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NAS PENSACOLA
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FINAL FOCUSED FEASIBILITY STUDY REPORT

SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

SOUTHNAVFACENGCOM
CONTRACT NO.: N62467-89-D0318
CTO-059

Prepared for:

Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina

Prepared by:

EnSafe Inc.
5724 Summer Trees Drive
Memphis, Tennessee 38134
(901) 372-7962
www.ensafe.com

October 22, 2004

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The Contractor, EnSafe Inc., hereby certifies that, to the best of its knowledge and belief, the technical data delivered herewith under Contract No. N62467-89-D-0318 are complete, accurate, and complies with all requirements of the contract.

Date: October 22, 2004
Signature: _____
Name: Allison Harris
Title: Task Order Manager

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Acronyms and Abbreviations

µg/kg	micrograms per kilogram
µg/L	microgram per liter
µg/dL	micrograms per deciliter
µg Pb/dL	micrograms of lead per deciliter of blood
ARARs	Applicable or Relevant and Appropriate Requirements
BDAT	best demonstrated achievable technology
BEHP	*bis*(1-Ethylhexyl)phthalate
bgs	below ground surface
BRA	Baseline Risk Assessment
btoc	below top of casing
CDC	Centers for Disease Control and Prevention
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CHIL	Consolidated Hazardous Item List
cis-1,2-DCE	cis-1,2-dichloroethene
cm/sec	centimeters per second
COC	contaminant of concern/chemical of concern
COPC	chemical of potential concern
CWA	Clean Water Act
1,1-DCA	1,1-dichloroethane
1,1-DCE	1,1-dichloroethene
DO	dissolved oxygen
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
Fe[II]	ferrous iron
Fe[III]	ferric iron
FFS	Focused Feasibility Study
FGGC	Florida Groundwater Guidance Concentration
FOTW	Federally Owned Treatment Works
FPDWS	Florida Primary Drinking Water Standards
ft/day	feet per day
GC	Groundwater Criteria
GCTL	Groundwater Cleanup Target Level
gpm	gallons per minute
HDEP	high-density polyethylene
HHRA	Human Health Risk Assessment
HRC	Hydrogen Release Compound

IAS	Initial Assessment Study
IEUBK	Integrated Exposure Uptake Biokinetic
ISCTL	Industrial Soil Cleanup Target Levels
IWTP	Industrial Wastewater Treatment Plant
kWhr	kilowatt hour
LS	lump sum
LUCA	Land-use Control Agreement
LURA	Land-use Restriction Agreement
MCL	maximum contaminant level
MCLG	Maximum Contaminant Level Goal
mg/kg	milligram per kilogram
mg/L	milligrams per liter
MNA	Monitored Natural Attenuation
msl	mean sea level
MSWQ	Marine Surface Water Quality [criteria]
mV	millivolts
MWR	Morale, Welfare, and Recreation
NADEP	Naval Aviation Depot
NADS	Natural Attenuation Default Source [concentrations]
NAPL	non-aqueous phase liquid
NAS	Naval Air Station
NCP	National Contingency Plan
ND	Not detected
NE	Did not exceed criteria
NEESA	Naval Energy and Environmental Support Activity
nM	nanoMolar
NS	Not sampled
O&M	operations and maintenance
ORP	oxygen-reduction potential
OSWER	Office of Solid Waste and Emergency Response
OU	operable unit
PAH	polycyclic aromatic hydrocarbon
PbB	lead blood level
PbS	lead sulfide
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PdB	lead blood levels
PPE	personal protective equipment
PRG	preliminary remedial goal
PVC	polyvinyl chloride
QA/QC	quality assurance/quality control

RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RC	reference concentration
RG	remedial goal
RGO	remedial goal option
RI	remedial investigation
ROD	record of decision
RSCTL	Residential Soil Cleanup Target Level
SARA	Superfund Amendments and Reauthorization Act
SCTL	Soil Cleanup Target Level
SEGS	Southeastern Geological Society
SVOC	semivolatile organic compound
SVE	Soil-vapor Extraction System
TBC	To be considered
TCE	trichloroethene
TOC	total organic hydrocarbon
TRPH	total recoverable petroleum hydrocarbon
TSS	total suspended solid
TTO	total toxic organic
UCL	upper confidence level
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VC	vinyl chloride
VOC	volatile organic compound
yd^3	cubic yard

EXECUTIVE SUMMARY

This Focused Feasibility Study (FFS) develops, evaluates, and compares remedial action alternatives for both soil and groundwater to mitigate hazards and threats to the environment at Site 38 (Operable Unit 11) at the Naval Air Station Pensacola. This FFS addresses both soil and groundwater for Building 71 and 604, which are the study areas. Remedial alternatives were developed for soil and groundwater, separately.

Soil alternatives:

- No Action
- Existing Surface Cap with Institutional Controls
- Excavation with Offsite Disposal
- Capping

Groundwater alternatives:

- No Action
- Monitored Natural Attenuation with Institutional Controls
- Enhanced Bioremediation
- Groundwater Extraction and Discharge to FOTW

Alternatives were screened based on implementability, effectiveness, and cost. They were then analyzed as required by the National Contingency Plan based on the following criteria:

- Long-term effectiveness
- Short-term effectiveness
- Reduction of toxicity, mobility, and volume
- Implementability
- Cost
- Compliance with applicable or relevant and appropriate requirements (ARARs)
- Overall protection of human health and the environment

- State acceptance
- Community acceptance

A comparative analysis of the alternatives was also performed using the above criteria. The evaluations presented in this document will be used to select the preferred remedial action(s) for the site, which will be presented in the Proposed Plan for OU 11.

1.0 INTRODUCTION

1.1 Purpose and Organization

This Focused Feasibility Study (FFS) will develop, evaluate, and compare remedial action alternatives that may be used to mitigate hazards and threats to human health and the environment resulting from soil and groundwater contamination at Site 38 (Operable Unit 11), which is composed of Building 604 and former Building 71 (Building 71) at Naval Air Station (NAS) Pensacola.

This study is being performed under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act (SARA) of 1986 based on findings reported in four EnSafe documents: *Final Remedial Investigation Report* (1998), *Remedial Investigation Report Addendum* (1999), *Remedial Investigation Report, Addendum 2 — Site 38* (2001), and the *Technical Memorandum — Evaluation of Soil Concentrations — Site 38* (August 2003).

This report is organized as outlined in the Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (Interim Final, October 1988). Because of the relatively small size of the site and limited number of contaminant exceedances, an abbreviated feasibility study was adopted as described below:

- **Section 1, Introduction:** Presents Site 38's history and background information, summarizes the nature and extent of contamination, and the results of previous investigations reported in the four documents previously cited.

- **Section 2, Basis for Feasibility Study Action:** Outlines areas requiring remedial analysis and the remedial action objectives. These were developed using characterization and assessments made in the remedial investigation (RI) and by considering applicable or relevant and appropriate requirements (ARARs), which are presented in Appendix A. This section also presents the development of site remedial goals and volumes, and/or areas that require remediation.

- **Section 3, Identification and Screening of Technologies:** Presents response actions, and identifies and screens remedial technologies that may be used to achieve remedial action objectives.

- **Section 4, Development and Screening of Alternatives:** Presents representative technologies that meet the screening criteria (i.e., implementability, effectiveness, and cost) and combines them into remedial alternatives for the site.

- **Section 5, Detailed Analysis of Alternatives:** Evaluates the individual alternatives according to the nine evaluation criteria identified in OSWER Directive 9355.3-01.

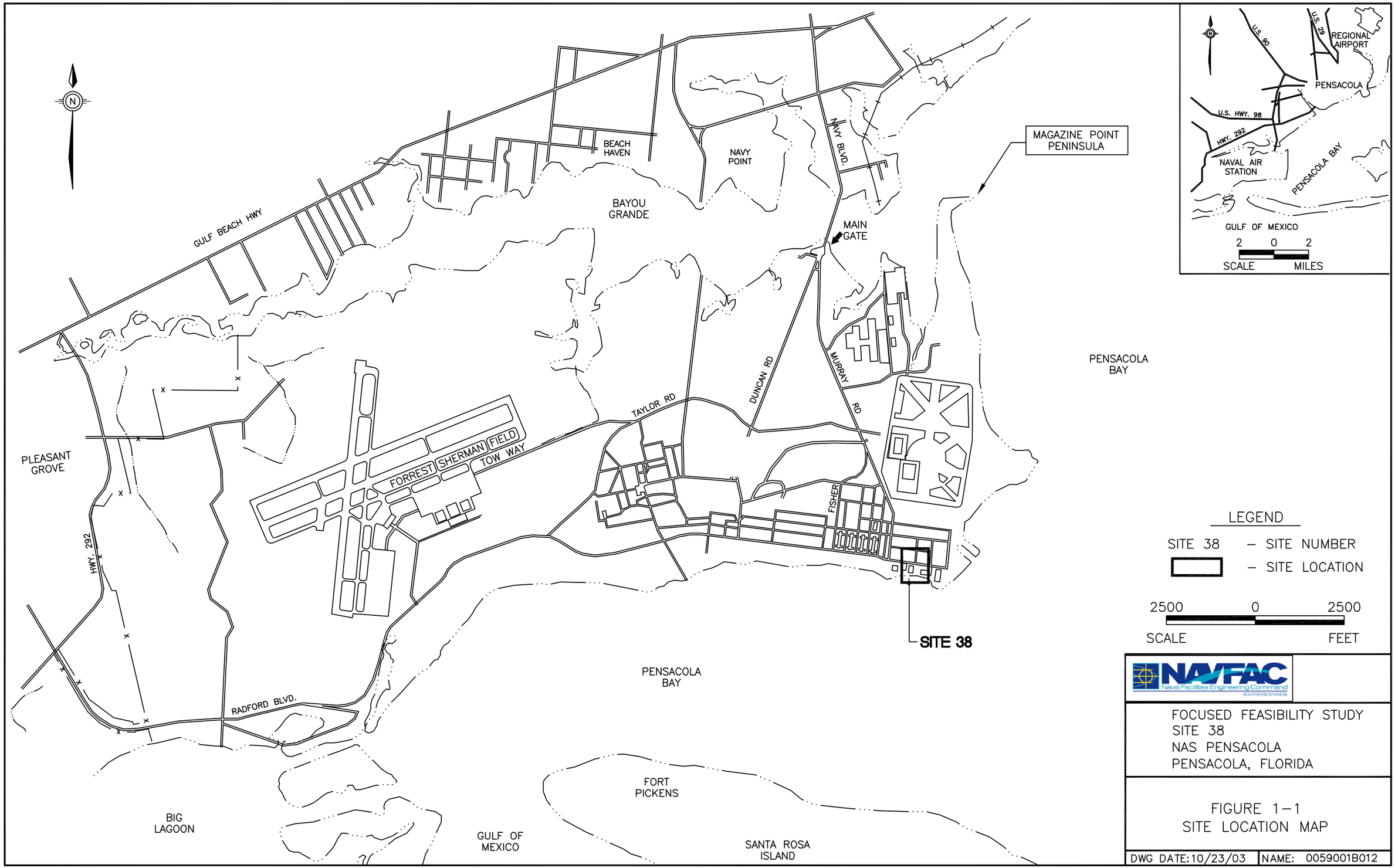
- **Section 6, Comparative Analysis of Alternatives:** Compares performance of alternatives, presenting strengths and weaknesses to prioritize the alternatives according to the nine evaluation criteria.

1.2 Background Information

The following section describes the site and its history, and summarizes the findings for Site 38. For more detail, refer to the RI report.

1.2.1 Site Description

Site 38, which is in the southeast portion of NAS Pensacola (Figure 1-1), includes the Building 71 and its surrounding areas and Building 604 and its surrounding areas, along with the associated Industrial Wastewater Treatment Plant (IWTP) sewer line. The site was divided into two study areas: the Building 71 area and Building 604 area (Figure 1-2). The general area surrounding the site is currently used for storage, maintenance, and operations support for morale, welfare, and recreation (MWR). Asphalt or concrete covers most of the area with exposed soil only along the roads or in parking lot medians. The southern part of the site is adjacent to the Pensacola Bay. Port operations and the main ship docks are to the east.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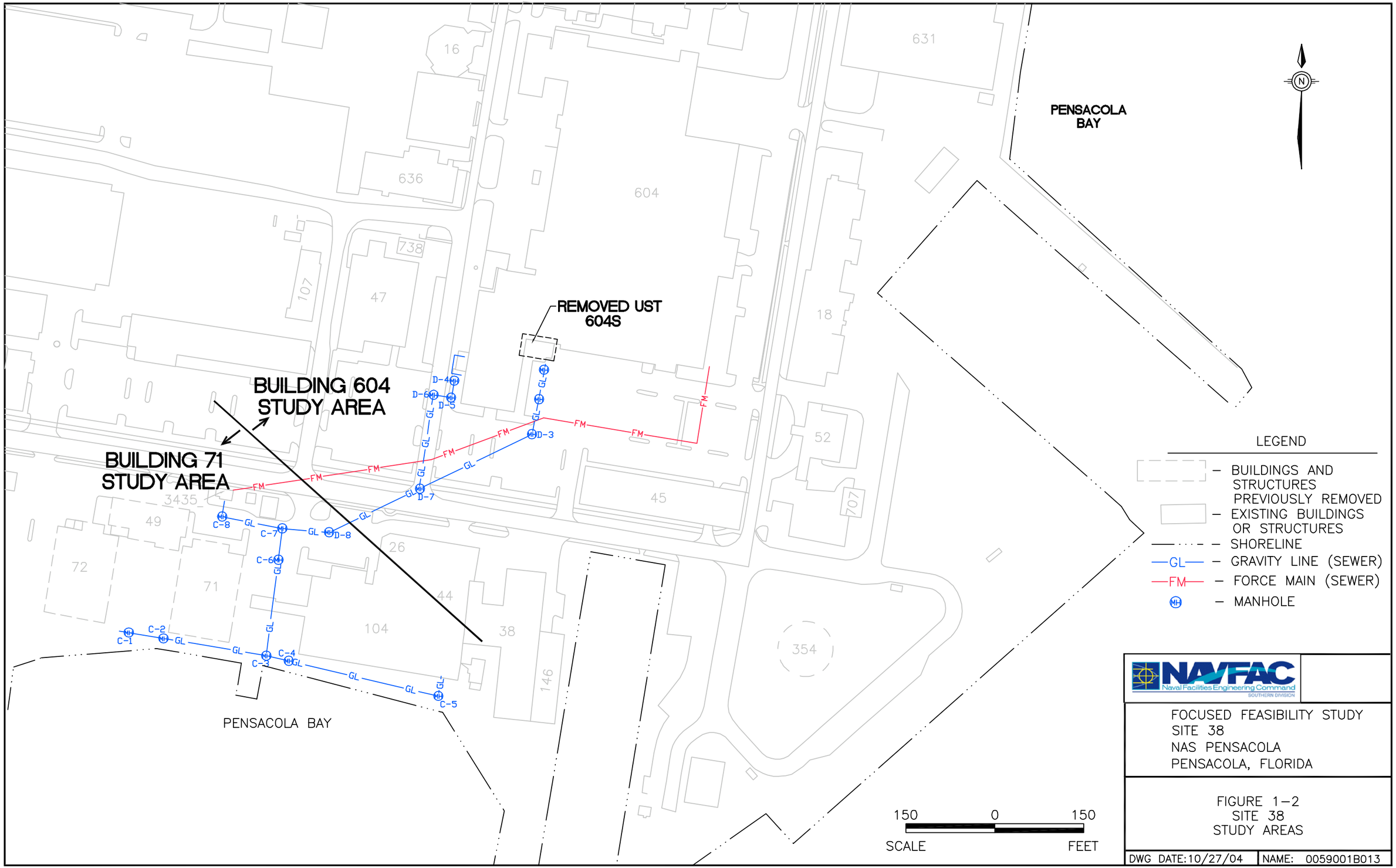
GULF BEACH HWY
BEACH HAVEN
NAVY POINT
NAVY BLVD.
BAYOU GRANDE
MAGAZINE POINT PENINSULA
MAIN GATE
PENSACOLA BAY
MURRAY RD
DUNCAN RD
TAYLOR RD
FORREST
SHERMAN
FIELD
TOW WAY
FISHER
PLEASANT GROVE
HWY. 292
RADFORD BLVD.
SITE 38
PENSACOLA BAY
FORT PICKENS
BIG LAGOON
GULF OF MEXICO
SANTA ROSA ISLAND
U.S. 90
U.S. 29
REGIONAL AIRPORT
PENSACOLA
U.S. HWY. 98
HWY. 292
NAVAL AIR STATION
PENSACOLA BAY
GULF OF MEXICO
2 0 2
SCALE MILES
LEGEND
SITE 38 – SITE NUMBER
– SITE LOCATION
2500 0 2500
SCALE FEET
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
FOCUSED FEASIBILITY STUDY
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 1–1
SITE LOCATION MAP
DWG DATE:10/23/03
NAME: 0059001B012


PENSACOLA BAY
REMOVED UST 604S
BUILDING 604 STUDY AREA
BUILDING 71 STUDY AREA
PENSACOLA BAY
16
631
636
604
738
107
47
18
52
45
707
3435
49
72
71
26
44
104
38
146
354
D-4
D-6
D-5
D-3
D-7
D-8
C-8
C-7
C-6
C-1
C-2
C-3
C-4
C-5
GL
FM
LEGEND
– BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
– EXISTING BUILDINGS OR STRUCTURES
– SHORELINE
GL – GRAVITY LINE (SEWER)
FM – FORCE MAIN (SEWER)
MH – MANHOLE
150 0 150
SCALE FEET
NAVFAC Naval Facilities Engineering Command SOUTHERN DIVISION
FOCUSED FEASIBILITY STUDY
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 1–2
SITE 38
STUDY AREAS
DWG DATE:10/27/04
NAME: 0059001B013

1.2.2 Site History

Building 71

Building 71 was a steel-framed structure with metal siding on a 10- to 14-inch-thick concrete slab. It 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. Wastes from various operations, including paint stripping, were discharged to Pensacola Bay until the IWTP was built in 1973. Wastes previously entered the IWTP sewer line without any pretreatment or segregation. Currently, the vacant lot is being used by the MWR for parking large trucks.

Structures surrounding Building 71 include Buildings 104, 26, and 44 immediately to the east and the former Buildings 72 and 49 to the west. Building 72, demolished in March and April 1993, was also used for paint stripping and painting operations. Building 49, used for painting operations, was also demolished in 1993. A storage yard, approximately 90 feet wide by 145 feet long, was between Buildings 71 and 72; Building 49 was at the north end of the storage yard. Building 104 was a Navy Exchange warehouse operated by the Navy Commissary. The facility was originally used for painting operations and was later converted to a sheet metal shop in the 1960s. Building 26 was constructed in 1882 as a blacksmith shop and functioned as a foundry for Naval Aviation Depot (NADEP). No foundry operations are currently being conducted there.

Building 604

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 building is not listed in the National Register of Historic Places; however, it was identified as possibly being eligible for listing. Plating operations were conducted in Buildings 29/604a, the western portion of Building 604, from approximately 1960 until the shop was demolished around 1970 (Naval Energy and Environmental Support Activity [NEESA], 1983). The rubber shop, which made plastic items for aircraft, was also housed in Building 29 until 1961. This shop reportedly only used small amounts of solvents.

Three cadmium plating lines and a magnesium treatment line were 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 a 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. Prior to 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 because plating wastes could upset the operation at the sewage treatment plant.

In approximately 1970, a much larger plating shop, the southwest portion of Building 604, was constructed at the site of Building 29/604a. Hazardous materials have been stored on the second floor of Building 604 since the early 1970s. Chemicals designated for separate storage on the Consolidated Hazardous Item List (CHIL) were consolidated into one segregated storage area. Reportedly, the storage area was reorganized and cleaned up in 1981. Before that time, spills and leaks frequently occurred (NEESA, 1983).

Approximately 30 plating process tanks were present in the Building 604 shop ranging in size from 40 gallons to 2,000 gallons. These tanks were drained about once a month. From 1970 to 1973, waste from the tanks were discharged through sewer lines that emptied into Pensacola Bay. After 1973, most drain lines were connected to the IWTP until 1979, and untreated liquid waste may have been unintentionally discharged to Pensacola Bay. According to an interview with Frank Stewart, Environmental Engineer for NADEP, work on the storm sewer lines from Building 604 around 1985 found that the line leading to Outfall 1 at Site 2 had not been sufficiently plugged or diverted and that liquid waste from the facility may have been unintentionally discharged up until this time.

1.2.3 Chronology of Events and Previous Investigations

The following chronology of events and previous investigations at Site 38 provides a basis for understanding the history and focus of the RI/FFS.

Initial Assessment Study (IAS): An IAS completed by NEESA in 1983 evaluated Site 38 based on information from historical records, field inspections, and interviews with NAS Pensacola personnel. According to the IAS, an estimated 400 gallons per day (gpd) of acrylic and epoxy paint stripper and another 400 gpd of ketone were used at Building 71 and nearby buildings during stripping operations. NEESA reported that plating operations were conducted along the western side of Building 604 from approximately 1960 to around 1970 when the building was demolished. Fifty-gallon tanks containing chromium solutions were drained once a month; larger tanks were present but drained less frequently. These tanks emptied into the Pensacola Bay. As a result, further study was recommended for Site 38.

ABB Investigation — UST 604S: ABB Environmental Services investigated an underground storage tank (UST) next to Building 604. Twelve soil borings were advanced and completed as monitoring wells. Groundwater detections included cadmium, lead, total recoverable petroleum hydrocarbons (TRPH), naphthalene, and volatile organic compounds (VOCs), including vinyl chloride, trichloroethene (TCE), and tetrachloroethene (PCE).

Remedial Investigation (RI): EnSafe conducted an investigation for the areas surrounding the Building 71, Building 604, and the IWTP sewer line. Soil and groundwater samples were collected to evaluate site conditions, determine nature and extent of contamination, and assess any potential human health and/or ecological risks. As a result of the investigation, Site 38 was divided into the two primary study areas: Building 71 and Building 604 study areas.

Contaminants detected above preliminary remedial goals (PRGs) in surface soil included heavy metals, semivolatiles, pesticides, and polychlorinated biphenyls (PCBs). Subsurface soil contaminants exceeding the leachability-based preliminary remedial goals included heavy metals, semivolatiles, pesticides, PCBs, and VOCs. The primary areas of soil contamination appeared to be centered beneath Building 71, surrounding area of Building 604, and a few isolated areas along the IWTP line.

Groundwater contaminants detected above PRGs included inorganics, semivolatiles, and VOCs in both study areas. PRG exceedances in the shallow groundwater were consistent with the soil exceedances at Building 71. Only one inorganic contaminant exceeded a PRG in the intermediate groundwater at Building 71. Inorganics, semivolatiles, and VOCs were detected above PRGs in shallow groundwater at Building 604. Aluminum and vinyl chloride were detected above PRGs in intermediate groundwater at Building 604.

