	85 - 115	
1,2-Dichloroethane-d4	30.00	30.57	102	70 - 120	
Toluene-d8	30.00	31.94	106	85 - 120	

ANALYSIS DATA SHEET

01GW01GI41-0510

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_001

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Ground Water Laboratory ID: 1005086-08 File ID: 0508608.D

Sampled: 05/11/10 13:55 Prepared: 05/17/10 14:44 Analyzed: 05/19/10 02:06

Solids: Preparation: 5030B Dilution: 1

Batch: 0E16002 Sequence: 0E14408 Calibration: 0134007 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	10.9	0.140	1.00	
108-90-7	Chlorobenzene	201	0.210	1.00	L
91-20-3	Naphthalene	7.90	0.500	2.00	
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride	0.300	0.200	1.00	Q, X, I
1330-20-7	Xylenes (total)	1.14	0.220	3.00	I

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.28	97.6	75 - 120	
Dibromofluoromethane	30.00	32.38	108	85 - 115	
1,2-Dichloroethane-d4	30.00	32.80	109	70 - 120	
Toluene-d8	30.00	30.66	102	85 - 120	

ANALYSIS DATA SHEET

01GW01GI41-0510

Laboratory:	Empirical Laboratories, LLC		SDG:	CTO067P_001	
Client:	Tetra Tech NUS, Inc. (T010)		Project:	CTO067 NAS Pensacola	
Matrix:	Ground Water	Laboratory ID:	1005086-08RE1	File ID:	0508608D.D
Sampled:	05/11/10 13:55	Prepared:	05/25/10 00:00	Analyzed:	05/25/10 22:25
Solids:		Preparation:	5030B	Dilution:	2
Batch:	0E25029	Sequence:	0E14601	Calibration:	0128001
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	9.63	0.280	2.00	D
108-90-7	Chlorobenzene	173	0.420	2.00	D
91-20-3	Naphthalene	6.10	1.00	4.00	D
79-34-5	1,1,2,2-Tetrachloroethane		0.460	2.00	U
75-01-4	Vinyl chloride		0.400	2.00	X, U
1330-20-7	Xylenes (total)	1.07	0.440	6.00	I, D

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	28.95	96.5	75 - 120	
Dibromofluoromethane	30.00	30.17	101	85 - 115	
1,2-Dichloroethane-d4	30.00	29.47	98.2	70 - 120	
Toluene-d8	30.00	30.94	103	85 - 120	

ANALYSIS DATA SHEET

01GW01GI44-0510

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_001

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Ground Water Laboratory ID: 1005086-10 File ID: 0508610.D

Sampled: 05/11/10 15:15 Prepared: 05/17/10 14:44 Analyzed: 05/19/10 03:05

Solids: Preparation: 5030B Dilution: 1

Batch: 0E16002 Sequence: 0E14408 Calibration: 0134007 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	6.58	0.140	1.00	
108-90-7	Chlorobenzene	48.5	0.210	1.00	
91-20-3	Naphthalene		0.500	2.00	U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride	1.21	0.200	1.00	Q, X
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.38	97.9	75 - 120	
Dibromofluoromethane	30.00	32.52	108	85 - 115	
1,2-Dichloroethane-d4	30.00	32.16	107	70 - 120	
Toluene-d8	30.00	31.17	104	85 - 120	

ANALYSIS DATA SHEET

01GW01GI59-0510

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_001

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Ground Water Laboratory ID: 1005086-04 File ID: 0508604.D

Sampled: 05/11/10 09:40 Prepared: 05/17/10 14:44 Analyzed: 05/19/10 00:36

Solids: Preparation: 5030B Dilution: 1

Batch: 0E16002 Sequence: 0E14408 Calibration: 0134007 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	3.08	0.140	1.00	
108-90-7	Chlorobenzene	91.1	0.210	1.00	
91-20-3	Naphthalene		0.500	2.00	U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	Q, X, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	30.05	100	75 - 120	
Dibromofluoromethane	30.00	32.39	108	85 - 115	
1,2-Dichloroethane-d4	30.00	33.00	110	70 - 120	
Toluene-d8	30.00	31.27	104	85 - 120	

ANALYSIS DATA SHEET

01GW01GI65-0510

Laboratory:	Empirical Laboratories, LLC			SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)			Project:	CTO067 NAS Pensacola
Matrix:	Ground Water	Laboratory ID:	1005086-01	File ID:	0508601.D
Sampled:	05/10/10 13:15	Prepared:	05/17/10 14:44	Analyzed:	05/19/10 00:06
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E16002	Sequence:	0E14408	Calibration:	0134007
Instrument:	MS-VOA5				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	11.7	0.140	1.00	
108-90-7	Chlorobenzene	37.0	0.210	1.00	
91-20-3	Naphthalene		0.500	2.00	U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride	4.83	0.200	1.00	Q, X
1330-20-7	Xylenes (total)	6.51	0.220	3.00	

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.57	98.6	75 - 120	
Dibromofluoromethane	30.00	32.21	107	85 - 115	
1,2-Dichloroethane-d4	30.00	32.00	107	70 - 120	
Toluene-d8	30.00	30.93	103	85 - 120	

ANALYSIS DATA SHEET

01GW01GS64-0510

Laboratory:	Empirical Laboratories, LLC		SDG:	CTO067P_001	
Client:	Tetra Tech NUS, Inc. (T010)		Project:	CTO067 NAS Pensacola	
Matrix:	Ground Water	Laboratory ID:	1005086-12	File ID:	0508612.D
Sampled:	05/10/10 13:15	Prepared:	05/19/10 00:00	Analyzed:	05/19/10 19:35
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E19014	Sequence:	0E14206	Calibration:	0128001
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	1.45	0.140	1.00	
108-90-7	Chlorobenzene	16.5	0.210	1.00	
91-20-3	Naphthalene		0.500	2.00	Y, U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	X, Q, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.94	99.8	75 - 120	
Dibromofluoromethane	30.00	29.86	99.5	85 - 115	
1,2-Dichloroethane-d4	30.00	29.49	98.3	70 - 120	
Toluene-d8	30.00	32.04	107	85 - 120	

ANALYSIS DATA SHEET

01GWUPG10510

Laboratory:	Empirical Laboratories, LLC			SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)			Project:	CTO067 NAS Pensacola
Matrix:	Ground Water	Laboratory ID:	1005086-20	File ID:	0508620.D
Sampled:	05/11/10 16:00	Prepared:	05/19/10 00:00	Analyzed:	05/19/10 20:35
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E19014	Sequence:	0E14206	Calibration:	0128001
Instrument:	MS-VOA3				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	Y, U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	Q, X, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.07	96.9	75 - 120	
Dibromofluoromethane	30.00	29.92	99.7	85 - 115	
1,2-Dichloroethane-d4	30.00	29.42	98.1	70 - 120	
Toluene-d8	30.00	31.65	106	85 - 120	

ANALYSIS DATA SHEET

GW02-051110

Laboratory:	Empirical Laboratories, LLC			SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)			Project:	CTO067 NAS Pensacola
Matrix:	Ground Water	Laboratory ID:	1005086-09	File ID:	0508609.D
Sampled:	05/11/10 14:05	Prepared:	05/17/10 14:44	Analyzed:	05/19/10 02:36
Solids:		Preparation:	5030B	Dilution:	1
Batch:	0E16002	Sequence:	0E14408	Calibration:	0134007
Instrument:	MS-VOA5				

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene	10.9	0.140	1.00	
108-90-7	Chlorobenzene	184	0.210	1.00	
91-20-3	Naphthalene	7.61	0.500	2.00	
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride	0.329	0.200	1.00	Q, X, J
1330-20-7	Xylenes (total)	1.24	0.220	3.00	J

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.21	97.4	75 - 120	
Dibromofluoromethane	30.00	32.06	107	85 - 115	
1,2-Dichloroethane-d4	30.00	33.76	113	70 - 120	
Toluene-d8	30.00	30.09	100	85 - 120	

APPENDIX C
SUPPORT DOCUMENTATION

Sample Delivery Group Case Narrative

Receipt Information

The samples were received within the preservation guidelines for the associated methods. The information associated with sample receipt and the Sample Delivery Group (SDG) are included within section 4 of this package, which also provides information on the link between the client sample ID listed on the COC and laboratory's assigned unique sample ID or WorkOrder #. The sample is tracked through the laboratory for all analysis via the assigned WorkOrder #.

All samples that were received were analyzed and none of the samples were placed on hold without analyses. There were no subcontracted analyses for this SDG.

Sample 1005086-13 was corrected to reflect the sample ID as 01GW01PZ100510, sampled 5/10/10 at 15:15. Per the client the correct sampling time for 1005086-06 was logged in as 11:32. A trip blank was not received with this shipment.

Changes to the Revision

This is an original submittal of the final report package.

Analytical Information

All samples were prepped (where applicable) and analyzed within the standard allowed holding times, unless noted within the exceptions listed below. The laboratory analyzed all samples within the program and method guidelines. The following information is provided specific to individual methods:

Chromatographic Flags for Manual Integration:

The following letters are used to denote manual integrations on the laboratory's raw data in association with chromatographic integrations:

A: The peak was manually integrated as it was not integrated in the original chromatogram.
B: The peak was manually integrated due to resolution or coelution issues in the original chromatogram.
C: The peak was manually integrated to correct the baseline from the original chromatogram.
D: The peak was manually integrated to identify the correct peak as the wrong peak was identified in the original chromatogram.
E: The peak was manually integrated to include the entire peak as the original chromatogram only integrated part of the peak.

SW8260B:

The continuing calibration standard failed criteria in 0E14408-CCV1 for Vinyl Chloride, in 0E14206-CCV1 for Naphthalene and Vinyl chloride. The blank spike failed criteria for Vinyl Chloride in batch 0E16002 and 0E19014.

No additional anomalies or deviations are noted and the data is properly qualified.

SW6010B:
No anomalies or deviations are noted.

Data Qualifiers

As applicable and where required, the following general qualifiers are associated with the sample results. Additional qualifiers will be specified within the reporting sections of the data package or within the body of the Case Narrative.

Analytical Report Terms and Qualifiers

MDL: The method detection limit (MDL) is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The MDL is determined from analysis of a sample containing the analyte in a given matrix.

EQL: The estimated quantitation limit (EQL), also known as Reporting Limit **(RL),** is defined as the estimated concentration above which quantitative results can be obtained with a specific degree of confidence. Empirical Laboratories defines the EQL to be at or near the lowest standard of the calibration curve.

*****: A failing quality control criteria is associated with the reported result.

B: The presence of a "B" to the right of an analytical value indicates that this compound was also detected in the method blank and the data should be interpreted with caution. One should consider the possibility that the correct sample result might be less than the reported result and, perhaps, zero. **For Florida DEP reports this qualifier is "V".**

D: When a sample (or sample extract) is rerun diluted because one of the compound concentrations exceeded the highest concentration range for the standard curve, all of the values obtained in the dilution run will be flagged with a "D".

E: The concentration for any compound found which exceeds the highest concentration level on the standard curve for that compound will be flagged with an "E". Usually the sample will be rerun at a dilution to quantitate the flagged compound. **For Florida DEP reports this qualifier is "L".**

H1: The result was analyzed outside of the EPA recommended holding time.

H2: The result was extracted outside of the EPA recommended holding time

J: The presence of a "J" to the right of an analytical result indicates that the reported result is estimated. The mass spectral data pass the identification criteria showing that the compound is present, but the calculated result is less than the EQL. One should feel confident that the result is greater than zero and less than the EQL. **For Florida DEP reports this qualifier is "I".**

M: Indicates that the sample matrix interfered with the quantitation of the analyte. In dual column analysis the result is reported from the column with the lower

concentration. In metals, the qualifier indicates that the parameters MDL/RL has been raised.

N: The MS/MSD accuracy and/or precision are outside criteria. The predigested spike recovery is not within control limits for the associated parameter.

P: The associated numerical value is an estimated quantity. There is greater than a 40% difference between the two GC columns for the detected concentrations. The higher of the two values is reported unless matrix interference is obvious or for HPLC analysis where the primary column is reported.

Q: The RPD and/or percent recovery failed in the associated Blank Spike and/or Blank Spike Duplicate.

S: The Internal Standard failed criteria.

U: The presence of a "U" indicates that the analyte was analyzed for but was not detected or the concentration of the analyte quantitated below the MDL.

X: The parameter shows a potential positive bias on a reported concentration due to an ICV or CCV exceeding the upper control limit on the high side.

Y: The parameter shows a potential negative bias on a reported concentration due to an ICV or CCV exceeding the lower control limit on the low side.

LIMS Definitions / Naming Conventions:
The following are general naming conventions that are used throughout the laboratory; however, on a method by method basis, there are additional QAQC items that are named in a consistent format.

BLK: LIMS assigns a unique identifier to the Method Blank by naming it as the letters BLK appended to the Batch ID. A Method Blank is an analyte-free matrix to which all reagents are added in the same volumes or proportions as used in sample processing. The Method Blank is used to assess for possible contamination during preparation and/or analysis steps. Method Blanks within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally.

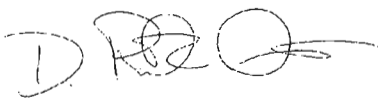
BS: LIMS assigns a unique identifier to the Blank Spike by naming it as the letters BS appended to the Batch ID. The Blank Spike or Lab Control Sample is a controlled analyte-free matrix, which is spiked with known and verified concentrations of target analytes. Spiking concentrations can be referenced in the method SOP. The BS is used to evaluate the viability of analytes taken through the entire prep (when applicable) and analytical process. Blank Spikes within a Batch or Analytical sequence will be appended with a numerical value beginning with 1 that will increase incrementally. A duplicate Blank Spike will

be designated as a BSD.

MS: The LIMS assigns each Client sample with a unique identifier. The Matrix Spike is designated with a MS at the end of the sample's unique identifier. The Matrix Spike sample is used to assess the effect of the sample matrix on the precision and accuracy of the results generated using the selected method. A duplicate Matrix Spike will be designated as a MSD.

IDs: The LIMS assigns each Client sample with a unique identifier. The letter "RE" may potentially be appended to the end of the LIMS Sample ID. And "**RE"** implies that the sample was either re-prepped, re-analyzed straight, or re-analyzed at a dilution. Subsequent re-analysis for the sample will be appended with a numerical value beginning with 1 that will increase incrementally. Eg: RE1, RE2, RE3, etc.

Statement of Data Authenticity:
I certify that, based upon my inquiry of those individuals immediately responsible for obtaining the information and to the best of my knowledge, the data package is in compliance with the terms and conditions of the contract, both technically and for completeness, with the exception of the conditions detailed in this Case Narrative, as verified by my signature below. During absences, Ms. Marcia K. McGinnity is authorized to sign this Statement of Data Authenticity.



Mr. Rick D. Davis
Laboratory Technical Director / VP Operations

TETRA TECH NUS, INC. | CHAIN OF CUSTODY | NUMBER 27016 | PAGE 1 OF 2

PROJECT NO:	FACILITY:	PROJECT MANAGER	PHONE NUMBER	LABORATORY NAME AND CONTACT:
112G00702	OU1-NAS Pensacola	Gerry Walker	(850) 385-9899	Empirical - Kim Kostzer
SAMPLERS (SIGNATURE)		FIELD OPERATIONS LEADER: Bill Olson	PHONE NUMBER: (850) 385-9899	ADDRESS: 621 Mainstream Drive Ste. 270
		CARRIER/WAYBILL NUMBER: 951597482765 FedEx		CITY, STATE: Nashville, TN 37228

STANDARD TAT ☒
RUSH TAT ☐ ☐ 24 hr. ☐ 48 hr. ☐ 72 hr. ☐ 7 day ☐ 14 day

DATE YEAR 2010	TIME	SAMPLE ID	LOCATION ID	TOP DEPTH (FT)	BOTTOM DEPTH (FT)	MATRIX (GW, SO, SW, SD, QC, ETC.)	COLLECTION METHOD GRAB (G) COMP (C)	No. OF CONTAINERS	8260B Vinyl chloride (HCL)	8260B Benzene (HCL)	8260B Chlorobenzene (HCL)	8260B Total Xylenes (HCL)	8260B 1,1,2,2-Tetrachloroethane (HCL)	8260B Naphthalene (HCL)	6010B Aluminum (HNO3)	6010B Cadmium (HNO3)	6010B Chromium (HNO3)	6010B Iron (HNO3)	6010B Manganese (HNO3)	6010B Nickel (HNO3)	COMMENTS
05/10	1315	01GW01GI65-0510		27.2	37.2	GW	G	4	X	X	X	X	X	X	X	X	X	X	X	X	Cool to 4°C -01
05/10	1450	01GW01PZ58-0510				GW	G	1									X				1005081 -02
05/10	1720	01GW01PZ78-0510				GW	G	1									X				-03
05/11	0940	01GW01GI59-0510		18.1	28.1	GW	G	4	X	X	X	X	X	X	X	X	X	X	X	X	-04
05/11	1025	01GW01GGMB3-0510		9	11.5	GW	G	4	X	X	X	X	X	X	X	X	X	X	X	X	-05
05/11	1125	01GW01GI32-0510		25	35	GW	G	4	X	X	X	X	X	X	X	X	X	X	X	X	-06
05/11	1245	01GW01PZ6-0510				GW	G	1									X				-07
05/11	1355	01GW01GI41-0510		29.5	39.5	GW	G	4	X	X	X	X	X	X	X	X	X	X	X	X	-08
05/11	1405	GW02-051110				GW	G	4	X	X	X	X	X	X	X	X	X	X	X	X	-09
05/11	1515	01GW01GI44-0510		18.9	28.9	GW	G	4	X	X	X	X	X	X	X	X	X	X	X	X	-10
		Trip Blank				QC			X	X	X	X	X	X							-11

1. RELINQUISHED BY	DATE 05/11/10	TIME 1605	1. RECEIVED BY	DATE 5/11/10	TIME 1610
2. RELINQUISHED BY	DATE 05/11/10	TIME 1650	2. RECEIVED BY	DATE	TIME
3. RELINQUISHED BY	DATE	TIME	3. RECEIVED BY	DATE 5/12/10	TIME 09:15

COMMENTS: 4.1°C

DISTRIBUTION: WHITE (ACCOMPANIES SAMPLE) YELLOW (FIELD COPY) PINK (FILE COPY)

4/02R
FORM NO. TtNUS-001

CTO067P_001

9

EMPIRICAL LABORATORIES, LLC - CHAIN OF CUSTODY RECORD

SHIP TO: 621 Mainstream Drive, Suite 270 ♦ Nashville, TN 37228 ♦ 615-345-1115 ♦ (fax) 615-846-5426

10272 2 of 2

Send Results to:	Send Invoice to:
Name	Name Sandy D'Alessandris
Company TtNUS	Company TtNUS
Address 661 Anderson Dr	Address 661 Anderson Dr
City Pittsburgh	City Pittsburgh
State, Zip PA, 15220	State, Zip PA, 15220
Phone (412) 921-7273	Phone (412) 921-7090
Fax	Fax
E-mail	E-mail

Project No./Name: OU1 CTO 067 NAS Pensacola

Sampler's (Signature):

Analysis Requirements:

Select VOCs* 8260 | Select Metals† 6010 | Iron 6010

Lab Use Only:

VOA Headspace	Y	(N)	NA
Field Filtered	Y	(N)	NA
Correct Containers	(Y)	N	NA
Discrepancies	Y	(N)	NA
Cust. Seals Intact	(Y)	N	NA
Containers Intact	(Y)	N	NA

Airbill #: 2765

CAR #: –

Lab Use Only Lab #	Date/Time Sampled	Sample Description	Sample Matrix	Cool 4°C	Cool 4°C	Cool 4°C	Comments	No. of Bottles	Lab Use Only Containers/Pres.
1005086-12	5/10/2010 13:15	01GW01GS64 0510	AQ	X	X			4	3J-HY, 1C-HVi
-13	5/10/2010 15:15	01GW01PZ10 0510	AQ			X		1	
-14	5/10/2010 16:40	01GW01PZ01 0510	AQ			X		1	
-15	5/10/2010 17:10	01GW01PZ7A0510	AQ			X		1	
-16	5/11/2010 8:50	01GW01GI36 0510	AQ	X	X		sheen @ purge water	4	3J-HY
-17	5/11/2010 11:20	01GW01PZ1 0510	AQ			X	sheen @ purge water	1	
-18	5/11/2010 11:22	PZ01051110	AQ			X		1	
-19	5/11/2010 1955	01GW01PZ6A0510	AQ			X	strong smell to petrol.	1	
-20	5/11/2010 1600	01GW4PGW1 0510	AQ	X	X				3J-HY

	Date/Time	Received By: (Signature)
Sample Kit Prep'd by: (Signature)	5/10/2010	
Relinquished by: (Signature)	5/11/2010 1650	Received By: (Signature)
Relinquished by: (Signature)	Date/Time	Received By: (Signature)
Received for Laboratory by: (Signature)	Date/Time 5/12/10 09:15	Temperature 4.4°C

REMARKS:

†Select metals are: Aluminum, Cadmium, Chromium, Iron, Manganese, Nickel

* Select VOCs are: Vinyl Chloride, Benzene, Chlorobenzene, Total Xylenes, 1,1,2,2 Tetrachloroethane, Naphthalene

Details:

Page 2 of 2

Cooler No. ____ of ____

Date Shipped 5/11/10

Shipped By Y. Marling

Turnaround ____

Distribution: Original and yellow copies accompany sample shipment to laboratory; Pink retained by samplers.

CTO067P_001

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HOLDTIME

SDG CTO067P_001

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	01GW01PZ8-0510	1005086-02	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01GI32-0510	1005086-06	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI36-0510	1005086-16	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI41-0510	1005086-08	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI44-0510	1005086-10	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI59-0510	1005086-04	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GI65-0510	1005086-01	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01GS64-0510	1005086-12	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01PZ07-0510	1005086-14	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01PZ10-0510	1005086-13	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
M	UG/L	01GW01PZ1-0510	1005086-17	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01PZ6-0510	1005086-07	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01PZ6A-0510	1005086-19	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01GGM33-0510	1005086-05	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01PZ7B-0510	1005086-03	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39

SORT	UNITS	NSAMPLE	LAB_ID	QC_TYPE	SAMP_DATE	EXTR_DATE	ANAL_DATE	SMP_EXTR	EXTR_ANL	SMP_ANL
M	UG/L	01GWUPG10510	1005086-20	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	GW02-051110	1005086-09	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	PZ01051110	1005086-18	NM	05/11/2010	06/10/2010	06/18/2010	30	8	38
M	UG/L	01GW01PZ7A-0510	1005086-15	NM	05/10/2010	06/10/2010	06/18/2010	31	8	39
OV	UG/L	GW02-051110	1005086-09	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GGM33-0510	1005086-05	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI32-0510	1005086-06	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI36-0510	1005086-16	NM	05/11/2010	05/19/2010	05/19/2010	8	0	8
OV	UG/L	01GW01GI41-0510	1005086-08	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI41-0510	1005086-08RE1	NM	05/11/2010	05/25/2010	05/25/2010	14	0	14
OV	UG/L	01GW01GI44-0510	1005086-10	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI59-0510	1005086-04	NM	05/11/2010	05/17/2010	05/19/2010	6	2	8
OV	UG/L	01GW01GI65-0510	1005086-01	NM	05/10/2010	05/17/2010	05/19/2010	7	2	9
OV	UG/L	01GW01GS64-0510	1005086-12	NM	05/10/2010	05/19/2010	05/19/2010	9	0	9
OV	UG/L	01GWUPG10510	1005086-20	NM	05/11/2010	05/19/2010	05/19/2010	8	0	8

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN2.D	Injection Date:	05/07/10
Instrument ID:	MS-VOA3	Injection Time:	23:46
Sequence:	0E12804	Lab Sample ID:	0E12804-TUN2

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	20.1	PASS
75	30 - 60% of 95	49.7	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.39	PASS
173	Less than 2% of 174	0.632	PASS
174	50 - 200% of 95	71	PASS
175	5 - 9% of 174	7.33	PASS
176	95 - 101% of 174	98.7	PASS
177	5 - 9% of 176	5.91	PASS

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN1.D	Injection Date:	05/07/10
Instrument ID:	MS-VOA3	Injection Time:	13:11
Sequence:	0E12804	Lab Sample ID:	0E12804-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	21	PASS
75	30 - 60% of 95	48.9	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.32	PASS
173	Less than 2% of 174	0	PASS
174	50 - 200% of 95	70.9	PASS
175	5 - 9% of 174	6.93	PASS
176	95 - 101% of 174	98.2	PASS
177	5 - 9% of 176	7.81	PASS

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0E12804	Instrument:	MS-VOA3
Calibration:	0128001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E12804-TUN1	SEQ-TUN1.D	05/07/10 13:11
Cal Standard	0E12804-CAL1	SEQ-CAL1.D	05/07/10 13:41
Cal Standard	0E12804-CAL2	SEQ-CAL2.D	05/07/10 14:11
Cal Standard	0E12804-CAL3	SEQ-CAL3.D	05/07/10 14:42
Cal Standard	0E12804-CAL4	SEQ-CAL4.D	05/07/10 15:12
Cal Standard	0E12804-CAL5	SEQ-CAL5.D	05/07/10 15:42
Cal Standard	0E12804-CAL6	SEQ-CAL6.D	05/07/10 16:13
Cal Standard	0E12804-CAL7	SEQ-CAL7.D	05/07/10 16:43
Cal Standard	0E12804-CAL8	SEQ-CAL8.D	05/07/10 17:13
Cal Standard	0E12804-CAL9	SEQ-CAL9.D	05/07/10 17:43
Initial Cal Check	0E12804-ICV1	SEQ-ICV1.D	05/07/10 18:14
Cal Standard	0E12804-CALA	SEQ-CALA.D	05/07/10 18:44
Cal Standard	0E12804-CALB	SEQ-CALB.D	05/07/10 19:14
Cal Standard	0E12804-CALC	SEQ-CALC.D	05/07/10 19:45
Cal Standard	0E12804-CALD	SEQ-CALD.D	05/07/10 20:15
Cal Standard	0E12804-CALE	SEQ-CALE.D	05/07/10 20:45
Cal Standard	0E12804-CALF	SEQ-CALF.D	05/07/10 21:15
Cal Standard	0E12804-CALG	SEQ-CALG.D	05/07/10 21:45
Cal Standard	0E12804-CALH	SEQ-CALH.D	05/07/10 22:15
Cal Standard	0E12804-CALI	SEQ-CALI.D	05/07/10 22:46
MS Tune	0E12804-TUN2	SEQ-TUN2.D	05/07/10 23:46
Cal Standard	0E12804-CALJ	SEQ-CALJ.D	05/08/10 00:16
Cal Standard	0E12804-CALK	SEQ-CALK.D	05/08/10 00:46
Cal Standard	0E12804-CALL	SEQ-CALL.D	05/08/10 01:16
Cal Standard	0E12804-CALM	SEQ-CALM.D	05/08/10 01:46
Cal Standard	0E12804-CALN	SEQ-CALN.D	05/08/10 02:16
Cal Standard	0E12804-CALO	SEQ-CALO.D	05/08/10 02:46
Cal Standard	0E12804-CALP	SEQ-CALP.D	05/08/10 03:16
Cal Standard	0E12804-CALQ	SEQ-CALQ.D	05/08/10 03:46
Cal Standard	0E12804-CALR	SEQ-CALR.D	05/08/10 04:16

INITIAL CALIBRATION CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Instrument ID:	MS-VOA3	Calibration:	0128001
Lab File ID:	SEQ-ICV1.D	Calibration Date:	05/07/10 15:51
Sequence:	0E12804	Injection Date:	05/07/10
Lab Sample ID:	0E12804-ICV1	Injection Time:	18:14

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	ICV	ICAL	ICV	MIN (#)	ICV	LIMIT (#)
Benzene	A	100.0	94.23	0.8513296	0.8022267		-5.8	20
Chlorobenzene	A	100.0	97.56	1.36545	1.332166	0.3	-2.4	20
Naphthalene	A	100.0	104.9	1.667032	1.748203		4.9	20
1,1,2,2-Tetrachloroethane	A	100.0	97.74	0.6520071	0.6372876	0.3	-2.3	20
Vinyl chloride	A	100.0	90.30	0.2254535	0.2035913		-9.7	20
Xylenes (total)	A	300.0	277.1	1.65548	1.569467		-5.2	20
Bromofluorobenzene	A	30.00	29.75	0.8488807	0.8417188		-0.8	20
Dibromofluoromethane	A	30.00	30.02	0.2645697	0.264731		0.06	20
1,2-Dichloroethane-d4	A	30.00	29.96	5.822815E-02	5.814867E-02		-0.1	20
Toluene-d8	A	30.00	29.03	2.233741	2.161863		-3.2	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_001
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Calibration: 0128001
Instrument: MS-VOA3
Matrix: Water
Calibration Date: 5/7/2010 3:51:54PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
Acetone	6.392465E-02	12.97931	5.645	0.1389461			15	
Acrolein	1.249117E-02	19.42736	5.475333	9.678328E-02	0.9973213		0.995	
Acrylonitrile	8.917726E-02	4.214244	6.356667	6.883235E-02			15	
Benzene	0.8513296	6.678909	12.36133	1.763584E-02			15	
Bromobenzene	0.6302335	4.860474	17.40189	7.46583E-03			15	
Bromochloromethane	0.1111916	14.2737	10.083	4.267067E-02			15	
Tert-Amyl Methyl Ether	0.7393959	30.41146	12.69233	0.0263267	0.9992581		0.995	
Bromodichloromethane	0.2762397	2.130832	13.33333	1.983408E-02			15	
Bromoform	0.3321782	18.56579	16.69	1.270906E-02	0.9994973		SPCC (0.1)	
Bromomethane	0.1558027	9.40424	4.607333	7.647505E-02			15	
Bromofluorobenzene	0.8488807	5.514613	17.231	2.208685E-02			15	
n-Butylbenzene	1.285873	8.434765	18.59533	1.038495E-02			15	
2-Butanone	8.784045E-02	13.43708	9.312625	0.4485282			15	
sec-Butylbenzene	1.675439	8.542345	18.14	1.856386E-02			15	
tert-Butylbenzene	1.459663	6.300852	18.26667	0.0151966			15	
Carbon disulfide	0.6272086	10.21249	6.919889	1.518417E-02			15	
Carbon tetrachloride	0.2425697	7.115983	12.324	3.015674E-02			15	
Chlorobenzene	1.36545	9.263947	16.28533	2.315512E-02			SPCC (0.3)	
Chloroethane	0.1684239	13.66591	4.778667	7.562152E-02			15	
Chloroform	0.3963755	9.474226	10.235	5.586952E-02			CCC (20)	
2-Chloroethyl vinyl ether	0.132268	6.739554	13.91333	4.988714E-02			15	
Chloromethane	0.2439782	13.54456	3.928556	0.1148554			SPCC (0.1)	
1-Chlorohexane	0.5981001	11.08132	16.24225	3.335839E-03			15	
2-Chlorotoluene	1.441616	10.01654	17.62089	1.930074E-02			15	
4-Chlorophenyl-phenylether	1.535488	9.884847	17.68044	2.536113E-02			15	
Cyclohexane	0.2734884	4.331117	12.21944	3.181187E-02			15	
Dibromochloromethane	0.4833603	6.859825	15.281	2.217809E-02			15	
1,2-Dibromo-3-chloropropane	0.1291907	11.8003	18.959	8.956841E-03			15	
1,2-Dibromoethane (EDB)	0.5265772	5.781451	15.51333	0.0165478			15	
Dibromomethane	0.1545597	3.942352	13.16033	1.775901E-02			15	
1,2-Dichlorobenzene	1.023735	4.641556	18.576	1.197095E-02			15	
1,3-Dichlorobenzene	1.060409	8.45233	18.223	2.242414E-02			15	

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_001
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Calibration: 0128001
Instrument: MS-VOA3
Matrix: Water
Calibration Date: 5/7/2010 3:51:54PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,4-Dichlorobenzene	1.16061	5.990904	18.27167	1.194414E-02			15	
Dichlorodifluoromethane	0.202545	5.356997	3.698333	8.647251E-02			15	
1,1-Dichloroethane	0.3847218	3.918511	8.282	5.113378E-02			SPCC (0.1)	
1,2-Dichloroethane	0.2909279	4.73019	11.56033	3.689135E-02			15	
1,1-Dichloroethene	0.1810459	7.408568	6.316333	3.090128E-02			CCC (20)	
cis-1,2-Dichloroethene	0.2491806	8.268029	9.693333	5.718375E-02			15	
trans-1,2-Dichloroethene	0.2166033	4.222177	7.748333	5.305986E-02			15	
1,2-Dichloroethene (total)	0.2328919	6.28001	0	0			15	
1,2-Dichloropropane	0.2343251	6.040209	13.21933	2.405015E-02			CCC (20)	
1,3-Dichloropropane	0.8275006	9.139689	15.03967	1.572642E-02			15	
2,2-Dichloropropane	0.2557617	9.293152	10.44133	6.659268E-02			15	
1,1-Dichloropropene	0.2756653	2.436473	12.08111	2.565211E-02			15	
cis-1,3-Dichloropropene	0.3336023	3.90331	14.151	1.992685E-02			15	
trans-1,3-Dichloropropene	0.6672308	4.598237	14.63433	2.048464E-02			15	
Diisopropyl Ether	0.6489996	3.648245	9.465222	0.1052134			15	
Ethylbenzene	2.118108	13.13578	16.44622	1.212614E-02			CCC (20)	
Ethyl tert-Butyl Ether	0.6166748	3.259488	10.51233	3.071805E-02			15	
Ethyl Methacrylate	0.6612875	6.418515	15.10533	7.916731E-02			15	
Hexachlorobutadiene	0.2659657	8.252218	20.55167	1.037684E-02			15	
2-Hexanone	0.2947969	21.07415	15.21662	0.1143159	0.999793		0.995	
Iodomethane	0.2033345	39.87961	6.358	4.476146E-02	0.9996908		0.995	
Isopropylbenzene	1.615648	8.339895	17.19767	0.0146951			15	
p-Isopropyltoluene	1.208727	6.13082	17.967	0.0140798			15	
Methylene chloride	0.2798913	26.81101	6.54125	2.516534E-02	0.9994534		0.995	
Methyl Acetate	0.1620765	5.318566	6.587	0.1363199			15	
Methylcyclohexane	0.232498	3.931094	13.946	1.141866E-02			15	
Naphthalene	1.667032	4.006895	20.51467	6.777849E-03			15	
Methyl Methacrylate	0.1777607	10.09673	13.5985	8.225799E-02			15	
4-Methyl-2-pentanone	0.1819818	12.20153	14.29525	7.467514E-02			15	
Methyl t-Butyl Ether	0.5965014	2.839457	8.019	6.343752E-02			15	
n-Propylbenzene	2.115723	12.98273	17.53511	1.393331E-02			15	
Styrene	1.409032	6.217907	16.85867	6.938597E-03			15	

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Calibration:	0128001	Instrument:	MS-VOA3
Matrix:	Water	Calibration Date:	5/7/2010 3:51:54PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,1,2,2-Tetrachloroethane	0.6520071	4.817003	16.92367	1.735102E-03			SPCC (0.3)	
1,1,1,2-Tetrachloroethane	0.4646979	4.807136	16.22722	2.476247E-02			15	
t-Butyl alcohol	2.641896E-02	7.322205	6.317	9.487985E-02			15	
Tetrachloroethene	0.5044643	3.595975	15.698	1.012467E-02			15	
Toluene	1.247637	7.830692	14.97533	1.596385E-02			CCC (20)	
1,2,3-Trichlorobenzene	0.5646116	4.512021	20.76133	9.586246E-03			15	
1,2,4-Trichlorobenzene	0.6137349	5.930749	20.24089	1.934272E-02			15	
1,1,2-Trichloroethane	0.4273489	8.142227	14.78667	1.982536E-02			15	
1,1,1-Trichloroethane	0.2938933	2.239795	11.75333	3.611599E-02			15	
Tetrahydrofuran	6.343919E-02	6.734125	10.98575	0.1795124			15	
Trichloroethene	0.2251778	3.749245	13.29833	0.0302045			15	
Trichlorofluoromethane	0.3084015	4.976415	5.523444	5.944283E-02			15	
1,2,3-Trichloropropane	0.1869629	4.311053	17.03056	1.161594E-02			15	
1,3,5-Trimethylbenzene	1.503271	7.544811	17.736	1.486751E-02			15	
1,2,4-Trimethylbenzene	1.576152	8.294678	18.04622	0.0192909			15	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.1704611	4.845664	6.646667	5.556678E-02			15	
Vinyl chloride	0.2254535	14.22332	4.13075	0.0738405			CCC (20)	
m,p-Xylene	1.675735	11.16825	16.59938	9.642842E-03			15	
o-Xylene	1.74272	10.38945	16.915	1.710043E-02			15	
Vinyl acetate	0.4414349	7.335954	8.587111	0.1878737			15	
Xylenes (total)	1.65548	14.07832	0	0			15	
Dibromofluoromethane	0.2645697	1.31402	10.50167	1.966633E-02			15	
1,2-Dichloroethane-d4	5.822815E-02	1.9858	11.42044	3.477841E-03			15	
Toluene-d8	2.233741	7.557731	14.901	1.850725E-02			15	

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_001
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Sequence: 0E12805
Instrument: MS-VOA5
Calibration: 0134007

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E12805-TUN1	SEQ-TUN1.D	05/08/10 13:09
Cal Standard	0E12805-CAL1	SEQ-CAL1.D	05/08/10 13:43
Cal Standard	0E12805-CAL2	SEQ-CAL2.D	05/08/10 14:33
Cal Standard	0E12805-CAL3	SEQ-CAL3.D	05/08/10 15:53
Cal Standard	0E12805-CAL4	SEQ-CAL4.D	05/08/10 16:24
Cal Standard	0E12805-CAL5	SEQ-CAL5.D	05/08/10 16:53
Cal Standard	0E12805-CAL6	SEQ-CAL6.D	05/08/10 17:26
Cal Standard	0E12805-CAL7	SEQ-CAL7.D	05/08/10 17:56
Cal Standard	0E12805-CAL8	SEQ-CAL8.D	05/08/10 18:26
Cal Standard	0E12805-CAL9	SEQ-CAL9.D	05/08/10 18:56
Initial Cal Check	0E12805-ICV1	SEQ-ICV1.D	05/08/10 19:26
Cal Standard	0E12805-CALA	SEQ-CALA.D	05/08/10 19:56
Cal Standard	0E12805-CALB	SEQ-CALB.D	05/08/10 20:26
Cal Standard	0E12805-CALC	SEQ-CALC.D	05/08/10 20:56
Cal Standard	0E12805-CALD	SEQ-CALD.D	05/08/10 21:26
Cal Standard	0E12805-CALE	SEQ-CALE.D	05/08/10 21:56
Cal Standard	0E12805-CALF	SEQ-CALF.D	05/08/10 22:26
Cal Standard	0E12805-CALG	SEQ-CALG.D	05/08/10 22:56
Cal Standard	0E12805-CALH	SEQ-CALH.D	05/08/10 23:26
Cal Standard	0E12805-CALI	SEQ-CALI.D	05/08/10 23:56
MS Tune	0E12805-TUN2	SEQ-TUN2.D	05/09/10 00:26
Cal Standard	0E12805-CALJ	SEQ-CALJ.D	05/09/10 01:26
Cal Standard	0E12805-CALK	SEQ-CALK.D	05/09/10 01:56
Cal Standard	0E12805-CALL	SEQ-CALL.D	05/09/10 02:26
Cal Standard	0E12805-CALM	SEQ-CALM.D	05/09/10 02:56
Cal Standard	0E12805-CALN	SEQ-CALN.D	05/09/10 03:26
Cal Standard	0E12805-CALO	SEQ-CALO.D	05/09/10 03:56
Cal Standard	0E12805-CALP	SEQ-CALP.D	05/09/10 04:26
Cal Standard	0E12805-CALQ	SEQ-CALQ.D	05/09/10 04:56
Cal Standard	0E12805-CALR	SEQ-CALR.D	05/09/10 05:26

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN1.D	Injection Date:	05/08/10
Instrument ID:	MS-VOA5	Injection Time:	13:09
Sequence:	0E12805	Lab Sample ID:	0E12805-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	17.7	PASS
75	30 - 60% of 95	42.8	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	6.61	PASS
173	Less than 2% of 174	0	PASS
174	50 - 200% of 95	97.6	PASS
175	5 - 9% of 174	7.41	PASS
176	95 - 101% of 174	97.1	PASS
177	5 - 9% of 176	6.7	PASS

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN2.D	Injection Date:	05/09/10
Instrument ID:	MS-VOA5	Injection Time:	00:26
Sequence:	0E12805	Lab Sample ID:	0E12805-TUN2

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	24.3	PASS
75	30 - 60% of 95	48.9	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.21	PASS
173	Less than 2% of 174	0	PASS
174	50 - 200% of 95	83.7	PASS
175	5 - 9% of 174	7.82	PASS
176	95 - 101% of 174	98.1	PASS
177	5 - 9% of 176	7.09	PASS

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_001
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Calibration: 0134007
Instrument: MS-VOA5
Matrix: Water
Calibration Date: 5/8/2010 3:40:08PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
Acetone	5.238476E-02	19.15053	6.9905	9.444361E-02	0.9994283		0.995	
Acrolein	2.520483E-02	51.28383	6.729111	9.368836E-02	0.9996098		0.995	
Acrylonitrile	0.0909455	20.56405	7.939375	0.1194936	0.9985561		0.995	
Benzene	1.247249	6.188391	13.73333	2.827717E-02			15	
Bromobenzene	1.002804	6.173738	18.38233	1.863737E-02			15	
Bromochloromethane	0.1985721	6.356347	11.96438	3.171568E-02			15	
Tert-Amyl Methyl Ether	0.9594432	15.74053	14.02638	3.456399E-02	0.9992891		0.995	
Bromodichloromethane	0.4898524	9.372995	14.58822	2.811553E-02			15	
Bromoform	0.6124822	9.988802	17.67944	2.095475E-02			SPCC (0.1)	
Bromomethane	0.2273189	12.07499	5.526778	8.692094E-02			15	
Bromofluorobenzene	0.8267954	9.811948	18.19756	1.561918E-02			15	
n-Butylbenzene	1.996385	13.72157	19.58244	1.329678E-02			15	
2-Butanone	0.1692204	31.23385	11.4875	0.1163059	0.9998638		0.995	
sec-Butylbenzene	2.671707	14.82944	19.11244	7.050123E-03			15	
tert-Butylbenzene	2.20326	12.57551	19.23811	7.41846E-03			15	
Carbon disulfide	1.062076	8.178008	8.625667	7.454269E-02			15	
Carbon tetrachloride	0.4199085	7.260258	13.704	2.568879E-02			15	
Chlorobenzene	2.019812	12.83353	17.27611	2.694582E-02			SPCC (0.3)	
Chloroethane	0.1826699	15.47544	5.764	9.213093E-02	0.9990811		0.995	
Chloroform	0.654407	9.296329	12.05888	2.346578E-02			CCC (20)	
2-Chloroethyl vinyl ether	0.1936709	11.00913	15.08656	2.799878E-02			15	
Chloromethane	0.3257038	10.08596	4.607444	8.629972E-02			SPCC (0.1)	
1-Chlorohexane	1.000747	17.01101	17.21267	1.589309E-02	0.9951034		0.995	
2-Chlorotoluene	2.229476	11.55886	18.59189	6.714239E-03			15	
4-Chlorophenyl-phenylether	2.375957	10.7515	18.64878	1.464079E-02			15	
Cyclohexane	0.4789897	8.92101	13.61311	3.492215E-02			15	
Dibromochloromethane	0.8895045	10.7247	16.35567	0.0170222			15	
1,2-Dibromo-3-chloropropane	0.184109	9.180321	19.98244	1.857088E-02			15	
1,2-Dibromoethane (EDB)	0.7767539	13.89922	16.56778	1.970337E-02			15	
Dibromomethane	0.2424485	7.073796	14.43533	0.0278618			15	
1,2-Dichlorobenzene	1.546126	5.555328	19.57811	1.871536E-02			15	
1,3-Dichlorobenzene	1.760097	10.13521	19.213	1.939489E-02			15	

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Calibration:	0134007	Instrument:	MS-VOA5
Matrix:	Water	Calibration Date:	5/8/2010 3:40:08PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,4-Dichlorobenzene	1.767108	10.42037	19.262	2.035883E-02			15	
Dichlorodifluoromethane	0.3079612	5.998622	4.325556	0.1123515			15	
1,1-Dichloroethane	0.6404133	7.468359	10.51433	6.188777E-02			SPCC (0.1)	
1,2-Dichloroethane	0.4689364	6.009006	13.05589	2.876157E-02			15	
1,1-Dichloroethene	0.237259	12.53446	7.849556	5.116829E-02			CCC (20)	
cis-1,2-Dichloroethene	0.3803055	6.452106	11.71144	0.0510054			15	
trans-1,2-Dichloroethene	0.3684619	13.74628	9.830222	4.358531E-02			15	
1,2-Dichloroethene (total)	0.3743837	9.434121	0	0			15	
1,2-Dichloropropane	0.3612511	5.961178	14.48322	2.723195E-02			CCC (20)	
1,3-Dichloropropane	1.161948	12.19093	16.11956	2.324187E-02			15	
2,2-Dichloropropane	0.4619466	9.940153	12.19878	3.306309E-02			15	
1,1-Dichloropropene	0.4596839	6.298667	13.48744	2.177147E-02			15	
cis-1,3-Dichloropropene	0.5626243	3.495755	15.314	2.040288E-02			15	
trans-1,3-Dichloropropene	1.097744	10.59458	15.74356	2.618353E-02			15	
Diisopropyl Ether	1.254393	4.457683	11.60311	6.825235E-02			15	
Ethylbenzene	3.349415	13.90669	17.4205	6.790657E-03			CCC (20)	
Ethyl tert-Butyl Ether	1.040987	3.50487	12.28278	7.442361E-02			15	
Ethyl Methacrylate	0.9449305	14.30866	16.15133	2.422963E-02			15	
Hexachlorobutadiene	0.3677814	11.86383	21.69844	1.669797E-02			15	
2-Hexanone	0.5774638	21.14357	16.271	3.124758E-02	0.9998099		0.995	
Iodomethane	0.3360427	27.60589	7.887286	7.967883E-02	0.997823		0.995	
Isopropylbenzene	2.494209	16.1397	18.15811	2.260212E-02	0.9955104		0.995	
p-Isopropyltoluene	1.910766	12.39102	18.93856	2.618166E-02			15	
Methylene chloride	0.4644191	27.98095	8.167	4.831629E-02	0.9993342		0.995	
Methyl Acetate	0.2751261	22.2525	8.285	5.968432E-02	0.9993492		0.995	
Methylcyclohexane	0.3837474	12.30218	15.14011	2.008505E-02			15	
Naphthalene	1.911635	11.83976	21.67011	1.550498E-02			15	
Methyl Methacrylate	0.3123349	15.23833	14.80467	0.0424575	0.9998213		0.995	
4-Methyl-2-pentanone	0.3187909	18.0896	15.44475	3.666023E-02	0.9994431		0.995	
Methyl t-Butyl Ether	0.8640902	10.14491	10.30122	0.1973546			15	
n-Propylbenzene	3.434776	14.85712	18.49478	1.591131E-02			15	
Styrene	2.052345	11.93191	17.82256	1.221684E-02			15	

INITIAL CALIBRATION DATA (Continued)

SW8260B

Laboratory: Empirical Laboratories, LLC
SDG: CTO067P_001
Client: Tetra Tech NUS, Inc. (T010)
Project: CTO067 NAS Pensacola
Calibration: 0134007
Instrument: MS-VOA5
Matrix: Water
Calibration Date: 5/8/2010 3:40:08PM

Compound	Mean RF	RF RSD	Mean RT	RT RSD	Linear r	Quad COD	LIMIT	Q
1,1,2,2-Tetrachloroethane	0.8415106	7.936326	17.89144	0.0117448			SPCC (0.3)	
1,1,1,2-Tetrachloroethane	0.8005544	11.79218	17.22144	1.587971E-02			15	
t-Butyl alcohol	2.755932E-02	24.60426	7.955286	0.177648	0.9987322		0.995	
Tetrachloroethene	0.8681995	14.3405	16.73067	2.060334E-02			15	
Toluene	1.855165	13.08201	16.06525	2.216442E-02			CCC (20)	
1,2,3-Trichlorobenzene	0.8580229	4.407042	21.94244	1.738218E-02			15	
1,2,4-Trichlorobenzene	0.9491041	7.915191	21.36622	1.974911E-02			15	
1,1,2-Trichloroethane	0.5972597	13.52011	15.8895	2.335001E-02			15	
1,1,1-Trichloroethane	0.5036942	8.934106	13.21756	1.920203E-02			15	
Tetrahydrofuran	9.041208E-02	15.77666	12.637	6.925057E-02	0.999439		0.995	
Trichloroethene	0.3487445	6.72321	14.55222	3.013863E-02			15	
Trichlorofluoromethane	0.4033409	8.290316	6.776111	6.693441E-02			15	
1,2,3-Trichloropropane	0.2367812	22.62616	17.99633	2.720879E-02	0.9967669		0.995	
1,3,5-Trimethylbenzene	2.304679	12.45385	18.69256	2.258813E-02			15	
1,2,4-Trimethylbenzene	2.403884	11.59619	19.01389	1.620209E-02			15	
1,1,2-Trichloro-1,2,2-trifluoroethane	0.3209896	7.467249	8.331556	8.641603E-02			15	
Vinyl chloride	0.2779007	11.62373	4.892667	8.851202E-02			CCC (20)	
m,p-Xylene	2.516964	14.78612	17.56538	1.484503E-02			15	
o-Xylene	2.520615	14.31816	17.88056	2.117163E-02			15	
Vinyl acetate	0.7993974	14.29818	10.87178	7.595569E-02			15	
Xylenes (total)	2.540603	13.93638	0	0			15	
Dibromofluoromethane	0.312256	2.605853	12.24467	0.0241036			15	
1,2-Dichloroethane-d4	6.052881E-02	8.307731	12.94311	3.829748E-02			15	
Toluene-d8	2.129377	10.46941	15.99711	2.601099E-02			15	

INITIAL CALIBRATION CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Instrument ID:	MS-VOA5	Calibration:	0134007
Lab File ID:	SEQ-ICV1.D	Calibration Date:	05/08/10 15:40
Sequence:	0E12805	Injection Date:	05/08/10
Lab Sample ID:	0E12805-ICV1	Injection Time:	19:26

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	ICV	ICAL	ICV	MIN (#)	ICV	LIMIT (#)
Benzene	A	100.0	97.94	1.247249	1.221548		-2.1	20
Chlorobenzene	A	100.0	91.51	2.019812	1.84843	0.3	-8.5	20
Naphthalene	A	100.0	107.5	1.911635	2.054644		7.5	20
1,1,2,2-Tetrachloroethane	A	100.0	103.6	0.8415106	0.8718514	0.3	3.6	20
Vinyl chloride	A	100.0	102.2	0.2779007	0.2839872		2.2	20
Xylenes (total)	A	300.0	260.5	2.540603	2.186508		-13.9	20
Bromofluorobenzene	A	30.00	27.83	0.8267954	0.7670308		-7.2	20
Dibromofluoromethane	A	30.00	30.58	0.312256	0.3182547		1.9	20
1,2-Dichloroethane-d4	A	30.00	30.83	6.052881E-02	6.220365E-02		2.8	20
Toluene-d8	A	30.00	27.53	2.129377	1.954252		-8.2	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0E14206	Instrument:	MS-VOA3
Calibration:	0128001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E14206-TUN1	SEQ-TUN1.D	05/19/10 10:40
Calibration Check	0E14206-CCV1	SEQ-CCV1.D	05/19/10 11:12
LCS	0E19014-BS1	V3LCS01.D	05/19/10 11:42
Blank	0E19014-BLK1	V3BLK01.D	05/19/10 13:12
01GW01GS64-0510	1005086-12	0508612.D	05/19/10 19:35
01GW01GI36-0510	1005086-16	0508616.D	05/19/10 20:05
01GWUPG10510 .	1005086-20	0508620.D	05/19/10 20:35
LCS Dup	0E19014-BSD1	V3LCD01.D	05/19/10 21:35

(3)

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN1.D	Injection Date:	05/19/10
Instrument ID:	MS-VOA3	Injection Time:	10:40
Sequence:	0E14206	Lab Sample ID:	0E14206-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	22.5	PASS
75	30 - 60% of 95	52.6	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.61	PASS
173	Less than 2% of 174	0.594	PASS
174	50 - 200% of 95	67.5	PASS
175	5 - 9% of 174	7.36	PASS
176	95 - 101% of 174	97.7	PASS
177	5 - 9% of 176	6.77	PASS

CONTINUING CALIBRATION CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Instrument ID:	MS-VOA3	Calibration:	0128001
Lab File ID:	SEQ-CCV1.D	Calibration Date:	05/07/10 15:51
Sequence:	0E14206	Injection Date:	05/19/10
Lab Sample ID:	0E14206-CCV1	Injection Time:	11:12

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
Benzene	A	100.0	101.7	0.8513296	0.8656577		1.7	20
Chlorobenzene	A	100.0	93.62	1.36545	1.278364	0.3	-6.4	20
Naphthalene	A	100.0	78.57	1.667032	1.309819		-21.4	20 *
1,1,2,2-Tetrachloroethane	A	100.0	93.05	0.6520071	0.6067104	0.3	-6.9	20
Vinyl chloride	A	100.0	142.7	0.2254535	0.321818		42.7	20 *
Xylenes (total)	A	300.0	290.1	1.65548	1.642697		-0.8	20
Bromofluorobenzene	A	30.00	27.26	0.8488807	0.7715068		-9.1	20
Dibromofluoromethane	A	30.00	28.53	0.2645697	0.2515925		-4.9	20
1,2-Dichloroethane-d4	A	30.00	27.76	5.822815E-02	5.387313E-02		-7.5	20
Toluene-d8	A	30.00	26.85	2.233741	1.99934		-10.5	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0E14601	Instrument:	MS-VOA3
Calibration:	0128001		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E14601-TUN1	SEQ-TUN1.D	05/25/10 15:21
Calibration Check	0E14601-CCV1	SEQ-CCV1.D	05/25/10 15:51
LCS	0E25029-BS1	V3LCS01.D	05/25/10 16:22
Blank	0E25029-BLK1	V3BLK01.D	05/25/10 17:53
01GW01GI41-0510	1005086-08RE1	0508608D.D	05/25/10 22:25

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN1.D	Injection Date:	05/25/10
Instrument ID:	MS-VOA3	Injection Time:	15:21
Sequence:	0E14601	Lab Sample ID:	0E14601-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	22.9	PASS
75	30 - 60% of 95	52	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.52	PASS
173	Less than 2% of 174	0.792	PASS
174	50 - 200% of 95	71.2	PASS
175	5 - 9% of 174	7.65	PASS
176	95 - 101% of 174	96.8	PASS
177	5 - 9% of 176	7.82	PASS

CONTINUING CALIBRATION CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Instrument ID:	MS-VOA3	Calibration:	0128001
Lab File ID:	SEQ-CCV1.D	Calibration Date:	05/07/10 15:51
Sequence:	0E14601	Injection Date:	05/25/10
Lab Sample ID:	0E14601-CCV1	Injection Time:	15:51

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
Benzene	A	100.0	106.2	0.8513296	0.9044545		6.2	20
Chlorobenzene	A	100.0	99.93	1.36545	1.364506	0.3	-0.07	20
Naphthalene	A	100.0	97.23	1.667032	1.620855		-2.8	20
1,1,2,2-Tetrachloroethane	A	100.0	112.8	0.6520071	0.7357059	0.3	12.8	20
Vinyl chloride	A	100.0	143.0	0.2254535	0.3223842		43.0	20 *
Xylenes (total)	A	300.0	306.2	1.65548	1.733907		4.7	20
Bromofluorobenzene	A	30.00	27.93	0.8488807	0.7903005		-6.9	20
Dibromofluoromethane	A	30.00	29.88	0.2645697	0.2635459		-0.4	20
1,2-Dichloroethane-d4	A	30.00	27.92	5.822815E-02	5.419464E-02		-6.9	20
Toluene-d8	A	30.00	26.70	2.233741	1.987935		-11.0	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS SEQUENCE SUMMARY

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Sequence:	0E14408	Instrument:	MS-VOA5
Calibration:	0134007		

Sample Name	Lab Sample ID	Lab File ID	Analysis Date/Time
MS Tune	0E14408-TUN1	SEQ-TUN2.D	05/18/10 18:07
Calibration Check	0E14408-CCV1	SEQ-CCV2.D	05/18/10 18:37
LCS	0E16002-BS1	V5-LCS2.D	05/18/10 19:07
Blank	0E16002-BLK1	V5-BLK3.D	05/18/10 20:37
01GW01GI65-0510	1005086-01	0508601.D	05/19/10 00:06
01GW01GI59-0510	1005086-04	0508604.D	05/19/10 00:36
01GW01GGM33-0510	1005086-05	0508605.D	05/19/10 01:06
01GW01GI32-0510	1005086-06	0508606.D	05/19/10 01:36
01GW01GI41-0510	1005086-08	0508608.D	05/19/10 02:06
GW02-051110	1005086-09	0508609.D	05/19/10 02:36
01GW01GI44-0510	1005086-10	0508610.D	05/19/10 03:05

MASS SPECTROMETER INSTRUMENT PERFORMANCE CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Lab File ID:	SEQ-TUN2.D	Injection Date:	05/18/10
Instrument ID:	MS-VOA5	Injection Time:	18:07
Sequence:	0E14408	Lab Sample ID:	0E14408-TUN1

m/z	ION ABUNDANCE CRITERIA	% RELATIVE ABUNDANCE	
50	15 - 40% of 95	22.5	PASS
75	30 - 60% of 95	47.1	PASS
95	Base peak, 100% relative abundance	100	PASS
96	5 - 9% of 95	7.04	PASS
173	Less than 2% of 174	0	PASS
174	50 - 200% of 95	84.2	PASS
175	5 - 9% of 174	7.14	PASS
176	95 - 101% of 174	97.8	PASS
177	5 - 9% of 176	6.78	PASS

CONTINUING CALIBRATION CHECK

SW8260B

Laboratory:	Empirical Laboratories, LLC	SDG:	CTO067P_001
Client:	Tetra Tech NUS, Inc. (T010)	Project:	CTO067 NAS Pensacola
Instrument ID:	MS-VOA5	Calibration:	0134007
Lab File ID:	SEQ-CCV2.D	Calibration Date:	05/08/10 15:40
Sequence:	0E14408	Injection Date:	05/18/10
Lab Sample ID:	0E14408-CCV1	Injection Time:	18:37

		CONC. (ug/L)		RESPONSE FACTOR			% DIFF / DRIFT	
COMPOUND	TYPE	STD	CCV	ICAL	CCV	MIN (#)	CCV	LIMIT (#)
Benzene	A	100.0	105.2	1.247249	1.312384		5.2	20
Chlorobenzene	A	100.0	92.09	2.019812	1.860093	0.3	-7.9	20
Naphthalene	A	100.0	84.05	1.911635	1.606749		-15.9	20
1,1,2,2-Tetrachloroethane	A	100.0	109.6	0.8415106	0.9222367	0.3	9.6	20
Vinyl chloride	A	100.0	134.1	0.2779007	0.3726887		34.1	20 *
Xylenes (total)	A	300.0	290.4	2.540603	2.437376		-4.1	20
Bromofluorobenzene	A	30.00	27.30	0.8267954	0.7522954		-9.0	20
Dibromofluoromethane	A	30.00	30.98	0.312256	0.3224823		3.3	20
1,2-Dichloroethane-d4	A	30.00	29.27	6.052881E-02	5.905247E-02		-2.4	20
Toluene-d8	A	30.00	26.48	2.129377	1.879198		-11.7	20

Column to be used to flag Response Factor and %Diff/Drift values with an asterisk

* Values outside of QC limits

ANALYSIS DATA SHEET

Blank

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_001

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Laboratory ID: 0E16002-BLK1 File ID: V5-BLK3.D

Sampled: Prepared: Analyzed: 05/18/10 20:37

Solids: Preparation: 5030B Dilution:

Batch: 0E16002 Sequence: 0E14408 Calibration: 0134007 Instrument: MS-VOA5

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	Q, X, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.45	98.2	75 - 120	
Dibromofluoromethane	30.00	32.04	107	85 - 115	
1.2-Dichloroethane-d4	30.00	32.82	109	70 - 120	
Toluene-d8	30.00	31.26	104	85 - 120	

ANALYSIS DATA SHEET

Blank

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_001

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Laboratory ID: 0E19014-BLK1 File ID: V3BLK01.D

Sampled: Prepared: Analyzed: 05/19/10 13:12

Solids: Preparation: 5030B Dilution:

Batch: 0E19014 Sequence: 0E14206 Calibration: 0128001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	Y, U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	Q, X, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.39	98.0	75 - 120	
Dibromofluoromethane	30.00	30.87	103	85 - 115	
1,2-Dichloroethane-d4	30.00	30.41	101	70 - 120	
Toluene-d8	30.00	31.74	106	85 - 120	

ANALYSIS DATA SHEET

Blank

Laboratory: Empirical Laboratories, LLC SDG: CTO067P_001

Client: Tetra Tech NUS, Inc. (T010) Project: CTO067 NAS Pensacola

Matrix: Laboratory ID: 0E25029-BLK1 File ID: V3BLK01.D

Sampled: Prepared: Analyzed: 05/25/10 17:53

Solids: Preparation: 5030B Dilution:

Batch: 0E25029 Sequence: 0E14601 Calibration: 0128001 Instrument: MS-VOA3

CAS NO.	COMPOUND	CONC. (ug/L)	MDL	MRL	Q
71-43-2	Benzene		0.140	1.00	U
108-90-7	Chlorobenzene		0.210	1.00	U
91-20-3	Naphthalene		0.500	2.00	U
79-34-5	1,1,2,2-Tetrachloroethane		0.230	1.00	U
75-01-4	Vinyl chloride		0.200	1.00	X, U
1330-20-7	Xylenes (total)		0.220	3.00	U

SYSTEM MONITORING COMPOUND	ADDED (ug/L)	CONC (ug/L)	% REC	QC LIMITS	Q
Bromofluorobenzene	30.00	29.17	97.2	75 - 120	
Dibromofluoromethane	30.00	30.77	103	85 - 115	
1,2-Dichloroethane-d4	30.00	30.75	103	70 - 120	
Toluene-d8	30.00	30.62	102	85 - 120	

APPENDIX C

MANN-KENDALL STATISTICAL TEST DATA ENTRY
(provided on the enclosed CD)

MANN-KENDALL ANALYSIS
EVALUATION OF ALUMINUM IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	8	18	0.016	18	12	Significant Upward Trend
01GGM33	9	15	0.075	15	14	Significant Upward Trend
01GI32	9	-3	0.421	-3	14	No Trend
01GI36	9	-2	0.460	-2	14	No Trend
01GI41	9	10	0.179	10	14	No Trend
01GI43	9	2	0.460	2	14	No Trend
01GI44	8	3	0.406	3	12	No Trend
01GI46	9	-3	0.421	-3	14	No Trend
01GI59	9	15	0.075	15	14	Significant Upward Trend
01UPGW1	9	2	0.460	2	14	No Trend
01GS57	--	--	--	--	--	--
01GS57	9	12	0.130	12	14	No Trend
01GS62	9	9	0.209	9	14	No Trend
01GS71	9	15	0.075	15	14	Significant Upward Trend
01GS72	9	16	0.060	16	14	Significant Upward Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.

MANN-KENDALL ANALYSIS
EVALUATION OF BENZENE IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	8	-18	0.016	-18	12	Significant Downward Trend
01GGM33	10	24	0.019	24	17	Significant Upward Trend
01GI32	9	-7	0.272	-7	14	No Trend
01GI36	9	-17	0.049	-17	14	Significant Downward Trend
01GI41	10	-19	0.054	-19	17	Significant Downward Trend
01GI43	10	-21	0.036	-21	17	Significant Downward Trend
01GI44	9	7	0.272	7	14	No Trend
01GI46	10	-9	0.242	-9	17	No Trend
01GI59	10	-24	0.019	-24	17	Significant Downward Trend
01GI65	10	6	0.332	6	17	No Trend
01UPGW1	5	0	0.592	0	8	No Trend
01GS57	9	0	0.540	0	14	No Trend
01GS62	10	-35	0.000	-35	17	Significant Downward Trend
01GS71	9	0	0.540	0	14	No Trend
01GS72	9	0	0.540	0	14	No Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.
Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF CADMIUM IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	8	-6	0.274	-6	12	No Trend
01GGM33	9	-13	0.110	-13	14	No Trend
01GI32	9	-8	0.238	-8	14	No Trend
01GI36	9	-3	0.421	-3	14	No Trend
01GI41	9	-8	0.238	-8	14	No Trend
01GI43	9	-13	0.110	-13	14	No Trend
01GI44	8	-8	0.199	-8	12	No Trend
01GI46	9	-11	0.155	-11	14	No Trend
01GI59	9	-13	0.110	-13	14	No Trend
01GI65	9	-13	0.110	-13	14	No Trend
01UPGW1	--	--	--	--	--	--
01GS57	9	10	0.179	10	14	No Trend
01GS62	9	-13	0.110	-13	14	No Trend
01GS71	9	-10	0.179	-10	14	No Trend
01GS72	9	3	0.421	3	14	No Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.

Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF CHLOROBENZENE IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	8	6	0.274	6	12	No Trend
01GGM33	9	30	0.000	30	14	Significant Upward Trend
01GI32	9	22	0.012	22	14	Significant Upward Trend
01GI36	9	0	0.540	0	14	No Trend
01GI41	9	18	0.038	18	14	Significant Upward Trend
01GI43	9	26	0.003	26	14	Significant Upward Trend
01GI44	8	0	0.548	0	12	No Trend
01GI46	9	9	0.209	9	14	No Trend
01GI59	9	29	0.001	29	14	Significant Upward Trend
01GI65	9	-3	0.421	-3	14	No Trend
01UPGW1	5	0	0.592	0	8	No Trend
01GS57	9	0	0.540	0	14	No Trend
01GS62	9	6	0.306	6	14	No Trend
01GS71	9	0	0.540	0	14	No Trend
01GS72	9	0	0.540	0	14	No Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.
Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF CHROMIUM IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	8	-4	0.360	-4	12	No Trend
01GGM33	9	-15	0.075	-15	14	Significant Downward Trend
01GI32	9	-5	0.344	-5	14	No Trend
01GI36	9	0	0.540	0	14	No Trend
01GI41	9	-22	0.012	-22	14	Significant Downward Trend
01GI43	9	-11	0.155	-11	14	No Trend
01GI44	8	-3	0.406	-3	12	No Trend
01GI46	9	0	0.540	0	14	No Trend
01GI59	8	-7	0.237	-7	12	No Trend
01GI65	9	-13	0.110	-13	14	No Trend
01UPGW1	5	7	0.080	7	8	No Trend
01GS57	9	6	0.306	6	14	No Trend
01GS62	9	-6	0.306	-6	14	No Trend
01GS71	9	-14	0.090	-14	14	Significant Downward Trend
01GS72	9	6	0.306	6	14	No Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.
Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF IRON IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	9	10	0.179	10	14	No Trend
01GGM33	9	22	0.012	22	14	Significant Upward Trend
01GI32	10	5	0.364	5	17	No Trend
01GI36	9	-14	0.090	-14	14	Significant Downward Trend
01GI41	10	8	0.271	8	17	No Trend
01GI43	10	-29	0.005	-29	17	Significant Downward Trend
01GI44	9	-22	0.012	-22	14	Significant Downward Trend
01GI46	10	-21	0.036	-21	17	Significant Downward Trend
01GI59	10	30	0.003	30	17	Significant Upward Trend
01GI65	10	-34	0.001	-34	17	Significant Downward Trend
01UPGW1	9	6	0.306	6	14	No Trend
01GS57	9	18	0.038	18	14	Significant Upward Trend
01GS62	9	22	0.012	22	14	Significant Upward Trend
01GS71	9	22	0.012	22	14	Significant Upward Trend
01GS72	9	18	0.038	18	14	Significant Upward Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.

Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF 1,1,2,2-TETRACHLOROETHANE IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	8	0	0.548	0	12	No Trend
01GGM33	9	0	0.540	0	14	No Trend
01GI32	9	0	0.540	0	14	No Trend
01GI36	9	0	0.540	0	14	No Trend
01GI41	9	0	0.540	0	14	No Trend
01GI43	9	0	0.540	0	14	No Trend
01GI44	8	0	0.548	0	12	No Trend
01GI46	9	0	0.540	0	14	No Trend
01GI59	8	0	0.548	0	12	No Trend
01GI65	9	0	0.540	0	14	No Trend
01UPGW1	5	0	0.592	0	8	No Trend
01GS57	9	0	0.540	0	14	No Trend
01GS62	9	0	0.540	0	14	No Trend
01GS71	9	0	0.540	0	14	No Trend
01GS72	9	0	0.540	0	14	No Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.
Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF MANGANESE IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	9	14	0.090	14	14	Significant Upward Trend
01GGM33	10	26	0.011	26	17	Significant Upward Trend
01GI32	10	9	0.242	9	17	No Trend
01GI36	9	13	0.110	13	14	No Trend
01GI41	10	9	0.242	9	17	No Trend
01GI43	9	29	0.001	29	14	Significant Upward Trend
01GI44	8	-16	0.031	-16	12	Significant Downward Trend
01GI46	10	-7	0.300	-7	17	No Trend
01GI59	10	35	0.000	35	17	Significant Upward Trend
01GI65	10	-33	0.001	-33	17	Significant Downward Trend
01UPGW1	--	--	--	--	--	--
01GS57	9	-24	0.006	-24	14	Significant Downward Trend
01GS62	9	11	0.155	11	14	No Trend
01GS71	9	25	0.005	25	14	Significant Upward Trend
01GS72	9	27	0.002	27	14	Significant Upward Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.
Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF NAPHTHALENE IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	7	7	0.191	7	11	No Trend
01GGM33	9	0	0.540	0	14	No Trend
01GI32	9	0	0.540	0	14	No Trend
01GI36	9	0	0.540	0	14	No Trend
01GI41	9	12	0.130	12	14	No Trend
01GI43	9	8	0.238	8	14	No Trend
01GI44	8	0	0.548	0	12	No Trend
01GI46	9	0	0.540	0	14	No Trend
01GI59	8	-5	0.317	-5	12	No Trend
01GI65	9	-17	0.049	-17	14	Significant Downward Trend
01UPGW1	5	0	0.592	0	8	No Trend
01GS57	9	0	0.540	0	14	No Trend
01GS62	9	-1	0.500	-1	14	No Trend
01GS71	9	0	0.540	0	14	No Trend
01GS72	9	0	0.540	0	14	No Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.
Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF NICKEL IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	8	18	0.016	18	12	Significant Upward Trend
01GGM33	9	0	0.540	0	14	No Trend
01GI32	9	0	0.540	0	14	No Trend
01GI36	9	0	0.540	0	14	No Trend
01GI41	9	0	0.540	0	14	No Trend
01GI43	9	0	0.540	0	14	No Trend
01GI44	8	0	0.548	0	12	No Trend
01GI46	9	0	0.540	0	14	No Trend
01GI59	8	0	0.548	0	12	No Trend
01GI65	9	-6	0.306	-6	14	No Trend
01UPGW1	5	5	0.180	5	8	No Trend
01GS57	9	-6	0.306	-6	14	No Trend
01GS62	9	1	0.500	1	14	No Trend
01GS71	9	-15	0.075	-15	14	Significant Downward Trend
01GS72	9	-6	0.306	-6	14	No Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes: Notes:
-- Indicates tl -- Indicates that there were an insufficient number of samples to run the test.