Human health risk was evaluated using the hypothetical exposure pathways for the site resident, trespasser, and site worker. The primary contributor to soil risk was determined to be arsenic along with secondary contributors upon the same sample location. Chemicals of concern were identified for site workers and residents. The cumulative Building 604 trespasser risk estimate exceeded Florida Department of Environmental Protection's (FDEP's) threshold of $1x10^{-6}$, while the cumulative risk estimate for the trespasser at Building 71 was below FDEP's threshold. Soil hazard estimates for Building 71 were below the threshold of 1.0. However, the hazard estimate for Building 604 exceeds the threshold of 1.0 due to copper.

Remedial Investigation — Addendum: Select monitoring wells were resampled to assess previously identified lead contamination in groundwater. Temporary groundwater monitoring wells were installed adjacent to Building 72. Samples were collected and submitted for lead analysis. A fuel odor was noticed from one of the temporary monitoring wells. Therefore, samples collected from this well were analyzed for a full scan analysis.

With sampling, water levels were measured at select wells to asses the influence of rain and tidal changes in the shallow groundwater flow regime. Geochemical sampling was also performed to assess the potential of natural attenuation at the site.

Based on the findings from sampling, Building 72 area separated into its own site and investigated separately.

Remedial Investigation — Addendum 2: A second addendum was conducted to summarize results from the 2000 sampling event and evaluate the applicability of monitored natural attenuation (MNA) at the site. Geochemical analysis and interpretation of groundwater results at Site 38 showed that conditions at both Building 71 and Building 604 were highly conducive to natural biological degradation of chlorinated solvents. Lead and cadmium concentrations at the site were found to be decreasing at the site as well.

1.3 Environmental Setting

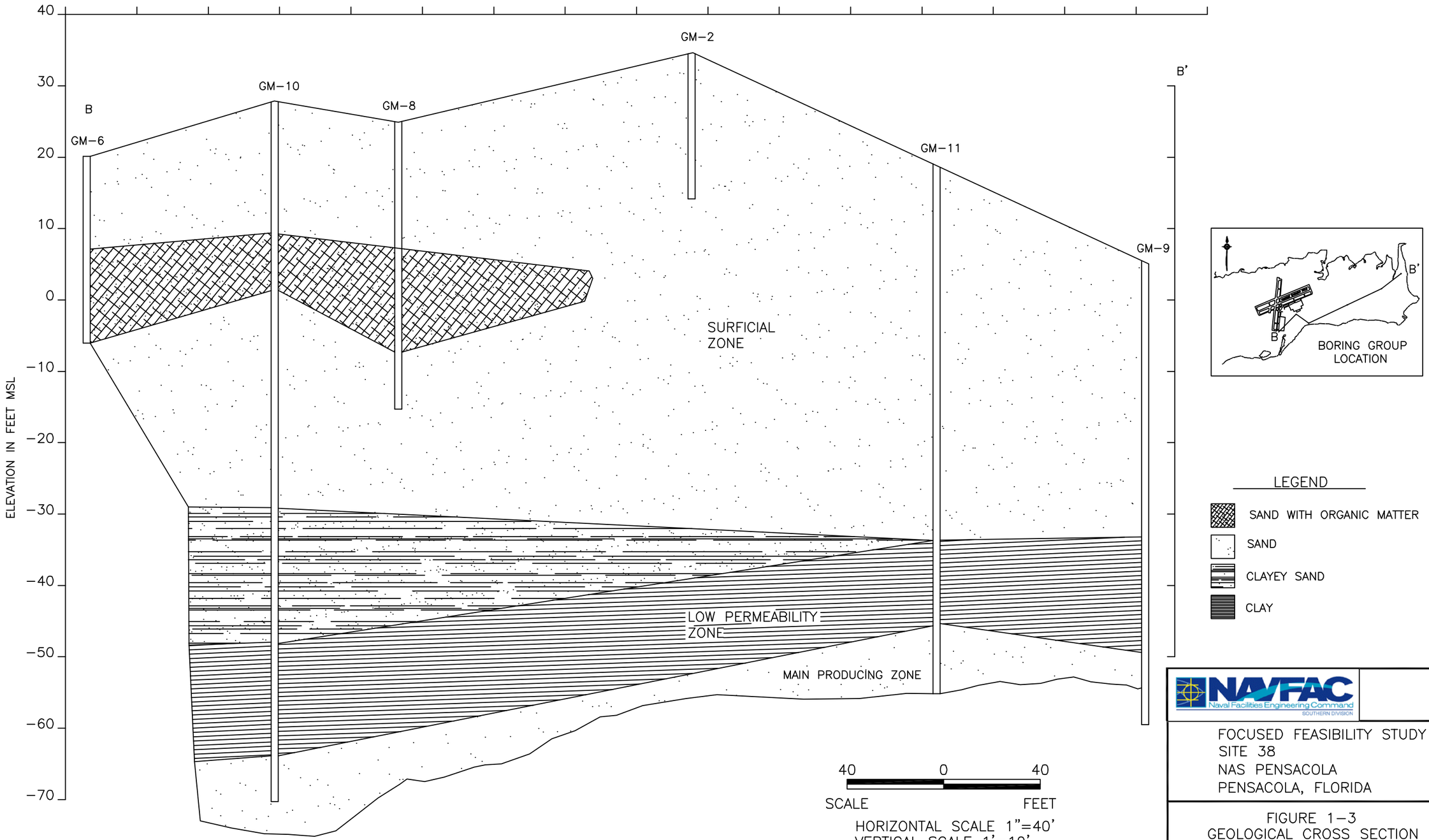
1.3.1 NAS Pensacola Stratigraphy

Stratigraphy beneath the Florida Panhandle generally consists of Quaternary marine terrace and fluvial deposits underlain by a thick sequence of interlayered fine-grained clastic deposits and carbonate strata of Tertiary age (Southeastern Geological Survey, 1986). Three main hydrogeologic units have been described within this stratigraphic column (in descending order): the surficial/sand-and-gravel aquifer, the intermediate system, and the Floridian aquifer system. Near NAS Pensacola, the surficial/sand-and-gravel aquifer unit has been subdivided into three distinct zones based on hydrogeologic differences (in descending order): the surficial zone, the low permeability zone (i.e., the intermediate zone), and the main producing zone (Wilkins et al., 1985). This investigation focuses on the upper (shallow depth) and basal (intermediate depth) portions of the surficial zone. Figure 1-3, a generalized cross section of the Sand-and-Gravel Aquifer produced by Geraghty and Miller (1984) shows the stratigraphic relationship of these zones.

For further discussion on stratigraphy and geologic conditions for NAS Pensacola, refer to the RI Report.

1.3.2 Surficial Zone Stratigraphy

The surficial zone stratigraphy observed at Site 38 is consistent with previous findings at NAS Pensacola. The typical shallow profile is shown in two cross sections, A-A′ (Figure 1-4), which trends north-south across the Building 71 area and B-B′ (Figure 1-5), which trends east-west along the force-main IWTP sewer line. The surficial zone is contiguous with land surface and contains



SOURCE: GERAGHTY & MILLER, 1986

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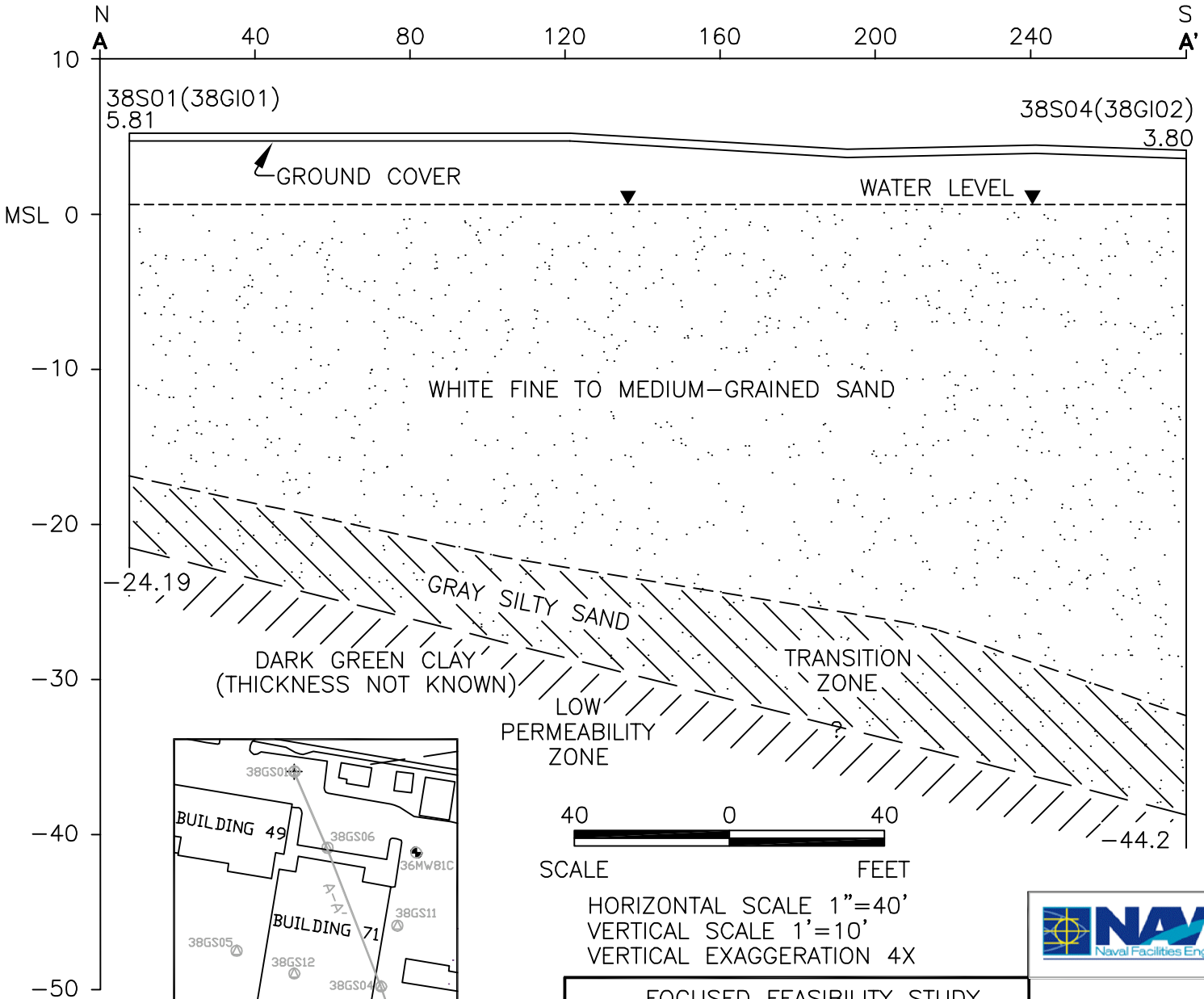
PENSACOLA, FLORIDA

FIGURE 1−3
GEOLOGICAL CROSS SECTION
OF THE SURFICIAL AQUIFER
AT NAS PENSACOLA

DATE: 10/26/04 | NAME: 0059001B008



LEGEND

- SAND
- SILTY SAND
- CLAY

FOCUSED FEASIBILITY STUDY
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

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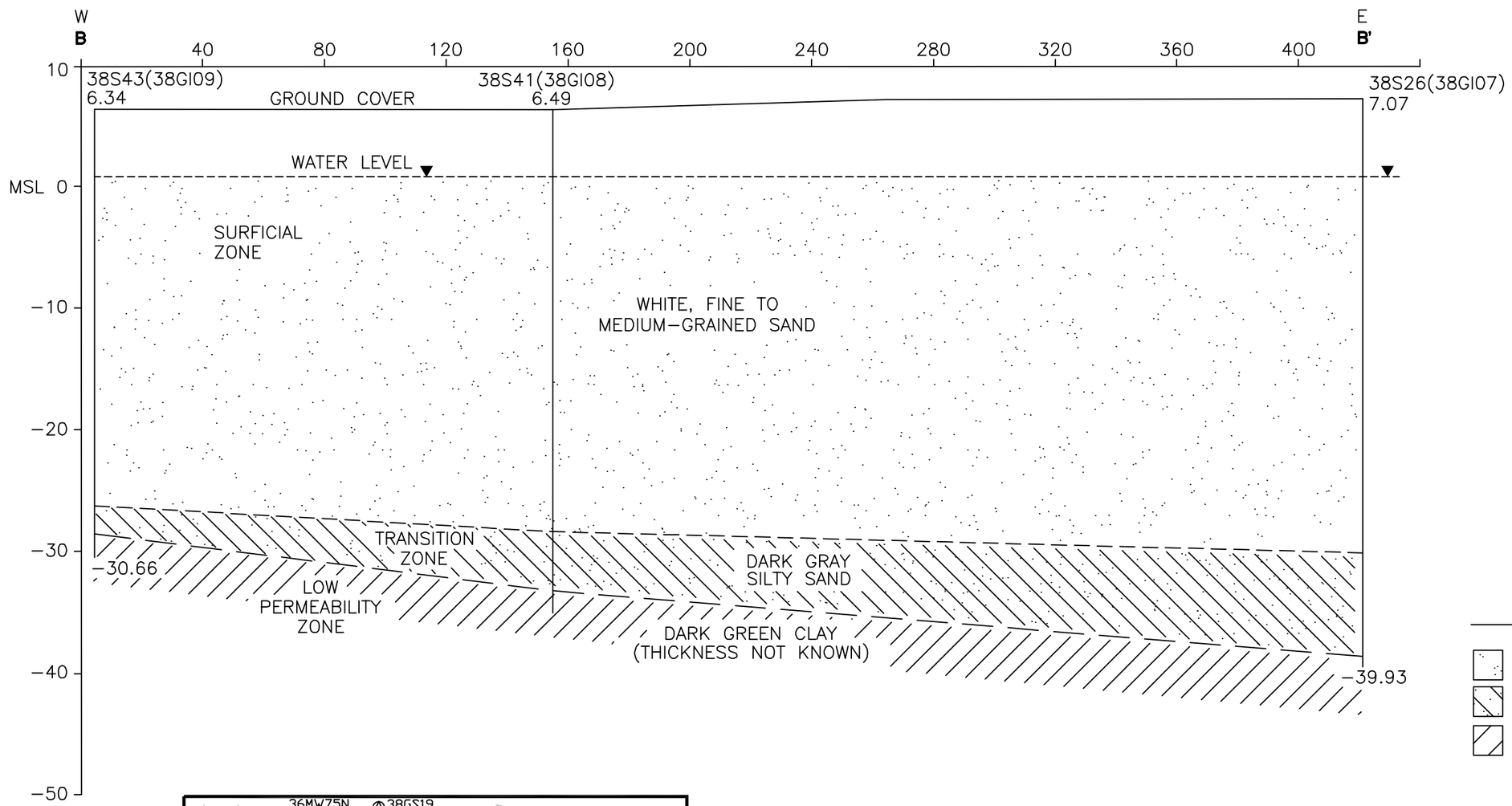
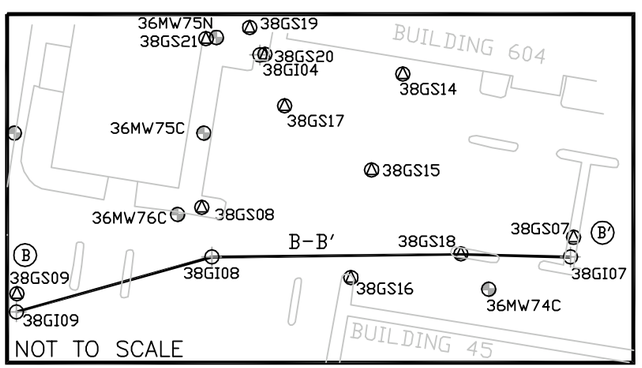
FIGURE 1−4
GEOLOGIC CROSS−SECTION A−A'
BUILDING 71

DWG DATE: 09/14/04 | NAME: 0059001B009



LEGEND

- SAND
- SILTY SAND
- CLAY



40 0 40

SCALE FEET

HORIZONTAL SCALE 1"=40'
VERTICAL SCALE 1'=10'
VERTICAL EXAGGERATION 4X

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SITE 38
NAS PENSACOLA
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FIGURE 1−5
GEOLOGIC CROSS−SECTION B−B'
BUILDING 604 AREA

DWG DATE:10/25/04 | NAME: 0059001B042

groundwater under perched conditions. The surficial zone thickness varies from 30 to 45 feet and consists of fine- to medium-grained, grayish-white quartz sand with localized, thin layers of silty clay. A 2- to 12-foot-thick "transition zone" is at the base of the surficial zone grading from a poorly sorted sand to silts and clays. Below the surficial zone, a dense greenish-gray clay layer ranges from 12 to 17 feet thick in the NAS Pensacola area.

1.3.3 Surface Water Movement and Site Drainage

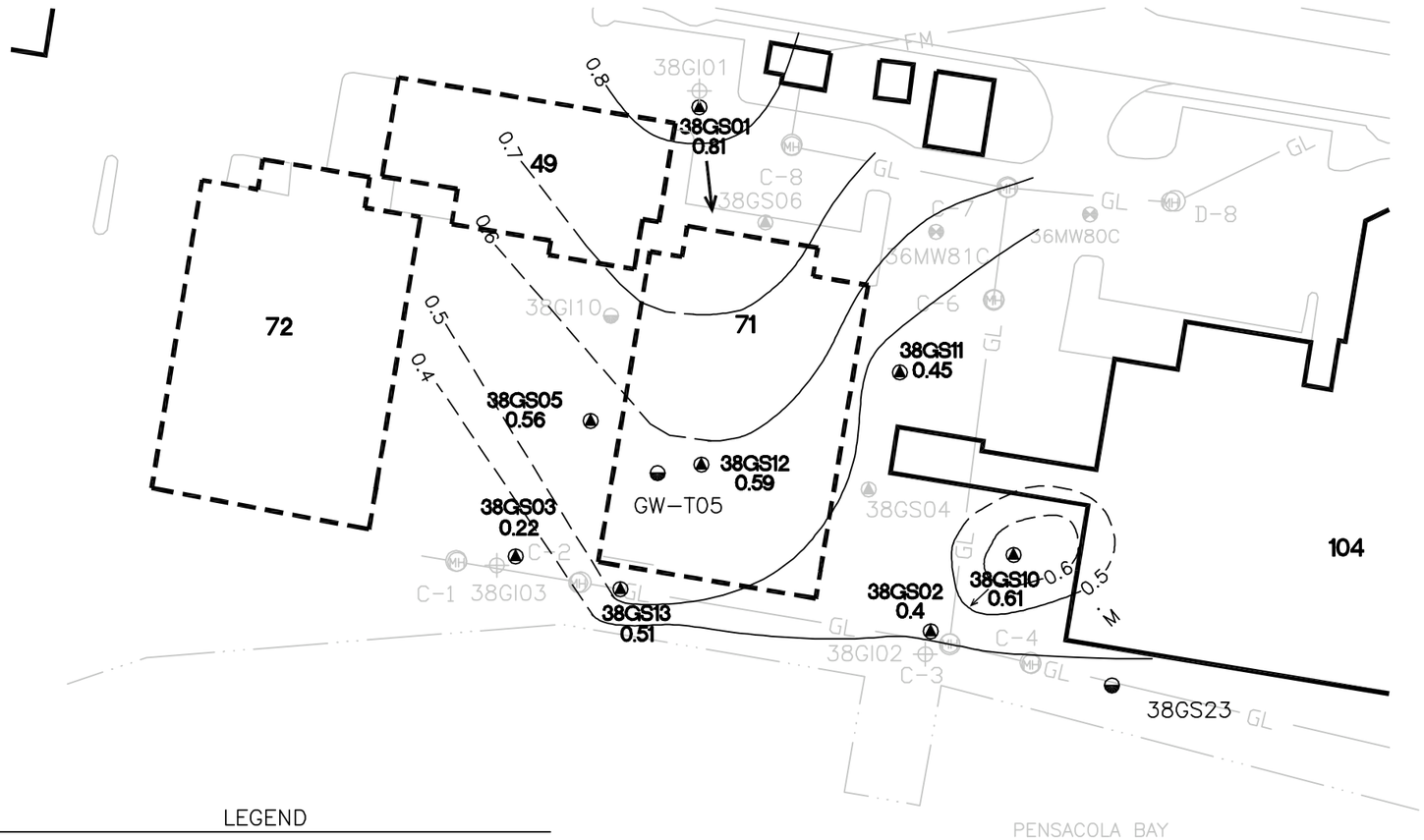
Site 38 lies within a developed area of the base. The site, in particular the Building 71 area, borders the Pensacola Bay. The entire site area is generally flat with land surface elevations approximately 3 to 8 feet above mean sea level (msl). The extensive pavement at Site 38 inhibits percolation of direct rainfall through site soil. Rainwater from Site 38 tends to flow over paved and unpaved surfaces into the existing storm water sewer system.

1.3.4 Site-Specific Hydrogeology

Forty groundwater monitoring wells were set within Site 38 to delineate plumes and groundwater flow direction within the surficial zone. Thirty-two of the 40 wells were screened in the shallow groundwater aquifer of the surficial zone with the deepest screened interval from 6.2 to 16.2 feet below ground surface (bgs). The remaining monitoring wells are screened along the bottom of the surficial zone in the transition zone with the deepest screened interval from 34 to 44 feet bgs. For more extensive discussions of the hydrogeology, refer to the RI report.

Water Level Elevations and Groundwater Flow

Water level data for four separate groundwater level sampling events and well construction information for Site 38 are listed in Table 1-1. Figures 1-6 and 1-7 present the latest potentiometric surface for Buildings 71 and 604 (September 2000). As discussed in the RI report, shallow groundwater flows south-southeast and intermediate-depth groundwater flows south. Horizontal gradients measured in the RI were similar at the shallow and intermediate depths, ranging from 0.0006 to 0.0027. The maximum and minimum estimated vertical gradients were -0.0119 to 0.0008, respectively.



LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
- E/A&H SITE 38 INTERMEDIATE MONITORING WELL
- E/A&H SITE 38 SHALLOW MONITORING WELL
- EPA WELL
- GL – GRAVITY LINE (SEWER)
- FM – FORCE MAIN (SEWER)
- MH – MANHOLE
- 0.6 – GROUNDWATER CONTOUR LINE AND INTERVAL
- GROUNDWATER FLOW DIRECTION

NOTE:
SCREENED BACK WELLS WERE NOT SAMPLED.

70 0 70
SCALE FEET

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SITE 38
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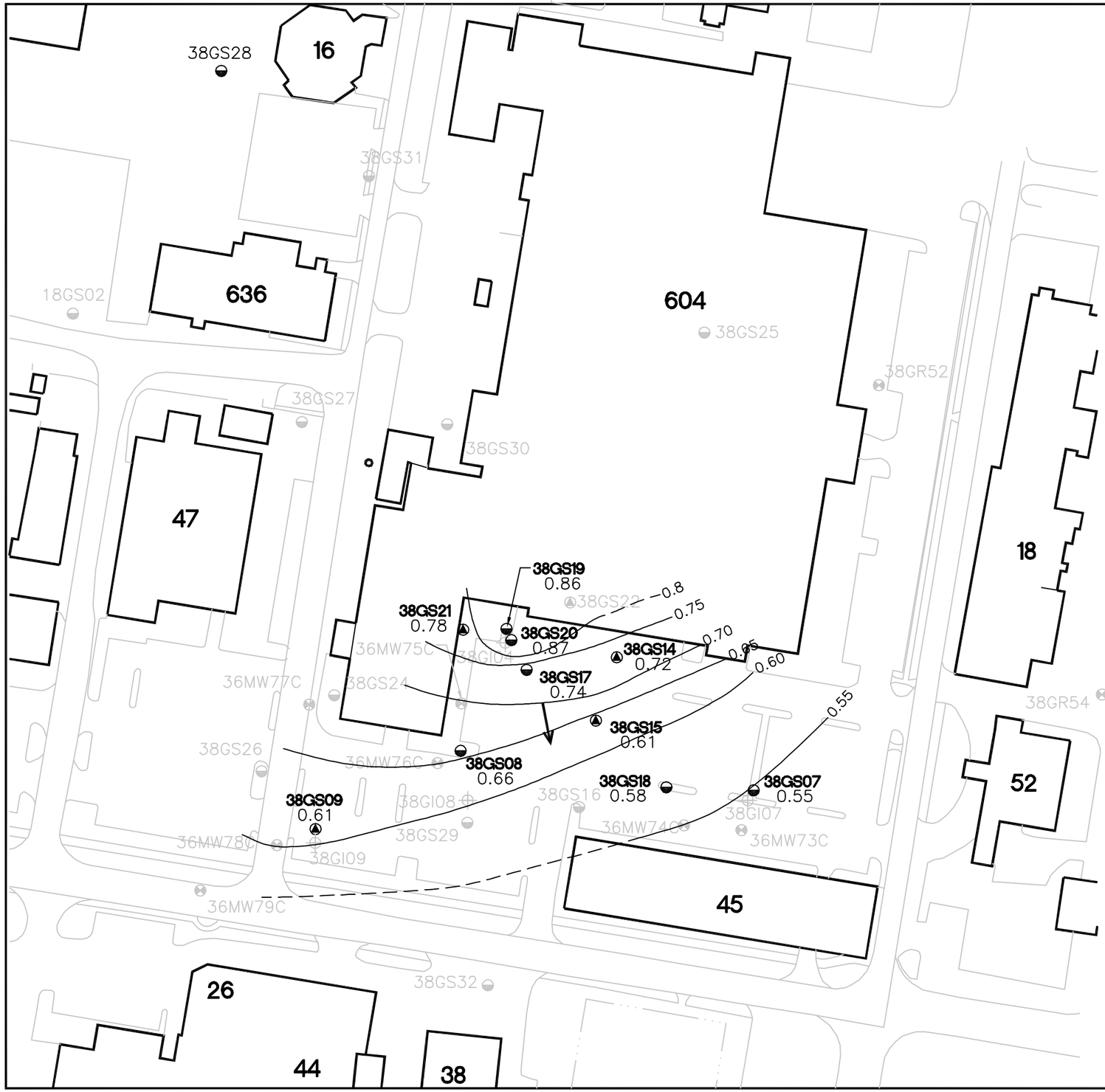
PENSACOLA, FLORIDA

FIGURE 1-6
BUILDING 71
SHALLOW POTENTIOMETRIC MAP
DECEMBER 7-13, 2000

DWG DATE: 10/25/04 | NAME: 0059001B023



LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
- SITE 38 INTERMEDIATE MONITORING WELL
- SITE 38 SHALLOW MONITORING WELL
- EPA PERMANENT WELL
- 0.6 — GROUNDWATER CONTOUR LINE AND INTERVAL
- GROUNDWATER FLOW DIRECTION

NOTE:
SCREENED WELLS WERE NOT SAMPLED.

100 0 100
SCALE FEET

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FOCUSED FEASIBILITY STUDY
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 1-7
BUILDING 604
SHALLOW POTENTIOMETRIC MAP
DECEMBER 2000

DWG DATE: 10/26/04 | NAME: 0059001B037

Table 1-1
Site 38 — Buildings 71 and 604
Monitoring Well Construction Information and Water Level Elevations [a]

Location	Total Well Depth (ft) (btoc)	Screened Interval (ft) (btoc)	Top of Casing Elevation [a]	Depth to Water (ft) (btoc)					Groundwater Level Elevation [a]				
				1993/ 1994	1995/ 1996	1998/1999[b]		2000	1993/ 1994	1995/ 1996	1998/1999[b]		2000
						High	Low				High	Low	
Building 71													
38GS01	13	3-13	5.74	4.74	5.16	4.87	4.86	4.93	1.00	0.54	0.87	0.88	0.81
38GS02	13	3-13	4.18	3.49	4.24	3.45	3.70	3.78	0.69	-0.04	0.73	0.48	0.4
38GS03	13	3-13	3.88	3.22	3.97	3.18	3.52	3.66	0.66	0.15	0.70	0.36	0.22
38GS04	13.5	3.5-13.5	4.56	3.83	4.44	3.88	3.91	NS	0.72	0.12	0.68	0.68	NS
38GS05	13.2	3.2-13.2	4.38	3.58	4.19	3.77	3.72	3.82	0.72	0.18	0.61	0.66	0.56
38GS06	13	3-13	5.63	4.78	5.27	4.92	4.97	NS	0.82	0.36	0.71	0.66	NS
38GS10	13	3-13	4.69	3.87	4.54	3.89	4.03	4.08	0.82	0.15	0.80	0.66	0.61
38GS11	13	3-13	4.3	3.63	4.2	NS	NS	3.85	0.67	0.18	NS	NS	0.45
38GS12	13	3-13	4.6	3.83	4.44	NS	NS	4.01	0.77	0.15	NS	NS	0.59
38GS13	13	3-13	4.04	3.33	4.09	3.27	3.62	3.53	0.71	-0.05	0.77	0.42	0.51
38GS23	21	11-21	4.64	NS	4.9	NS	NS	NS	NS	-0.26	NS	NS	NS
38GI01	27	17-27	5.81	4.84	NS	5.08	4.88	NS	0.97	NS	0.73	0.93	NS
38GI02	43	33-43	3.8	2.93	NS	NS	NS	NS	0.87	NS	NS	NS	NS
38GI03	42	32-42	4.09	3.03	NS	2.67	3.59	NS	1.00	NS	1.36	0.44	NS
38GI10	40.55	30.55-40.55	4.27	NS	3.94	NS	NS	NS	NS	0.33	NS	NS	NS
Building 604													
38GS07	13.7	3.7-13.7	7.34	6.51	7.05	6.73	6.73	6.79	0.83	0.26	0.61	0.61	0.55
38GS08	12.6	2.6-12.6	7.29	6.44	6.89	NS	NS	6.63	0.85	0.4	NS	NS	0.66
38GS09	13	3-13	6.25	5.44	5.89	NS	NS	5.64	0.81	0.35	NS	NS	0.61
38GS14	13	3-13	8.43	7.49	7.95	NS	NS	7.71	0.94	0.69	NS	NS	0.72
38GS15	13	3-13	7.98	7.12	7.59	NS	NS	7.37	0.86	0.37	NS	NS	0.61
38GS16	13	3-13	6.71	NS	6.41	NS	NS	NS	NS	0.3	NS	NS	NS
38GS17	13	3-13	7.71	6.81	7.25	7.00	6.99	6.97	0.90	0.49	0.71	0.72	0.74
38GS18	13	3-13	7.18	6.33	6.85	NS	NS	6.60	0.85	0.29	NS	NS	0.58
38GS19	13	3-13	7.87	6.83	7.25	NS	NS	7.01	1.04	0.6	NS	NS	0.86
38GS20	13	3-13	6.81	5.78	6.21	NS	NS	5.94	1.03	0.57	NS	NS	0.87

Table 1-1
Site 38 — Buildings 71 and 604
Monitoring Well Construction Information and Water Level Elevations [a]

Location	Total Well Depth (ft) (btoc)	Screened Interval (ft) (btoc)	Top of Casing Elevation [a]	Depth to Water (ft) (btoc)					Groundwater Level Elevation [a]				
				1993/ 1994	1995/ 1996	1998/1999[b]		2000	1993/ 1994	1995/ 1996	1998/1999[b]		2000
						High	Low				High	Low	
38GS21	13	3-13	7.62	6.59	7	NS	NS	6.84	1.03	0.58	NS	NS	0.78
38GS22	10.2	0.2-10.2	8.44	NS	7.89	NS	NS	7.62	NS	0.55	NS	NS	NS
38GS24	14.5	4.5-14.5	6.84	NS	6.3	NS	NS	5.94	NS	0.54	NS	NS	NS
38GS25	14.35	4.35-14.35	8.51	NS	7.7	NS	NS	NS	NS	0.81	NS	NS	NS
38GS26	12.3	2.3-12.3	6.98	NS	6.48	NS	NS	NS	NS	0.5	NS	NS	NS
Building 604													
38GS27	16.2	6.2-16.2	6.97	NS	5.92	5.54	5.52	NS	NS	1.05	1.4	1.45	NS
38GS28	15.05	5.05-15.05	6.48	NS	4.94	NS	NS	4.67	NS	1.54	NS	NS	NS
38GS29	13.79	3.79-13.79	NS	NS	NS	NS	NS	5.49	NS	NS	NS	NS	NS
38GS30	15.05	5.05-15.05	5.65	NS	4.69	NS	NS	NS	NS	0.96	NS	NS	NS
38GS31	15.15	5.15-15.15	6.61	NS	5.3	NS	NS	NS	NS	1.31	NS	NS	NS
38GS32	13.1	3.1-13.1	6.61	NS	5.3	6.34	5.31	5.35	NS	1.31	0.27	1.3	NS
38GI04[c]	32	27-32	7.21	5.97	5.97	NS	NS	9.16	1.24	1.24	NS	NS	-1.95
38GI07[c]	44	34-44	7.07	6.28	NS	NS	NS	NS	0.79	NS	NS	NS	NS
38GI08[c]	37	27-37	6.49	5.66	5.66	NS	NS	5.89	0.83	0.83	NS	NS	0.63
38GI09[c]	32	22-32	6.34	5.51	NS	NS	NS	NS	0.83	NS	NS	NS	NS

Notes:

[a] = All elevations measured in feet above msl.
[b] = Water elevations were measured during high and low tides in 1998/1999 sampling event.
[c] = Monitoring wells are not completed at the base of the surficial aquifer and are not used to determine groundwater flow.
NS = Top of casing elevations were not supplied by USEPA, therefore, the groundwater elevation could not be calculated.
btoc = Below top of well casing
ft = feet

Using the data from tests, the geometric mean for hydraulic conductivity was calculated for both the shallow and intermediate zones. The geometric mean is considered the most representative value of the central tendency of these data, because hydrologic conductivity data are generally log-normally distributed. The range of hydraulic conductivity for shallow wells is 0.03 to 0.12 centimeters per second (cm/sec) with the geometric mean of 0.085 cm/sec. The range of hydraulic conductivity for intermediate wells is 0.006 to 0.04 cm/sec with the geometric mean of 0.02 cm/sec.

Surficial Aquifer Characteristics

During the RI, specific capacity pumping tests were performed on select monitoring wells to evaluate aquifer characteristics. Specific capacity, transmissivity, and hydraulic conductivity were estimated using Bradbury and Rothschild's computer program, *A Computerized Technique for Estimation the Hydraulic Conductivity of Aquifers from Specific Capacity Data* (1985). Results are provided in Table 1-2.

Table 1-2
Specific Capacity Test Results

Well ID	Specific Capacity (gpm/ft)	Transmissivity (ft^2/day)	Hydraulic Conductivity (ft/day)
Shallow Monitoring Wells			
38GS01	3.93	3,370	84
38GS14	9.44	7,208	180
38GS13	17.78	13,614	340
38GS11	14.64	11,285	282
38GS08	11.53	8,844	221
38GS07	12.83	9,858	246
38GS03	18.19	13,288	332
Intermediate Monitoring Wells			
38GI09	5.44	3,001	75
38GI07	1.49	790	20
38GI03	1.18	624	16
38GI01	8.85	4,955	124

Notes:
gpm = Gallons per minute
ft = Feet

Groundwater Velocity Estimate

In the RI, groundwater velocities were estimated using Darcy's Law. Estimated velocity of shallow groundwater ranges from 1.38 to 3.18 ft/day. Estimated velocity of groundwater at the intermediate depth ranges from 0.10 to 0.61 ft/day. For more details on hydrogeology, refer to the RI report.

1.4 Nature and Extent of Contamination

1.4.1 Soil

Three soil sampling events were performed: IWTP, RI, and U.S. Environmental Protection Agency (USEPA) sampling events. Soil data collected during the RI identified constituents above applicable criteria identified as Residential Soil Cleanup Target Levels (RSCTLs), Industrial Soil Cleanup Target Levels (ISCTLs), and Leachability Criteria in surface and subsurface soil.

Building 71

Surface Soil: Inorganics, semivolatile organic compounds (SVOCs), pesticides, and PCBs exceeded applicable criteria for the Building 71 study area. Inorganic contamination beneath Building 71 diminished with distance from the building. Organic exceedances in Building 71 surface soil were very limited. Pesticide and PCB exceedances were limited to two locations.

Subsurface Soil: Inorganics, SVOCs, pesticides, and VOCs exceeded their criteria. Again, much of the contamination appeared to be beneath Building 71. Inorganic and pesticide exceedances were consistent with those in surface soil. SVOC and VOC exceedances were extensive in subsurface soil beneath Building 71. In general, the contaminants included heavy metals, chlorinated solvents, and petroleum solvents potentially related to past paint stripping and metal refinishing activities at Building 71. Soil in the Building 71 study area is completely covered with concrete or asphalt.

Building 604

Surface Soil: Inorganics, SVOCs, pesticides, and PCBs exceeded their criteria in surface soil. Many of the inorganic parameters, including aluminum, arsenic, and iron were fairly ubiquitous

across the site and may reflect, in part, local ambient concentrations. Heavy metals related to past plating activities exceeded applicable criteria in the surface soil surrounding the former plating facility at the southwest portion of Building 604. SVOC contaminant exceedances were primarily associated with the IWTP line, except for one location beneath the southern part of Building 604. Parts cleaning took place in the general vicinity of this sample. Pesticides and PCBs exceeded their criteria in samples from grassy areas onsite. Pesticide detections in these areas are likely the result of residuals remaining from routine spraying.

Subsurface Soil: Contaminants detected at Building 604 above applicable criteria included inorganics, SVOCs, pesticides, and VOCs. Heavy metals, including chromium and cadmium, were detected above reference concentrations (RCs) and applicable criteria near the former plating facility. SVOC exceedances included polyaromatic hydrocarbons (PAHs) at one location along the IWTP line. Dieldrin was the only pesticide detected. Its presence is likely a result of routine application of pesticides in the area. Two VOCs exceeded applicable criteria: TCE and PCE. In summary, the RI identified chemicals of potential concern (COPCs) and area that exceeded applicable criteria. The nature and extent of soil contamination are discussed further in Section 2.

1.4.2 Groundwater

The 2000 groundwater sampling data were compared with Groundwater Cleanup Target Levels (Groundwater Criteria [GC]), Surface Water Cleanup Target Levels (Marine Surface Water Quality Criteria [MSWQ]), RCs, and Natural Attenuation Default Source concentrations (NADS) to evaluate the nature and extent of contamination. The RCs used for inorganic compounds are briefly discussed in Section 1.5. The other criteria are taken from Chapter 62-777, F.A.C., which applies only to brownfield, UST, and dry cleaning sites. However, this rule incorporates all primary and secondary Florida groundwater standards as provided in Chapters 62-520 and 62-550 and all surface water standards as provided in Chapter 62-302; therefore, the rule was used as the source of criteria limits. Section 2 summarizes criteria exceedances.

1.5 Background Water Quality

Because inorganics occur naturally as well as from manmade sources, RCs were established for inorganics in groundwater at NAS Pensacola. Shallow and intermediate reference monitoring wells 01GS67, 01GI68, 01GS69, and 01GI70 were sampled in July 1994 using low-flow rate quiescent sampling techniques to determine the base-wide background groundwater quality for the shallow and intermediate zones. RCs were calculated for each inorganic parameter, equal to two times the parameter's mean concentration, to approximate the upper extent of ambient concentration ranges for analyzed inorganic parameters. These reference concentrations were presented in the approved Final Site 1 Remedial Investigation Report (EnSafe, 1996) and are listed in Appendix B.

Background concentrations for aluminum, antimony, iron, and thallium exceeded their associated groundwater cleanup target levels GCTLs, indicating that these metals naturally occur at relatively high concentrations at NAS Pensacola. These background concentrations are also consistent with Florida Geological Survey's regional reference data for Escambia County (EnSafe, 1996).

1.6 Baseline Risk Assessment

Baseline risk assessment was performed during the RI. Several COCs were identified as discussed in Section 1.2.3. The reader is referred to the RI for additional information. However, FDEP requires risk assessment to be performed using soil cleanup target levels (SCTLs) and 95% UCLs to assess exposure risk to soil and GCTLs to assess risk to groundwater.

1.6.1 Human Health Risk Assessment

Using the protocol described above, several inorganic and organic parameters were identified as contaminants of concern (COCs) in the human health component of the human health risk assessment for specific land-use scenarios.

Risk Summary

As discussed in Section 2, the extent of impacted media driving excess risk at Buildings 71 and 604 is limited. The magnitude of this contamination is also low relative to most ARARs. This human heath risk analysis should be qualified based on factors that affect the exposure potential of humans to impacted media at these sites. The surface soil exposure pathways at Building 71 and 604 have been effectively eliminated by the widespread asphalt pavement and concrete flooring. Additionally, neither area's surficial groundwater is used as a groundwater source due to its poor ambient quality. Further, because higher-quality water sources are available for the base, shallow groundwater is unlikely to be used in the future. These factors greatly reduce the actual exposure potential to soil and groundwater.

Development of Remedial Goal Options

The Baseline Risk Assessment (BRA) identified several COCs for Buildings 71 and 604, and for each COC a set of remedial goal options (RGOs) was developed. The RGOs are site-specific. Soil RGOs depend on whether the area will be residential or industrial. Soil and groundwater RGOs are discussed further in Section 2.

1.6.2 Ecological Risk Assessment

According to the RI report, natural terrestrial habitat features in and around Site 38 are absent. The only terrestrial receptors that appear to be present onsite are shorebirds that periodically frequent the area. Minimal soil contamination from the few exposed locations does not warrant further pathway-uptake analyses.

Marine/estuarine receptors are potentially at risk due to groundwater migration from Site 38 into Pensacola Bay. Section 2 compares groundwater detections for selected monitoring wells with MSWQ. The reader should note that the area of Pensacola Bay adjacent to Site 38 is being investigated under a separate operable unit, Site 2 waterfront sediments.

2.0 BASIS FOR FEASIBILITY STUDY ACTION

The overall objective of the CERCLA remedy selection process is to select remedies that protect human health and the environment, maintain protection over time, and reduce untreated waste. The RI was used to assess Site 38 conditions; based on RI findings, the risk assessment process evaluated risk and hazard. The RI data were used to gauge the magnitude of site risk and to identify possible areas requiring a feasibility study. ARARs and risk management techniques were then used to develop realistic remedial goals and determine what areas might require a response action.

2.1 Delineation of Areas for Feasibility Study

Three media were reviewed for Site 38 using applicable screening criteria. Areas exceeding screening criteria for soil and groundwater were considered for further evaluation in this FFS.

- Surface soil — 0 to 2 feet bgs
- Subsurface soil — 2 feet bgs and deeper
- Shallow and intermediate groundwater zones

2.1.1 Screening Criteria

The following media-specific screening criteria were used to identify areas potentially requiring feasibility study.

2.1.1.1 Soils

Individual soil concentrations were compared with background reference concentrations (inorganics only), residential and industrial soil cleanup target levels (SCTLs), and leachability criteria as contained in Florida Administrative Code (FAC) 62-777 to identify areas requiring consideration in the FFS. To determine the overall extent of site contamination, 95% Upper Confidence Limit (95% UCL) for soil concentrations were also evaluated and compared with SCTLs.

Also, benzo(a)pyrene equivalents (BEQs) were computed and compared to the benzo(a)pyrene SCTL in FAC 62-777.

2.1.1.2 Groundwater

Analytical data from the 2000 groundwater sampling event were compared with the following screening criteria to assess areas to be considered in the FFS: background reference concentrations (inorganics only) and GC. Analytical data from selected groundwater monitoring wells representative of groundwater discharge to Pensacola Bay were compared to MSWQ. In addition, groundwater concentrations were compared with NADS criteria in Section 4 to evaluate the appropriateness of natural attenuation.

The GC and MSWQ criteria were taken from Chapter 62-777, FAC. This rule incorporates the primary and secondary Florida groundwater standards (FPDWS and FSDWS) as provided in Chapters 62-520 and 62-550 and all surface water standards as provided in Chapter 62-302. For a summary of GC and MSWQ exceedances, refer to Section 2.3.

2.1.2 Soil Evaluation — Surface and Subsurface

To identify areas requiring a feasibility study, soil detections were evaluated by first comparing them with RSCTLs and ISCTLs. Inorganics were also compared with RCs.

Concentrations exceeding their SCTLs were evaluated further. Detected concentrations were also compared with 3X SCTL for both residential and industrial scenarios to determine whether the location is a "hot spot" that must be evaluated to address the risk of acute exposures from high concentrations.

For protection of groundwater, soil detections were also compared with Leachability Criteria for groundwater based on the cleanup levels in FAC 62-777. Constituents exceeding these criteria indicate a potential to contaminate groundwater.

Appendix C tables compare soil detections with RSCTLs, 3X RSCTLs, ISCTLs, 3X ISCTLs, and Leachability Criteria.

As part of the soil evaluation, subsequent exposure quantification and risk/hazard projects for carcinogenic PAHs in soil were evaluated using the total BEQ values for each sampling location. Carcinogenic PAHs include benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene. Reported concentrations for each carcinogenic PAH were multiplied by its corresponding toxicity adjustment factor (TAF). Due to the high number and values for not detected concentrations, two separate calculations were conducted; one using half the value not detected and the other using zero for the value not detected. After calculations, BEQ values were then summed for each sample, and the total was compared to the benzo(a)pyrene SCTL as included in FAC 62-777.

2.1.2.1 Determination of Site-Wide Soil Concentrations

Data sets for each COPC were evaluated to determine whether a 95% UCL could be calculated. The 95% UCL is used to determine the average contaminant concentration over an entire area or site, because an individual's risk of exposure to contamination is likely to be over the entire area. To calculate the 95% UCL, the data set must have at least 10 samples, and less than 30% of the samples should be not detected samples (Roberts and Halmes, 1999). The 95% UCLs were calculated using *Pro UCL Version 2.0* (Lockheed Martin, 2001). For every data set, estimated or "J" qualified data were considered as detections. The reported concentrations were used for estimated data and detected chemicals. If the chemical was not detected, one half the sample quantitation limit (SQL) was used for the data set to be conservative. Using *Pro UCL*, each data set was tested for normal and lognormal distribution. The 95% UCL was calculated based on the data set's distribution type. Then, the 95% UCL was compared to its respective SCTL. If the 95% UCL exceeded its respective SCTL, the constituent was identified as a COC.