Null Hypothe Null Hypothesis: Ho: There is no trend.
Alternative H Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value
HA: There is a downward trend (indicated by a negative va

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.
Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

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MANN-KENDALL ANALYSIS
EVALUATION OF IRON IN PIEZOMETERS
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01PZ1	--	--	--	--	--	--
01PZ6	6	-3	0.360	-3	9	No Trend
01PZ6A	5	2	0.408	2	8	No Trend
01PZ7	6	-1	0.500	-1	9	No Trend
01PZ7A	5	0	0.592	0	8	No Trend
01PZ7B	5	-2	0.408	-2	8	No Trend
01PZ8	6	-7	0.136	-7	9	No Trend
01PZ10	6	-7	0.136	-7	9	No Trend

Notes:
-- Indicates that there were an insufficient number of samples to run the test.
01GGW1
Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.

If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.

Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF IRON IN PIEZOMETERS
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01PZ1	--	--	--	--	--	--
01PZ6	6	-3	0.360	-3	9	No Trend
01PZ6A	5	2	0.408	2	8	No Trend
01PZ7	6	-1	0.500	-1	9	No Trend
01PZ7A	5	0	0.592	0	8	No Trend
01PZ7B	5	-2	0.408	-2	8	No Trend
01PZ8	6	-7	0.136	-7	9	No Trend
01PZ10	6	-7	0.136	-7	9	No Trend

Notes:
-- Indicates that there were an insufficient number of samples to run the test.
01GGW1
Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.

If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.

Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF IRON IN SURFACE WATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01SW02	12	-32	0.017	-2.126	1.282	Significant Downward Trend

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.

Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF VINYL CHLORIDE IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	9	-9	0.209	-9	14	No Trend
01GGM33	9	13	0.110	13	14	No Trend
01GI32	10	2	0.466	2	17	No Trend
01GI36	10	-23	0.023	-23	17	Significant Downward Trend
01GI41	10	-34	0.001	-34	17	Significant Downward Trend
01GI43	10	-23	0.023	-23	17	Significant Downward Trend
01GI44	8	5	0.317	5	12	No Trend
01GI46	10	-11	0.190	-11	17	No Trend
01GI59	10	-31	0.002	-31	17	Significant Downward Trend
01GI65	10	-11	0.190	-11	17	No Trend
01UPGW1	5	4	0.242	4	8	No Trend
01GS57	9	-6	0.306	-6	14	No Trend
01GS62	9	-17	0.049	-17	14	Significant Downward Trend
01GS71	9	-6	0.306	-6	14	No Trend
01GS72	9	-6	0.306	-6	14	No Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.

Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

MANN-KENDALL ANALYSIS
EVALUATION OF TOTAL XYLENES IN GROUNDWATER
OPERATIONAL UNIT 1
NAS PENSACOLA
PENSACOLA, FLORIDA

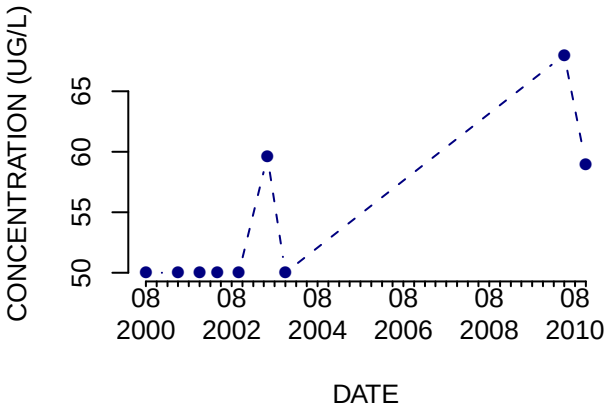
Location	N	S	p-value	Test Statistic	Alpha = 0.1	
					Critical Value	Trend?
01GS64	7	0	0.000	0	11	No Trend
01GGM33	9	8	0.238	8	14	No Trend
01GI32	9	0	0.540	0	14	No Trend
01GI36	9	0	0.540	0	14	No Trend
01GI41	9	-18	0.038	-18	14	Significant Downward Trend
01GI43	9	0	0.540	0	14	No Trend
01GI44	8	0	0.548	0	12	No Trend
01GI46	9	0	0.540	0	14	No Trend
01GI59	9	-30	0.000	-30	14	Significant Downward Trend
01GI65	9	28	0.001	28	14	Significant Upward Trend
01UPGW1	5	0	0.592	0	8	No Trend
01GS57	9	0	0.540	0	14	No Trend
01GS62	9	-26	0.003	-26	14	Significant Downward Trend
01GS71	8	0	0.548	0	12	No Trend
01GS72	9	0	0.540	0	14	No Trend
01GS73	--	--	--	--	--	--
01GS74	--	--	--	--	--	--

Notes:
-- Indicates that there were an insufficient number of samples to run the test.

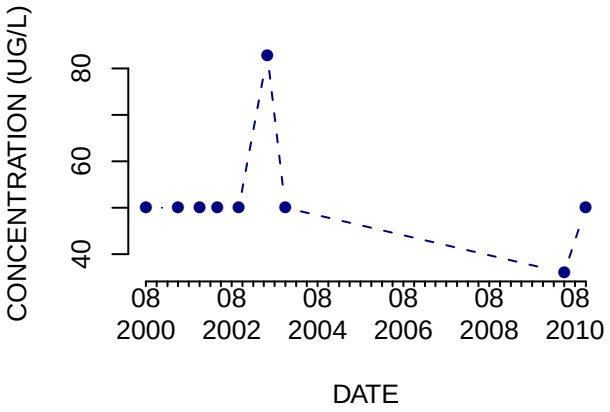
Null Hypothesis: Ho: There is no trend.
Alternative Hypothesis: HA: There is an upward trend (indicated by a positive value of S).
HA: There is a downward trend (indicated by a negative value of S).

If p-value is less than alpha then reject null hypothesis of no trend.
If absolute value of the test statistic is greater than or equal to the critical value then reject null hypothesis of no trend.
Source: Data Quality Assessment: Statistical Methods for Practitioners EPA QA/G-9S, EPA/240/B-06/003. February 2006.

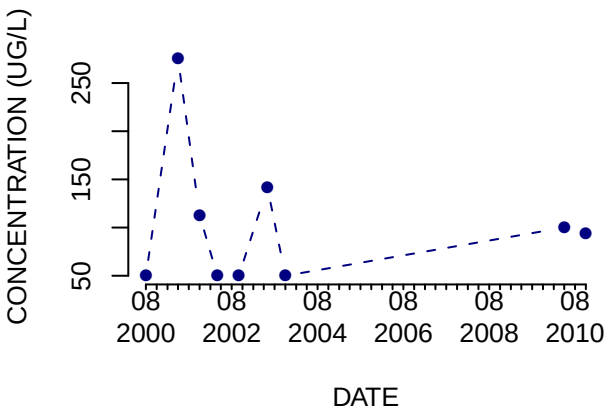
TIME PLOT ALUMINUM 01GGM33



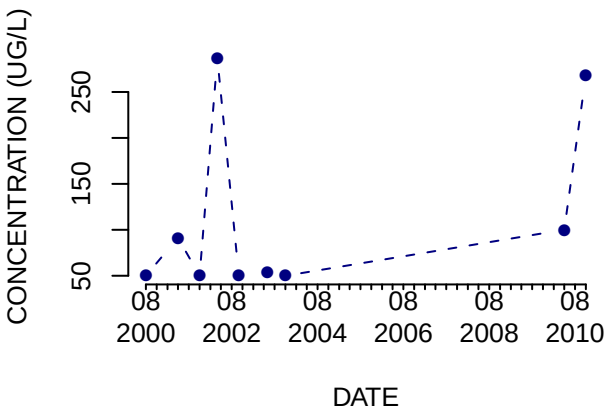
TIME PLOT ALUMINUM 01GI32



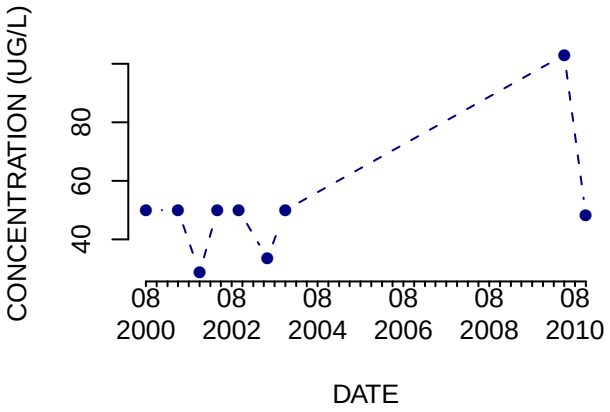
TIME PLOT ALUMINUM 01GI36



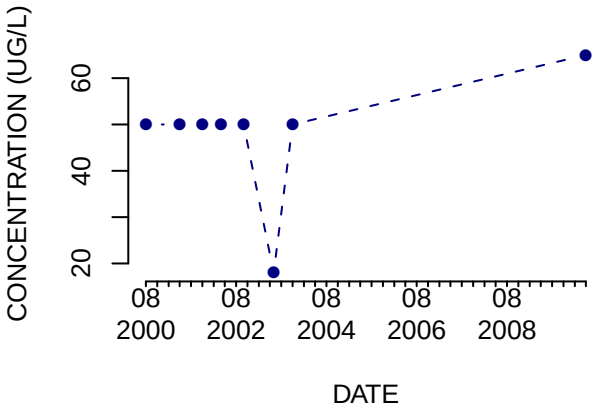
TIME PLOT ALUMINUM 01GI41



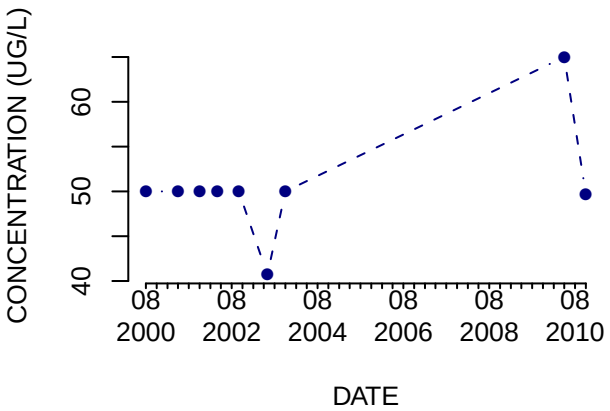
TIME PLOT ALUMINUM 01GI43



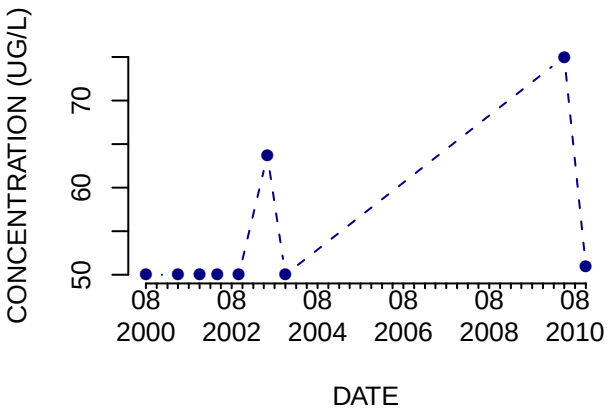
TIME PLOT ALUMINUM 01GI44



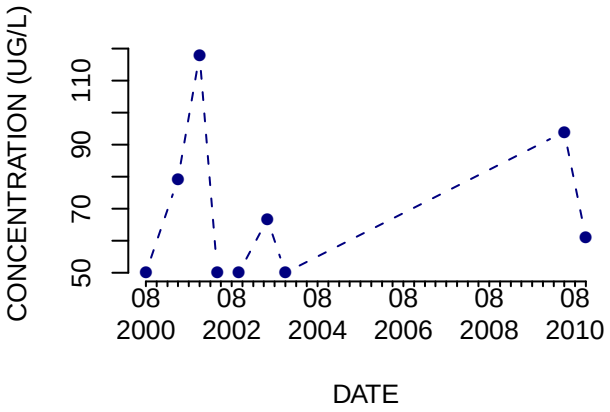
TIME PLOT ALUMINUM 01GI46



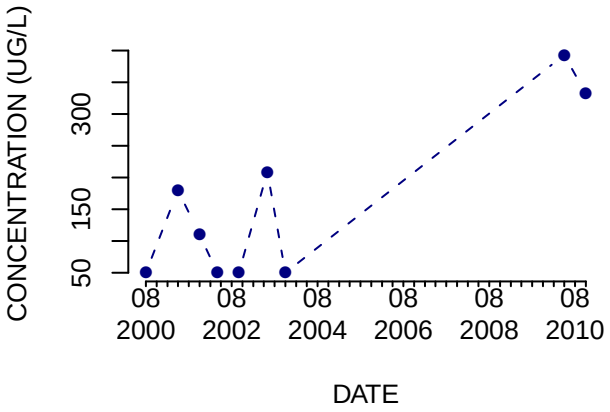
TIME PLOT ALUMINUM 01GI59



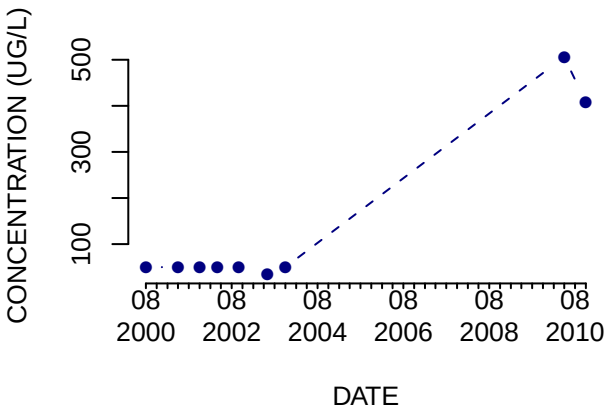
TIME PLOT ALUMINUM 01GI65



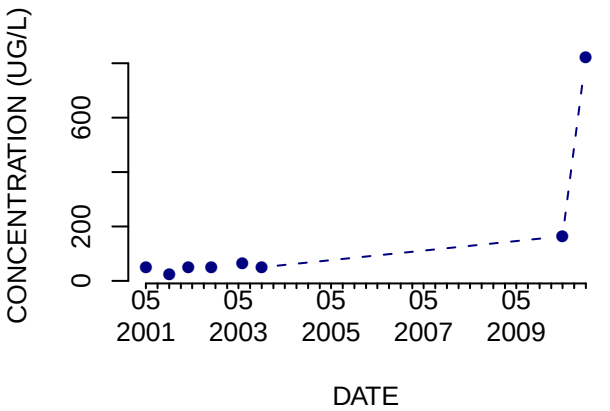
TIME PLOT ALUMINUM 01GS57



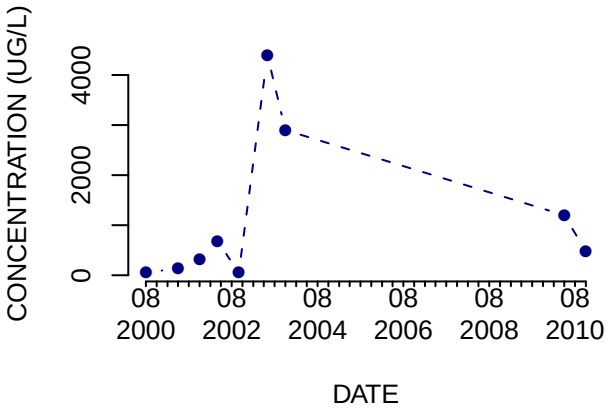
TIME PLOT ALUMINUM 01GS62



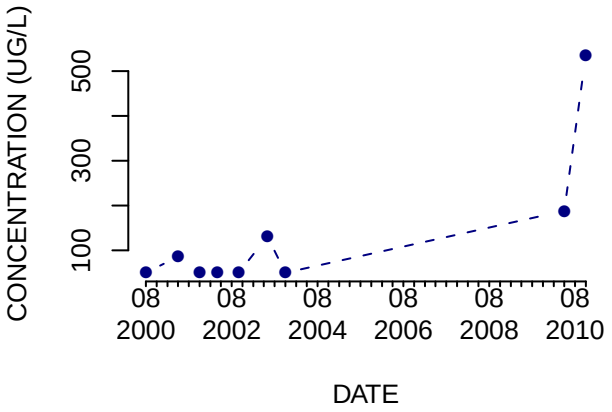
TIME PLOT ALUMINUM 01GS64



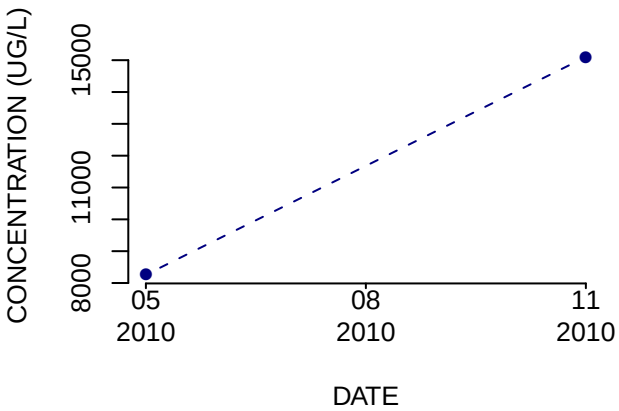
TIME PLOT ALUMINUM 01GS71



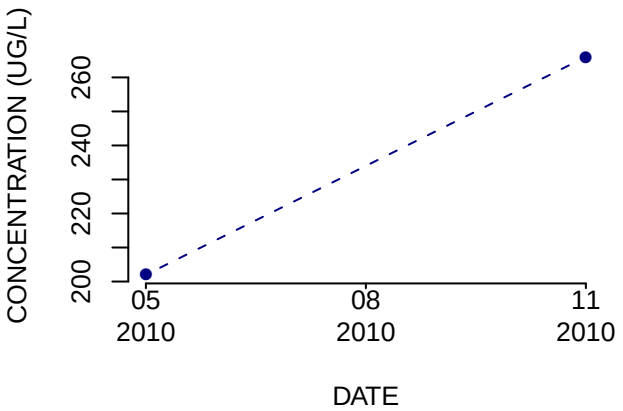
TIME PLOT ALUMINUM 01GS72



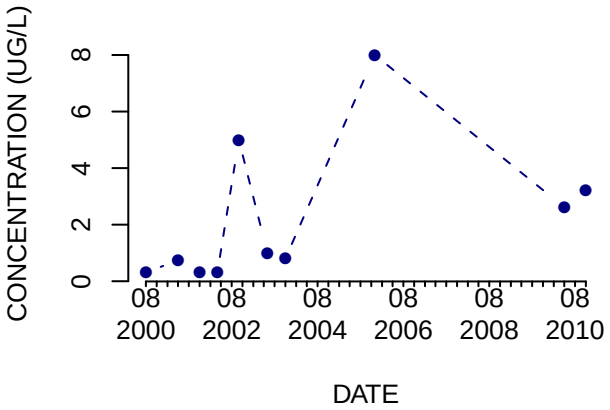
TIME PLOT ALUMINUM 01GS73



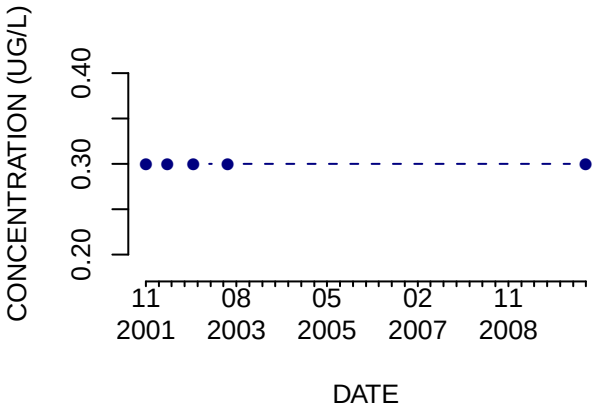
TIME PLOT ALUMINUM 01GS74



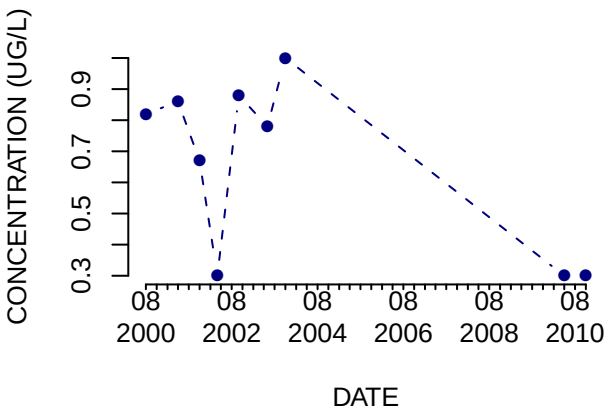
TIME PLOT BENZENE 01GGM33



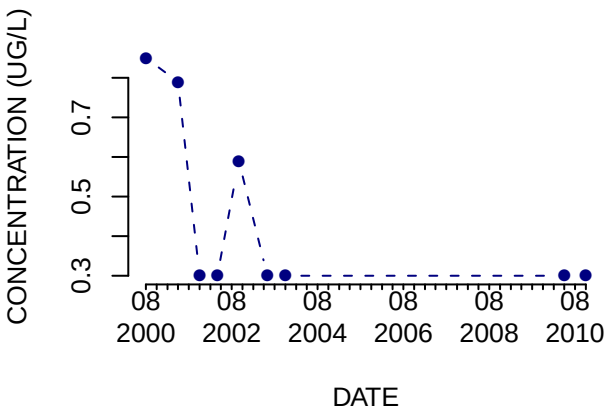
TIME PLOT BENZENE 01GGW1



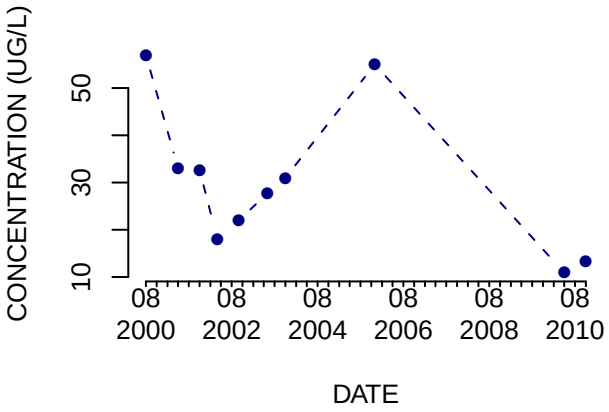
TIME PLOT BENZENE 01GI32



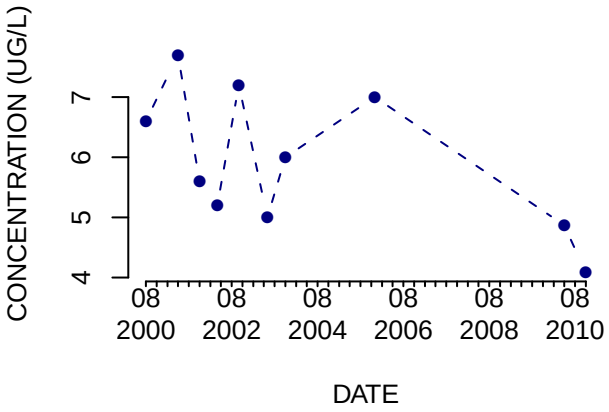
TIME PLOT BENZENE 01GI36



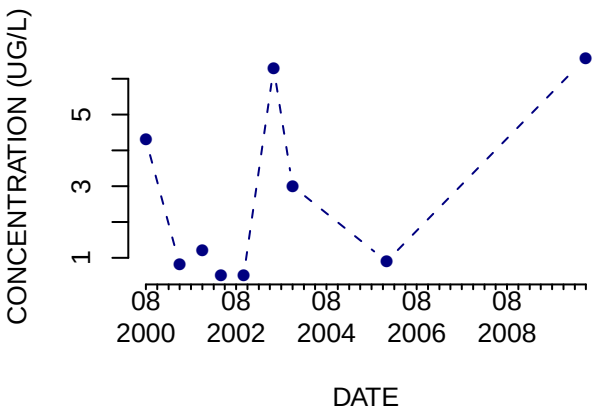
TIME PLOT BENZENE 01GI41



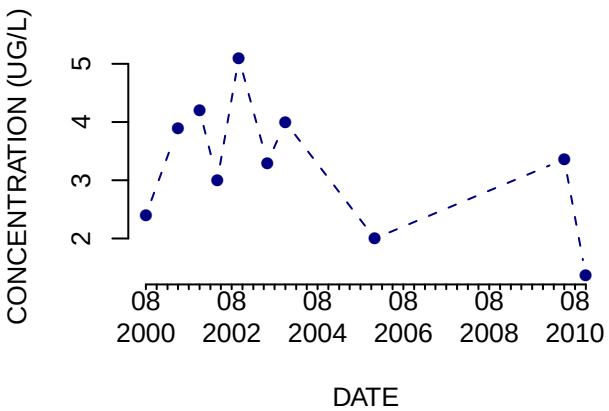
TIME PLOT BENZENE 01GI43

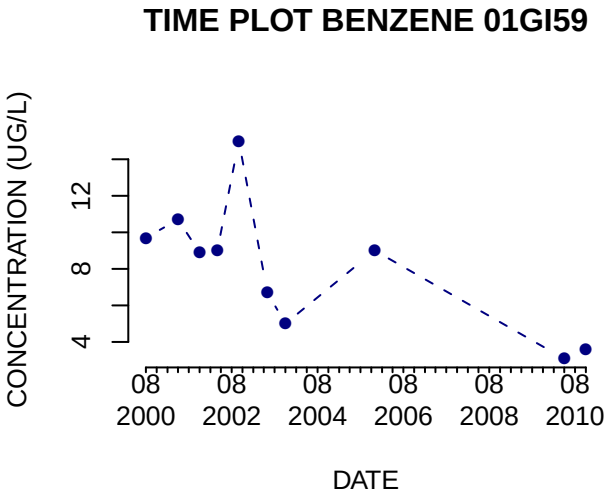


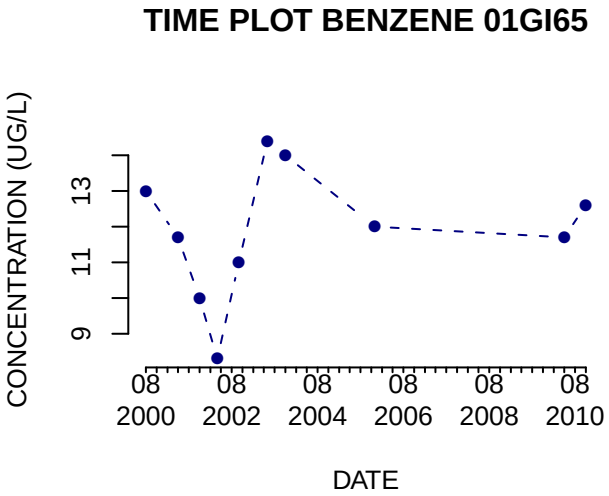
TIME PLOT BENZENE 01GI44



TIME PLOT BENZENE 01GI46




TIME PLOT BENZENE 01GI59
CONCENTRATION (UG/L)
4
8
12
08
2000
08
2002
08
2004
08
2006
08
2008
08
2010
DATE


TIME PLOT BENZENE 01GI65
CONCENTRATION (UG/L)
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11
13
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2000
08
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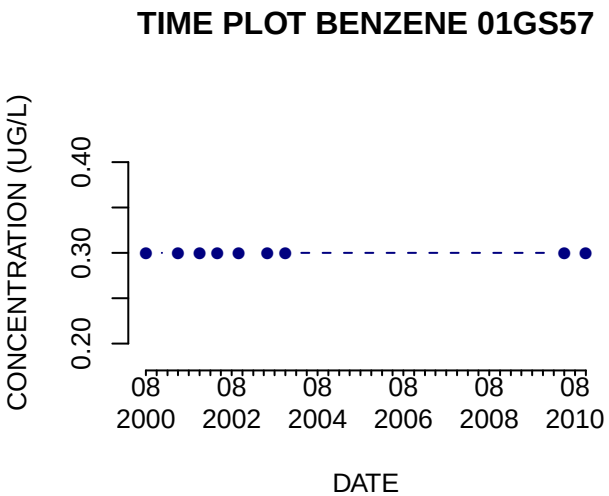
08
2004
08
2006
08
2008
08
2010
DATE


TIME PLOT BENZENE 01GS57
CONCENTRATION (UG/L)
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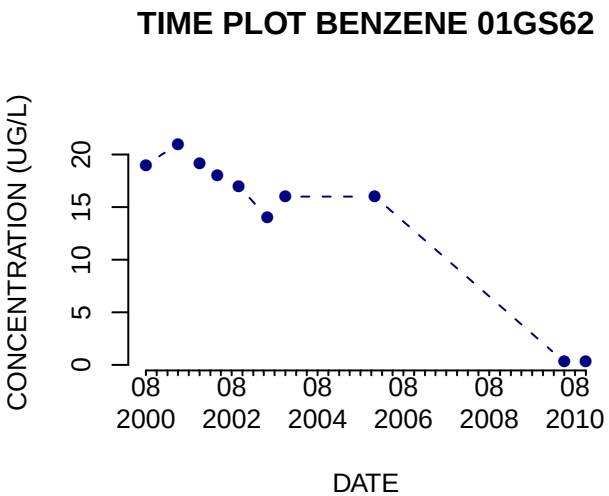
0.30
0.40
08
2000
08
2002
08
2004
08
2006
08
2008
08
2010
DATE


TIME PLOT BENZENE 01GS62
CONCENTRATION (UG/L)
0
5
10
15
20
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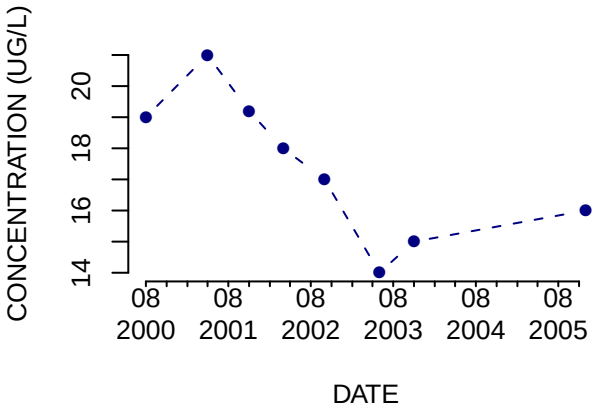
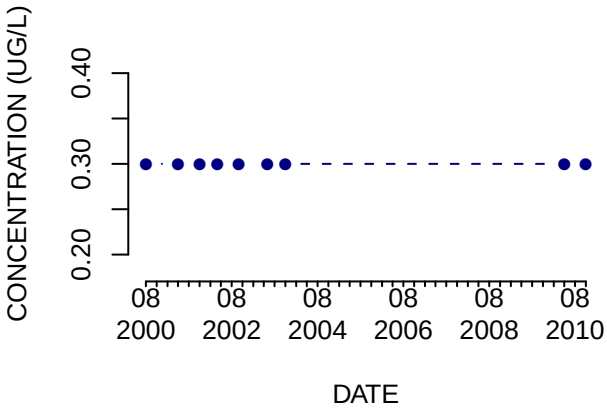
2000
08
2002
08
2004
08
2006
08
2008
08
2010
DATE

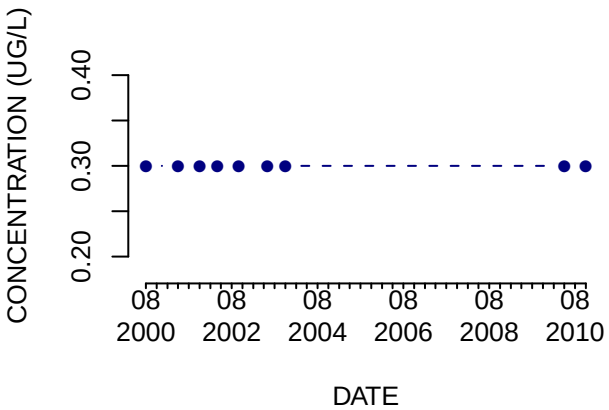
TIME PLOT BENZENE 01GS64



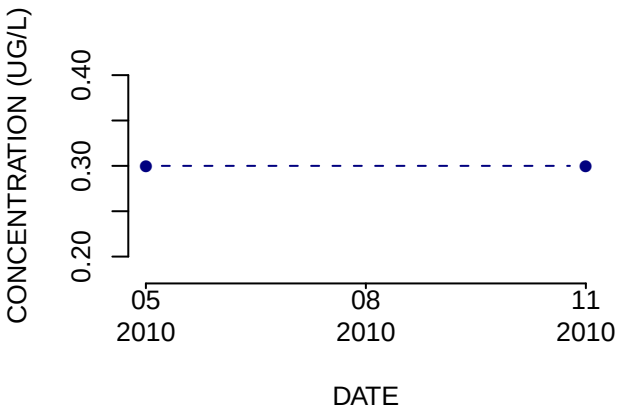
TIME PLOT BENZENE 01GS71



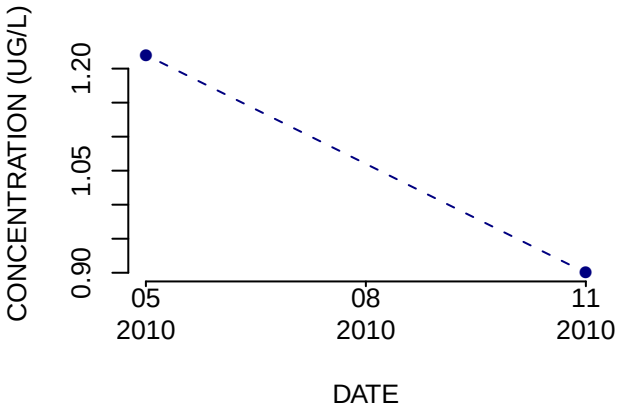
TIME PLOT BENZENE 01GS72



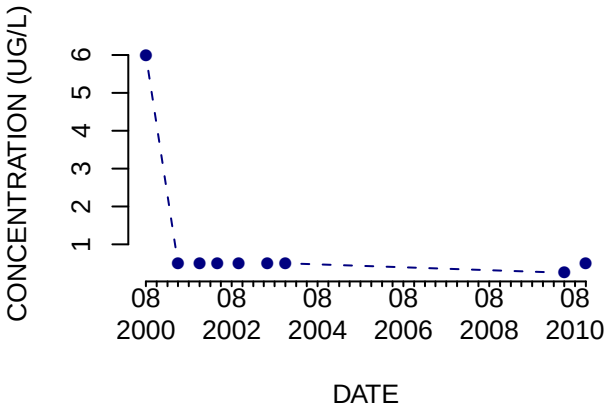
TIME PLOT BENZENE 01GS73



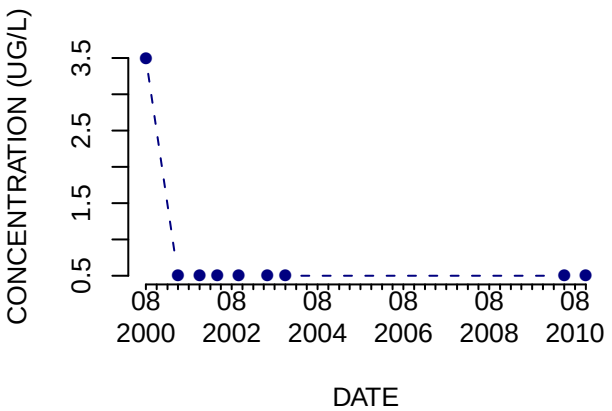
TIME PLOT BENZENE 01GS74



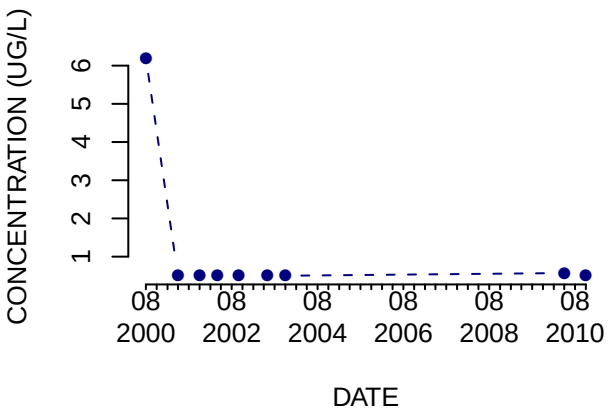
TIME PLOT CADMIUM 01GGM33



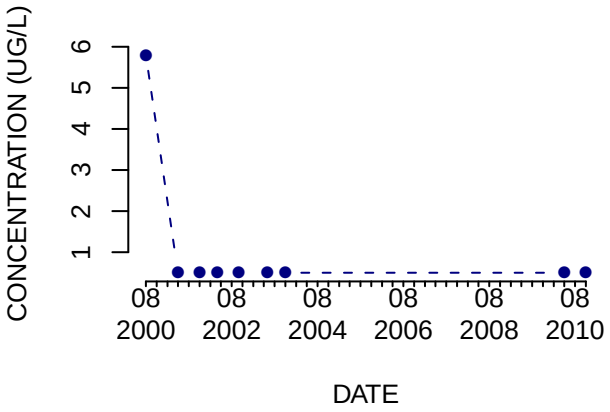
TIME PLOT CADMIUM 01GI32



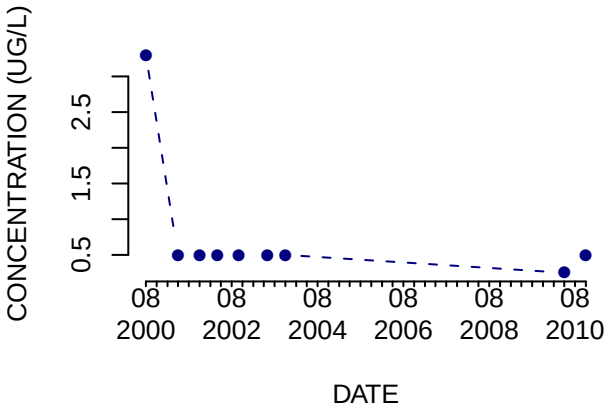
TIME PLOT CADMIUM 01GI36



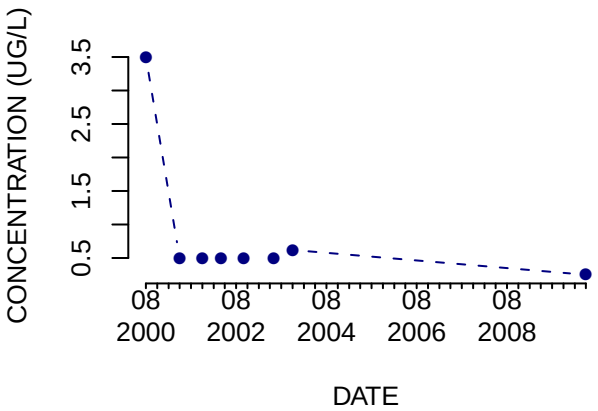
TIME PLOT CADMIUM 01GI41



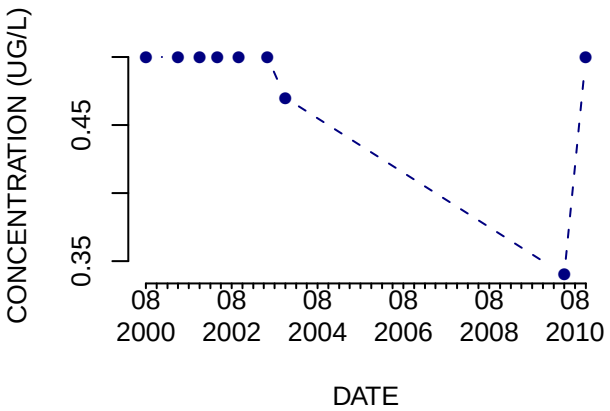
TIME PLOT CADMIUM 01GI43



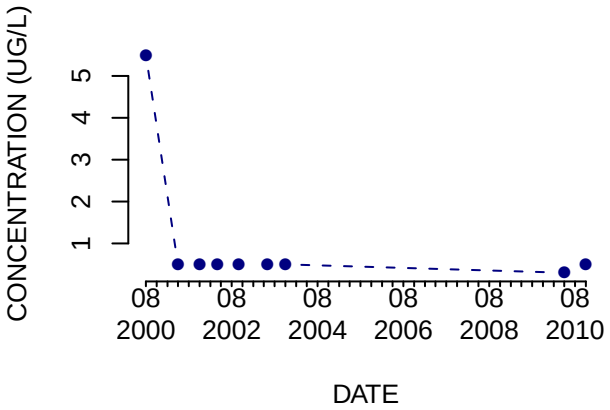
TIME PLOT CADMIUM 01GI44



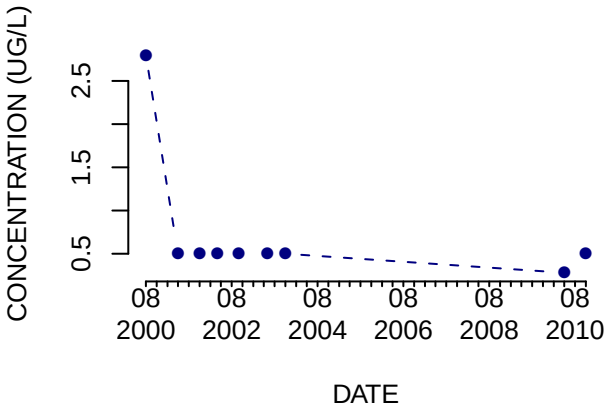
TIME PLOT CADMIUM 01GI46



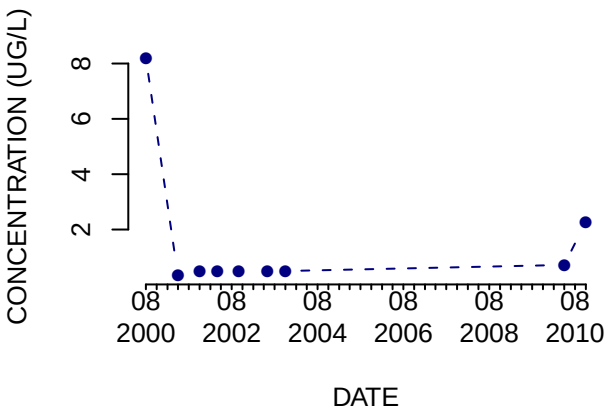
TIME PLOT CADMIUM 01GI59



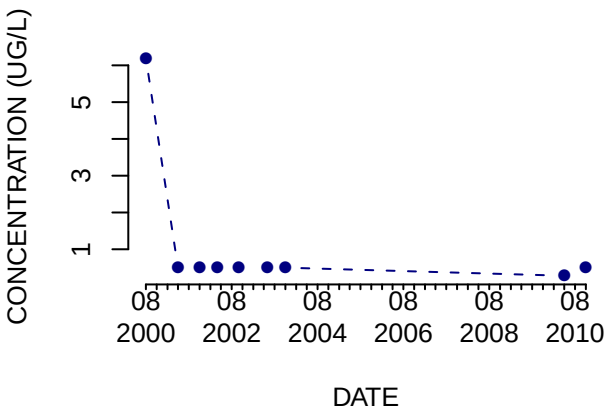
TIME PLOT CADMIUM 01GI65



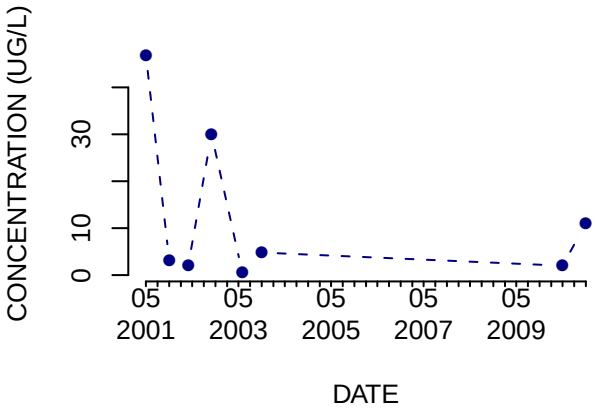
TIME PLOT CADMIUM 01GS57



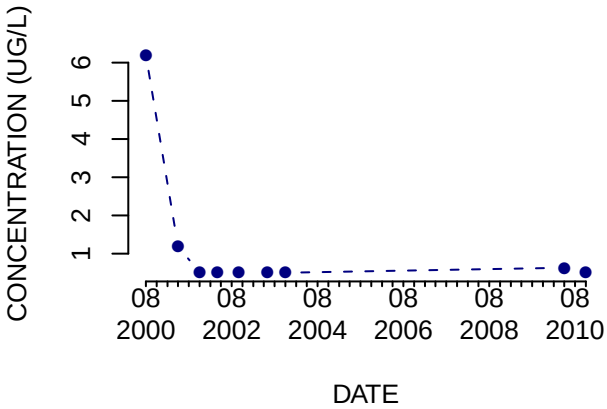
TIME PLOT CADMIUM 01GS62



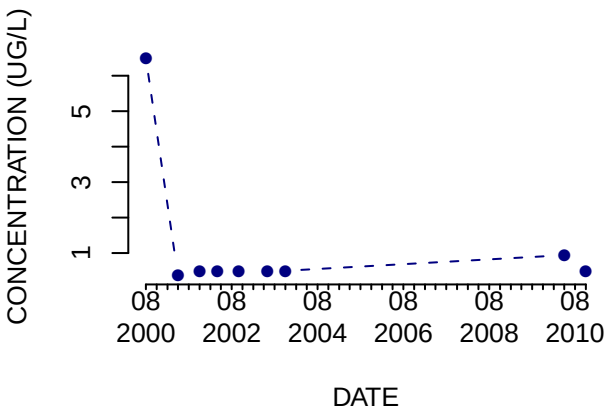
TIME PLOT CADMIUM 01GS64



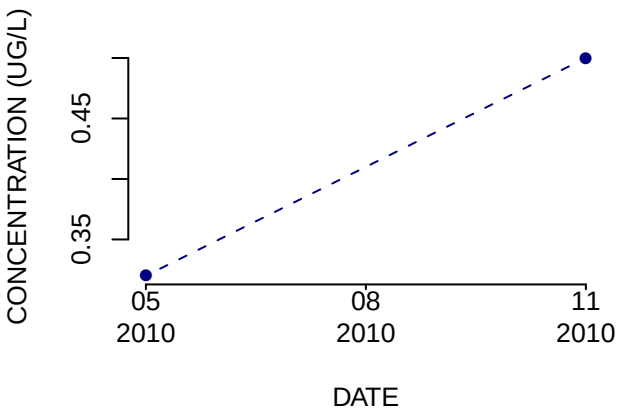
TIME PLOT CADMIUM 01GS71



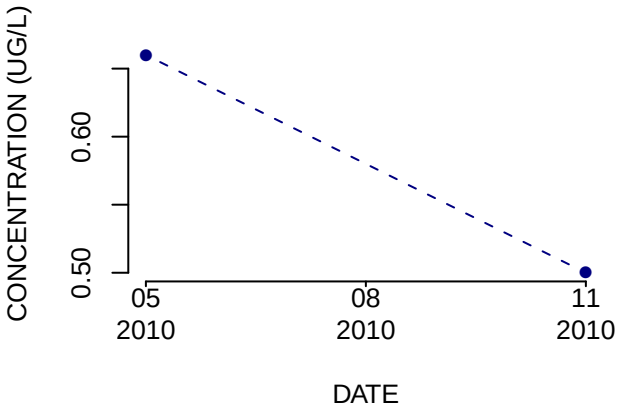
TIME PLOT CADMIUM 01GS72



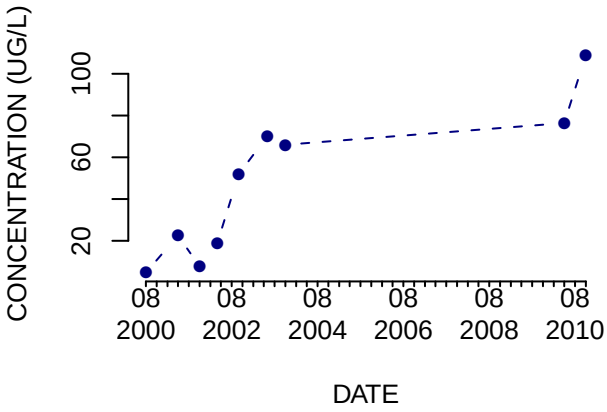
TIME PLOT CADMIUM 01GS73



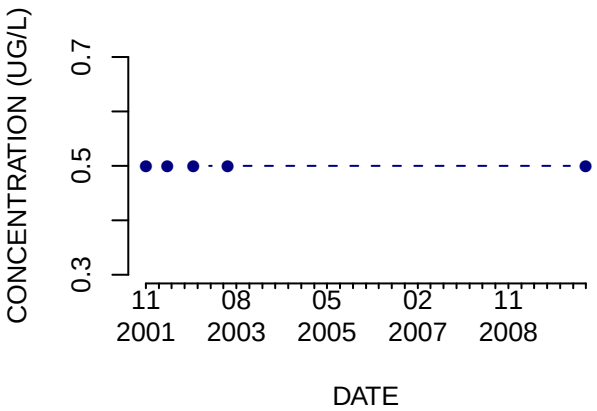
TIME PLOT CADMIUM 01GS74



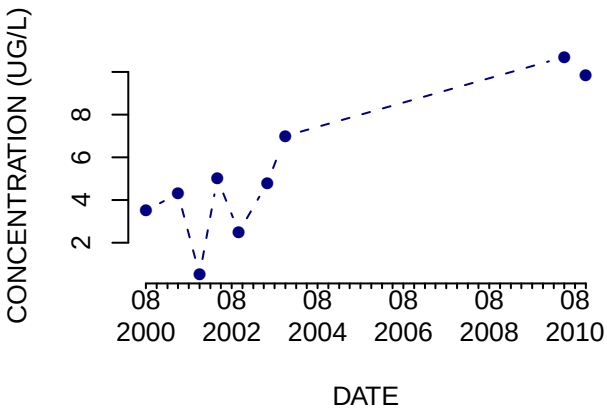
TIME PLOT CHLOROBENZENE 01GGM33



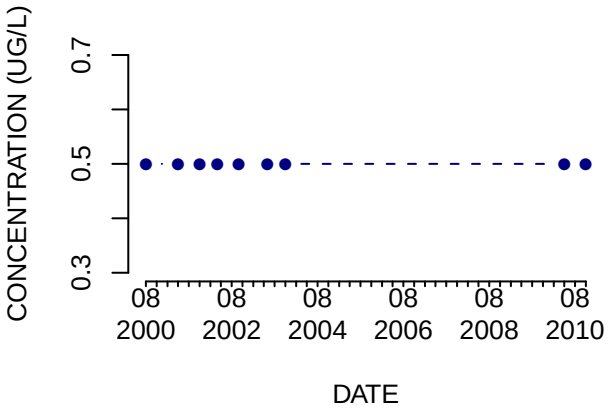
TIME PLOT CHLOROBENZENE 01GGW1



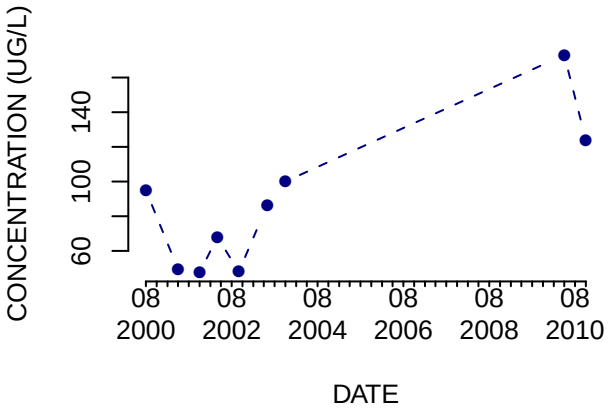
TIME PLOT CHLOROBENZENE 01GI32



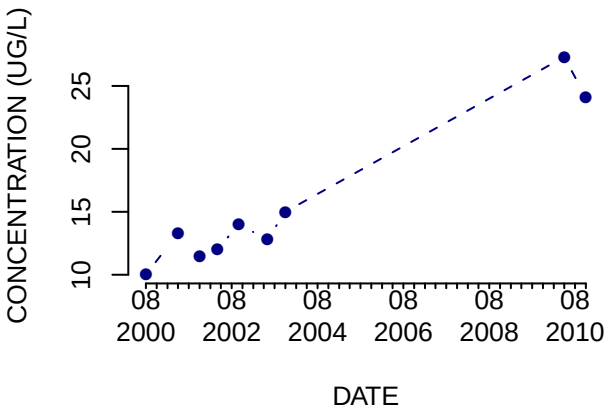
TIME PLOT CHLOROBENZENE 01GI36



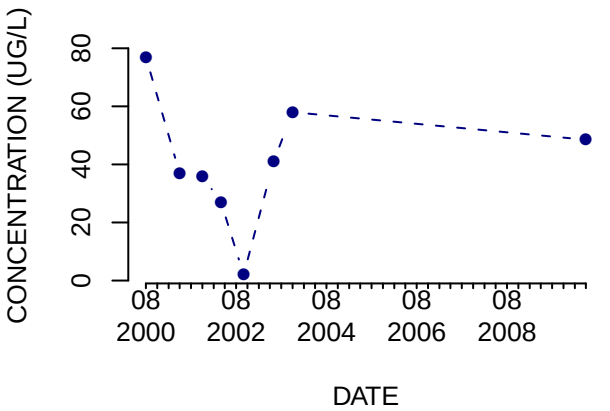
TIME PLOT CHLOROBENZENE 01GI41



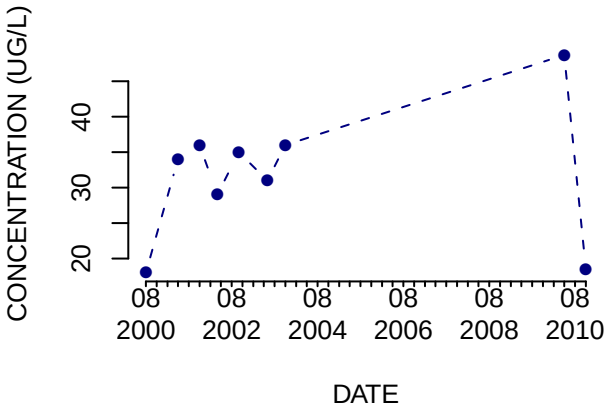
TIME PLOT CHLOROBENZENE 01GI43



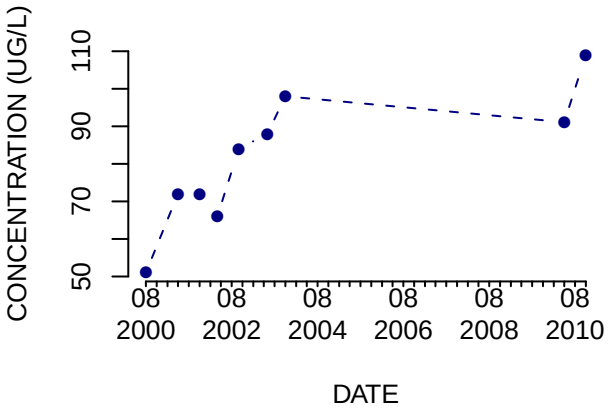
TIME PLOT CHLOROBENZENE 01GI44



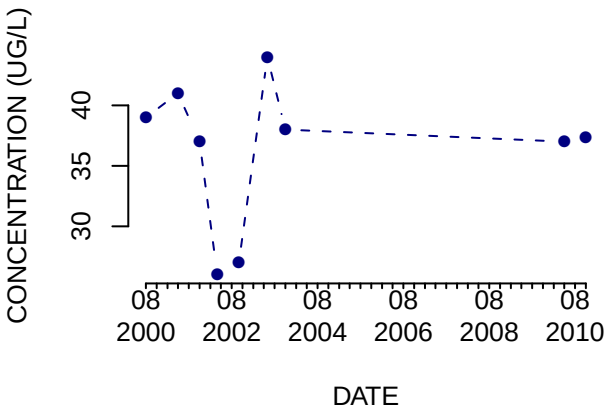
TIME PLOT CHLOROBENZENE 01GI46



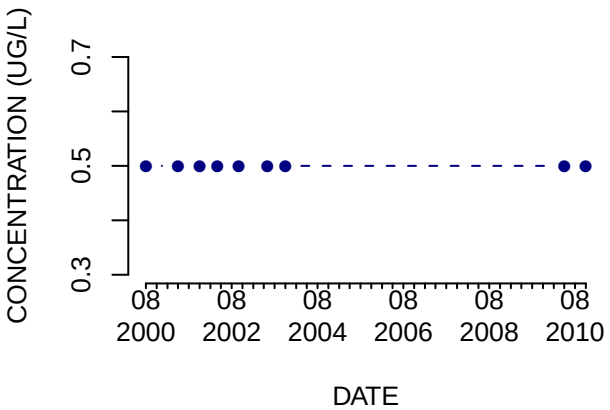
TIME PLOT CHLOROBENZENE 01GI59



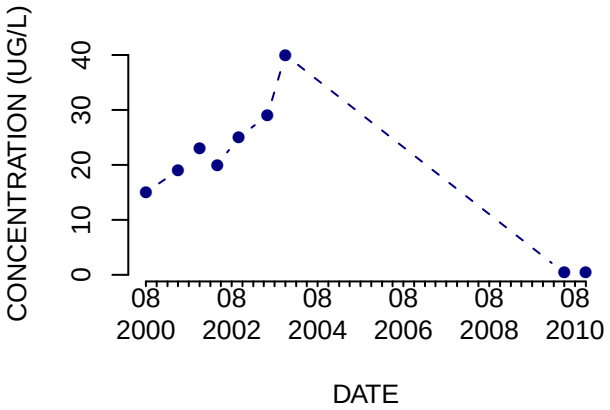
TIME PLOT CHLOROBENZENE 01GI65



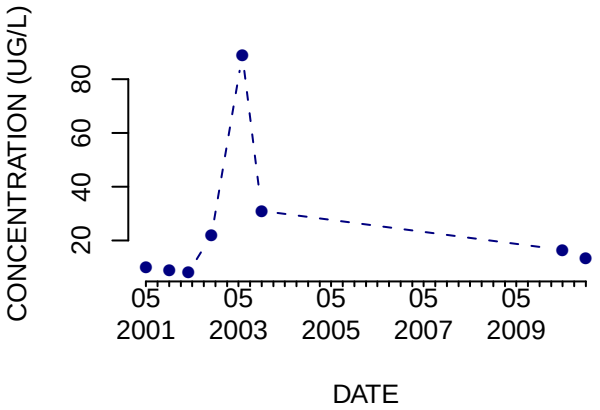
TIME PLOT CHLOROBENZENE 01GS57



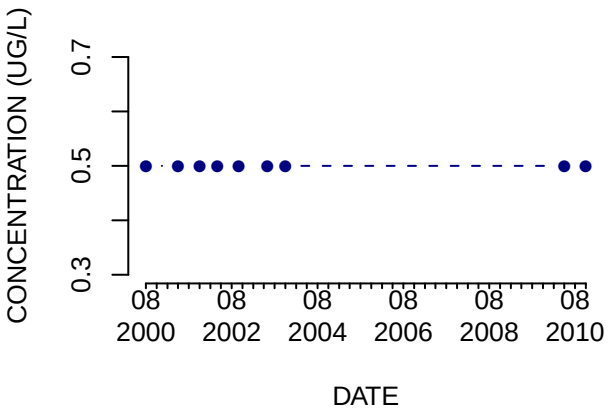
TIME PLOT CHLOROBENZENE 01GS62



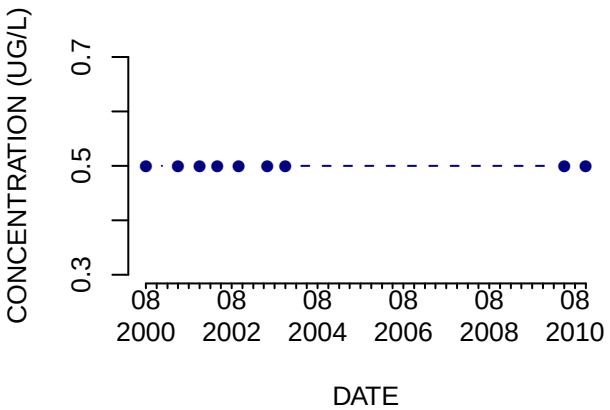
TIME PLOT CHLOROBENZENE 01GS64



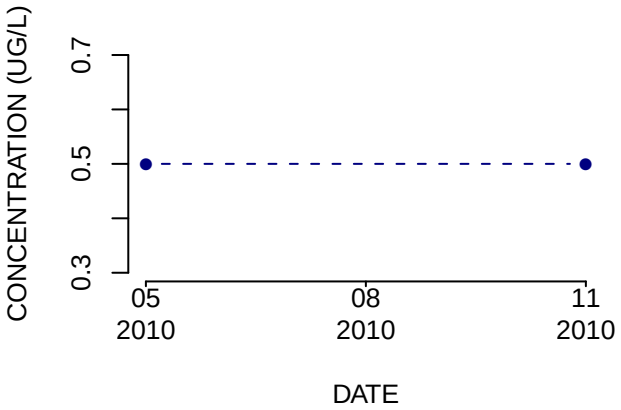
TIME PLOT CHLOROBENZENE 01GS71



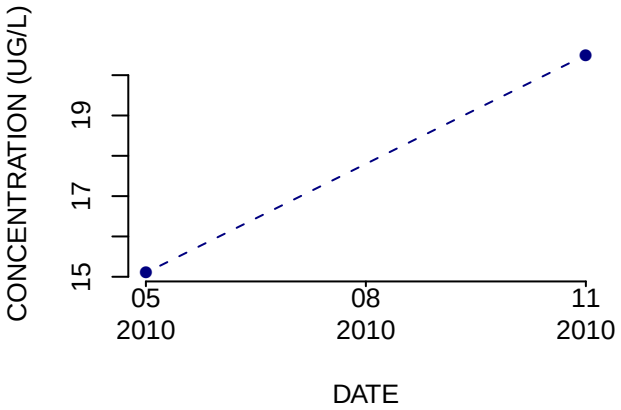
TIME PLOT CHLOROBENZENE 01GS72



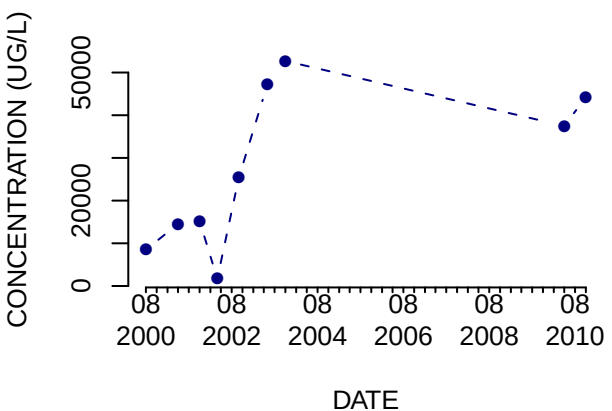
TIME PLOT CHLOROBENZENE 01GS73



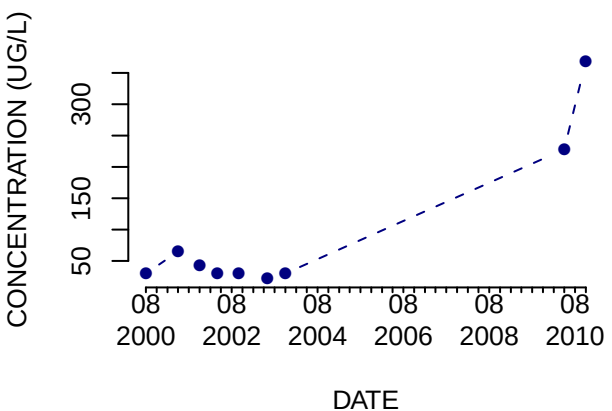
TIME PLOT CHLOROBENZENE 01GS74



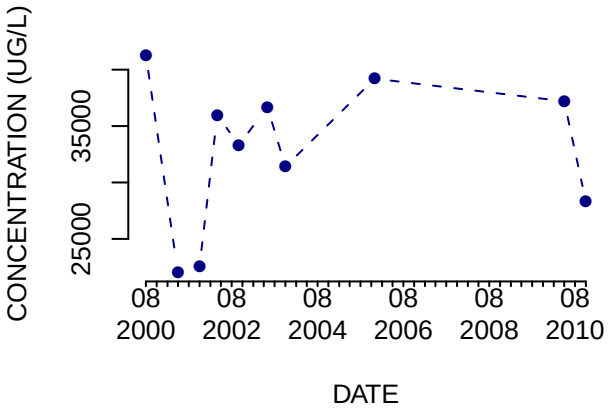
TIME PLOT IRON 01GGM33



TIME PLOT IRON 01GGW1



TIME PLOT IRON 01GI32



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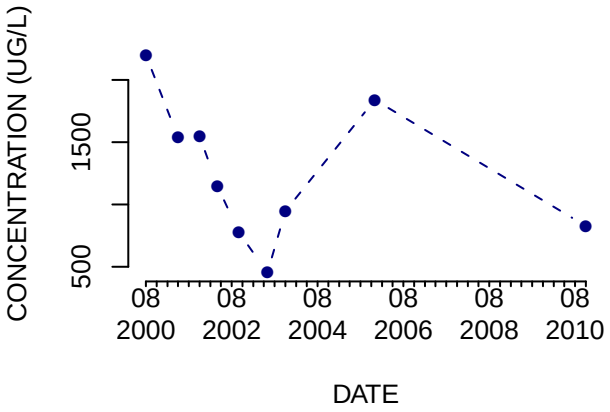

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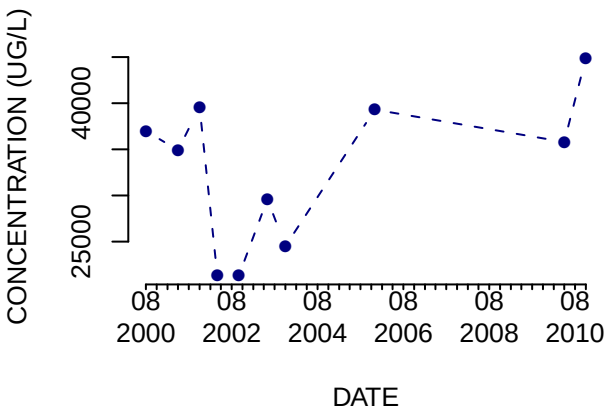

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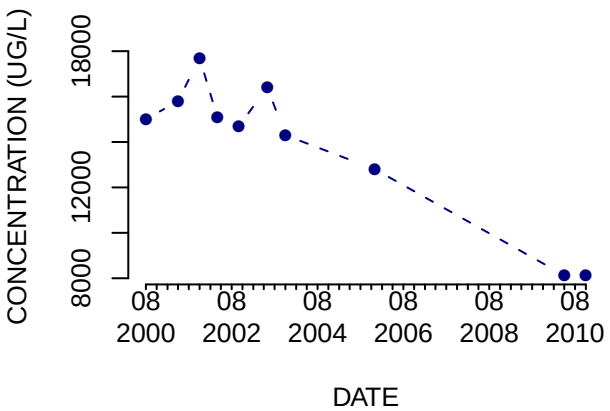

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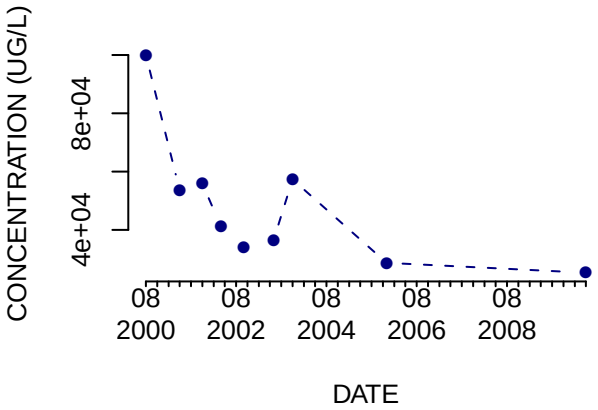

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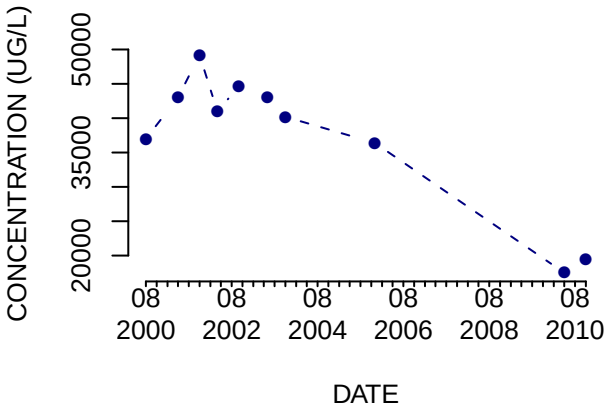

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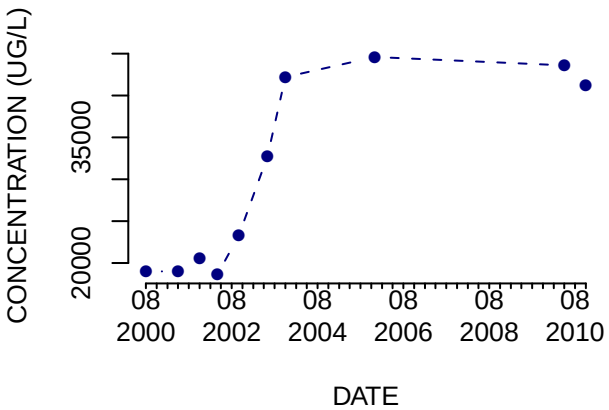

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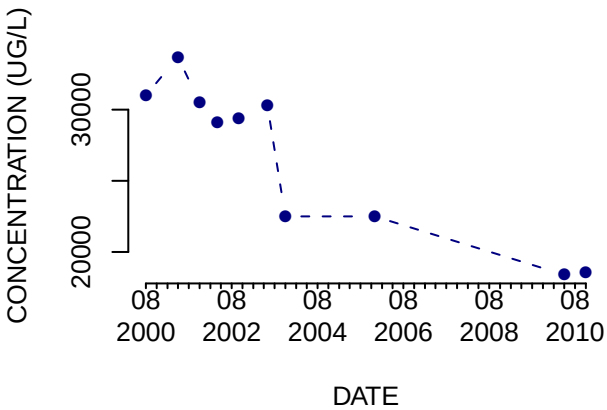

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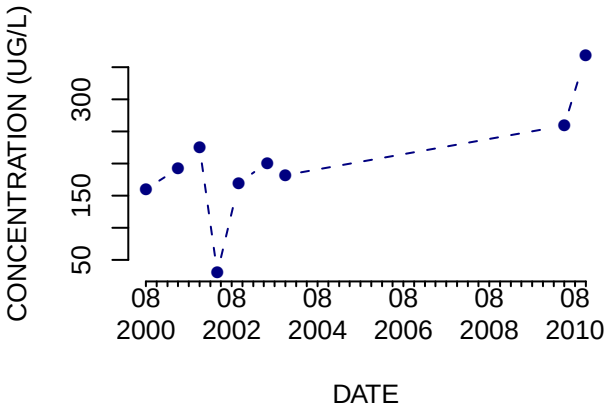

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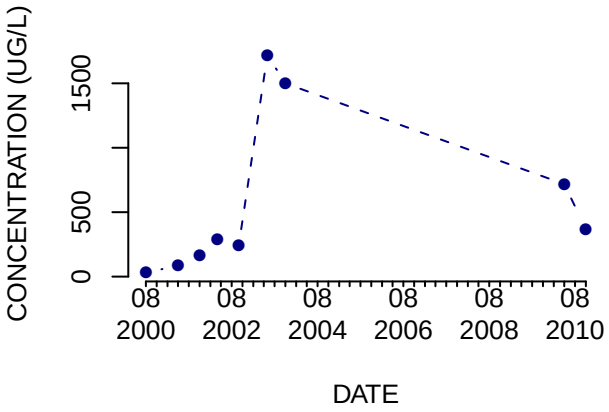