If the 95% UCL could not be calculated, the COPCs were evaluated using the arithmetic mean, which were compared with their SCTLs. If the arithmetic mean exceeded its SCTL, the constituent was identified as a COC.

2.1.2.2 Comparison to SCTLs

Surface and subsurface soil detections from Buildings 71 and 604 areas were compared with SCTLs for residential and industrial scenarios. Constituents that exceeded residential SCTLs are listed as COPCs (Table 2-1).

Table 2-1
Chemicals of Potential Concern for Soil

Building 71	Building 604
Surface Soil	
Arsenic	Arsenic
Chromium	Copper
Copper	Iron
Vanadium	Lead
Aroclor-1254	Vanadium
Benzo(a)pyrene	Aroclor-1260
Dibenz(a,h)anthracene	Benzo(a)anthracene
—	Benzo(a)pyrene
—	Benzo(b)fluoranthene
—	Dieldrin
Subsurface Soil	
Arsenic	Arsenic
Chromium	Copper
Copper	Iron
Lead	Lead
Aroclor-1254	Vanadium
Benzo(a)pyrene	Benzo(a)anthracene
Benzo(b)fluoranthene	Benzo(a)pyrene
Dibenz(a,h)anthracene	Benzo(b)fluoranthene
—	Dibenz(a,h)anthracene
—	Indeno(1,2,3-cd)pyrene

2.1.2.3 Hot-Spot/Acute Toxicity Evaluation

For each COPC, the data set was compared with 3X SCTLs to determine whether the area was a "hot spot" — defined as an area with concentrations exceeding 3X SCTL. Detected and not detected concentrations were compared with 3X SCTLs using one half the detection limit for not detected concentrations, which were included in this comparison because one half the detection limit for some samples exceeded their 3X SCTLs. Hot spots were evaluated to address the risk of exposure due to acute exposures from high concentrations.

Eight constituents are excluded from the 3X SCTL criteria: barium, cadmium, copper, cyanide, fluoride, nickel, phenol, and vanadium. Their RSCTLs are based on acute toxicity to children; therefore, they cannot be exceeded at any point onsite where children might be exposed. Therefore, detections of these constituents are compared to the RSCTL to evaluate the acute exposure for a residential scenario. It is assumed that, under an industrial scenario, the ISCTL can be applied for these constituents using 3X ISCTL since children would not be an appropriate endpoint for an industrial setting.

Table 2-2 summarizes constituents' exceedances. Samples in blue indicate the constituent was not detected for that sample. As stated above, one-half the detection limit was used for screening those concentrations not detected.

Table 2-2
Soil Samples and Parameters Exceeding 3X SCTL or Acute Toxicity

Sample ID	Parameter	Exceeds 3X RSCTL or Acute Toxicity	Exceeds 3X ISCTL
Building 71 — Surface Soil			
036S080S02	Copper	X	—
038S000102	Vanadium	X	—
038S000301	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S000402	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S000501	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S000701	Arsenic	X	—
038S001301	Chromium	X	—
038S001401	Chromium	X	—
	Copper	X	—
038S001601	Vanadium	X	—
	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S001701	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S001801	Aroclor-1254	X	X
	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S001901	Dibenz(a,h)anthracene	X	—
038S001902	Benzo(a)pyrene	X	—
038S002201	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S002501	Benzo(a)pyrene	X	—

Table 2-2
Soil Samples and Parameters Exceeding 3X SCTL or Acute Toxicity

Sample ID	Parameter	Exceeds 3X RSCTL or Acute Toxicity	Exceeds 3X ISCTL
	Dibenz(a,h)anthracene	X	—
038S002702	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S003201	Arsenic	X	—
	Copper	X	—
	Benzo(a)pyrene	X	—
038S003301	Arsenic	X	—
	Vanadium	X	—
038S003401	Arsenic	X	—
	Vanadium	X	—
038S0I1001	Benzo(a)pyrene	X	X
	Dibenz(a,h)anthracene	X	X
038S0I1002	Benzo(a)pyrene	X	X
	Dibenz(a,h)anthracene	X	X
038S0S2301	Benzo(a)pyrene	X	X
	Dibenz(a,h)anthracene	X	X
038S0S2302	Benzo(a)pyrene	X	X
	Dibenz(a,h)anthracene	X	X
038S0T0501	Benzo(a)pyrene	X	X
	Dibenz(a,h)anthracene	X	X
038S0T0502	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	X
Building 71 — Subsurface Soil			
038S000106	Benzo(a)pyrene	X	—
038S000303	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
	Dibenz(a,h)anthracene	X	—
038S000305	Dibenz(a,h)anthracene	X	—
038S000503	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S000505	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S001203	Copper	X	—
	Benzo(a)pyrene	X	—
038S001204	Arsenic	X	X
038S001303	Arsenic	X	—
038S001304	Arsenic	X	—
038S001403	Copper	X	—
038S001603	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S001605	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S001703	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S001705	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—

Table 2-2
Soil Samples and Parameters Exceeding 3X SCTL or Acute Toxicity

Sample ID	Parameter	Exceeds 3X RSCTL or Acute Toxicity	Exceeds 3X ISCTL
038S001803	Aroclor-1254	X	X
	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S001805	Aroclor-1254	X	X
	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S002203	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S002403	Vanadium	X	—
	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S002503	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S002704	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S003203	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S003205	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S003403	Dibenz(a,h)anthracene	X	—
	Benzo(a)pyrene	X	—
Building 604 — Surface Soil			
036S074N02	Arsenic	X	—
	Copper	X	—
036S074W02	Arsenic	X	—
	Copper	X	—
	Benzo(a)pyrene	X	—
036S075C02	Benzo(a)pyrene	X	—
036S075E02	Arsenic	X	—
	Copper	X	—
036S077W02	Benzo(a)pyrene	X	—
036S078E02	Arsenic	X	—
	Copper	X	—
036S078W02	Vanadium	X	—
038S002601	Arsenic	X	—
	Vanadium	X	—
038S002801	Benzo(a)pyrene	X	—
038S003501	Arsenic	X	X
	Vanadium	X	—
	Benzo(a)pyrene	X	—
038S003601	Arsenic	X	—
	Vanadium	X	—
038S003701	Arsenic	X	—
	Vanadium	X	—
038S004102	Copper	X	—

Table 2-2
Soil Samples and Parameters Exceeding 3X SCTL or Acute Toxicity

Sample ID	Parameter	Exceeds 3X RSCTL or Acute Toxicity	Exceeds 3X ISCTL
038S0T0101	Arsenic	X	—
	Vanadium	X	—
	Benzo(a)pyrene	X	X
038S0T0102	Benzo(a)pyrene	X	X
038S0T0201	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T0301	Arsenic	X	
	Benzo(a)pyrene	X	X
038S0T0302	Benzo(a)pyrene	X	X
038S0T0401	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T0402	Benzo(a)pyrene	X	X
038S0T0601	Benzo(a)pyrene	X	X
038S0T0602	Benzo(a)pyrene	X	X
038S0T0701	Benzo(a)pyrene	X	X
038S0T0702	Benzo(a)pyrene	X	X
038S0T0801	Vanadium	X	—
	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T0802	Benzo(a)pyrene	X	X
038S0T0901	Vanadium	X	—
	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T0902	Benzo(a)pyrene	X	X
038S0T1001	Benzo(a)pyrene	X	X
038S0T1002	Benzo(a)pyrene	X	X
038S0T1101	Arsenic	X	—
	Copper	X	—
	Benzo(a)pyrene	X	X
038S0T1102	Benzo(a)pyrene	X	X
038S0T1201	Benzo(a)pyrene	X	X
038S0T1202	Benzo(a)pyrene	X	X
038S0T1301	Vanadium	X	—
	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T1302	Benzo(a)pyrene	X	X
038S0T1401	Arsenic	X	—
	Vanadium	X	—
	Benzo(a)pyrene	X	X
038S0T1402	Benzo(a)pyrene	X	X
038S0T1501	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T1502	Benzo(a)pyrene	X	X
038S0T1601	Arsenic	X	—
	Vanadium	X	—
	Benzo(a)pyrene	X	X

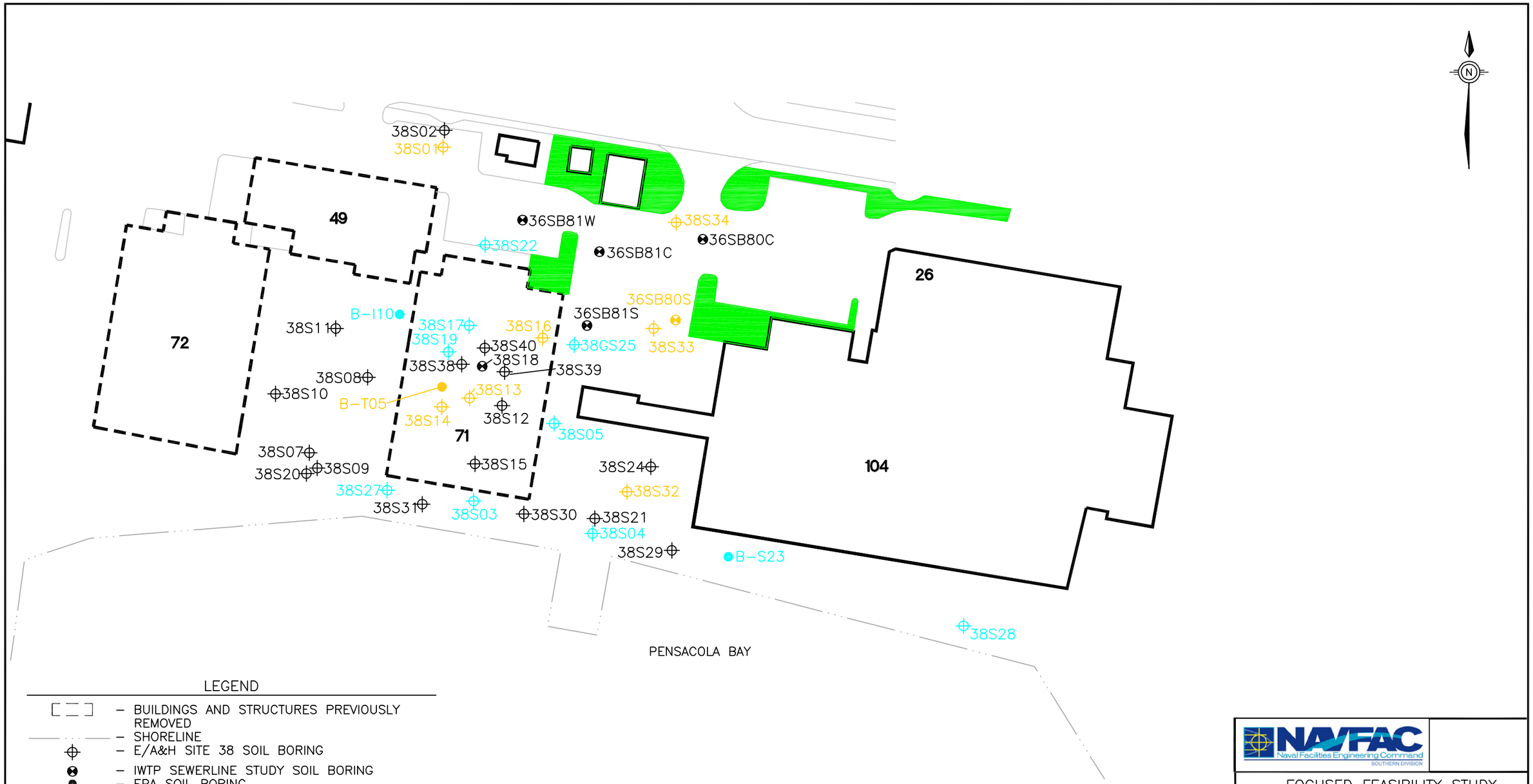
Table 2-2
Soil Samples and Parameters Exceeding 3X SCTL or Acute Toxicity

Sample ID	Parameter	Exceeds 3X RSCTL or Acute Toxicity	Exceeds 3X ISCTL
038S0T1602	Benzo(a)pyrene	X	X
038S0T1701	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T1702	Benzo(a)pyrene	X	X
038S0T1801	Vanadium	X	—
	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T1802	Arsenic	X	—
	Barium	X	—
	Benzo(a)pyrene	X	X
038S0T1901	Vanadium	X	—
	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T1902	Benzo(a)pyrene	X	X
038S0T2001	Vanadium	X	—
	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T2002	Benzo(a)pyrene	X	X
038S0T2201	Benzo(a)pyrene	X	X
038S0T2202	Benzo(a)pyrene	X	X
038S0T2301	Arsenic	X	—
	Vanadium	X	—
	Benzo(a)pyrene	X	X
038S0T2302	Benzo(a)pyrene	X	X
038S0T2501	Arsenic	X	—
	Vanadium	X	—
	Benzo(a)pyrene	X	X
038S0T2502	Benzo(a)pyrene	X	—
038S0T2601	Benzo(a)pyrene	X	—
038S0T2602	Benzo(a)pyrene	X	X
038S0T2701	Benzo(a)pyrene	X	X
038S0T2702	Benzo(a)pyrene	X	X
038S0T2801	Benzo(a)pyrene	X	—
038S0T2802	Benzo(a)pyrene	X	X
038S0T2901	Benzo(a)pyrene	X	X
038S0T2902	Benzo(a)pyrene	X	X
038S0T3002	Benzo(a)pyrene	X	X
038S0T3101	Copper	X	—
	Benzo(a)pyrene	X	X
038S0T3202	Benzo(a)pyrene	X	X
038S0T3301	Benzo(a)pyrene	X	—
038S0T3302	Benzo(a)pyrene	X	X
038S0T3401	Benzo(a)pyrene	X	X
038S0T3402	Benzo(a)pyrene	X	X
038S0T3501	Benzo(a)pyrene	X	X
038S0T3502	Benzo(a)pyrene	X	X

Table 2-2
Soil Samples and Parameters Exceeding 3X SCTL or Acute Toxicity

Sample ID	Parameter	Exceeds 3X RSCTL or Acute Toxicity	Exceeds 3X ISCTL
038S0T3601	Benzo(a)pyrene	X	X
038S0T3602	Benzo(a)pyrene	X	X
038S0T3701	Benzo(a)pyrene	X	X
038S0T3702	Benzo(a)pyrene	X	X
038S0T3801	Benzo(a)pyrene	X	X
038S0T3901	Vanadium	X	—
	Arsenic	X	—
	Benzo(a)pyrene	X	X
038S0T4001	Benzo(a)pyrene	X	X
038S0T4002	Benzo(a)pyrene	X	—
038S0T4101	Copper	X	—
	Benzo(a)pyrene	X	X
038S0T4102	Benzo(a)pyrene	X	X
038S0T4201	Copper	X	—
	Benzo(a)anthracene	X	—
	Benzo(a)pyrene	X	X
	Benzo(b)fluoranthene	X	—
Building 604 — Subsurface Soil			
036S074C04	Benzo(a)anthracene	X	—
	Benzo(a)pyrene	X	X
	Benzo(b)fluoranthene	X	—
	Dibenz(a,h)anthracene	X	—
036S075E06	Arsenic	X	—
	Copper	X	—
	Vanadium	X	—
038S002603	Arsenic	X	—
	Copper	X	—
	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S002605	Arsenic	X	—
038S002803	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S003503	Arsenic	X	—
	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S003603	Arsenic	X	—
	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S003703	Benzo(a)pyrene	X	—
	Dibenz(a,h)anthracene	X	—
038S004204	Dibenz(a,h)anthracene	X	—

Figures 2-1 through 2-4 show the locations of exceedances for both areas.



LEGEND

- [ ] – BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- – SHORELINE
- – E/A&H SITE 38 SOIL BORING
- – IWTP SEWERLINE STUDY SOIL BORING
- – EPA SOIL BORING
- – EXCEEDS 3X RSCTL OR ACUTE TOXICITY
- – EXCEEDS 3X RSCTL AND/OR 3X ISCTL HOWEVER SAMPLE IS NON DETECT
- 3X RSCTL – 3X RESIDENTIAL SOIL CLEANUP TARGET LEVEL
- 3X ISCTL – 3X INDUSTRIAL SOIL CLEANUP TARGET LEVEL
- – GRASSY AREA

NOTES: BORING 38S28 IS INCLUDED WITH BUILDING 604.

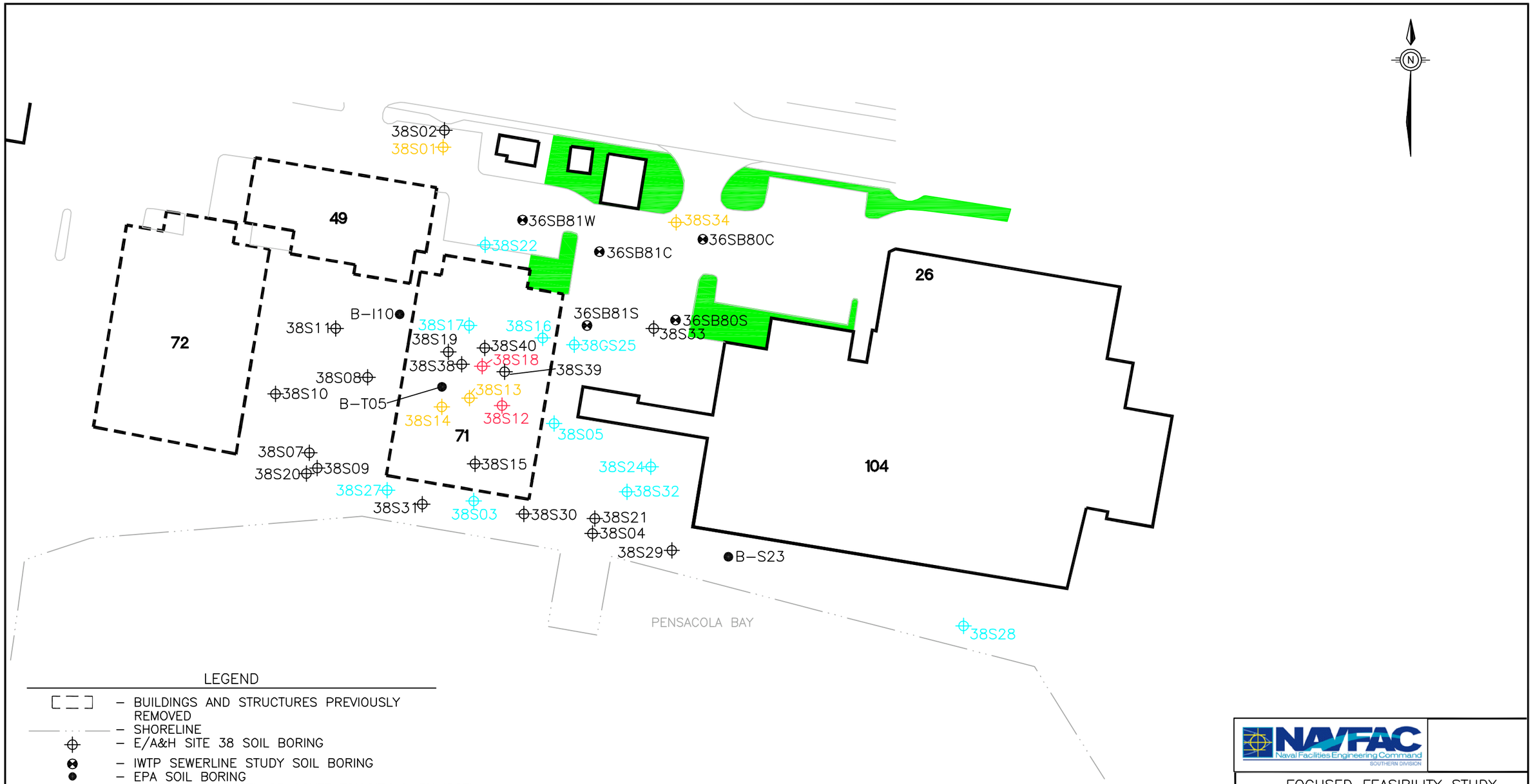
70 0 70
SCALE FEET

NAVFAC Naval Facilities Engineering Command SOUTHERN DIVISION

FOCUSED FEASIBILITY STUDY
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 2-1
BUILDING 71
3X RSCTL/ACUTE TOXICITY
AND 3X ISCTL EXCEEDANCES
IN SURFACE SOIL

DWG DATE:10/26/04 | NAME: 0059001B024



LEGEND

- [ ] – BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- – SHORELINE
- ⊕ – E/A&H SITE 38 SOIL BORING
- ⊗ – IWTP SEWERLINE STUDY SOIL BORING
- ● – EPA SOIL BORING
- ⊕ – EXCEEDS 3X RSCTL OR ACUTE TOXICITY & 3X ISCTL
- ⊕ – EXCEEDS 3X RSCTL OR ACUTE TOXICITY
- ⊕ – EXCEEDS 3X RSCTL AND/OR 3X ISCTL HOWEVER SAMPLE IS NON DETECT
- 3X RSCTL – 3X RESIDENTIAL SOIL CLEANUP TARGET LEVEL
- 3X ISCTL – 3X INDUSTRIAL SOIL CLEANUP TARGET LEVEL
- ▭ – GRASSY AREA

NOTES: BORING 38S28 IS INCLUDED WITH BUILDING 604 DISCUSSION.

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FIGURE 2–2
BUILDING 71
3X RSCTL/ACUTE TOXICITY
AND 3X ISCTL EXCEEDANCES
SUBSURFACE SOIL

DWG DATE:10/27/04 | NAME: 0059001G007

LEGEND

- [- - -] – BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- – SHORELINE
- – E/A&H SITE 38 SOIL BORING
- – IWTP SEWERLINE STUDY SOIL BORING
- – EPA SOIL BORING
- – EXCEEDS 3X RSCTL OR ACUTE TOXICITY & 3X ISCTL
- – EXCEEDS 3X RSCTL OR ACUTE TOXICITY
- – EXCEEDS 3X RSCTL AND/OR 3X ISCTL HOWEVER SAMPLE IS NON DETECT
- 3X RSCTL – 3X RESIDENTIAL SOIL CLEANUP TARGET LEVEL
- 3X ISCTL – 3X INDUSTRIAL SOIL CLEANUP TARGET LEVEL
- – GRASSY AREA

NOTE: BORING 38S28 IS SHOWN ON FIGURES FOR BUILDING 71.

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FIGURE 2-3
BUILDING 604
3X RSCTL/ACUTE TOXICITY
AND 3X ISCTL EXCEEDANCES
IN SURFACE SOIL

DWG DATE:10/26/04 | NAME: 0059001B021

LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- E/A&H SITE 38 SOIL BORING
- IWTP SEWERLINE STUDY SOIL BORING
- EPA SOIL BORING
- EXCEEDS 3X RSCTL OR ACUTE TOXICITY & 3X ISCTL
- EXCEEDS 3X RSCTL OR ACUTE TOXICITY
- EXCEEDS 3X RSCTL AND/OR 3X ISCTL HOWEVER SAMPLE IS NON DETECT
- 3X RSCTL – 3X RESIDENTIAL SOIL CLEANUP TARGET LEVEL
- 3X ISCTL – 3X INDUSTRIAL SOIL CLEANUP TARGET LEVEL
- GRASSY AREA

NOTE: BORING 38S28 IS SHOWN ON FIGURES FOR BUILDING 71.

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SCALE FEET

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FIGURE 2–4
BUILDING 604
3X RSCTL/ACUTE TOXICITY
AND 3X ISCTL EXCEEDANCES
IN SUBSURFACE SOIL

DWG DATE: 10/25/04 | NAME: 0059001B020

Carcinogenic PAHs listed above were converted into BEQs and compared to residential SCTLs, which are included in Appendices E and F. Table 2-3 summarizes samples exceeding 3X RSCTL.

Table 2-3
BEQs Exceeding 3X SCTL for Benzo(a)pyrene

Sample ID	Adjusted Concentration (0.5 times ND)	Adjusted Concentration (0 times ND)	3X RSCTL (300 µg/kg)	3X ISCTL (1,500 µg/kg)
Building 71 – Surface Soil				
038S000102	368.42	368.42	X	—
038S002901	451.01	451.01	X	—
038S002101	1,090.74	1,090.41	X	—
038S0T0502	2453.1	508.1	X	—
Building 71 – Subsurface Soil				
038S000106	711.64	711.64	X	—
038S000803	361.28	361.28	X	—
038S001203	718.46	718.46	X	—
038S003403	2,045.9	950.9	X	—
Building 604 – Surface Soil				
036S074C02	533.44	350.29	X	—
036S074W02	665.84	438.29	X	—
036S075C02	594.38	346.33	X	—
036S077W02	844.03	672.33	X	—
038S003501	1,647.22	437.22	X	—
038S003701	1,324.84	334.84	X	—
038S0T2701	4,492.2	2,942.2	X	X
Building 604 – Subsurface Soil				
036S074C04	6,761.2	6,754.2	X	X
038S002603	742.08	351.58	X	—
038S002605	502.98	304.98	X	—

Notes:
ND = not detected
SCTL = soil cleanup target level
µg/kg = microgram per kilogram

2.1.2.4 95% Upper Confidence Level Evaluation

For the COPCs listed in Table 2-1, each data set was evaluated to determine if a 95% UCL could be calculated. The 95% UCL calculation requires that the data set has more than 10 samples and less than 30% of the data set should be not detected. Table 2-4 summarizes each COPC, number of samples, and percentage of those not detected.

Table 2-4
Soil Chemicals of Potential Concern and Percentages of Those Not Detected

Building 71			Building 604		
Parameter	**No. of Samples**	**Not Detected (%)**	**Parameter**	**No. of Samples**	**Not Detected (%)**
Surface Soil					
Arsenic	37	43%	Arsenic	100	61%
Chromium	37	5%	Copper	100	15%
Copper	37	5%	Iron	100	1%
Vanadium	37	51%	Lead	100	11%
Aroclor-1254	34	91%	Vanadium	107	40%
Benzo(a)pyrene	37	76%	Aroclor-1260	51	94%
Dibenz(a,h)anthracene	37	89%	Benzo(a)anthracene	27	91%
—	—	—	Benzo(a)pyrene	27	89%
—	—	—	Benzo(b)fluoranthene	27	89%
—	—	—	Dieldrin	51	80%
Subsurface Soil					
Arsenic	42	57%	Arsenic	27	37%
Chromium	42	10%	Copper	27	0%
Copper	42	10%	Iron	27	0%
Lead	42	0%	Lead	27	0%
Aroclor-1254	42	90%	Vanadium	27	44%
Benzo(a)pyrene	42	86%	Benzo(a)anthracene	27	89%
Benzo(b)fluoranthene	42	71%	Benzo(a)pyrene	27	85%
Dibenz(a,h)anthracene	42	88%	Benzo(b)fluoranthene	27	81%
—	—	—	Dibenz(a,h)anthracene	27	96%
—	—	—	Indeno(1,2,3-cd)pyrene	27	85%

Based on the 30% non-detects restriction, the 95% UCL could only be calculated for the following: chromium, copper, iron, and lead. However, lead is not included in the 95% UCL calculations as discussed in Section 2.1.2.6.

Using *Pro UCL*, each data set was tested for normal and lognormal distribution. The 95% UCL was calculated based on the data's distribution. As shown on Table 2-5, two data sets had lognormal distributions, and the remainder had neither normal nor lognormal distributions.

Table 2-5
Normal and Lognormal Distribution Testing for Soil

Building 71			Building 604		
Parameter	**Normal**	**Lognormal**	**Parameter**	**Normal**	**Lognormal**
Surface Soil					
Chromium	No	Yes	Copper	No	No
Copper	No	No	Iron	No	Yes
Subsurface Soil					
Chromium	No	No	Copper	No	No
Copper	No	No	Iron	No	No

The 95% UCL could be calculated for only chromium in Building 71 surface soil and iron in Building 604 surface soil. Analytical data used for distribution testing and 95% UCL calculations are available in Appendix D. Table 2-6 compares the 95% UCLs to their SCTLs. Neither parameter exceeded its RSCTL or ISCTL; therefore, they are not site-wide COCs for their interval and area.

Table 2-6
95% UCL Comparison to SCTLs

Parameter	95% UCL	RSCTL	ISCTL
Chromium (Bldg 71 surface soil)	119.69	210	420
Iron (Bldg 604 surface soil)	9,305.28	23,000	480,000

2.1.2.5 FDEP 95% UCL Evaluation

For each data set in which the 95% UCL could not be calculated, FDEP calculated 95% UCLs using their software tool as provided in comments on the Site 38 Technical Memorandum dated April 1, 2004. Table 2-7 lists these values and compares them with their respective SCTLs. Data set averages were calculated using the reported value for detections and one half the detection limit for not detected samples.

Table 2-7
Comparison of FDEP Provided 95% UCLs to SCTLs

Parameter	RSCTL	ISCTL	FDEP 95% UCL	Units
Building 71 — Surface Soil				
Arsenic	1.56*	3.7	1.6	mg/kg
Copper	110	76,000	790	mg/kg
Vanadium	15	7,400	10.7	mg/kg
Aroclor-1254	500	2,100	***16,000***[a]	µg/kg
Benzo(a)anthracene	1,400	5,000	838	µg/kg
Benzo(a)pyrene	100	500	NG	µg/kg

Table 2-7
Comparison of FDEP Provided 95% UCLs to SCTLs

Parameter	RSCTL	ISCTL	FDEP 95% UCL	Units
Dibenz(a,h)anthracene	100	500	*230*[a]	µg/kg
Building 71 — Subsurface Soil				
Arsenic	1.56*	3.7	*2.6*	mg/kg
Chromium	210	420	69	mg/kg
Copper	110	76,000	46	mg/kg
Lead	400	920	151	mg/kg
Aroclor-1254	500	2,100	***11,000***[a]	mg/kg
Benzo(a)pyrene	100	500	*410*[a]	µg/kg
Benzo(b)fluoranthene	1,400	4,800	533	µg/kg
Dibenz(a,h)anthracene	100	500	*160*[a]	µg/kg
Building 604 — Surface Soil				
Arsenic	1.56*	3.7	*3.3*	mg/kg
Copper	110	76,000	74	mg/kg
Lead	400	920	139	mg/kg
Vanadium	15	7,400	12	mg/kg
Aroclor-1260	500	2,100	*810*[a]	µg/kg
Benzo(a)anthracene	1,400	5,000	*1,950*	µg/kg
Benzo(a)pyrene	100	500	***1,960***[a]	µg/kg
Benzo(b)fluoranthene	1,400	4,800	*1,960*	µg/kg
Dieldrin	70	300	23	µg/kg
Building 604 — Subsurface Soil				
Arsenic	1.56*	3.7	*3.0*	mg/kg
Copper	110	76,000	67	mg/kg
Iron	23,000	480,000	4927	mg/kg
Lead	400	900	242	mg/kg
Vanadium	15	7,400	6.2	mg/kg
Benzo(a)anthracene	1,400	5,000	***4,500***[a]	µg/kg
Benzo(a)pyrene	100	500	***4500***[a]	µg/kg
Benzo(b)fluoranthene	1,400	4,800	***8,300***[a]	µg/kg
Dibenz(a,h)anthracene	100	500	***800***[a]	µg/kg
Indeno(1,2,3-cd)pyrene	1,500	5,300	*1,700*[a]	µg/kg

Notes:
* = The Reference Concentration (1.56 mg/kg) for arsenic was used because it is greater than the RSCTL (0.8 mg/kg).
[a] = Value corresponds to the maximum concentration (number of detected values is less than 7).
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
NG = not given
Average concentrations exceeding RSCTLs are noted in *italics*.
Average concentrations exceeding RSCTLs and ISCTLs are noted in ***bold italics***.

Building 71 Surface Soil: The 95% UCL concentration for dibenz(a,h)anthracene (230 µg/kg) exceeded its RSCTL of 100 µg/kg. Aroclor-1254 (16,000 µg/kg) exceeded both RSCTL (500 µg/kg) and ISCTL (2,100 (µg/kg). The 95% UCL for benzo(a)pyrene was not given by FDEP.

Building 71 Subsurface Soil: The 95% UCLs for arsenic (2.6 mg/kg), benzo(a)pyrene (410 µg/kg), and dibenz(a,h)anthracene (160 µg/kg) exceeding their respective RSCTLs. Aroclor-1254 (11,000 µg/kg) exceeded both RSCTL and ISCTL.

Building 604 Surface Soil: The 95% UCLs for arsenic (3.3 mg/kg), aroclor-1260 (810 µg/kg), benzo(a)anthracene (1,950 µg/kg), and benzo(b)fluoranthene (1,960 µg/kg) exceeded their RSCTLs. The 95% UCL for benzo(a)pyrene (1,960 µg/kg) exceeded both RSCTL and ISCTL.

Building 604 Subsurface Soil: RSCTLs were exceeded by 95% UCLs for arsenic (3.0 mg/kg) and indeno(1,2,3-cd)pyrene (1,700 mg/kg). ISCTLs were exceeded by 95% UCLs for the following parameters: benzo(a)anthracene (4,500 µg/kg), benzo(a)pyrene (4,500 µg/kg), benzo(b)fluoranthene (8,300 µg/kg), and dibenz(a,h)anthracene (800 µg/kg).

2.1.2.6 Lead Modeling Using Average Concentrations

USEPA has not established a slope factor or a reference dose for lead, so lead was evaluated as a special case for the residential use scenario. USEPA and the Centers for Disease Control and Prevention (CDC) have determined that childhood lead blood level (PbB) concentrations at or above 10 micrograms of lead per deciliter of blood (µg Pb/dL) present risks to children's health. The Integrated Exposure Uptake Biokinetic (IEUBK) model calculates the probability that children's PbB concentrations will exceed 10 µg Pb/dL (http://www.epa.gov/superfund/programs/lead/ieubk.htm). When lead concentrations result in probability greater than 5%, lead is identified as a COC.

USEPA recommends the IEUBK model when assessing lead exposure to estimate the blood lead level of a child receptor. Thus, this model would be applicable only to the residential land-use scenario. USEPA's IEUBK model (Version 1.0, Building 253) was used to estimate blood lead levels in children assumed to drink groundwater and directly contact soil and dust. Appendix G contains results from the IEUBK model.

Residential Scenario

Building 71 — Surface Soil

The average surface soil lead concentration is 74.75 mg/kg. The average lead concentration reported in groundwater was 0.0626 milligrams per liter (mg/L), which exceeds the treatment technique action level (0.015 mg/L). Model variables and a distribution probability plot are shown in Table G-1 and Figure G-1 of Appendix G. The model predicts lead levels in blood based on lead concentrations in soil, dust, and water and develops a probability density curve for PbB. As shown on Figure G-1, the geometric mean on the probability density for the age range of 0 to 84 months is 6.4 µg/dL. It also predicts that 17.3% of the lead blood levels would exceed 10 micrograms per deciliter (µg/dL). Therefore, lead is identified as a COC for surface soil.

Building 71 — Subsurface Soil

The average subsurface soil lead concentration is 79.87 mg/kg. The average lead concentration reported in groundwater is 0.0626 mg/L, which exceeds the treatment technique action level (0.015 mg/L). Model variables and a distribution probability plot are shown in Table G-2 and Figure G-2 of Appendix G. Based on subsurface soil lead data for Building 71, the geometric mean on the probability density for the age range of 0 to 84 months is 6.5 µg/dL. The model also predicts that 17.6% of the lead blood levels would exceed 10 µg/dL. Therefore, lead is identified as a COC for subsurface soil.

Building 604 — Surface Soil

The average surface soil lead concentration is 82.91 mg/kg. The average lead concentration reported in groundwater is 0.0409 mg/L, which exceeds the treatment technique action level (0.015 mg/L). Model variables and a distribution probability plot are shown in Table G-3 and Figure G-3 of Appendix G. Based on subsurface soil lead data for Building 604, the geometric mean on the probability density for the age range of 0 to 84 months is 5.0 µg/dL. The model also predicts that 7.2% of the lead blood levels would exceed 10 µg/dL. Therefore, lead is identified as a COC for surface soil.

Building 604 — Subsurface Soil

The average subsurface soil lead concentration is 95.71 mg/kg. The average lead concentration reported in groundwater is 0.0409 mg/L, which exceeds the treatment technique action level (0.015 mg/L). Model variables and a distribution probability plot are shown in Table G-4 and Figure G-4 of Appendix G. Based on subsurface soil lead data for Building 604, the geometric mean on the probability density for 0 to 84 months is 5.1 µg/dL. The model also predicts that 7.9% of the lead blood levels would exceed 10 µg/dL. Therefore, lead is identified as a COC for subsurface soil.

Industrial Scenario

Detected lead concentrations did not exceed the ISCTL; therefore, lead is not a COC under the industrial use scenario.

2.1.2.7 Leachability Evaluation

To assess potential effects of soil contaminants on groundwater, detected soil concentrations were compared to leachability based groundwater criteria, which are based on the groundwater cleanup levels in FAC 62-777. Table 2-8 summarizes criteria exceedances.

Table 2-8
Soil Leachability Criteria Exceedances

Sample ID	Parameter	Detection	Leachability Criteria	Units
Building 71 — Surface Soil				
038S0I1001	Chromium	93	38	mg/kg
038S0I1002	Tetrachloroethene	1,100	30	µg/kg
038S013A02	Chromium	40.1	38	mg/kg
038S013B02	Chromium	383	38	mg/kg
038S000701	Trichloroethene	110	30	µg/kg
038S000901	Trichloroethene	36	30	µg/kg
038S001001	Chromium	103	38	mg/kg
	Tetrachloroethene	94	30	µg/kg
038S001201	Chromium	80.2	38	mg/kg
038S001301	Chromium	713	38	mg/kg
	Phenol	59	50	µg/kg
	Tetrachloroethene	43	30	µg/kg
	Trichloroethene	34	30	µg/kg
038S001401	Cadmium	18.6	8	mg/kg
	Chloroform	47	30	µg/kg
	Chromium	668	38	mg/kg

Table 2-8
Soil Leachability Criteria Exceedances

Sample ID	Parameter	Detection	Leachability Criteria	Units
	1,2-Dichloroethane	27	10	µg/kg
	2-Methylphenol	340	300	µg/kg
038S001401 (con't)	4-Methylphenol	740	30	µg/kg
	Phenol	990	50	µg/kg
	Tetrachloroethene	370	30	µg/kg
	Trichloroethene	390	30	µg/kg
038S001501	Phenol	130	50	µg/kg
038S001701	Chromium	53.4	38	mg/kg
038S001801	Chromium	291	38	mg/kg
	Phenol	930	50	µg/kg
038S001901	Phenol	370	50	µg/kg
038S001902	Phenol	600	50	µg/kg
038S0T0502	Tetrachloroethene	810	30	µg/kg
	Trichloroethene	200	30	µg/kg
Building 71 — Subsurface Soil				
038S000703	Trichloroethene	79	30	µg/kg
038S000705	Trichloroethene	74	30	µg/kg
038S000803	Trichloroethene	33	30	µg/kg
038S001303	Chromium	553	38	mg/kg
	Trichloroethene	120	30	µg/kg
038S001304	Chromium	296	38	mg/kg
	Trichloroethene	34	30	µg/kg
038S001403	Chloroform	79	30	µg/kg
	Chromium	331	38	mg/kg
	1,2-Dichloroethane	22	10	µg/kg
	4-Methylphenol	580	30	µg/kg
	Phenol	830	50	µg/kg
	Tetrachloroethene	410	30	µg/kg
	Trichloroethene	400	30	µg/kg
038S001405	Chromium	155	38	mg/kg
	4-Methylphenol	190	30	µg/kg
	Phenol	180	50	µg/kg
	Tetrachloroethene	120	30	µg/kg
038S001503	Phenol	110	50	µg/kg
038S001603	Chromium	58.8	38	mg/kg
038S001803	Chromium	48.5	38	mg/kg
038S001805	Chromium	87.8	38	mg/kg
	Phenol	360	50	µg/kg
	Tetrachloroethene	230	30	µg/kg
	Trichloroethene	110	30	µg/kg
Building 604 — Surface Soil				
036S073C02	Methylene chloride	730	20	µg/kg
036S078S02	Acetone	8,600	2,800	µg/kg
036S078W02	Dieldrin	15	4	µg/kg
038S003701	Dieldrin	5.4	4	µg/kg
038S0T0301	Dieldrin	20	4	µg/kg

Table 2-8
Soil Leachability Criteria Exceedances

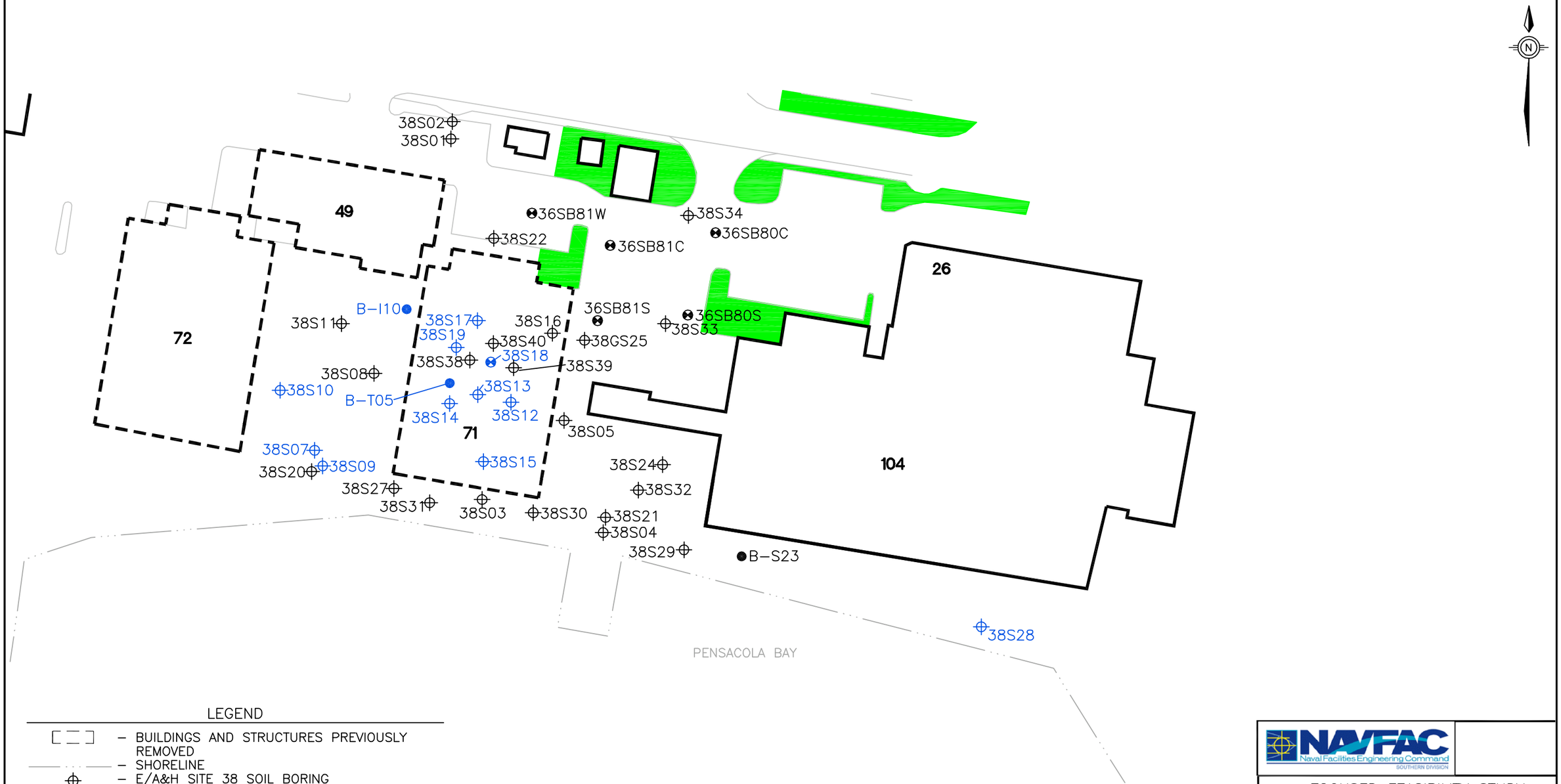
Sample ID	Parameter	Detection	Leachability Criteria	Units
038S0T0701	Dieldrin	9	4	µg/kg
038S0T0802	Chromium	38	38	µg/kg
038S0T1501	Dieldrin	40	4	µg/kg
038S0T2902	Tetrachloroethene	34	30	µg/kg
038S0T3701	Dieldrin	84	4	µg/kg
038S0T3801	Chromium	48	38	µg/kg
	Dieldrin	5.3	4	µg/kg
038S0T4101	Cadmium	17	8	µg/kg
038S0T4201	Beta-BHC	56	1	µg/kg
	Cadmium	21	8	µg/kg
	Chromium	40	38	µg/kg
	Delta-BHC	300	200	µg/kg
Building 604 — Subsurface Soil				
036S074C04	Benzo(a)anthracene	4,500	3,200	µg/kg
038S002603	Dieldrin	4.4	5	µg/kg
038S003703	Antimony	6.1	5	mg/kg

Notes:
mg/kg = milligrams per kilogram
µg/kg = micrograms per kilogram
To be conservative, leachability criteria for hexavalent chromium were used to evaluate chromium

Figures 2-5 through 2-8 show locations exceeding leachability criteria in surface and subsurface soil at Buildings 71 and 604.

2.1.3 Groundwater Evaluation

Site 38 groundwater has been sampled four times: 1993/1994 (original RI), 1995 (USEPA), 1998/1999, and 2000. Groundwater samples collected during the 1993/1994 sampling event were collected using bailer techniques. Subsequent events (1998/1999 and 2000) were conducted using low-flow sampling techniques. For the 1998/1999 and 2000 sampling events, monitoring wells were selected for sampling based on their proximity to the plume (i.e., upgradient, downgradient, and within) to assess areas requiring feasibility study along with assessing the potential for natural attenuation. Data from the 2000 sampling event represents the current conditions of the groundwater contaminant plume and eliminates redundancy of the previous data. Therefore, the 2000 sampling event data were used to define the nature and extent of contamination and delineate areas requiring further assessment. Previous results for the monitoring wells are presented in the groundwater tables, but they are not used in volume determination.



LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- E/A&H SITE 38 SOIL BORING
- IWTP SEWERLINE STUDY SOIL BORING
- EPA SOIL BORING
- DETECTION EXCEEDS LEACHABILITY SCTL
- GRASSY AREA

NOTES: BORING 38S28 IS INCLUDED WITH BUILDING 604 DISCUSSION.

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FIGURE 2-5
BUILDING 71
LEACHABILITY SCTL EXCEEDANCES
SURFACE SOIL

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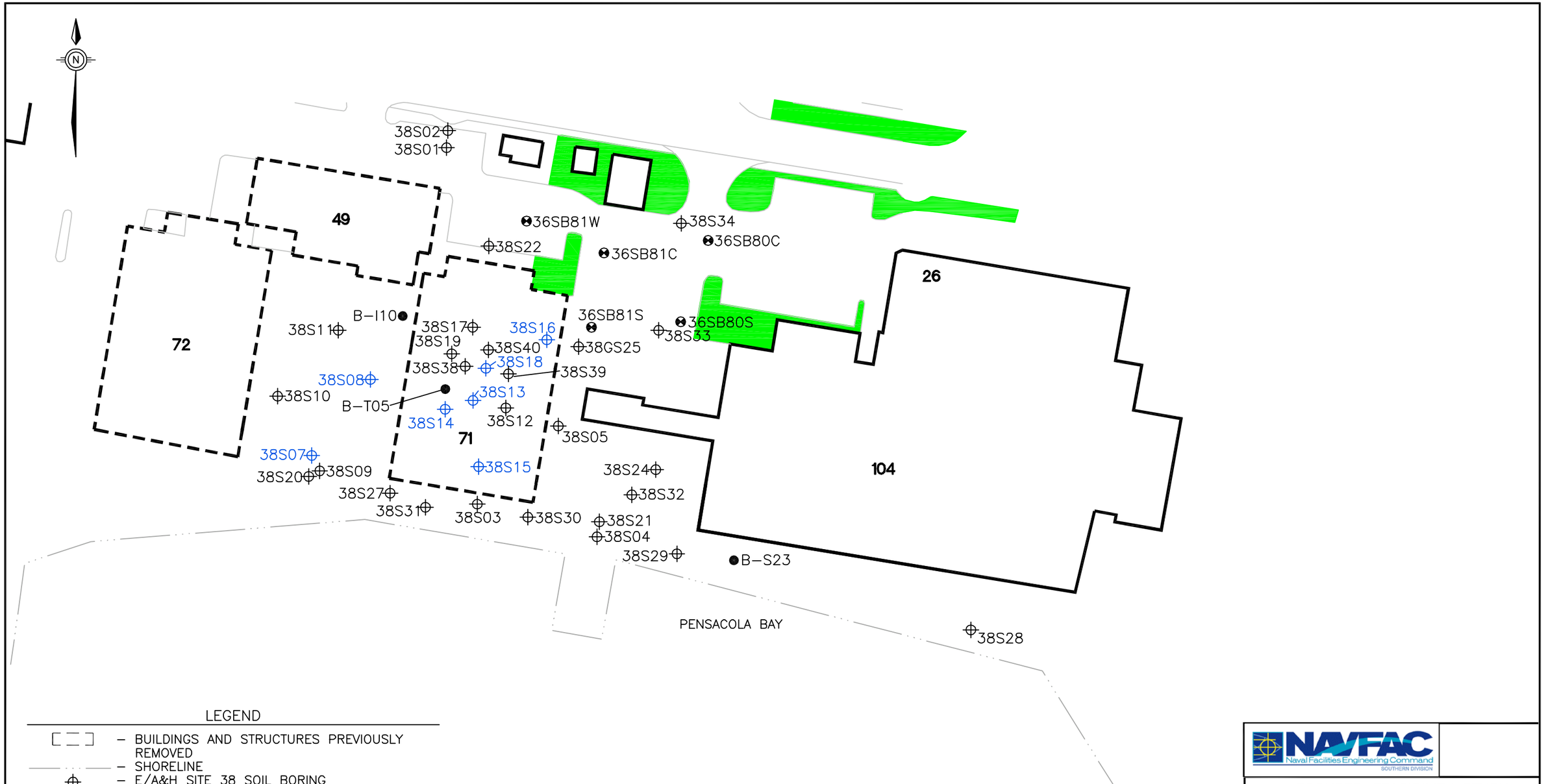

LEGEND

- [ ] – BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- – SHORELINE
- – E/A&H SITE 38 SOIL BORING
- – IWTP SEWERLINE STUDY SOIL BORING
- – EPA SOIL BORING
- – DETECTION EXCEEDS LEACHABILITY SCTL
- – GRASSY AREA

NOTES: BORING 38S28 IS INCLUDED IN BUILDING 604 DISCUSSION.

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SCALE FEET

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FIGURE 2-6
BUILDING 71
LEACHABILITY SCTL EXCEEDANCES
IN SUBSURFACE SOIL

DWG DATE:10/26/04 | NAME: 0059001B034

LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- E/A&H SITE 38 SOIL BORING
- IWTP SEWERLINE STUDY SOIL BORING
- EPA SOIL BORING
- DETECTION EXCEEDS LEACHABILITY BASED ON GROUNDWATER CRITERIA
- GRASSY AREA

NOTE: BORING 38S28 IS SHOWN ON FIGURES FOR BUILDING 71.

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SCALE FEET

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FIGURE 2-7
BUILDING 604
LEACHABILITY SCTL EXCEEDANCES
IN SURFACE SOIL

DWG DATE:10/26/04 | NAME: 0059001B033

LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- E/A&H SITE 38 SOIL BORING
- IWTP SEWERLINE STUDY SOIL BORING
- EPA SOIL BORING
- DETECTION EXCEEDS LEACHABILITY BASED ON GROUNDWATER CRITERIA
- GRASSY AREA

NOTE: BORING 38S28 IS SHOWN ON FIGURES FOR BUILDING 71.

100 0 100
SCALE FEET

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FIGURE 2-8
BUILDING 604
LEACHABILITY SCTL EXCEEDANCES
IN SUBSURFACE SOIL

DWG DATE:10/26/04 | NAME: 0059001B032

Analytical data collected from groundwater sampling are compared with RC and GC (Appendix H) in Section 2.1.3.1. Inorganic GC exceedances less than RCs are considered indicative of natural conditions. They are not considered further in this feasibility study.

In Section 2.1.3.2, the three most downgradient wells at each study area were compared with MSWQ criteria to evaluate concentrations at a representative point of discharge into Pensacola Bay. For the Building 71 study area, wells 38GS02, 38GS03, and 38GS13 were used in this comparison. These wells are approximately 32 feet from the sea wall. For the Building 604 study area, wells 38GS07, 38GS18, and 38GS32 were used; these wells are approximately 130 feet from Pensacola Bay. Groundwater sampling exceedances from 2000 are shown on Figures 2-9 through 2-14.

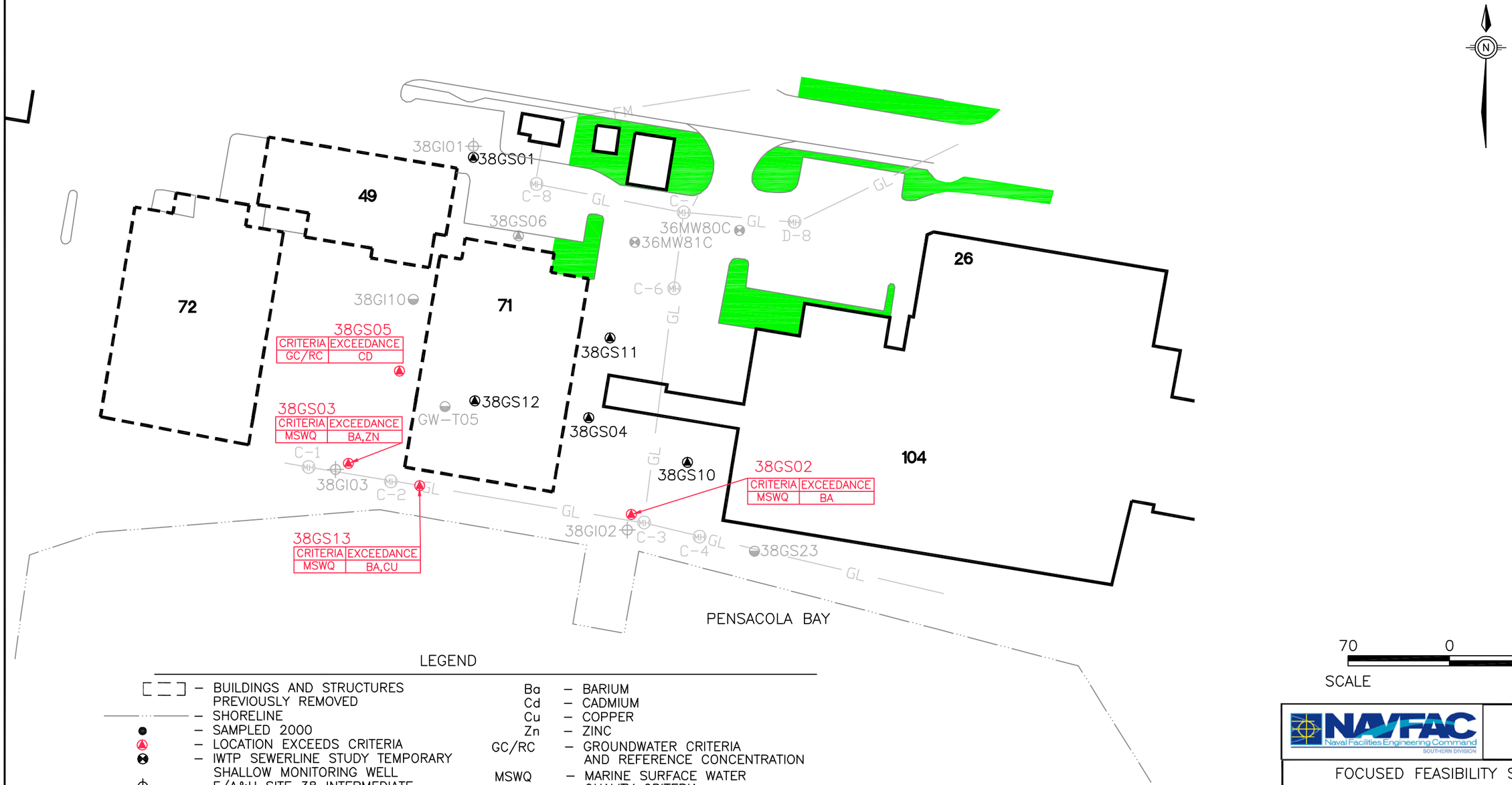
In Section 4, groundwater concentrations were also compared against NADS in Chapter FAC 62-777 to evaluate natural attenuation.

2.1.3.1 Groundwater Criteria

Groundwater screening is discussed by building area and chemical class in this section. To delineate areas requiring a feasibility study, groundwater concentrations were compared with GC criteria (and RC for inorganics). Data from the 2000 sampling event represents the current conditions of the groundwater contaminant plume and eliminates redundancy of the previous data. Therefore, the 2000 sampling event data were used to define the nature and extent of contamination and delineate areas requiring further assessment. Groundwater data from temporary wells during the 1993/1994 sampling event were not included

Building 71 — Inorganics

Only one inorganic exceeded its GC and RC in this area during the 2000 sampling event. Cadmium exceeded its GC (5 µg/L) in well 38GS05 (5.9 µg/L). Table 2-9 summarizes the historical GC and RC inorganic exceedances at Building 71.



LEGEND

- [ ] – BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- – SHORELINE
- – SAMPLED 2000
- – LOCATION EXCEEDS CRITERIA
- – IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
- – E/A&H SITE 38 INTERMEDIATE MONITORING WELL
- – E/A&H SITE 38 SHALLOW MONITORING WELL
- – EPA WELL
- GL – GRAVITY LINE (SEWER)
- FM – FORCE MAIN (SEWER)
- MH – MANHOLE
- – GRASSY AREA

Ba – BARIUM
Cd – CADMIUM
Cu – COPPER
Zn – ZINC
GC/RC – GROUNDWATER CRITERIA AND REFERENCE CONCENTRATION
MSWQ – MARINE SURFACE WATER QUALITY CRITERIA
NADS – NATURAL ATTENUATION DEFAULT SOURCE CRITERIA

NOTE:
SCREENED WELLS WERE EITHER NOT SAMPLED OR WERE SAMPLED BUT NOT FOR SPECIFIED ANALYSIS.

70 0 70
SCALE FEET

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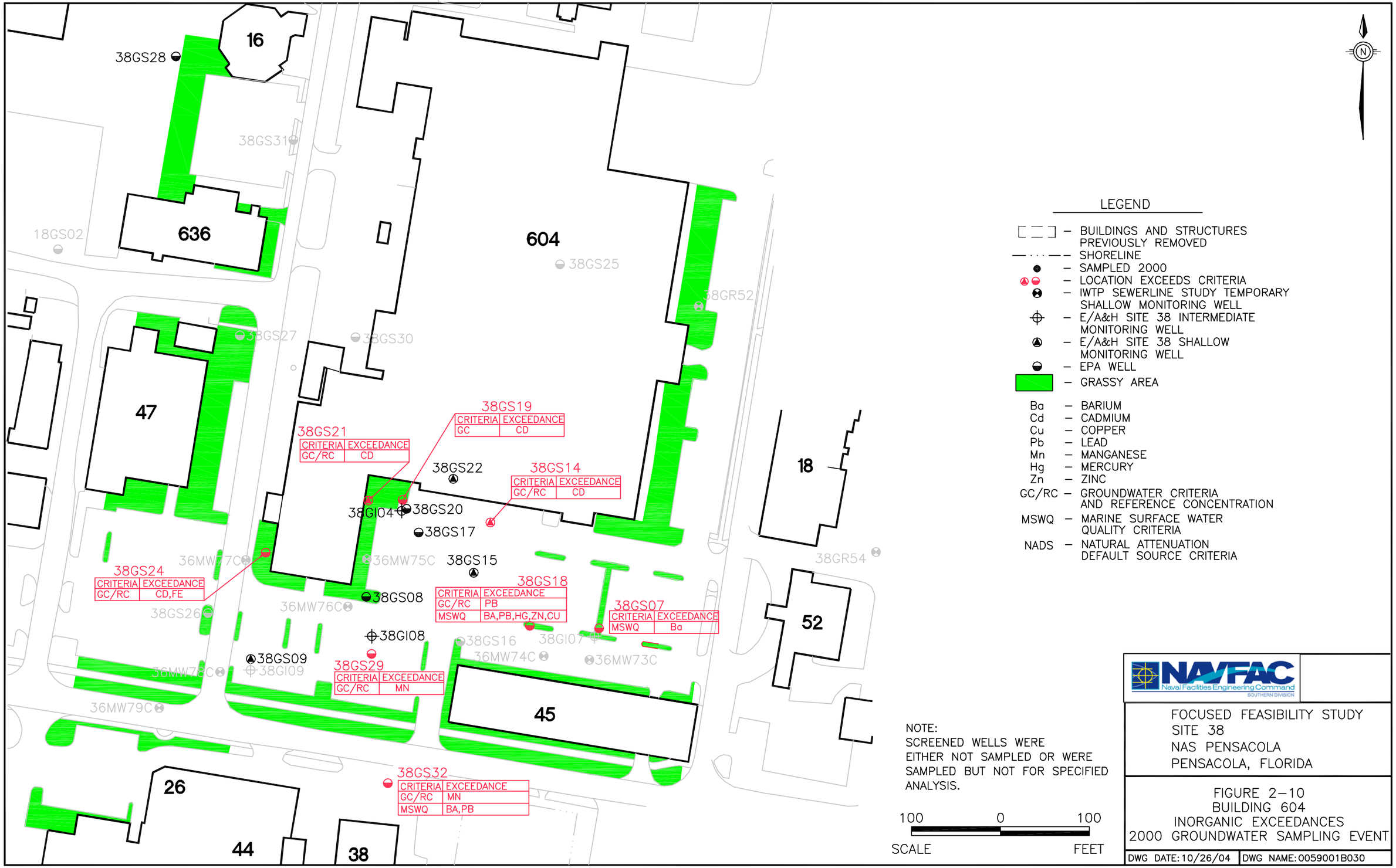
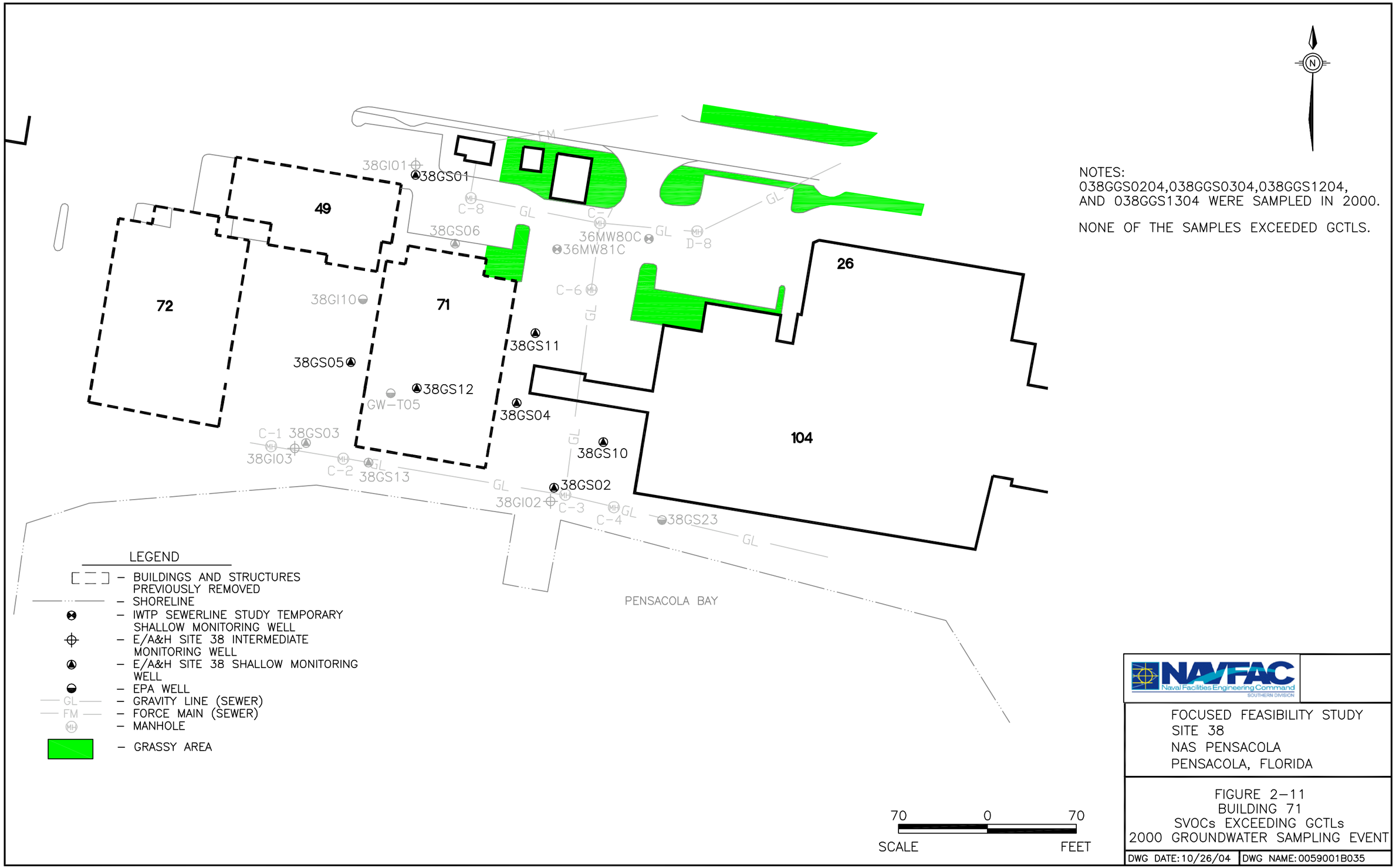
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