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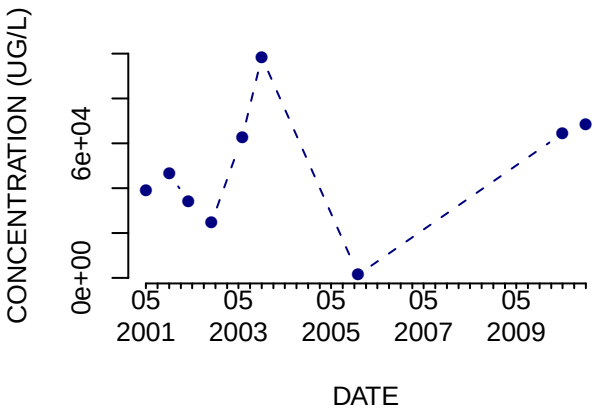

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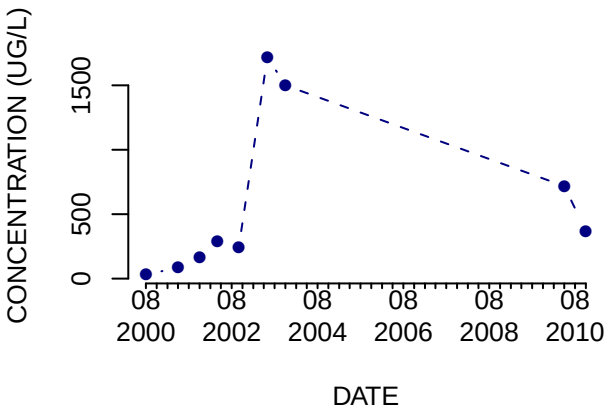

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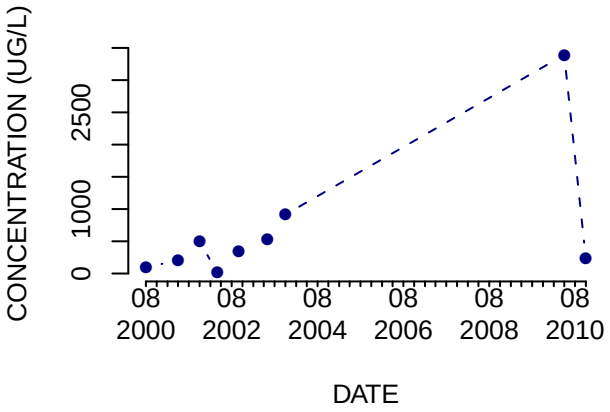

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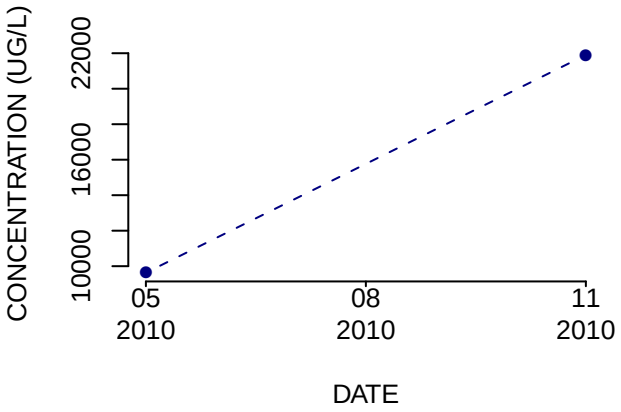

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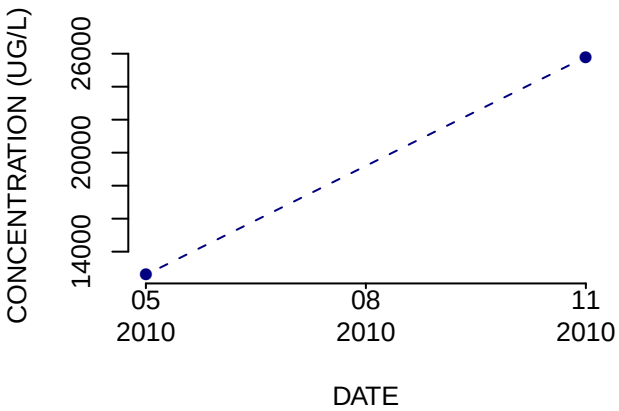

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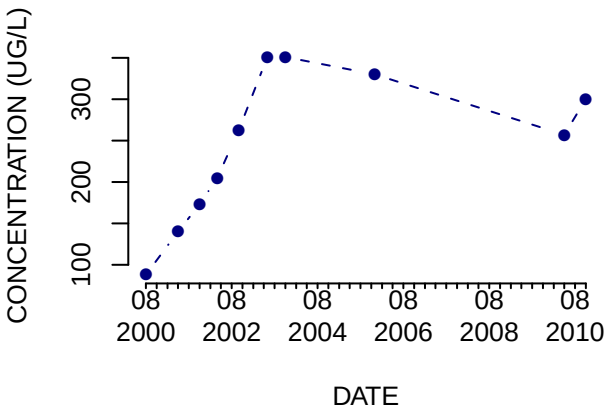

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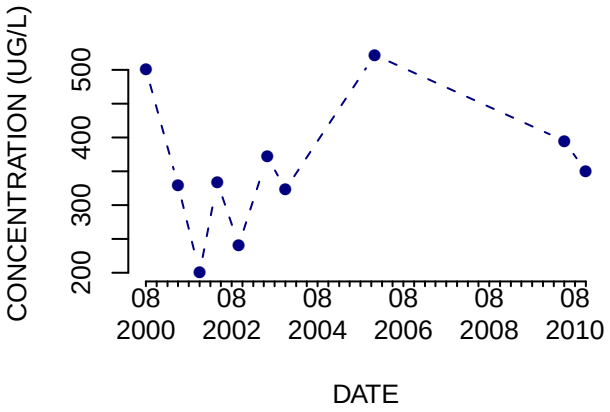

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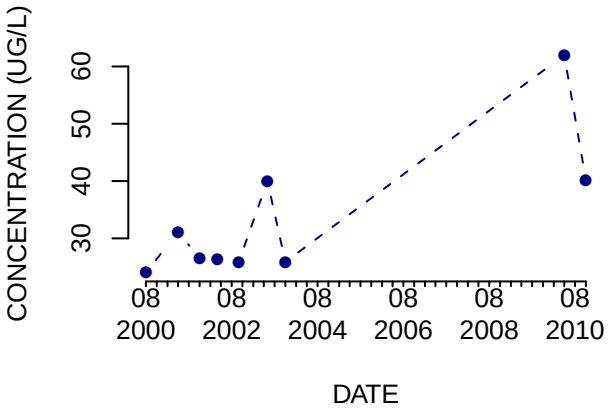

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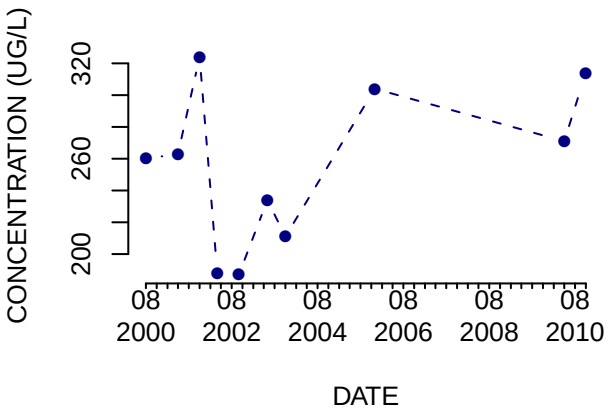

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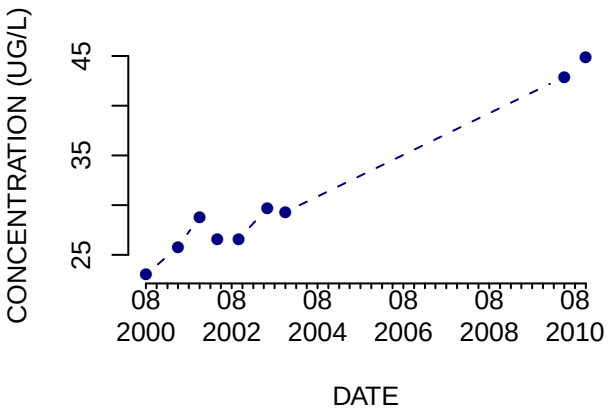

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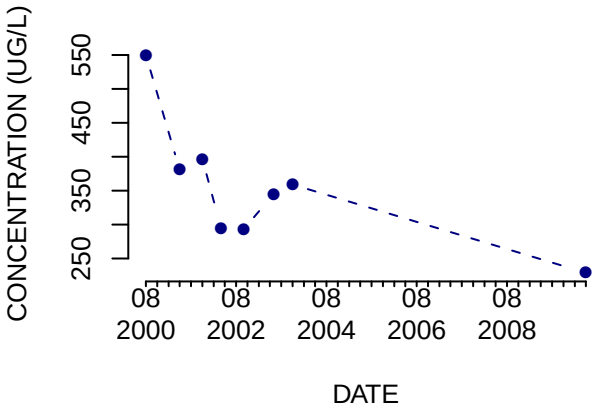

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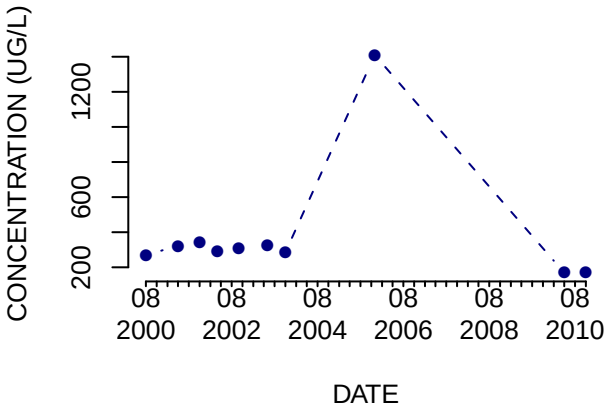

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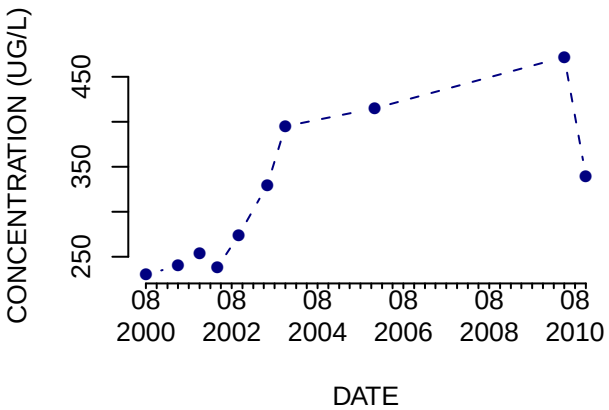

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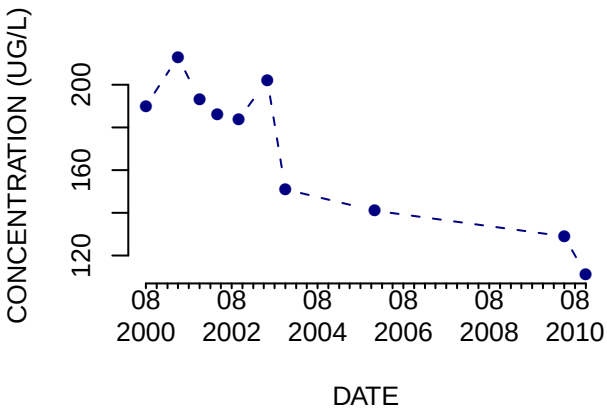

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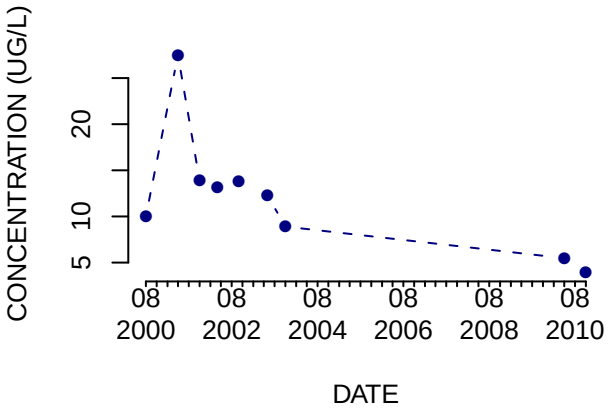

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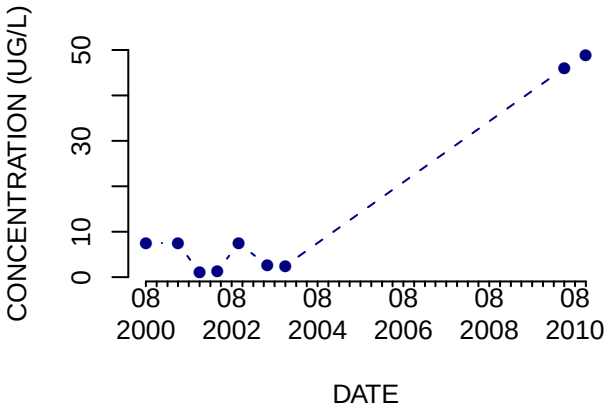

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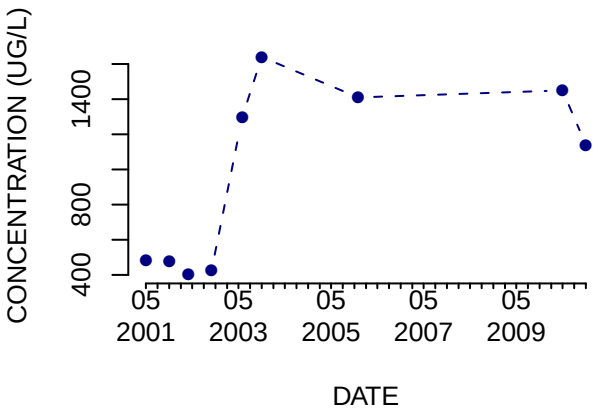

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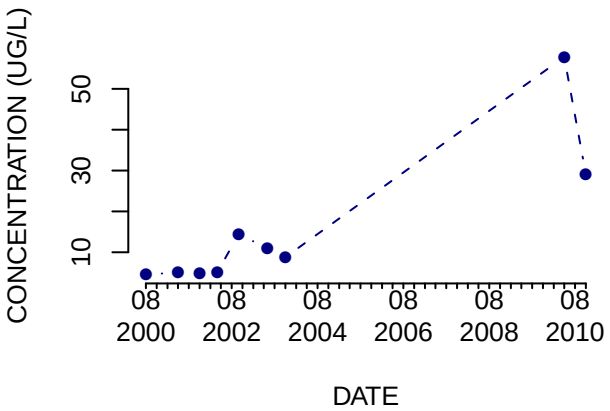

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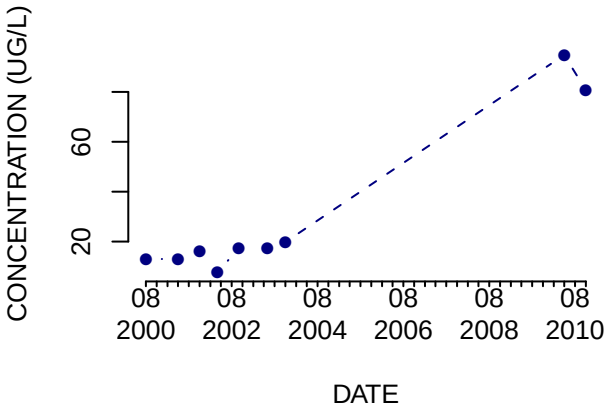

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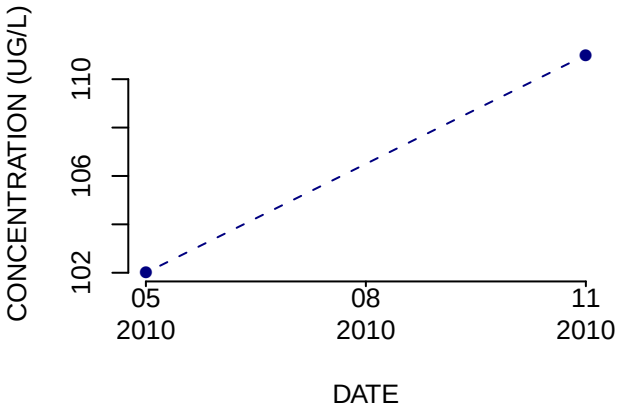

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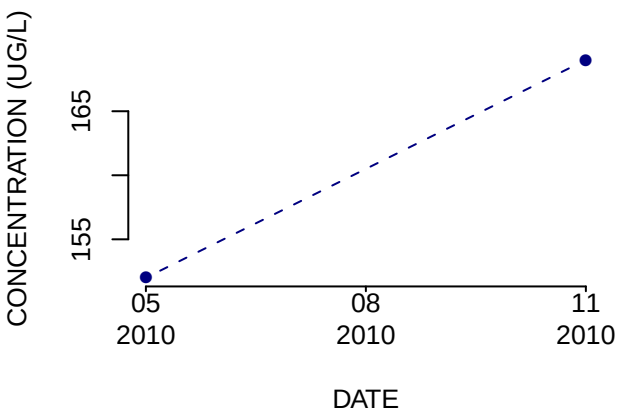

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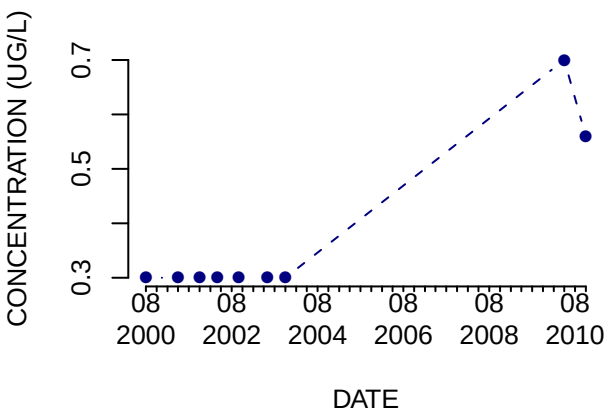

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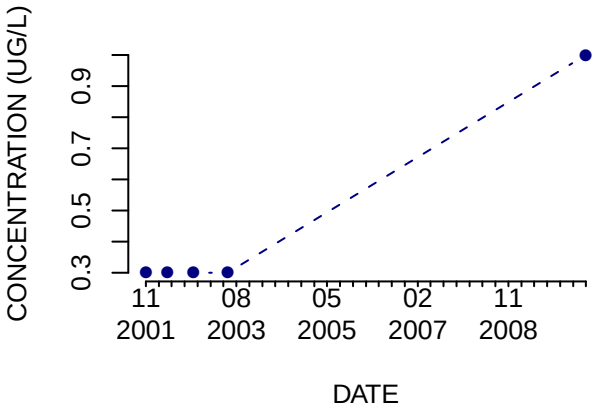

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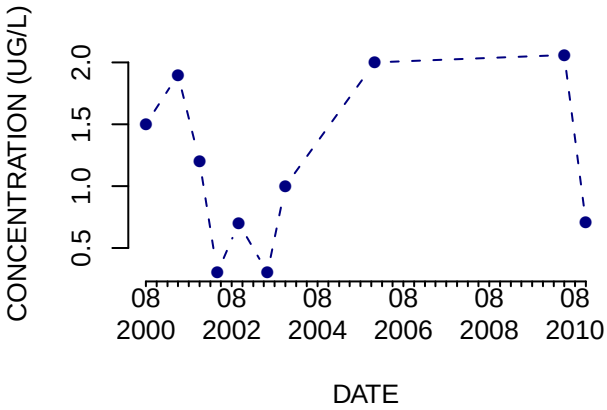

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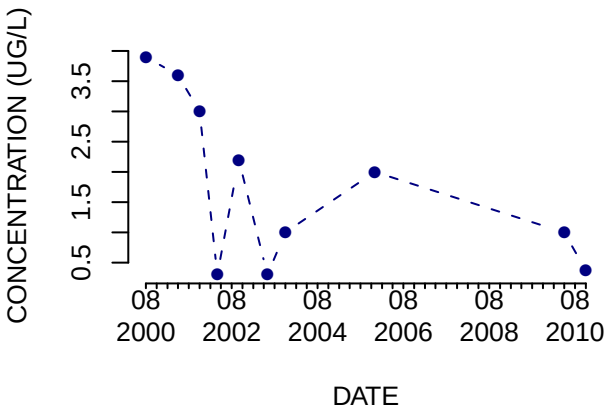

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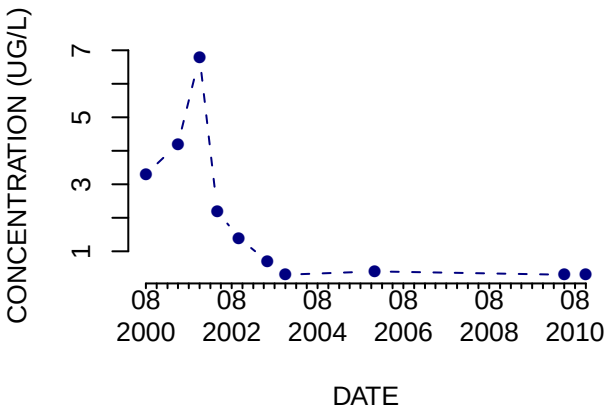

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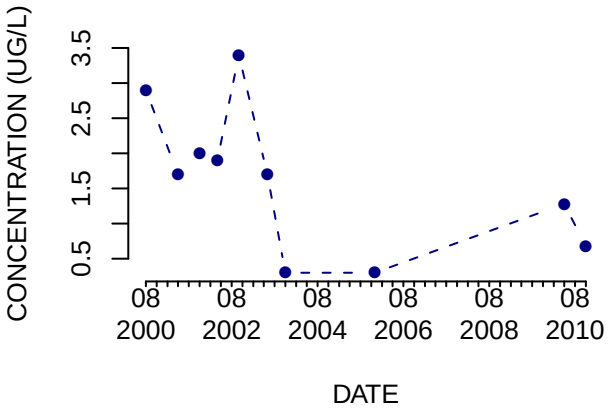

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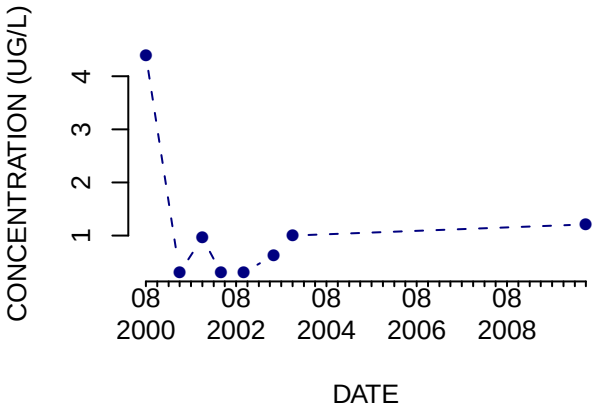

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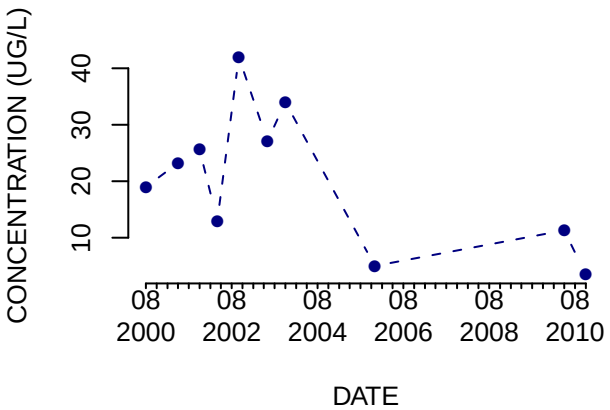

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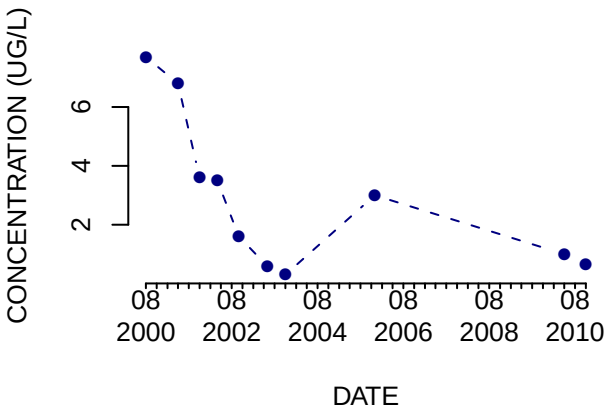

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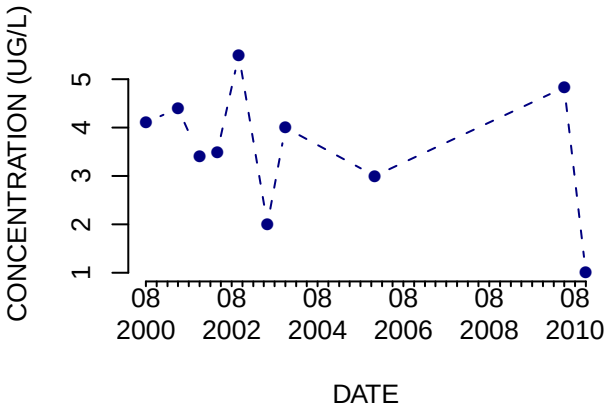

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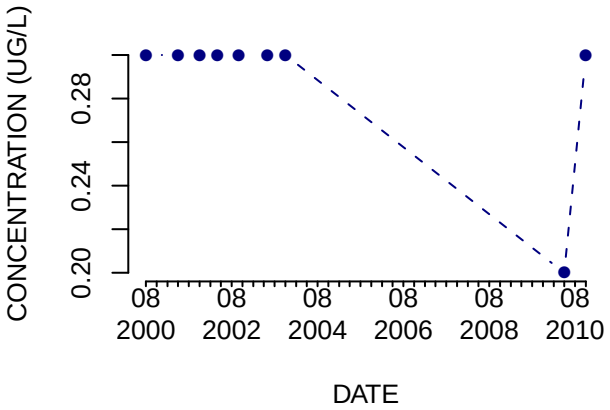

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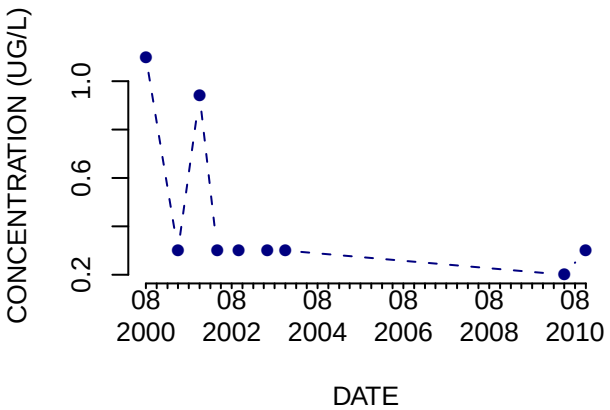

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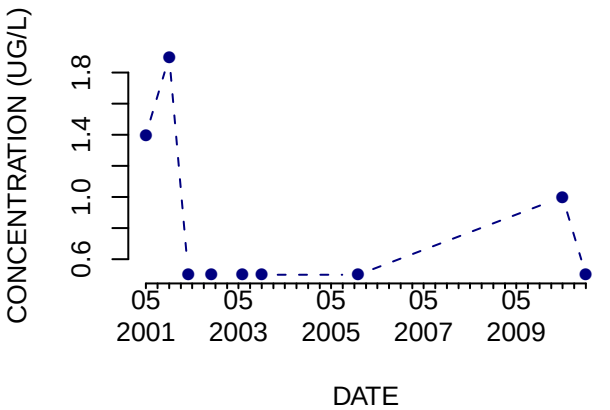

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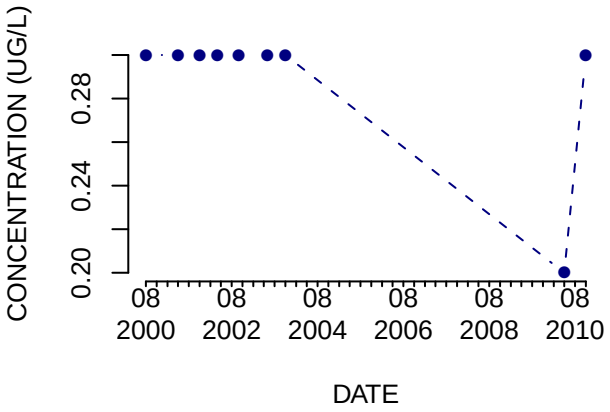

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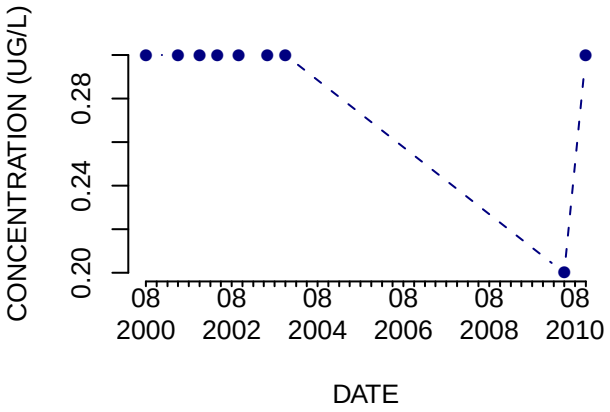

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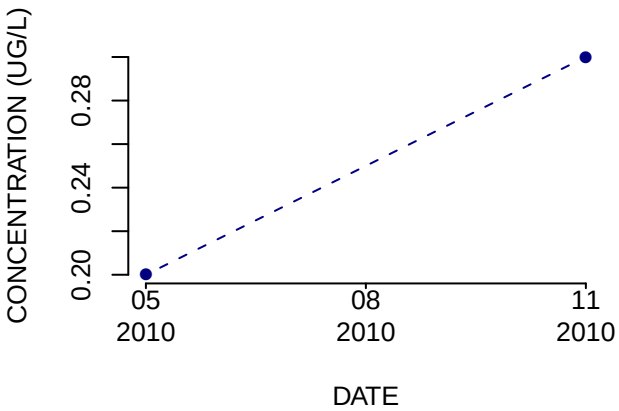

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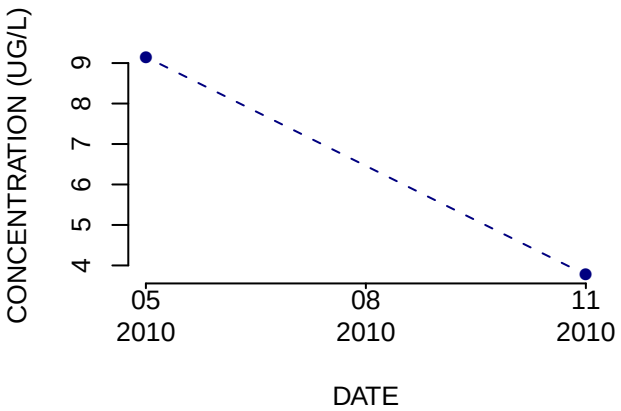

APPENDIX D

ANNUAL LUC REPORT LETTERS AND INSPECTION CHECKLIST

(provided on the enclosed CD)

DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAS PENSACOLA
190 RADFORD BLVD
PENSACOLA, FLORIDA 32508-5217

IN REPLY REFER TO

5090
Ser N45/110
8 February 2011

Mrs. Julie L. Corkran, Ph.D.
Senior Remedial Project Manager
Federal Facilities Branch, Superfund Division
U.S. Region 4
Sam Nunn Atlanta Federal Center
61 Forsyth Street, SW
Atlanta, GA 30303

Re: 2010 ANNUAL LAND USE CONTROL (LUC) REPORT – NAVAL AIR STATION, PENSACOLA, FLORIDA

Dear Mrs. Corkran:

Naval Air Station Pensacola hereby certifies that the institutional and land use controls for operable units 1, 2, 4, 11, 13 and 18 as outlined in the Land Use Control Memorandum of Agreement of September 1999 are still in effect and should remain in place.

If you have any questions, please contact Mr. Greg Campbell, Naval Air Station Installation Restoration Program manager, at 850-452-3131 (ext. 3007).

Sincerely,

William H. Taylor Jr.

WILLIAM H. TAYLOR, JR.
Environmental Division Director
Public Works Department
By direction of
the Commanding Officer

DEPARTMENT OF THE NAVY
COMMANDING OFFICER
NAS PENSACOLA
190 RADFORD BLVD
PENSACOLA, FLORIDA 32508-5217

IN REPLY REFER TO

5090
Ser N45/109
8 February 2011

Mr. David Grabka
Florida Department of Environmental Protection
Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Fl 32399

Re: 2010 ANNUAL LAND USE CONTROL (LUC) REPORT - NAVAL AIR STATION, PENSACOLA, FLORIDA

Dear Mr. Grabka:

Naval Air Station Pensacola hereby certifies that the institutional and land use controls for operable units 1, 2, 4, 11, 13 and 18 as outlined in the Land Use Control Memorandum of Agreement of September 1999 are still in effect and should remain in place.

If you have any questions, please contact Mr. Greg Campbell, Naval Air Station Installation Restoration Program manager, at 850-452-3131 (ext. 3007).

Sincerely,

William H. Taylor, Jr.

WILLIAM H. TAYLOR, JR.
Environmental Division Director
Public Works Department
By directions of
the Commanding Officer

Site 1 (OU 1) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 1 property? ALL
If evaluating only a portion of the site, attach a figure identifying the portion being evaluated.

This evaluation covers the period from **1 January** 2011 **through 31 December** 2011.
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

	In Compliance	Non-Compliance	See Comment
1) Restrict intrusive activities within the landfill boundary without prior approval from NAS Pensacola Environmental Office	☑	☐	☐
2) Restrict use of groundwater from the surficial zone of the Sand-and-Gravel Aquifer within 300 feet of the site	☑	☐	☐

I, the undersigned, herby certify that I am an authorized representative of the above named property owner and that the above described Land Use Controls have been complied with for the period noted. Alternately, any known deficiencies and owner's completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiency(ies).

Signature – Greg Campbell (Navy) — Date: 12-12-11

Signature – Patty Whittemore (Navy) — Date: 12/12/11

Signature — Date: 12/12/11

Signature — Date

Site 38 (OU 11) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 11 property? all
If evaluating only a portion of the site, attach a figure identifying the portion being evaluated.

This evaluation covers the period from **1 January** 2010 **through 31 December** 2010
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

	In Compliance	Non-Compliance	See Comment
1) Prevent residential use at Site 38	☒	☐	☐
2) Restrict future uses of the surficial aquifer until the levels of contamination in the groundwater meet the State of Florida's Groundwater Cleanup Target Levels (GCTLs) in 62-777.	☒	☐	☐

I, the undersigned, herby certify that I am an authorized representative of the above named property owner and that the above described Land Use Controls have been complied with for the period noted. Alternately, any known deficiencies and owner's completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiency(ies).

Signature – Greg Campbell (Navy) — Date: 7/1/10

Signature – Patty Whittemore (Navy) — Date: 7/1/10

Signature — Date

Signature — Date

Sites 8 and 24 (OU 13) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 13 property? all
If evaluating only a portion of the site, attach a figure identifying the portion being evaluated.

This evaluation covers the period from 1 **January** 2010 **through 31 December** 2010
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

	In Compliance	Non-Compliance	See Comment
1) No groundwater being used for any purpose (unless previously approved by USEPA, FDEP, and the Navy).	☒	☐	☐
2) No tampering or damage to groundwater monitoring wells or remediation system(s).	☒	☐	☐
3) Any violations of these LUCs were reported within 10 days of discovery and an explanation provided of those actions taken or to be taken was provided within 10 days of notification.	☒	☐	☐

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Signature – Greg Campbell (Navy) — Date: 7/1/10

Signature – Patty Whittemore (Navy) — Date: 7/1/10

Signature — Date

Signature — Date

Mail completed form(s) to:

U.S. Environmental Protection Agency
Region 4
Waste Management Division, Federal Facilities Branch.
61 Forsyth Street
Atlanta, GA 30303

Florida Dept of Environmental Protection
Division of Waste Management
Twin Towers Building
2600 Blair Stone Road
Tallahassee, FL 32399-2400

Commanding Officer
Naval Facilities Engineering Command, Southeast
Attn: Director, Environmental Restoration Division
PO Box 190010
North Charleston, SC 29419-9010

Sites 11, 12, 25, 26 27. & 30 (OU 2) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 2 property? All
If evaluating only a portion of the site, attach a figure identifying the portion being evaluated.

This evaluation covers the period from **1 January** 2010 **through 31 December** 2010
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

	In Compliance	Non-Compliance	See Comment
1) Prohibit reuse of the site for residential uses including, but not limited to, any form of housing, child-care facilities, any kind of school including preschools, elementary schools, and secondary schools, playgrounds, and adult convalescent or nursing care facilities.	☒	☐	☐
2) Prohibit the excavation, disturbance, and removal of soil unless prior written approval is obtained from the facility's environmental coordinator.	☒	☐	☐
3) Prohibit potable uses of groundwater from the surficial aquifer underlying the site, including, but not limited to, drinking, washing, cooking, cleaning, and turf irrigation, without prior written approval from the Navy, USEPA, and FDEP.	☒	☐	☐
4) Prevent unacceptable occupational exposure to contaminated groundwater in the surficial aquifer by requiring the use of personal protective equipment (PPE) and monitoring equipment for excavations that may encounter groundwater.	☒	☐	☐
5) Maintain the integrity of any existing or future monitoring or remediation system(s	☒	☐	☐

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Signature – Greg Campbell (Navy)	Date 7/1/10
Signature – Patty Whittemore (Navy)	Date 7/1/10
Signature	Date
Signature	Date

Site 15 (OU 4) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 4 property? all
If evaluating only a portion of the site, attach a figure identifying the portion being evaluated.

This evaluation covers the period from **1 January** 2010 **through 31 December** 2010
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

	In Compliance	Non-Compliance	See Comment
1) Restrict use of groundwater from the surficial zone of the Sand-and-Gravel Aquifer within 300 feet of the site.	☒	☐	☐
2) Restrict intrusive activities within the Site boundary without prior approval from NAS Pensacola Environmental Office	☒	☐	☐

I, the undersigned, herby certify that I am an authorized representative of the above named property owner and that the above described Land Use Controls have been complied with for the period noted. Alternately, any known deficiencies and owner's completed or planned actions to address such deficiencies are described in the attached Explanation of Deficiency(ies).

Greg Campbell — 7/1/10
Signature – Greg Campbell (Navy) — Date

[signature] — 7/1/10
Signature – Patty Whittemore (Navy) — Date

Signature — Date

Signature — Date

Site 1 (OU 1) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 1 property? all
If evaluating only a portion of the site, attach a figure identifying the portion being evaluated.

This evaluation covers the period from **1 January** 2010 **through 31 December** 2010
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

	In Compliance	Non-Compliance	See Comment
1) Restrict intrusive activities within the landfill boundary without prior approval from NAS Pensacola Environmental Office	☒	☐	☐
2) Restrict use of groundwater from the surficial zone of the Sand-and-Gravel Aquifer within 300 feet of the site	☒	☐	☐

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Signature – Patty Whittemore (Navy) — Date: 7/1/10

Signature — Date

Signature — Date

TETRA TECH

TtNUS/TAL-09-85/0390/4196-7.0

September 4, 2009

Project Number 112G00390

Commander, Southeast
SOUTHNAVFACENGCOM
Attention: Patty Marajh-Whittemore
Remedial Project Manager
ITP Gulf Coast
NAS Jacksonville Building 903
Jacksonville, FL 32212

Reference: Clean Contract No. N62467-04-D-0055
Contract Task Order No. 0030

Subject: Annual Land Use Control Compliance Certificate Completion.

Dear Ms. Marajh-Whittemore:

Attached are the signed Annual Land Use Control (LUC) Compliance Certificates for the Naval Air Station Pensacola sites with Record of Decisions (RODs) that have LUC implemented. The certificates were completed for Operable Units (OUs) 1, 4, 11, 13, and 2 during the inspection completed on September 2, 2009. Participating in the inspections were Ms. Patty Marajh-Whittemore, NAVFAC SE; Mr. Greg Campbell, NASP PWC; Mr. Greg Fraley, USEPA; Mr. Gerry Walker, Tetra Tech; and Mr. Ron Kotun, Tetra Tech.

Please retain these certificates for you files and I will include them in the Administrative Record. If you have any questions, please call me at (850) 385-9899.

Sincerely yours,

Gerald Walker

Gerald Walker, P.G.
Task Order Manager

GAW/gaw

Enclosure
c. Greg Campbell, NASP PWC

Tetra Tech NUS, Inc.
1558 Village Square Blvd., Ste. 2, Tallahassee, FL 32309-2478
Tel 850 385 9899 Fax 850 385.9860 www.tetratech.com

Site 1 (OU 1) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

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Form shall be submitted by **1 March** of the year following the reporting period.

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Signature – Greg Campbell (Navy) — Date: 9/2/09

Signature – Patty Whittemore (Navy) — Date: 9/2/09

Signature — Date

Signature — Date

Site 15 (OU 4) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 4 property? All
If evaluating only a portion of the site, attach a figure identifying the portion being evaluated.

This evaluation covers the period from **1 January** 2009 **through 31 December** 2009.
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

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Signature – Greg Campbell (Navy) — Date: 9/2/09

Signature – Patty Whittemore (Navy) — Date: 9/2/09

Signature — Date

Signature — Date

Site 38 (OU 11) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 11 property? All
If evaluating only a portion of the site, attach a figure identifying the portion being evaluated.

This evaluation covers the period from **1 January** 2009 **through 31 December** 2009.
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

	In Compliance	Non-Compliance	See Comment
1) Prevent residential use at Site 38	☑	☐	☐
2) Restrict future uses of the surficial aquifer until the levels of contamination in the groundwater meet the State of Florida's Groundwater Cleanup Target Levels (GCTLs) in 62-777.	☑	☐	☐

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Signature – Patty Whittemore (Navy) — Date: 9/2/09

Signature — Date

Signature — Date

Sites 8 and 24 (OU 13) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 13 property? All
If evaluating only a portion of the site, attach a figure identifying the portion being evaluated.

This evaluation covers the period from **1 January** 2009 **through 31 December** 2009.
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

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2) No tampering or damage to groundwater monitoring wells or remediation system(s).	☑	☐	☐
3) Any violations of these LUCs were reported within 10 days of discovery and an explanation provided of those actions taken or to be taken was provided within 10 days of notification.	☑	☐	☐

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Signature — Date

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Sites 11, 12, 25, 26 27. & 30 (OU 2) Annual LUC Compliance Certificate

Naval Air Station Pensacola
FL9170024567

Property Owner: NAVAL AIR STATION PENSACOLA

Property Address: NAS PENSACOLA - PENSACOLA, FLORIDA

Is evaluation for all or a portion of the OU 2 property? All
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This evaluation covers the period from **1 January** 2009 **through 31 December** 2009.
Form shall be submitted by **1 March** of the year following the reporting period.

Certification Checklist

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1) Prohibit reuse of the site for residential uses including, but not limited to, any form of housing, child-care facilities, any kind of school including preschools, elementary schools, and secondary schools, playgrounds, and adult convalescent or nursing care facilities.	☑	☐	☐
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3) Prohibit potable uses of groundwater from the surficial aquifer underlying the site, including, but not limited to, drinking, washing, cooking, cleaning, and turf irrigation, without prior written approval from the Navy, USEPA, and FDEP.	☑	☐	☐
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Signature – Greg Campbell (Navy)	Date 9/2/09
Signature – Patty Whittemore (Navy)	Date 9/2/09
Signature	Date
Signature	Date

Mail completed form(s) to:

U.S. Environmental Protection Agency Region 4 Waste Management Division, Federal Facilities Branch. 61 Forsyth Street Atlanta, GA 30303	Florida Dept of Environmental Protection Division of Waste Management Twin Towers Building 2600 Blair Stone Road Tallahassee, FL 32399-2400	Commanding Officer Naval Facilities Engineering Command, Southeast Attn: Director, Environmental Restoration Division PO Box 190010 North Charleston, SC 29419-9010

YEAR 2011 SEMI-ANNUAL GROUNDWATER MONITORING REPORT
OPERABLE UNIT 04, SITE 15
PESTICIDE RINSATE DISPOSAL AREA
NAVAL AIR STATION PENSACOLA
PENSACOLA, FLORIDA
Contract No. N69450-09-M-0094

PREPARED FOR:

United States Naval Facilities
Engineering Command
Southeast Division
Ajax Street, Building 903
Jacksonville, Florida 32212

PREPARED BY:

Aerostar Environmental Services, Inc.
803 Government Street, Suite A
Mobile, Alabama 36602
(251) 432-2664
AES Project # 0409-470-07

February 2012

Curtis R. Mills, Project Engineer Date

Geoffrey Reichold, P.G., Senior Project Manager Date

CERTIFICATION

PROFESSIONAL GEOLOGIST LICENSED IN THE STATE OF FLORIDA

This is to certify that the geological and hydrogeological features of the ***Year 2011 Semi-Annual Groundwater Monitoring Report, Operable Unit 04, Site 15, Pesticide Rinsate Disposable Area, Naval Air Station Pensacola*** have been examined by the undersigned.

Signed:_____

Geoffrey Reichold, P.G. Date

State of Florida License No. 2483

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1.0 INTRODUCTION

Aerostar Environmental Services, Inc. (AEROSTAR) has prepared this Year 2011, Semi-Annual Monitoring Report for Operable Unit (OU) 04, Site 15, Pesticide Rinsate Disposal Area, Naval Air Station (NAS) Pensacola, Pensacola, Florida, hereafter referred to as the site. This report summarizes the results of the September 2011 groundwater sampling event. This work is being performed under Contract No. N69450-09-M-0094. A Site Location Map is presented as Figure 1.

The site is located in the northern portion of NAS Pensacola and includes the golf course maintenance facilities, equipment storage buildings and concrete wash-down areas. The site is surrounded by the golf course to the north, east, south and west, and by Bayou Grande located approximately 600 feet to the north. A Site Plan is presented as Figure 2.

2.0 BACKGROUND

From 1963 to the present, fertilizer, pesticides and herbicides have been stored and mixed at the golf course maintenance facility. Historically, chemical application equipment has been rinsed on the facility's asphalt wash-down pad. Prior to the construction of the wash racks, cleaning of the equipment released dilute rinsate solutions directly onto the ground surface, where they infiltrated into the soil (CH2MHill Constructors, Inc. [CH2MHill], 2003). In addition, during the removal of an underground storage tank (UST) containing pesticides, the contents of the tank were reportedly spread across the ground surface (Geraghty and Miller [G&M], 1984).

A Confirmation Study, consisting of a Verification Study and a Characterization Study, was conducted by G&M in 1984 and 1986. Three surface soil samples were collected from the pesticide storage area and asphalt wash-down pad during the Verification Study and analyzed for arsenic and organic pesticides. The soil samples exhibited arsenic concentrations ranging from 1.6 milligrams per kilogram (mg/kg) to 31 mg/kg, and total pesticides ranging from 0.02 mg/kg to 23.4 mg/kg (G&M, 1984). Six additional soil samples were collected from 0 to 24 inches below land surface (BLS) during the Characterization Study and analyzed for arsenic. Two of the soil samples exceeded the extraction procedure maximum toxicity characteristic contaminant level for arsenic of 5 milligrams per liter (mg/L) (G&M, 1986).

Phase I of a Contamination Assessment/Remedial Investigation (RI) was conducted in 1991 by EnSafe, Inc. The investigation results indicated that metals (particularly arsenic), total recoverable petroleum hydrocarbons (TRPHs), volatile organic compounds (VOCs), polynuclear aromatic hydrocarbons (PAHs) and pesticides were potentially present in the soil. Groundwater samples detected low concentrations of metals (particularly arsenic) and dieldrin concentrations at the site (EnSafe, 1997).

Additional phases of the RI were conducted in 1995 and 1996. Phase I consisted of collecting 82 soil samples and 12 groundwater samples from monitor wells located at the site. Phases II and III consisted of collecting 47 soil samples and 21 groundwater samples. Table 1 summarizes the monitor well construction details of the wells installed during phases I through III. The investigations concluded that arsenic and dieldrin were the primary contaminants of concern (COC) in the soil, and that arsenic was the primary COC in groundwater. In addition, the Baseline Risk Assessment (BRA) identified arsenic, benzo(a)pyrene equivalent (BEQ), dieldrin, alpha-chlordane, and gamma-chlordane as COC for surface soil, and arsenic and dieldrin as the COC for groundwater. The BRA

used the Florida risk threshold goals, as comparative guidelines which are more conservative than U.S. Environmental Protection Agency (EPA)-acceptable risk ranges and associated *Risk Assessment Guidance for Superfund* (RAGS) information (EnSafe, 1997).

The Record of Decision (ROD) for Site 15 required the removal of contaminated soil in exceedance of the industrial cleanup goals to eliminate dermal and ingestion risk pathways and the monitoring of groundwater to ensure that COC were not migrating off site. (EnSafe, 1999). The ROD also concluded that dieldrin concentrations in groundwater did not warrant further assessment at the site. From April 26, 2002, to May 6, 2002, an estimated 754 cubic yards of contaminated soil were removed from Site 15. Additionally, a baseline groundwater sampling event was conducted in November and December 2001.

The Remedial Goal (RG) established in the Site 15 ROD for arsenic in groundwater is 50 micrograms per liter (µg/L). Arsenic concentrations detected during the baseline groundwater monitoring event in November-December 2001 ranged from 70 µg/L to 510 µg/L in monitor wells 15GR03, 15GR36, 15GR65, and 15GR66.

Arsenic concentrations detected in the groundwater samples collected during the semi-annual sampling event in June 2002 ranged from 66 µg/L to 650 µg/L in the sample collected. Wells exceeding the RG for arsenic in the baseline survey also exceeded the RG for arsenic during the June 2002 semi-annual monitoring event.

Arsenic concentrations detected in the groundwater samples collected during the January 2003 semi-annual sampling event in ranged from 53 µg/L to 630 µg/L. Wells exceeding the RG for arsenic during the June 2002 survey also exceeded the RG for arsenic during the January 2003 semi-annual monitoring event.

AEROSTAR was awarded the long term monitoring contract at OU 04, Site 15, in 2003 and has been monitoring groundwater quality at the site since November 2003.

AEROSTAR has not been able to locate monitor well 15GR03R since September therefore, at the direction of the Navy, AEROSTAR replaced monitor well 15GR03RR in July 2008 and reinstalled the well with an aboveground outer casing.

Groundwater analytical results of the samples collected at the site from January 2004 to November 2008 have showed a gradual but consistent decrease in the concentration of arsenic.

AEROSTAR conducted semi-annual sampling activities in September 2009. Groundwater flow was determined to be to the north, which is consistent with historical data. Arsenic exceeded the RG of 50 µg/L in the groundwater sample collected from monitor well 15GR03RR (110 µg/L). AEROSTAR recommended reducing the sampling plan to only include monitor wells 15GR03RR, 15GR04R, 15GR65R, and 15GR66R and the excluded monitoring wells be properly abandoned.

On December 31, 2009, the Florida Department of Environmental Protection (FDEP) issued a letter to NAVFAC SE stating that they agreed with reducing the sampling plan, but that the excluded monitor wells should not be abandoned and still be used for determining the groundwater flow direction.

AEROSTAR conducted semi-annual sampling activities in March 2010. Groundwater flow was determined to be to the north, which is consistent with historical data. Arsenic exceeded the FDEP Groundwater Target Cleanup Level (GCTL) of 10 µg/L in the groundwater samples collected from monitor wells 15GR03RR, 15GR5R and 15GR66R. The groundwater sample collected from monitor well 15GR03RR exceeded the RG of 50 µg/L.

At the NAS Pensacola Partnering meeting conducted on June 30, 2010, the FDEP stated that monitoring wells 15MW72 and 15MW74 needed to be included in the sampling plan as compliance wells and upgradient monitoring well 15GR04R could be removed from the sampling plan.

At the NAS Pensacola Partnering meeting conducted September 22, 2010, the FDEP and NAS Pensacola Partnering Team determined that arsenic concentration exceedances should be based on the EPA Regional Screening Level (RSL) of 10 µg/L instead of the RG of 50 µg/L.

AEROSTAR conducted semi-annual sampling activities in September 2010. Groundwater flow was determined to be to the north, which is consistent with historical data. Arsenic exceeded the FDEP GCTL and EPA RSL of 10 µg/L in the groundwater samples collected from monitor wells 15GR03RR and 15GR66R. The groundwater sample collected from monitor well 15GR03RR exceeded the RG of 50 µg/L.

AEROSTAR conducted semi-annual sampling activities in March 2011. Groundwater flow was determined to be to the north, which is consistent with historical data. Arsenic exceeded the FDEP GCTL and EPA RSL of 10 µg/L in the groundwater samples collected from monitor wells 15GR03RR, 15GR65R and 15GR66R. The groundwater sample collected from monitor well 15GR03RR exceeded the RG of 50 µg/L.

On October 24, 2011, the EPA issued comments regarding the March 2011 Semi-Annual Monitoring Report. On November 22, 2011, AEROSTAR and Tetra Tech NUS, Inc. issued responses to the comments. The response to comments are included in Appendix A.

3.0 SITE ASSESSMENT ACTIVITIES

This section describes the field tasks completed at the site in September 2011. Field tasks included measuring the depth-to-groundwater from 13 monitor wells and collecting groundwater samples from five monitor wells for laboratory analysis. The following sections detail the scope of work for the monitoring activities conducted at the site.

3.1 Groundwater Elevation Measurements

AEROSTAR mobilized to the site on September 21, 2011, to collect depth-to-water measurements from groundwater monitoring wells 15GR03RR, 15GR04R, 15GR07R, 15GR65R, 15GR66R, 15GS68, 15GS69R, 15GS70, 15GS71, 15MW72, 15MW73, 15MW74 and 15MW75. Monitor well 15MW76 has not been located since September 2006. Prior to gauging the depths-to-water, the well caps were removed and the water levels were allowed to stabilize for at least 15 minutes. The depths-to-water and total well depths were measured to the nearest 0.01 inch using an electronic water level indicator and recorded on a groundwater sampling log. The estimated direction of groundwater flow beneath the subject site was calculated using this data and is discussed in Section 4.1.

3.2 Groundwater Sample Collection

AEROSTAR collected groundwater samples on September 21, 2011 for laboratory analysis from monitor wells 15GR03RR, 15GR65R, 15GR66R, 15MW72 and 15MW74 to evaluate groundwater quality. Groundwater samples were collected utilizing a variable speed peristaltic pump. The groundwater samples were transferred into the appropriate-laboratory supplied sample containers, placed on ice and delivered under chain-of-custody to a Test America Laboratories in Pensacola, Florida for analysis per EPA Method 6010B for arsenic. Groundwater samples were collected in accordance with the guidelines established in the FDEP Standard Operating Procedures (SOP) document FS2200. The FDEP groundwater sampling logs are included in Appendix B**.**

4.0 RESULTS OF THE SITE ASSESSMENT

4.1 Groundwater Flow Direction

Depth-to-water measurements were collected from 13 monitor wells on March 25, 2011. The depth-to-water and total depth of each monitor well were recorded on groundwater sampling logs and are presented in Table 2. The depth-to-water measurement of each well was subtracted from the corresponding top-of-casing elevation to determine the groundwater elevation at each well and create a groundwater contour map. The general groundwater flow direction was estimated to be towards the north during the September 2011 sampling event, which is consistent with historical groundwater flow at the site. Figure 3 illustrates the groundwater contours and general groundwater flow direction in September 2011.

4.2 Groundwater Laboratory Analysis

Groundwater samples collected during the September 2011 sampling event from 15GR03RR and 15GR66R showed concentrations of arsenic at 110 µg/L and 16.0 µg/L, respectively, above the FDEP GCTL and the EPA RSL of 10 µg/L. The groundwater sample collected from 15GR65R showed concentrations of arsenic at 7.9 ug/L, below the FDEP GCTL of 10 ug/L. The groundwater analytical results for 15MW72 and 15MW74 were below the laboratory method detection limit of 4 µg/L.

The results of the groundwater laboratory analysis dating back to 2004 are summarized in Table 3. Arsenic concentrations of the groundwater samples collected during the September 2011 sampling event are illustrated in Figure 4. Figure 5 through Figure 9 show arsenic concentrations vs. time at monitor wells 15GR03RR, 15GR65R, 15GR66R, 15MW72 and 15MW74. The laboratory analytical results with appropriate chain-of-custody records are included in Appendix C.

5.0 CONCLUSIONS AND RECOMMENDATIONS

AEROSTAR conducted groundwater monitoring activities on September 21, 2011 at OU 04, Site 15, Pesticide Rinsate Disposal Area, NAS Pensacola, Pensacola, Florida in accordance with the SOW established in Contract No. N69450-09-M-0094. Based on the findings of the investigation, AEROSTAR presents the following conclusions:

- Groundwater flow direction is estimated to be to the north, consistent with the previously reported groundwater flow direction at the site.
- Laboratory analytical results of the groundwater samples collected from monitor wells 15GR03RR and 15GR66R showed arsenic concentrations above the FDEP GCTL and the EPA RSL of 10 µg/L during the September 2011 sampling event.
- Arsenic concentrations in the groundwater samples collected from monitor well 15GR03RR increased from 92 µg/L to 110 µg/L from the previous sampling event.
- The arsenic concentration for monitor well 15GR66R increased from 15 ug/L to 16 ug/L from the previous sampling event.
- The arsenic concentrations in monitor well 15GR65R decreased from 12 µg/L to 7.9 µg/L from the previous sampling event.
- Monitor well 15MW72 and 15MW74 have consistently shown arsenic concentrations below the EPA RSL since 2004.

AEROSTAR recommends continuing semi-annual groundwater sampling to monitor the extent and potential migration of arsenic in the groundwater.

TABLES

Table 1
Monitor Well Construction Details

Operable Unit 04, Site 15
Pesticide Rinsate Disposal Area
NAS Pensacola, Pensacola, Florida

WELL ID	DATE INSTALLED	INSTALLATION METHOD	TOP OF CASING ELEVATION (ft)	TOTAL WELL DEPTH (ft)	SCREENED INTERVAL (ft)	WELL DIAMETER (in)	LITHOLOGY OF SCREENED INTERVAL
15GR03R	1/7/2004	4.25" Hollow Stem Auger	14.03	17.13	7.13 - 17.13	2	Fine SAND
15GR03RR	7/20/2008	4.25" Hollow Stem Auger	18.25	21.13	11.03-21.03	2	Fine SAND
15GR04R	1/7/2004	4.25" Hollow Stem Auger	15.21	17.81	7.81 - 17.81	2	Fine to Medium SAND; Fine SILTY SAND
15GR07R	1/9/2004	4.25" Hollow Stem Auger	14.40	16.00	6.00 - 16.00	2	Fine SAND
15GR65R	1/7/2004	4.25" Hollow Stem Auger	14.90	17.21	7.21 - 17.21	2	Fine to Medium SAND
15GR66R	1/9/2004	4.25" Hollow Stem Auger	14.30	16.40	6.40 - 16.40	2	Fine SAND
15GS69R	1/8/2004	4.25" Hollow Stem Auger	14.69	20.16	10.16 - 20.16	2	Fine SAND
15MW72	1/8/2004	4.25" Hollow Stem Auger	19.03	21.94	11.94 - 21.94	2	Fine SAND; Fine to Medium SILTY SAND
15MW73	1/8/2004	4.25" Hollow Stem Auger	19.49	22.09	12.09 - 22.09	2	Fine SAND
15MW74	1/8/2004	4.25" Hollow Stem Auger	13.11	15.70	5.70 - 15.70	2	Fine SAND
15MW75	1/9/2004	4.25" Hollow Stem Auger	12.32	16.57	6.57 - 16.57	2	Fine to Medium SAND
15MW76	1/9/2004	4.25" Hollow Stem Auger	4.14	11.93	1.93 - 11.93	2	Fine SAND

15GR03RR was a replacement well for 15GR03R and was installed in July of 2008 as a stick up well

Table 2
Groundwater Elevation Table

Operable Unit 04, Site 15
Pesticide Rinsate Disposal Area
NAS Pensacola, Pensacola, Florida

WELL DESIGNATION	15GR03R			15GR03RR			15GR04R			15GR07R			15GR65R			15GR66R			15GS68			15GS69R		
DIAMETER	2	in.		2	in.		2	in.		2	in.		2	in.		2	in.		2	in.		2	in.	
WELL DEPTH	17.13	feet		21.13	feet		17.81	feet		16.00	feet		17.21	feet		16.40	feet		12.61	feet		20.16	feet	
SCREEN INTERVAL	7.13-17.13	feet		11.13-21.13	feet		7.81-17.81	feet		6.00-16.00	feet		7.21-17.21	feet		6.40-16.40	feet		2.61-12.61	feet		10.16-20.16	feet	
TOC ELEVATION	14.03	feet		18.25	feet		15.21	feet		14.40	feet		14.90	feet		14.30	feet		5.55	feet		14.69	feet	
DATE	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL
1/21/2004	2.04	11.99	--	--	--	--	2.84	12.37	--	3.32	11.08	--	1.79	13.11	--	3.09	11.21	--	-0.06	5.61	--	-0.24	14.93	
6/28/2004	2.61	11.42	--	--	--	--	3.57	11.64	--	3.92	10.48	--	2.35	12.55	--	3.70	10.60	--	0.81	4.74	--	0.59	14.10	
3/10/2005	2.67	11.36	--	--	--	--	3.55	11.66	--	4.32	10.08	--	2.38	12.52	--	4.08	10.22	--	0.55	5.00	--	-0.10	14.79	
9/13/2005	CNL	CNL	--	--	--	--	4.51	10.70	--	5.12	9.28	--	3.14	11.76	--	4.89	9.41	--	1.20	4.35	--	0.98	13.71	
3/8/2006	2.19	11.84	--	--	--	--	3.11	12.10	--	3.78	10.62	--	1.99	12.91	--	3.53	10.77	--	0.02	5.53	--	-0.21	14.90	
9/18/2006	CNL	CNL	--	--	--	--	3.46	11.75	--	3.92	10.48	--	2.45	12.45	--	3.70	10.60	--	1.45	4.10	--	1.12	13.57	
3/22/2007	CNL	CNL	--	--	--	--	2.64	12.57	--	3.13	11.27	--	1.65	13.25	--	2.89	11.41	--	0.10	5.45	--	-0.16	14.85	
10/8/2007	CNL	CNL	--	--	--	--	2.87	12.34	--	3.23	11.17	--	2.09	12.81	--	3.02	11.28	--	1.05	4.5	--	1.19	13.5	
4/23/2008	CNL	CNL	--	--	--	--	3.25	11.96	--	3.90	10.50	--	2.16	12.74	--	3.64	10.66	--	0.78	4.77	--	0.44	14.25	
9/11/2008	--	--	--	3.73	14.52	--	4.69	10.52	--	5.34	9.06	--	3.60	11.30	--	5.10	9.20	--	3.32	2.23	--	2.43	12.26	
11/12/2008	--	--	--	3.30	14.95	--	4.16	11.05	--	4.87	9.53	--	2.96	11.94	--	4.60	9.70	--	0.8	4.75	--	0.61	14.08	
9/25/2009	--	--	--	3.76	14.49	--	4.49	10.72	--	5.16	9.24	--	3.50	11.40	--	4.98	9.32	--	1.79	3.76	--	1.63	13.06	
3/31/2010	--	--	--	3.49	14.76	--	4.43	10.78	--	5.11	9.29	--	3.14	11.76	--	4.97	9.33	--	1.74	3.81	--	1.6	13.09	
9/28/2010	--	--	--	3.70	14.55	--	4.50	10.71	--	5.19	9.21	--	3.39	11.51	--	5.09	9.21	--	1.19	4.36	--	1.04	13.65	
3/25/2011	--	--	--	2.23	16.02	--	2.86	12.35	--	3.46	10.94	--	1.87	13.03	--	3.22	11.08	--	0.19	5.36	--	--	Dry	
9/21/2011	--	--	--	3.05	15.2	--	4.52	10.69	--	4.45	9.95	--	2.79	12.11	--	4.23	10.07	--	1.11	4.44	--	0.89	13.8	

WELL DESIGNATION	15GS70			15GS71			15MW72			15MW73			15MW74			15MW75			15MW76		
DIAMETER	2	in.		2	in.		2	in.		2	in.		2	in.		2	in.		2	in.	
WELL DEPTH	15.06	feet		12.55	feet		21.94	feet		22.09	feet		15.70	feet		16.57	feet		11.93	feet	
SCREEN INTERVAL	5.06-15.06	feet		2.55-12.55	feet		11.94-21.94	feet		12.09-22.09	feet		5.70-15.70	feet		6.57-16.57	feet		1.93-11.93	feet	
TOC ELEVATION	8.93	feet		5.56	feet		19.03	feet		19.49	feet		13.11	feet		12.32	feet		4.14	feet	
DATE	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL	ELEV	DTW	LNAPL
1/21/2004	5.30	8.73	--	8.90	5.13	--	0.17	18.08	--	0.61	18.88	--	2.01	12.39	--	2.32	10.00	--	0.56	3.58	--
6/28/2004	5.98	8.05	--	9.60	4.43	--	0.62	17.63	--	1.06	18.43	--	2.48	11.92	--	2.93	9.39	--	1.33	2.81	--
3/10/2005	0.24	8.69	--	0.57	4.99	--	1.32	17.71	--	0.92	18.57	--	1.03	12.08	--	3.05	9.27	--	0.97	3.17	--
9/13/2005	6.39	7.64	--	10.04	3.99	--	1.39	16.86	--	1.75	17.74	--	3.20	11.20	--	3.81	8.51	--	CNL	CNL	--
3/8/2006	5.23	8.80	--	8.93	5.10	--	0.27	17.98	--	0.67	18.82	--	2.06	12.34	--	2.62	9.70	--	0.02	4.12	--
9/18/2006	6.45	7.58	--	9.98	4.05	--	0.89	17.36	--	1.39	18.10	--	2.76	11.64	--	3.01	9.31	--	CNL	CNL	--
3/22/2007	5.42	8.61	--	9.01	5.02	--	0.05	18.20	--	0.52	18.97	--	1.80	12.60	--	2.16	10.16	--	CNL	CNL	--
10/8/2007	6.59	7.44	--	10.03	4.00	--	0.75	17.50	--	1.36	18.13	--	2.61	11.79	--	2.51	9.81	--	CNL	CNL	--
4/23/2008	5.89	8.14	--	9.48	4.55	--	0.45	17.80	--	0.88	18.61	--	2.23	12.17	--	2.68	9.64	--	CNL	CNL	--
9/11/2008	7.88	6.15	--	11.83	2.20	--	1.97	16.28	--	2.43	17.06	--	4.8	9.60	--	4.14	8.18	--	CNL	CNL	--
11/12/2008	0.89	8.04	--	1.24	4.32	--	1.96	17.07	--	1.58	17.91	--	1.65	11.46	--	3.53	8.79	--	CNL	CNL	--
9/25/2009	1.93	7.0	--	2.1	3.46	--	1.91	16.34	--	2.38	17.11	--	3.75	10.65	--	4.06	8.26	--	CNL	CNL	--
3/31/2010	1.23	7.70	--	2.04	3.52	--	2.0	16.25	--	1.98	17.51	--	3.71	10.69	--	4.01	8.31	--	CNL	CNL	--
9/28/2010	1.38	7.55	--	1.69	3.87	--	1.6	16.63	--	2.03	17.46	--	3.44	10.96	--	4.01	8.31	--	CNL	CNL	--
3/25/2011	0.28	8.65	--	0.54	5.02	--	0.2	18.02	--	0.69	18.8	--	2.05	12.35	--	2.41	9.91	--	CNL	CNL	--
9/21/2011	1.40	7.53	--	1.67	3.89	--	1.1	17.15	--	1.57	17.92	--	2.89	11.51	--	3.92	8.4	--	CNL	CNL	--

CNL =Can not Locate
DTW = Depth-to-Water, measurements are in feet
-- = Data not available/applicable
15GR03RR was a replacement well for 15GR03R and was installed in July of 2008 as a stick up well

Table 3
Groundwater Laboratory Analytical Summary

Operable Unit 04, Site 15
Pesticide Rinsate Disposal Area
NAS Pensacola, Pensacola, Florida

Sample I.D.	Date Collected	Arsenic (ug/L)
Record of Decision Remedial Goal		**50**
EPA Regional Screening Level		**10**
15GR03R	1/21/2004	**150**
	6/28/2004	**160**
	3/14/2005	**160**
	9/13/2005	CNL
	3/9/2006	<5.00
	9/19/2006	CNL
	3/22/2007	CNL
	10/8/2007	CNL
	4/23/2008	CNL
	9/28/2010	CNL
	3/25/2011	CNL
	9/21/2011	CNL
15GR03RR	9/11/2008	**870**
	11/12/2008	**100**
	9/25/2009	**110**
	3/31/2010	**71**
	9/28/2010	**65**
	3/25/2011	**92**
	9/21/2011	**110**
15GR04R	1/21/2004	**22**
	6/28/2004	**47**
	3/14/2004	8.3
	9/13/2005	**19.0**
	3/8/2006	**13.0**
	9/18/2006	4.8
	10/8/2006	**20.0**
	3/22/2007	5.61 I
	4/23/2008	**15.0**
	9/11/2008	**16.0**
	11/12/2008	**11.0**
	9/25/2009	7.1 I
	3/31/2010	9.7 I
	9/28/2010	NS
	3/25/2011	NS
	9/21/2011	NS
15GR07R	1/21/2004	<5.0
	6/28/2004	<5.0
	3/14/2005	<4.0
	9/13/2005	3.1 B
	3/9/2006	<5.0
	9/18/2006	<10.0
	3/22/2007	<3.0
	10/8/2007	<5.0
	4/23/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	<5.0
	9/25/2009	<5.0
	3/31/2010	NS
	9/28/2010	NS
	3/25/2011	NS
	9/21/2011	NS
15GR65R	1/21/2004	**13**
	6/28/2004	10
	3/14/2005	9.4
	9/14/2005	**12**
	3/8/2006	7.1
	9/19/2006	<10.0
	3/22/2007	<3.0
	10/8/2007	5.1 I
	4/23/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	5.2 I
	9/25/2009	<5.0
	3/31/2010	**14.0**
	9/28/2010	**10.0**
	3/25/2011	**12.0**
	9/21/2011	7.9
15GR66R	1/21/2004	**35.0**
	6/28/2004	**29.0**
	3/14/2005	**38.0**
	9/13/2005	**26.0**
	3/9/2006	**25.0**
	9/18/2006	**17.0**
	3/22/2007	**10.0**
	10/8/2007	**35.0**
	4/23/2008	**18.0**
	9/11/2008	**19.0**
	11/12/2008	**18.0**
	9/25/2009	**17.0**
	3/31/2010	**15.0**
	9/28/2010	**15.0**
	3/25/2011	**15.0**
	9/21/2011	**16.0**
15GS68	1/22/2004	<5.0
	6/28/2004	<5.0
	3/14/2005	5.3
	9/13/2005	9.2
	3/8/2006	<5.00
	9/19/2006	<10.0
	3/22/2007	<3.0
	10/8/2007	5.4 I
	4/23/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	<5.0
	9/25/2009	<5.0
	3/31/2010	NS
	9/28/2010	NS
	3/25/2011	NS
	9/21/2011	NS
15GS69R	1/22/2004	<5.0
	6/28/2004	<5.0
	3/14/2005	<4.0
	9/13/2005	3.2 B
	3/8/2006	<5.0
	9/19/2006	<10.0
	3/22/2007	<3.0
	10/8/2007	<5.0
	4/23/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	<5.0
	9/25/2009	<5.0
	3/31/32010	NS
	9/28/2010	NS
	3/25/2011	NS
	9/21/2011	NS

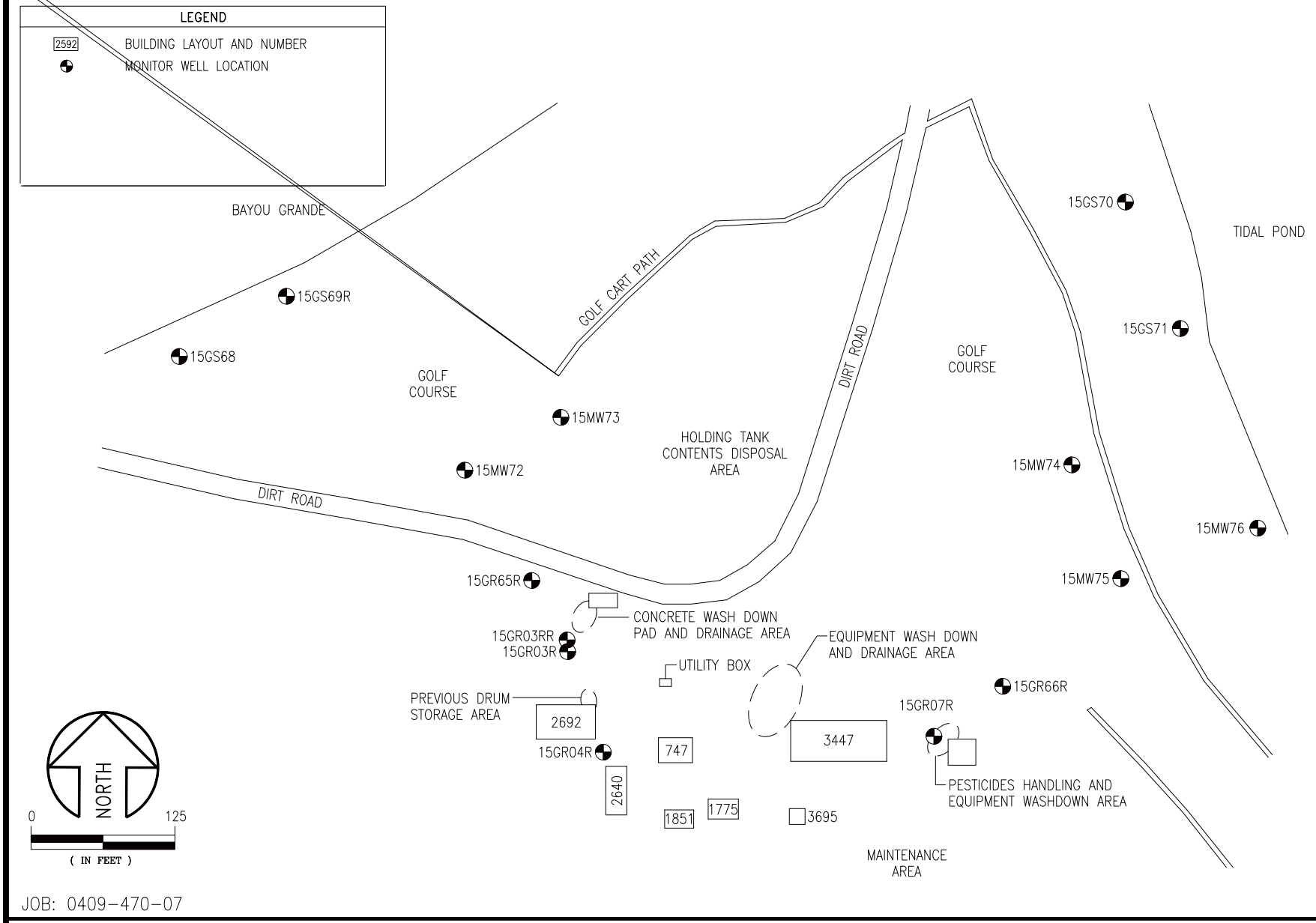
Sample I.D.	Date Collected	Arsenic (ug/L)
Record of Decision Remedial Goal		**50**
EPA Regional Screening Level		**10**
15GS70	1/22/2004	<5.0
	6/29/2004	<5.0
	3/14/2005	<4.0
	9/13/2005	2.9 B
	3/8/2006	<5.0
	9/18/2006	**24.0**
	3/22/2007	<3.0
	10/8/2007	<5.0
	4/23/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	<5.0
	9/25/2009	<5.0
	9/25/2009	<5.0
	3/31/2010	NS
	9/28/2010	NS
	3/25/2011	NS
	9/21/2011	NS
15GS71	1/22/2004	<5.0
	6/29/2004	<5.0
	3/14/2005	<4.0
	9/13/2005	4.7 B
	3/8/2006	<5.0
	9/18/2006	<10.0
	3/22/2007	<3.0
	10/8/2007	<5.0
	4/23/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	<5.0
	9/25/2009	<5.0
	3/31/2010	NS
	9/28/2010	NS
	3/25/2011	NS
	9/21/2011	NS
15MW72	1/22/2004	<5.0
	6/28/2004	<5.0
	3/14/2005	<4.0
	9/13/2005	3.0 B
	3/8/2006	<5.0
	9/19/2006	<10.0
	3/22/2007	4.41
	10/8/2007	<5.0
	4/23/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	<5.0
	9/25/2009	<5.0
	3/31/2010	NS
	9/28/2010	<4.0
	3/25/2011	<4.0
	9/21/2011	<4.0
15MW73	1/21/2004	<5.0
	6/28/2004	<5.0
	3/14/2005	<4.0
	9/13/2005	<5.0
	3/8/2006	<5.0
	9/19/2006	<10.0
	3/22/2007	<3.0
	10/8/2007	<5.0
	4/23/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	<5.0
	9/25/2009	<5.0
	3/31/2010	NS
	9/28/2010	NS
	3/25/2011	NS
	9/21/2011	NS
15MW74	1/22/2004	<5.0
	6/29/2004	<5.0
	3/14/2005	<4.0
	9/13/2005	4.5 B
	3/9/2006	<5.0
	9/18/2006	<10.0
	3/22/2007	<3.0
	10/8/2007	<5.0
	4/24/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	<5.0
	9/25/2009	<5.0
	3/31/2010	NS
	9/28/2010	<4.0
	3/25/2011	<4.0
	9/21/2011	<4.0
15MW75	1/22/2004	<5.0
	6/29/2004	<5.0
	3/14/2005	<4.0
	9/13/2005	<5.0
	3/9/2006	<5.0
	9/18/2006	<10.0
	3/22/2007	<3.0
	10/8/2007	<5.0
	4/24/2008	<5.0
	9/11/2008	<5.0
	11/12/2008	<5.0
	9/25/2009	<5.0
	3/31/2010	NS
	9/28/2010	NS
	3/25/2011	NS
	9/21/2011	NS
15MW76	1/22/2004	<5.0
	6/29/2004	<5.0
	3/14/2005	<4.0
	9/13/2005	NS
	3/9/2006	<5.0
	9/19/2006	CNL
	3/22/2007	CNL
	10/8/2007	CNL
	4/23/2008	CNL
	9/11/2008	CNL
	11/12/2008	CNL
	9/25/2009	CNL
	3/31/2010	CNL
	9/28/2010	CNL
	3/25/2011	CNL
	9/21/2011	CNL

Notes:
EPA = Environmental Protection Agency
ug/L = micrograms per liter
Exceedances above the EPA RSL are in bold
NS-Not Sampled
B= Indicates the result is between the RDL and MDL
CNL=Could Not Locate
15GR03RR was replaced in July 2008

FIGURES

FIGURE 1: SITE LOCATION MAP

AEROSTAR ENVIRONMENTAL SERVICES, INC.	OPERABLE UNIT 04, SITE 15 PESTICIDE RINSATE DISPOSAL AREA NAS PENSACOLA PENSACOLA, FLORIDA	DRAWN BY: PRF REFERENCE: MAP OF PENSACOLA, FLORIDA PREPARED BY: THE MICROSOFT CORP.



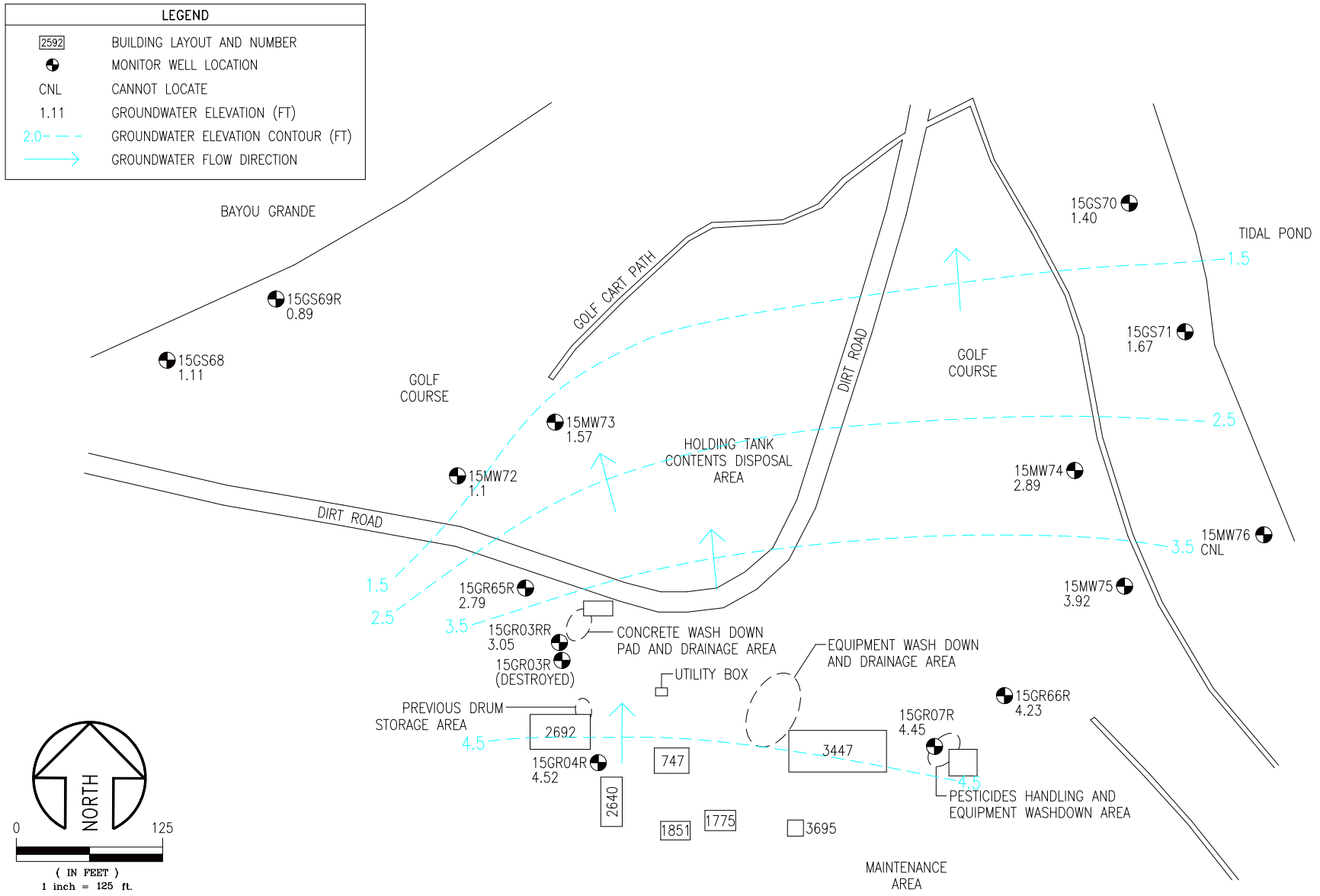
JOB: 0409-470-07

FIGURE 2 - SITE PLAN

AEROSTAR ENVIRONMENTAL SERVICES, INC.

OPERABLE UNIT 04, SITE 15
PESTICIDE RINSATE DISPOSAL AREA
NAS PENSACOLA, PENSACOLA, FLORIDA

DRAWN BY: E.W.
SCALE: 1" = 125'-0"
DATE: APRIL 2008



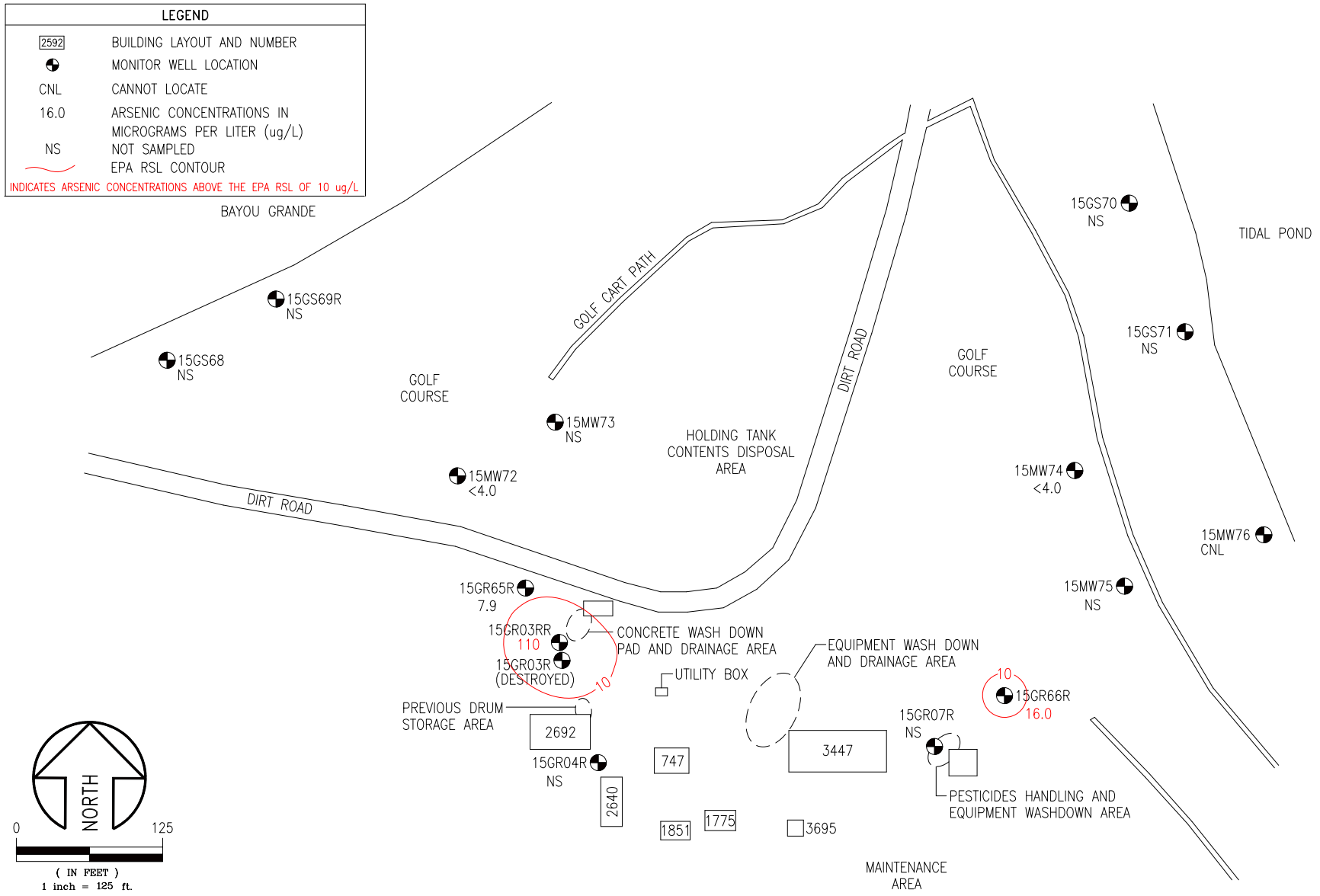
JOB: 0409-470-07

FIGURE 3 - GROUNDWATER ELEVATION MAP (SEPTEMBER 2011)

AEROSTAR ENVIRONMENTAL SERVICES, INC.

OPERABLE UNIT 04, SITE 15
PESTICIDE RINSATE DISPOSAL AREA
NAS PENSACOLA, PENSACOLA, FLORIDA

SCALE: 1" = 125'-0"
DATE: OCTOBER 2011
DRAWN BY: MILLS



JOB: 0409-470-07

FIGURE 4 - ARSENIC CONCENTRATIONS IN GROUNDWATER MAP (SEPTEMBER 2011)

AEROSTAR ENVIRONMENTAL SERVICES, INC.

OPERABLE UNIT 04, SITE 15
PESTICIDE RINSATE DISPOSAL AREA
NAS PENSACOLA, PENSACOLA, FLORIDA

DRAWN BY MILLS
SCALE: 1" = 125'-0"
DATE: SEPTEMBER 2011

Figure 5 - Arsenic Concentrations vs. Time at Monitoring Well 15GR03R and 15GR03RR

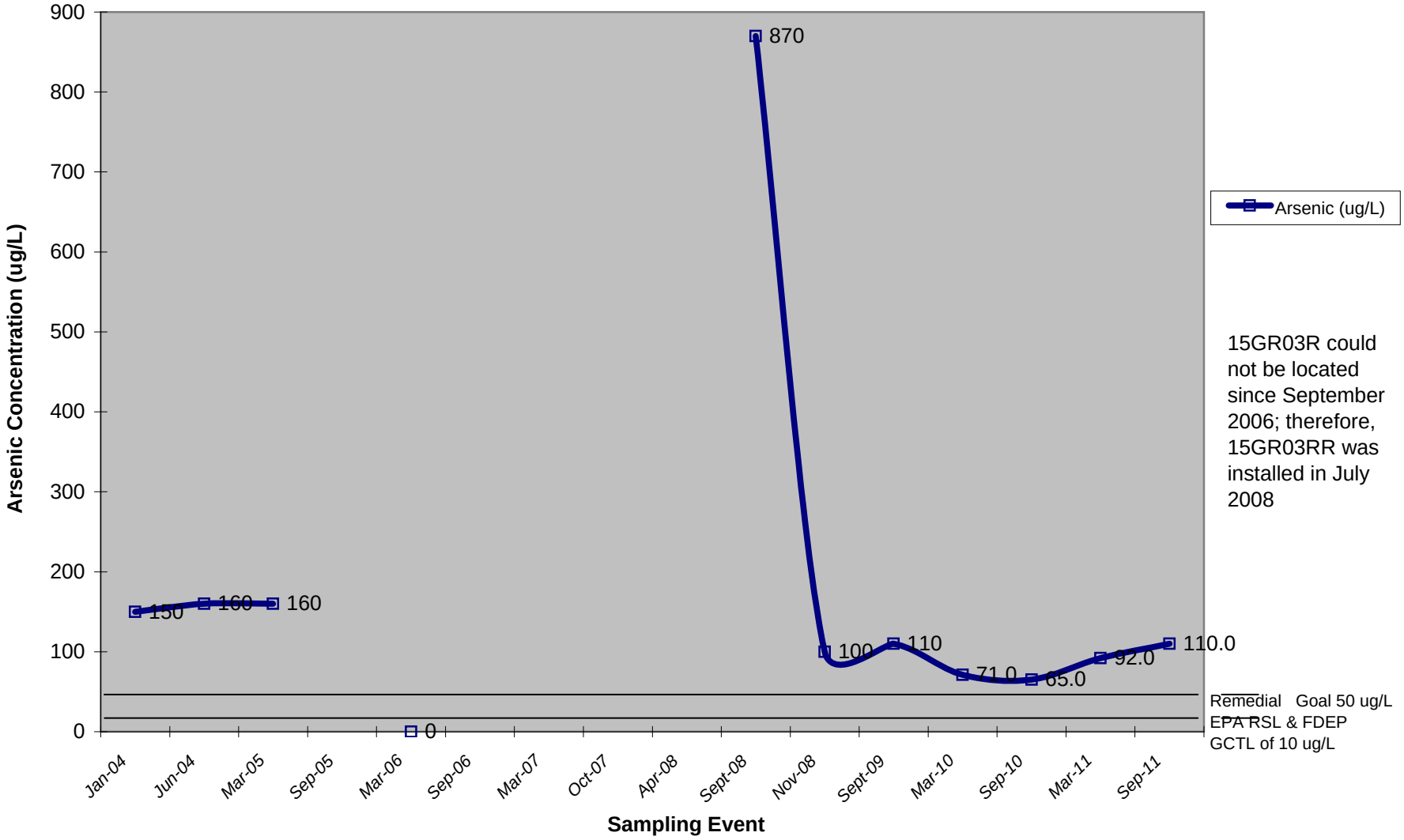


Figure 6 - Arsenic Concentrations vs. Time at Monitoring Well 15GR65R

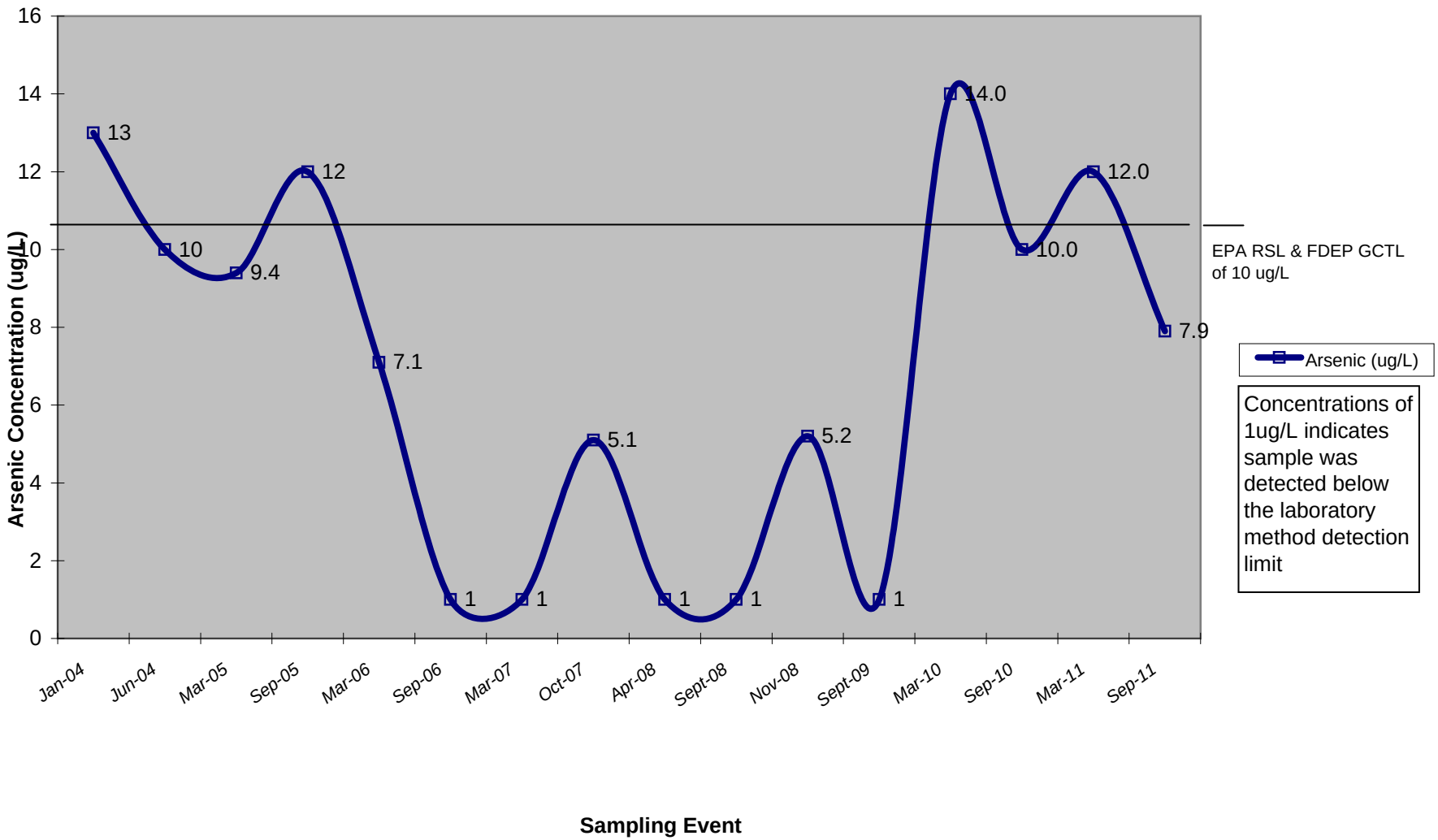


Figure 7 - Arsenic Concentrations vs. Time at Monitoring Well 15GR66R

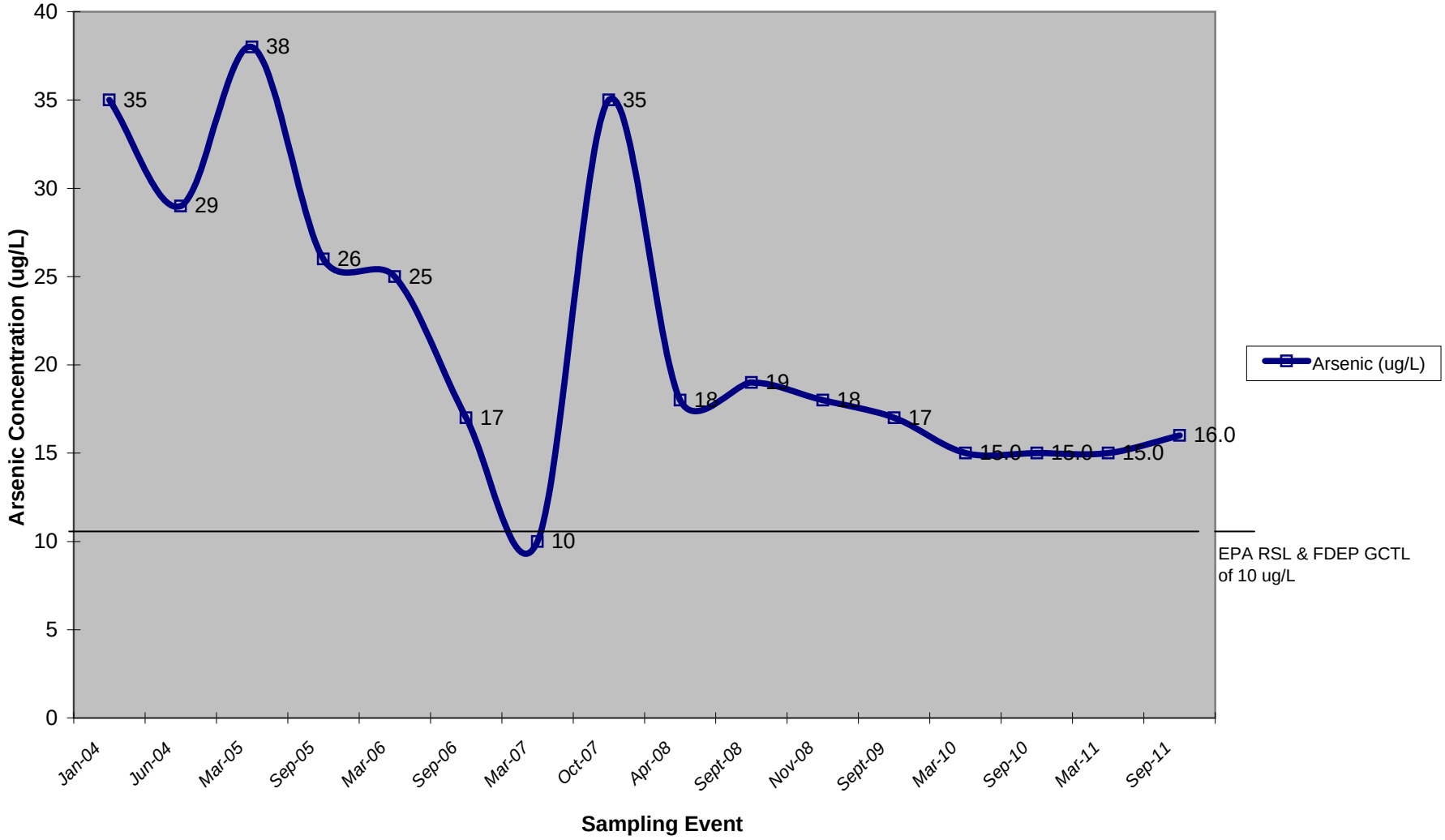


Figure 8 - Arsenic Concentrations vs. Time at Monitoring Well 15GS72

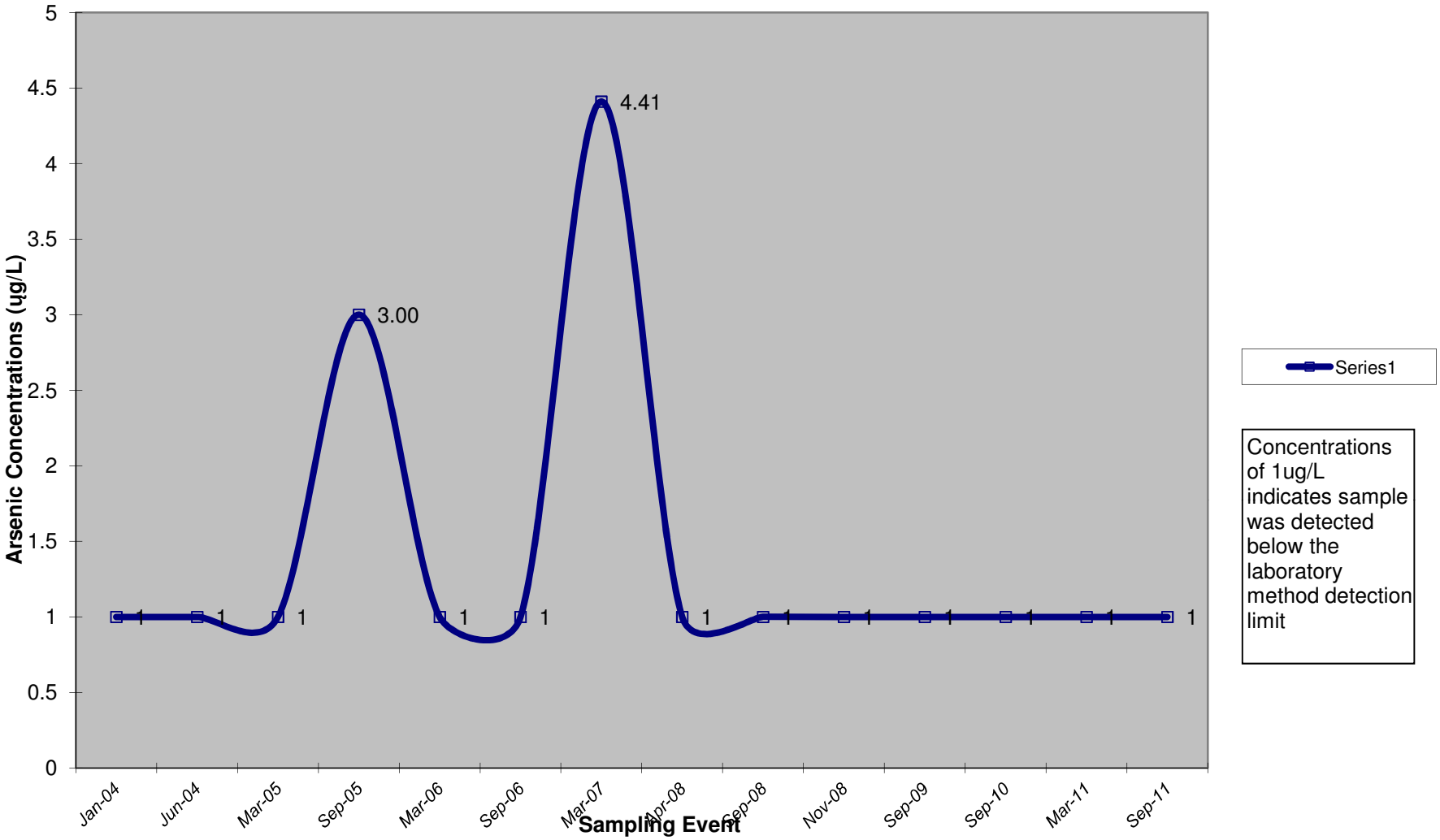
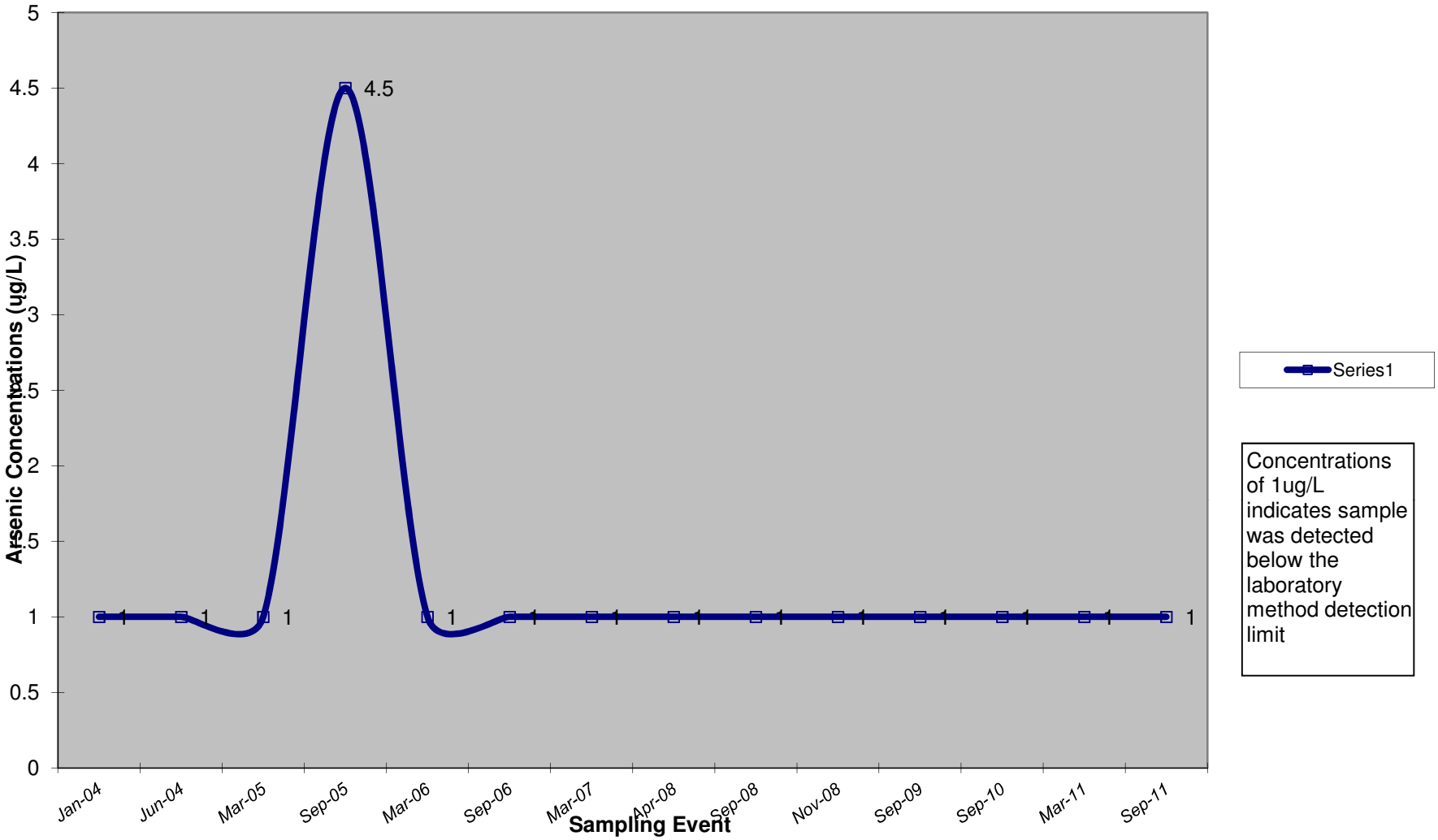


Figure 9 - Arsenic Concentrations vs. Time at Monitoring Well 15MW74



APPENDIX A

Response to EPA Comments

AEROSTAR
ENVIRONMENTAL SERVICES, INC.

November 22, 2011

Re: Response to Comments
Operable Unit 04, Site 15
Documents Reviewed: Semi-Annual Groundwater Monitoring Report
Document Date: July, 2011
Reviewed By: Mr. Tim Woolheater, USEPA
Comments Received: October 24, 2011
Response By: Brian Caldwell, Tetra Tech NUS, Inc.; Gerry Walker, Tetra Tech NUS, Inc.; Curtis Mills, Aerostar Environmental Services, Inc.

Mr. Woolheater,

Below are responses to the USEPA's comments regarding the Semi-Annual Groundwater Monitoring Report for Operable Unit 04, Site 15 located at NAS Pensacola.

1) The groundwater is said to flow to the north of the site and yet the monitoring network would appear to be to the northeast and northwest of the site. Please explain why the network does not include wells to the north.

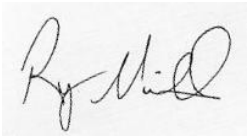
Response: The groundwater flow regime at the Site is influenced by the land surface topography and nearby surface water bodies. The surface water bodies include Bayou Grande to the northwest and the adjacent tidal pond to the northeast. The topography to the north of the Site is elevated relative to the northwest and northeast of the site, and during the RI it was concluded that this elevated land surface area tended to influence groundwater flow towards the northwest and northeast where it discharges into Bayou Grande and the tidal pond respectively. The map illustrating the piezometric surface measured during the RI (and including the area of the topographic high) is attached to these comments to support this conclusion.

2) The northern and central area of the site also includes the following labels that would be of concern in the north if they are correctly labeled. These include the "Equipment Wash Down and Drainage Area" and the "Holding Tank Contents Disposal Area." Neither of these areas include wells in the vicinity of the labels nor down-gradient of them.
Please explain.

Response: Please refer to the above response concerning the groundwater flow direction. Based on the inferred groundwater flow direction, monitoring wells 15MW72 and MW1573 are hydraulically downgradient from the Equipment Wash Down and Drainage Area. The Holding Tank Contents Disposal Area refers to an underground storage tank (UST) that was removed in 1993; it was previously used to store pesticide and herbicide rinsate waste. The contents of this UST were periodically pumped and disposed of offsite by a contractor prior to the UST removal. During the UST removal activities, a small amount of rinsate waste was disposed of further south of the area shown on the attached figure. During the RI, a number of soil samples were collected in this area; the primary chemical of concern detected was

arsenic. However, arsenic was not detected in the groundwater sample collected from monitoring well 15GR01, located in the immediate vicinity of this area (http://www.epa.gov/superfund/sites/rods/fulltext/r0400075.pdf). Monitoring well 15MW73 is hydraulically downgradient and is sufficient to monitor this area. The figure will be revised to show a more accurate location of the Holding Tank Contents Disposal Area.

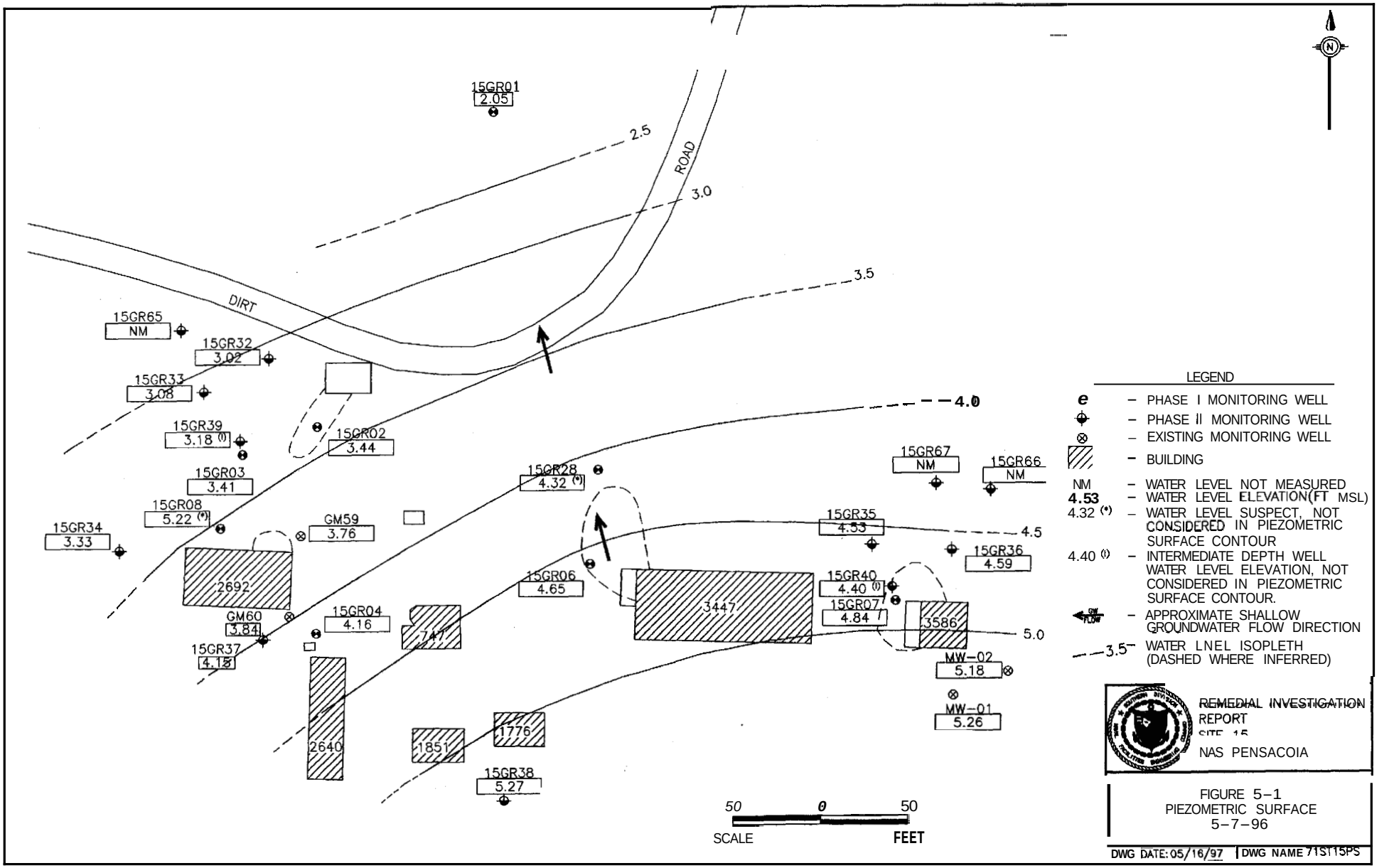
If you have any questions or require additional information, please feel free to contact me at (251) 432-2664 or cmills@aerostar.net.

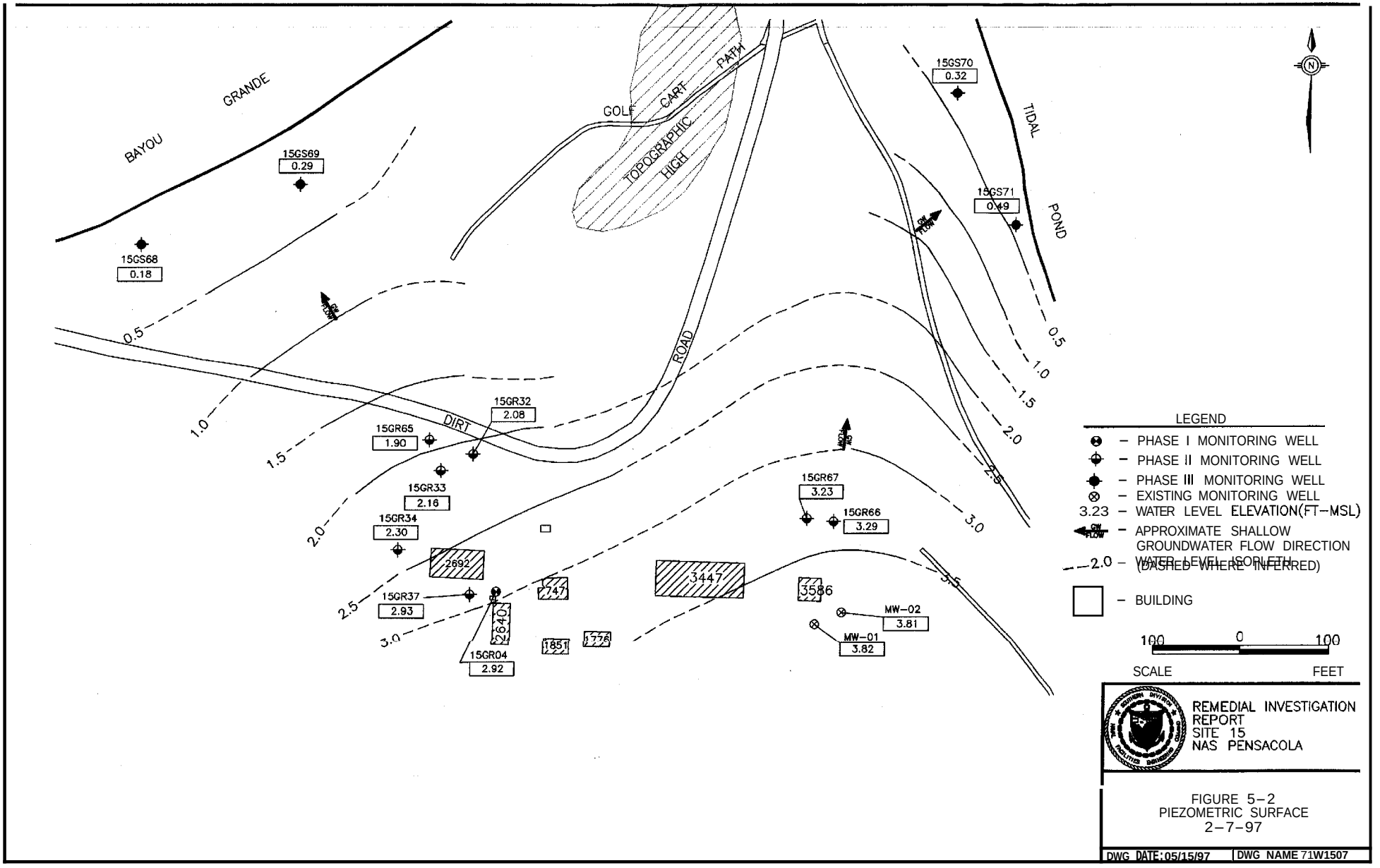


Curtis R. Mills
Project Manager

Attachments

Cc: NAS Pensacola Partnering Team


15GR01
2.05
2.5
ROAD
3.0
DIRT
3.5
15GR65
NM
15GR32
3.02
15GR33
3.08
15GR39
3.18 (I)
15GR02
3.44
4.0
15GR03
3.41
15GR08
5.22 (*)
15GR34
3.33
GM59
3.76
15GR28
4.32 (*)
15GR67
NM
15GR66
NM
15GR35
4.53
4.5
15GR36
4.59
2692
15GR06
4.65
3447
15GR40
4.40 (I)
15GR07
4.84
3586
GM60
3.84
15GR04
4.16
747
5.0
15GR37
4.15
MW-02
5.18
MW-01
5.26
2640
1851
1776
15GR38
5.27
50
0
50
SCALE
FEET
LEGEND
– PHASE I MONITORING WELL
– PHASE II MONITORING WELL
– EXISTING MONITORING WELL
– BUILDING
NM – WATER LEVEL NOT MEASURED
4.53 – WATER LEVEL ELEVATION(FT MSL)
4.32 (*) – WATER LEVEL SUSPECT, NOT CONSIDERED IN PIEZOMETRIC SURFACE CONTOUR
4.40 (I) – INTERMEDIATE DEPTH WELL WATER LEVEL ELEVATION, NOT CONSIDERED IN PIEZOMETRIC SURFACE CONTOUR.
GW FLOW – APPROXIMATE SHALLOW GROUNDWATER FLOW DIRECTION
3.5 – WATER LNEL ISOPLETH (DASHED WHERE INFERRED)
REMEDIAL INVESTIGATION REPORT
SITE 15
NAS PENSACOIA
FIGURE 5-1
PIEZOMETRIC SURFACE
5-7-96
DWG DATE: 05/16/97
DWG NAME 71ST15PS


BAYOU GRANDE
15GS69
0.29
15GS68
0.18
GOLF CART PATH
TOPOGRAPHIC HIGH
15GS70
0.32
TIDAL POND
15GS71
0.49
GW FLOW
0.5
1.0
1.5
2.0
2.5
3.0
3.5
DIRT ROAD
15GR32
2.08
15GR65
1.90
15GR33
2.16
15GR34
2.30
15GR37
2.93
15GR04
2.92
15GR67
3.23
15GR66
3.29
MW-02
3.81
MW-01
3.82
2692
2747
2640
1851
2776
3447
3586
LEGEND
– PHASE I MONITORING WELL
– PHASE II MONITORING WELL
– PHASE III MONITORING WELL
– EXISTING MONITORING WELL
3.23 – WATER LEVEL ELEVATION(FT-MSL)
– APPROXIMATE SHALLOW GROUNDWATER FLOW DIRECTION
2.0 – WATER LEVEL ISOPLETH (DASHED WHERE INFERRED)
– BUILDING
100 0 100
SCALE FEET
REMEDIAL INVESTIGATION REPORT
SITE 15
NAS PENSACOLA
FIGURE 5-2
PIEZOMETRIC SURFACE
2-7-97
DWG DATE:05/15/97
DWG NAME 71W1507

APPENDIX B

Groundwater Sampling Logs
(September 2011)

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: OU04		SITE LOCATION: NAS Pensacola	
WELL NO: 15MW72	SAMPLE ID: 15MW72		DATE: 9/21/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 11.94 - 21.94	STATIC DEPTH TO WATER (feet): 17.15	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (21.94 feet – 17.15 feet) X 0.16 gallons/foot = 0.8 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 18.1	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 18.1	PURGING INITIATED AT: 0845	PURGING ENDED AT: 0857	TOTAL VOLUME PURGED (gallons): 1.58

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) (mg/L) or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
0851	0.8	0.8	0.13	17.17	6.39	25.1	132.1	0.91	2	Clear	None
0854	0.39	1.19	0.13	17.17	6.39	25.1	132.1	0.90	2	Clear	None
0857	0.39	1.58	0.13	17.17	6.40	25.2	132.3	0.89	1	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 0858	SAMPLING ENDED AT: 0859
PUMP OR TUBING DEPTH IN WELL (feet): 18.1	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
15MW72	1	PE	250 ml	HNO_3	—	—	Arsenic/6010	APP	492

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: OU04		SITE LOCATION: NAS Pensacola	
WELL NO: 15MW74	SAMPLE ID: 15MW74		DATE: 9/21/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 5.7 - 15.7	STATIC DEPTH TO WATER (feet): 11.51	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (15.7 feet – 11.51 feet) X 0.16 gallons/foot = 0.7 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 12.5	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 12.5	PURGING INITIATED AT: 0910	PURGING ENDED AT: 0922	TOTAL VOLUME PURGED (gallons): 1.42

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) (mg/l) or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
0916	0.7	0.7	0.12	11.55	6.26	24.9	151.4	0.90	1.83	Clear	None
0919	0.36	1.06	0.12	11.55	6.25	24.8	150.8	0.88	1.81	Clear	None
0922	0.36	1.42	0.12	11.55	6.26	24.8	150.9	0.87	1.74	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 923	SAMPLING ENDED AT: 924
PUMP OR TUBING DEPTH IN WELL (feet): 12.5	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
15MW74	1	PE	250 ml	HNO3	—	—	Arsenic/Lead	APP	454

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: OU04		SITE LOCATION: NAS Pensacola
WELL NO: 15GR66R	SAMPLE ID: 15GR66R	DATE: 9/21/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 6.4 - 16.4	STATIC DEPTH TO WATER (feet): 10.07	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (16.4 feet – 10.07 feet) X 0.16 gallons/foot = 1.01 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 11.0	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 11.0	PURGING INITIATED AT: 930	PURGING ENDED AT: 946	TOTAL VOLUME PURGED (gallons): 1.92

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (mS/cm)	DISSOLVED OXYGEN (circle units) (mg/L) or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
940	1.2	1.2	0.12	10.14	6.72	24.6	99.41	0.85	3.52	Clear	None
943	0.36	1.56	0.12	12.14	6.72	24.5	99.36	0.82	3.17	Clear	None
946	0.36	1.92	0.12	12.14	6.72	24.5	99.35	0.84	2.08	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 947	SAMPLING ENDED AT: 948
PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
15GR66R	1	PE	250 ml	HNO3	—	—	Arsenic/6010	APP	454

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: OU04		SITE LOCATION: NAS Pensacola	
WELL NO: 156R65R	SAMPLE ID: 156R65R		DATE: 9/21/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 7.21 - 17.21	STATIC DEPTH TO WATER (feet): 12.11	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (17.21 feet – 12.11 feet) X 0.16 gallons/foot = 0.82 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 13.1	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 13.1	PURGING INITIATED AT: 1029	PURGING ENDED AT: 1041	TOTAL VOLUME PURGED (gallons): 1.6

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) (mg/L or % saturation)	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1035	0.82	0.82	0.13	12.14	6.61	25.7	125.8	2.9	9.26	Clear	None
1038	0.39	1.21	0.13	12.14	6.59	25.7	125.8	2.89	8.51	Clear	None
1041	0.39	1.60	0.13	12.14	6.59	25.7	125.7	2.85	7.19	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1042	SAMPLING ENDED AT: 1043
PUMP OR TUBING DEPTH IN WELL (feet): 13.1	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
156R65R	1	PE	250 ml	HNO_3	—	—	Arsenic/6010	APP	492

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: OU04	SITE LOCATION: NAS Pensacola	
WELL NO: 15GR03RR	SAMPLE ID: 15GR03RR	DATE: 9/21/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 11.13 - 21.13	STATIC DEPTH TO WATER (feet): 15.2	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (21.13 feet – 15.2 feet) X 0.16 gallons/foot = 0.95 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 16.2	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 16.2	PURGING INITIATED AT: 1100	PURGING ENDED AT: 1114	TOTAL VOLUME PURGED (gallons): 1.78

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) (mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1108	1.0	1.0	0.13	15.23	6.33	24.9	156.4	0.75	9.90	Clear	None
1111	0.39	1.39	0.13	15.23	6.33	24.8	156.1	0.75	9.84	Clear	None
1114	0.39	1.78	0.13	15.23	6.33	24.9	155.8	0.71	9.17	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1115	SAMPLING ENDED AT: 1116
PUMP OR TUBING DEPTH IN WELL (feet): 16.2	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
15GR03RR	1	PE	250 ml	HNO_3	—	—	Arsenic/6010	APP	492

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

APPENDIX C

Laboratory Analytical Results
&
Chain-of-Custody Forms
(September 2011)

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Pensacola
3355 McLemore Drive
Pensacola, FL 32514
Tel: (850)474-1001

TestAmerica Job ID: 400-59579-1
TestAmerica Sample Delivery Group: Proj. OU04
Client Project/Site: NAS Pensacola
Revision: 1

For:
Aerostar Environmental Services, Inc.
803 Government Street
Suite A
Mobile, Alabama 36602

Attn: Mr. Curtis Mills

Authorized for release by:
09/29/2011 05:26:18 PM

Carolyn Hooper
Project Manager I
carolyn.hooper@testamericainc.com

LINKS

Review your project results through TotalAccess

Have a Question? Ask The Expert

Visit us at: www.testamericainc.com

Results relate only to the items tested and the sample(s) as received by the laboratory. The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

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Job ID: 400-59579-1

Laboratory: TestAmerica Pensacola

Narrative

Job Narrative
400-59579-1

Receipt
All samples were received in good condition within temperature requirements.

Metals
No analytical or quality issues were noted.

Revision I
This report has been revised to change location name for sample 59579-4 from 15GR60R to 15GR65R.

Sample Summary

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
400-59579-1	15MW72	Water	09/21/11 08:58	09/22/11 14:15
400-59579-2	15MW74	Water	09/21/11 09:23	09/22/11 14:15
400-59579-3	15GR66R	Water	09/21/11 09:47	09/22/11 14:15
400-59579-4	15GR65R	Water	09/21/11 10:42	09/22/11 14:15
400-59579-5	15GR03RR	Water	09/21/11 11:15	09/22/11 14:15

Detection Summary

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Client Sample ID: 15MW72 — Lab Sample ID: 400-59579-1

No Detections

Client Sample ID: 15MW74 — Lab Sample ID: 400-59579-2

No Detections

Client Sample ID: 15GR66R — Lab Sample ID: 400-59579-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.016		0.0050	0.0040	mg/L	1		6010B	Total/NA

Client Sample ID: 15GR65R — Lab Sample ID: 400-59579-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.0079		0.0050	0.0040	mg/L	1		6010B	Total/NA

Client Sample ID: 15GR03RR — Lab Sample ID: 400-59579-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	0.11		0.0050	0.0040	mg/L	1		6010B	Total/NA

Client Sample Results

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Client Sample ID: 15MW72
Date Collected: 09/21/11 08:58
Date Received: 09/22/11 14:15

Lab Sample ID: 400-59579-1
Matrix: Water

Method: 6010B - Arsenic

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0040	U	0.0050	0.0040	mg/L		09/26/11 12:09	09/27/11 16:29	1

Client Sample Results

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Client Sample ID: 15MW74
Date Collected: 09/21/11 09:23
Date Received: 09/22/11 14:15

Lab Sample ID: 400-59579-2
Matrix: Water

Method: 6010B - Arsenic

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0040	U	0.0050	0.0040	mg/L		09/26/11 12:09	09/27/11 16:42	1

Client Sample Results

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Client Sample ID: 15GR66R
Date Collected: 09/21/11 09:47
Date Received: 09/22/11 14:15

Lab Sample ID: 400-59579-3
Matrix: Water

Method: 6010B - Arsenic

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.016		0.0050	0.0040	mg/L		09/26/11 12:09	09/27/11 16:46	1

Client Sample Results

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Client Sample ID: 15GR65R
Date Collected: 09/21/11 10:42
Date Received: 09/22/11 14:15

Lab Sample ID: 400-59579-4
Matrix: Water

Method: 6010B - Arsenic

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0079		0.0050	0.0040	mg/L		09/26/11 12:09	09/27/11 16:49	1

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Client Sample ID: 15GR03RR
Date Collected: 09/21/11 11:15
Date Received: 09/22/11 14:15

Lab Sample ID: 400-59579-5
Matrix: Water

Method: 6010B - Arsenic

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.11		0.0050	0.0040	mg/L		09/26/11 12:09	09/27/11 16:52	1

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Qualifiers

Metals

Qualifier	Qualifier Description
U	Indicates that the compound was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
☼	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
DL, RA, RE, IN	Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample
EDL	Estimated Detection Limit
EPA	United States Environmental Protection Agency
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
RL	Reporting Limit
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Method	Method Description	Protocol	Laboratory
6010B	Arsenic	SW846	TAL PEN

Protocol References:

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL PEN = TestAmerica Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

Lab Chronicle

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Client Sample ID: 15MW72

Lab Sample ID: 400-59579-1

Date Collected: 09/21/11 08:58

Matrix: Water

Date Received: 09/22/11 14:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			140232	09/26/11 12:09	KN	TAL PEN
Total/NA	Analysis	6010B		1	140467	09/27/11 16:29	JH	TAL PEN

Client Sample ID: 15MW74

Lab Sample ID: 400-59579-2

Date Collected: 09/21/11 09:23

Matrix: Water

Date Received: 09/22/11 14:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			140232	09/26/11 12:09	KN	TAL PEN
Total/NA	Analysis	6010B		1	140467	09/27/11 16:42	JH	TAL PEN

Client Sample ID: 15GR66R

Lab Sample ID: 400-59579-3

Date Collected: 09/21/11 09:47

Matrix: Water

Date Received: 09/22/11 14:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			140232	09/26/11 12:09	KN	TAL PEN
Total/NA	Analysis	6010B		1	140467	09/27/11 16:46	JH	TAL PEN

Client Sample ID: 15GR65R

Lab Sample ID: 400-59579-4

Date Collected: 09/21/11 10:42

Matrix: Water

Date Received: 09/22/11 14:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			140232	09/26/11 12:09	KN	TAL PEN
Total/NA	Analysis	6010B		1	140467	09/27/11 16:49	JH	TAL PEN

Client Sample ID: 15GR03RR

Lab Sample ID: 400-59579-5

Date Collected: 09/21/11 11:15

Matrix: Water

Date Received: 09/22/11 14:15

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared Or Analyzed	Analyst	Lab
Total/NA	Prep	3010A			140232	09/26/11 12:09	KN	TAL PEN
Total/NA	Analysis	6010B		1	140467	09/27/11 16:52	JH	TAL PEN

Laboratory References:

TAL PEN = TestAmerica Pensacola, 3355 McLemore Drive, Pensacola, FL 32514, TEL (850)474-1001

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Method: 6010B - Arsenic

Lab Sample ID: MB 400-140232/23-A
Matrix: Water
Analysis Batch: 140467

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 140232

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0040	U	0.0050	0.0040	mg/L		09/26/11 12:09	09/27/11 19:45	1

Lab Sample ID: LCS 400-140232/24-A
Matrix: Water
Analysis Batch: 140467

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 140232

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	% Rec	% Rec. Limits
Arsenic	1.00	0.949		mg/L		95	80 - 120

Lab Sample ID: 400-59637-A-1-B MS
Matrix: Water
Analysis Batch: 140467

Client Sample ID: Matrix Spike
Prep Type: Total/NA
Prep Batch: 140232

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	% Rec	% Rec. Limits
Arsenic	0.040		1.00	1.02		mg/L		98	75 - 125

Lab Sample ID: 400-59637-A-1-C MSD
Matrix: Water
Analysis Batch: 140467

Client Sample ID: Matrix Spike Duplicate
Prep Type: Total/NA
Prep Batch: 140232

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	% Rec	% Rec. Limits	RPD	RPD Limit
Arsenic	0.040		1.00	1.02		mg/L		98	75 - 125	0	20

Metals

Prep Batch: 140232

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
400-59579-1	15MW72	Total/NA	Water	3010A	
400-59579-2	15MW74	Total/NA	Water	3010A	
400-59579-3	15GR66R	Total/NA	Water	3010A	
400-59579-4	15GR65R	Total/NA	Water	3010A	
400-59579-5	15GR03RR	Total/NA	Water	3010A	
400-59637-A-1-B MS	Matrix Spike	Total/NA	Water	3010A	
400-59637-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	3010A	
LCS 400-140232/24-A	Lab Control Sample	Total/NA	Water	3010A	
MB 400-140232/23-A	Method Blank	Total/NA	Water	3010A	

Analysis Batch: 140467

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
400-59579-1	15MW72	Total/NA	Water	6010B	140232
400-59579-2	15MW74	Total/NA	Water	6010B	140232
400-59579-3	15GR66R	Total/NA	Water	6010B	140232
400-59579-4	15GR65R	Total/NA	Water	6010B	140232
400-59579-5	15GR03RR	Total/NA	Water	6010B	140232
400-59637-A-1-B MS	Matrix Spike	Total/NA	Water	6010B	140232
400-59637-A-1-C MSD	Matrix Spike Duplicate	Total/NA	Water	6010B	140232
LCS 400-140232/24-A	Lab Control Sample	Total/NA	Water	6010B	140232
MB 400-140232/23-A	Method Blank	Total/NA	Water	6010B	140232

Chain of Custody Record

400-59579

Lab Report No.:

Company: AEROSTAR	**Gulf Coast LabNet, Inc.** An Environmental Lab Services Co.	Modified from DEP Form #: 62-770.900(2) — Page 1 of 1
Address: 803 GOVT. ST., STE. A MOBILE, AL 36602	Phone: (251) 625-1331 Fax: (251) 625-1299	FDEP Facility No.:
		Project Name: NAS PENSACOLA
		Location: OU 04
		Project No.:

Attn: CURTIS MILLS Phone: Fax:

Sampled by [Print Name]/Affiliation: Sampler Signature:

Item No.	Field ID No.	Sampled Date	Sampled Time	Grab or Comp.	Matrix Codes	No. Cont.	2 (6010 ARSENIC)	←Preservative / ←Analysis	REQUESTED DUE DATE	Remarks	Lab. No.
1	15MW72	9/21/11	0858	Grab	GW	1	X				
2	15MW74	9/21/11	0923	Grab	GW	1	X				
3	15GR66R	9/21/11	0947	Grab	GW	1	X				
4	15GR60R	9/21/11	1042	Grab	GW	1	X				
5	15GR03RR	9/21/11	1115	Grab	GW	1	X				

Shipment Method: 5 ←Total Number of Containers

Out: / / Via:

Returned: / / Via:

Additional Comments

Item #	Relinquished by / Affiliation	Date	Time	Accepted by / Affiliation	Date	Time
	EMPTY CONTAINERS	9-21-11	0700	AES	9/21/11	0700
	AES	9/21/11	1315	GCL	9-21-11	1315
	GCL	9-22-11	1100	GCL	9-22-11	100
		9-22-11	1415		9-22-11	14:15

Cooler No.(s) / Temperature(s) (°C)	Sampling Kit No.	Equipment ID No.
2.0°C	10633	

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) O = Other (specify)

PRESERVATIVE CODES: H = Hydrochloric acid + ice I = Ice only N = Nitric acid + ice S = Sulfuric acid + ice O = Other (specify)

09/29/2011

Login Sample Receipt Checklist

Client: Aerostar Environmental Services, Inc.

Job Number: 400-59579-1
SDG Number: Proj. OU04

Login Number: 59579
List Number: 1
Creator: Hor, Koma

List Source: TestAmerica Pensacola

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	N/A	
The cooler's custody seal, if present, is intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	2.0°C
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	True	

Certification Summary

Client: Aerostar Environmental Services, Inc.
Project/Site: NAS Pensacola

TestAmerica Job ID: 400-59579-1
SDG: Proj. OU04

Laboratory	Authority	Program	EPA Region	Certification ID
TestAmerica Pensacola	Alabama	State Program	4	40150
TestAmerica Pensacola	Arizona	State Program	9	AZ0710
TestAmerica Pensacola	Arkansas	State Program	6	88-0689
TestAmerica Pensacola	Florida	NELAC	4	E81010
TestAmerica Pensacola	Georgia	Georgia EPD	4	N/A
TestAmerica Pensacola	Illinois	NELAC	5	200041
TestAmerica Pensacola	Iowa	State Program	7	367
TestAmerica Pensacola	Kansas	NELAC	7	E-10253
TestAmerica Pensacola	Kentucky	Kentucky UST	4	53
TestAmerica Pensacola	Louisiana	NELAC	6	30976
TestAmerica Pensacola	Maryland	State Program	3	233
TestAmerica Pensacola	Massachusetts	State Program	1	M-FL094
TestAmerica Pensacola	Michigan	State Program	5	9912
TestAmerica Pensacola	New Hampshire	NELAC	1	2505
TestAmerica Pensacola	New Jersey	NELAC	2	FL006
TestAmerica Pensacola	North Carolina	North Carolina DENR	4	314
TestAmerica Pensacola	Oklahoma	State Program	6	9810
TestAmerica Pensacola	Pennsylvania	NELAC	3	68-00467
TestAmerica Pensacola	Rhode Island	State Program	1	LAO00307
TestAmerica Pensacola	South Carolina	State Program	4	96026
TestAmerica Pensacola	Tennessee	State Program	4	TN02907
TestAmerica Pensacola	Texas	NELAC	6	T104704286-09-1
TestAmerica Pensacola	USDA	USDA		P330-10-00407
TestAmerica Pensacola	Virginia	NELAC	3	918
TestAmerica Pensacola	Washington	State Program	10	C915
TestAmerica Pensacola	West Virginia	West Virginia DEP	3	136

Accreditation may not be offered or required for all methods and analytes reported in this package. Please contact your project manager for the laboratory's current list of certified methods and analytes.

ANNUAL GROUNDWATER MONITORING REPORT
OPERABLE UNIT 13
(SITES 8 AND 24)
NAVAL AIR STATION PENSACOLA
PENSACOLA, ESCAMBIA COUNTY, FLORIDA

Contract No. N62467-03-G-0110
Contract Task Order No. 0009

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APRIL 2012

Curtis R. Mills, Project Manager — Date 4/10/12

Paul Fitch, P.E., Senior Project Engineer — Date 6 Apr 12

CERTIFICATION

PROFESSIONAL ENGINEER LICENSED IN THE STATE OF FLORIDA

This is to certify that the geological and hydrogeological features of the ***Annual Groundwater Monitoring Report, Operable Unit 13 (Sites 8 and 24), Naval Air Station Pensacola, Pensacola, Escambia County, Florida*** have been examined by the undersigned.

Signed: _____

Paul Fitch, P.E.
State of Florida License No. 57447
Date Signed: 6 Apr 12

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1.0 INTRODUCTION

Aerostar Environmental Services, Inc. (AEROSTAR) has prepared the Annual Groundwater Monitoring Report, Year 2011 for Operable Unit (OU) 13 (Sites 8 and 24), Naval Air Station (NAS) Pensacola, Pensacola, Florida, hereafter referred to as the site. This report was prepared for the United States Navy, Naval Facilities Engineering Command, Southeast Division (NAVFAC SE) under Contract Task Order (CTO) 0009 for one year of annual groundwater monitoring. This report summarizes the year 2011 annual groundwater sampling event under Basic Order Agreement (BOA) Contract No. N62467-03-G-0110 Task Order 0009.

1.1 Site Description and History

NAS Pensacola is located in Escambia County, approximately five miles west of the Pensacola city limits. The approximate 5,000-acre installation was constructed in the 1800s. Prior to construction, the facility was undeveloped and sparsely vegetated. Land use at NAS Pensacola consists of various military housing, training, and support facilities, as well as large industrial complexes for major repairs and refurbishment of aircraft frames and engines.

OU13 is comprised of Site 8 (Rifle Range Disposal Area) and Site 24 (DDT Mixing Area) that border the eastern side of John H. Tower Road and are southeast of the intersection of John H. Tower and Taylor Roads. A Street Site Location Map is presented as Figure 1.

Site 8 is an approximate 450 by 600 foot area currently occupied by Building 3561, which houses the NAS Pensacola Public Works Center Maintenance/Material Department. Site 8 includes the paved area around the building along with several office trailers, fenced storage areas, and a parking lot. Most of Site 8 is surrounded by a chain-link fence. Site 8 contained a refuse disposal/burning area and a rifle range during the 1950s and 1960s. Building 3561 was constructed in 1976. During the 1980s, there was a pesticide storage and equipment rinsing area on the east side of the building.

Site 24 is immediately north of Building 3561 and Site 8. The northern and central portion of the site is encompassed by the Barrancas National Cemetery and contains many grave sites. The southern portion is primarily unpaved and sparsely covered with grass and trees. The southern portion contains a fenced storage area with a gravel and crushed shell surface. An unimproved dirt road runs east to west across the southern portion of the site. Site 24 was once used as a pesticide

mixing and handling area. A Site Map showing the approximate DDT mixing area, refuse/disposal area, and equipment rinsing area is presented as Figure 2.

2.0 BACKGROUND

From the early 1950s until the early 1960s, Site 24 was used to mix dichlorodiphenyltrichloroethane (DDT) with diesel fuel for mosquito control. DDT reportedly was spilled in the mixing area while being transferred from drums to spray tanks, potentially contaminating the soil and groundwater. DDT was aerially applied for at least 10 years to control mosquito outbreaks. In subsequent years, DDT was applied via a fogger machine. On the average, two or three mosquito outbreaks occurred each year during the spring and summer. Following each outbreak, DDT generally was applied for a one week period (EnSafe 2000). For each application, 500 gallons of 20 percent DDT solution was mixed with 300 gallons of diesel fuel. An estimated 20 gallons of the 20 percent solution may have been spilled during the approximate 10-year period of DDT mixing at the site (Naval Environmental Support Activity, 1983). No other pesticides have been reported as being stored and used at this site. The possible DDT mixing area is shown in Figure 2.

In 1991, Ecology & Environment, Inc., completed a Phase I investigation to identify areas with contaminants of potential concern. Soil and groundwater samples were collected during the investigation and submitted for laboratory analysis. Lead, total recoverable petroleum hydrocarbons (TRPHs), polynuclear aromatic hydrocarbons (PAHs), and the carbamate pesticide, fluormeturon, were detected in soil. Metals, tetrachloroethene, and the carbamate pesticide methomyl, were detected in groundwater. DDT was not detected. As a result, additional assessment was recommended at Site 24 (EnSafe, 2000).