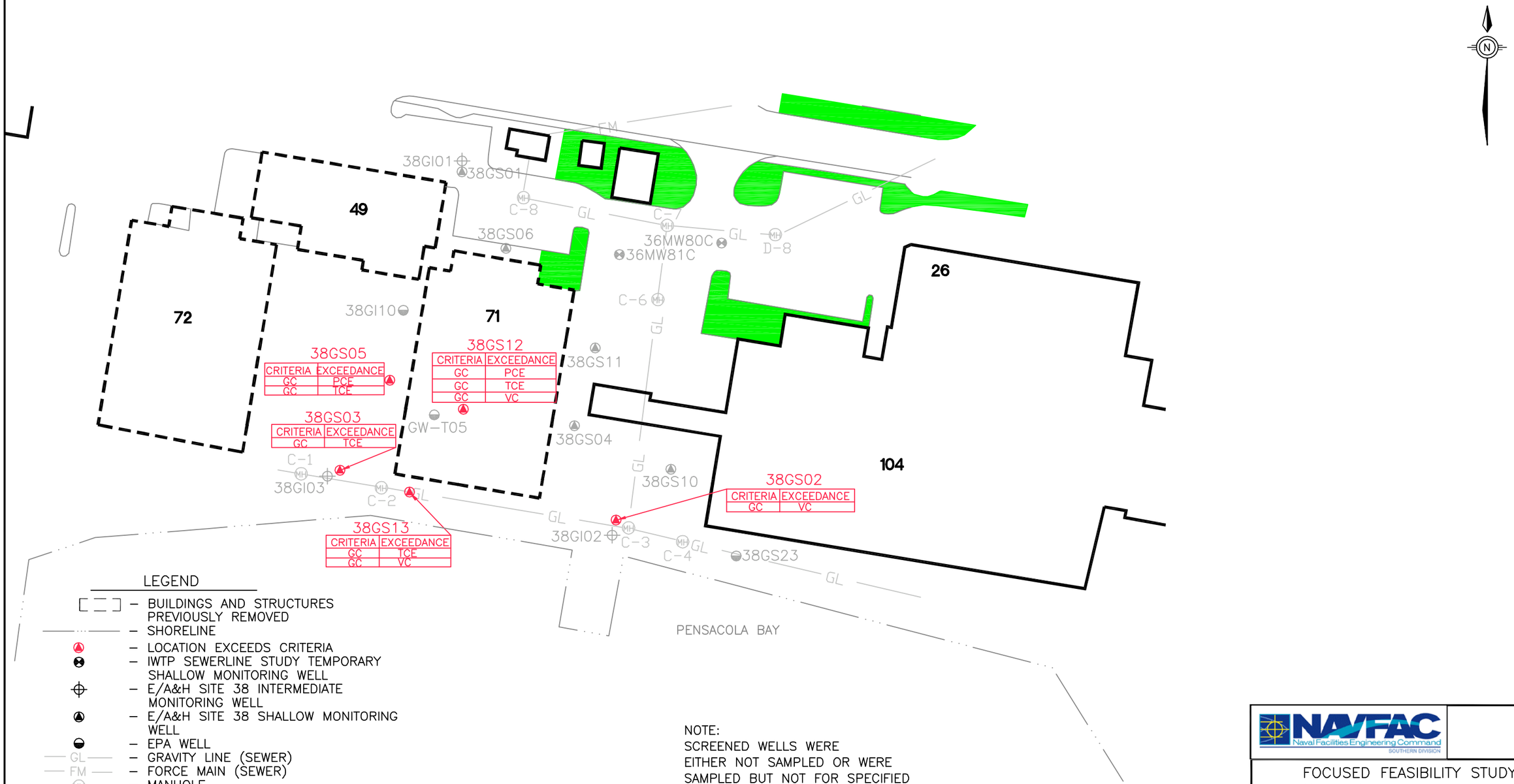
FIGURE 2-9
BUILDING 71
INORGANIC EXCEEDANCES
2000 GROUNDWATER SAMPLING EVENT

DWG DATE: 10/26/04 | DWG NAME: 0059001B031


16
38GS28
38GS31
636
18GS02
604
38GS25
38GR52
38GS27
38GS30
47
38GS19
CRITERIA EXCEEDANCE
GC CD
38GS21
CRITERIA EXCEEDANCE
GC/RC CD
38GS22
38GS14
CRITERIA EXCEEDANCE
GC/RC CD
38GI04
38GS20
38GS17
18
38GR54
36MW77C
36MW75C
38GS15
38GS24
CRITERIA EXCEEDANCE
GC/RC CD,FE
38GS18
CRITERIA EXCEEDANCE
GC/RC PB
MSWQ BA,PB,HG,ZN,CU
38GS08
38GS07
CRITERIA EXCEEDANCE
MSWQ Ba
36MW76C
38GS26
52
38GI08
38GS16
38GI07
36MW74C
36MW73C
38GS09
38GI09
38GS29
CRITERIA EXCEEDANCE
GC/RC MN
36MW78C
45
36MW79C
38GS32
CRITERIA EXCEEDANCE
GC/RC MN
MSWQ BA,PB
26
44
38
N
LEGEND
– BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
– SHORELINE
– SAMPLED 2000
– LOCATION EXCEEDS CRITERIA
– IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
– E/A&H SITE 38 INTERMEDIATE MONITORING WELL
– E/A&H SITE 38 SHALLOW MONITORING WELL
– EPA WELL
– GRASSY AREA
Ba – BARIUM
Cd – CADMIUM
Cu – COPPER
Pb – LEAD
Mn – MANGANESE
Hg – MERCURY
Zn – ZINC
GC/RC – GROUNDWATER CRITERIA AND REFERENCE CONCENTRATION
MSWQ – MARINE SURFACE WATER QUALITY CRITERIA
NADS – NATURAL ATTENUATION DEFAULT SOURCE CRITERIA
NOTE:
SCREENED WELLS WERE EITHER NOT SAMPLED OR WERE SAMPLED BUT NOT FOR SPECIFIED ANALYSIS.
100 0 100
SCALE FEET
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
FOCUSED FEASIBILITY STUDY
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 2–10
BUILDING 604
INORGANIC EXCEEDANCES
2000 GROUNDWATER SAMPLING EVENT
DWG DATE: 10/26/04
DWG NAME: 0059001B030


NOTES:
038GGS0204,038GGS0304,038GGS1204,
AND 038GGS1304 WERE SAMPLED IN 2000.
NONE OF THE SAMPLES EXCEEDED GCTLS.
49
72
71
26
104
38GI01
38GS01
38GS06
38GI10
38GS05
38GS12
GW-T05
38GS11
38GS04
38GS10
38GS02
38GS03
38GI03
38GS13
38GI02
38GS23
C-8
C-7
C-6
C-1
C-2
C-3
C-4
D-8
36MW80C
36MW81C
GL
FM
PENSACOLA BAY
LEGEND
– BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
– SHORELINE
– IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
– E/A&H SITE 38 INTERMEDIATE MONITORING WELL
– E/A&H SITE 38 SHALLOW MONITORING WELL
– EPA WELL
– GRAVITY LINE (SEWER)
– FORCE MAIN (SEWER)
– MANHOLE
– GRASSY AREA
70 0 70
SCALE FEET
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
FOCUSED FEASIBILITY STUDY
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 2-11
BUILDING 71
SVOCs EXCEEDING GCTLs
2000 GROUNDWATER SAMPLING EVENT
DWG DATE: 10/26/04
DWG NAME: 0059001B035

16
38GS28
38GS31
636
18GS02
604
38GS25
38GR52
38GS27
38GS30
47
38GS22
38GS21
38GI04
38GS19
38GS20
38GS14
38GS17
18
38GR54
36MW77C
38GS24
36MW75C
38GS15
CRITERIA EXCEEDANCE
GC Napththalene
38GS18
CRITERIA EXCEEDANCE
GC ACENAPHTHENE, DIBENZOFURAN
MSWQ ACENAPHTHENE, ANTHRACENE, DIBENZOFURAN, FLUORANTHENE, PHENANTHRENE, PYRENE
38GS08
38GS26
36MW76C
38GI08
38GS16
38GI07
38GS07
52
38GS09
38GS29
36MW74C
36MW73C
36MW78C
38GI09
45
36MW79C
38GS32
26
44
38
N
LEGEND
BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
SHORELINE
SAMPLED 2000
LOCATION EXCEEDS CRITERIA
IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
E/A&H SITE 38 INTERMEDIATE MONITORING WELL
E/A&H SITE 38 SHALLOW MONITORING WELL
EPA WELL
GC – GROUNDWATER CRITERIA
MSWQ – MARINE SURFACE WATER QUALITY CRITERIA
GRASSY AREA
NOTE:
SCREENED WELLS WERE EITHER NOT SAMPLED OR WERE SAMPLED BUT NOT FOR SPECIFIED ANALYSIS.
100 0 100
SCALE FEET
NAVFAC
Naval Facilities Engineering Command
SOUTHERN DIVISION
FOCUSED FEASIBILITY STUDY
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA
FIGURE 2–12
BUILDING 604
SVOC GCTL EXCEEDANCES
2000 GROUNDWATER SAMPLING EVENT
DWG DATE: 10/25/04
DWG NAME: 0059001B027



LEGEND

- [ ] – BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- – SHORELINE
- – LOCATION EXCEEDS CRITERIA
- – IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
- – E/A&H SITE 38 INTERMEDIATE MONITORING WELL
- – E/A&H SITE 38 SHALLOW MONITORING WELL
- – EPA WELL
- GL – GRAVITY LINE (SEWER)
- FM – FORCE MAIN (SEWER)
- MH – MANHOLE
- GC – GENERAL CRITERIA
- PCE – TETRACHLOROETHENE
- TCE – TRICHLOROETHENE
- VC – VINYL CHLORIDE
- – GRASSY AREA

NOTE:
SCREENED WELLS WERE EITHER NOT SAMPLED OR WERE SAMPLED BUT NOT FOR SPECIFIED ANALYSIS.

70 0 70
SCALE FEET

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SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 2-13
BUILDING 71
VOC GCTL EXCEEDANCES
2000 GROUNDWATER SAMPLING EVENT

DWG DATE: 10/26/04 | DWG NAME: 0059001B022

LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- SAMPLED 2000
- LOCATION EXCEEDS CRITERIA
- IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
- E/A&H SITE 38 INTERMEDIATE MONITORING WELL
- E/A&H SITE 38 SHALLOW MONITORING WELL
- EPA WELL
- PCE – TETRACHLOROETHENE
- TCE – TRICHLOROETHENE
- VC – VINYL CHLORIDE
- GC – GENERAL CRITERIA
- MSWQ – MARINE SURFACE WATER QUALITY CRITERIA
- GRASSY AREA

NOTE:
SCREENED WELLS WERE EITHER NOT SAMPLED OR WERE SAMPLED BUT NOT FOR SPECIFIED ANALYSIS.

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FOCUSED FEASIBILITY STUDY
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 2-14
BUILDING 604
VOC GCTL EXCEEDANCES
2000 GROUNDWATER SAMPLING EVENT

DWG DATE: 10/25/04 | DWG NAME: 0059001B029

Table 2-9
Building 71 Groundwater Criteria/Reference Concentrations Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**GC/RC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS01	Aluminum	3,882.8*	6,420	NS	NE	NE
	Iron	1,707.8*	6,820	NS	NE	ND
	Lead	15	276	NS	117	ND
	Manganese	50	174	NS	ND	NE
38GS02	Iron	1,707.8*	7,470	NS	NS	NE
	Lead	15	362	NS	NS	ND
38GS03	Antimony	6	ND	NS	70	ND
	Iron	1,707.8*	4,930	NS	NE	NE
	Lead	15	88.5	NS	NE	ND
	Manganese	50	NE	NS	50	NE
38GS05	Cadmium	5	9.7	NS	NS	5.9
	Lead	15	55.8	NS	NS	NE
38GS06	Manganese	50	97.80	NS	NS	NS
38GS10	Aluminum	3,882.8*	8,940	NS	NS	NE
	Iron	1,707.8*	15,700	NS	NS	NE
	Lead	15	54	NS	NS	ND
	Manganese	50	101	NS	NS	NE
38GS11	Lead	15	20.1	NS	NS	NE
38GS12	Aluminum	3,882.8*	11,400	NS	ND	NE
	Antimony	30.2*	ND	NS	180	ND
	Arsenic	50	102	NS	NE	NE
	Cadmium	5	NE	NS	50	ND
	Chromium (Total)	100	326	NS	ND	NE
	Iron	1,707.8*	17,600	NS	NE	NE
	Lead	15	280	NS	128	NE
	Manganese	50	128	NS	NE	NE
	Vanadium	49	74.6	NS	ND	ND
38GS13	Cadmium	5	11	NS	NS	NE
	Chromium (Total)	100	184	NS	NS	NE
	Iron	1,707.8*	4,560	NS	NS	NE
	Lead	15	158	NS	NS	NE

Notes:
GC/RC = The larger value (GC or RC) was used
* = Reference concentration was used for iron and aluminum
NE = Concentration did not exceed GC/RC
ND = Parameter was not detected
NS = Well was not sampled
µg/L = microgram per liter

Building 71 — Semivolatile Organic Compounds

No SVOC parameters exceeded GC during the 2000 sampling event in this area. Table 2-10 summarizes the historical SVOC GC exceedances for this sampling event and other sampling events.

Table 2-10
Building 71 — Groundwater Criteria Exceedances for SVOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**GCs**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS02	Naphthalene	20	44	NS	NS	NE
38GS09	Bis(2-Ethylhexyl)phthalate	6	NS	11	NS	NS
38GS12	Naphthalene	20	44	NS	NE	ND
	1,2,4-Trimethylbenzene	10	ND	NS	23	ND
	1,3,5-Trimethylbenzene	10	ND	NS	12	ND

Notes:
NS = Well was not sampled
NE = Concentration did not exceed GC
ND = Parameter was not detected
µg/L = microgram per liter

Building 71 — Volatile Organic Compounds

During the 2000 sampling event, three VOCs exceeded GC: PCE, TCE, and vinyl chloride, as highlighted in Table 2-11. PCE exceeded its GC (3 µg/L) in well 38GS12 (11 µg/L). TCE exceeded its GC (3 µg/L) in wells 38GS03 (4 µg/L), 38GS12 (6 µg/L), and 38GS13 (5 µg/L). Vinyl chloride exceeded its GC (1 µg/L) in 3 wells: 38GS02 (3 µg/L), 38GS12 (7 µg/L), and 38GS13 (4 µg/L).

Table 2-11
Building 71 — Groundwater Criteria Exceedances for VOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**GC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS02	Chloroethane (Ethyl chloride)	12	NE	NS	13	NE
	Vinyl Chloride	1	12	NS	ND	3
38GS03	Benzene	1	ND	NS	2	NE
	Trichloroethene	3	ND	NS	4	4
	Vinyl Chloride	1	ND	NS	3	1
38GS05	Tetrachloroethene	3	NE	NS	NS	3
	Trichloroethene	3	NE	NS	NS	3
38GS11	Chloroform	5.7	6	NS	NS	ND
38GS12	1,1,1-Trichloroethane	200	770	NS	NE	NE
	1,1,2,2-Tetrachloroethane	0.2	ND	NS	100	ND
	1,1-Dichloroethane	70	640	NS	NE	NE
	1,1-Dichloroethene	7	42	NS	ND	ND
	Chloroform	5.7	24	NS	NE	NE
	Tetrachloroethene	3	33	NS	102	11
	Trichloroethene	3	53	NS	25	6
	Vinyl Chloride	1	ND	NS	15	7

Table 2-11
Building 71 — Groundwater Criteria Exceedances for VOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**GC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS13	Tetrachloroethene	3	3	NS	NS	ND
	Trichloroethene	3	4	NS	NS	5
	Vinyl Chloride	1	11	NS	NS	4

Notes:
NE = Concentration did not exceed GC
ND = Parameter was not detected
NS = Well was not sampled
µg/L = microgram per liter

Building 604 — Inorganics

Four inorganics exceeded GC and RC in this area during the 2000 sampling event: cadmium, iron, lead, and manganese, as highlighted in Table 2-12. Cadmium exceeded its GC in four wells. Iron and lead exceeded their GC in one well each, and manganese exceeded its GC in two wells.

Table 2-12
Building 604 — General Criteria and Reference Concentrations Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**GC/RC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GI04	Aluminum	3,882.8*	9,110	NE	NS	ND
	Cadmium	5	14.5	ND	NS	ND
	Chromium (Total)	100	370	ND	NS	ND
	Manganese	50	140	NE	NS	NE
38GS07	Lead	15	18.6	ND	NS	NE
38GS08	Antimony	30.2	ND	NS	210	ND
	Cadmium	5	14.7	NS	50	NE
	Chromium (Total)	100	233	NS	100	NE
	Lead	15	79.2	NS	116	NE
	Manganese	50	194	NS	1,990	NE
38GS09	Iron	1,707.8*	4,660	NE	NS	NE
	Lead	15	58.8	NE	NS	NE
38GS14	Cadmium	5	14.5	NS	NS	19
	Lead	15	118	NS	NS	NE
38GS15	Lead	15	52	NS	NS	ND
38GS17	Lead	15	65.2	ND	NS	ND
38GS18	Lead	15	71.2	NE	NS	59
38GS19	Antimony	30.2	ND	NS	60	NE
	Cadmium	5	382	NS	NE	79
	Chromium (Total)	100	544	NS	NE	NE
	Iron	1,707.8*	2,650	NS	NE	NE
	Lead	15	180	NS	58	ND
	Manganese	50	155	NS	950	NE

Table 2-12
Building 604 — General Criteria and Reference Concentrations Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**GC/RC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS20	Aluminum	3,882.8*	20,000	NS	NS	NE
	Cadmium	5	34.1	NS	NS	ND
	Chromium (Total)	100	378	NS	NS	ND
	Iron	1,707.8*	24,900	NS	NS	NE
	Lead	15	110	NS	NS	ND
	Manganese	50	98.1	NS	NS	NE
	Vanadium	49	65.8	NS	NS	NE
38GS21	Cadmium	5	336	NS	NS	150
	Chromium (Total)	100	297	NS	NS	NE
	Iron	1,707.8*	4,520	NS	NS	NE
	Lead	15	639	NS	NS	NE
	Manganese	50	104	NS	NS	NE
38GS24	Cadmium	5	NS	11	NS	12
	Iron	1,707.8*	NS	3,200	NS	6,100
38GS26	Manganese	50	NS	120	NS	NS
38GS29	Manganese	50	NS	130	NS	190
38GS32	Antimony	30.2	NS	ND	190	ND
	Lead	15	NS	ND	24	NE
	Manganese	50	NS	NE	ND	83

Notes:
GC/RC = The larger value (GC or RC) was used
* = Reference concentration was used for iron and aluminum
NE = Concentration did not exceed GC/RC
ND = Parameter was not detected
NS = Well was not sampled
µg/L = microgram per liter

Building 604 — Semivolatile Organic Compounds

Three SVOCs exceeded GC in this area during the 2000 sampling: acenaphthene, dibenzofuran, and naphthalene. Acenaphthene exceeded its GC (20 µg/L) in well 38GS18 (79 µg/L). Dibenzofuran exceeded its GC (28 µg/L) in well 38GS18 (91 µg/L). Naphthalene exceeded its GC (20 µg/L) in well 38GS15 (170 µg/L). Table 2-13 summarizes exceedances for all sampling events.

Table 2-13
Building 604 — Groundwater Criteria Exceedances for SVOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**GC**	**1993/ 1994**	**1995/ 1996**	**1998/ 1999**	**2000**
38GS15	Naphthalene	20	140	NS	NS	170
38GS17	Naphthalene	20	NE	24	NS	NE
38GS18	2,4-Dinitrotoluene	0.1	2	ND	NS	ND
	Acenaphthene	20	NE	NE	NS	79
	Dibenzofuran	28	NE	ND	NS	91
38GS32	Bis(2-Ethylhexyl)phthalate	6	NS	22	NS	ND

Notes:
NE = Concentration did not exceed GC
ND = Parameter was not detected
NS = Well was not sampled
µg/L = microgram per liter

Building 604 — Volatile Organic Compounds

Five VOCs exceeded GC in this area during the 2000 sampling: 1,2-dibromo-3-chloropropane, ethylbenzene, TCE, PCE, and vinyl chloride. 1,2-Dibromo-3-chloropropane exceeded its GC (0.2 µg/L) in well 38GI08 (1 µg/L). Ethylbenzene exceeded its GC (30 µg/L) in well 38GS15 (53 µg/L). PCE exceeded its GC (3 µg/L) in six wells: 38GS08 (4 µg/L), 38GS09 (3 µg/L), 38GS14 (12 µg/L), 38GS18 (14 µg/L), 38GS19 (25 µg/L), and 38GS21 (27 µg/L). TCE exceeded its GC (3 µg/L) in eight wells: 38GS08 (17 µg/L), 38GS09 (10 µg/L), 38GS14 (18 µg/L), 38GS18 (15 µg/L), 38GS19 (20 µg/L), 38GS21 (3 µg/L), 38GS22 (4 µg/L), and 38GS24 (4 µg/L). Vinyl chloride exceeded its GC (1 µg/L) in nine wells with concentrations ranging from 2 µg/L (38GS32) to 22 µg/L (38GS08). Table 2-14 summarizes GC exceedances occurring in the four sampling events.

Table 2-14
Building 604 — Groundwater Criteria Exceedances for VOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**GC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GI04	Vinyl Chloride	1	ND	4.2	NS	NE
38GI08	1,2-Dibromo-3-chloropropane	0.2	ND	ND	NS	1
	Vinyl Chloride	1	ND	1.9	NS	NE
38GS07	Vinyl Chloride	1	ND	6.2	NS	NE
38GS08	Tetrachloroethene	3	14	NS	8	4
	Trichloroethene	3	33	NS	24	17

Table 2-14
Building 604 — Groundwater Criteria Exceedances for VOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**GC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
	Vinyl Chloride	1	6	NS	ND	22
38GS09	Tetrachloroethene	3	NE	NE	NS	3
	Trichloroethene	3	6	8.4	NS	10
	Vinyl Chloride	1	12	6.6	NS	3
38GS14	Tetrachloroethene	3	20	NS	NS	12
	Trichloroethene	3	19	NS	NS	18
38GS15	1,1-Dichloroethane	70	180	NS	NS	NE
	Ethylbenzene	30	89	NS	NS	53
	Vinyl Chloride	1	41	NS	NS	3
38GS17	1,1-Dichloroethene	7	ND	21	NS	ND
	cis-1,2-Dichloroethene	70	ND	460	NS	ND
	Tetrachloroethene	3	4	110	NS	ND
	Trichloroethene	3	ND	19	NS	ND
	Vinyl Chloride	1	1,600	3,700	NS	7
38GS18	Tetrachloroethene	3	41	10	NS	14
	Trichloroethene	3	20	7.6	NS	15
38GS19	1,1,1,2-Tetrachloroethane	1.3	ND	NS	22	ND
	1,2-Dichloroethene (Total)	63	130	NS	ND	ND
	Tetrachloroethene	3	240	NS	22	25
	Trichloroethene	3	41	NS	22	20
	Vinyl Chloride	1	29	NS	3	16
38GS20	1,2-Dichloroethene (Total)	63	970	NS	ND	ND
	Tetrachloroethene	3	14	NS	ND	ND
	Vinyl Chloride	1	1,100	NS	15	12
38GS21	1,2-Dichloroethene (Total)	63	100	NS	NS	ND
	Tetrachloroethene	3	280	NS	NS	27
	Trichloroethene	3	13	NS	NS	3
	Vinyl Chloride	1	15	NS	NS	ND
38GS22	Tetrachloroethene	3	NS	7	NS	NE
	Trichloroethene	3	NS	9	NS	4
	Vinyl Chloride	1	NS	70	NS	20
38GS24	Trichloroethene	3	NS	3.6	NS	4
38GS29	Trichloroethene	3	NS	4	NS	NE
	Vinyl Chloride	1	NS	43	NS	6
38GS32	cis-1,2-Dichloroethene	70	NS	640	NE	NE
	Tetrachloroethene	3	NS	820	5	ND
	Trichloroethene	3	NS	340	5	ND
	Vinyl Chloride	1	NS	130	14	2

Notes:
NE = Concentration did not exceed GC
ND = Parameter was not detected
NS = Well was not sampled
µg/L = microgram per liter

2.1.3.2 Marine Surface Water Quality Criteria

To assess potential impacts to offsite marine surface water, groundwater detections were screened at the three most downgradient wells from each study area using MSWQ criteria (and RC for inorganics).

Building 71 — Inorganics

During the 2000 sampling event, three inorganics exceeded their MSWQs or RCs: barium, copper, and zinc. Barium exceeded its MSWQ (14.55 µg/L) in all three wells: 38GS02 (26 µg/L), 38GS03 (41 µg/L), and 38GS13 (21 µg/L). Copper exceeded its RC (16.2 µg/L) in only one well: 38GS13 (17 µg/L). Zinc exceeded its RC (153.2 µg/L) in well 38GS03 (500 µg/L). Table 2-15 highlights exceedances from all sampling events.

Table 2-15
Building 71 — Marine Surface Water Criteria Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**MSWQ/RC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS02	Barium	14.55	21.6	NS	NS	26
	Copper	16.2*	311	NS	NS	NE
	Iron	1,707.8*	7,470	NS	NS	NE
	Lead	5.6	362	NS	NS	ND
38GS03	Barium	14.55	79.6	NS	140	41
	Copper	16.2*	45.6	NS	ND	NE
	Iron	1,707.8*	4,930	NS	NE	NE
	Lead	5.6	88.5	NS	ND	NE
	Zinc	153.2*	819	NS	530	500
38GS13	Barium	14.55	ND	NS	NS	21
	Cadmium	9.3	11	NS	NS	NE
	Copper	16.2*	319	NS	NS	17
	Iron	1,707.8*	4,560	NS	NS	NE
	Lead	5.6	158	NS	NS	NE
	Zinc	153.2*	684	NS	NS	NE

Notes:

MSWQ/RC = The larger value (MSWQ or RC) was used
* = Reference concentration was used
NE = Concentration did not exceed MSWQ/RC
ND = Parameter was not detected
NS = Well was not sampled
µg/L = microgram per liter

Building 71 — Semivolatile Organic Compounds

No SVOCs exceeded MSWQ during the 2000 sampling event. For historical exceedances, see Table 2-16.