Between 1995 and 1997, preliminary site characterization was performed under the authority of the U.S. Navy Comprehensive Long-Term Environmental Action Navy (CLEAN) program. Soil and groundwater samples were analyzed for the full target analyte list/target compound list (TAL/TCL). These analyses included TCL volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), TCL pesticides, TCL polychlorinated biphenyls (PCBs), TAL metals (unfiltered for groundwater), and TAL cyanide. The investigation was raised to Remedial Investigation (RI) status after the analytical results showed preliminary remediation goal exceedances for metals, SVOCs, and pesticides at several locations (EnSafe, 1999).

The results of the RI identified four soil contamination areas at Site 24 in the vicinity of samples 24S01, 24S10, 24S11, and 24S12. Initially, dieldrin was identified as a chemical of concern (COC) based on an exceedance of the then target concentrations of 0.001 milligrams per kilogram (mg/kg). However, the remediation goal for dieldrin in subsurface soil subsequently was changed to the

leachability-based Florida Soil Cleanup Target Level (SCTL) of 0.004 mg/kg. Consequently, the dieldrin concentration detected in sample 24S01 no longer exceeded the cleanup level for dieldrin. Samples 24S10 and 24S12 still exceeded the subsurface SCTL for dieldrin. Samples 24S10 also exceeded the surface soil remedial goals for arsenic and benzo(a)pyrene and sample 24S11 exceeded the surface soil remediation goal for arsenic.

Between 1995 and 1996, groundwater samples collected from temporary wells at the site did not reveal the presence of benzo(a)pyrene. Only the sample collected from 24GS01 (located at former boring (24S01) exceeded the applicable Preliminary Remediation Goal (PRG) of 0.10 micrograms per liter (ug/L) for dieldrin during the RI (0.26 ug/L and 0.34 ug/L). Samples collected from wells 24GS01 and 24GS03 (located at former boring 24S03) exhibited dieldrin in excess of the current RG of 0.005 ug/L. Both of these temporary wells were located on the western portion of the property. The sample collected from temporary well 24GS03 also exhibited an arsenic concentration of 10.6 ug/L. This concentration did not exceed the applicable RG of 50 ug/L during the RI; however, it slightly exceeds the new federal maximum contaminant level (MCL) of 10 ug/L. The location of former monitor well 24GS03 is shown in Figure 3.

Site 8 was formerly a base rifle range and disposal area. Various solid waste and dry refuse were reportedly placed in trenches and burned there during the late 1950s and 1960s (EnSafe, 2000). Aerial photographs and maps from the 1950s and 1960s show a rifle range at the current location of Building 3561. Earlier aerial photographs show an excavation at the northern end of the rifle range, while later photographs show the excavated area overgrown with vegetation (EnSafe, 2000). Most of the excavation noted in the earlier photographs is currently covered by Building 3561 and the surrounding paved area, which were covered in the mid 1970s. Facility personnel reported no waste or residue was identified during the building's construction (Naval Energy and Environmental Support Activity [NEESA], 1983); however, cemetery personnel have reported finding buried metal, rubber, and plastic aircraft parts during excavation along Site 24's eastern boundary (Montgomery, 1996). The approximate location of the refuse/burning area is shown in Figure 2.

An Initial Assessment Study, completed by NEESA in 1983, evaluated Site 8 based on information from historical records, field inspections, and interviews with NAS Pensacola personnel. No evidence of hazardous waste disposal was identified at Site 8. During RI activities conducted by EnSafe in 1996, two soil contamination areas were identified beneath the asphalt pavement at Site 8 in the vicinity of previous sample locations at 08S01 and 08S03. Sample 08S01 was taken from the western side of Building 3561 and sample 08S03 was taken adjacent to the eastern side of

Building 3561. It was determined that sample 08S01 exhibited cadmium levels at 10.9 mg/kg at 4 to 6 feet below land surface (ft bls) and 15.9 mg/kg at 7 to 9 ft BLS. Both of the samples exceeded the preliminary remediation goal (PRG) of 6.0 mg/kg applicable during the investigation. The PRG was the lower of the USEPA Region 3 preliminary remediation goal or the Florida Department of Environmental Protection (FDEP) cleanup goal. In addition, sample 08S03 exhibited a dieldrin concentration of 2.01 mg/kg in surface soil and 0.49 mg/kg (5 to 7 feet) and 0.134 mg/kg (9 to 11 feet bls) in subsurface soil.

Between 1996 and 1997, groundwater samples collected from temporary monitoring wells at Site 8 did not reveal the presence of dieldrin. The PRG for dieldrin in groundwater during the RI was 0.1 ug/L. Cadmium was detected in four temporary wells ranging from 19 to 32 ug/L, all above the applicable FDEP primary drinking water standard of 5 ug/L for cadmium.

In 2001, EnSafe submitted a Record of Decision (ROD), which proposed the removal of soil to industrial criteria with Land Use Controls (LUCs). However, in an effort to remove the land use restrictions on soil at the site and achieve residential soil cleanup goals, EnSafe performed a statistical evaluation of the data using FDEPs “use of the 95% Upper Confidence Level (UCL)” in Developing Exposure Point Concentrations of Contaminants in Soil. Based on this statistical analysis, the new interim action would remove “hot spots” to residential criteria and no LUCs would be required for soil. An Interim Removal Action (IRA) was recommended at OU13 to remove soil to residential criteria to minimize human health and ecological risk.

From 2002 through 2003, CH2M HILL conducted IRA activities at OU13. The objective of the IRA was to excavate and properly dispose of contaminated soil. Before excavation activities, soil and groundwater samples were collected to delineate or confirm the presence of cadmium and dieldrin at Site 8. In addition, CH2M HILL installed groundwater monitor wells and collected groundwater samples to evaluate whether the constituents detected in soil affected groundwater.

On August 13 and 14, 2002, CH2M HILL collected two soil samples at Site 8 near former RI sample 08S01 for the source delineation of cadmium. Subsurface soil samples were collected in intervals from 5 to 7 feet BLS and 10 to 12 feet BLS. Of the eight initial subsurface samples collected and analyzed for cadmium, no samples exceeded the residential direct exposure RG of 75 mg/kg or the leachability PRG of 8 mg/kg.

On August 13 and 14, 2002, CH2M HILL collected two groundwater samples and one duplicate sample. The groundwater samples were collected downgradient of the former samples at 08S01 and 08S03 at locations 08S104 NS 08s113, respectively. No detectable concentrations of cadmium or dieldrin were reported in the groundwater samples.

In October 2002, CH2M HILL submitted two technical memoranda, "Evaluation of Site Conditions based on Results of Soil and Groundwater Sampling, OU Site 13-Site 8" and "Evaluation of Site Conditions based on Soil and Groundwater Sampling, OU 13-Site 24." These memoranda provided details of the soil and groundwater sampling subsequent results. After review of these memoranda, the EPA and FDEP recommended further soil sampling using the synthetic precipitation leaching procedure (SPLP) method in the hot spot areas to evaluate whether the contaminants in the soil have the potential to leach into groundwater. In addition, it was recommended that permanent groundwater monitoring wells be installed and sampled to verify groundwater contamination in the hot spot areas.

From June through August 2003, three soil borings were advanced at intervals from 5 to 7 feet BLS and 7 to 9 feet BLS near RI sample 08S01 and analyzed for cadmium at Site 8. Cadmium concentrations ranged from 1.44 to 222 J (estimated) mg/kg, exceeding the residential direct exposure PRG of 75 mg/kg in one sample and the leachability PRG of 8 mg/kg in two samples. In addition, one of four samples collected from 7 to 9 feet BLS and analyzed for cadmium using SPLP methodology exceeded the GCTL of 5 µg/L, with a concentration of 257 µg/L.

Additionally, in an effort to evaluate the leachable properties of the dieldrin contamination in the vicinity of RI sample 08S03, three surface (0 to 1 feet BLS) and three subsurface (5 to 7 feet BLS) soil samples were collected and analyzed for dieldrin. None of the surface soil samples exceeded the residential direct exposure PRG of 0.21 mg/kg and none of the three subsurface soil samples analyzed for dieldrin exceeded the residential or leachablility PRGs. Additionally, all three surface samples and two of the three subsurface soils collected and analyzed for dieldrin using SPLPP methodology exceeded the Groundwater Cleanup Target Level (GCTL) of 0.002 µg/L.

In the dieldrin-impacted area east of Building 3561, dieldrin was previously delineated to the residential soil RG, but was not delineated to the leachability PRG. Therefore, CH2M HILL remobilized in April 2004 to collect additional samples to the north, east, and west of sample 08S10. Delineation was accomplished by collecting a total of 17 samples from 9 borings in the vicinity of former sample 08S110. Samples collected 10, 20, and 25 ft north of sample 08S110 either

exceeded the leachability PRG (0.005 mg/kg) or failed SPLP (SPLP result greater than the groundwater PRG of 0.004 µg/L). One sample east of 08S110 also failed the leachability criteria from 0 to 1 feet BLS.

From June 28 through August 25, 2004, CH2M HILL conducted IRAs at OU13. The objective of the IRA was to remove contaminated soil at Site 8. Delineation samples were collected and the remedial volume was calculated for the protection of human health and protection of groundwater from leachable contaminants. An estimated area of 1,075 square feet to 10 feet depth was identified at location 08S01 to address cadmium contamination. The volume was approximately 634 cubic yards. Approximately 429 cubic yards of dieldrin contaminated soil was removed in the area of 08S110, west of Building 3561. The backfill material was analyzed and determined to be clean fill.

In 2006, a ROD for site OU13 and was approved by FDEP and USEPA. The selected remedy specified in the ROD was no action for soils, Land Use Controls (LUCs) for groundwater and long-term groundwater monitoring.

AEROSTAR was contracted by the Naval Facilities Engineering Command, Southeast (Division) on September 26, 2007 under Contract Task Order (CTO) N62467-03-G-0110-0009, to perform long term groundwater monitoring at OU 13 Sites 8 and 24, NAS Pensacola, Florida.

On December 17, 2007, AEROSTAR replaced monitoring wells 08GR01, 08GR03, 08GS06, 24GS02, 24GS06, and 24GS09 with monitoring wells 08GR01R, 08GR03R, 08GS06R, 24GS02R, 24GS06R, and 24GS09R (The original monitoring wells had been damaged or destroyed). All wells were installed to twenty (20) feet below ground surface (BGS) and completed with flush mounted covers. Monitoring wells 08GR01, 08GR03, 08GS06, 24GS02, 24GS06, and 24GS09 were abandoned in accordance with the contract, dated September 26, 2007, and the guidelines established in the Northwest Florida Water Management District Chapter 402-C, Florida Administrative Code (FAC) for Water Wells.

AEROSTAR conducted groundwater sampling activities from November 2007 to October 2010. The groundwater flow direction has consistently been to the northwest. VOC concentrations have been detected below the respective FDEP GCTLs since March 2009, with the exception of bromodichloromethane during the October 2010 sampling event. Antimony, Cadmium, Iron, and Manganese concentrations have consistently exceeded the respective FDEP GCTLs since

November 2007. Pesticide concentrations have consistently been detected below the respective FDEP GCTLs since November 2007.

3.0 SITE ASSESSMENT ACTIVITIES

This section describes the field tasks completed on October 27 and 28, 2011 and January 13, 2012. Field tasks included measuring the depth to groundwater, collecting groundwater samples from twelve (12) monitor wells, and surveying the monitor well top of casing elevations by a Professional Land Surveyor (PLS). Monitor well locations are shown in Figure 3. The following sections detail the scope of work for the assessment activities conducted at the site.

3.1 Groundwater Elevation Measurements

AEROSTAR mobilized to the site on October 27, 2011, to collect depth-to-water (DTW) measurements from groundwater monitor wells 08GR01R, 08GR02R, 08GR03R, 08GR05, 08GR06R, 24GS01, 24GS02R, 24GS06R, 24GS09R, 24GS10R, 24GS11, and 24GS15. Prior to gauging the depths-to-water, the well caps were removed and the water levels were allowed to stabilize for at least 15 minutes. The DTW was measured to the nearest 0.01' using an electronic water level indicator and recorded on a groundwater sampling log. A DTW measurement was not collected from monitor well 24GS02 due to a blockage in the well at 10.5 feet below land surface (BLS). The estimated direction of groundwater flow is discussed in Section 4.1.

At the request of NAVFAC SE to verify the direction of groundwater flow at the site, AEROSTAR had the monitor well top of casing elevations resurveyed by a PLS. On January 13, 2012, Southeastern Surveying of Chipley, Florida mobilized to the site to survey the horizontal and vertical locations of the 12 monitor wells located at the site. The resurveyed top of casing elevations were used to determine the groundwater flow direction during the October 2011 sampling event. Horizontal and vertical locations and a site map provided by the PLS are included in Appendix A.

3.2 Groundwater Sample Collection

AEROSTAR collected groundwater samples on October 27 and 28, 2011 from monitor wells 08GR01R, 08GR02R, 08GR03R, 08GR05, 08GR06R, 24GS01, 24GS06R, 24GS09R, 24GS10R, 24GS11, and 24GS15 to evaluate groundwater quality. A sample was not collected from monitor well 24GS02 due to a blockage in the well at 10.5 feet BLS. The groundwater samples were collected utilizing a variable speed peristaltic pump. Groundwater sampling procedures were conducted in accordance with the guidelines established in the Work Plan and the FDEP Standard Operating Procedures (SOP)-01/01, revision date June 8, 2004. The groundwater samples were transferred into the appropriate laboratory supplied sample containers, placed on ice, and delivered

under chain-of-custody, to Xenco Laboratories of Boca Raton, Florida, a Navy-approved laboratory for analyses per EPA Method 8270 for PAHs, EPA Method 8260B for VOCs, EPA Method 6010B for antimony, cadmium, iron, lead, manganese, nickel, and thallium, and EPA Method 8081A for pesticides.

The FDEP groundwater sampling logs are included in Appendix B. The results of the groundwater laboratory analyses are detailed in Section 4.2.

4.0 RESULTS OF THE SITE ASSESSMENT

4.1 Groundwater Flow Direction

DTW measurements were collected from 11 monitoring wells on October 27, 2011. DTW and total depth of each monitor well were recorded and are presented in Table 1. DTW measurements were subtracted from the corresponding top of casing elevations for each well to derive groundwater elevations from which to create a groundwater contour map. The groundwater flow direction is towards the north northeast, which is not consistent with recent groundwater flow data. The change in the groundwater flow direction is likely due to the top of casing elevations provided in the January 2012 survey. Figure 4 illustrates the groundwater flow direction for the October 2011 monitoring event.

4.2 Groundwater Laboratory Analysis

Analytical results of the October 27 and 28, 2011 sampling event showed all pesticide concentrations were below laboratory MDLs in the groundwater samples collected during this event.

Chloroform was detected in the groundwater samples collected from monitor wells 24GS06R, 24GS09R, and 24GS10R at concentrations of 2.80 µg/L, 3.44 µg/L, and 5.28 µg/L, respectively which are below the FDEP GCTL of 70 µg/L.

Cis-1,2-dichloroethylene was detected in the groundwater sample collected in the groundwater sample collected from monitor well 08GR01R, which is below the FDEP GCTL of 70 µg/L.

Metheylene chloride was detected in the groundwater samples collected from monitor wells 08GR02R, 08GR05, 24GS09R, 24GS11, and 24GS15 at concentrations of 0.8 µg/L, 0.83 µg/L, 0.83 µg/L, 0.75 µg/L, and 0.78 µg/L, respectively, which are below the FDEP GCTL of 5 µg/L.

Tetrachloroethylene was detected in the groundwater samples collected from monitor wells 08GR02R and 08GR05 at concentrations of 0.59 µg/L and 0.98 µg/L, respectively, which are below the FDEP GCTL of 3 µg/L.

Trichloroethylene was detected in the groundwater sample collected from monitor well 08GR01R at a concentration of 0.65 µg/L, which is below the FDEP GCTL of 3 µg/L.

All other VOC concentrations were below laboratory MDLs in the groundwater samples collected

during this event.

Antimony was detected in the groundwater sample collected from monitor well 24GS09R at a concentration of 0.0624 milligrams per liter (mg/L), which is above the FDEP GCTL of 0.006 mg/L.

Cadmium was detected in the groundwater samples collected from monitor wells 08GR01R, 08GR02R, 08GR03R, and 08GR05 at concentrations of 0.0164 mg/L, 0.0238 mg/L, 0.00096 mg/L, and 0.00042 mg/L, respectively. Cadmium exceeded the FDEP GCTL of 0.005 mg/L in the groundwater samples collected from monitor wells 08GR01R (0.0164 mg/L) and 08GR02R (0.0238 mg/L).

Iron was detected in groundwater samples collected from monitor wells 08GR01R, 08GR02R, 08GR03R, 08GR05, 08GR06R, 24GS01, 24GS06R, 24GS09R, 24GS10R, 24GS11, and 24GS15 at concentrations 0.141 mg/L, 0.668 mg/L, 0.47 mg/L, 0.106 mg/L, 1.21 mg/L, 0.194 mg/L, 0.159 mg/L, 0.583 mg/L, 1.63 mg/L, 0.792 mg/L, and 0.0772 mg/L, respectively, which are below the FDEP GCTL of 1.707 mg/L.

Lead was detected in the groundwater samples collected from monitor wells 08GR03R, 08GR06R, 24GS06R, 24GS09R, 24GS10R, and 24GS11 at concentrations of 0.00058 mg/L, 0.00241 mg/L, 0.00022 mg/L, 0.00099 mg/L, 0.00094 mg/L, and 0.00054 mg/L, respectively, which are below the FDEP GCTL of 0.015 mg/L.

Manganese was detected in the groundwater samples collected from monitor wells 08GR01R, 08GR02R, 08GR03R, 08GR05, 08GR06R, 24GS01, 24GS06R, 24GS10R, 24GS11, and 24GS15 at concentrations of 0.133 mg/L, 0.181 mg/L, 0.00377 mg/L, 0.0265 mg/L, 0.0032 mg/L, 0.141 mg/L, 0.00186 mg/L, 0.0022 mg/L, 0.00646 mg/L, 0.00284 mg/L, and 0.00797 mg/L, respectively. Manganese exceeded the FDEP GCTL of 0.05 mg/L in the groundwater samples collected from monitor wells 08GR01R (0.133 mg/L), 08GR02R (0.181 mg/L), and 24GS01 (0.141 mg/L).

Nickel was detected in the groundwater samples collected from monitor wells 08GR01R, 08GR02R, 08GR05, 08GR06R, 24GS10R, and 24GS15 at concentrations of 0.00266 mg/L, 0.00288 mg/L, 0.00572 mg/L, 0.00168 mg/L, 0.00077 mg/L and 0.00238 mg/L, respectively, which are below the FDEP GCTL of 0.1 mg/L.

Thallium was detected in the groundwater samples collected from monitor wells 08GR01R, 08GR02R, 08GR03R, 08GR06R, and 24GS10R at concentrations of 0.0.00025 mg/L, 0.00012

mg/L, 0.00005 mg/L, 0.00005 mg/L, and 0.00035 mg/L, respectively, which are below the FDEP GCTL of 0.002 mg/L.

All other metal concentrations were below laboratory MDLs during the sampling event.

The results of the groundwater laboratory analysis are summarized in Tables 2 and 3; and illustrated in Figures 5 through 7. Historical analytical data of detected concentrations dating back to November 2007 is summarized in Tables 4, 5, and 6. The laboratory analytical results with appropriate chain-of-custody records are included in Appendix C.

5.0 SUMMARY AND RECOMMENDATIONS

AEROSTAR conducted groundwater sampling activities on October 27 and 28, 2011. Based on the findings of the investigation, AEROSTAR presents the following:

- The groundwater flow direction on October 27, 2011 was to the north northeast.
- All pesticide concentrations were either below laboratory MDLs or the respective FDEP GCTLs in the groundwater samples collected during this event.
- All VOC concentrations were either below laboratory MDLs or the respective FDEP GCTLs in the groundwater samples collected during this event.
- Antimony was detected above the FDEP GCTL of 0.006 mg/L in the groundwater sample collected from monitor well 24GS09R (0.0624 mg/L).
- Cadmium was detected above the FDEP GCTL of 0.005 mg/L in the groundwater samples collected from monitor wells 08GR01R (0.0164 mg/L) and 08GR02R (0.0238 mg/L).
- Manganese was detected above the FDEP GCTL of 0.05 mg/L in the groundwater samples collected from monitor wells 08GR01R (0.133 mg/L), 08GR02R (0.181 mg/L), and 24GS01 (0.141 mg/L).

Excluding bromodichloromethane from the October 2011 sampling event, VOC concentrations have been either below laboratory MDLs or the respective FDEP GCTLs since October 2008. Pesticide concentrations have been either below the laboratory MDLs or the respective FDEP GCTLs since April 2008. Antimony, cadmium, iron, and manganese have consistently been detected at concentrations above the respective FDEP GCTLs at a select number of wells located at the site. However, iron concentrations did not exceed the FDEP GCTL in any of the samples collected during the October 2011 sampling event. AEROSTAR recommends reducing the groundwater monitoring plan to only include antimony, cadmium, iron, and manganese. All other analytes have consistently been detected below their respective FDEP GCTLs.

TABLES

TABLE 1
GROUNDWATER ELEVATION TABLE

Operable Unit 13 (Sites 8 and 24)
NAS Pensacola
Pensacola, Florida

WELL DESIGNATION		08GR01R			08GR02R			08GR03R			08GR05			08GR06R			24GS01	
DIAMETER		2	in.		2	in.		2	in.		2	in.		2	in.		2	in.
WELL DEPTH		18.90	feet		20.00	feet		18.97	feet		19.60	feet		20.00	feet		20.00	feet
SCREEN INTERVAL		8.9-18.9	feet		10.00-20.00	feet		8.97-18.97	feet		9.6-19.6	feet		10.00-20.00	feet		10.00-20.00	feet
TOC ELEVATION*		27.56	feet		27.74	feet		28.02	feet		28.15	feet		26.95	feet		25.22	feet
DATE	ELEV*	DTW	LNAPL	ELEV*	DTW	LNAPL	ELEV*	DTW	LNAPL	ELEV*	DTW	LNAPL	ELEV*	DTW	LNAPL	ELEV*	DTW	LNAPL
11/20/2007	--	--	--	17.13	10.61	--	--	--	--	17.30	10.85	--	--	--	--	--	--	--
12/18/2007	17.54	10.02	--	17.12	10.62	--	17.37	10.65	--	17.33	10.82	--	17.67	9.28	--	17.35	7.87	--
4/24/2008	17.96	9.60	--	17.78	9.96	--	17.82	10.2	--	17.60	10.55	--	18.17	8.78	--	17.45	7.77	--
10/13/2008	17.33	10.23	--	17.22	10.52	--	17.12	10.9	--	17.05	11.10	--	17.58	9.37	--	17.02	8.20	--
3/30/2009	16.46	11.10	--	16.42	11.32	--	16.27	11.75	--	17.25	10.90	--	16.60	10.35	--	16.42	8.80	--
10/15/2009	16.76	10.80	--	16.71	11.03	--	16.51	11.51	--	16.44	11.71	--	16.99	9.96	--	16.67	8.55	--
3/16/2010	20.14	7.42	--	20.06	7.68	--	20.02	8.0	--	19.97	8.18	--	20.44	6.51	--	19.97	5.25	--
10/13/2010	18.81	8.75	--	18.63	9.11	--	18.67	9.35	--	18.40	9.75	--	19.20	7.75	--	18.27	6.95	--
10/27/2011	15.54	12.02	--	15.42	12.32	--	15.41	12.61	--	15.20	12.95	--	15.80	11.15	--	15.17	10.05	--

WELL DESIGNATION		24GS02R			24GS06R			24GS09R			24GS10			24GS11			24GS15			24GS10R	
DIAMETER		2	in.		2	in.		2	in.		2			2	in.		2	in.		2	in.
WELL DEPTH		19.00	feet		19.35	feet		19.45	feet		17.00			16.85	feet		10.35	feet		16.72	feet
SCREEN INTERVAL		9.0-19.0	feet		9.35-19.35	feet		9.45-19.45	feet		6.5-16.5			6.85-16.85	feet		5.35-10.35	feet		6.72-16.72	feet
TOC ELEVATION*		25.77	feet		27.76	feet		26.67	feet		24.89			24.65	feet		24.42	feet		25.52	feet
DATE	ELEV*	DTW	LNAPL	ELEV*	DTW	LNAPL	ELEV*	DTW	LNAPL				ELEV*	DTW	LNAPL	ELEV*	DTW	LNAPL	ELEV*	DTW	LNAPL
11/20/2007	--	--	--	--	--	--	--	--	--	--	--	--	15.2	9.45	--	15.32	9.10	--	--	--	--
12/18/2007	17.25	8.52	--	17.74	10.02	--	17.10	9.57	--	15.39	9.50	--	15.22	9.43	--	15.31	9.11	--	--	--	--
4/24/2008	17.48	8.29	--	17.86	9.90	--	17.27	9.40	--	--	--	--	16.86	7.79	--	16.97	7.45	--	--	--	--
10/13/2008	17.02	8.75	--	17.50	10.26	--	16.86	9.81	--	DESTROYED			16.68	7.97	--	16.76	7.66	--	16.77	8.75	--
3/30/2009	16.36	9.41	--	17.85	9.91	--	16.25	10.42	--	DESTROYED			16.08	8.57	--	16.16	8.26	--	16.15	9.37	--
10/15/2009	16.58	9.19	--	17.11	10.65	--	16.45	10.22	--	DESTROYED			16.45	8.20	--	16.55	7.87	--	16.52	9.00	--
3/16/2010	19.92	5.85	--	20.39	7.37	--	19.78	6.89	--	DESTROYED			19.47	5.18	--	19.57	4.85	--	19.72	5.80	--
10/13/2010	18.35	7.42	--	18.71	9.05	--	18.12	8.55	--	DESTROYED			17.70	6.95	--	17.81	6.61	--	17.87	7.65	--
10/27/2011	BLOCKAGE IN WELL			15.08	12.68	--	15.02	11.65	--	DESTROYED			14.79	9.86	--	14.86	9.56	--	14.87	10.65	--

BGS = Below Ground Surface
AMSL = Above Mean Sea Level based on an estimated site elevation of 25 feet amsl
NE=Not Encountered
NA-No Data Available
NS-Monitor well not measured because monitor well is not in the work plan
**Top Of Casing elevations taken from survey conducted January 2012*
from August 10, 2006.
Replacement wells 08GR01R, 08GR03R, 08GS06, 24GS02R, 24GS06R, and 24GS09R were installed on December 17, 2007

TABLE 2
GROUNDWATER MONITORING WELL ANALYTICAL SUMMARY
VOLATILE ORGANIC AROMATICS
(OCTOBER 27 & 28, 2011)

Sample ID			08GR01R	08GR02R	08GR03R	08GR05	08GR06R	24GS01	24GS06R	24GS09R	24GS10R	24GS11	24GS15
FIELD DATA													
Date Well Sampled			10/27/2011	10/27/2011	10/27/2011	10/27/2011	10/27/2011	10/28/2011	10/28/2011	10/28/2011	10/28/2011	10/28/2011	10/28/2011
Depth-to-Water (ft, BTOC)			12.15	12.57	12.66	12.98	11.21	10.11	12.71	11.7	10.68	9.92	9.6
Depth-to-Product (ft, BTOC)			--	--	--	--	--	--	--	--	--	--	--
Temperature (ºC)			28.1	25.9	26.2	25.6	23.6	23.1	25.1	25.8	22.5	22.9	23.2
Conductivity (µS/cm)			638	278	359	349	88.8	821	101.8	284	178.7	127.2	387
pH			6.15	5.87	5.98	5.65	5.78	6.72	5.51	6.24	5.75	5.59	5.99
Turbidity (NTU)			5.02	4.29	7.32	7.43	7.04	1.27	6.42	9.83	16.60	15.7	5.29
Dissolved Oxygen (ppm)			0.34	0.22	0.20	0.20	0.19	0.56	0.52	0.49	1.02	0.65	0.69
LABORATORY ANALYSES	Units	FDEP											
Volatile Organic Aromatics (Method 8260B)													
1,1,1,2-Tetrachloroethane - 630-20-6	µg/L	**1.3**	<0.280	<0.280	<0.280	<0.280	<0.280	<0.280	<0.280	<0.280	<0.280	<0.280	<0.280
1,1,1-Trichloroethane - 71-55-6	µg/L	**200**	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310
1,1,2,2-Tetrachloroethane - 79-34-5	µg/L	**0.2**	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420
1,1,2-Trichloroethane - 79-34-5	µg/L	**1.3**	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410
1,1-Dichloroethane - 75-34-3	µg/L	**70**	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310
1,1-Dichloroethene - 75-35-4	µg/L	**7**	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330
1,1-Dichloropropene - 563-58-6	µg/L	*	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410	<0.410
1,2,3-Trichlorobenzene - 87-61-6	µg/L	**70**	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260
1,2,3-Trichloropropane - 96-18-4	µg/L	**0.02**	<0.590	<0.590	<0.590	<0.590	<0.590	<0.590	<0.590	<0.590	<0.590	<0.590	<0.590
1,2,4-Trichlorobenzene - 120-82-1	µg/L	**70**	<0.440	<0.440	<0.440	<0.440	<0.440	<0.440	<0.440	<0.440	<0.440	<0.440	<0.440
1,2,4-Trimethylbenzene - 95-63-6	µg/L	**10**	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140
1,2-Dibromo-3-Chloropropane - 96-12-8	µg/L	**0.2**	<1.43	<1.43	<1.43	<1.43	<1.43	<1.43	<1.43	<1.43	<1.43	<1.43	<1.43
1,2-Dichlorobenzene - 95-50-1	µg/L	**600**	<0.240	<0.240	<0.240	<0.240	<0.240	<0.240	<0.240	<0.240	<0.240	<0.240	<0.240
1,2-Dichloroethane - 107-06-2	µg/L	**3**	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270
1,2-Dichloropropane - 78-87-5	µg/L	**5**	<0.370	<0.370	<0.370	<0.370	<0.370	<0.370	<0.370	<0.370	<0.370	<0.370	<0.370
1,3,5-Trimethylbenzene - 108-67-8	µg/L	**10**	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
1,3-Dichlorobenzene - 541-73-1	µg/L	**210**	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190
1,3-Dichloropropane - 142-28-9	µg/L	*	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330
1,4-Dichlorobenzene - 106-46-7	µg/L	**75**	<0.360	<0.360	<0.360	<0.360	<0.360	<0.360	<0.360	<0.360	<0.360	<0.360	<0.360
2,2-Dichloropropane - 594-20-7	µg/L	*	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260
Methyl ethyl ketone - 78-93-3	µg/L	**4200**	<4.09	<4.09	<4.09	<4.09	<4.09	<4.09	<4.09	<4.09	<4.09	<4.09	<4.09
2-Chloroethyl Vinyl Ether - 110-75-8	µg/L	*	<0.510	<0.510	<0.510	<0.510	<0.510	<0.510	<0.510	<0.510	<0.510	<0.510	<0.510
2-Chlorotoluene - 95-49-8	µg/L	**140**	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300
2-Hexanone - 591-78-6	µg/L	**280**	<3.53	<3.53	<3.53	<3.53	<3.53	<3.53	<3.53	<3.53	<3.53	<3.53	<3.53
4-Chlorotoluene - 106-43-4	µg/L	**140**	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
4-Methyl-2-Pentanone - 108-10-1	µg/L	**560**	<2.76	<2.76	<2.76	<2.76	<2.76	<2.76	<2.76	<2.76	<2.76	<2.76	<2.76
Acetone - 67-64-1	µg/L	**6300**	<7.03	<7.03	<7.03	<7.03	<7.03	<7.03	<7.03	<7.03	<7.03	<7.03	<7.03
Acrolein - 107-02-8	µg/L	**3.5**	<3.51	<3.51	<3.51	<3.51	<3.51	<3.51	<3.51	<3.51	<3.51	<3.51	<3.51
Acrylonitrile - 107-13-1	µg/L	**0.06**	<2.32	<2.32	<2.32	<2.32	<2.32	<2.32	<2.32	<2.32	<2.32	<2.32	<2.32
Benzene - 71-43-2	µg/L	**1**	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260	<0.260
Bromobenzene - 108-86-1	µg/L	*	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390
Bromochloromethane - 74-97-5	µg/L	**91**	<0.480	<0.480	<0.480	<0.480	<0.480	<0.480	<0.480	<0.480	<0.480	<0.480	<0.480
Bromodichloromethane - 75-27-4	µg/L	**0.6**	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420
Bromoform - 75-25-2	µg/L	**4.4**	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340
Methyl bromide - 74-83-9	µg/L	**9.8**	<0870	<0.870	<0.870	<0.870	<0.870	<0.870	<0.870	<0.870	<0.870	<0.870	<0.870
Carbon Disulfide - 75-15-0	µg/L	**700**	<1.26	<1.26	<1.26	<1.26	<1.26	<1.26	<1.26	<1.26	<1.26	<1.26	<1.26
Carbon Tetrachloride - 56-23-5	µg/L	**3**	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140
Chlorobenzene - 108-90-7	µg/L	**100**	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270	<0.270
Chloroethane - 75-00-3	µg/L	**12**	<0.206	<0.206	<0.206	<0.206	<0.206	<0.206	<0.206	<0.206	<0.206	<0.206	<0.206
Chloroform - 67-66-3	µg/L	**70**	<0.620	<0.620	<0.620	<0.620	<0.620	<0.620	2.80 I	3.44 I	5.28	<0.620	<0.620
Methyl Chloride - 74-87-3	µg/L	**2.7**	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420	<0.420
cis-1,2-Dichloroethylene - 156-59-2	µg/L	**70**	0.420	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350
cis-1,3-Dichloropropene - 10061-01-5	µg/L	*	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
Dibromochloromethane - 124-48-1	µg/L	**0.4**	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350	<0.350
Methylene bromide - 74-95-3	µg/L	**70**	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470
Dichlorodifluoromethane - 75-71-8	µg/L	**1400**	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310
Ethylbenzene - 100-41-4	µg/L	**30**	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800	<0.0800
Hexachlorobutadiene - 87-68-3	µg/L	**0.4**	<0.560	<0.560	<0.560	<0.560	<0.560	<0.560	<0.560	<0.560	<0.560	<0.560	<0.560
Isopropylbenzene - 98-82-8	µg/L	**0.8**	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250	<0.250
m,p-Xylenes - 179601-23-1	µg/L	*	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470	<0.470
Methyl iodide - 74-88-4	µg/L	*	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Methylene Chloride - 75-09-2	µg/L	**5**	<0.750	0.800 I V	<0.750	0.830 I V	<0.750	<0.750	<0.750	0.830 I V	<0.750	0.750 I V	0.780 I V
MTBE - 1634-04-4	µg/L	**20**	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430
Naphthalene - 91-20-3	µg/L	**14**	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430	<0.430
n-Butylbenzene - 104-51-8	µg/L	*	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190	<0.190
n-Propylbenzene - 103-65-1	µg/L	*	<0.180	<0.180	<0.180	<0.180	<0.180	<0.180	<0.180	<0.180	<0.180	<0.180	<0.180
o-Xylene - 95-47-6	µg/L	*	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310
p-Cymene (p-Isopropyltoluene) - 99-87-6	µg/L	*	<0.230	<0.230	<0.230	<0.230	<0.230	<0.230	<0.230	<0.230	<0.230	<0.230	<0.230
Sec-Butylbenzene - 135-98-8	µg/L	*	<0.120	<0.120	<0.120	<0.120	<0.120	<0.120	<0.120	<0.120	<0.120	<0.120	<0.120
Styrene - 100-42-5	µg/L	**100**	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140	<0.140
tert-Butylbenzene - 98-06-6	µg/L	*	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Tetrachloroethylene - 127-18-4	µg/L	**3**	<0.590	<0.590	0.590 I	0.980 I	<0.590	<0.590	<0.590	<0.590	<0.590	<0.590	<0.590
Toluene - 108-88-3	µg/L	**40**	<0.490	<0.490	<0.490	<0.490	<0.490	<0.490	<0.490	<0.490	<0.490	<0.490	<0.490
trans-1,2-dichloroethylene - 156-60-5	µg/L	**100**	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340	<0.340
trans-1,3-dichloropropene - 10061-02-6	µg/L	*	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300	<0.300
Trichloroethylene - 79-01-6	µg/L	**3**	0.65 I	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390	<0.390
Trichlorofluoromethane - 75-69-4	µg/L	**2100**	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330	<0.330
Vinyl Acetate - 108-05-4	µg/L	**88**	<1.06	<1.06	<1.06	<1.06	<1.06	<1.06	<1.06	<1.06	<1.06	<1.06	<1.06
Vinyl Chloride - 75-01-4	µg/L	**1**	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310	<0.310

Notes:

All results in micrograms per liter (µg/L)

GCTL-Groundwater Cleanup Target Level

** There is no set GCTL*

FDEP = Florida Department of Environmental Protection (remediation endpoints)

Exceedances above the remediation endpoints are in bold

Data Qualifiers:

<=The analyte was below detection limits

I = The reportable value is between the laboratory method detection limit and the laboratory practical quantitation limit

NS=Not Sampled

TABLE 3
GROUNDWATER MONITORING WELL ANALYTICAL SUMMARY
METALS AND PESTICIDES
(October 27 & 28, 2011)

Sample ID			08GR01R	08GR02R	08GR03R	08GR05	08GR06R	24GS01	24GS06R	24GS09R	24GS10R	24GS11	24GS15
Date Well Sampled			10/27/2011	10/27/2011	10/27/2011	10/27/2011	10/27/2011	10/28/2011	10/28/2011	10/28/2011	10/28/2011	10/28/2011	10/28/2011
LABORATORY ANALYSES	Units	FDEP											
Metals (Method 6010B and 6020)													
Antimony - 7440-36-0	mg/L	**0.006**	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300	<0.00300	**0.0624**	<0.00300	<0.00300	<0.00300
Cadmium - 7440-43-9	mg/L	**0.005**	**0.0164**	**0.0238**	0.00096	0.000420 I	<0.0000614	<0.0000614	<0.0000614	<0.0000614	<0.0000614	<0.0000614	<0.0000614
Iron - 7439-89-6	mg/L	**1.707**	0.141 I	0.668	0.47	0.106 I	1.21	0.194	0.159	0.583	1.63 J	0.792	0.0772 I
Lead - 7439-92-1	mg/L	**0.015**	<0.0000434	<0.0000434	0.000580 I	<0.0000434	0.00241	<0.0000434	0.00022 I	0.00099 I	0.00094 I	0.000540 I	<0.0000434
Manganese - 7439-96-5	mg/L	**0.05**	**0.133**	**0.181**	0.00377	0.0265	0.0032	**0.141**	0.00186 I	0.0022 I	0.00646	0.00284 I	0.00797
Nickel - 7440-02-0	mg/L	**0.1**	0.00266 I	0.00288 I	<0.000344	0.00572	0.00168 I	<0.000344	<0.000344	<0.000344	0.00077 I	<0.000344	0.00238 I
Thallium - 7440-28-0	mg/L	**0.002**	0.00025 I	0.00012 I	0.00005 I	<0.0000475	0.00005 I	<0.0000475	<0.0000475	<0.0000475	0.000350 I	<0.0000475	<0.0000475
LABORATORY ANALYSES	Units	FDEP											
Pesticides (Method 8081A)													
4,4-DDD - 72-54-8	µg/L	**0.1**	<0.0104	<0.0102	<0.0101	<0.0102	<0.0101	<0.0105	<0.0104	<0.0101	<0.0103	<0.0108	<0.0108
4,4-DDE - 72-55-9	µg/L	**0.1**	<0.0177	<0.0173	<0.0172	<0.0173	<0.0172	<0.0179	<0.0176	<0.0171	<0.0174	<0.0183	<0.0183
4,4-DDT - 50-29-3	µg/L	**0.1**	<0.0125	<0.0122	<0.0121	<0.0122	<0.0121	<0.0126	<0.0124	<0.0121	<0.0123	<0.0129	<0.0129
Aldrin - 309-00-2	µg/L	**0.002**	<0.00177	<0.00173	<0.00172	<0.00173	<0.00172	<0.00179	<0.00176	<0.00171	<0.00174	<0.00183	<0.00183
Alpha-BHC - 319-84-6	µg/L	**0.006**	<0.00531	<0.00518	<0.00515	<0.00520	<0.00515	<0.00537	<0.00529	<0.00513	<0.00523	<0.00548	<0.00548
Alpha-Chlordane - 5103-71-9	µg/L	**0.02**	<0.0208	<0.0203	<0.0202	<0.0204	<0.0202	<0.0211	<0.0207	<0.0201	<0.0205	<0.0215	<0.0215
Beta-BHC - 319-85-7	µg/L	**0.02**	<0.0184	<0.0180	<0.0179	<0.0181	<0.0179	<0.0186	<0.0183	<0.0178	<0.0182	<0.0190	<0.0190
Heptachlor Epoxide - 1024-57-3	µg/L	**0.2**	<0.00375	<0.00365	<0.00364	<0.00367	<0.00364	<0.00379	<0.00373	<0.00362	<0.00369	<0.00387	<0.00387
Chlordane - 57-74-9	µg/L	*	<0.0531	<0.0518	<0.0515	<0.0520	<0.0515	<0.0537	<0.0528	<0.0513	<0.0523	<0.0548	<0.0548
Delta-BHC - 319-86-8	µg/L	**2.1**	<0.0135	<0.0132	<0.0131	<0.0133	<0.0131	<0.0137	<0.0135	<0.0131	<0.0133	<0.0140	<0.0140
Dieldrin - 60-57-1	µg/L	**0.002**	<0.00177	<0.00173	<0.00172	<0.00173	<0.00172	<0.00179	<0.00176	<0.00171	<0.00174	<0.00183	<0.00183
Endosulfan I - 959-98-8	µg/L	**42**	<0.00938	<0.00914	<0.00909	<0.00918	<0.00909	<0.00947	<0.00933	<0.00905	<0.00923	<0.00968	<0.00968
Endosulfan II - 33213-65-9	µg/L	**42**	<0.0135	<0.0132	<0.0131	<0.0133	<0.0131	<0.0137	<0.0135	<0.0131	<0.0133	<0.0140	<0.0140
Endosulfan Sulfate - 1031-07-8	µg/L	**42**	<0.0125	<0.0122	<0.0121	<0.0122	<0.0121	<0.0126	<0.0124	<0.0121	<0.0123	<0.0129	<0.0129
Endrin - 72-20-8	µg/L	**2**	<0.0156	<0.0152	<0.0152	<0.0153	<0.0152	<0.0158	<0.0155	<0.0151	<0.0154	<0.0161	<0.0161
Endrin Ketone - 53494-70-5	µg/L	*	<0.0146	<0.0142	<0.0141	<0.0143	<0.0141	<0.0147	<0.0145	<0.0141	<0.0144	<0.0151	<0.0151
Endrin Aldehyde - 7421-93-4	µg/L	*	<0.00833	<0.00812	<0.00808	<0.00816	<0.00808	<0.00842	<0.00829	<0.00804	<0.00821	<0.00860	<0.00860
Gamma-BHC (Lindane) - 58-89-9	µg/L	**0.2**	<0.00521	<0.00508	<0.00505	<0.00510	<0.00505	<0.00526	<0.00518	<0.00503	<0.00513	<0.00538	<0.00538
Gamma-Chlordane - 5103-74-2	µg/L	*	<0.0135	<0.0132	<0.0131	<0.0133	<0.0131	<0.0137	<0.0135	<0.0131	<0.0133	<0.0140	<0.0140
Heptachlor - 76-44-8	µg/L	**0.4**	<0.0344	<0.0335	<0.0333	<0.0337	<0.0333	<0.0347	<0.0342	<0.0332	<0.0338	<0.0355	<0.0355
Methoxychlor - 72-43-5	µg/L	**40**	<0.0135	<0.0132	<0.0131	<0.0133	<0.0131	<0.0137	<0.0135	<0.0131	<0.0133	<0.0140	<0.0140
Toxaphene - 8001-35-2	µg/L	**3**	<0.0313	<0.0305	<0.0303	<0.0306	<0.0303	<0.0316	<0.0311	<0.0302	<0.00308	<0.0323	<0.0323
Chlorobenzilate - 510-15-6	µg/L	**0.1**	<0.00177	<0.00173	<0.00172	<0.00173	<0.00172	<0.00179	<0.00176	<0.00171	<0.00174	<0.00183	<0.00183
Isodrin - 465-73-6	µg/L	*	<0.00141	<0.00137	<0.00136	<0.00138	<0.00136	<0.00142	<0.00140	<0.00136	<0.00138	<0.00145	<0.00145

Notes:
GCTL-Groundwater Cleanup Target Level
** There is no set GCTL*
FDEP = Florida Department of Environmental Protection (remediation endpoints)
Exceedances above the remediation endpoints are in bold

Data Qualifiers:
<=The analyte was below detection limits
I = The reportable value is between the laboratory method detection limit and the laboratory practical quantitation limit
NS=Not Sampled
V=Indicates the analyte was detected in both the sample and associated method bl

TABLE 4
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
OPERABLE UNIT 13, NAS PENSACOLA
PENSACOLA, ESCAMBIA COUNTY, FLORIDA

Well ID	Date Sampled	Units	8260/VOA										
			Acetone	Carbon Disulfide	Cymene-p	Bromodichloromethane	Chloroform	Dibromochloromethane	Methylene Chloride	Methyl tert-butyl ether	Tetrachloroethylene	Trichloroethylene
08GR01R	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	0.57 I
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	0.82 I
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<0.5	<0.5	1.5 I	<0.5	<0.5	2.7 I
	10/13/2010	ug/L	3.19 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	1.36
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	<0620	<0.350	<0.750	<0.430	<0.590	0.65 I
08GR02R	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	1.8 I	<0.5	<0.5	<0.5
	10/13/2010	ug/L	4.00 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	<0620	<0.350	0.800 I V	<0.430	<0.590	<0.390
08GR03R	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	1.5 I	<0.5	<0.5	<0.5
	10/13/2010	ug/L	2.22 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	<0620	<0.350	<0.750	<0.430	0.590 I	<0.390
08GR05	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	0.52 I	0.70 I	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	1.1 I	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	0.91 I	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	1.7 I	<0.5	<0.5	<0.5
	10/13/2010	ug/L	3.29 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	0.718 I	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	<0620	<0.350	0.830 I V	<0.430	0.980 I	<0.390
08GR06R	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	1.5 I	<0.5	<0.5	<0.5
	10/13/2010	ug/L	6.58 I	0.276 I	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	<0620	<0.350	<0.750	<0.430	<590	<0.390
24GS01	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	1.6 I	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13/2010	ug/L	2.07 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	<0620	<0.350	<0.750	<0.430	<590	<0.390
24GS02R	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	1.3 I	<0.5	<0.5	<0.5
	10/13/2010	ug/L	5.16 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
24GS06R	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	4.3 I	<0.5	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	1.1 I	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	1.2 I	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	1.1 I	<0.5	1.2 I	<0.5	<0.5	<0.5
	10/13/2010	ug/L	<1.99	<0.162	<0.353	**1.28**	5.52	0.301 I	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	2.80 I	<0.350	<0.750	<0.430	<590	<0.390
24GS09R	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	1.7 I	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	<0.5	**2.1 I**	5.1	**1.1 I**	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	7.2	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	2.0 I	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13/2010	ug/L	3.19 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	3.44 I	<0.350	0.830 I V	<0.430	<590	<0.390
24GS10R	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	NS	NS	NS	NS	NS	NS	NS	NS
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	4.2 I	<0.5	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	1.4 I	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	4.7 I	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	15	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13/2010	ug/L	2.36 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	5.28	<0.350	<0.750	<0.430	<590	<0.390
24GS11	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	1.6 I	<0.5	<0.5	<0.5
	10/13/2010	ug/L	2.93 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	<0620	<0.350	0.750 I V	<0.430	<590	<0.390
24GS15	11/20-12/19 2007	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	4/24 & 25/ 2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13 & 14/2008	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/30/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/15/2009	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	3/16/2010	ug/L	NA	NA	<0.5	<0.5	<1.0	<0.5	<1.0	<0.5	<0.5	<0.5
	10/13/2010	ug/L	2.75 I	<0.162	<0.353	<0.076	<0.122	<0.059	<1.27	<0.46	<0.098	<0.357
	10/27 & 28/2011	ug/L	<7.03	<1.26	<0.230	<0.420	<0620	<0.350	0.780 I V	<0.430	<590	<0.390
FDEP GCTL		ug/L	**6,300**	**700**	*	**0.6**	**70**	**0.4**	**5**	**20**	**3**	**3**

Notes:
GCTL-Groundwater Cleanup Target Level
** There is no set GCTL*
FDEP = Florida Department of Environmental Protection (remediation endpoints)
Exceedances above the remediation endpoints are in bold

Data Qualifiers:
<=The analyte was below detection limits
I = The reportable value is between the laboratory method detection limit and the laboratory practical quantitation limit
NS=Not Sampled
V=Indicates the analyte was detected in both the sample and associated method blank
NA = Not Analyzed
V = Analyte was detected in both the sample and the associated method blank

TABLE 5
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
OPERABLE UNIT 13, NAS PENSACOLA
PENSACOLA, ESCAMBIA COUNTY, FLORIDA

Well ID	Date Sampled	Units	Method 6010 and 6020/METALS						
			Antimony	Cadmium	Iron	Lead	Manganese	Nickel	Thallium
08GR01R	11/20-12/19/2007	ug/L	<25.0	1.5 I	**2,600**	<4.0	**360**	<10.0	<1.5
	4/24 & 25/2008	ug/L	**6.3 V**	4.3 I	**5,800**	<4.0	**800**	<10.0	<1.0
	10/13 & 14/2008	ug/L	1.1 IV	**8.1**	**3,500**	<4.0	**600**	<10.0	<0.55
	3/30/2009	ug/L	1.5 IV	**13**	**5,600**	<4.0	**500**	<10.0	<0.55
	10/15/2009	ug/L	<2.0	**9.7**	**2,600**	<4.0	**350**	<10.0	<0.25
	3/16/2010	ug/L	<2.0	2.6 I	**4,700**	<4.0	**300**	<10	<0.25
	10/13/2010	ug/L	<4.1	**12.2**	**2,572**	<4.7	**309.6**	6.5 I	6.5 I
	10/27 & 28/2011	ug/L	<3	**16.4**	141 I	<0.0434	**133**	2.66 I	0.25 I
08GR02R	11/20-12/19/2007	ug/L	<25.0	2.3 I	96.0 I	<4.0	**130**	<10.0	<1.5
	4/24 & 25/2008	ug/L	4.0 I V	**29**	**6,000**	<4.0	**92**	<10.0	<1.0
	10/13 & 14/2008	ug/L	2.9 V	**18**	230	<4.0	12	<10.0	<0.55
	3/30/2009	ug/L	1.3 IV	**43**	**4,700**	<4.0	**810**	<10.0	<0.55
	10/15/2009	ug/L	<2.0	**39**	**2,700**	<4.0	**580**	<10.0	<0.25
	3/16/2010	ug/L	3.8 I	**19**	680	<4.0	**120**	<10	<0.25
	10/13/2010	ug/L	<4.1	**37.5**	176.5 I	<4.7	**337.7**	13.4	5.4 I
	10/27 & 28/2011	ug/L	<3	**23.8**	668	<0.0434	**181**	2.88 I	0.12 I
08GR03R	11/20-12/19/2007	ug/L	<0.25	**5**	450	<4.0	**120**	<10.0	<1.5
	4/24 & 25/2008	ug/L	3.9 I V	**8.9**	1000	<4.0	<10.0	<10.0	<1.0
	10/13 & 14/2008	ug/L	2.6 V	4.7 I	**2,500**	<4.0	<10.0	<10.0	<0.55
	3/30/2009	ug/L	1.7 IV	**5.7**	**5,300**	<4.0	49	<10.0	<0.55
	10/15/2009	ug/L	<2.0	2.3 I	**2,700**	<4.0	44	<10.0	<0.25
	3/16/2010	ug/L	3.7 I	**6.3**	**1,900**	<4.0	14	<10	<0.25
	10/13/2010	ug/L	<4.1	2.8 I	637.7	<4.7	<6.4	<1.9	7.0 I
	10/27 & 28/2011	ug/L	<3	0.96	470	0.58 I	3.77	<0.344	0.05 I
08GR05	11/20-12/19/2007	ug/L	<0.25	**12**	190	<4.0	<10.0	<10.0	<1.5
	4/24 & 25/2008	ug/L	**8.6 V**	**25**	100	<4.0	<10.0	<10.0	<1.0
	10/13 & 14/2008	ug/L	5.2 V	**8.4**	150	<4.0	17	<10.0	<0.55
	3/30/2009	ug/L	2.5 V	1.2 I	520	<4.0	46	<10.0	<0.55
	10/15/2009	ug/L	2.9 I	<1.0	97 I	<4.0	**53**	<10.0	<0.25
	3/16/2010	ug/L	5.4	**19**	80 I	<4.0	<10	<10	<0.25
	10/13/2010	ug/L	4.6 I	**76.2**	<32	<4.7	<6.4	10.1	<4.9
	10/27 & 28/2011	ug/L	<3	0.42 I	106 I	<0.0434	26.5	5.72	<0.0475
08GR06R	11/20-12/19/2007	ug/L	<25.0	<1.0	**3,100**	7	<10.0	<10.0	<12
	4/24 & 25/2008	ug/L	3.9 I V	<1	**2,600**	<4.0	<10.0	<10.0	<1.0
	10/13 & 14/2008	ug/L	3.3 V	<1.0	**2,200**	<4.0	<10.0	<10.0	<0.55
	3/30/2009	ug/L	1.8 IV	<1.0	**2,900**	4.6 I	<10.0	<10.0	<0.55
	10/15/2009	ug/L	<2.0	<1.0	1100	<4.0	<10.0	<10.0	<0.25
	3/16/2010	ug/L	2.2 I	<1.0	**2,600**	6.7	<10	<10	<0.25
	10/13/2010	ug/L	5.4 I	<1.1	**3,124**	<4.7	6.4 I	3.5 I	<4.9
	10/27 & 28/2011	ug/L	<3	<0.0614	1,210	2.41	3.2	1.68 I	0.05 I
24GS01	11/20-12/19/2007	ug/L	<25.0	<1.0	170	<4.0	<10.0	<10.0	<1.5
	4/24 & 25/2008	ug/L	**7.7 V**	<1	210	<4.0	<10.0	<10.0	<1.0
	10/13 & 14/2008	ug/L	**6.1 V**	<1.0	<60.0	<4.0	<10.0	<10.0	<0.55
	3/30/2009	ug/L	4.1 V	<1.0	410	<4.0	11	<10.0	<0.55
	10/15/2009	ug/L	**6.1**	<1.0	190	<4.0	15	<10.0	<0.25
	3/16/2010	ug/L	**7.6**	<1.0	100	<4.0	<10	<10	<0.25
	10/13/2010	ug/L	<4.1	<1.1	365.5	<4.7	**68.6**	<1.9	<4.9
	10/27 & 28/2011	ug/L	<3	<0.0614	194	<0.0434	**141**	<0.344	<0.0475
24GS02R**	11/20-12/19/2007	ug/L	<25.0	<1.0	**9,200**	14	**120**	<10.0	<1.5
	4/24 & 25/2008	ug/L	2.8 I V	<1	130	<4.0	<10.0	<10.0	<1.0
	10/13 & 14/2008	ug/L	1.4 IV	<1.0	1100	<4.0	<10.0	<10.0	<0.55
	3/30/2009	ug/L	1.1 IV	<1.0	**4,200**	6.5	16	<10.0	<0.55
	10/15/2009	ug/L	<2.0	<1.0	120	<4.0	<10.0	<10.0	<0.25
	3/16/2010	ug/L	<2.0	<1.0	**3,800**	8.7	19	<10	<0.25
	10/13/2010	ug/L	<4.1	<1.1	569.6	<4.7	36.9	2.4 I	<4.9
	10/27 & 28/2011	ug/L	NS	NS	NS	NS	NS	NS	NS
24GS06R	11/20-12/19/2007	ug/L	<25.0	<1.0	**3,300**	**77**	**230**	<10.0	<1.5
	4/24 & 25/2008	ug/L	2.3 I V	<1	560	<4.0	13	<10.0	<1.0
	10/13 & 14/2008	ug/L	1.9 IV	<1.0	170	<4.0	<10.0	<10.0	<0.55
	3/30/2009	ug/L	2.0 IV	<1.0	430	<4.0	<10.0	<10.0	<0.55
	10/15/2009	ug/L	2.6 I	<1.0	<60	<4.0	<10.0	<10.0	<0.25
	3/16/2010	ug/L	<2.0	<1.0	190	<4.0	<10	<10	<0.25
	10/13/2010	ug/L	<4.1	<1.1	**4,373**	8.1 I	22.1	5.4 I	<4.9
	10/27 & 28/2011	ug/L	<3	<0.0614	159	0.22 I	1.86 I	<0.344	<0.0475
24GS09R	11/20-12/19/2007	ug/L	**54**	<1.0	**4,000**	12	**100**	<10.0	<1.5
	4/24 & 25/2008	ug/L	**44 V**	<1	**1,800**	6	20	<10.0	<1.0
	10/13 & 14/2008	ug/L	**54 V**	<1.0	370	<4.0	<10.0	<10.0	<0.55
	3/30/2009	ug/L	**52 V**	<1.0	860	<4.0	<10.0	<10.0	<0.55
	10/15/2009	ug/L	**60**	<1.0	70 I	<4.0	<10.0	<10.0	<0.25
	3/16/2010	ug/L	**44**	<1.0	390	<4.0	<10	<10	<0.25
	10/13/2010	ug/L	**39.3**	<1.1	68.8 I	<4.7	<6.4	1.9 I	5.8 I
	10/27 & 28/2011	ug/L	**62.4**	<0.0614	583	0.99 I	2.2 I	<0.344	<0.0475
24GS10R	11/20-12/19/2007	ug/L	<25.0	<1.0	<60	<4.0	<40.0	<10.0	<1.5
	4/24 & 25/2008	ug/L	NS	NS	NS	NS	NS	NS	NS
	10/13 & 14/2008	ug/L	1.6 IV	<1.0	980	<4.0	<10.0	<10.0	<0.55
	3/30/2009	ug/L	1.5 IV	<1.0	340	<4.0	<10.0	<10.0	<0.55
	10/15/2009	ug/L	<2.0	<1.0	470	<4.0	<10.0	<10.0	<0.25
	3/16/2010	ug/L	<2.0	<1.0	**3,500**	5 I	32	<10	<0.25
	10/13/2010	ug/L	<4.1	<1.1	**2,200**	<4.7	10.0 I	8.6 I	6.6 I
	10/27 & 28/2011	ug/L	<3	<0.0614	1,630 J	0.94 I	6.46	0.77 I	0.35 I
24GS11	11/20-12/19/2007	ug/L	<25.0	<1.0	**8,500**	9.6	14	<10.0	<1.5
	4/24 & 25/2008	ug/L	<2.0	<1	1500	<4.0	<10.0	<10.0	<1.0
	10/13 & 14/2008	ug/L	1.3 IV	<1.0	**5,000**	4.8 I	<10.0	<10.0	<0.55
	3/30/2009	ug/L	0.7 IV	<1.0	**3,500**	4.0 I	<10.0	<10.0	<0.55
	10/15/2009	ug/L	<2.0	<1.0	**2,800**	<4.0	<10.0	<10.0	<0.25
	3/16/2010	ug/L	<2.0	<1.0	**2,300**	<4.0	<10	<10	<0.25
	10/13/2010	ug/L	<4.1	<1.1	1,699	<4.7	17.0 I	<1.9	<4.9
	10/27 & 28/2011	ug/L	<3	<0.0614	792	0.54 I	2.84 I	<0.344	<0.0475
24GS15	11/20-12/19/2007	ug/L	<25.0	<1.0	**1,800**	5	<10.0	<10.0	<1.5
	4/24 & 25/2008	ug/L	<2.0	<1	230	<4.0	<10.0	<10.0	<1.0
	10/13 & 14/2008	ug/L	1.0 IV	<1.0	330	<4.0	<10.0	<10.0	<0.55
	3/30/2009	ug/L	4.6 IV	<1.0	370	<4.0	<10.0	<10.0	<0.55
	10/15/2009	ug/L	<2.0	<1.0	110	<4.0	<10.0	<10.0	<0.25
	3/16/2010	ug/L	<2.0	<1.0	1300	<4.0	<10	<10	<0.25
	10/13/2010	ug/L	<4.1	<1.1	94.6 I	<4.7	<6.4	<1.9	<4.9
	10/27 & 28/2011	ug/L	<3	<0.0614	77.2 I	<0.0434	7.97	2.38 I	<0.0475
FDEP GCTL		ug/L	**6**	**5**	**1,707**	**15**	**50**	**100**	**2**

Notes:
GCTL-Groundwater Cleanup Target Level
** There is no set GCTL*
FDEP = Florida Department of Environmental Protection (remediation endpoints)
Exceedances above the remediation endpoints are in bold
***24GS02R was not sampled in October 2011 due to obstruction in the well.*

Data Qualifiers:
<=The analyte was below detection limits
I = The reportable value is between the laboratory method detection limit and the laboratory practical quantitation limit
NS=Not Sampled
V=Indicates the analyte was detected in both the sample and associated method blank

TABLE 6
HISTORICAL GROUNDWATER ANALYTICAL SUMMARY
OPERABLE UNIT 13, NAS PENSACOLA
PENSACOLA, ESCAMBIA COUNTY, FLORIDA

Well ID	Date Sampled	Units	8081/PESTICIDES																							
			4,4-DDD	4,4-DDE	4,4-DDT	Aldrin	Alpha-BHC	Alpha-Chlordane	Beta-BHC	Heptachlor Epoxide	Chlordane	Delta-BHC	Dieldrin	Endosulfan I	Endosulfan II	Endosulfan Sulfate	Endrin	Endrin Ketone	Endrin Aldehyde	Gamma-BHC	Gamma-chlordane	Heptachlor	Methoxychlor	Toxaphene	Alachor	Chlorobezilate	Isodrin
08GR01R	11/20-12/19/2007	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	**0.0026 I**	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0088	<0.0088	<0.0088	<0.0023	<0.0046	NA	<0.0046	<0.0046	<0.046	<0.046	<0.0023	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	NA	<0.046	<0.046	<0.23	NA	NA	NA
	3/30/2009	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	10/15/2009	ug/L	<0.0094	<0.0094	<0.0094	<0.0025	<0.0050	NA	<0.0050	<0.0050	<0.050	<0.050	<0.0025	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NA	<0.050	<0.050	<0.25	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0104	<0.0177	<0.0125	<0.00177	<0.00531	<0.0208	<0.0184	<0.00375	<0.0531	<0.0135	<0.00177	<0.00938	<0.0135	<0.0125	<0.0156	<0.0146	<0.00833	<0.00521	<0.0135	<0.0344	<0.0135	<0.0313	NA	<0.00177	<0.00141
08GR02R	11/20-12/19/2007	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	3/30/2009	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	10/15/2009	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	0.003 I	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0102	<0.0173	<0.0122	<0.00173	<0.00518	<0.0203	<0.0180	<0.00365	<0.0518	<0.0132	<0.00173	<0.00914	<0.0132	<0.0122	<0.0152	<0.0142	<0.00812	<0.00508	<0.0132	<0.0335	<0.0132	<0.0305	NA	<0.00173	<0.00137
08GR03R	11/20-12/19/2007	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	3/30/2009	ug/L	<0.0092	<0.0092	<0.0092	<0.0024	<0.0048	NA	<0.0048	<0.0049	<0.049	<0.048	<0.0024	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.048	NA	<0.049	<0.049	<0.24	NA	NA	NA
	10/15/2009	ug/L	<0.0088	<0.0088	<0.0088	<0.0023	<0.0046	NA	<0.0046	<0.0046	<0.046	<0.046	<0.0024	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	NA	<0.046	<0.046	<0.23	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0101	<0.0172	<0.0121	<0.00172	<0.00515	<0.0202	<0.0179	<0.00364	<0.0515	<0.0131	<0.00172	<0.00909	<0.0131	<0.0121	<0.0152	<0.0141	<0.00808	<0.00505	<0.0131	<0.0333	<0.0131	<0.0303	NA	<0.00172	<0.00136
08GR05	11/20-12/19/2007	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	3/30/2009	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	10/15/2009	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	0.0015 I"	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0102	<0.0173	<0.0122	<0.00173	<0.00520	<0.0204	<0.0181	<0.00367	<0.0520	<0.0133	<0.00173	<0.00918	<0.0133	<0.0122	<0.0153	<0.0143	<0.00816	<0.00510	<0.0133	<0.0337	<0.0133	<0.0306	NA	<0.00173	<0.00138
08GR06R	11/20-12/19/2007	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0088	<0.0088	<0.0088	<0.0023	<0.0046	NA	<0.0046	<0.0046	<0.046	<0.046	<0.0023	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	NA	<0.046	<0.046	<0.23	NA	NA	NA
	3/30/2009	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	10/15/2009	ug/L	<0.0094	<0.0094	<0.0094	<0.0025	<0.0050	NA	<0.0050	<0.0050	<0.050	<0.050	<0.0025	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NA	<0.050	<0.050	<0.25	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0101	<0.0172	<0.0121	<0.00172	<0.00515	<0.0202	<0.0179	<0.00364	<0.0515	<0.0131	<0.00172	<0.00909	<0.0131	<0.0121	<0.0152	<0.0141	<0.00808	<0.00505	<0.0131	<0.0333	<0.0131	<0.0303	NA	<0.00172	<0.00136
24GS01	11/20-12/19/2007	ug/L	<0.0093	<0.0093	<0.0093	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0092	<0.0092	<0.0092	<0.0024	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0024	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.24	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0047	NA	<0.0047	<0.0047	<0.047	<0.047	<0.0024	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	NA	<0.047	<0.047	<0.24	NA	NA	NA
	3/30/2009	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	10/15/2009	ug/L	<0.0094	<0.0094	<0.0094	<0.0025	<0.0050	NA	<0.0050	<0.0050	<0.050	<0.050	<0.0025	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	NA	<0.050	<0.050	<0.25	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0105	<0.0179	<0.0126	<0.00179	<0.00537	<0.0211	<0.0186	<0.00379	<0.0537	<0.0137	<0.00179	<0.00947	<0.0137	<0.0126	<0.0158	<0.0147	<0.00842	<0.00526	<0.0137	<0.0347	<0.0137	<0.0316	NA	<0.00179	<0.00142
24GS02R	11/20-12/19/2007	ug/L	<0.0094	<0.0094	<0.0094	<0.0025	<0.005	NA	<0.005	<0.005	<0.05	<0.05	<0.0025	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.25	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0088	<0.0088	<0.0088	<0.0023	<0.0046	NA	<0.0046	<0.0046	<0.046	<0.046	<0.0023	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	<0.046	NA	<0.046	<0.046	<0.23	NA	NA	NA
	3/30/2009	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	10/15/2009	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	0.0012 I	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
24GS06R	11/20-12/19/2007	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0089	<0.0089	<0.0089	<0.0023	<0.0047	NA	<0.0047	<0.0047	<0.047	<0.047	<0.0023	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	NA	<0.047	<0.047	<0.23	NA	NA	NA
	3/30/2009	ug/L	<0.0092	<0.0092	<0.0092	<0.0024	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0024	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.24	NA	NA	NA
	10/15/2009	ug/L	<0.0096	<0.0096	<0.0092	<0.0025	<0.0051	NA	<0.0051	<0.0051	<0.051	<0.051	<0.0025	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	<0.051	NA	<0.051	<0.051	<0.25	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0104	<0.0176	<0.0124	<0.00176	<0.00529	<0.0207	<0.0183	<0.00373	<0.0528	<0.0135	<0.00176	<0.00933	<0.0135	<0.0124	<0.0155	<0.0145	<0.00829	<0.00518	<0.0135	<0.0342	<0.0135	<0.0311	NA	<0.00176	<0.00140
24GS09R	11/20-12/19/2007	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0092	<0.0092	<0.0092	<0.0024	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0024	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.24	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0089	<0.0089	<0.0089	<0.0023	<0.0047	NA	<0.0047	<0.0047	<0.047	<0.047	<0.0023	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	NA	<0.047	<0.047	<0.23	NA	NA	NA
	3/30/2009	ug/L	<0.0089	<0.0089	<0.0089	<0.0023	<0.0047	NA	<0.0047	<0.0047	<0.047	<0.047	<0.0023	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	NA	<0.047	<0.047	<0.23	NA	NA	NA
	10/15/2009	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0101	<0.0171	<0.0121	<0.00171	<0.00513	<0.0201	<0.0178	<0.00362	<0.0513	<0.0131	<0.00171	<0.00905	<0.0131	<0.0121	<0.0151	<0.0141	<0.00804	<0.00503	<0.0131	<0.0332	<0.0131	<0.0302	NA	<0.00171	<0.00136
24GS10R	11/20-12/19/2007	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	4/24 & 25/2008	ug/L	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
	10/13 & 14/2008	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0047	NA	<0.0047	<0.0047	<0.047	<0.047	<0.0024	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	NA	<0.047	<0.047	<0.24	NA	NA	NA
	3/30/2009	ug/L	<0.0092	<0.0092	<0.0092	<0.0024	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0024	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.24	NA	NA	NA
	10/15/2009	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0047	NA	<0.0047	<0.0047	<0.047	<0.047	<0.0024	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	NA	<0.047	<0.047	<0.24	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0103	<0.0174	<0.0123	<0.00174	<0.00523	<0.0205	<0.0182	<0.00369	<0.0523	<0.0133	<0.00174	<0.00923	<0.0133	<0.0123	<0.0154	<0.0144	<0.00821	<0.00513	<0.0133	<0.0338	<0.0133	<0.00308	NA	<0.00174	<0.00138
24GS11	11/20-12/19/2007	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0094	<0.0094	<0.0094	<0.0025	<0.005	NA	<0.005	<0.005	<0.05	<0.05	<0.0025	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	NA	<0.05	<0.05	<0.25	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	3/30/2009	ug/L	<0.0092	<0.0092	<0.0092	<0.0024	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.048	<0.0024	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.24	NA	NA	NA
	10/15/2009	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0047	NA	<0.0047	<0.0047	<0.047	<0.047	<0.0024	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	<0.047	NA	<0.047	<0.047	<0.24	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0108	<0.0183	<0.0129	<0.00183	<0.00548	<0.0215	<0.0190	<0.00387	<0.0548	<0.0140	<0.00183	<0.00968	<0.0140	<0.0129	<0.0161	<0.0151	<0.00860	<0.00538	<0.0140	<0.0355	<0.0140	<0.0323	NA	<0.00183	<0.00145
24GS15	11/20-12/19/2007	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	4/24 & 25/2008	ug/L	<0.0091	<0.0091	<0.0091	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	10/13 & 14/2008	ug/L	<0.0092	<0.0092	<0.0092	<0.0024	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0024	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.24	NA	NA	NA
	3/30/2009	ug/L	<0.0093	<0.0093	<0.0093	<0.0025	<0.0049	NA	<0.0049	<0.0049	<0.049	<0.049	<0.0025	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	<0.049	NA	<0.049	<0.049	<0.25	NA	NA	NA
	10/15/2009	ug/L	<0.0090	<0.0090	<0.0090	<0.0024	<0.0048	NA	<0.0048	<0.0048	<0.048	<0.048	<0.0024	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	<0.048	NA	<0.048	<0.048	<0.24	NA	NA	NA
	3/16/2010	ug/L	<0.0005	<0.0004	<0.0006	<0.0014	<0.0009	<0.0012	<0.0012	<0.0003	<0.0063	<0.0009	<0.0011	<0.001	<0.0013	<0.0013	<0.0007	<0.001	<0.0007	<0.0006	<0.0013	<0.0012	<0.0015	<0.0471	<0.0014	<0.002	<0.001
	10/13/2010	ug/L	< 0.0005	< 0.0004	< 0.0006	< 0.0014	< 0.0009	< 0.0012	< 0.0012	< 0.0003	< 0.0063	< 0.0009	< 0.0011	< 0.001	< 0.0013	< 0.0003	< 0.0007	< 0.001	< 0.0007	< 0.0006	< 0.0013	< 0.0012	< 0.0015	< 0.0471	< 0.0014	< 0.002	< 0.001
	10/27 & 28/2011	ug/L	<0.0108	<0.0183	<0.0129	<0.00183	<0.00548	<0.0215	<0.0190	<0.00387	<0.0548	<0.0140	<0.00183	<0.00968	<0.0140	<0.0129	<0.0161	<0.0151	<0.00860	<0.00538	<0.0140	<0.0355	<0.0140	<0.0323	NA	<0.00183	<0.00145
FDEP GCTL		ug/L	**0.1**	**0.1**	**0.1**	**0.002**	**0.006**	**0.02**	**0.02**	**0.2**	*	**2.1**	**0.002**	**42**	**42**	**42**	**2**	*	*	**0.2**	*	**0.4**	**40**	**3**	*	**0.1**	*

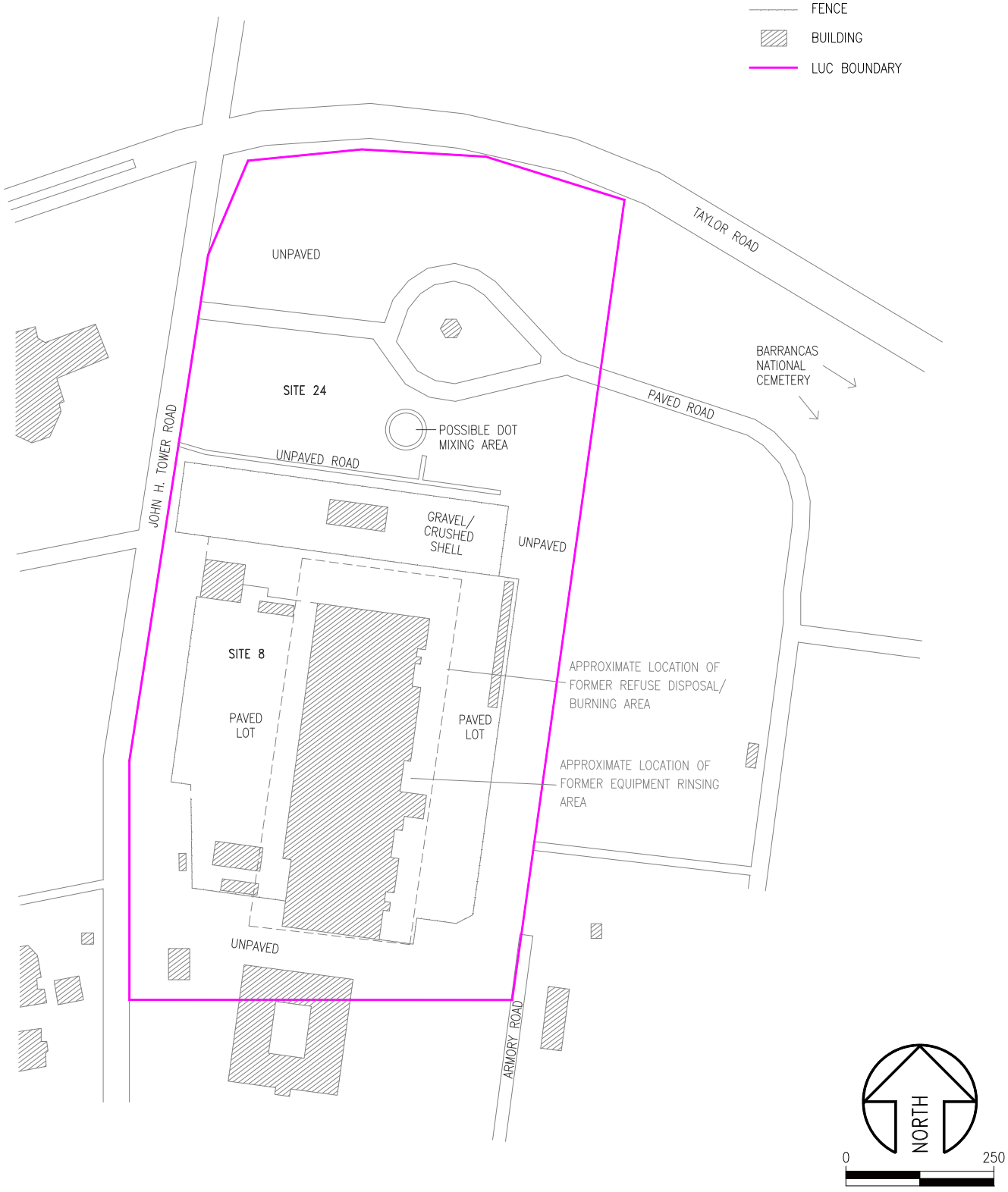
Notes:
GCTL-Groundwater Cleanup Target Level
** There is no set GCTL*
FDEP = Florida Department of Environmental Protection (remediation endpoints)
Exceedances above the remediation endpoints are in bold

Data Qualifiers:
<=The analyte was below detection limits
I = The reportable value is between the laboratory method detection limit and the laboratory practical quantitation limit.
NS=Not Sampled
NA = Not Analyzed
V=Indicates the analyte was detected in both the sample and associated method blank

FIGURES

FIGURE 1 - STREET SITE LOCATION MAP

AEROSTAR ENVIRONMENTAL SERVICES, INC.	OPERABLE UNIT 13 (SITES 8 & 24) NAS PENSACOLA PENSACOLA, ESCAMBIA COUNTY, FLORIDA	DRAWN BY: STUART REFERENCE: MAP OF PENSACOLA, FLORIDA PREPARED BY: GOOGLE MAPS



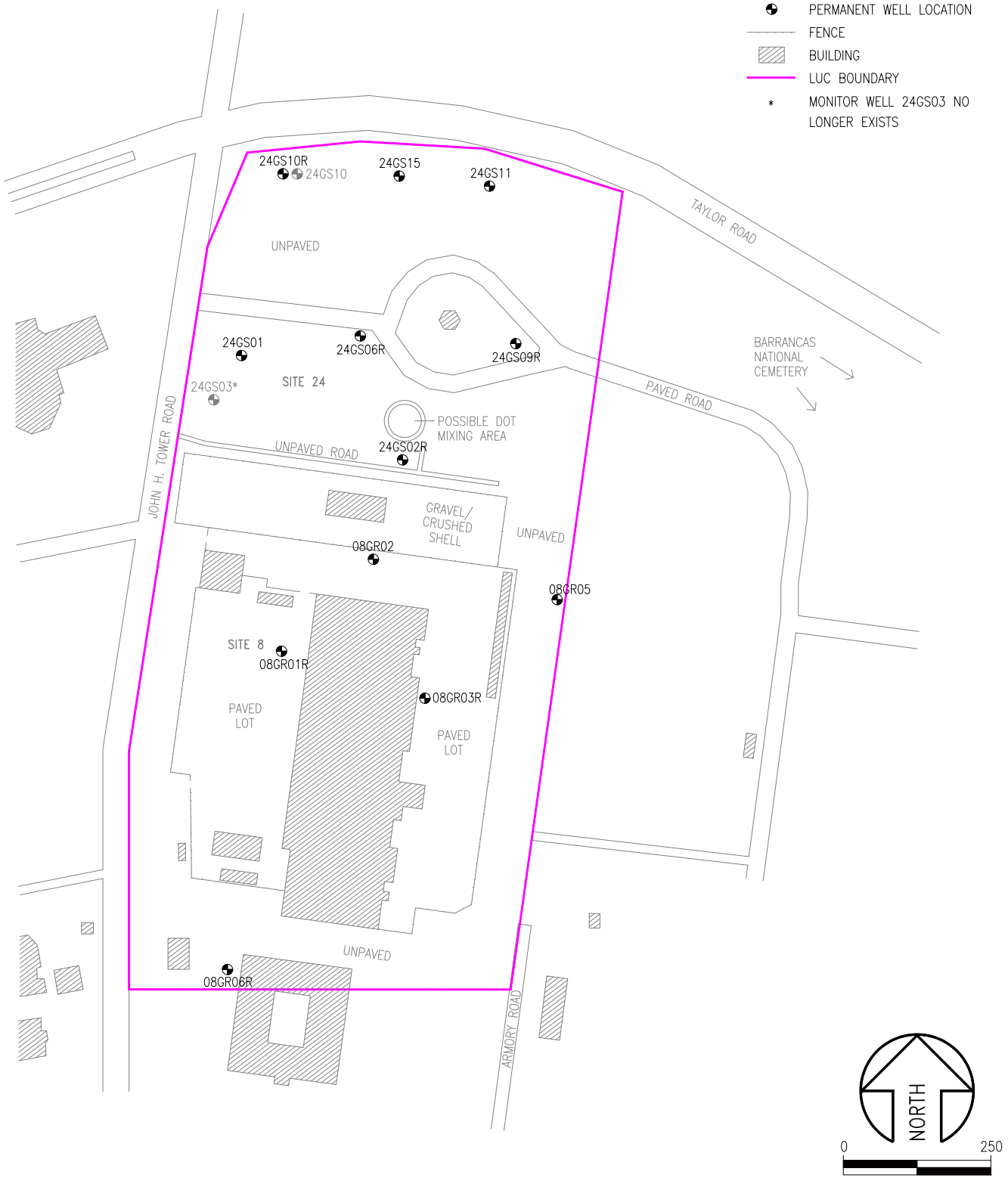
JOB #: 0407-585-24

FIGURE 2 - SITE MAP

AEROSTAR ENVIRONMENTAL SERVICES, INC.

OU 13 (SITES 8 AND 24)
NAS PENSACOLA
PENSACOLA, FLORIDA

SCALE: 1" = 250'-0"
DATE: APRIL 2008
DRAWN BY: MILLS



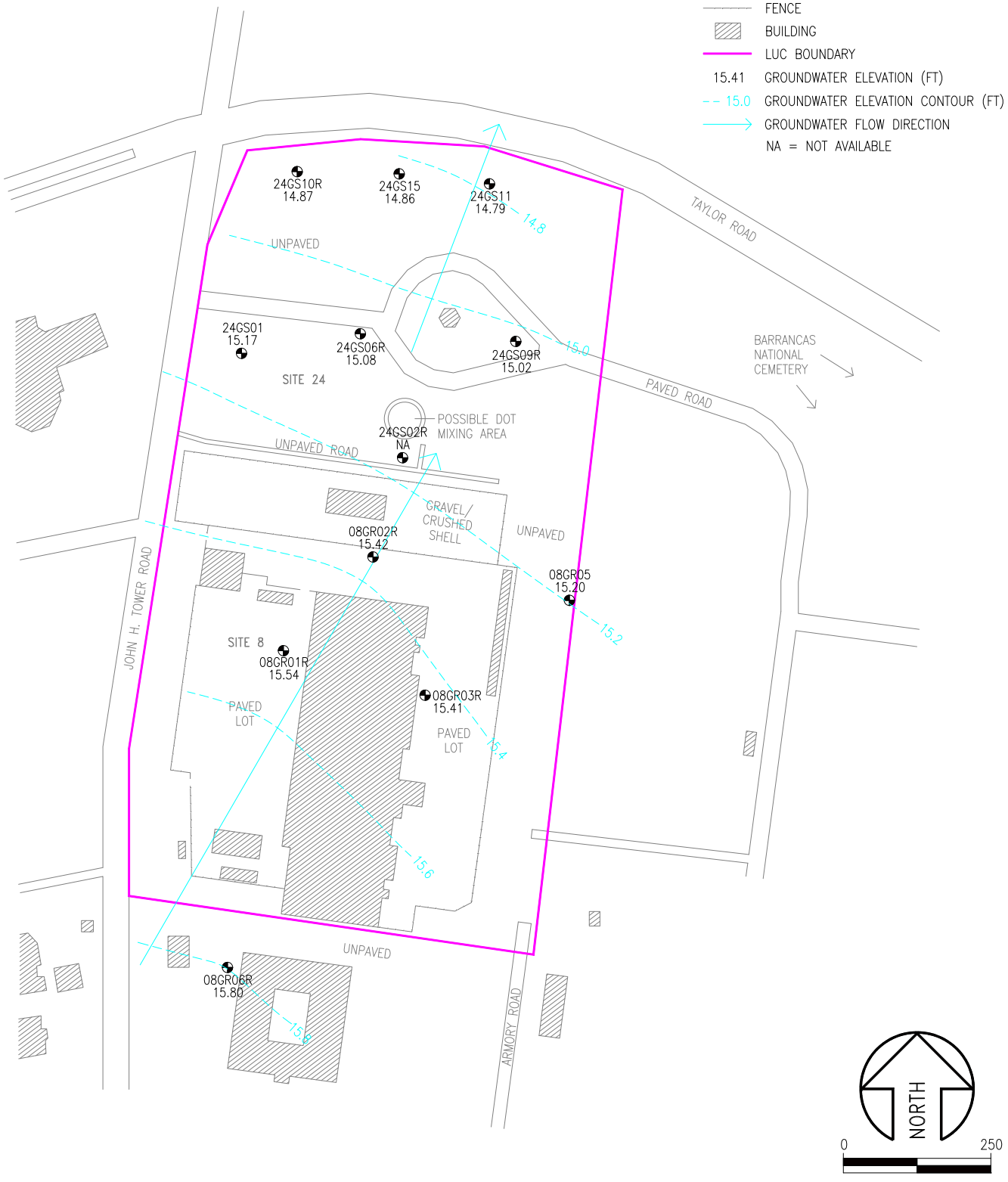
JOB #: 0407-585-24

FIGURE 3 - MONITORING WELL LOCATIONS

AEROSTAR ENVIRONMENTAL SERVICES, INC.

OU 13 (SITES 8 AND 24)
NAS PENSACOLA
PENSACOLA, FLORIDA

SCALE: 1" = 250'-0"
DATE: APRIL 2008
DRAWN BY: MILLS



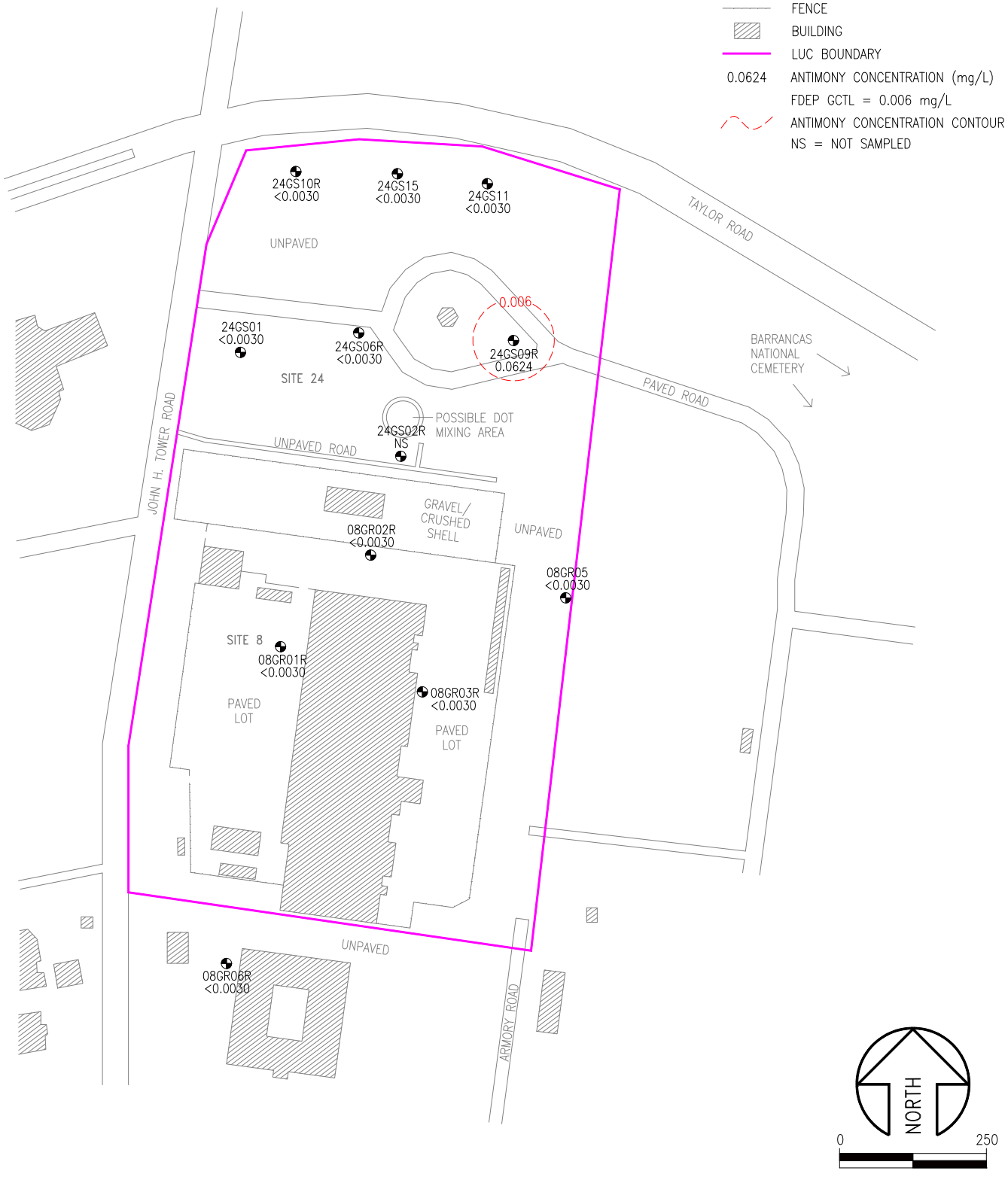
JOB #: 0407-585-24

FIGURE 4 - GROUNDWATER ELEVATION MAP (OCTOBER 27, 2011)

AEROSTAR ENVIRONMENTAL SERVICES, INC.

OU 13 (SITES 8 AND 24)
NAS PENSACOLA
PENSACOLA, FLORIDA

SCALE: 1" = 250'-0"
DATE: JANUARY 2012
DRAWN BY: MILLS



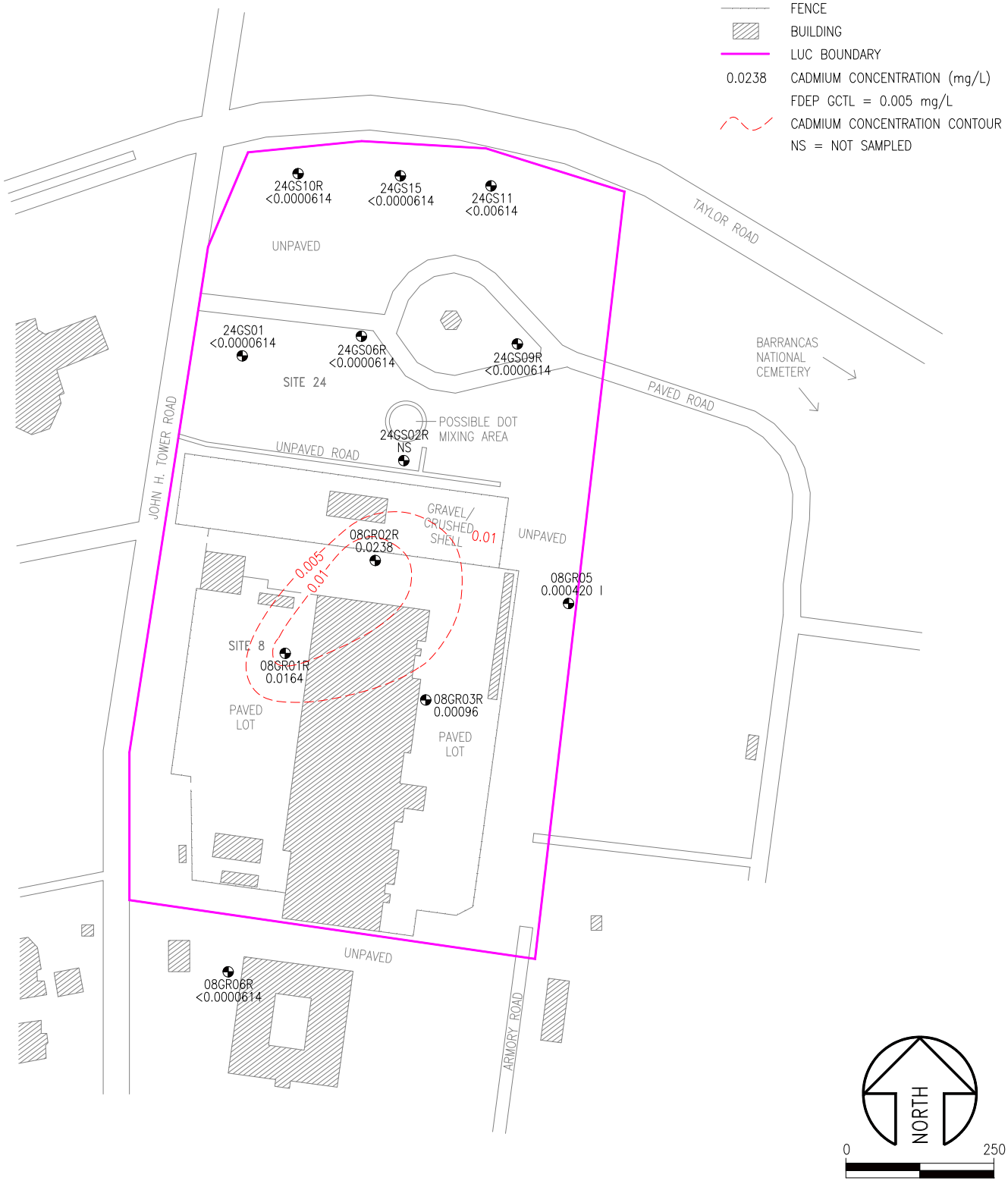
JOB #: 0407-585-24

FIGURE 5 - ANTIMONY CONCENTRATIONS IN GROUNDWATER (OCTOBER 27 & 28, 2011)

AEROSTAR ENVIRONMENTAL SERVICES, INC.

OU 13 (SITES 8 AND 24)
NAS PENSACOLA
PENSACOLA, FLORIDA

SCALE: 1" = 250'-0"
DATE: JANUARY 2012
DRAWN BY: MILLS



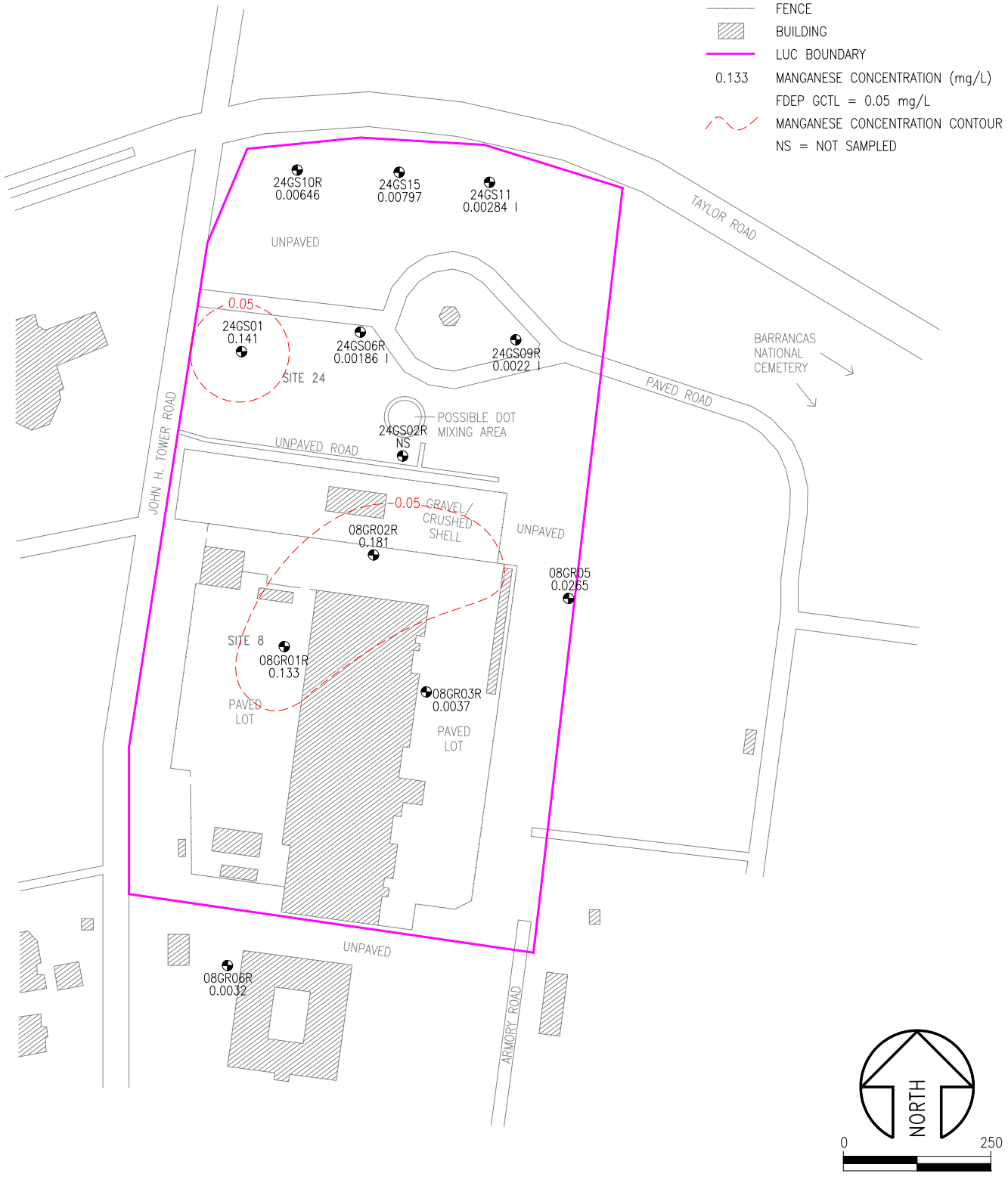
JOB #: 0407-585-24

FIGURE 6 - CADMIUM CONCENTRATIONS IN GROUNDWATER (OCTOBER 27 & 28, 2011)

AEROSTAR ENVIRONMENTAL SERVICES, INC.

OU 13 (SITES 8 AND 24)
NAS PENSACOLA
PENSACOLA, FLORIDA

SCALE: 1" = 250'-0"
DATE: JANUARY 2012
DRAWN BY: MILLS



JOB #: 0407-585-24

FIGURE 7 - MANGANESE CONCENTRATIONS IN GROUNDWATER (OCTOBER 27 & 28, 2011)

AEROSTAR ENVIRONMENTAL SERVICES, INC.

OU 13 (SITES 8 AND 24)
NAS PENSACOLA
PENSACOLA, FLORIDA

SCALE: 1" = 250'-0"
DATE: JANUARY 2012
DRAWN BY: MILLS

APPENDIX A

Professional Land Surveyor Data and Map

MONITOR WELL SURVEY RESULTS
OPERABLE UNIT 0U13
NAS PENSACOLA
January 2012

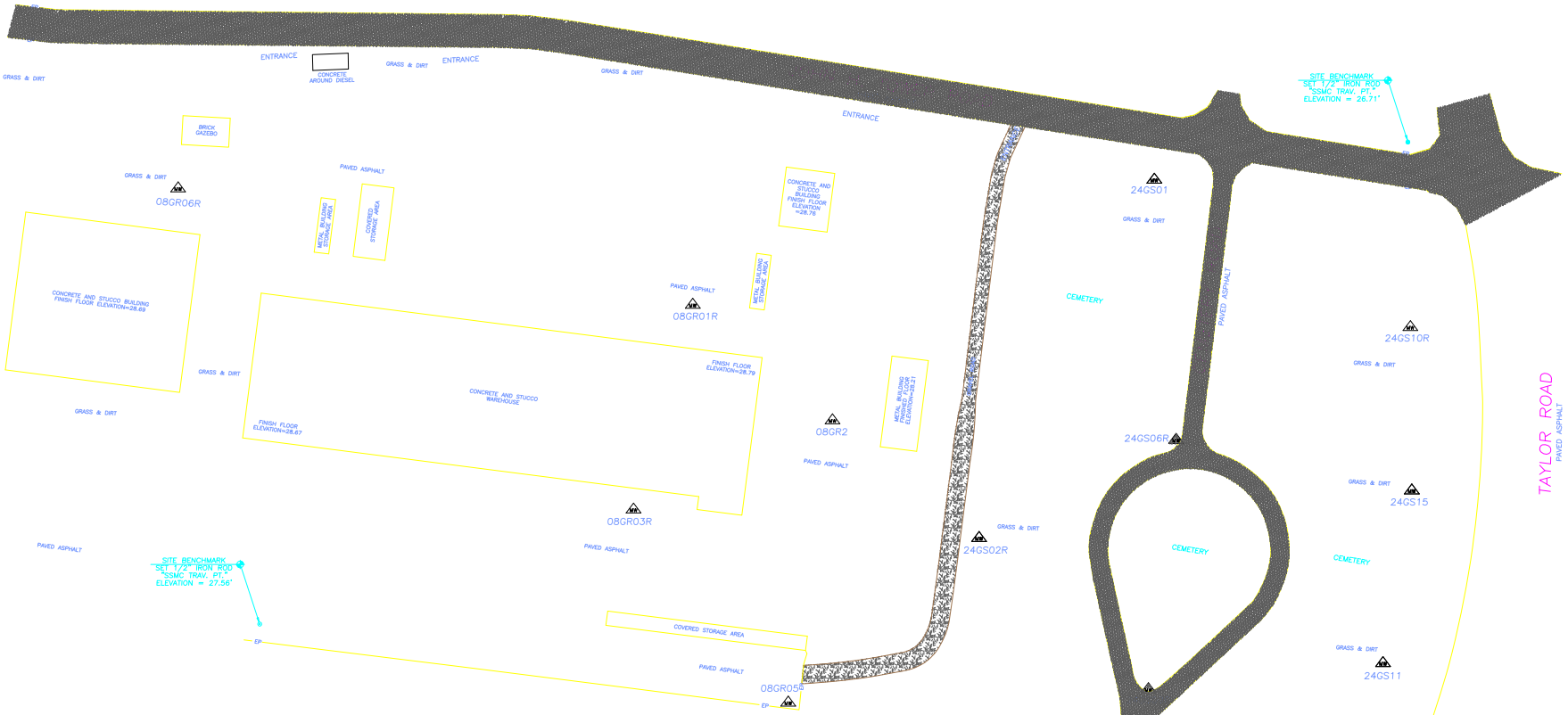
Monitoring Well	Northing	Easting	Latitude	Longitude	Casing Elevation	Ground Elevation
08GR01R	503925.975	1089017.836	30.2122	-87.1719	27.56	27.85
08GR02	504079.111	1089144.612	30.2123	-87.1718	27.74	27.95
08GR03R	503861.198	1089242.501	30.2121	-87.1717	28.02	28.3
08GR05	504030.602	1089454.060	30.2123	-87.1714	28.15	28.58
08GR06R	503362.047	1088890.335	30.2116	-87.1721	26.95	27.16
24GS01	504434.740	1088880.840	30.2127	-87.1721	25.22	25.84
24GS02R	504239.680	1089273.586	30.2125	-87.1717	25.77	25.95
24GS06R	504455.636	1089166.091	30.2127	-87.1718	27.76	27.39
24GS09R	504425.205	1089439.361	30.2127	-81.1715	26.67	26.85
24GS10R	504712.308	1089042.477	30.2130	-87.1719	25.52	25.84
24GS11	504682.314	1089410.718	30.2129	-87.1715	24.65	24.67
24GS15	504713.911	1089221.518	30.2130	-87.1717	24.42	24.66

N.A.S. PENSACOLA

SPECIFIC PURPOSE SURVEY

MONITORING WELL PROJECT BEING LOCATED AT
THE INTERSECTION OF JOHN H. TOWER WITH TAYLOR ROAD
IN SECTION 1, TOWNSHIP 3 SOUTH, RANGE 31-1 WEST,
ESCAMBIA COUNTY, FLORIDA

MONITORING WELL	NORTHING	EASTING	LATITUDE	LONGITUDE	TOP OF CASING ELEVATION	GROUND ELEVATION
08GR01R	503925.975	1089017.836	30.2122	-87.1719	27.56	27.85
08GR2	504079.111	1089144.612	30.2123	-87.1718	27.74	27.95
08GR03R	503861.198	1089242.501	30.2121	-87.1717	28.02	28.30
08GR05	504030.602	1089454.060	30.2123	-87.1714	28.15	28.58
08GR06R	503762.047	1088890.335	30.2116	-87.1721	26.95	27.16
24GS01	504431.740	1088880.840	30.2127	-87.1721	25.22	25.84
24GS02R	504239.680	1089273.586	30.2125	-87.1717	25.77	25.95
24GS06R	504455.636	1089166.091	30.2127	-87.1718	27.26	27.39
24GS09R	504425.205	1089439.361	30.2127	-87.1715	26.61	26.85
24GS10R	504712.308	1089042.477	30.2130	-87.1719	25.52	25.84
24GS11	504662.314	1089410.718	30.2129	-87.1715	24.65	24.67
24GS15	504713.911	1089221.918	30.2130	-87.1717	24.42	24.66



SURVEYOR'S REPORT:

1. The purpose of this survey is to reflect the horizontal and vertical positions of existing Monitoring Wells and their relationship to the improvements on this site.
2. Utility locations if shown hereon are based on field location of markings by Utility Company representatives, surface features and construction plans furnished to the surveyor. Additional sub-surface utilities may exist that have not been field located.
3. Easements or rights of way that appear on recorded plans or that have been furnished to the surveyor by others have been incorporated into this drawing with appropriate notation. Other easements may be discovered by a search of the Public Records.
4. Measurement methods used for this survey meet MINIMUM TECHNICAL STANDARDS FOR LAND SURVEYING CH. 5J-17.050-.052 requirements.
5. Not valid without the signature and raised seal of a Florida licensed surveyor and mapper.
6. Features shown by symbol as indicated in the legend are not to scale.
7. Numbers shown on Monitoring Wells were taken from markings in field or marked plans by the client.
8. This Survey was performed without benefit of a Title search. A Title search may reveal additional information affecting the Parcel as shown.
9. Unless shown, only those visible features in the immediate vicinity of the above described parcel boundary have been located.
10. Vertical information shown hereon refers to survey disc in top of a concrete monument stamped "ESC-4123" Elevation = 7.00 and a disc in top of metal pipe stamped "FERRY 1942" NAD 83/99).

LEGEND & ABBREVIATIONS

= MONITORING WELL

-EP- = EDGE OF PAVEMENT

1" = 60'
GRAPHIC SCALE
0 30 60 120

Specific Purpose Survey

Survey Date: 01-16-2012
Drawing Number: 56359
Scale: 1"=60'
Drawn By: C.Corbitt
Certify to: Aerostar Environmental Services, Inc.
Checked by:
56359001

SOUTHEASTERN SURVEYING & MAPPING CORP
1130 Highway 90
Chipley, Florida 32428
(850)638-0790 Fax(850)638-0060
e-mail: info@southeasternsurveying.com
Cert. No. LB-2100

THOMAS K. MEAD, P.S.M.
PROFESSIONAL SURVEYOR & MAPPER NO. 5424

APPENDIX B

FDEP Groundwater Sampling Logs

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: 0113	SITE LOCATION: NAS Pensacola	
WELL NO: 08GR01R	SAMPLE ID: 08GR01R	DATE: 10/27/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 8.9 - 13.9	STATIC DEPTH TO WATER (feet): 12.02	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (13.9 feet – 12.02 feet) X 06/10 gallons/foot = 1.1 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 13.0	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 13.0	PURGING INITIATED AT: 1345	PURGING ENDED AT: 1358	TOTAL VOLUME PURGED (gallons): 2.06

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) (mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1352	1.1	1.1	0.10	12.15	6.16	28.1	640	0.35	7.96	Clear	None
1355	0.48	1.58	0.10	12.15	6.16	28.1	640	0.35	6.63	Clear	None
1358	0.48	2.06	0.10	12.15	6.15	28.1	638	0.34	5.02	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1359	SAMPLING ENDED AT: 1406
PUMP OR TUBING DEPTH IN WELL (feet): 13.0	TUBING MATERIAL CODE: 13.0	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING (Y) N (replaced)	DUPLICATE: (Y) N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
08GR01R	2	AG	1L	Ice	—	—	Pesticides/8081	APP	606
08GR01R	1	PE	500 ml	HNO3	—	—	Metals/6010	APP	606
08GR01R	2	CG	40ml	HCL	—	—	VOC/8260	RFPP	<100

REMARKS: Dup Collected.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: OU13	SITE LOCATION: NAS Pensacola	
WELL NO: 08GR02	SAMPLE ID: 08GR02	DATE: 10/27/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 10 - 20	STATIC DEPTH TO WATER (feet): 12.32	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (20 feet – 12.32 feet) X 0.16 gallons/foot = 1.23 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 13.3	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 13.3	PURGING INITIATED AT: 1437	PURGING ENDED AT: 1451	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1445	1.25	1.25	0.16	12.57	5.87	26	270	0.22	5.97	Clear	None
1448	0.48	1.73	0.16	12.57	5.87	25.9	277	0.22	4.34	Clear	None
1451	0.48	2.21	0.16	12.57	5.87	25.9	278	0.22	4.29	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1452	SAMPLING ENDED AT: 1459
PUMP OR TUBING DEPTH IN WELL (feet): 13.3	TUBING MATERIAL CODE: 13.3	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING (Y) N (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
08GR02	2	AG	1L	Ice	—		Pesticides/8081	APP	606
08GR02	1	PE	500ml	HNO3	—		Metals/6010	APP	606
08GR02	2	CG	40ml	HCL	—		VOCs/8260	RFPP	606

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: 0413		SITE LOCATION: NAS Pensacola	
WELL NO: 08GR03R	SAMPLE ID: 08GR03R		DATE: 10/27/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 8.97 - 18.97	STATIC DEPTH TO WATER (feet): 12.61	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (18.97 feet – 12.61 feet) X 0.10 gallons/foot = 1.02 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 13.6	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 13.6	PURGING INITIATED AT: 1520	PURGING ENDED AT: 1537	TOTAL VOLUME PURGED (gallons): 2.36

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) (mg/L) or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1528	1.1	1.1	0.14	12.66	5.99	26.3	348	0.2	14.4	Clear	None
1531	0.42	1.52	0.14	12.66	5.98	26.3	356	0.2	13.7	Clear	None
1534	0.42	1.94	0.14	12.66	5.98	26.3	358	0.2	9.43	Clear	None
1537	0.42	2.36	0.14	12.66	5.98	26.2	359	0.2	7.32	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1538	SAMPLING ENDED AT: 1545
PUMP OR TUBING DEPTH IN WELL (feet): 13.6	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING (Y) N (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
08GR03R	2	AG	1L	Ice	—		Pesticides/8081	APP	530
08GR03R	1	PE	500ml	HNO_3	—		Metals/6010	APP	530
08GR03R	2	CG	40mL	HCL	—		VOC/8260	REPP	<100

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: OU13	SITE LOCATION: NAS Pensacola	
WELL NO: 08GR05	SAMPLE ID: 08GR05	DATE: 10/21/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 9.6 - 19.6	STATIC DEPTH TO WATER (feet): 12.95	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (19.6 feet – 12.95 feet) X 0.16 gallons/foot = 1.06 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 13.9	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 13.9	PURGING INITIATED AT: 1605	PURGING ENDED AT: 1618	TOTAL VOLUME PURGED (gallons): 2.06

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (mS/cm)	DISSOLVED OXYGEN (circle units) (mg/L) or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1612	1.1	1.1	0.16	12.98	5.65	25.6	347	0.19	11.4	Clear	None
1615	0.48	1.58	0.16	12.98	5.65	25.6	348	0.19	9.12	Clear	None
1618	0.48	2.06	0.16	12.98	5.65	25.4	349	0.2	7.43	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1619	SAMPLING ENDED AT: 1625
PUMP OR TUBING DEPTH IN WELL (feet): 13.9	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING (Y) N (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
08GR05	2	AG	1L	Ice	—		Pesticides/8081	APP	606
08GR05	1	PE	500ml	HNO3	—		Metals/6010	APP	606
08GR05	2	CG	40ml	HCl	—		VOCs/8260	RFPP	<1000

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: OU13	SITE LOCATION: NAS Pensacola	
WELL NO: 08GR06R	SAMPLE ID: 08GR06R	DATE: 10/27/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 10-20	STATIC DEPTH TO WATER (feet): 11.15	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (20 feet – 11.15 feet) X 0.16 gallons/foot = 1.42 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 12.1	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 12.1	PURGING INITIATED AT: 1645	PURGING ENDED AT: 1710	TOTAL VOLUME PURGED (gallons):

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or mS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1658	1.5	1.5	0.11	11.20	5.79	23.6	83.5	0.21	14.94	Clear	None
1701	0.33	1.83	0.11	11.21	5.79	23.6	83.6	0.21	11.72	Clear	None
1704	0.33	2.16	0.11	11.21	5.79	23.6	83.7	0.20	9.86	Clear	None
1707	0.33	2.49	0.11	11.21	5.79	23.6	83.7	0.20	7.34	Clear	None
1710	0.33	2.82	0.11	11.21	5.78	23.6	83.8	0.19	7.04	Clear	None

WELL CAPACITY (Gallons Per Foot): 0.75" = 0.02; 1" = 0.04; 1.25" = 0.06; 2" = 0.16; 3" = 0.37; 4" = 0.65; 5" = 1.02; 6" = 1.47; 12" = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): 1/8" = 0.0006; 3/16" = 0.0014; 1/4" = 0.0026; 5/16" = 0.004; 3/8" = 0.006; 1/2" = 0.010; 5/8" = 0.016

PURGING EQUIPMENT CODES: B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; PP = Peristaltic Pump; O = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1711	SAMPLING ENDED AT: 1720
PUMP OR TUBING DEPTH IN WELL (feet): 12.1	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING (Y) N (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
08GR06R	2	AG	1L	Ice	—		Pesticides/8081	APP	4/6
08GR06R	1	PE	500 ml	HNO3	—		Metals/6010	APP	4/6
08GR06R	2	CG	40 ml	HCL	—		VOCs/8260	RFPP	<100

REMARKS:

MATERIAL CODES: AG = Amber Glass; CG = Clear Glass; PE = Polyethylene; PP = Polypropylene; S = Silicone; T = Teflon; O = Other (Specify)

SAMPLING EQUIPMENT CODES: APP = After Peristaltic Pump; B = Bailer; BP = Bladder Pump; ESP = Electric Submersible Pump; RFPP = Reverse Flow Peristaltic Pump; SM = Straw Method (Tubing Gravity Drain); O = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**

2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	0413	SITE LOCATION:	115 Pensacola
WELL NO:	24GS10R	SAMPLE ID: 24GS10R	DATE: 10/28/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 6.72 - 16.72	STATIC DEPTH TO WATER (feet): 10.65	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (16.72 feet – 10.65 feet) X 0.16 gallons/foot = 0.9 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 11.7	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 11.7	PURGING INITIATED AT: 1028	PURGING ENDED AT: 1048	TOTAL VOLUME PURGED (gallons): 2.6

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) (mg/L) or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1036	1.0	1.0	0.13	10.68	5.73	22.6	179.3	1.15	19.2	Clear	None
1039	0.4	1.4	0.13	10.68	5.75	22.5	179.3	1.07	17.4	Clear	None
1042	0.4	1.8	0.13	10.68	5.74	22.5	178.3	1.06	17.9	Clear	None
1045	0.4	2.2	0.13	10.66	5.75	22.5	178.8	1.05	16.4	Clear	None
1048	0.4	2.6	0.13	10.68	5.75	22.5	178.7	1.02	16.6	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1049	SAMPLING ENDED AT: 1100
PUMP OR TUBING DEPTH IN WELL (feet): 11.7	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING (Y) (N) (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
24GS10R	2	AG	1L	Ice	—		Pesticides/8081	APP	482
24GS10R	1	PE	500ml	HNO_3	—		metals/6010	APP	482
24GS10R	2	CG	40ml	HCl	—		VOCs/8260	RFPP	<400

REMARKS: MS/MSD collected.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	SITE LOCATION:
OU13	NAS Pensacola

WELL NO:	SAMPLE ID:	DATE:
246515	246515	10/28/11

PURGING DATA

WELL DIAMETER (inches):	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH:	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:
2	3/16	5.35 - 10.35	9.56	Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (10.35 feet – 9.56 feet) X 0.16 gallons/foot = 0.12 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	PURGING INITIATED AT:	PURGING ENDED AT:	TOTAL VOLUME PURGED (gallons):
10.5	10.5	1123	1131	0.8

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1125	0.2	0.2	0.1	9.60	6.03	23.2	386	0.65	8.76	Clear	None
1128	0.3	0.5	0.1	9.60	5.99	23.2	388	0.65	7.43	Clear	None
1131	0.3	0.8	0.1	9.60	5.95	23.2	387	0.69	5.29	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT:	SAMPLING ENDED AT:
Curtis R. Mills / AEROSTAR		1132	1140

PUMP OR TUBING DEPTH IN WELL (feet):	TUBING MATERIAL CODE:	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
10.5	PE		

FIELD DECONTAMINATION: PUMP Y N TUBING (Y) N (replaced) DUPLICATE: Y (N)

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
246515	2	AG	1L	Ice	—		Pesticides/8081	APP	379
246515	1	PE	500 ml	HNO3	—		metals/6010	APP	379
246515	2	CG	40 ml	HCL	—		VOCs/8260	RFPP	200

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: 0413	SITE LOCATION: NAS Pensacola	
WELL NO: 246S11	SAMPLE ID: 246S11	DATE: 10/28/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: 4.85 - 16.85	STATIC DEPTH TO WATER (feet):	PURGE PUMP TYPE OR BAILER:

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (16.85 feet – 9.86 feet) X 0.16 gallons/foot = 1.12 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 10.8	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 10.8	PURGING INITIATED AT: 1157	PURGING ENDED AT: 1214	TOTAL VOLUME PURGED (gallons): 2.46

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1205	1.2	1.2	0.14	9.92	5.76	22.4	126.3	0.63	18.3	Clear	None
1208	0.42	1.62	0.14	9.92	5.60	22.9	127.7	0.65	16.7	Clear	None
1211	0.42	2.04	0.14	9.92	5.59	22.9	127.7	0.65	15.4	Clear	None
1214	0.42	2.46	0.14	9.92	5.59	22.9	127.2	0.65	15.7	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1215	SAMPLING ENDED AT: 1222
PUMP OR TUBING DEPTH IN WELL (feet): 10.8	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
246S11	2	AG	1L	Ice	—		Pesticides / 8081	APP	530
246S11	1	PE	500 ml	HNO3	—		Metals / 6010	APP	530
246S11	2	CG	40 ml	HCL	—		VOCs / 8260	RFPP	200

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: 0113	SITE LOCATION: NAS Pensacola	
WELL NO: 24 6501	SAMPLE ID: 24 6501	DATE: 10/28/14

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches):	WELL SCREEN INTERVAL DEPTH: 10 - 20	STATIC DEPTH TO WATER (feet): 10.05	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (20 feet – 10.05 feet) X 0.16 gallons/foot = 1.6 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 11.0	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 11.0	PURGING INITIATED AT: 1309	PURGING ENDED AT: 1326	TOTAL VOLUME PURGED (gallons): 2.50

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1320	1.6	1.6	0.15	10.11	6.77	23.1	817	0.56	1.62	Clear	None
1323	0.45	2.05	0.15	10.11	6.72	23.1	818	0.56	1.41	Clear	None
1326	0.45	2.50	0.15	10.11	6.72	23.1	821	0.56	1.27	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1327	SAMPLING ENDED AT: 1334
PUMP OR TUBING DEPTH IN WELL (feet): 11.0	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING (Y) N (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
246501	2	AG	1L	Ice	—		Pesticides/8081	APP	568
246501	1	PE	500 ml	HNO3			Metals/6010	APP	568
246501	2	CG	40 ml	HCl	—		VOCs/8260	RFPP	400

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME:	DU13	SITE LOCATION:	NAS Pensacola
WELL NO:	24G506R	SAMPLE ID:	24G506R
		DATE:	10/28/11

PURGING DATA

WELL DIAMETER (inches):	2	TUBING DIAMETER (inches):	3/16	WELL SCREEN INTERVAL DEPTH:	9.35-19.35	STATIC DEPTH TO WATER (feet):	12.68	PURGE PUMP TYPE OR BAILER:	Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (19.35 feet – 12.68 feet) X 0.16 gallons/foot = 1.07 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet):	13.6	FINAL PUMP OR TUBING DEPTH IN WELL (feet):	13.7	PURGING INITIATED AT:	1412	PURGING ENDED AT:	1426	TOTAL VOLUME PURGED (gallons):	

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or (µS/cm)	DISSOLVED OXYGEN (circle units) (mg/L) or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1420	1.07	1.07	0.13	12.71	5.53	25.1	101.8	0.52	7.14	Clear	None
1423	0.39	1.46	0.13	12.71	5.51	25.0	101.6	0.52	6.87	Clear	None
1426	0.39	1.85	0.13	12.71	5.51	25.1	101.8	0.52	6.42	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION:	Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):		SAMPLING INITIATED AT:	1427	SAMPLING ENDED AT:	1434
PUMP OR TUBING DEPTH IN WELL (feet):	13.7	TUBING MATERIAL CODE:	PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:		FILTER SIZE: ____ µm	
FIELD DECONTAMINATION: PUMP Y N		TUBING (Y) N (replaced)		DUPLICATE: Y (N)			

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
24G506R	2	AG	1L	Ice	—		Pesticides/8081	APP	492
24G506R	1	PE	500 ml	HNO3	—		Metals/6010	APP	492
24G506R	2	CG	40 ml	HCl	—		VOCs/8260	RFPP	<100

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

DEP-SOP-001/01
FS 2200 Groundwater Sampling

Form FD 9000-24

GROUNDWATER SAMPLING LOG

SITE NAME: 0413	SITE LOCATION: NAS Pensacola	
WELL NO: 24GS09R	SAMPLE ID: 24GS09R	DATE: 10/28/11

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 9.45-19.45	STATIC DEPTH TO WATER (feet): 11.65	PURGE PUMP TYPE OR BAILER: Peristaltic

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (19.45 feet – 11.65 feet) X 0.16 gallons/foot = 1.25 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 12.7	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 12.7	PURGING INITIATED AT: 1448	PURGING ENDED AT: 1502	TOTAL VOLUME PURGED (gallons): 2.21

TIME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or ~~µS/cm~~	DISSOLVED OXYGEN (circle units) ~~mg/L~~ or % saturation	TURBIDITY (NTUs)	COLOR (describe)	ODOR (describe)
1456	1.25	1.25	0.16	11.7	6.22	25.9	288	0.49	15.4	Clear	None
1459	0.48	1.73	0.16	11.7	6.24	25.8	283	0.49	11.7	Clear	None
1502	0.48	2.21	0.16	11.7	6.24	25.8	281	0.49	9.89	Clear	None

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Curtis R. Mills / AEROSTAR	SAMPLER(S) SIGNATURE(S):	SAMPLING INITIATED AT: 1503	SAMPLING ENDED AT: 1510
PUMP OR TUBING DEPTH IN WELL (feet): 12.7	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y (N) Filtration Equipment Type:	FILTER SIZE: ____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING (Y) N (replaced)	DUPLICATE: Y (N)	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION					
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH	INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
24GS09R	2	AG	1L	ICE			Pesticides/8081	APP	600
24GS09R	1	PE	500ml	HNO3			Metals/6010	APP	600
24GS09R	2	CG	40ml	HCL			VOCs/8260	RFPP	<100

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

NOTES: 1. **The above do not constitute all of the information required by Chapter 62-160, F.A.C.**
2. STABILIZATION CRITERIA FOR RANGE OF VARIATION OF LAST THREE CONSECUTIVE READINGS (SEE FS 2212, SECTION 3)

pH: ± 0.2 units **Temperature:** ± 0.2 °C **Specific Conductance:** ± 5% **Dissolved Oxygen:** all readings ≤ 20% saturation (see Table FS 2200-2); optionally, ± 0.2 mg/L or ± 10% (whichever is greater) **Turbidity:** all readings ≤ 20 NTU; optionally ± 5 NTU or ± 10% (whichever is greater)

Revision Date: February 12, 2009

APPENDIX C

Laboratory Analytical Results & Chain-of-Custody

Analytical Report 430498

for

Aerostar

Project Manager: Curtis Mills

NAS Pensacola

22-DEC-11

Collected By: Client

4143 Greenbriar Dr., Stafford, TX 77477

Xenco-Houston (EPA Lab code: TX00122):
Texas (T104704215-10-6-TX), Arizona (AZ0765), Arkansas (08-039-0), Connecticut (PH-0102), Florida (E871002)
Illinois (002082), Indiana (C-TX-02), Iowa (392), Kansas (E-10380), Kentucky (45), Louisiana (03054)
New Hampshire (297408), New Jersey (TX007), New York (11763), Oklahoma (9218), Pennsylvania (68-03610)
Rhode Island (LAO00312), USDA (S-44102)

Xenco-Atlanta (EPA Lab Code: GA00046):
Florida (E87429), North Carolina (483), South Carolina (98015), Utah (AALI1), West Virginia (362), Kentucky (85)
Louisiana (04176), USDA (P330-07-00105)

Xenco-Miami (EPA Lab code: FL01152): Florida (E86678), Maryland (330)
Xenco-Tampa Mobile (EPA Lab code: FL01212): Florida (E84900)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-TX)
Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-TX)
Xenco Phoenix (EPA Lab Code: AZ00901): Arizona(AZ0757)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)
Xenco Tucson (EPA Lab code:AZ000989): Arizona (AZ0758)

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Summary of Quality control	56
Sample Receipt Conformance Report	63
Chain of Custody	64

22-DEC-11

Project Manager: **Curtis Mills**
Aerostar
803 Government St Suite A
Mobile, AL 36602

Reference: XENCO Report No: **430498**
NAS Pensacola
Project Address: Sites 8 & 24

Curtis Mills:

We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number 430498. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. Estimation of data uncertainty for this report is found in the quality control section of this report unless otherwise noted. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 430498 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,

Carlos Castro

Managing Director, Texas

Recipient of the Prestigious Small Business Administration Award of Excellence in 1994.
Certified and approved by numerous States and Agencies.
A Small Business and Minority Status Company that delivers SERVICE and QUALITY

Houston - Dallas - San Antonio - Austin - Tampa - Miami - Atlanta - Corpus Christi - Latin America

Sample Cross Reference 430498

Aerostar, Mobile, AL

NAS Pensacola

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
08GR01R	W	10-27-11 13:59		430498-001
08GR02	W	10-27-11 14:52		430498-002
08GR03R	W	10-27-11 15:38		430498-003
08GR05	W	10-27-11 16:19		430498-004
08GR06R	W	10-27-11 17:11		430498-005
24GS10R	W	10-28-11 10:49		430498-006
24GS15	W	10-28-11 11:32		430498-007
24GS11	W	10-28-11 12:15		430498-008
24GS01	W	10-28-11 13:27		430498-009
24GS06R	W	10-28-11 14:27		430498-010
24GS09R	W	10-28-11 15:03		430498-011
DUP	W	10-27-11 00:00		430498-012

CASE NARRATIVE

Client Name: Aerostar
Project Name: NAS Pensacola

Project ID:
Work Order Number: *430498*

Report Date: *22-DEC-11*
Date Received: *10/29/2011*

Sample receipt non conformances and comments:

39 BOTTLES CHECKED PH

Sample receipt non conformances and comments per sample:

None

Analytical non nonformances and comments:

Batch: LBA-874147 Metals by EPA 200.8
E200.8

Batch 874147, Iron recovered above QC limits in the Matrix Spike and Matrix Spike Duplicate.
Samples affected are: 430498-006.
The Laboratory Control Sample for Iron is within laboratory Control Limits

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR01R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-001 **Date Collected:** Oct-27-11 13:59

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:37

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 17:50	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 17:50	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 17:50	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 17:50	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 17:50	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 17:50	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 17:50	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 17:50	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 17:50	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 17:50	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 17:50	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 17:50	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 17:50	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 17:50	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 17:50	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 17:50	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 17:50	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 17:50	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 17:50	U	1
Chloroform	67-66-3	U	0.00500	0.000620	mg/L	11/02/11 17:50	U	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 17:50	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 17:50	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 17:50	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 17:50	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 17:50	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 17:50	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 17:50	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 17:50	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 17:50	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 17:50	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 17:50	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 17:50	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 17:50	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 17:50	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 17:50	U	1
cis-1,2-Dichloroethene	156-59-2	**0.000420**	0.00500	0.000350	mg/L	11/02/11 17:50	I	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 17:50	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 17:50	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 17:50	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 17:50	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR01R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-001 **Date Collected:** Oct-27-11 13:59

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:37

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 17:50	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 17:50	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 17:50	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 17:50	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 17:50	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 17:50	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 17:50	U	1
Methylene Chloride	75-09-2	U	0.00500	0.000750	mg/L	11/02/11 17:50	U	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 17:50	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 17:50	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 17:50	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 17:50	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 17:50	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 17:50	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 17:50	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 17:50	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 17:50	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 17:50	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 17:50	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 17:50	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 17:50	U	1
Trichloroethene	79-01-6	**0.000650**	0.00500	0.000390	mg/L	11/02/11 17:50	I	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 17:50	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 17:50	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 17:50	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 17:50	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 17:50	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 17:50	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 17:50	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 17:50	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 17:50	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	98	%	74-124	11/02/11 17:50	
Dibromofluoromethane	1868-53-7	99	%	75-131	11/02/11 17:50	
1,2-Dichloroethane-D4	17060-07-0	96	%	63-144	11/02/11 17:50	
Toluene-D8	2037-26-5	95	%	80-117	11/02/11 17:50	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR01R | **Matrix:** Water | **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-001 | **Date Collected:** Oct-27-11 13:59

Analytical Method: Metals by EPA 200.8 | **Prep Method:** SW3010A

Tech: MLI | **% Moisture:**

Analyst: MKO | **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 11:55	U	1
Cadmium	7440-43-9	**0.0164**	0.000600	0.0000614	mg/L	11/04/11 11:55		1
Iron	7439-89-6	**0.141**	0.150	0.00142	mg/L	11/04/11 11:55	I	1
Lead	7439-92-1	U	0.00200	0.0000434	mg/L	11/04/11 11:55	U	1
Manganese	7439-96-5	**0.133**	0.00300	0.000137	mg/L	11/04/11 11:55		1
Nickel	7440-02-0	**0.00226**	0.00500	0.000344	mg/L	11/04/11 11:55	I	1
Thallium	7440-28-0	**0.000250**	0.000500	0.0000475	mg/L	11/04/11 11:55	I	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR01R **Matrix:** Water **Date Received:** Oct-29-11 09:30
Lab Sample Id: 430498-001 **Date Collected:** Oct-27-11 13:59

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C
Tech: LRA **% Moisture:**
Analyst: JUM **Date Prep:** Nov-03-11 10:54
Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000313	0.0000104	mg/L	11/04/11 17:49	U	1
4,4-DDE	72-55-9	U	0.0000313	0.0000177	mg/L	11/04/11 17:49	U	1
4,4-DDT	50-29-3	U	0.0000313	0.0000125	mg/L	11/04/11 17:49	U	1
Aldrin	309-00-2	U	0.0000313	0.00000177	mg/L	11/04/11 17:49	U	1
Alpha-BHC	319-84-6	U	0.0000313	0.00000531	mg/L	11/04/11 17:49	U	1
Alpha-Chlordane	5103-71-9	U	0.0000521	0.0000208	mg/L	11/04/11 17:49	U	1
Beta-BHC	319-85-7	U	0.0000313	0.0000184	mg/L	11/04/11 17:49	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000313	0.00000375	mg/L	11/04/11 17:49	U	1
Chlordane	57-74-9	U	0.000104	0.0000531	mg/L	11/04/11 17:49	U	1
Delta-BHC	319-86-8	U	0.0000313	0.0000135	mg/L	11/04/11 17:49	U	1
Dieldrin	60-57-1	U	0.0000313	0.00000177	mg/L	11/04/11 17:49	U	1
Endosulfan I	959-98-8	U	0.0000313	0.00000938	mg/L	11/04/11 17:49	U	1
Endosulfan II	33213-65-9	U	0.0000313	0.0000135	mg/L	11/04/11 17:49	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000313	0.0000125	mg/L	11/04/11 17:49	U	1
Endrin	72-20-8	U	0.0000313	0.0000156	mg/L	11/04/11 17:49	U	1
Endrin Ketone	53494-70-5	U	0.0000313	0.0000146	mg/L	11/04/11 17:49	U	1
Endrin Aldehyde	7421-93-4	U	0.0000521	0.00000833	mg/L	11/04/11 17:49	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000313	0.00000521	mg/L	11/04/11 17:49	U	1
Gamma-Chlordane	5103-74-2	U	0.0000521	0.0000135	mg/L	11/04/11 17:49	U	1
Heptachlor	76-44-8	U	0.0000313	0.0000344	mg/L	11/04/11 17:49	U	1
Methoxychlor	72-43-5	U	0.000104	0.0000135	mg/L	11/04/11 17:49	U	1
Toxaphene	8001-35-2	U	0.000208	0.0000313	mg/L	11/04/11 17:49	U	1
Chlorobenzilate	510-15-6	U	0.000104	0.00000177	mg/L	11/04/11 17:49	U	1
Isodrin	465-73-6	U	0.0000521	0.00000141	mg/L	11/04/11 17:49	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	70	%	15-136	11/04/11 17:49	
Tetrachloro-m-xylene *	877-09-8	84	%	18-126	11/04/11 17:49	
Decachlorobiphenyl *	2051-24-3	74	%	15-136	11/04/11 17:49	
Tetrachloro-m-xylene *	877-09-8	87	%	18-126	11/04/11 17:49	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR02 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-002 **Date Collected:** Oct-27-11 14:52

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:38

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 18:33	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 18:33	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 18:33	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 18:33	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 18:33	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 18:33	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 18:33	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 18:33	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 18:33	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 18:33	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 18:33	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 18:33	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 18:33	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 18:33	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 18:33	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 18:33	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 18:33	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 18:33	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 18:33	U	1
Chloroform	67-66-3	U	0.00500	0.000620	mg/L	11/02/11 18:33	U	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 18:33	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 18:33	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 18:33	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 18:33	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 18:33	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 18:33	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 18:33	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 18:33	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 18:33	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 18:33	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 18:33	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 18:33	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 18:33	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 18:33	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 18:33	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 18:33	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 18:33	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 18:33	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 18:33	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 18:33	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR02 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-002 **Date Collected:** Oct-27-11 14:52

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:38

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 18:33	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 18:33	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 18:33	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 18:33	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 18:33	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 18:33	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 18:33	U	1
Methylene Chloride	75-09-2	**0.000800**	0.00500	0.000750	mg/L	11/02/11 18:33	VI	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 18:33	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 18:33	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 18:33	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 18:33	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 18:33	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 18:33	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 18:33	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 18:33	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 18:33	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 18:33	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 18:33	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 18:33	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 18:33	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 18:33	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 18:33	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 18:33	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 18:33	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 18:33	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 18:33	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 18:33	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 18:33	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 18:33	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 18:33	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	101	%	74-124	11/02/11 18:33	
Dibromofluoromethane	1868-53-7	98	%	75-131	11/02/11 18:33	
1,2-Dichloroethane-D4	17060-07-0	90	%	63-144	11/02/11 18:33	
Toluene-D8	2037-26-5	96	%	80-117	11/02/11 18:33	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR02 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-002 **Date Collected:** Oct-27-11 14:52

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A

Tech: MLI **% Moisture:**

Analyst: MKO **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 12:01	U	1
Cadmium	7440-43-9	**0.0238**	0.000600	0.0000614	mg/L	11/04/11 12:01		1
Iron	7439-89-6	**0.668**	0.150	0.00142	mg/L	11/04/11 12:01		1
Lead	7439-92-1	U	0.00200	0.0000434	mg/L	11/04/11 12:01	U	1
Manganese	7439-96-5	**0.181**	0.00300	0.000137	mg/L	11/04/11 12:01		1
Nickel	7440-02-0	**0.00288**	0.00500	0.000344	mg/L	11/04/11 12:01	I	1
Thallium	7440-28-0	**0.000120**	0.000500	0.0000475	mg/L	11/04/11 12:01	I	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR02 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-002 **Date Collected:** Oct-27-11 14:52

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C

Tech: LRA **% Moisture:**

Analyst: JUM **Date Prep:** Nov-03-11 10:57

Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000305	0.0000102	mg/L	11/04/11 18:05	U	1
4,4-DDE	72-55-9	U	0.0000305	0.0000173	mg/L	11/04/11 18:05	U	1
4,4-DDT	50-29-3	U	0.0000305	0.0000122	mg/L	11/04/11 18:05	U	1
Aldrin	309-00-2	U	0.0000305	0.00000173	mg/L	11/04/11 18:05	U	1
Alpha-BHC	319-84-6	U	0.0000305	0.00000518	mg/L	11/04/11 18:05	U	1
Alpha-Chlordane	5103-71-9	U	0.0000508	0.0000203	mg/L	11/04/11 18:05	U	1
Beta-BHC	319-85-7	U	0.0000305	0.0000180	mg/L	11/04/11 18:05	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000305	0.00000365	mg/L	11/04/11 18:05	U	1
Chlordane	57-74-9	U	0.000102	0.0000518	mg/L	11/04/11 18:05	U	1
Delta-BHC	319-86-8	U	0.0000305	0.0000132	mg/L	11/04/11 18:05	U	1
Dieldrin	60-57-1	U	0.0000305	0.00000173	mg/L	11/04/11 18:05	U	1
Endosulfan I	959-98-8	U	0.0000305	0.00000914	mg/L	11/04/11 18:05	U	1
Endosulfan II	33213-65-9	U	0.0000305	0.0000132	mg/L	11/04/11 18:05	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000305	0.0000122	mg/L	11/04/11 18:05	U	1
Endrin	72-20-8	U	0.0000305	0.0000152	mg/L	11/04/11 18:05	U	1
Endrin Ketone	53494-70-5	U	0.0000305	0.0000142	mg/L	11/04/11 18:05	U	1
Endrin Aldehyde	7421-93-4	U	0.0000508	0.00000812	mg/L	11/04/11 18:05	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000305	0.00000508	mg/L	11/04/11 18:05	U	1
Gamma-Chlordane	5103-74-2	U	0.0000508	0.0000132	mg/L	11/04/11 18:05	U	1
Heptachlor	76-44-8	U	0.0000305	0.0000335	mg/L	11/04/11 18:05	U	1
Methoxychlor	72-43-5	U	0.000102	0.0000132	mg/L	11/04/11 18:05	U	1
Toxaphene	8001-35-2	U	0.000203	0.0000305	mg/L	11/04/11 18:05	U	1
Chlorobenzilate	510-15-6	U	0.000102	0.00000173	mg/L	11/04/11 18:05	U	1
Isodrin	465-73-6	U	0.0000508	0.00000137	mg/L	11/04/11 18:05	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	66	%	15-136	11/04/11 18:05	
Tetrachloro-m-xylene *	877-09-8	77	%	18-126	11/04/11 18:05	
Decachlorobiphenyl *	2051-24-3	68	%	15-136	11/04/11 18:05	
Tetrachloro-m-xylene *	877-09-8	87	%	18-126	11/04/11 18:05	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR03R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-003 **Date Collected:** Oct-27-11 15:38

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:39

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 18:55	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 18:55	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 18:55	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 18:55	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 18:55	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 18:55	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 18:55	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 18:55	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 18:55	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 18:55	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 18:55	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 18:55	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 18:55	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 18:55	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 18:55	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 18:55	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 18:55	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 18:55	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 18:55	U	1
Chloroform	67-66-3	U	0.00500	0.000620	mg/L	11/02/11 18:55	U	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 18:55	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 18:55	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 18:55	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 18:55	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 18:55	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 18:55	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 18:55	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 18:55	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 18:55	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 18:55	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 18:55	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 18:55	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 18:55	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 18:55	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 18:55	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 18:55	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 18:55	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 18:55	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 18:55	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 18:55	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR03R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-003 **Date Collected:** Oct-27-11 15:38

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:39

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 18:55	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 18:55	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 18:55	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 18:55	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 18:55	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 18:55	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 18:55	U	1
Methylene Chloride	75-09-2	U	0.00500	0.000750	mg/L	11/02/11 18:55	U	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 18:55	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 18:55	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 18:55	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 18:55	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 18:55	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 18:55	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 18:55	U	1
Tetrachloroethylene	127-18-4	**0.000590**	0.00500	0.000590	mg/L	11/02/11 18:55	I	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 18:55	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 18:55	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 18:55	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 18:55	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 18:55	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 18:55	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 18:55	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 18:55	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 18:55	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 18:55	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 18:55	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 18:55	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 18:55	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 18:55	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 18:55	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	99	%	74-124	11/02/11 18:55	
Dibromofluoromethane	1868-53-7	100	%	75-131	11/02/11 18:55	
1,2-Dichloroethane-D4	17060-07-0	99	%	63-144	11/02/11 18:55	
Toluene-D8	2037-26-5	97	%	80-117	11/02/11 18:55	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR03R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-003 **Date Collected:** Oct-27-11 15:38

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A

Tech: MLI **% Moisture:**

Analyst: MKO **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 12:07	U	1
Cadmium	7440-43-9	**0.000960**	0.000600	0.0000614	mg/L	11/04/11 12:07		1
Iron	7439-89-6	**0.470**	0.150	0.00142	mg/L	11/04/11 12:07		1
Lead	7439-92-1	**0.000580**	0.00200	0.0000434	mg/L	11/04/11 12:07	I	1
Manganese	7439-96-5	**0.00377**	0.00300	0.000137	mg/L	11/04/11 12:07		1
Nickel	7440-02-0	U	0.00500	0.000344	mg/L	11/04/11 12:07	U	1
Thallium	7440-28-0	**0.0000500**	0.000500	0.0000475	mg/L	11/04/11 12:07	I	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR03R **Matrix:** Water **Date Received:** Oct-29-11 09:30
Lab Sample Id: 430498-003 **Date Collected:** Oct-27-11 15:38

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C
Tech: LRA **% Moisture:**
Analyst: JUM **Date Prep:** Nov-03-11 11:00
Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000303	0.0000101	mg/L	11/04/11 18:22	U	1
4,4-DDE	72-55-9	U	0.0000303	0.0000172	mg/L	11/04/11 18:22	U	1
4,4-DDT	50-29-3	U	0.0000303	0.0000121	mg/L	11/04/11 18:22	U	1
Aldrin	309-00-2	U	0.0000303	0.00000172	mg/L	11/04/11 18:22	U	1
Alpha-BHC	319-84-6	U	0.0000303	0.00000515	mg/L	11/04/11 18:22	U	1
Alpha-Chlordane	5103-71-9	U	0.0000505	0.0000202	mg/L	11/04/11 18:22	U	1
Beta-BHC	319-85-7	U	0.0000303	0.0000179	mg/L	11/04/11 18:22	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000303	0.00000364	mg/L	11/04/11 18:22	U	1
Chlordane	57-74-9	U	0.000101	0.0000515	mg/L	11/04/11 18:22	U	1
Delta-BHC	319-86-8	U	0.0000303	0.0000131	mg/L	11/04/11 18:22	U	1
Dieldrin	60-57-1	U	0.0000303	0.00000172	mg/L	11/04/11 18:22	U	1
Endosulfan I	959-98-8	U	0.0000303	0.00000909	mg/L	11/04/11 18:22	U	1
Endosulfan II	33213-65-9	U	0.0000303	0.0000131	mg/L	11/04/11 18:22	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000303	0.0000121	mg/L	11/04/11 18:22	U	1
Endrin	72-20-8	U	0.0000303	0.0000152	mg/L	11/04/11 18:22	U	1
Endrin Ketone	53494-70-5	U	0.0000303	0.0000141	mg/L	11/04/11 18:22	U	1
Endrin Aldehyde	7421-93-4	U	0.0000505	0.00000808	mg/L	11/04/11 18:22	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000303	0.00000505	mg/L	11/04/11 18:22	U	1
Gamma-Chlordane	5103-74-2	U	0.0000505	0.0000131	mg/L	11/04/11 18:22	U	1
Heptachlor	76-44-8	U	0.0000303	0.0000333	mg/L	11/04/11 18:22	U	1
Methoxychlor	72-43-5	U	0.000101	0.0000131	mg/L	11/04/11 18:22	U	1
Toxaphene	8001-35-2	U	0.000202	0.0000303	mg/L	11/04/11 18:22	U	1
Chlorobenzilate	510-15-6	U	0.000101	0.00000172	mg/L	11/04/11 18:22	U	1
Isodrin	465-73-6	U	0.0000505	0.00000136	mg/L	11/04/11 18:22	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	57	%	15-136	11/04/11 18:22	
Tetrachloro-m-xylene *	877-09-8	73	%	18-126	11/04/11 18:22	
Tetrachloro-m-xylene *	877-09-8	74	%	18-126	11/04/11 18:22	
Decachlorobiphenyl *	2051-24-3	61	%	15-136	11/04/11 18:22	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR05 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-004 **Date Collected:** Oct-27-11 16:19

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:40

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 19:17	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 19:17	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 19:17	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 19:17	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 19:17	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 19:17	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 19:17	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 19:17	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 19:17	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 19:17	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 19:17	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 19:17	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 19:17	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 19:17	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 19:17	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 19:17	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 19:17	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 19:17	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 19:17	U	1
Chloroform	67-66-3	U	0.00500	0.000620	mg/L	11/02/11 19:17	U	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 19:17	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 19:17	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 19:17	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 19:17	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 19:17	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 19:17	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 19:17	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 19:17	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 19:17	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 19:17	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 19:17	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 19:17	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 19:17	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 19:17	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 19:17	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 19:17	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 19:17	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 19:17	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 19:17	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 19:17	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR05 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-004 **Date Collected:** Oct-27-11 16:19

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:40

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 19:17	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 19:17	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 19:17	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 19:17	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 19:17	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 19:17	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 19:17	U	1
Methylene Chloride	75-09-2	**0.000830**	0.00500	0.000750	mg/L	11/02/11 19:17	VI	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 19:17	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 19:17	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 19:17	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 19:17	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 19:17	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 19:17	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 19:17	U	1
Tetrachloroethylene	127-18-4	**0.000980**	0.00500	0.000590	mg/L	11/02/11 19:17	I	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 19:17	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 19:17	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 19:17	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 19:17	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 19:17	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 19:17	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 19:17	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 19:17	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 19:17	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 19:17	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 19:17	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 19:17	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 19:17	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 19:17	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 19:17	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	97	%	74-124	11/02/11 19:17	
Dibromofluoromethane	1868-53-7	101	%	75-131	11/02/11 19:17	
1,2-Dichloroethane-D4	17060-07-0	94	%	63-144	11/02/11 19:17	
Toluene-D8	2037-26-5	95	%	80-117	11/02/11 19:17	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR05 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-004 **Date Collected:** Oct-27-11 16:19

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A

Tech: MLI **% Moisture:**

Analyst: MKO **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 12:13	U	1
Cadmium	7440-43-9	**0.000420**	0.000600	0.0000614	mg/L	11/04/11 12:13	I	1
Iron	7439-89-6	**0.106**	0.150	0.00142	mg/L	11/04/11 12:13	I	1
Lead	7439-92-1	U	0.00200	0.0000434	mg/L	11/04/11 12:13	U	1
Manganese	7439-96-5	**0.0265**	0.00300	0.000137	mg/L	11/04/11 12:13		1
Nickel	7440-02-0	**0.00572**	0.00500	0.000344	mg/L	11/04/11 12:13		1
Thallium	7440-28-0	U	0.000500	0.0000475	mg/L	11/04/11 12:13	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR05 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-004 **Date Collected:** Oct-27-11 16:19

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C

Tech: LRA **% Moisture:**

Analyst: JUM **Date Prep:** Nov-03-11 11:03

Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000306	0.0000102	mg/L	11/04/11 18:39	U	1
4,4-DDE	72-55-9	U	0.0000306	0.0000173	mg/L	11/04/11 18:39	U	1
4,4-DDT	50-29-3	U	0.0000306	0.0000122	mg/L	11/04/11 18:39	U	1
Aldrin	309-00-2	U	0.0000306	0.00000173	mg/L	11/04/11 18:39	U	1
Alpha-BHC	319-84-6	U	0.0000306	0.00000520	mg/L	11/04/11 18:39	U	1
Alpha-Chlordane	5103-71-9	U	0.0000510	0.0000204	mg/L	11/04/11 18:39	U	1
Beta-BHC	319-85-7	U	0.0000306	0.0000181	mg/L	11/04/11 18:39	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000306	0.00000367	mg/L	11/04/11 18:39	U	1
Chlordane	57-74-9	U	0.000102	0.0000520	mg/L	11/04/11 18:39	U	1
Delta-BHC	319-86-8	U	0.0000306	0.0000133	mg/L	11/04/11 18:39	U	1
Dieldrin	60-57-1	U	0.0000306	0.00000173	mg/L	11/04/11 18:39	U	1
Endosulfan I	959-98-8	U	0.0000306	0.00000918	mg/L	11/04/11 18:39	U	1
Endosulfan II	33213-65-9	U	0.0000306	0.0000133	mg/L	11/04/11 18:39	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000306	0.0000122	mg/L	11/04/11 18:39	U	1
Endrin	72-20-8	U	0.0000306	0.0000153	mg/L	11/04/11 18:39	U	1
Endrin Ketone	53494-70-5	U	0.0000306	0.0000143	mg/L	11/04/11 18:39	U	1
Endrin Aldehyde	7421-93-4	U	0.0000510	0.00000816	mg/L	11/04/11 18:39	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000306	0.00000510	mg/L	11/04/11 18:39	U	1
Gamma-Chlordane	5103-74-2	U	0.0000510	0.0000133	mg/L	11/04/11 18:39	U	1
Heptachlor	76-44-8	U	0.0000306	0.0000337	mg/L	11/04/11 18:39	U	1
Methoxychlor	72-43-5	U	0.000102	0.0000133	mg/L	11/04/11 18:39	U	1
Toxaphene	8001-35-2	U	0.000204	0.0000306	mg/L	11/04/11 18:39	U	1
Chlorobenzilate	510-15-6	U	0.000102	0.00000173	mg/L	11/04/11 18:39	U	1
Isodrin	465-73-6	U	0.0000510	0.00000138	mg/L	11/04/11 18:39	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	73	%	15-136	11/04/11 18:39	
Decachlorobiphenyl *	2051-24-3	65	%	15-136	11/04/11 18:39	
Tetrachloro-m-xylene *	877-09-8	85	%	18-126	11/04/11 18:39	
Tetrachloro-m-xylene *	877-09-8	92	%	18-126	11/04/11 18:39	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR06R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-005 **Date Collected:** Oct-27-11 17:11

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:41

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 19:39	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 19:39	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 19:39	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 19:39	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 19:39	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 19:39	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 19:39	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 19:39	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 19:39	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 19:39	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 19:39	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 19:39	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 19:39	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 19:39	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 19:39	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 19:39	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 19:39	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 19:39	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 19:39	U	1
Chloroform	67-66-3	U	0.00500	0.000620	mg/L	11/02/11 19:39	U	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 19:39	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 19:39	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 19:39	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 19:39	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 19:39	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 19:39	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 19:39	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 19:39	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 19:39	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 19:39	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 19:39	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 19:39	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 19:39	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 19:39	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 19:39	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 19:39	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 19:39	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 19:39	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 19:39	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 19:39	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR06R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-005 **Date Collected:** Oct-27-11 17:11

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:41

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 19:39	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 19:39	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 19:39	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 19:39	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 19:39	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 19:39	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 19:39	U	1
Methylene Chloride	75-09-2	U	0.00500	0.000750	mg/L	11/02/11 19:39	U	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 19:39	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 19:39	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 19:39	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 19:39	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 19:39	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 19:39	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 19:39	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 19:39	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 19:39	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 19:39	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 19:39	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 19:39	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 19:39	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 19:39	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 19:39	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 19:39	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 19:39	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 19:39	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 19:39	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 19:39	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 19:39	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 19:39	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 19:39	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	98	%	74-124	11/02/11 19:39	
Dibromofluoromethane	1868-53-7	101	%	75-131	11/02/11 19:39	
1,2-Dichloroethane-D4	17060-07-0	97	%	63-144	11/02/11 19:39	
Toluene-D8	2037-26-5	96	%	80-117	11/02/11 19:39	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR06R **Matrix:** Water **Date Received:** Oct-29-11 09:30
Lab Sample Id: 430498-005 **Date Collected:** Oct-27-11 17:11

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A
Tech: MLI **% Moisture:**
Analyst: MKO **Date Prep:** Nov-03-11 16:00
Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 12:31	U	1
Cadmium	7440-43-9	U	0.000600	0.0000614	mg/L	11/04/11 12:31	U	1
Iron	7439-89-6	**1.21**	0.150	0.00142	mg/L	11/04/11 12:31		1
Lead	7439-92-1	**0.00241**	0.00200	0.0000434	mg/L	11/04/11 12:31		1
Manganese	7439-96-5	**0.00320**	0.00300	0.000137	mg/L	11/04/11 12:31		1
Nickel	7440-02-0	**0.00168**	0.00500	0.000344	mg/L	11/04/11 12:31	I	1
Thallium	7440-28-0	**0.0000500**	0.000500	0.0000475	mg/L	11/04/11 12:31	I	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 08GR06R **Matrix:** Water **Date Received:** Oct-29-11 09:30
Lab Sample Id: 430498-005 **Date Collected:** Oct-27-11 17:11

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C
Tech: LRA **% Moisture:**
Analyst: JUM **Date Prep:** Nov-03-11 11:06
Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000303	0.0000101	mg/L	11/04/11 18:55	U	1
4,4-DDE	72-55-9	U	0.0000303	0.0000172	mg/L	11/04/11 18:55	U	1
4,4-DDT	50-29-3	U	0.0000303	0.0000121	mg/L	11/04/11 18:55	U	1
Aldrin	309-00-2	U	0.0000303	0.00000172	mg/L	11/04/11 18:55	U	1
Alpha-BHC	319-84-6	U	0.0000303	0.00000515	mg/L	11/04/11 18:55	U	1
Alpha-Chlordane	5103-71-9	U	0.0000505	0.0000202	mg/L	11/04/11 18:55	U	1
Beta-BHC	319-85-7	U	0.0000303	0.0000179	mg/L	11/04/11 18:55	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000303	0.00000364	mg/L	11/04/11 18:55	U	1
Chlordane	57-74-9	U	0.000101	0.0000515	mg/L	11/04/11 18:55	U	1
Delta-BHC	319-86-8	U	0.0000303	0.0000131	mg/L	11/04/11 18:55	U	1
Dieldrin	60-57-1	U	0.0000303	0.00000172	mg/L	11/04/11 18:55	U	1
Endosulfan I	959-98-8	U	0.0000303	0.00000909	mg/L	11/04/11 18:55	U	1
Endosulfan II	33213-65-9	U	0.0000303	0.0000131	mg/L	11/04/11 18:55	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000303	0.0000121	mg/L	11/04/11 18:55	U	1
Endrin	72-20-8	U	0.0000303	0.0000152	mg/L	11/04/11 18:55	U	1
Endrin Ketone	53494-70-5	U	0.0000303	0.0000141	mg/L	11/04/11 18:55	U	1
Endrin Aldehyde	7421-93-4	U	0.0000505	0.00000808	mg/L	11/04/11 18:55	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000303	0.00000505	mg/L	11/04/11 18:55	U	1
Gamma-Chlordane	5103-74-2	U	0.0000505	0.0000131	mg/L	11/04/11 18:55	U	1
Heptachlor	76-44-8	U	0.0000303	0.0000333	mg/L	11/04/11 18:55	U	1
Methoxychlor	72-43-5	U	0.000101	0.0000131	mg/L	11/04/11 18:55	U	1
Toxaphene	8001-35-2	U	0.000202	0.0000303	mg/L	11/04/11 18:55	U	1
Chlorobenzilate	510-15-6	U	0.000101	0.00000172	mg/L	11/04/11 18:55	U	1
Isodrin	465-73-6	U	0.0000505	0.00000136	mg/L	11/04/11 18:55	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Tetrachloro-m-xylene *	877-09-8	85	%	18-126	11/04/11 18:55	
Tetrachloro-m-xylene *	877-09-8	82	%	18-126	11/04/11 18:55	
Decachlorobiphenyl *	2051-24-3	52	%	15-136	11/04/11 18:55	
Decachlorobiphenyl *	2051-24-3	54	%	15-136	11/04/11 18:55	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS10R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-006 **Date Collected:** Oct-28-11 10:49

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:42

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 20:01	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 20:01	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 20:01	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 20:01	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 20:01	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 20:01	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 20:01	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 20:01	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 20:01	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 20:01	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 20:01	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 20:01	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 20:01	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 20:01	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 20:01	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 20:01	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 20:01	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 20:01	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 20:01	U	1
Chloroform	67-66-3	**0.00528**	0.00500	0.000620	mg/L	11/02/11 20:01		1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 20:01	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 20:01	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 20:01	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 20:01	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 20:01	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 20:01	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 20:01	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 20:01	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 20:01	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 20:01	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 20:01	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 20:01	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 20:01	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 20:01	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 20:01	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 20:01	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 20:01	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 20:01	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 20:01	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 20:01	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS10R **Matrix:** Water **Date Received:** Oct-29-11 09:30
Lab Sample Id: 430498-006 **Date Collected:** Oct-28-11 10:49

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B
Tech: CYE **% Moisture:**
Analyst: CYE **Date Prep:** Nov-02-11 13:42
Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 20:01	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 20:01	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 20:01	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 20:01	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 20:01	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 20:01	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 20:01	U	1
Methylene Chloride	75-09-2	U	0.00500	0.000750	mg/L	11/02/11 20:01	U	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 20:01	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 20:01	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 20:01	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 20:01	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 20:01	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 20:01	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 20:01	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 20:01	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 20:01	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 20:01	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 20:01	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 20:01	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 20:01	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 20:01	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 20:01	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 20:01	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 20:01	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 20:01	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 20:01	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 20:01	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 20:01	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 20:01	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 20:01	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	99	%	74-124	11/02/11 20:01	
Dibromofluoromethane	1868-53-7	99	%	75-131	11/02/11 20:01	
1,2-Dichloroethane-D4	17060-07-0	100	%	63-144	11/02/11 20:01	
Toluene-D8	2037-26-5	96	%	80-117	11/02/11 20:01	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS10R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-006 **Date Collected:** Oct-28-11 10:49

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A

Tech: MLI **% Moisture:**

Analyst: MKO **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 11:30	U	1
Cadmium	7440-43-9	U	0.000600	0.0000614	mg/L	11/04/11 11:30	U	1
Iron	7439-89-6	**1.63**	0.150	0.00142	mg/L	11/04/11 11:30	J	1
Lead	7439-92-1	**0.000940**	0.00200	0.0000434	mg/L	11/04/11 11:30	I	1
Manganese	7439-96-5	**0.00646**	0.00300	0.000137	mg/L	11/04/11 11:30		1
Nickel	7440-02-0	**0.000770**	0.00500	0.000344	mg/L	11/04/11 11:30	I	1
Thallium	7440-28-0	**0.000350**	0.000500	0.0000475	mg/L	11/04/11 11:30	I	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS10R **Matrix:** Water **Date Received:** Oct-29-11 09:30
Lab Sample Id: 430498-006 **Date Collected:** Oct-28-11 10:49

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C
Tech: LRA **% Moisture:**
Analyst: JUM **Date Prep:** Nov-03-11 11:09
Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000308	0.0000103	mg/L	11/04/11 19:12	U	1
4,4-DDE	72-55-9	U	0.0000308	0.0000174	mg/L	11/04/11 19:12	U	1
4,4-DDT	50-29-3	U	0.0000308	0.0000123	mg/L	11/04/11 19:12	U	1
Aldrin	309-00-2	U	0.0000308	0.00000174	mg/L	11/04/11 19:12	U	1
Alpha-BHC	319-84-6	U	0.0000308	0.00000523	mg/L	11/04/11 19:12	U	1
Alpha-Chlordane	5103-71-9	U	0.0000513	0.0000205	mg/L	11/04/11 19:12	U	1
Beta-BHC	319-85-7	U	0.0000308	0.0000182	mg/L	11/04/11 19:12	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000308	0.00000369	mg/L	11/04/11 19:12	U	1
Chlordane	57-74-9	U	0.000103	0.0000523	mg/L	11/04/11 19:12	U	1
Delta-BHC	319-86-8	U	0.0000308	0.0000133	mg/L	11/04/11 19:12	U	1
Dieldrin	60-57-1	U	0.0000308	0.00000174	mg/L	11/04/11 19:12	U	1
Endosulfan I	959-98-8	U	0.0000308	0.00000923	mg/L	11/04/11 19:12	U	1
Endosulfan II	33213-65-9	U	0.0000308	0.0000133	mg/L	11/04/11 19:12	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000308	0.0000123	mg/L	11/04/11 19:12	U	1
Endrin	72-20-8	U	0.0000308	0.0000154	mg/L	11/04/11 19:12	U	1
Endrin Ketone	53494-70-5	U	0.0000308	0.0000144	mg/L	11/04/11 19:12	U	1
Endrin Aldehyde	7421-93-4	U	0.0000513	0.00000821	mg/L	11/04/11 19:12	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000308	0.00000513	mg/L	11/04/11 19:12	U	1
Gamma-Chlordane	5103-74-2	U	0.0000513	0.0000133	mg/L	11/04/11 19:12	U	1
Heptachlor	76-44-8	U	0.0000308	0.0000338	mg/L	11/04/11 19:12	U	1
Methoxychlor	72-43-5	U	0.000103	0.0000133	mg/L	11/04/11 19:12	U	1
Toxaphene	8001-35-2	U	0.000205	0.0000308	mg/L	11/04/11 19:12	U	1
Chlorobenzilate	510-15-6	U	0.000103	0.00000174	mg/L	11/04/11 19:12	U	1
Isodrin	465-73-6	U	0.0000513	0.00000138	mg/L	11/04/11 19:12	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	57	%	15-136	11/04/11 19:12	
Tetrachloro-m-xylene *	877-09-8	83	%	18-126	11/04/11 19:12	
Decachlorobiphenyl *	2051-24-3	58	%	15-136	11/04/11 19:12	
Tetrachloro-m-xylene *	877-09-8	85	%	18-126	11/04/11 19:12	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS15 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-007 **Date Collected:** Oct-28-11 11:32

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:43

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 20:23	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 20:23	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 20:23	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 20:23	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 20:23	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 20:23	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 20:23	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 20:23	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 20:23	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 20:23	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 20:23	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 20:23	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 20:23	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 20:23	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 20:23	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 20:23	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 20:23	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 20:23	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 20:23	U	1
Chloroform	67-66-3	U	0.00500	0.000620	mg/L	11/02/11 20:23	U	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 20:23	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 20:23	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 20:23	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 20:23	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 20:23	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 20:23	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 20:23	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 20:23	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 20:23	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 20:23	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 20:23	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 20:23	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 20:23	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 20:23	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 20:23	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 20:23	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 20:23	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 20:23	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 20:23	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 20:23	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS15 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-007 **Date Collected:** Oct-28-11 11:32

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:43

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 20:23	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 20:23	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 20:23	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 20:23	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 20:23	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 20:23	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 20:23	U	1
Methylene Chloride	75-09-2	**0.000780**	0.00500	0.000750	mg/L	11/02/11 20:23	VI	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 20:23	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 20:23	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 20:23	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 20:23	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 20:23	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 20:23	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 20:23	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 20:23	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 20:23	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 20:23	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 20:23	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 20:23	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 20:23	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 20:23	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 20:23	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 20:23	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 20:23	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 20:23	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 20:23	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 20:23	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 20:23	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 20:23	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 20:23	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	95	%	74-124	11/02/11 20:23	
Dibromofluoromethane	1868-53-7	103	%	75-131	11/02/11 20:23	
1,2-Dichloroethane-D4	17060-07-0	97	%	63-144	11/02/11 20:23	
Toluene-D8	2037-26-5	94	%	80-117	11/02/11 20:23	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS15 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-007 **Date Collected:** Oct-28-11 11:32

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A

Tech: MLI **% Moisture:**

Analyst: MKO **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 12:37	U	1
Cadmium	7440-43-9	U	0.000600	0.0000614	mg/L	11/04/11 12:37	U	1
Iron	7439-89-6	**0.0772**	0.150	0.00142	mg/L	11/04/11 12:37	I	1
Lead	7439-92-1	U	0.00200	0.0000434	mg/L	11/04/11 12:37	U	1
Manganese	7439-96-5	**0.00797**	0.00300	0.000137	mg/L	11/04/11 12:37		1
Nickel	7440-02-0	**0.00238**	0.00500	0.000344	mg/L	11/04/11 12:37	I	1
Thallium	7440-28-0	U	0.000500	0.0000475	mg/L	11/04/11 12:37	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS15 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-007 **Date Collected:** Oct-28-11 11:32

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C

Tech: LRA **% Moisture:**

Analyst: JUM **Date Prep:** Nov-03-11 11:18

Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000323	0.0000108	mg/L	11/04/11 20:18	U	1
4,4-DDE	72-55-9	U	0.0000323	0.0000183	mg/L	11/04/11 20:18	U	1
4,4-DDT	50-29-3	U	0.0000323	0.0000129	mg/L	11/04/11 20:18	U	1
Aldrin	309-00-2	U	0.0000323	0.00000183	mg/L	11/04/11 20:18	U	1
Alpha-BHC	319-84-6	U	0.0000323	0.00000548	mg/L	11/04/11 20:18	U	1
Alpha-Chlordane	5103-71-9	U	0.0000538	0.0000215	mg/L	11/04/11 20:18	U	1
Beta-BHC	319-85-7	U	0.0000323	0.0000190	mg/L	11/04/11 20:18	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000323	0.00000387	mg/L	11/04/11 20:18	U	1
Chlordane	57-74-9	U	0.000108	0.0000548	mg/L	11/04/11 20:18	U	1
Delta-BHC	319-86-8	U	0.0000323	0.0000140	mg/L	11/04/11 20:18	U	1
Dieldrin	60-57-1	U	0.0000323	0.00000183	mg/L	11/04/11 20:18	U	1
Endosulfan I	959-98-8	U	0.0000323	0.00000968	mg/L	11/04/11 20:18	U	1
Endosulfan II	33213-65-9	U	0.0000323	0.0000140	mg/L	11/04/11 20:18	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000323	0.0000129	mg/L	11/04/11 20:18	U	1
Endrin	72-20-8	U	0.0000323	0.0000161	mg/L	11/04/11 20:18	U	1
Endrin Ketone	53494-70-5	U	0.0000323	0.0000151	mg/L	11/04/11 20:18	U	1
Endrin Aldehyde	7421-93-4	U	0.0000538	0.00000860	mg/L	11/04/11 20:18	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000323	0.00000538	mg/L	11/04/11 20:18	U	1
Gamma-Chlordane	5103-74-2	U	0.0000538	0.0000140	mg/L	11/04/11 20:18	U	1
Heptachlor	76-44-8	U	0.0000323	0.0000355	mg/L	11/04/11 20:18	U	1
Methoxychlor	72-43-5	U	0.000108	0.0000140	mg/L	11/04/11 20:18	U	1
Toxaphene	8001-35-2	U	0.000215	0.0000323	mg/L	11/04/11 20:18	U	1
Chlorobenzilate	510-15-6	U	0.000108	0.00000183	mg/L	11/04/11 20:18	U	1
Isodrin	465-73-6	U	0.0000538	0.00000145	mg/L	11/04/11 20:18	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	61	%	15-136	11/04/11 20:18	
Tetrachloro-m-xylene *	877-09-8	72	%	18-126	11/04/11 20:18	
Tetrachloro-m-xylene *	877-09-8	71	%	18-126	11/04/11 20:18	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS11 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-008 **Date Collected:** Oct-28-11 12:15

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:44

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 20:45	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 20:45	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 20:45	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 20:45	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 20:45	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 20:45	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 20:45	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 20:45	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 20:45	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 20:45	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 20:45	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 20:45	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 20:45	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 20:45	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 20:45	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 20:45	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 20:45	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 20:45	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 20:45	U	1
Chloroform	67-66-3	U	0.00500	0.000620	mg/L	11/02/11 20:45	U	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 20:45	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 20:45	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 20:45	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 20:45	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 20:45	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 20:45	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 20:45	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 20:45	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 20:45	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 20:45	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 20:45	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 20:45	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 20:45	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 20:45	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 20:45	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 20:45	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 20:45	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 20:45	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 20:45	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 20:45	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS11 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-008 **Date Collected:** Oct-28-11 12:15

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:44

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 20:45	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 20:45	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 20:45	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 20:45	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 20:45	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 20:45	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 20:45	U	1
Methylene Chloride	75-09-2	**0.000750**	0.00500	0.000750	mg/L	11/02/11 20:45	VI	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 20:45	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 20:45	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 20:45	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 20:45	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 20:45	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 20:45	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 20:45	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 20:45	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 20:45	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 20:45	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 20:45	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 20:45	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 20:45	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 20:45	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 20:45	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 20:45	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 20:45	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 20:45	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 20:45	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 20:45	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 20:45	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 20:45	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 20:45	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	96	%	74-124	11/02/11 20:45	
Dibromofluoromethane	1868-53-7	103	%	75-131	11/02/11 20:45	
1,2-Dichloroethane-D4	17060-07-0	98	%	63-144	11/02/11 20:45	
Toluene-D8	2037-26-5	95	%	80-117	11/02/11 20:45	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS11 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-008 **Date Collected:** Oct-28-11 12:15

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A

Tech: MLI **% Moisture:**

Analyst: MKO **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 12:43	U	1
Cadmium	7440-43-9	U	0.000600	0.0000614	mg/L	11/04/11 12:43	U	1
Iron	7439-89-6	**0.792**	0.150	0.00142	mg/L	11/04/11 12:43		1
Lead	7439-92-1	**0.000540**	0.00200	0.0000434	mg/L	11/04/11 12:43	I	1
Manganese	7439-96-5	**0.00284**	0.00300	0.000137	mg/L	11/04/11 12:43	I	1
Nickel	7440-02-0	U	0.00500	0.000344	mg/L	11/04/11 12:43	U	1
Thallium	7440-28-0	U	0.000500	0.0000475	mg/L	11/04/11 12:43	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS11 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-008 **Date Collected:** Oct-28-11 12:15

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C

Tech: LRA **% Moisture:**

Analyst: JUM **Date Prep:** Nov-03-11 11:21

Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000323	0.0000108	mg/L	11/04/11 20:34	U	1
4,4-DDE	72-55-9	U	0.0000323	0.0000183	mg/L	11/04/11 20:34	U	1
4,4-DDT	50-29-3	U	0.0000323	0.0000129	mg/L	11/04/11 20:34	U	1
Aldrin	309-00-2	U	0.0000323	0.00000183	mg/L	11/04/11 20:34	U	1
Alpha-BHC	319-84-6	U	0.0000323	0.00000548	mg/L	11/04/11 20:34	U	1
Alpha-Chlordane	5103-71-9	U	0.0000538	0.0000215	mg/L	11/04/11 20:34	U	1
Beta-BHC	319-85-7	U	0.0000323	0.0000190	mg/L	11/04/11 20:34	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000323	0.00000387	mg/L	11/04/11 20:34	U	1
Chlordane	57-74-9	U	0.000108	0.0000548	mg/L	11/04/11 20:34	U	1
Delta-BHC	319-86-8	U	0.0000323	0.0000140	mg/L	11/04/11 20:34	U	1
Dieldrin	60-57-1	U	0.0000323	0.00000183	mg/L	11/04/11 20:34	U	1
Endosulfan I	959-98-8	U	0.0000323	0.00000968	mg/L	11/04/11 20:34	U	1
Endosulfan II	33213-65-9	U	0.0000323	0.0000140	mg/L	11/04/11 20:34	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000323	0.0000129	mg/L	11/04/11 20:34	U	1
Endrin	72-20-8	U	0.0000323	0.0000161	mg/L	11/04/11 20:34	U	1
Endrin Ketone	53494-70-5	U	0.0000323	0.0000151	mg/L	11/04/11 20:34	U	1
Endrin Aldehyde	7421-93-4	U	0.0000538	0.00000860	mg/L	11/04/11 20:34	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000323	0.00000538	mg/L	11/04/11 20:34	U	1
Gamma-Chlordane	5103-74-2	U	0.0000538	0.0000140	mg/L	11/04/11 20:34	U	1
Heptachlor	76-44-8	U	0.0000323	0.0000355	mg/L	11/04/11 20:34	U	1
Methoxychlor	72-43-5	U	0.000108	0.0000140	mg/L	11/04/11 20:34	U	1
Toxaphene	8001-35-2	U	0.000215	0.0000323	mg/L	11/04/11 20:34	U	1
Chlorobenzilate	510-15-6	U	0.000108	0.00000183	mg/L	11/04/11 20:34	U	1
Isodrin	465-73-6	U	0.0000538	0.00000145	mg/L	11/04/11 20:34	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	69	%	15-136	11/04/11 20:34	
Tetrachloro-m-xylene *	877-09-8	91	%	18-126	11/04/11 20:34	
Decachlorobiphenyl *	2051-24-3	70	%	15-136	11/04/11 20:34	
Tetrachloro-m-xylene *	877-09-8	86	%	18-126	11/04/11 20:34	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS01 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-009 **Date Collected:** Oct-28-11 13:27

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:45

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 21:06	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 21:06	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 21:06	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 21:06	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 21:06	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 21:06	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 21:06	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 21:06	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 21:06	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 21:06	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 21:06	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 21:06	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 21:06	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 21:06	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 21:06	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 21:06	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 21:06	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 21:06	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 21:06	U	1
Chloroform	67-66-3	U	0.00500	0.000620	mg/L	11/02/11 21:06	U	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 21:06	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 21:06	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 21:06	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 21:06	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 21:06	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 21:06	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 21:06	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 21:06	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 21:06	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 21:06	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 21:06	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 21:06	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 21:06	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 21:06	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 21:06	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 21:06	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 21:06	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 21:06	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 21:06	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 21:06	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS01 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-009 **Date Collected:** Oct-28-11 13:27

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:45

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 21:06	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 21:06	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 21:06	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 21:06	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 21:06	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 21:06	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 21:06	U	1
Methylene Chloride	75-09-2	U	0.00500	0.000750	mg/L	11/02/11 21:06	U	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 21:06	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 21:06	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 21:06	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 21:06	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 21:06	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 21:06	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 21:06	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 21:06	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 21:06	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 21:06	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 21:06	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 21:06	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 21:06	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 21:06	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 21:06	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 21:06	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 21:06	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 21:06	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 21:06	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 21:06	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 21:06	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 21:06	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 21:06	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	97	%	74-124	11/02/11 21:06	
Dibromofluoromethane	1868-53-7	101	%	75-131	11/02/11 21:06	
1,2-Dichloroethane-D4	17060-07-0	95	%	63-144	11/02/11 21:06	
Toluene-D8	2037-26-5	96	%	80-117	11/02/11 21:06	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS01 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-009 **Date Collected:** Oct-28-11 13:27

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A

Tech: MLI **% Moisture:**

Analyst: MKO **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 12:49	U	1
Cadmium	7440-43-9	U	0.000600	0.0000614	mg/L	11/04/11 12:49	U	1
Iron	7439-89-6	**0.194**	0.150	0.00142	mg/L	11/04/11 12:49		1
Lead	7439-92-1	U	0.00200	0.0000434	mg/L	11/04/11 12:49	U	1
Manganese	7439-96-5	**0.141**	0.00300	0.000137	mg/L	11/04/11 12:49		1
Nickel	7440-02-0	U	0.00500	0.000344	mg/L	11/04/11 12:49	U	1
Thallium	7440-28-0	U	0.000500	0.0000475	mg/L	11/04/11 12:49	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS01 **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-009 **Date Collected:** Oct-28-11 13:27

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C

Tech: LRA **% Moisture:**

Analyst: JUM **Date Prep:** Nov-03-11 11:24

Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000316	0.0000105	mg/L	11/04/11 20:51	U	1
4,4-DDE	72-55-9	U	0.0000316	0.0000179	mg/L	11/04/11 20:51	U	1
4,4-DDT	50-29-3	U	0.0000316	0.0000126	mg/L	11/04/11 20:51	U	1
Aldrin	309-00-2	U	0.0000316	0.00000179	mg/L	11/04/11 20:51	U	1
Alpha-BHC	319-84-6	U	0.0000316	0.00000537	mg/L	11/04/11 20:51	U	1
Alpha-Chlordane	5103-71-9	U	0.0000526	0.0000211	mg/L	11/04/11 20:51	U	1
Beta-BHC	319-85-7	U	0.0000316	0.0000186	mg/L	11/04/11 20:51	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000316	0.00000379	mg/L	11/04/11 20:51	U	1
Chlordane	57-74-9	U	0.000105	0.0000537	mg/L	11/04/11 20:51	U	1
Delta-BHC	319-86-8	U	0.0000316	0.0000137	mg/L	11/04/11 20:51	U	1
Dieldrin	60-57-1	U	0.0000316	0.00000179	mg/L	11/04/11 20:51	U	1
Endosulfan I	959-98-8	U	0.0000316	0.00000947	mg/L	11/04/11 20:51	U	1
Endosulfan II	33213-65-9	U	0.0000316	0.0000137	mg/L	11/04/11 20:51	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000316	0.0000126	mg/L	11/04/11 20:51	U	1
Endrin	72-20-8	U	0.0000316	0.0000158	mg/L	11/04/11 20:51	U	1
Endrin Ketone	53494-70-5	U	0.0000316	0.0000147	mg/L	11/04/11 20:51	U	1
Endrin Aldehyde	7421-93-4	U	0.0000526	0.00000842	mg/L	11/04/11 20:51	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000316	0.00000526	mg/L	11/04/11 20:51	U	1
Gamma-Chlordane	5103-74-2	U	0.0000526	0.0000137	mg/L	11/04/11 20:51	U	1
Heptachlor	76-44-8	U	0.0000316	0.0000347	mg/L	11/04/11 20:51	U	1
Methoxychlor	72-43-5	U	0.000105	0.0000137	mg/L	11/04/11 20:51	U	1
Toxaphene	8001-35-2	U	0.000211	0.0000316	mg/L	11/04/11 20:51	U	1
Chlorobenzilate	510-15-6	U	0.000105	0.00000179	mg/L	11/04/11 20:51	U	1
Isodrin	465-73-6	U	0.0000526	0.00000142	mg/L	11/04/11 20:51	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	83	%	15-136	11/04/11 20:51	
Tetrachloro-m-xylene *	877-09-8	73	%	18-126	11/04/11 20:51	
Tetrachloro-m-xylene *	877-09-8	92	%	18-126	11/04/11 20:51	
Decachlorobiphenyl *	2051-24-3	72	%	15-136	11/04/11 20:51	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS06R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-010 **Date Collected:** Oct-28-11 14:27

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:46

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 21:28	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 21:28	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 21:28	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 21:28	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 21:28	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 21:28	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 21:28	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 21:28	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 21:28	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 21:28	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 21:28	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 21:28	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 21:28	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 21:28	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 21:28	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 21:28	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 21:28	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 21:28	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 21:28	U	1
Chloroform	67-66-3	**0.00280**	0.00500	0.000620	mg/L	11/02/11 21:28	I	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 21:28	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 21:28	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 21:28	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 21:28	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 21:28	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 21:28	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 21:28	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 21:28	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 21:28	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 21:28	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 21:28	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 21:28	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 21:28	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 21:28	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 21:28	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 21:28	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 21:28	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 21:28	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 21:28	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 21:28	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS06R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-010 **Date Collected:** Oct-28-11 14:27

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:46

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 21:28	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 21:28	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 21:28	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 21:28	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 21:28	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 21:28	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 21:28	U	1
Methylene Chloride	75-09-2	U	0.00500	0.000750	mg/L	11/02/11 21:28	U	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 21:28	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 21:28	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 21:28	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 21:28	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 21:28	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 21:28	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 21:28	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 21:28	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 21:28	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 21:28	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 21:28	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 21:28	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 21:28	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 21:28	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 21:28	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 21:28	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 21:28	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 21:28	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 21:28	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 21:28	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 21:28	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 21:28	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 21:28	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	98	%	74-124	11/02/11 21:28	
Dibromofluoromethane	1868-53-7	100	%	75-131	11/02/11 21:28	
1,2-Dichloroethane-D4	17060-07-0	94	%	63-144	11/02/11 21:28	
Toluene-D8	2037-26-5	97	%	80-117	11/02/11 21:28	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS06R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-010 **Date Collected:** Oct-28-11 14:27

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A

Tech: MLI **% Moisture:**

Analyst: MKO **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	U	0.00200	0.00300	mg/L	11/04/11 12:56	U	1
Cadmium	7440-43-9	U	0.000600	0.0000614	mg/L	11/04/11 12:56	U	1
Iron	7439-89-6	**0.159**	0.150	0.00142	mg/L	11/04/11 12:56		1
Lead	7439-92-1	**0.000220**	0.00200	0.0000434	mg/L	11/04/11 12:56	I	1
Manganese	7439-96-5	**0.00186**	0.00300	0.000137	mg/L	11/04/11 12:56	I	1
Nickel	7440-02-0	U	0.00500	0.000344	mg/L	11/04/11 12:56	U	1
Thallium	7440-28-0	U	0.000500	0.0000475	mg/L	11/04/11 12:56	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS06R **Matrix:** Water **Date Received:** Oct-29-11 09:30
Lab Sample Id: 430498-010 **Date Collected:** Oct-28-11 14:27

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C
Tech: LRA **% Moisture:**
Analyst: JUM **Date Prep:** Nov-03-11 11:27
Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000311	0.0000104	mg/L	11/04/11 21:08	U	1
4,4-DDE	72-55-9	U	0.0000311	0.0000176	mg/L	11/04/11 21:08	U	1
4,4-DDT	50-29-3	U	0.0000311	0.0000124	mg/L	11/04/11 21:08	U	1
Aldrin	309-00-2	U	0.0000311	0.00000176	mg/L	11/04/11 21:08	U	1
Alpha-BHC	319-84-6	U	0.0000311	0.00000529	mg/L	11/04/11 21:08	U	1
Alpha-Chlordane	5103-71-9	U	0.0000518	0.0000207	mg/L	11/04/11 21:08	U	1
Beta-BHC	319-85-7	U	0.0000311	0.0000183	mg/L	11/04/11 21:08	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000311	0.00000373	mg/L	11/04/11 21:08	U	1
Chlordane	57-74-9	U	0.000104	0.0000528	mg/L	11/04/11 21:08	U	1
Delta-BHC	319-86-8	U	0.0000311	0.0000135	mg/L	11/04/11 21:08	U	1
Dieldrin	60-57-1	U	0.0000311	0.00000176	mg/L	11/04/11 21:08	U	1
Endosulfan I	959-98-8	U	0.0000311	0.00000933	mg/L	11/04/11 21:08	U	1
Endosulfan II	33213-65-9	U	0.0000311	0.0000135	mg/L	11/04/11 21:08	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000311	0.0000124	mg/L	11/04/11 21:08	U	1
Endrin	72-20-8	U	0.0000311	0.0000155	mg/L	11/04/11 21:08	U	1
Endrin Ketone	53494-70-5	U	0.0000311	0.0000145	mg/L	11/04/11 21:08	U	1
Endrin Aldehyde	7421-93-4	U	0.0000518	0.00000829	mg/L	11/04/11 21:08	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000311	0.00000518	mg/L	11/04/11 21:08	U	1
Gamma-Chlordane	5103-74-2	U	0.0000518	0.0000135	mg/L	11/04/11 21:08	U	1
Heptachlor	76-44-8	U	0.0000311	0.0000342	mg/L	11/04/11 21:08	U	1
Methoxychlor	72-43-5	U	0.000104	0.0000135	mg/L	11/04/11 21:08	U	1
Toxaphene	8001-35-2	U	0.000207	0.0000311	mg/L	11/04/11 21:08	U	1
Chlorobenzilate	510-15-6	U	0.000104	0.00000176	mg/L	11/04/11 21:08	U	1
Isodrin	465-73-6	U	0.0000518	0.00000140	mg/L	11/04/11 21:08	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	64	%	15-136	11/04/11 21:08	
Decachlorobiphenyl *	2051-24-3	69	%	15-136	11/04/11 21:08	
Tetrachloro-m-xylene *	877-09-8	78	%	18-126	11/04/11 21:08	
Tetrachloro-m-xylene *	877-09-8	81	%	18-126	11/04/11 21:08	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS09R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-011 **Date Collected:** Oct-28-11 15:03

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B

Tech: CYE **% Moisture:**

Analyst: CYE **Date Prep:** Nov-02-11 13:47

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 21:50	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 21:50	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 21:50	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 21:50	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 21:50	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 21:50	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 21:50	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 21:50	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 21:50	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 21:50	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 21:50	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 21:50	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 21:50	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 21:50	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 21:50	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 21:50	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 21:50	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 21:50	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 21:50	U	1
Chloroform	67-66-3	**0.00344**	0.00500	0.000620	mg/L	11/02/11 21:50	I	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 21:50	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 21:50	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 21:50	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 21:50	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 21:50	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 21:50	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 21:50	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 21:50	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 21:50	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 21:50	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 21:50	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 21:50	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 21:50	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 21:50	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 21:50	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 21:50	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 21:50	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 21:50	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 21:50	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 21:50	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS09R **Matrix:** Water **Date Received:** Oct-29-11 09:30
Lab Sample Id: 430498-011 **Date Collected:** Oct-28-11 15:03

Analytical Method: VOCs by SW-846 8260B **Prep Method:** SW5030B
Tech: CYE **% Moisture:**
Analyst: CYE **Date Prep:** Nov-02-11 13:47
Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 21:50	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 21:50	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 21:50	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 21:50	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 21:50	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 21:50	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 21:50	U	1
Methylene Chloride	75-09-2	**0.000830**	0.00500	0.000750	mg/L	11/02/11 21:50	VI	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 21:50	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 21:50	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 21:50	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 21:50	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 21:50	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 21:50	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 21:50	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 21:50	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 21:50	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 21:50	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 21:50	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 21:50	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 21:50	U	1
Trichloroethene	79-01-6	U	0.00500	0.000390	mg/L	11/02/11 21:50	U	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 21:50	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 21:50	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 21:50	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 21:50	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 21:50	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 21:50	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 21:50	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 21:50	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 21:50	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	97	%	74-124	11/02/11 21:50	
Dibromofluoromethane	1868-53-7	106	%	75-131	11/02/11 21:50	
1,2-Dichloroethane-D4	17060-07-0	99	%	63-144	11/02/11 21:50	
Toluene-D8	2037-26-5	93	%	80-117	11/02/11 21:50	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS09R **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-011 **Date Collected:** Oct-28-11 15:03

Analytical Method: Metals by EPA 200.8 **Prep Method:** SW3010A

Tech: MLI **% Moisture:**

Analyst: MKO **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	**0.0624**	0.00200	0.00300	mg/L	11/04/11 13:57		1
Cadmium	7440-43-9	U	0.000600	0.0000614	mg/L	11/04/11 13:57	U	1
Iron	7439-89-6	**0.583**	0.150	0.00142	mg/L	11/04/11 13:57		1
Lead	7439-92-1	**0.000990**	0.00200	0.0000434	mg/L	11/04/11 13:57	I	1
Manganese	7439-96-5	**0.00220**	0.00300	0.000137	mg/L	11/04/11 13:57	I	1
Nickel	7440-02-0	U	0.00500	0.000344	mg/L	11/04/11 13:57	U	1
Thallium	7440-28-0	U	0.000500	0.0000475	mg/L	11/04/11 13:57	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: 24GS09R **Matrix:** Water **Date Received:** Oct-29-11 09:30
Lab Sample Id: 430498-011 **Date Collected:** Oct-28-11 15:03

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C
Tech: LRA **% Moisture:**
Analyst: JUM **Date Prep:** Nov-03-11 11:30
Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000302	0.0000101	mg/L	11/04/11 21:24	U	1
4,4-DDE	72-55-9	U	0.0000302	0.0000171	mg/L	11/04/11 21:24	U	1
4,4-DDT	50-29-3	U	0.0000302	0.0000121	mg/L	11/04/11 21:24	U	1
Aldrin	309-00-2	U	0.0000302	0.00000171	mg/L	11/04/11 21:24	U	1
Alpha-BHC	319-84-6	U	0.0000302	0.00000513	mg/L	11/04/11 21:24	U	1
Alpha-Chlordane	5103-71-9	U	0.0000503	0.0000201	mg/L	11/04/11 21:24	U	1
Beta-BHC	319-85-7	U	0.0000302	0.0000178	mg/L	11/04/11 21:24	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000302	0.00000362	mg/L	11/04/11 21:24	U	1
Chlordane	57-74-9	U	0.000101	0.0000513	mg/L	11/04/11 21:24	U	1
Delta-BHC	319-86-8	U	0.0000302	0.0000131	mg/L	11/04/11 21:24	U	1
Dieldrin	60-57-1	U	0.0000302	0.00000171	mg/L	11/04/11 21:24	U	1
Endosulfan I	959-98-8	U	0.0000302	0.00000905	mg/L	11/04/11 21:24	U	1
Endosulfan II	33213-65-9	U	0.0000302	0.0000131	mg/L	11/04/11 21:24	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000302	0.0000121	mg/L	11/04/11 21:24	U	1
Endrin	72-20-8	U	0.0000302	0.0000151	mg/L	11/04/11 21:24	U	1
Endrin Ketone	53494-70-5	U	0.0000302	0.0000141	mg/L	11/04/11 21:24	U	1
Endrin Aldehyde	7421-93-4	U	0.0000503	0.00000804	mg/L	11/04/11 21:24	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000302	0.00000503	mg/L	11/04/11 21:24	U	1
Gamma-Chlordane	5103-74-2	U	0.0000503	0.0000131	mg/L	11/04/11 21:24	U	1
Heptachlor	76-44-8	U	0.0000302	0.0000332	mg/L	11/04/11 21:24	U	1
Methoxychlor	72-43-5	U	0.000101	0.0000131	mg/L	11/04/11 21:24	U	1
Toxaphene	8001-35-2	U	0.000201	0.0000302	mg/L	11/04/11 21:24	U	1
Chlorobenzilate	510-15-6	U	0.000101	0.00000171	mg/L	11/04/11 21:24	U	1
Isodrin	465-73-6	U	0.0000503	0.00000136	mg/L	11/04/11 21:24	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	72	%	15-136	11/04/11 21:24	
Decachlorobiphenyl *	2051-24-3	68	%	15-136	11/04/11 21:24	
Tetrachloro-m-xylene *	877-09-8	91	%	18-126	11/04/11 21:24	
Tetrachloro-m-xylene *	877-09-8	85	%	18-126	11/04/11 21:24	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: DUP | **Matrix:** Water | **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-012 | **Date Collected:** Oct-27-11 13:59

Analytical Method: VOCs by SW-846 8260B | **Prep Method:** SW5030B

Tech: CYE | **% Moisture:**

Analyst: CYE | **Date Prep:** Nov-02-11 13:48

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Acetone	67-64-1	U	0.100	0.00703	mg/L	11/02/11 22:12	U	1
Acrolein	107-02-8	U	50.0	3.51	ug/L	11/02/11 22:12	U	1
Acrylonitrile	107-13-1	U	0.0500	0.00232	mg/L	11/02/11 22:12	U	1
Benzene	71-43-2	U	0.00500	0.000260	mg/L	11/02/11 22:12	U	1
Bromobenzene	108-86-1	U	0.00500	0.000390	mg/L	11/02/11 22:12	U	1
Bromochloromethane	74-97-5	U	0.00500	0.000480	mg/L	11/02/11 22:12	U	1
Bromodichloromethane	75-27-4	U	0.00500	0.000420	mg/L	11/02/11 22:12	U	1
Bromoform	75-25-2	U	0.00500	0.000340	mg/L	11/02/11 22:12	U	1
Bromomethane	74-83-9	U	0.00500	0.000870	mg/L	11/02/11 22:12	U	1
2-Butanone	78-93-3	U	0.0500	0.00409	mg/L	11/02/11 22:12	U	1
MTBE	1634-04-4	U	0.00500	0.000430	mg/L	11/02/11 22:12	U	1
n-Butylbenzene	104-51-8	U	0.00500	0.000190	mg/L	11/02/11 22:12	U	1
Sec-Butylbenzene	135-98-8	U	0.00500	0.000120	mg/L	11/02/11 22:12	U	1
tert-Butylbenzene	98-06-6	U	0.00500	0.000200	mg/L	11/02/11 22:12	U	1
Carbon Disulfide	75-15-0	U	0.0500	0.00126	mg/L	11/02/11 22:12	U	1
Carbon Tetrachloride	56-23-5	U	0.00500	0.000140	mg/L	11/02/11 22:12	U	1
Chlorobenzene	108-90-7	U	0.00500	0.000270	mg/L	11/02/11 22:12	U	1
Chloroethane	75-00-3	U	0.0100	0.000206	mg/L	11/02/11 22:12	U	1
2-Chloroethyl Vinyl Ether	110-75-8	U	0.00500	0.000510	mg/L	11/02/11 22:12	U	1
Chloroform	67-66-3	U	0.00500	0.000620	mg/L	11/02/11 22:12	U	1
Chloromethane	74-87-3	U	0.0100	0.000420	mg/L	11/02/11 22:12	U	1
2-Chlorotoluene	95-49-8	U	0.00500	0.000300	mg/L	11/02/11 22:12	U	1
4-Chlorotoluene	106-43-4	U	0.00500	0.000250	mg/L	11/02/11 22:12	U	1
p-Cymene (p-Isopropyltoluene)	99-87-6	U	0.00500	0.000230	mg/L	11/02/11 22:12	U	1
Dibromochloromethane	124-48-1	U	0.00500	0.000350	mg/L	11/02/11 22:12	U	1
1,2-Dibromo-3-Chloropropane	96-12-8	U	0.00500	0.00143	mg/L	11/02/11 22:12	U	1
1,2-Dibromoethane	106-93-4	U	0.00500	0.000360	mg/L	11/02/11 22:12	U	1
Dibromomethane	74-95-3	U	0.00500	0.000470	mg/L	11/02/11 22:12	U	1
1,2-Dichlorobenzene	95-50-1	U	0.00500	0.000240	mg/L	11/02/11 22:12	U	1
1,3-Dichlorobenzene	541-73-1	U	0.00500	0.000190	mg/L	11/02/11 22:12	U	1
1,4-Dichlorobenzene	106-46-7	U	0.00500	0.000360	mg/L	11/02/11 22:12	U	1
Dichlorodifluoromethane	75-71-8	U	0.00500	0.000310	mg/L	11/02/11 22:12	U	1
1,1-Dichloroethane	75-34-3	U	0.00500	0.000310	mg/L	11/02/11 22:12	U	1
1,2-Dichloroethane	107-06-2	U	0.00500	0.000270	mg/L	11/02/11 22:12	U	1
1,1-Dichloroethene	75-35-4	U	0.00500	0.000330	mg/L	11/02/11 22:12	U	1
cis-1,2-Dichloroethene	156-59-2	U	0.00500	0.000350	mg/L	11/02/11 22:12	U	1
trans-1,2-dichloroethene	156-60-5	U	0.00500	0.000340	mg/L	11/02/11 22:12	U	1
1,2-Dichloropropane	78-87-5	U	0.00500	0.000370	mg/L	11/02/11 22:12	U	1
1,3-Dichloropropane	142-28-9	U	0.00500	0.000330	mg/L	11/02/11 22:12	U	1
2,2-Dichloropropane	594-20-7	U	0.00500	0.000260	mg/L	11/02/11 22:12	U	1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: DUP | **Matrix:** Water | **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-012 | **Date Collected:** Oct-27-11 13:59

Analytical Method: VOCs by SW-846 8260B | **Prep Method:** SW5030B

Tech: CYE | **% Moisture:**

Analyst: CYE | **Date Prep:** Nov-02-11 13:48

Seq Number: 873900

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
1,1-Dichloropropene	563-58-6	U	0.00500	0.000410	mg/L	11/02/11 22:12	U	1
cis-1,3-Dichloropropene	10061-01-5	U	0.00500	0.000250	mg/L	11/02/11 22:12	U	1
trans-1,3-dichloropropene	10061-02-6	U	0.00500	0.000300	mg/L	11/02/11 22:12	U	1
Ethylbenzene	100-41-4	U	0.00500	0.0000800	mg/L	11/02/11 22:12	U	1
Hexachlorobutadiene	87-68-3	U	0.00500	0.000560	mg/L	11/02/11 22:12	U	1
2-Hexanone	591-78-6	U	0.0500	0.00353	mg/L	11/02/11 22:12	U	1
isopropylbenzene	98-82-8	U	0.00500	0.000250	mg/L	11/02/11 22:12	U	1
Methylene Chloride	75-09-2	U	0.00500	0.000750	mg/L	11/02/11 22:12	U	1
Methyl iodide	74-88-4	U	0.0200	0.00400	mg/L	11/02/11 22:12	U	1
4-Methyl-2-Pentanone	108-10-1	U	0.0500	0.00276	mg/L	11/02/11 22:12	U	1
Naphthalene	91-20-3	U	0.0100	0.000430	mg/L	11/02/11 22:12	U	1
n-Propylbenzene	103-65-1	U	0.00500	0.000180	mg/L	11/02/11 22:12	U	1
Styrene	100-42-5	U	0.00500	0.000140	mg/L	11/02/11 22:12	U	1
1,1,1,2-Tetrachloroethane	630-20-6	U	0.00500	0.000280	mg/L	11/02/11 22:12	U	1
1,1,2,2-Tetrachloroethane	79-34-5	U	0.00500	0.000420	mg/L	11/02/11 22:12	U	1
Tetrachloroethylene	127-18-4	U	0.00500	0.000590	mg/L	11/02/11 22:12	U	1
Toluene	108-88-3	U	0.00500	0.000490	mg/L	11/02/11 22:12	U	1
1,2,3-Trichlorobenzene	87-61-6	U	0.00500	0.000260	mg/L	11/02/11 22:12	U	1
1,2,4-Trichlorobenzene	120-82-1	U	0.00500	0.000440	mg/L	11/02/11 22:12	U	1
1,1,1-Trichloroethane	71-55-6	U	0.00500	0.000310	mg/L	11/02/11 22:12	U	1
1,1,2-Trichloroethane	79-00-5	U	0.00500	0.000410	mg/L	11/02/11 22:12	U	1
Trichloroethene	79-01-6	**0.000520**	0.00500	0.000390	mg/L	11/02/11 22:12	I	1
Trichlorofluoromethane	75-69-4	U	0.00500	0.000330	mg/L	11/02/11 22:12	U	1
1,2,3-Trichloropropane	96-18-4	U	0.00500	0.000590	mg/L	11/02/11 22:12	U	1
1,2,4-Trimethylbenzene	95-63-6	U	0.00500	0.000140	mg/L	11/02/11 22:12	U	1
1,3,5-Trimethylbenzene	108-67-8	U	0.00500	0.000250	mg/L	11/02/11 22:12	U	1
o-Xylene	95-47-6	U	0.00500	0.000310	mg/L	11/02/11 22:12	U	1
m,p-Xylenes	1330-20-7	U	0.0100	0.000470	mg/L	11/02/11 22:12	U	1
Vinyl Acetate	108-05-4	U	50.0	1.06	ug/L	11/02/11 22:12	U	1
Vinyl Chloride	75-01-4	U	0.00200	0.000310	mg/L	11/02/11 22:12	U	1
Total Xylenes	1330-20-7	U	0.00500	0.000310	mg/L	11/02/11 22:12	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	97	%	74-124	11/02/11 22:12	
Dibromofluoromethane	1868-53-7	106	%	75-131	11/02/11 22:12	
1,2-Dichloroethane-D4	17060-07-0	97	%	63-144	11/02/11 22:12	
Toluene-D8	2037-26-5	94	%	80-117	11/02/11 22:12	

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: DUP | **Matrix:** Water | **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-012 | **Date Collected:** Oct-27-11 13:59

Analytical Method: Metals by EPA 200.8 | **Prep Method:** SW3010A

Tech: MLI | **% Moisture:**

Analyst: MKO | **Date Prep:** Nov-03-11 16:00

Seq Number: 874147

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
Antimony	7440-36-0	**0.00374**	0.00200	0.00300	mg/L	11/04/11 14:21		1
Cadmium	7440-43-9	**0.0158**	0.000600	0.0000614	mg/L	11/04/11 14:21		1
Iron	7439-89-6	**0.0987**	0.150	0.00142	mg/L	11/04/11 14:21	I	1
Lead	7439-92-1	U	0.00200	0.0000434	mg/L	11/04/11 14:21	U	1
Manganese	7439-96-5	**0.130**	0.00300	0.000137	mg/L	11/04/11 14:21		1
Nickel	7440-02-0	**0.00227**	0.00500	0.000344	mg/L	11/04/11 14:21	I	1
Thallium	7440-28-0	**0.000810**	0.000500	0.0000475	mg/L	11/04/11 14:21		1

Project: Florida Standard List of Methods

Aerostar, Mobile, AL

NAS Pensacola

Sample Id: DUP **Matrix:** Water **Date Received:** Oct-29-11 09:30

Lab Sample Id: 430498-012 **Date Collected:** Oct-27-11 13:59

Analytical Method: Organochlorine Pesticides by EPA 8081A **Prep Method:** SW3510C

Tech: LRA **% Moisture:**

Analyst: JUM **Date Prep:** Nov-03-11 11:33

Seq Number: 874126

Parameter	Cas Number	Result	PQL	MDL	Units	Analysis Date	Flag	Dil
4,4-DDD	72-54-8	U	0.0000309	0.0000103	mg/L	11/04/11 21:41	U	1
4,4-DDE	72-55-9	U	0.0000309	0.0000175	mg/L	11/04/11 21:41	U	1
4,4-DDT	50-29-3	U	0.0000309	0.0000124	mg/L	11/04/11 21:41	U	1
Aldrin	309-00-2	U	0.0000309	0.00000175	mg/L	11/04/11 21:41	U	1
Alpha-BHC	319-84-6	U	0.0000309	0.00000526	mg/L	11/04/11 21:41	U	1
Alpha-Chlordane	5103-71-9	U	0.0000515	0.0000206	mg/L	11/04/11 21:41	U	1
Beta-BHC	319-85-7	U	0.0000309	0.0000182	mg/L	11/04/11 21:41	U	1
Heptachlor Epoxide	1024-57-3	U	0.0000309	0.00000371	mg/L	11/04/11 21:41	U	1
Chlordane	57-74-9	U	0.000103	0.0000526	mg/L	11/04/11 21:41	U	1
Delta-BHC	319-86-8	U	0.0000309	0.0000134	mg/L	11/04/11 21:41	U	1
Dieldrin	60-57-1	U	0.0000309	0.00000175	mg/L	11/04/11 21:41	U	1
Endosulfan I	959-98-8	U	0.0000309	0.00000928	mg/L	11/04/11 21:41	U	1
Endosulfan II	33213-65-9	U	0.0000309	0.0000134	mg/L	11/04/11 21:41	U	1
Endosulfan Sulfate	1031-07-8	U	0.0000309	0.0000124	mg/L	11/04/11 21:41	U	1
Endrin	72-20-8	U	0.0000309	0.0000155	mg/L	11/04/11 21:41	U	1
Endrin Ketone	53494-70-5	U	0.0000309	0.0000144	mg/L	11/04/11 21:41	U	1
Endrin Aldehyde	7421-93-4	U	0.0000515	0.00000825	mg/L	11/04/11 21:41	U	1
Gamma-BHC (Lindane)	58-89-9	U	0.0000309	0.00000515	mg/L	11/04/11 21:41	U	1
Gamma-Chlordane	5103-74-2	U	0.0000515	0.0000134	mg/L	11/04/11 21:41	U	1
Heptachlor	76-44-8	U	0.0000309	0.0000340	mg/L	11/04/11 21:41	U	1
Methoxychlor	72-43-5	U	0.000103	0.0000134	mg/L	11/04/11 21:41	U	1
Toxaphene	8001-35-2	U	0.000206	0.0000309	mg/L	11/04/11 21:41	U	1
Chlorobenzilate	510-15-6	U	0.000103	0.00000175	mg/L	11/04/11 21:41	U	1
Isodrin	465-73-6	U	0.0000515	0.00000139	mg/L	11/04/11 21:41	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
Decachlorobiphenyl *	2051-24-3	73	%	15-136	11/04/11 21:41	
Decachlorobiphenyl *	2051-24-3	65	%	15-136	11/04/11 21:41	
Tetrachloro-m-xylene *	877-09-8	85	%	18-126	11/04/11 21:41	
Tetrachloro-m-xylene *	877-09-8	78	%	18-126	11/04/11 21:41	

Project: Florida Standard List of Methods

FLORIDA flagging criteria

Data were reviewed by the
Department Supervisor and QA Director

A Value reported is the mean (average) of two or more determinations.

B Results based upon colony counts outside the acceptable range.

J Estimated value; value not accurate. All results with a "J" qualifier require comment.

- J1: Surrogate Recoveries exceed established QA/QC Limits
- J2: No known QA/QC exists.
- J3: Reported value failed to meet established QA/QC limits or the sample matrix interfered with the ability to make an accurate determination
- J4: The data is questionable due to improper laboratory or field protocols

Q Sample held beyond the accepted holding time

T Value reported is less than the laboratory method detection limit. The value is reported for informational purposes, only and shall not be used in statistical analysis.

U Compound was analyzed for but not detected at the MDL Level.

V Analyte was detected in both the sample and the associated method blank.

Y Laboratory analysis was from an unpreserved or improperly preserved sample. The data may not be accurate.

I The reported value is between the laboratory MDL and the laboratory PQL.

***** Not analyzed due to interference.

R Significant rain in the past 48 hours.

! Data deviates from historically established concentration ranges.

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to effect the recovery of the spike concentration. This condition could also effect the relative percent difference in the MS/MSD.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

F RPD exceeded lab control limits.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

***** (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

Aerostar, Mobile, AL

NAS Pensacola

Analytical Method: **VOCs by SW-846 8260B** Prep Method: SW5030B

Seq Number: 873900 Matrix: Water Date Prep: 11/02/2011

MB Sample Id: 613615-2-BLK LCS Sample Id: 613615-2-BKS

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	Limits	Units	Analysis Date	Flag
Acetone	<0.00703	0.5	0.321	64	60-140	mg/L	11/02/11 17:06	
Acrylonitrile	<0.00232	0.5	0.434	87	50-150	mg/L	11/02/11 17:06	
Benzene	<0.000260	0.05	0.0452	90	66-142	mg/L	11/02/11 17:06	
Bromobenzene	<0.000390	0.05	0.0477	95	75-125	mg/L	11/02/11 17:06	
Bromochloromethane	<0.000480	0.05	0.0477	95	73-125	mg/L	11/02/11 17:06	
Bromodichloromethane	<0.000420	0.05	0.0509	102	75-125	mg/L	11/02/11 17:06	
Bromoform	<0.000340	0.05	0.0408	82	75-125	mg/L	11/02/11 17:06	
Bromomethane	<0.000870	0.05	0.0484	97	70-130	mg/L	11/02/11 17:06	
2-Butanone	<0.00409	0.5	0.349	70	60-140	mg/L	11/02/11 17:06	
MTBE	<0.000430	0.05	0.0497	99	65-135	mg/L	11/02/11 17:06	
n-Butylbenzene	<0.000190	0.05	0.0524	105	75-125	mg/L	11/02/11 17:06	
Sec-Butylbenzene	<0.000120	0.05	0.0512	102	75-125	mg/L	11/02/11 17:06	
tert-Butylbenzene	<0.000200	0.05	0.0520	104	75-125	mg/L	11/02/11 17:06	
Carbon Disulfide	<0.00126	0.5	0.435	87	60-140	mg/L	11/02/11 17:06	
Carbon Tetrachloride	<0.000140	0.05	0.0533	107	62-125	mg/L	11/02/11 17:06	
Chlorobenzene	<0.000270	0.05	0.0469	94	60-133	mg/L	11/02/11 17:06	
Chloroethane	<0.000206	0.05	0.0434	87	70-130	mg/L	11/02/11 17:06	
2-Chloroethyl Vinyl Ether	<0.000510	0.05	0.0374	75	50-150	mg/L	11/02/11 17:06	
Chloroform	<0.000620	0.05	0.0480	96	74-125	mg/L	11/02/11 17:06	
Chloromethane	<0.000420	0.05	0.0426	85	70-130	mg/L	11/02/11 17:06	
2-Chlorotoluene	<0.000300	0.05	0.0515	103	73-125	mg/L	11/02/11 17:06	
4-Chlorotoluene	<0.000250	0.05	0.0506	101	74-125	mg/L	11/02/11 17:06	
p-Cymene (p-Isopropyltoluene)	<0.000230	0.05	0.0535	107	75-125	mg/L	11/02/11 17:06	
Dibromochloromethane	<0.000350	0.05	0.0483	97	73-125	mg/L	11/02/11 17:06	
1,2-Dibromo-3-Chloropropane	<0.00143	0.05	0.0402	80	59-125	mg/L	11/02/11 17:06	
1,2-Dibromoethane	<0.000360	0.05	0.0478	96	73-125	mg/L	11/02/11 17:06	
Dibromomethane	<0.000470	0.05	0.0482	96	69-127	mg/L	11/02/11 17:06	
1,2-Dichlorobenzene	<0.000240	0.05	0.0489	98	75-125	mg/L	11/02/11 17:06	
1,3-Dichlorobenzene	<0.000190	0.05	0.0501	100	75-125	mg/L	11/02/11 17:06	
1,4-Dichlorobenzene	<0.000360	0.05	0.0498	100	75-125	mg/L	11/02/11 17:06	
Dichlorodifluoromethane	<0.000310	0.05	0.0608	122	70-130	mg/L	11/02/11 17:06	
1,1-Dichloroethane	<0.000310	0.05	0.0484	97	72-125	mg/L	11/02/11 17:06	
1,2-Dichloroethane	<0.000270	0.05	0.0509	102	68-127	mg/L	11/02/11 17:06	
1,1-Dichloroethene	<0.000330	0.05	0.0475	95	59-172	mg/L	11/02/11 17:06	
cis-1,2-Dichloroethene	<0.000350	0.05	0.0473	95	75-125	mg/L	11/02/11 17:06	
trans-1,2-dichloroethene	<0.000340	0.05	0.0460	92	75-125	mg/L	11/02/11 17:06	
1,2-Dichloropropane	<0.000370	0.05	0.0443	89	74-125	mg/L	11/02/11 17:06	
1,3-Dichloropropane	<0.000330	0.05	0.0464	93	75-125	mg/L	11/02/11 17:06	
2,2-Dichloropropane	<0.000260	0.05	0.0540	108	75-125	mg/L	11/02/11 17:06	
1,1-Dichloropropene	<0.000410	0.05	0.0480	96	75-125	mg/L	11/02/11 17:06	
cis-1,3-Dichloropropene	<0.000250	0.05	0.0485	97	74-125	mg/L	11/02/11 17:06	
trans-1,3-dichloropropene	<0.000300	0.05	0.0403	81	66-125	mg/L	11/02/11 17:06	
Ethylbenzene	<0.0000800	0.05	0.0477	95	75-125	mg/L	11/02/11 17:06	
Hexachlorobutadiene	<0.000560	0.05	0.0493	99	75-125	mg/L	11/02/11 17:06	
2-Hexanone	<0.00353	0.5	0.388	78	60-140	mg/L	11/02/11 17:06	
isopropylbenzene	<0.000250	0.05	0.0500	100	75-125	mg/L	11/02/11 17:06	

Aerostar, Mobile, AL

NAS Pensacola

Analytical Method: **VOCs by SW-846 8260B** Prep Method: SW5030B

Seq Number: 873900 Matrix: Water Date Prep: 11/02/2011

MB Sample Id: 613615-2-BLK LCS Sample Id: 613615-2-BKS

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	Limits	Units	Analysis Date	Flag
Methylene Chloride	0.00515	0.05	0.0416	83	75-125	mg/L	11/02/11 17:06	
4-Methyl-2-Pentanone	<0.00276	0.5	0.456	91	60-140	mg/L	11/02/11 17:06	
Naphthalene	<0.000430	0.05	0.0509	102	75-125	mg/L	11/02/11 17:06	
n-Propylbenzene	<0.000180	0.05	0.0526	105	75-125	mg/L	11/02/11 17:06	
Styrene	<0.000140	0.05	0.0493	99	75-125	mg/L	11/02/11 17:06	
1,1,1,2-Tetrachloroethane	<0.000280	0.05	0.0519	104	72-125	mg/L	11/02/11 17:06	
1,1,2,2-Tetrachloroethane	<0.000420	0.05	0.0448	90	74-125	mg/L	11/02/11 17:06	
Tetrachloroethylene	<0.000590	0.05	0.0457	91	71-125	mg/L	11/02/11 17:06	
Toluene	<0.000490	0.05	0.0460	92	59-139	mg/L	11/02/11 17:06	
1,2,3-Trichlorobenzene	<0.000260	0.05	0.0478	96	75-137	mg/L	11/02/11 17:06	
1,2,4-Trichlorobenzene	<0.000440	0.05	0.0493	99	75-135	mg/L	11/02/11 17:06	
1,1,1-Trichloroethane	<0.000310	0.05	0.0530	106	75-125	mg/L	11/02/11 17:06	
1,1,2-Trichloroethane	<0.000410	0.05	0.0473	95	75-127	mg/L	11/02/11 17:06	
Trichloroethene	<0.000390	0.05	0.0477	95	62-137	mg/L	11/02/11 17:06	
Trichlorofluoromethane	<0.000330	0.05	0.0543	109	67-125	mg/L	11/02/11 17:06	
1,2,3-Trichloropropane	<0.000590	0.05	0.0473	95	75-125	mg/L	11/02/11 17:06	
1,2,4-Trimethylbenzene	<0.000140	0.05	0.0524	105	75-125	mg/L	11/02/11 17:06	
1,3,5-Trimethylbenzene	<0.000250	0.05	0.0528	106	70-125	mg/L	11/02/11 17:06	
o-Xylene	<0.000310	0.05	0.0481	96	75-125	mg/L	11/02/11 17:06	
m,p-Xylenes	<0.000470	0.1	0.0974	97	75-125	mg/L	11/02/11 17:06	
Vinyl Chloride	<0.000310	0.05	0.0460	92	75-125	mg/L	11/02/11 17:06	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	Limits	Units	Analysis Date
4-Bromofluorobenzene	99		98		74-124	%	11/02/11 17:06
Dibromofluoromethane	97		101		75-131	%	11/02/11 17:06
1,2-Dichloroethane-D4	93		94		63-144	%	11/02/11 17:06
Toluene-D8	98		98		80-117	%	11/02/11 17:06

Aerostar, Mobile, AL

NAS Pensacola

Analytical Method: **VOCs by SW-846 8260B** Prep Method: SW5030B

Seq Number: 873900 Matrix: Water Date Prep: 11/02/2011

Parent Sample Id: 430289-001 MS Sample Id: 430289-001 S MSD Sample Id: 430289-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Acetone	<0.00703	0.5	0.197	39	0.154	31	60-140	25	25	mg/L	11/02/11 14:54	J
Acrylonitrile	<0.00232	0.5	0.533	107	0.431	86	50-150	21	25	mg/L	11/02/11 14:54	
Benzene	<0.000260	0.05	0.0482	96	0.0473	95	66-142	2	25	mg/L	11/02/11 14:54	
Bromobenzene	<0.000390	0.05	0.0505	101	0.0514	103	75-125	2	25	mg/L	11/02/11 14:54	
Bromochloromethane	<0.000480	0.05	0.0508	102	0.0460	92	73-125	10	25	mg/L	11/02/11 14:54	
Bromodichloromethane	<0.000420	0.05	0.0540	108	0.0520	104	75-125	4	25	mg/L	11/02/11 14:54	
Bromoform	<0.000340	0.05	0.0478	96	0.0420	84	75-125	13	25	mg/L	11/02/11 14:54	
Bromomethane	<0.000870	0.05	0.0473	95	0.0439	88	70-130	7	25	mg/L	11/02/11 14:54	
2-Butanone	<0.00409	0.5	0.303	61	0.241	48	60-140	23	25	mg/L	11/02/11 14:54	J
MTBE	<0.000430	0.05	0.0592	118	0.0514	103	65-135	14	25	mg/L	11/02/11 14:54	
n-Butylbenzene	<0.000190	0.05	0.0538	108	0.0565	113	75-125	5	25	mg/L	11/02/11 14:54	
Sec-Butylbenzene	<0.000120	0.05	0.0542	108	0.0568	114	75-125	5	25	mg/L	11/02/11 14:54	
tert-Butylbenzene	<0.000200	0.05	0.0554	111	0.0562	112	75-125	1	25	mg/L	11/02/11 14:54	
Carbon Disulfide	<0.00126	0.5	0.468	94	0.449	90	60-140	4	25	mg/L	11/02/11 14:54	
Carbon Tetrachloride	<0.000140	0.05	0.0538	108	0.0531	106	62-125	1	25	mg/L	11/02/11 14:54	
Chlorobenzene	<0.000270	0.05	0.0487	97	0.0486	97	60-133	0	25	mg/L	11/02/11 14:54	
Chloroethane	<0.000206	0.05	0.0442	88	0.0407	81	70-130	8	25	mg/L	11/02/11 14:54	
2-Chloroethyl Vinyl Ether	<0.000510	0.05	0.000760	2	0.000800	2	50-150	5	25	mg/L	11/02/11 14:54	J
Chloroform	<0.000620	0.05	0.0486	97	0.0471	94	74-125	3	25	mg/L	11/02/11 14:54	
Chloromethane	<0.000420	0.05	0.0417	83	0.0393	79	70-130	6	25	mg/L	11/02/11 14:54	
2-Chlorotoluene	<0.000300	0.05	0.0535	107	0.0543	109	73-125	1	25	mg/L	11/02/11 14:54	
4-Chlorotoluene	<0.000250	0.05	0.0526	105	0.0535	107	74-125	2	25	mg/L	11/02/11 14:54	
p-Cymene (p-Isopropyltoluene)	<0.000230	0.05	0.0556	111	0.0579	116	75-125	4	25	mg/L	11/02/11 14:54	
Dibromochloromethane	<0.000350	0.05	0.0531	106	0.0514	103	73-125	3	25	mg/L	11/02/11 14:54	
1,2-Dibromo-3-Chloropropane	<0.00143	0.05	0.0517	103	0.0421	84	59-125	20	25	mg/L	11/02/11 14:54	
1,2-Dibromoethane	<0.000360	0.05	0.0535	107	0.0509	102	73-125	5	25	mg/L	11/02/11 14:54	
Dibromomethane	<0.000470	0.05	0.0523	105	0.0479	96	69-127	9	25	mg/L	11/02/11 14:54	
1,2-Dichlorobenzene	<0.000240	0.05	0.0527	105	0.0532	106	75-125	1	25	mg/L	11/02/11 14:54	
1,3-Dichlorobenzene	<0.000190	0.05	0.0526	105	0.0526	105	75-125	0	25	mg/L	11/02/11 14:54	
1,4-Dichlorobenzene	<0.000360	0.05	0.0521	104	0.0534	107	75-125	2	25	mg/L	11/02/11 14:54	
Dichlorodifluoromethane	<0.000310	0.05	0.0618	124	0.0567	113	70-130	9	25	mg/L	11/02/11 14:54	
1,1-Dichloroethane	<0.000310	0.05	0.0480	96	0.0469	94	72-125	2	25	mg/L	11/02/11 14:54	
1,2-Dichloroethane	<0.000270	0.05	0.0523	105	0.0507	101	68-127	3	25	mg/L	11/02/11 14:54	
1,1-Dichloroethene	<0.000330	0.05	0.0519	104	0.0504	101	59-172	3	25	mg/L	11/02/11 14:54	
cis-1,2-Dichloroethene	<0.000350	0.05	0.0499	100	0.0467	93	75-125	7	25	mg/L	11/02/11 14:54	
trans-1,2-dichloroethene	<0.000340	0.05	0.0468	94	0.0445	89	75-125	5	25	mg/L	11/02/11 14:54	
1,2-Dichloropropane	<0.000370	0.05	0.0449	90	0.0438	88	74-125	2	25	mg/L	11/02/11 14:54	
1,3-Dichloropropane	<0.000330	0.05	0.0514	103	0.0509	102	75-125	1	25	mg/L	11/02/11 14:54	
2,2-Dichloropropane	<0.000260	0.05	0.0560	112	0.0541	108	75-125	3	25	mg/L	11/02/11 14:54	
1,1-Dichloropropene	<0.000410	0.05	0.0494	99	0.0496	99	75-125	0	25	mg/L	11/02/11 14:54	
cis-1,3-Dichloropropene	<0.000250	0.05	0.0510	102	0.0500	100	74-125	2	25	mg/L	11/02/11 14:54	
trans-1,3-dichloropropene	<0.000300	0.05	0.0431	86	0.0438	88	66-125	2	25	mg/L	11/02/11 14:54	
Ethylbenzene	<0.0000800	0.05	0.0501	100	0.0513	103	75-125	2	25	mg/L	11/02/11 14:54	
Hexachlorobutadiene	<0.000560	0.05	0.0556	111	0.0565	113	75-125	2	25	mg/L	11/02/11 14:54	
2-Hexanone	<0.00353	0.5	0.384	77	0.314	63	60-140	20	25	mg/L	11/02/11 14:54	
isopropylbenzene	<0.000250	0.05	0.0524	105	0.0522	104	75-125	0	25	mg/L	11/02/11 14:54	

Aerostar, Mobile, AL

NAS Pensacola

Analytical Method: **VOCs by SW-846 8260B** Prep Method: SW5030B

Seq Number: 873900 Matrix: Water Date Prep: 11/02/2011

Parent Sample Id: 430289-001 MS Sample Id: 430289-001 S MSD Sample Id: 430289-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Methylene Chloride	0.000790	0.05	0.0428	84	0.0403	79	75-125	6	25	mg/L	11/02/11 14:54	
4-Methyl-2-Pentanone	<0.00276	0.5	0.558	112	0.444	89	60-140	23	25	mg/L	11/02/11 14:54	
Naphthalene	<0.000430	0.05	0.0619	124	0.0565	113	75-125	9	25	mg/L	11/02/11 14:54	
n-Propylbenzene	<0.000180	0.05	0.0554	111	0.0579	116	75-125	4	25	mg/L	11/02/11 14:54	
Styrene	<0.000140	0.05	0.0516	103	0.0503	101	75-125	3	25	mg/L	11/02/11 14:54	
1,1,1,2-Tetrachloroethane	<0.000280	0.05	0.0555	111	0.0547	109	72-125	1	25	mg/L	11/02/11 14:54	
1,1,2,2-Tetrachloroethane	<0.000420	0.05	0.0508	102	0.0470	94	74-125	8	25	mg/L	11/02/11 14:54	
Tetrachloroethylene	<0.000590	0.05	0.0473	95	0.0500	100	71-125	6	25	mg/L	11/02/11 14:54	
Toluene	<0.000490	0.05	0.0481	96	0.0497	99	59-139	3	25	mg/L	11/02/11 14:54	
1,2,3-Trichlorobenzene	<0.000260	0.05	0.0531	106	0.0533	107	75-137	0	25	mg/L	11/02/11 14:54	
1,2,4-Trichlorobenzene	<0.000440	0.05	0.0522	104	0.0528	106	75-135	1	25	mg/L	11/02/11 14:54	
1,1,1-Trichloroethane	<0.000310	0.05	0.0549	110	0.0536	107	75-125	2	25	mg/L	11/02/11 14:54	
1,1,2-Trichloroethane	<0.000410	0.05	0.0498	100	0.0498	100	75-127	0	25	mg/L	11/02/11 14:54	
Trichloroethene	<0.000390	0.05	0.0494	99	0.0484	97	62-137	2	25	mg/L	11/02/11 14:54	
Trichlorofluoromethane	<0.000330	0.05	0.0593	119	0.0557	111	67-125	6	25	mg/L	11/02/11 14:54	
1,2,3-Trichloropropane	<0.000590	0.05	0.0552	110	0.0501	100	75-125	10	25	mg/L	11/02/11 14:54	
1,2,4-Trimethylbenzene	<0.000140	0.05	0.0550	110	0.0552	110	75-125	0	25	mg/L	11/02/11 14:54	
1,3,5-Trimethylbenzene	<0.000250	0.05	0.0555	111	0.0564	113	70-125	2	25	mg/L	11/02/11 14:54	
o-Xylene	<0.000310	0.05	0.0519	104	0.0505	101	75-125	3	25	mg/L	11/02/11 14:54	
m,p-Xylenes	<0.000470	0.1	0.102	102	0.103	103	75-125	1	25	mg/L	11/02/11 14:54	
Vinyl Chloride	<0.000310	0.05	0.0454	91	0.0435	87	75-125	4	25	mg/L	11/02/11 14:54	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
4-Bromofluorobenzene	98		100		74-124	%	11/02/11 14:54
Dibromofluoromethane	98		99		75-131	%	11/02/11 14:54
1,2-Dichloroethane-D4	98		87		63-144	%	11/02/11 14:54
Toluene-D8	97		99		80-117	%	11/02/11 14:54

Analytical Method: **Metals by EPA 200.8** Prep Method: SW3010A

Seq Number: 874147 Matrix: Water Date Prep: 11/03/2011

MB Sample Id: 613624-1-BLK LCS Sample Id: 613624-1-BKS

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	Limits	Units	Analysis Date	Flag
Antimony	<0.00300	0.2	0.185	93	85-115	mg/L	11/04/11 11:24	
Cadmium	<0.0000614	0.2	0.179	90	85-115	mg/L	11/04/11 11:24	
Iron	<0.00142	1	0.893	89	85-115	mg/L	11/04/11 11:24	
Lead	<0.0000434	0.2	0.184	92	85-115	mg/L	11/04/11 11:24	
Manganese	<0.000137	0.2	0.176	88	85-115	mg/L	11/04/11 11:24	
Nickel	<0.000344	0.2	0.174	87	85-115	mg/L	11/04/11 11:24	
Thallium	<0.0000475	0.2	0.181	91	85-115	mg/L	11/04/11 11:24	

Aerostar, Mobile, AL

NAS Pensacola

Analytical Method: **Metals by EPA 200.8** Prep Method: SW3010A
Seq Number: 874147 Matrix: Water Date Prep: 11/03/2011
Parent Sample Id: 430498-006 MS Sample Id: 430498-006 S MSD Sample Id: 430498-006 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Antimony	<0.00300	0.2	0.185	93	0.185	93	85-115	0	20	mg/L	11/04/11 11:36	
Cadmium	<0.0000614	0.2	0.178	89	0.177	89	85-115	1	20	mg/L	11/04/11 11:36	
Iron	1.63	1	2.91	128	2.89	126	85-115	1	20	mg/L	11/04/11 11:36	J
Lead	0.000940	0.2	0.187	93	0.187	93	85-115	0	20	mg/L	11/04/11 11:36	
Manganese	0.00646	0.2	0.185	89	0.183	88	85-115	1	20	mg/L	11/04/11 11:36	
Nickel	0.000770	0.2	0.176	88	0.173	86	85-115	2	20	mg/L	11/04/11 11:36	
Thallium	0.000350	0.2	0.182	91	0.183	91	85-115	1	20	mg/L	11/04/11 11:36	

Analytical Method: **Metals by EPA 200.8** Prep Method: SW3010A
Seq Number: 874147 Matrix: Water Date Prep: 11/03/2011
Parent Sample Id: 430498-011 MS Sample Id: 430498-011 S

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	Limits	Units	Analysis Date	Flag
Antimony	0.0624	0.2	0.241	89	85-115	mg/L	11/04/11 14:15	
Cadmium	<0.0000614	0.2	0.182	91	85-115	mg/L	11/04/11 14:15	
Iron	0.583	1	1.57	99	85-115	mg/L	11/04/11 14:15	
Lead	0.000990	0.2	0.190	95	85-115	mg/L	11/04/11 14:15	
Manganese	0.00220	0.2	0.183	90	85-115	mg/L	11/04/11 14:15	
Nickel	<0.000344	0.2	0.173	87	85-115	mg/L	11/04/11 14:15	
Thallium	<0.0000475	0.2	0.186	93	85-115	mg/L	11/04/11 14:15	

Aerostar, Mobile, AL

NAS Pensacola

Analytical Method: **Organochlorine Pesticides by EPA 8081A** Prep Method: SW3510C

Seq Number: 874126 Matrix: Water Date Prep: 11/03/2011

MB Sample Id: 613580-1-BLK LCS Sample Id: 613580-1-BKS LCSD Sample Id: 613580-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
4,4-DDD	<0.0000100	1	0.000800	80	0.000830	83	11-160	4	25	mg/L	11/04/11 17:16	
4,4-DDE	<0.0000170	1	0.00100	100	0.00106	106	15-157	6	29	mg/L	11/04/11 17:16	
4,4-DDT	<0.0000120	1	0.00102	102	0.00107	107	15-157	5	27	mg/L	11/04/11 17:16	
Aldrin	<0.0000017	1	0.000920	92	0.000930	93	12-154	1	23	mg/L	11/04/11 17:16	
Alpha-BHC	<0.0000051	1	0.000920	92	0.000920	92	10-149	0	20	mg/L	11/04/11 17:16	
Alpha-Chlordane	<0.0000200	1	0.000890	89	0.000920	92	15-140	3	20	mg/L	11/04/11 17:16	
Beta-BHC	<0.0000177	1	0.000900	90	0.000910	91	10-151	1	20	mg/L	11/04/11 17:16	
Heptachlor Epoxide	<0.0000036	1	0.000920	92	0.000940	94	15-155	2	27	mg/L	11/04/11 17:16	
Delta-BHC	<0.0000130	1	0.000720	72	0.000740	74	10-155	3	20	mg/L	11/04/11 17:16	
Dieldrin	<0.0000017	1	0.000920	92	0.000970	97	14-156	5	27	mg/L	11/04/11 17:16	
Endosulfan I	<0.0000090	1	0.000860	86	0.000890	89	12-155	3	25	mg/L	11/04/11 17:16	
Endosulfan II	<0.0000130	1	0.000790	79	0.000820	82	16-158	4	25	mg/L	11/04/11 17:16	
Endosulfan Sulfate	<0.0000120	1	0.000830	83	0.000870	87	17-159	5	21	mg/L	11/04/11 17:16	
Endrin	<0.0000150	1	0.000980	98	0.00104	104	14-169	6	26	mg/L	11/04/11 17:16	
Endrin Ketone	<0.0000140	1	0.000780	78	0.000800	80	28-154	3	20	mg/L	11/04/11 17:16	
Endrin Aldehyde	<0.0000080	1	0.000740	74	0.000790	79	22-148	7	20	mg/L	11/04/11 17:16	
Gamma-BHC (Lindane)	<0.0000050	1	0.000910	91	0.000910	91	8-157	0	20	mg/L	11/04/11 17:16	
Gamma-Chlordane	<0.0000130	1	0.000910	91	0.000940	94	18-141	3	20	mg/L	11/04/11 17:16	
Heptachlor	<0.0000330	1	0.000980	98	0.000980	98	10-157	0	26	mg/L	11/04/11 17:16	
Methoxychlor	<0.0000130	1	0.000920	92	0.000980	98	25-161	6	21	mg/L	11/04/11 17:16	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
Decachlorobiphenyl	71		83		84		15-136	%	11/04/11 17:16
Decachlorobiphenyl	67		80		83		15-136	%	11/04/11 17:16
Tetrachloro-m-xylene	92		91		88		18-126	%	11/04/11 17:16
Tetrachloro-m-xylene	91		91		89		18-126	%	11/04/11 17:16

Aerostar, Mobile, AL

NAS Pensacola

Analytical Method: **Organochlorine Pesticides by EPA 8081A** Prep Method: SW3510C

Seq Number: 874126 Matrix: Water Date Prep: 11/03/2011

Parent Sample Id: 430498-006 MS Sample Id: 430498-006 S MSD Sample Id: 430498-006 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
4,4-DDD	<0.0000106	0.00106	0.000825	78	0.000781	75	11-160	5	25	mg/L	11/04/11 19:28	
4,4-DDE	<0.0000180	0.00106	0.00102	96	0.000990	95	15-157	3	29	mg/L	11/04/11 19:28	
4,4-DDT	<0.0000127	0.00106	0.00105	99	0.000990	95	15-157	6	27	mg/L	11/04/11 19:28	
Aldrin	<0.0000018	0.00106	0.000963	91	0.000896	86	12-154	7	23	mg/L	11/04/11 19:28	
Alpha-BHC	<0.0000054	0.00106	0.000963	91	0.000906	87	10-149	6	20	mg/L	11/04/11 19:28	
Alpha-Chlordane	<0.0000212	0.00106	0.000952	90	0.000896	86	15-140	6	20	mg/L	11/04/11 19:28	
Beta-BHC	<0.0000187	0.00106	0.000952	90	0.000885	85	10-151	7	20	mg/L	11/04/11 19:28	
Heptachlor Epoxide	<0.0000038	0.00106	0.000963	91	0.000896	86	15-155	7	27	mg/L	11/04/11 19:28	
Delta-BHC	<0.0000138	0.00106	0.000751	71	0.000719	69	10-155	4	20	mg/L	11/04/11 19:28	
Dieldrin	<0.0000018	0.00106	0.000952	90	0.000885	85	14-156	7	27	mg/L	11/04/11 19:28	
Endosulfan I	<0.0000095	0.00106	0.000899	85	0.000833	80	12-155	8	25	mg/L	11/04/11 19:28	
Endosulfan II	<0.0000138	0.00106	0.000847	80	0.000792	76	16-158	7	25	mg/L	11/04/11 19:28	
Endosulfan Sulfate	<0.0000127	0.00106	0.000836	79	0.000802	77	17-159	4	21	mg/L	11/04/11 19:28	
Endrin	<0.0000159	0.00106	0.00103	97	0.000969	93	14-169	6	26	mg/L	11/04/11 19:28	
Endrin Ketone	<0.0000148	0.00106	0.000794	75	0.000760	73	28-154	4	20	mg/L	11/04/11 19:28	
Endrin Aldehyde	<0.0000085	0.00106	0.000730	69	0.000698	67	22-148	4	20	mg/L	11/04/11 19:28	
Gamma-BHC (Lindane)	<0.0000053	0.00106	0.000952	90	0.000906	87	8-157	5	20	mg/L	11/04/11 19:28	
Gamma-Chlordane	<0.0000138	0.00106	0.000963	91	0.000896	86	18-141	7	20	mg/L	11/04/11 19:28	
Heptachlor	<0.0000349	0.00106	0.00103	97	0.000958	92	10-157	7	26	mg/L	11/04/11 19:28	
Methoxychlor	<0.0000138	0.00106	0.000931	88	0.000938	90	25-161	1	21	mg/L	11/04/11 19:28	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
Decachlorobiphenyl	63		62		15-136	%	11/04/11 19:28
Decachlorobiphenyl	65		63		15-136	%	11/04/11 19:28
Tetrachloro-m-xylene	84		82		18-126	%	11/04/11 19:28
Tetrachloro-m-xylene	85		81		18-126	%	11/04/11 19:28

XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In

Client: Aerostar

Date/ Time Received: 10/29/2011 09:30:00 AM

Work Order #: 430498

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : R29

Sample Receipt Checklist		Comments
#1 *Temperature of cooler(s)?	1.1	
#2 *Shipping container in good condition?	**Yes**	
#3 *Samples received on ice?	**Yes**	
#4 *Custody Seals intact on shipping container/ cooler?	**Yes**	
#5 Custody Seals intact on sample bottles/ container?	**N/A**	
#6 *Custody Seals Signed and dated for Containers/coolers	**Yes**	
#7 *Chain of Custody present?	**Yes**	
#8 Sample instructions complete on Chain of Custody?	**Yes**	
#9 Any missing/extra samples?	**No**	
#10 Chain of Custody signed when relinquished/ received?	**Yes**	
#11 Chain of Custody agrees with sample label(s)?	**Yes**	
#12 Container label(s) legible and intact?	**Yes**	
#13 Sample matrix/ properties agree with Chain of Custody?	**Yes**	
#14 Samples in proper container/ bottle?	**Yes**	
#15 Samples properly preserved?	**Yes**	
#16 Sample container(s) intact?	**Yes**	
#17 Sufficient sample amount for indicated test(s)?	**Yes**	
#18 All samples received within hold time?	**Yes**	
#19 Subcontract of sample(s)?	**No**	
#20 VOC samples have zero headspace (less than 1/4 inch bubble)?	**Yes**	
#21 <2 for all samples preserved with HNO3,HCL, H2SO4?	**Yes**	39 BOTTLES CHECKED PH
#22 >10 for all samples preserved with NaAsO2+NaOH, ZnAc+NaOH?	**N/A**	

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst:	AM	PH Device/Lot#	Lot 225810

NonConformance:

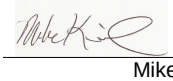
39 BOTTLES CHECKED PH

Corrective Action Taken:

Nonconformance Documentation

Contact: _____ **Contacted by :** _____ **DateTime :** _____

Checklist completed by: Date: 10/29/2011
Angel Morales

Checklist reviewed by:  Date: 11/09/2011
Mike Kimmel

Chain of Custody Record 430498-H Lab Report No.:

Page 1 of 2

Company: AEROSTAR

Address: 803 GOVT. ST., STE. A MOBILE, AL 36602

Gulf Coast LabNet, Inc.
An Environmental Lab Services Co.

Phone: (251) 625-1331
Fax: (251) 625-1299

Modified from DEP Form #: 62-770.900(2)

FDEP Facility No.:

Project Name: NAS PENSACOLA

Location: SITES 8 & 24

Project No.:

Attn: CURTIS MILLS

Phone:

Fax:

Sampled by [Print Name]/Affiliation

Sampler Signature

Item No.	Field ID No.	Sampled Date	Sampled Time	Grab or Comp.	Matrix Codes	No. Cont.	1 8260 VOC	2 Sb, Cd, Fe, Pb, Mn, Ni, Tl	H PEST 8081	←Preservative / ←Analysis / REQUESTED DUE DATE	Remarks	Lab. No.
1	08GR01R	10/27/11	1359	Grab	GW	5	X	X	X		NEED Tl REPORTED TO <0.0015 ppm & Sb <0.002 ppm	
2	08GR02	10/27/11	1452	Grab	GW	5	X	X	X			
3	08GR03R	10/27/11	1538	Grab	GW	5	X	X	X			
4	08GR05	10/27/11	1619	Grab	GW	5	X	X	X			
5	08GR06R	10/27/11	1711	Grab	GW	5	X	X	X			
6	24GS10R	10/28/11	1049	Grab	GW	5	X	X	X			
7	24GS15	10/28/11	1132	Grab	GW	5	X	X	X			
8	24GS11	10/28/11	1245	Grab	GW	5	X	X	X			
9	24GS01	10/28/11	1327	Grab	GW	5	X	X	X		FDEP NAVY	
						45				←Total Number of Containers		

Shipment Method

Out: / / Via:

Returned: / / Via:

Additional Comments

REPORT ALL METALS BY ICPMS 200.8

Item #	Relinquished by / Affiliation	Date	Time	Accepted by / Affiliation	Date	Time
	EMPTY CONTAINERS	10-27-11	0700	AGS	10/27/11	0700
	AGS	10/28/11	1700	GW	10-28-11	1700
	GW	10-28-11	1800	FedEx D.M.	10-28-11	1800
	FedEx D.M.				10/29/11	0930

Cooler No.(s) / Temperature(s) (°C)

Sampling Kit No.: 10729

Equipment ID No.: 1.1°C / 1.3°C / 1.0°C / 1.4°C

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) O = Other (specify)

PRESERVATIVE CODES: H = Hydrochloric acid + ice I = Ice only N = Nitric acid + ice S = Sulfuric acid + ice O = Other (specify)

Chain of Custody Record 430498-H Lab Report No.:

Company: AEROSTAR	**Gulf Coast LabNet, Inc.** An Environmental Lab Services Co.	Modified from DEP Form #: 62-770.900(2) Page 2 of 2
Address: 803 GOUT. ST., STE. A MOBILE, AL 36602	Phone: (251) 625-1331 Fax: (251) 625-1299	FDEP Facility No.:
		Project Name: NAS PENSACOLA
		Location: SITES 8 & 24
		Project No.:
Attn: CURTIS MICUS	Phone:	
Sampled by [Print Name]/Affiliation	Sampler Signature	

Item No.	Field ID No.	Sampled Date	Sampled Time	Grab or Comp.	Matrix Codes	No. Cont.	# 4 VOC 8260	# 2 Sb, Cd, Fe, Pb Mn, Ni, Tl	# 1 PEST 8081	←Preservative / ←Analysis	Remarks	Lab. No.
10	24GS06R	10/28/11	0942	Grab	GW	5	X	X	X		NEED Tl REPORTED TO < 0.001 ppm & Sb < 0.002 ppm	
11	24GS09R	10/28/11	1503	Grab	GW	5	X	X	X			
12	Dup	10/27/11	—	Grab	GW	5	X	X	X			
											FDEP NAVY	

15 ←Total Number of Containers

Shipment Method			
Out: / /	Via:	Returned: / /	Via:

Additional Comments: REPORT ALL METALS BY ICPMS 200.8

Item #	Relinquished by / Affiliation	Date	Time	Accepted by / Affiliation	Date	Time
	EMPTY CONTAINERS	10-27-11	0700	AES	10/27/11	0700
	AES	10/28/11	1700	[illegible]	10-28-11	1700
	[illegible]	10-28-11	1800	FedEx	10-28-11	1800
	FedEx			[illegible]	10/29/11	0930

Cooler No.(s) / Temperature(s) (°C)	Sampling Kit No.	Equipment ID No.
	10729	

MATRIX CODES: A = Air GW = Groundwater SE = Sediment SO = Soil SW = Surface Water W = Water (Blanks) O = Other (specify)

PRESERVATIVE CODES: H = Hydrochloric acid + ice I = Ice only N = Nitric acid + ice S = Sulfuric acid + ice O = Other (specify)

From: (251) 625-1331
Daniel Miller
Gulf Coast LabNet
6389 Spanish Fort Blvd.

Spanish Fort, AL 36527

Origin ID: MVCA

FedEx Express

J112011080502225

Ship Date: 28OCT11
ActWgt: 30.0 LB
CAD: 7018933/INET3210

Delivery Address Bar Code

SHIP TO: (281) 240-4200 BILL RECIPIENT

Sample Receiving
FedEx Express Ship Center
10555 S Sam Houston Pky W

Houston, TX 77071

Ref # NAS 8&24
Invoice #
PO #
Dept #

4 of 4

MPS# 7953 5065 8357
0263

Mstr# 7953 5065 8324 0201

X0 SGRA

SATURDAY ### A2
PRIORITY OVERNIGHT
HLD
77071
TX-US
IAH

50FG1/A013/F5F4

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

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From: (251) 625-1331
Daniel Miller
Gulf Coast LabNet
6389 Spanish Fort Blvd.

Spanish Fort, AL 36527

Origin ID: MVCA

FedEx Express

J112011080502 25

Ship Date: 28OCT11
ActWgt: 30.0 LB
CAD: 7018933/INET3210

Delivery Address Bar Code

SHIP TO: (281) 240-4200 BILL RECIPIENT

Sample Receiving
FedEx Express Ship Center
10555 S Sam Houston Pky W

Houston, TX 77071

Ref # NAS 8&24
Invoice #
PO #
Dept #

3 of 4

MPS# 7953 5065 8298
0263

Mstr# 7953 5065 8324 0201

X0 SGRA

SATURDAY ### A2
PRIORITY OVERNIGHT
HLD
77071
TX-US
IAH

50FG1/A013/F5F4

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Use of this system constitutes your agreement to the service conditions in the current FedEx Service Guide, available on fedex.com.FedEx will not be responsible for any claim in excess of $100 per package, whether the result of loss, damage, delay, non-delivery,misdelivery,or misinformation, unless you declare a higher value, pay an additional charge, document your actual loss and file a timely claim.Limitations found in the current FedEx Service Guide apply. Your right to recover from FedEx for any loss, including intrinsic valueof the package, loss of sales, income interest, profit, attorney's fees, costs, and other forms of damage whether direct, incidental,consequential, or special is limited to the greater of $100 or the authorized declared value. Recovery cannot exceed actual documented loss.Maximum for items of extraordinary value is $500, e.g. jewelry, precious metals, negotiable instruments and other items listed in our ServiceGuide. Written claims must be filed within strict time limits, see current FedEx Service Guide.

From: (251) 625-1331
Daniel Miller
Gulf Coast LabNet
6389 Spanish Fort Blvd.

Spanish Fort, AL 36527

Origin ID: MVCA

FedEx Express

J11201108050225

Ship Date: 28OCT11
ActWgt: 30.0 LB
CAD: 7018933/INET3210

Delivery Address Bar Code

SHIP TO: (281) 240-4200 BILL RECIPIENT

Sample Receiving
FedEx Express Ship Center
10555 S Sam Houston Pky W

Houston, TX 77071

Ref # NAS 8&24
Invoice #
PO #
Dept #

2 of 4

MPS# 7953 5065 8335
0263

Mstr# 7953 5065 8324 0201

X0 SGRA

SATURDAY ### A2
PRIORITY OVERNIGHT
HLD
77071
TX-US
IAH

50FG1/A013/F5F4

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Sample Receiving
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10555 S Sam Houston Pky W

Houston, TX 77071

Ref # NAS 8&24
Invoice #
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Dept #

1 of 4

TRK# 7953 5065 8324
0201
MASTER

X0 SGRA

SATURDAY ### A2
PRIORITY OVERNIGHT
HLD
77071
TX-US
IAH

50FG1/A013/F5F4

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
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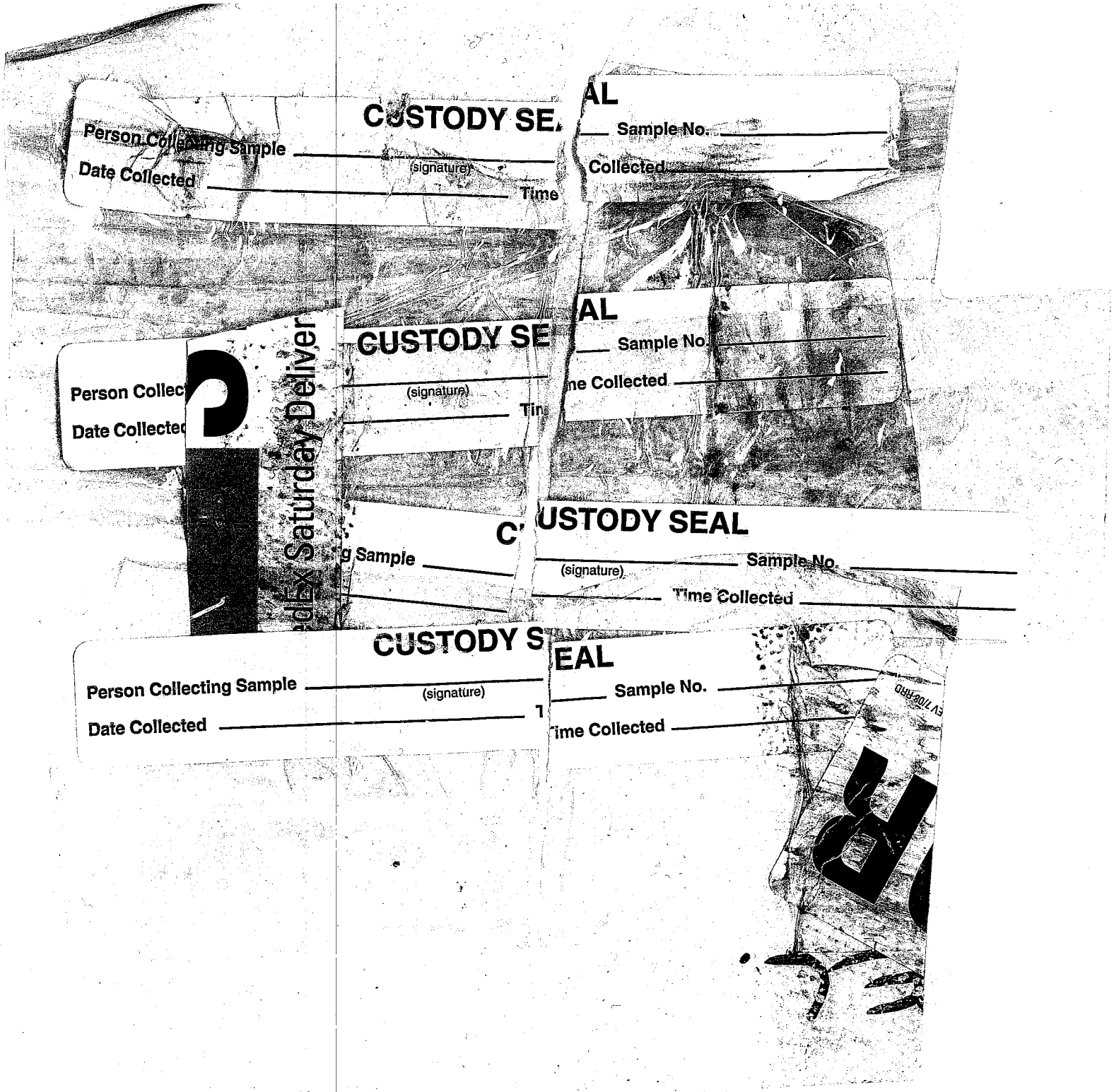

CUSTODY SEAL
Person Collecting Sample
(signature)
Date Collected
Time
Sample No.
Collected
CUSTODY SEAL
Person Collecting Sample
(signature)
Date Collected
Time Collected
Sample No.
CUSTODY SEAL
Person Collecting Sample
(signature)
Date Collected
Time Collected
Sample No.
CUSTODY SEAL
Person Collecting Sample
(signature)
Date Collected
Time Collected
Sample No.
FedEx Saturday Deliver

XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In

Client: Aerostar

Date/ Time Received: 10/29/2011 09:30:00 AM

Work Order #: 430498

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used : R29

Sample Receipt Checklist		Comments
#1 *Temperature of cooler(s)?	1.1	
#2 *Shipping container in good condition?	**Yes**	
#3 *Samples received on ice?	**Yes**	
#4 *Custody Seals intact on shipping container/ cooler?	**Yes**	
#5 Custody Seals intact on sample bottles/ container?	**N/A**	
#6 *Custody Seals Signed and dated for Containers/coolers	**Yes**	
#7 *Chain of Custody present?	**Yes**	
#8 Sample instructions complete on Chain of Custody?	**Yes**	
#9 Any missing/extra samples?	**No**	
#10 Chain of Custody signed when relinquished/ received?	**Yes**	
#11 Chain of Custody agrees with sample label(s)?	**Yes**	
#12 Container label(s) legible and intact?	**Yes**	
#13 Sample matrix/ properties agree with Chain of Custody?	**Yes**	
#14 Samples in proper container/ bottle?	**Yes**	
#15 Samples properly preserved?	**Yes**	
#16 Sample container(s) intact?	**Yes**	
#17 Sufficient sample amount for indicated test(s)?	**Yes**	
#18 All samples received within hold time?	**Yes**	
#19 Subcontract of sample(s)?	**No**	
#20 VOC samples have zero headspace (less than 1/4 inch bubble)?	**Yes**	
#21 <2 for all samples preserved with HNO3,HCL, H2SO4?	**Yes**	39 BOTTLES CHECKED PH
#22 >10 for all samples preserved with NaAsO2+NaOH, ZnAc+NaOH?	**N/A**	

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst:	AM	PH Device/Lot#	Lot 225810

NonConformance:

39 BOTTLES CHECKED PH

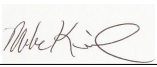
Corrective Action Taken:

Nonconformance Documentation

Contact: _____ **Contacted by :** _____ **DateTime :** _____

Checklist completed by: Date: 10/29/2011

Angel Morales

Checklist reviewed by:  Date: 11/09/2011

Mike Kimmel

APPENDIX K

VAPOR INTRUSION CALCULATIONS

Provided on CD

VAPOR INTRUSION MODEL PREDICTED INDOOR AIR CONCENTRATIONS

OPERABLE UNIT 1

Shallow Zone Groundwater

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	3.23E+00	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,998	4.83E-03	1.99E-01	1.79E-04	1.42E-02	0.00E+00	0.00E+00	5.67E-04	4.86E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.44E+02	0.10	9.95E+01	1.42E-02	4.00E+02	9.20E+75	1.44E-04	9.24E-02	7.8E-06	3.0E-02

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Reset to

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	6.00E+00	Chlorobenzene

MORE	ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
	22	15	236	236	0	0	A	S	S		

Totals must add up to value of L_{WT} (cell G28)

MORE	ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
	Lookup Soil				Lookup Soil				Lookup Soil			
	S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE	ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
	10	40	1000	1000	244	0.1	2	

MORE	ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
	70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	221	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,681	3.13E-03	1.29E-01	1.79E-04	1.18E-02	0.00E+00	0.00E+00	4.72E-04	4.14E-03	221

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.74E+02	0.10	9.95E+01	1.18E-02	4.00E+02	3.74E+91	1.22E-04	9.46E-02	NA	5.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	6.00E+00	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	236	236	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	762	1829	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	221	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	5,182

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.89E+05	1.47E+06	3.52E-04	15	9,681	3.13E-03	1.29E-01	1.79E-04	1.18E-02	0.00E+00	0.00E+00	4.72E-04	4.14E-03	221

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.74E+02	0.10	1.29E+02	1.18E-02	5.18E+02	3.74E+91	1.20E-04	9.31E-02	NA	5.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	1.09E+02	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,681	3.13E-03	1.29E-01	1.79E-04	1.18E-02	0.00E+00	0.00E+00	4.72E-04	4.04E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.41E+04	0.10	9.95E+01	1.18E-02	4.00E+02	3.74E+91	1.23E-04	1.74E+00	NA	5.0E-02

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	4.00E-01	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	236	236	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	221	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	5.98E-03	221

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.09E+02	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.64E-04	6.72E-02	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	4.00E-01	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	236	236	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	762	1829	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	221	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	5,182

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.89E+05	1.47E+06	3.52E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	5.98E-03	221

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.09E+02	0.10	1.29E+02	1.71E-02	5.18E+02	1.16E+63	1.61E-04	6.59E-02	4.4E-06	1.0E-01

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	5.61E-01	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	5.83E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	5.74E+02	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.66E-04	9.52E-02	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

Reset to

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	6.33E+00	o-Xylene

MORE

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	228	228	0	0	A	S	S		

MORE

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	4.81E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.13E+03	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.42E-04	1.61E-01	NA	1.0E-01

END

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	3.23E+00	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,998	4.83E-03	1.99E-01	1.79E-04	1.42E-02	0.00E+00	0.00E+00	5.67E-04	4.86E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.44E+02	0.10	9.95E+01	1.42E-02	4.00E+02	9.20E+75	1.15E-03	7.39E-01	7.8E-06	3.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	1.09E+02	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	9,681	3.13E-03	1.29E-01	1.79E-04	1.18E-02	0.00E+00	0.00E+00	4.72E-04	4.04E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.41E+04	0.10	9.95E+01	1.18E-02	4.00E+02	3.74E+91	9.88E-04	1.39E+01	NA	5.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	5.61E-01	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	5.83E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	5.74E+02	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.33E-03	7.61E-01	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	6.33E+00	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	4.81E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.13E+03	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.14E-03	1.29E+00	NA	1.0E-01

END

Intermediate Zone Groundwater

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	1.40E+01	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,998	4.83E-03	1.99E-01	1.79E-04	1.42E-02	0.00E+00	0.00E+00	5.67E-04	4.86E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.79E+03	0.10	9.95E+01	1.42E-02	4.00E+02	9.20E+75	1.44E-04	4.00E-01	7.8E-06	3.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	1.26E+02	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,681	3.13E-03	1.29E-01	1.79E-04	1.18E-02	0.00E+00	0.00E+00	4.72E-04	4.04E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.63E+04	0.10	9.95E+01	1.18E-02	4.00E+02	3.74E+91	1.23E-04	2.01E+00	NA	5.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	7.96E+00	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	3.44E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.27E+02	0.10	9.95E+01	9.54E-03	4.00E+02	1.99E+113	1.08E-04	1.37E-02	3.4E-05	3.0E-03

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	3.77E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	5.83E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.86E+03	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.66E-04	6.39E-01	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

Reset to

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	1.37E+01	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	4.81E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.46E+03	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.42E-04	3.49E-01	NA	1.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

Reset to

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	1.40E+01	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,998	4.83E-03	1.99E-01	1.79E-04	1.42E-02	0.00E+00	0.00E+00	5.67E-04	4.86E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.79E+03	0.10	9.95E+01	1.42E-02	4.00E+02	9.20E+75	1.15E-03	3.20E+00	7.8E-06	3.0E-02

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	1.26E+02	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	9,681	3.13E-03	1.29E-01	1.79E-04	1.18E-02	0.00E+00	0.00E+00	4.72E-04	4.04E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.63E+04	0.10	9.95E+01	1.18E-02	4.00E+02	3.74E+91	9.88E-04	1.61E+01	NA	5.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

Reset to

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	7.96E+00	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	3.44E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.27E+02	0.10	9.95E+01	9.54E-03	4.00E+02	1.99E+113	8.62E-04	1.10E-01	3.4E-05	3.0E-03

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	3.77E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	5.83E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.86E+03	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.33E-03	5.12E+00	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	1.37E+01	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	228	228	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	213	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	4.81E-03	213

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.46E+03	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.14E-03	2.80E+00	NA	1.0E-01

END

VAPOR INTRUSION MODEL PREDICTED INDOOR AIR CONCENTRATIONS

SITE 11 – OPERABLE UNIT 2

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75354	9.90E-01	1,1-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	6,313	2.34E-02	9.65E-01	1.79E-04	1.45E-02	0.00E+00	0.00E+00	5.77E-04	3.63E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.55E+02	0.10	9.95E+01	1.45E-02	4.00E+02	1.89E+74	1.61E-04	1.54E-01	NA	2.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75354	9.90E-01	1,1-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1372	3048	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	8,840

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
5.67E+05	4.31E+06	2.05E-04	15	6,313	2.34E-02	9.65E-01	1.79E-04	1.45E-02	0.00E+00	0.00E+00	5.77E-04	3.63E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.55E+02	0.10	2.20E+02	1.45E-02	8.84E+02	1.89E+74	1.33E-04	1.27E-01	NA	2.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75354	9.90E-01	1,1-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	6,313	2.34E-02	9.65E-01	1.79E-04	1.45E-02	0.00E+00	0.00E+00	5.77E-04	3.63E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.55E+02	0.10	9.95E+01	1.45E-02	4.00E+02	1.89E+74	1.61E-04	1.54E-01	NA	2.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	4.00E+00	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,998	4.83E-03	1.99E-01	1.79E-04	1.42E-02	0.00E+00	0.00E+00	5.67E-04	3.56E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.97E+02	0.10	9.95E+01	1.42E-02	4.00E+02	9.20E+75	1.59E-04	1.27E-01	7.8E-06	3.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	1.45E+02	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	2.99E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.14E+04	0.10	9.95E+01	1.19E-02	4.00E+02	6.70E+90	1.38E-04	2.96E+00	NA	6.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to Defaults

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	1.45E+02	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil Parameters				Lookup Soil Parameters				Lookup Soil Parameters			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1372	3048	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	8,840

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
5.67E+05	4.31E+06	2.05E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	2.99E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.14E+04	0.10	2.20E+02	1.19E-02	8.84E+02	6.70E+90	1.16E-04	2.49E+00	NA	6.0E-02

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	1.45E+02	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	2.99E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.14E+04	0.10	9.95E+01	1.19E-02	4.00E+02	6.70E+90	1.38E-04	2.96E+00	NA	6.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	6.70E-01	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	3.03E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.83E+02	0.10	9.95E+01	1.21E-02	4.00E+02	1.35E+89	1.40E-04	2.56E-02	2.5E-06	1.0E+00

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	6.90E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	2.90E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.45E+02	0.10	9.95E+01	1.16E-02	4.00E+02	7.00E+92	1.35E-04	6.01E-02	2.6E-07	4.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	6.90E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1372	3048	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	8,840

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
5.67E+05	4.31E+06	2.05E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	2.90E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.45E+02	0.10	2.20E+02	1.16E-02	8.84E+02	7.00E+92	1.14E-04	5.07E-02	2.6E-07	4.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	6.90E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	2.90E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.45E+02	0.10	9.95E+01	1.16E-02	4.00E+02	7.00E+92	1.35E-04	6.01E-02	2.6E-07	4.0E-02

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	8.80E+00	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	8,407	8.89E-03	3.67E-01	1.79E-04	1.28E-02	0.00E+00	0.00E+00	5.08E-04	3.19E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.23E+03	0.10	9.95E+01	1.28E-02	4.00E+02	4.15E+84	1.46E-04	4.71E-01	4.1E-06	2.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	8.80E+00	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1372	3048	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	8,840

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
5.67E+05	4.31E+06	2.05E-04	15	8,407	8.89E-03	3.67E-01	1.79E-04	1.28E-02	0.00E+00	0.00E+00	5.08E-04	3.19E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.23E+03	0.10	2.20E+02	1.28E-02	8.84E+02	4.15E+84	1.22E-04	3.93E-01	4.1E-06	2.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	8.80E+00	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	8,407	8.89E-03	3.67E-01	1.79E-04	1.28E-02	0.00E+00	0.00E+00	5.08E-04	3.19E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.23E+03	0.10	9.95E+01	1.28E-02	4.00E+02	4.15E+84	1.46E-04	4.71E-01	4.1E-06	2.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	1.70E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	4.27E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.74E+03	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.83E-04	3.18E-01	4.4E-06	1.0E-01

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	1.70E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1372	3048	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	8,840

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
5.67E+05	4.31E+06	2.05E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	4.27E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.74E+03	0.10	2.20E+02	1.71E-02	8.84E+02	1.16E+63	1.47E-04	2.56E-01	4.4E-06	1.0E-01

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	1.70E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	4.27E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.74E+03	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.83E-04	3.18E-01	4.4E-06	1.0E-01

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	1.72E+01	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	3.52E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.08E+03	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.58E-04	4.86E-01	NA	1.0E-01

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75354	9.90E-01	1,1-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	6,313	2.34E-02	9.65E-01	1.79E-04	1.45E-02	0.00E+00	0.00E+00	5.77E-04	3.63E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.55E+02	0.10	9.95E+01	1.45E-02	4.00E+02	1.89E+74	1.29E-03	1.23E+00	NA	2.0E-01

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71432	4.00E+00	Benzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,998	4.83E-03	1.99E-01	1.79E-04	1.42E-02	0.00E+00	0.00E+00	5.67E-04	3.56E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.97E+02	0.10	9.95E+01	1.42E-02	4.00E+02	9.20E+75	1.27E-03	1.01E+00	7.8E-06	3.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_w (µg/L)	Chemical
156592	1.45E+02	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	2.99E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.14E+04	0.10	9.95E+01	1.19E-02	4.00E+02	6.70E+90	1.11E-03	2.37E+01	NA	6.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	6.70E-01	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	3.03E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.83E+02	0.10	9.95E+01	1.21E-02	4.00E+02	1.35E+89	1.12E-03	2.05E-01	2.5E-06	1.0E+00

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	6.90E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	2.90E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^I) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.45E+02	0.10	9.95E+01	1.16E-02	4.00E+02	7.00E+92	1.08E-03	4.81E-01	2.6E-07	4.0E-02

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	8.80E+00	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	8,407	8.89E-03	3.67E-01	1.79E-04	1.28E-02	0.00E+00	0.00E+00	5.08E-04	3.19E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.23E+03	0.10	9.95E+01	1.28E-02	4.00E+02	4.15E+84	1.17E-03	3.77E+00	4.1E-06	2.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	1.70E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	4.27E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.74E+03	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.46E-03	2.55E+00	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	1.72E+01	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	152	152	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	137	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	3.52E-03	137

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.08E+03	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.26E-03	3.89E+00	NA	1.0E-01

END

VAPOR INTRUSION MODEL PREDICTED INDOOR AIR CONCENTRATIONS

SITES 12, 25, 26, AND 27 – OPERABLE UNIT 2

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75343	3.40E+00	1,1-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,317	4.94E-03	2.04E-01	1.79E-04	1.20E-02	0.00E+00	0.00E+00	4.79E-04	6.43E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.94E+02	0.10	9.95E+01	1.20E-02	4.00E+02	1.24E+90	9.28E-05	6.44E-02	1.6E-06	NA

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106467	1.00E+00	1,4-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	11,119	1.98E-03	8.17E-02	1.79E-04	1.12E-02	0.00E+00	0.00E+00	4.49E-04	6.00E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.17E+01	0.10	9.95E+01	1.12E-02	4.00E+02	7.61E+96	8.74E-05	7.14E-03	1.1E-05	8.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	3.38E+01	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	6.74E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.98E+03	0.10	9.95E+01	1.19E-02	4.00E+02	6.70E+90	8.70E-05	4.34E-01	NA	6.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

Reset to

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	3.38E+01	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	3048	3658	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	13,412

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.51E+06	1.14E+07	1.18E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	6.74E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^I) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.98E+03	0.10	3.34E+02	1.19E-02	1.34E+03	6.70E+90	6.63E-05	3.31E-01	NA	6.0E-02

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	3.38E+01	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	6.39E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.98E+03	0.10	9.95E+01	1.19E-02	4.00E+02	6.70E+90	9.23E-05	4.60E-01	NA	6.0E-02

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	1.33E+01	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	6.85E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.63E+03	0.10	9.95E+01	1.21E-02	4.00E+02	1.35E+89	8.82E-05	3.21E-01	2.5E-06	1.0E+00

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

Reset to

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	1.33E+01	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	3048	3658	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	13,412

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.51E+06	1.14E+07	1.18E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	6.85E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.63E+03	0.10	3.34E+02	1.21E-02	1.34E+03	1.35E+89	6.71E-05	2.44E-01	2.5E-06	1.0E+00

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	1.33E+01	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	6.48E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.63E+03	0.10	9.95E+01	1.21E-02	4.00E+02	1.35E+89	9.35E-05	3.40E-01	2.5E-06	1.0E+00

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	4.14E+01	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	5.59E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.61E+02	0.10	9.95E+01	9.54E-03	4.00E+02	1.99E+113	7.36E-05	4.87E-02	3.4E-05	3.0E-03

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

Reset to

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	4.14E+01	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	3048	3658	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	13,412

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.51E+06	1.14E+07	1.18E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	5.59E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.61E+02	0.10	3.34E+02	9.54E-03	1.34E+03	1.99E+113	5.80E-05	3.83E-02	3.4E-05	3.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	4.14E+01	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	5.31E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.61E+02	0.10	9.95E+01	9.54E-03	4.00E+02	1.99E+113	7.84E-05	5.18E-02	3.4E-05	3.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_w (µg/L)	Chemical
127184	7.00E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	6.57E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.51E+02	0.10	9.95E+01	1.16E-02	4.00E+02	7.00E+92	8.50E-05	3.84E-02	2.6E-07	4.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	7.00E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	3048	3658	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	13,412

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.51E+06	1.14E+07	1.18E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	6.57E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.51E+02	0.10	3.34E+02	1.16E-02	1.34E+03	7.00E+92	6.51E-05	2.94E-02	2.6E-07	4.0E-02

END

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	9.70E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	6.22E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.25E+02	0.10	9.95E+01	1.16E-02	4.00E+02	7.00E+92	9.02E-05	5.64E-02	2.6E-07	4.0E-02

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

Reset to

YES X

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	2.50E-01	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	8,407	8.89E-03	3.67E-01	1.79E-04	1.28E-02	0.00E+00	0.00E+00	5.08E-04	6.83E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^I)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.18E+01	0.10	9.95E+01	1.28E-02	4.00E+02	4.15E+84	9.78E-05	8.98E-03	4.1E-06	2.0E-03

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	6.40E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	9.67E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.55E+03	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.19E-04	7.77E-01	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	6.40E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	3048	3658	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	13,412

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.51E+06	1.14E+07	1.18E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	9.67E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.55E+03	0.10	3.34E+02	1.71E-02	1.34E+03	1.16E+63	8.41E-05	5.51E-01	4.4E-06	1.0E-01

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	6.40E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	9.15E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.55E+03	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.25E-04	8.21E-01	4.4E-06	1.0E-01

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	1.02E+02	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	7.96E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.83E+04	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.01E-04	1.84E+00	NA	1.0E-01

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	1.02E+02	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	549	549	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	3048	3658	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	534	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	13,412

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.51E+06	1.14E+07	1.18E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	7.96E-03	534

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.83E+04	0.10	3.34E+02	1.41E-02	1.34E+03	6.87E+76	7.43E-05	1.36E+00	NA	1.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	1.02E+02	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	7.53E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.83E+04	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.06E-04	1.95E+00	NA	1.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75343	3.40E+00	1,1-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,317	4.94E-03	2.04E-01	1.79E-04	1.20E-02	0.00E+00	0.00E+00	4.79E-04	6.43E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.94E+02	0.10	9.95E+01	1.20E-02	4.00E+02	1.24E+90	7.43E-04	5.15E-01	1.6E-06	NA

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106467	1.00E+00	1,4-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	11,119	1.98E-03	8.17E-02	1.79E-04	1.12E-02	0.00E+00	0.00E+00	4.49E-04	6.00E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	8.17E+01	0.10	9.95E+01	1.12E-02	4.00E+02	7.61E+96	6.99E-04	5.71E-02	1.1E-05	8.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	3.38E+01	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	6.39E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^I)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	4.98E+03	0.10	9.95E+01	1.19E-02	4.00E+02	6.70E+90	7.38E-04	3.68E+00	NA	6.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	1.33E+01	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	6.48E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.63E+03	0.10	9.95E+01	1.21E-02	4.00E+02	1.35E+89	7.48E-04	2.72E+00	2.5E-06	1.0E+00

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	4.14E+01	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, η_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	5.31E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.61E+02	0.10	9.95E+01	9.54E-03	4.00E+02	1.99E+113	6.27E-04	4.15E-01	3.4E-05	3.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	9.70E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	6.22E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.25E+02	0.10	9.95E+01	1.16E-02	4.00E+02	7.00E+92	7.21E-04	4.51E-01	2.6E-07	4.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	2.50E-01	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	8,407	8.89E-03	3.67E-01	1.79E-04	1.28E-02	0.00E+00	0.00E+00	5.08E-04	6.83E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe')$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.18E+01	0.10	9.95E+01	1.28E-02	4.00E+02	4.15E+84	7.83E-04	7.19E-02	4.1E-06	2.0E-03

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75014	6.40E+00	Vinyl chloride (chloroethene)

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	4,864	2.48E-02	1.02E+00	1.79E-04	1.71E-02	0.00E+00	0.00E+00	6.80E-04	9.15E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.55E+03	0.10	9.95E+01	1.71E-02	4.00E+02	1.16E+63	1.00E-03	6.57E+00	4.4E-06	1.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	1.02E+02	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	7.53E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.83E+04	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	8.52E-04	1.56E+01	NA	1.0E-01

END

VAPOR INTRUSION MODEL PREDICTED INDOOR AIR CONCENTRATIONS

SITE 30 – OPERABLE UNIT 2

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71556	5.30E-01	1,1,1-Trichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,754	1.50E-02	6.20E-01	1.79E-04	1.26E-02	0.00E+00	0.00E+00	5.01E-04	6.30E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.29E+02	0.10	9.95E+01	1.26E-02	4.00E+02	5.05E+85	1.03E-04	3.38E-02	NA	5.0E+00

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_w (µg/L)	Chemical
75343	6.30E+00	1,1-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,317	4.94E-03	2.04E-01	1.79E-04	1.20E-02	0.00E+00	0.00E+00	4.79E-04	6.01E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.29E+03	0.10	9.95E+01	1.20E-02	4.00E+02	1.24E+90	9.88E-05	1.27E-01	1.6E-06	NA

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106467	8.60E+00	1,4-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	11,119	1.98E-03	8.17E-02	1.79E-04	1.12E-02	0.00E+00	0.00E+00	4.49E-04	6.00E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.02E+02	0.10	9.95E+01	1.12E-02	4.00E+02	7.61E+96	8.74E-05	6.14E-02	1.1E-05	8.0E-01

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106467	8.60E+00	1,4-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	2743	5486	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	16,458

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
2.04E+06	1.53E+07	1.08E-04	15	11,119	1.98E-03	8.17E-02	1.79E-04	1.12E-02	0.00E+00	0.00E+00	4.49E-04	6.00E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.02E+02	0.10	4.10E+02	1.12E-02	1.65E+03	7.61E+96	6.45E-05	4.53E-02	1.1E-05	8.0E-01

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106467	8.60E+00	1,4-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	11,119	1.98E-03	8.17E-02	1.79E-04	1.12E-02	0.00E+00	0.00E+00	4.49E-04	5.62E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.02E+02	0.10	9.95E+01	1.12E-02	4.00E+02	7.61E+96	9.31E-05	6.54E-02	1.1E-05	8.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	5.30E-01	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,681	3.13E-03	1.29E-01	1.79E-04	1.18E-02	0.00E+00	0.00E+00	4.72E-04	5.92E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.84E+01	0.10	9.95E+01	1.18E-02	4.00E+02	3.74E+91	9.75E-05	6.67E-03	NA	5.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67663	2.00E+00	Chloroform

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,429	3.22E-03	1.33E-01	1.79E-04	1.68E-02	0.00E+00	0.00E+00	6.72E-04	8.43E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.66E+02	0.10	9.95E+01	1.68E-02	4.00E+02	1.89E+64	1.31E-04	3.50E-02	2.3E-05	9.8E-02

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	9.00E+00	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	5.98E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.33E+03	0.10	9.95E+01	1.19E-02	4.00E+02	6.70E+90	9.83E-05	1.30E-01	NA	6.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	2.76E+02	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	6.48E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.54E+04	0.10	9.95E+01	1.21E-02	4.00E+02	1.35E+89	9.35E-05	7.06E+00	2.5E-06	1.0E+00

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	2.76E+02	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	2743	5486	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	16,458

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
2.04E+06	1.53E+07	1.08E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	6.48E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.54E+04	0.10	4.10E+02	1.21E-02	1.65E+03	1.35E+89	6.80E-05	5.13E+00	2.5E-06	1.0E+00

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	2.76E+02	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	6.07E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.54E+04	0.10	9.95E+01	1.21E-02	4.00E+02	1.35E+89	9.95E-05	7.51E+00	2.5E-06	1.0E+00

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	9.47E+01	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	5.31E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.51E+03	0.10	9.95E+01	9.54E-03	4.00E+02	1.99E+113	7.84E-05	1.19E-01	3.4E-05	3.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	9.47E+01	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	2743	5486	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	16,458

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
2.04E+06	1.53E+07	1.08E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	5.31E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.51E+03	0.10	4.10E+02	9.54E-03	1.65E+03	1.99E+113	5.93E-05	8.97E-02	3.4E-05	3.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	9.47E+01	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	4.98E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.51E+03	0.10	9.95E+01	9.54E-03	4.00E+02	1.99E+113	8.37E-05	1.27E-01	3.4E-05	3.0E-03

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	8.80E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	6.22E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	5.67E+02	0.10	9.95E+01	1.16E-02	4.00E+02	7.00E+92	9.02E-05	5.12E-02	2.6E-07	4.0E-02

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

Reset to

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	8.80E-01	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	2743	5486	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	16,458

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
2.04E+06	1.53E+07	1.08E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	6.22E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	5.67E+02	0.10	4.10E+02	1.16E-02	1.65E+03	7.00E+92	6.61E-05	3.75E-02	2.6E-07	4.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	1.70E+00	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	5.82E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.10E+03	0.10	9.95E+01	1.16E-02	4.00E+02	7.00E+92	9.60E-05	1.05E-01	2.6E-07	4.0E-02

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	2.50E-01	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	8,407	8.89E-03	3.67E-01	1.79E-04	1.28E-02	0.00E+00	0.00E+00	5.08E-04	6.39E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF ($\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.18E+01	0.10	9.95E+01	1.28E-02	4.00E+02	4.15E+84	1.04E-04	9.55E-03	4.1E-06	2.0E-03

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	4.35E+02	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{e,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	7.53E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^I)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.80E+04	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.06E-04	8.30E+00	NA	1.0E-01

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	4.35E+02	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	488	488	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	2743	5486	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1

Used to calculate risk-based groundwater concentration.

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	473	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	16,458

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
2.04E+06	1.53E+07	1.08E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	7.53E-03	473

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.80E+04	0.10	4.10E+02	1.41E-02	1.65E+03	6.87E+76	7.49E-05	5.84E+00	NA	1.0E-01

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	4.35E+02	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	2	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.36E+05	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	7.05E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.80E+04	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	1.13E-04	8.82E+00	NA	1.0E-01

END

DATA ENTRY SHEET

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
71556	5.30E-01	1,1,1-Trichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,754	1.50E-02	6.20E-01	1.79E-04	1.26E-02	0.00E+00	0.00E+00	5.01E-04	6.30E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	3.29E+02	0.10	9.95E+01	1.26E-02	4.00E+02	5.05E+85	8.23E-04	2.70E-01	NA	5.0E+00

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
75343	6.30E+00	1,1-Dichloroethane

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,317	4.94E-03	2.04E-01	1.79E-04	1.20E-02	0.00E+00	0.00E+00	4.79E-04	6.01E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.29E+03	0.10	9.95E+01	1.20E-02	4.00E+02	1.24E+90	7.90E-04	1.02E+00	1.6E-06	NA

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
106467	8.60E+00	1,4-Dichlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	11,119	1.98E-03	8.17E-02	1.79E-04	1.12E-02	0.00E+00	0.00E+00	4.49E-04	5.62E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.02E+02	0.10	9.95E+01	1.12E-02	4.00E+02	7.61E+96	7.45E-04	5.23E-01	1.1E-05	8.0E-01

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
108907	5.30E-01	Chlorobenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	9,681	3.13E-03	1.29E-01	1.79E-04	1.18E-02	0.00E+00	0.00E+00	4.72E-04	5.92E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	6.84E+01	0.10	9.95E+01	1.18E-02	4.00E+02	3.74E+91	7.80E-04	5.34E-02	NA	5.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
67663	2.00E+00	Chloroform

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP (g/cm-s^2)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,429	3.22E-03	1.33E-01	1.79E-04	1.68E-02	0.00E+00	0.00E+00	6.72E-04	8.43E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^I) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	2.66E+02	0.10	9.95E+01	1.68E-02	4.00E+02	1.89E+64	1.05E-03	2.80E-01	2.3E-05	9.8E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
156592	9.00E+00	cis-1,2-Dichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	7,612	3.57E-03	1.47E-01	1.79E-04	1.19E-02	0.00E+00	0.00E+00	4.77E-04	5.98E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.33E+03	0.10	9.95E+01	1.19E-02	4.00E+02	6.70E+90	7.86E-04	1.04E+00	NA	6.0E-02

END

GW-ADV
Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
100414	2.76E+02	Ethylbenzene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm-s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	10,017	6.62E-03	2.73E-01	1.79E-04	1.21E-02	0.00E+00	0.00E+00	4.82E-04	6.07E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $\exp(Pe^f)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.54E+04	0.10	9.95E+01	1.21E-02	4.00E+02	1.35E+89	7.96E-04	6.01E+01	2.5E-06	1.0E+00

END

DATA ENTRY SHEET

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
91203	9.47E+01	Naphthalene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	12,789	3.87E-04	1.60E-02	1.79E-04	9.54E-03	0.00E+00	0.00E+00	4.12E-04	4.98E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.51E+03	0.10	9.95E+01	9.54E-03	4.00E+02	1.99E+113	6.70E-04	1.01E+00	3.4E-05	3.0E-03

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
127184	1.70E+00	Tetrachloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Totals must add up to value of L_{WT} (cell G28) Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	9,431	1.56E-02	6.45E-01	1.79E-04	1.16E-02	0.00E+00	0.00E+00	4.62E-04	5.82E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, $exp(Pe^I)$ (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	1.10E+03	0.10	9.95E+01	1.16E-02	4.00E+02	7.00E+92	7.68E-04	8.41E-01	2.6E-07	4.0E-02

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
79016	2.50E-01	Trichloroethylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	8,407	8.89E-03	3.67E-01	1.79E-04	1.28E-02	0.00E+00	0.00E+00	5.08E-04	6.39E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe^f) (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	9.18E+01	0.10	9.95E+01	1.28E-02	4.00E+02	4.15E+84	8.32E-04	7.64E-02	4.1E-06	2.0E-03

END

GW-ADV Version 3.1; 02/04

Reset to

CALCULATE RISK-BASED GROUNDWATER CONCENTRATION (enter "X" in "YES" box)

YES [ ]

OR

CALCULATE INCREMENTAL RISKS FROM ACTUAL GROUNDWATER CONCENTRATION (enter "X" in "YES" box and initial groundwater conc. below)

YES [X]

ENTER Chemical CAS No. (numbers only, no dashes)	ENTER Initial groundwater conc., C_W (µg/L)	Chemical
95476	4.35E+02	o-Xylene

MORE ↓

ENTER Average soil/ groundwater temperature, T_S (°C)	ENTER Depth below grade to bottom of enclosed space floor, L_F (cm)	ENTER Depth below grade to water table, L_{WT} (cm)	ENTER Thickness of soil stratum A, h_A (cm)	ENTER Thickness of soil stratum B, (Enter value or 0) h_B (cm)	ENTER Thickness of soil stratum C, (Enter value or 0) h_C (cm)	ENTER Soil stratum directly above water table, (Enter A, B, or C)	ENTER SCS soil type directly above water table	ENTER Soil stratum A SCS soil type (used to estimate soil vapor permeability)	OR	ENTER User-defined stratum A soil vapor permeability, k_v (cm^2)
			Totals must add up to value of L_{WT} (cell G28)							
22	15	427	427	0	0	A	S	S		

MORE ↓

ENTER Stratum A SCS soil type	ENTER Stratum A soil dry bulk density, ρ_b^A (g/cm^3)	ENTER Stratum A soil total porosity, n^A (unitless)	ENTER Stratum A soil water-filled porosity, θ_w^A (cm^3/cm^3)	ENTER Stratum B SCS soil type	ENTER Stratum B soil dry bulk density, ρ_b^B (g/cm^3)	ENTER Stratum B soil total porosity, n^B (unitless)	ENTER Stratum B soil water-filled porosity, θ_w^B (cm^3/cm^3)	ENTER Stratum C SCS soil type	ENTER Stratum C soil dry bulk density, ρ_b^C (g/cm^3)	ENTER Stratum C soil total porosity, n^C (unitless)	ENTER Stratum C soil water-filled porosity, θ_w^C (cm^3/cm^3)
Lookup Soil				Lookup Soil				Lookup Soil			
S	1.66	0.375	0.054	S	1.66	0.375	0.054	S	1.66	0.375	0.054

MORE ↓

ENTER Enclosed space floor thickness, L_{crack} (cm)	ENTER Soil-bldg. pressure differential, ΔP ($g/cm\text{-}s^2$)	ENTER Enclosed space floor length, L_B (cm)	ENTER Enclosed space floor width, W_B (cm)	ENTER Enclosed space height, H_B (cm)	ENTER Floor-wall seam crack width, w (cm)	ENTER Indoor air exchange rate, ER (1/h)	ENTER Average vapor flow rate into bldg. OR Leave blank to calculate Q_{soil} (L/m)
10	40	1000	1000	244	0.1	0.25	

MORE ↓

ENTER Averaging time for carcinogens, AT_C (yrs)	ENTER Averaging time for noncarcinogens, AT_{NC} (yrs)	ENTER Exposure duration, ED (yrs)	ENTER Exposure frequency, EF (days/yr)	ENTER Target risk for carcinogens, TR (unitless)	ENTER Target hazard quotient for noncarcinogens, THQ (unitless)
70	25	25	250	1.0E-06	1
				Used to calculate risk-based groundwater concentration.	

END

INTERMEDIATE CALCULATIONS SHEET

Exposure duration, τ (sec)	Source-building separation, L_T (cm)	Stratum A soil air-filled porosity, θ_a^A (cm^3/cm^3)	Stratum B soil air-filled porosity, θ_a^B (cm^3/cm^3)	Stratum C soil air-filled porosity, θ_a^C (cm^3/cm^3)	Stratum A effective total fluid saturation, S_{te} (cm^3/cm^3)	Stratum A soil intrinsic permeability, k_i (cm^2)	Stratum A soil relative air permeability, k_{rg} (cm^2)	Stratum A soil effective vapor permeability, k_v (cm^2)	Thickness of capillary zone, L_{cz} (cm)	Total porosity in capillary zone, n_{cz} (cm^3/cm^3)	Air-filled porosity in capillary zone, $\theta_{a,cz}$ (cm^3/cm^3)	Water-filled porosity in capillary zone, $\theta_{w,cz}$ (cm^3/cm^3)	Floor-wall seam perimeter, X_{crack} (cm)
7.88E+08	412	0.321	0.321	0.321	0.003	1.01E-07	0.998	1.01E-07	17.05	0.375	0.122	0.253	4,000

Bldg. ventilation rate, $Q_{building}$ (cm^3/s)	Area of enclosed space below grade, A_B (cm^2)	Crack-to-total area ratio, η (unitless)	Crack depth below grade, Z_{crack} (cm)	Enthalpy of vaporization at ave. groundwater temperature, $\Delta H_{v,TS}$ (cal/mol)	Henry's law constant at ave. groundwater temperature, H_{TS} (atm-m^3/mol)	Henry's law constant at ave. groundwater temperature, H'_{TS} (unitless)	Vapor viscosity at ave. soil temperature, μ_{TS} (g/cm-s)	Stratum A effective diffusion coefficient, D^{eff}_A (cm^2/s)	Stratum B effective diffusion coefficient, D^{eff}_B (cm^2/s)	Stratum C effective diffusion coefficient, D^{eff}_C (cm^2/s)	Capillary zone effective diffusion coefficient, D^{eff}_{cz} (cm^2/s)	Total overall effective diffusion coefficient, D^{eff}_T (cm^2/s)	Diffusion path length, L_d (cm)
1.69E+04	1.06E+06	3.77E-04	15	10,268	4.34E-03	1.79E-01	1.79E-04	1.41E-02	0.00E+00	0.00E+00	5.61E-04	7.05E-03	412

Convection path length, L_p (cm)	Source vapor conc., C_{source} ($\mu g/m^3$)	Crack radius, r_{crack} (cm)	Average vapor flow rate into bldg., Q_{soil} (cm^3/s)	Crack effective diffusion coefficient, D^{crack} (cm^2/s)	Area of crack, A_{crack} (cm^2)	Exponent of equivalent foundation Peclet number, exp(Pe') (unitless)	Infinite source indoor attenuation coefficient, α (unitless)	Infinite source bldg. conc., $C_{building}$ ($\mu g/m^3$)	Unit risk factor, URF $(\mu g/m^3)^{-1}$	Reference conc., RfC (mg/m^3)
15	7.80E+04	0.10	9.95E+01	1.41E-02	4.00E+02	6.87E+76	9.05E-04	7.06E+01	NA	1.0E-01

END