Table 2-16
Building 71 — Marine Surface Water Criteria Exceedances for SVOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**MSWQ**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS02	Naphthalene	26	44.00	NS	NS	NE

Notes:
NE = Concentration did not exceed MSWQ/RC
NS = Well was not sampled
µg/L = microgram per liter

Building 71 — Volatile Organic Compounds

No VOCs exceeded their MSWQ during the 2000 sampling event or any of the previous sampling events.

Building 604 — Inorganics

During the 2000 sampling event, five inorganics exceeded their MSWQs or RCs: barium, copper, lead, mercury, and zinc. Barium exceeded its MSWQ (14.55 µg/L) in all three wells: 38GS07 (99 µg/L), 38GS18 (60 µg/L), and 38GS32 (76 µg/L). Copper exceeded its RC in well 38GS18 (20 µg/L). Lead concentrations in two wells exceeded its MSWQ (5.6 µg/L): 38GS18 (59 µg/L) and 38GS32 (11 µg/L). Mercury exceeded its RC (0.2 µg/L) in well 38GS18 (0.46 µg/L). Zinc exceeded its RC (153.2 µg/L) in well 38GS18 (370 µg/L). The exceedances are listed in Table 2-17.

Table 2-17
Building 604 — Marine Surface Water Criteria Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**MSWQ/RC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS07	Barium	14.55	55.8	68	NS	99
	Lead	5.6	18.6	ND	NS	NE
	Mercury	0.2*	1	ND	NS	ND

Table 2-17
Building 604 — Marine Surface Water Criteria Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**MSWQ/RC**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS18	Barium	14.55	ND	99	NS	60
	Copper	16.2*	222	NE	NS	20
	Lead	5.6	71.2	NE	NS	59
	Mercury	0.2*	ND	ND	NS	0.46
	Zinc	153.2*	325	620	NS	370
38GS32	Barium	14.55	NS	60	144	71
	Copper	16.2*	NS	ND	20	ND
	Lead	5.6	NS	ND	24	11

Notes:
MSWQ/RC = The larger value (MSWQ or RC) was used
* = Reference concentration was used
NE = Concentration did not exceed MSWQ
ND = Parameter was not detected
NS = Well was not sampled
µg/L = microgram per liter

Building 604 – Semivolatile Organic Compounds

During the 2000 sampling event, six SVOCs exceeded their MSWQs, all at well 38GS18: acenaphthene (MSWQ is 3 µg/L) at 79 µg/L, anthracene (MSWQ is 0.3 µg/L) at 11 µg/L, dibenzofuran (MSWQ is 67 µg/L) at 91 µg/L, fluoranthene (MSWQ is 0.3 µg/L) at 24 µg/L, phenanthrene (MSWQ is 0.031 µg/L) at 190 µg/L, and pyrene (MSWQ is 0.3 µg/L) at 11 µg/L. SVOC exceedances for Building 604 are highlighted in Table 2-18.

Table 2-18
Building 604 — Marine Surface Water Criteria Exceedances for SVOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**MSWQ**	**1993/ 1994**	**1995/ 1996**	**1998/ 1999**	**2000**
38GS18	Acenaphthene	3	4	NE	NS	79
	Anthracene	0.3	17	ND	NS	11
	Dibenzofuran	67	NE	ND	NS	91
	Fluoranthene	0.3	23	7	NS	24
	Phenanthrene	0.031	170	ND	NS	190
	Pyrene	0.3	11	8.8	NS	11
38GS32	bis(2-Ethylhexyl)phthalate (BEHP)	0.02	NS	22	ND	ND

Notes:
NE = Concentration did not exceed MSWQ
ND = Parameter was not detected
NS = Well was not sampled
µg/L = microgram per liter

Building 604 — Volatile Organic Compounds

During the 2000 sampling event, only PCE exceeded its MSWQ (8.85 µg/L) at 38GS18 (14 µg/L). Table 2-19 highlights historical exceedances.

Table 2-19
Building 604 — Marine Surface Water Criteria Exceedances for VOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**MSWQ**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS18	1,1-Dichloroethene	3.2	4	NE	NS	ND
	Tetrachloroethene	8.85	41	10	NS	14
38GS32	Tetrachloroethene	8.85	NS	820	NE	ND
	Trichloroethene	80.7	NS	340	NE	ND

Notes:
NE = Concentration did not exceed MSWQ
ND = Parameter was not detected
NS = Well was not sampled
µg/L = microgram per liter

2.1.4 Screening Summary

Screening of soil and groundwater results identified several locations requiring a feasibility study based on residential and industrial land use scenarios for soil, soil leachability criteria, and on the various groundwater criteria. Areas recommended for a feasibility study are discussed in the following section.

2.2 Remedial Action Objectives

Remedial action objectives (RAOs) provide a general description of what the remediation alternative will accomplish. The remedial alternatives selection process begins during the planning of the RI when preliminary remediation objectives, based on readily available information such as presence of chemical-specific ARARs, are set. As the RI/FS proceeds, RAOs are modified as needed to reflect better understanding of the site and identified ARARs.

In developing RAOs for the FFS, these issues were addressed:

- Preliminary Remediation Goals (PRGs) based on chemical-specific ARARs
- The BRA that includes human health and ecological assessments and exposure pathways
- Potential groundwater contamination by residual contaminants in site soil

2.2.1 Chemical-Specific ARARs and To-Be-Considered (TBCs)

In accordance with the National Contingency Plan, remedial goals (RGs) must establish acceptable exposure levels that are protective of human health and the environment. They must be developed by considering the following:

- Water quality criteria established under the Clean Water Act (CWA) where relevant and appropriate
- Florida Soil Cleanup Target Levels, for human health and leachability to groundwater (FAC 62-777)
- 95% Upper Confidence Limits, for protection of human health on a site-wide basis for soil
- Groundwater Cleanup Target Levels (GCTLs), protective of groundwater (FAC 62-777)

Chemical-specific ARARs and TBCs will be considered in developing remedial objectives for the site. Appendix A lists all ARARs and TBCs. ARARs that might impact the selection and screening of technologies (such as land-ban criteria) will be considered in the technologies discussion, if appropriate.

2.2.2 Remedial Goals

Final RGs must establish acceptable exposure levels protective of human health and the environment and must consider ARARs.

The following remedial goals have been developed for Site 38:

- Evaluation of surface and subsurface soil for both unrestricted use and industrial risk
- Protection of the environment by managing future soil-to-groundwater transfer of contaminants

- Mitigation of groundwater use in areas where constituents exceed federal and state groundwater standards. Although the surficial aquifer is unlikely to be used as a potable water source, the State of Florida regards it as a potential drinking water aquifer.

2.2.2.1 Soil Remedial Goals

Once COCs were identified by the process in Section 2.1.2, the extent of contamination was evaluated based on unrestricted use and industrial use risk. For the unrestricted use scenario, all locations exceeding acute toxicity, 3X RSCTLs, 95% UCL and/or leachability criteria must be addressed in the feasibility study. For the industrial scenario, only locations with a grass and/or soil surface (not asphalt or concrete surface) and exceeding 3X ISCTL and/or leachability criteria must be addressed in the feasibility study. Under the industrial scenario, locations that are "capped" by an impermeable soil layer, asphalt, or concrete are protective of human health for industrial use, because the cap reduces the risk of exposure and leachability to groundwater. Institutional controls would be required to ensure that the cover is maintained.

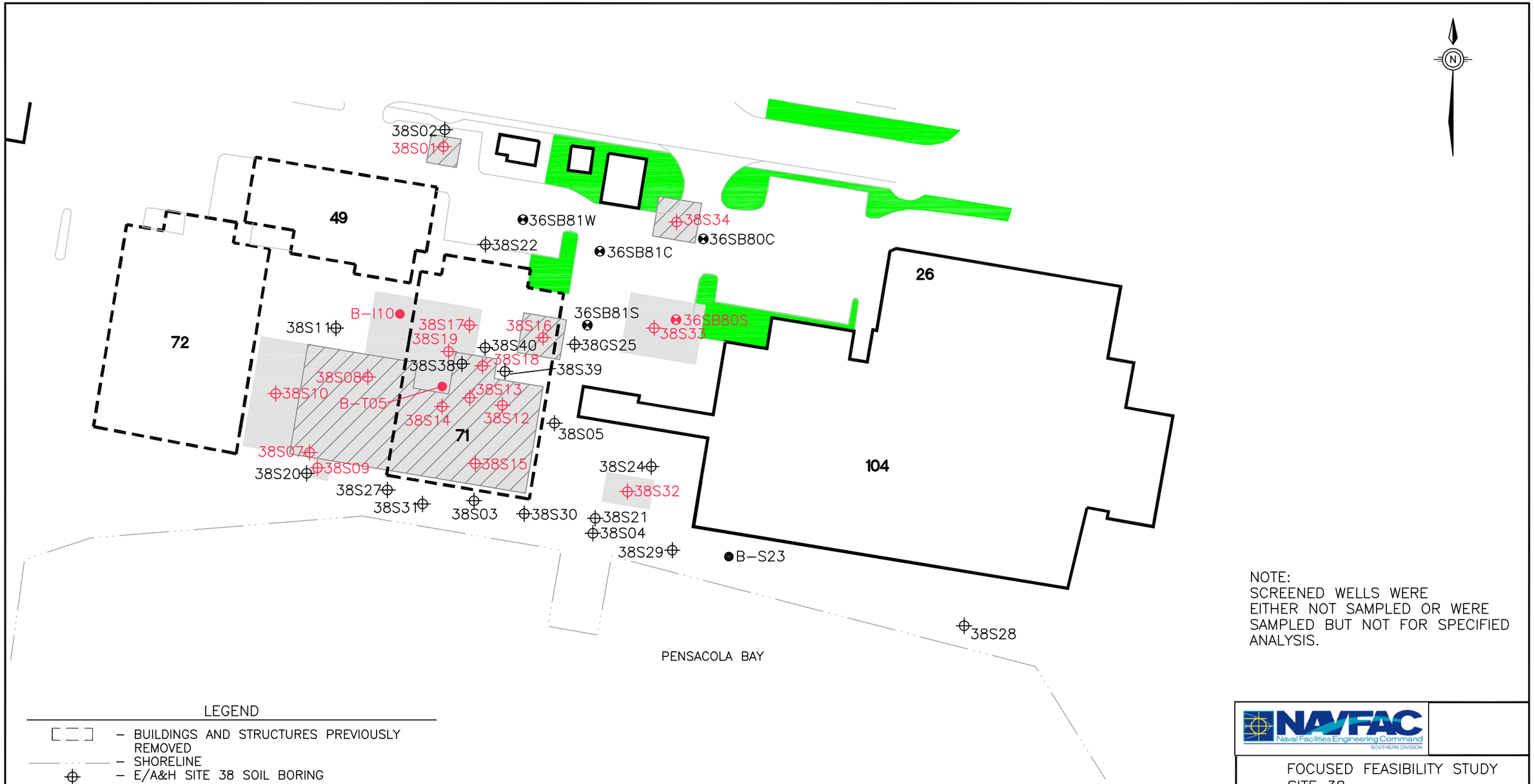
2.2.2.2 Groundwater Remedial Goals

Contaminants were screened against PRGs, which include ARARs and RCs. Once COCs were identified, the extent of contamination was evaluated.

2.2.3 Extent of Contamination

2.2.3.1 Soil

A summary table showing all locations exceeding 3X SCTLs and descriptions of these locations is included in Appendix I. Areas with surface and subsurface soil contamination exceeding residential RGs are shown on Figures 2-15 and 2-16. If the Buildings 71 and 604 areas were redeveloped for unrestricted use, removal of structures and pavement would likely occur, thereby exposing soil currently covered by pavement and the building. Table 2-20 summarizes locations requiring a feasibility study under the unrestricted use scenario, which were used to estimate a soil volume for the feasibility study.



NOTE:
SCREENED WELLS WERE EITHER NOT SAMPLED OR WERE SAMPLED BUT NOT FOR SPECIFIED ANALYSIS.

LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- E/A&H SITE 38 SOIL BORING
- IWTP SEWERLINE STUDY SOIL BORING
- EPA SOIL BORING
- EXCEEDS 3X RSCTL AND/OR LEACHABILITY CRITERIA
- REMOVAL AREA TO 2 FEET DEEP
- REMOVAL AREA TO 5 FEET DEEP
- GRASSY AREA

NOTES: BORING 38S28 IS INCLUDED WITH BUILDING 604 DISCUSSION.
NO BORINGS WITH A GRASS SURFACE EXCEED 3X ISCTL AND/OR LEACHABILITY CRITERIA

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FIGURE 2-15
BUILDING 71
SOIL FEASIBILITY STUDY AREAS
RESIDENTIAL SCENARIO

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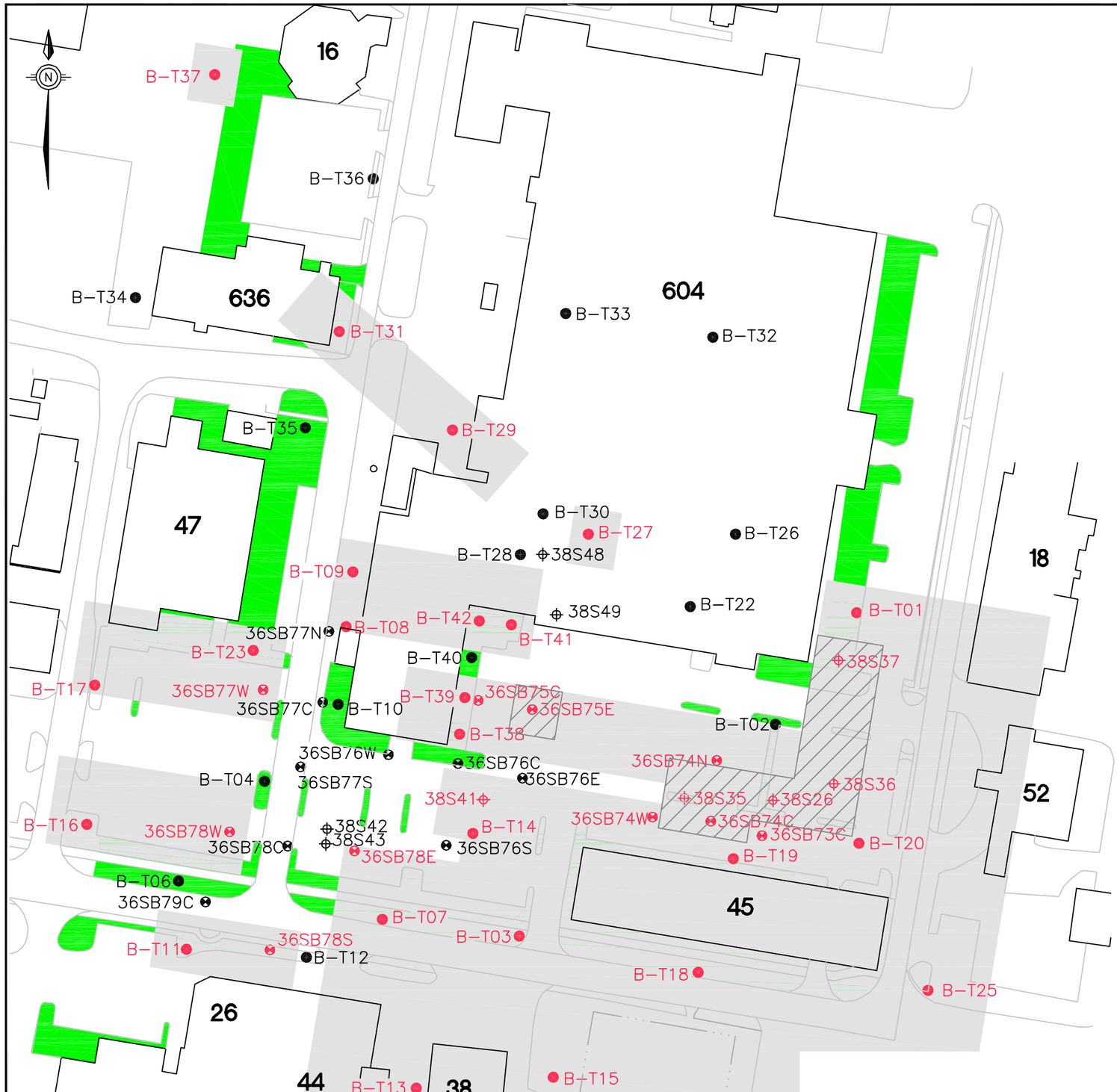

LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- E/A&H SITE 38 SOIL BORING
- IWTP SEWERLINE STUDY SOIL BORING
- EPA SOIL BORING
- EXCEEDS 3X RSCTL AND/OR LEACHABILITY CRITERIA
- REMOVAL AREA TO 2 FEET DEEP
- REMOVAL AREA TO 5 FEET DEEP
- GRASSY AREA

NOTES: BORING 38S28 IS SHOWN ON FIGURES FOR BUILDING 71.

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PENSACOLA, FLORIDA

FIGURE 2-16
BUILDING 604
SOIL FEASIBILITY STUDY AREAS
RESIDENTIAL SCENARIOS

DWG DATE:10/25/04 | NAME: 0059001B028

Table 2-20
Soil Locations Listed for Feasibility Study
Unrestricted Scenario

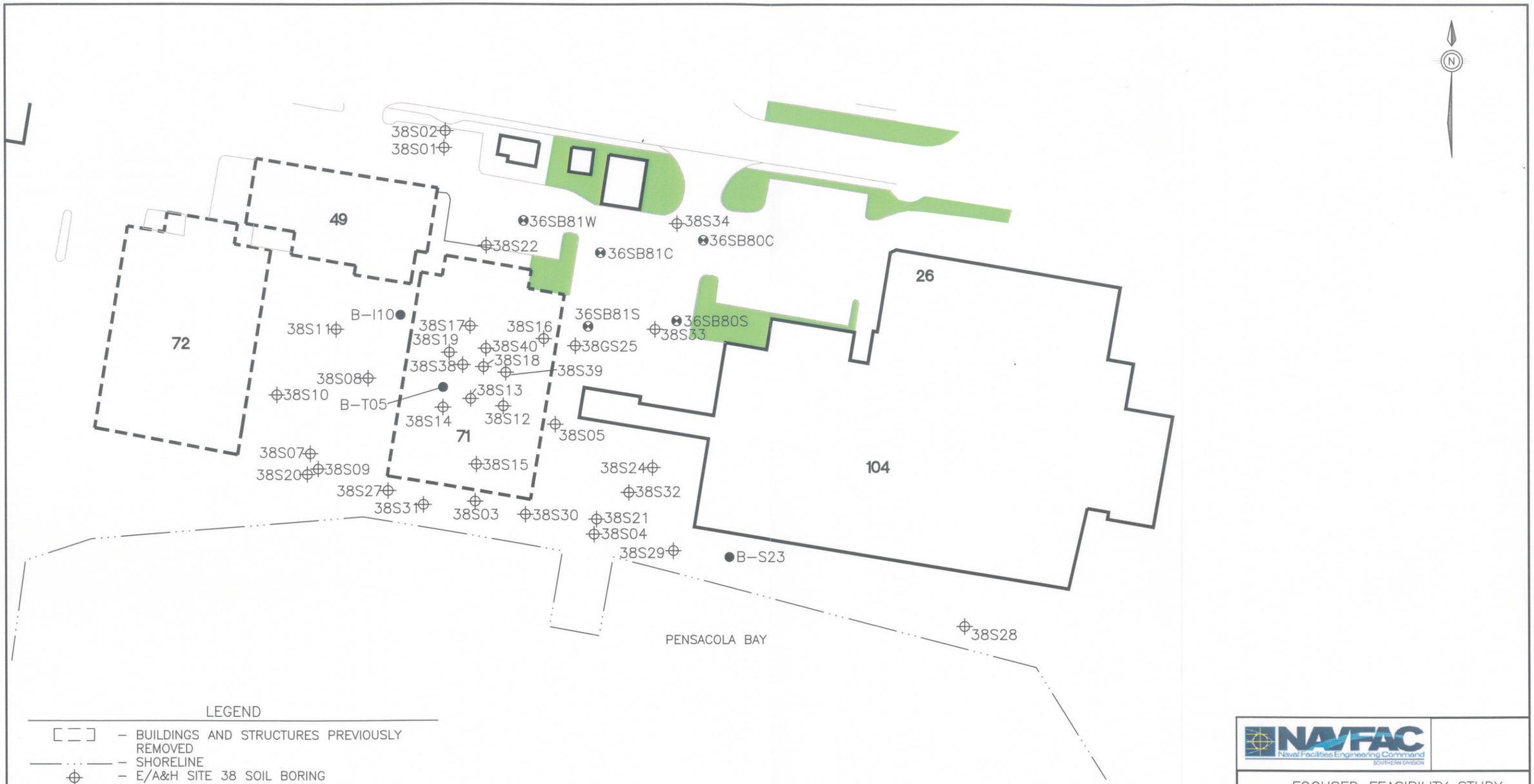
Soil Boring	Contains Parameter Exceeding Acute Toxicity or 3X RSCTL?	Contains Parameter Exceeding Leachability Criteria?	Surface Soil	Subsurface Soil
Building 71				
36SB80S	X	—	X	—
38S01	X	—	X	X
38S07	X	X	X	X
38S08	—	X	—	X
38S09	—	X	X	—
38S10	—	X	X	—
38S12	X	X	X	X
38S13	X	X	X	X
38S14	X	X	X	X
38S15	—	X	X	X
38S16	X	X	X	X
38S17	—	X	X	—
38S18	X	X	X	X
38S19	—	X	X	—
38S24	X	—	—	X
38S32	X	—	X	—
38S33	X	—	X	—
38S34	X	—	X	X
B-I10	—	X	X	—
B-T05	X	X	X	—
Building 604				
36SB73C	—	X	X	—
36SB74C	X	X	X	X
36SB74N	X	—	X	—
36SB74W	X	—	X	—
36SB75C	X	—	X	—
36SB75E	X	—	X	X
36SB77W	X	—	X	—
36SB78E	X	—	X	—
38SB78S	—	X	X	—
36SB78W	X	X	X	—
38S26	X	X	X	X
38S35	X	—	X	X
38S36	X	—	X	X
38S37	X	X	X	X
38S41	X	—	X	—
B-T01	X	—	X	—
B-T03	—	X	X	—
B-T07	—	X	X	—
B-T08	X	X	X	—
B-T09	X	—	X	—
B-T11	X	—	X	—
B-T13	X	—	X	—
B-T14	X	—	X	—

Table 2-20
Soil Locations Listed for Feasibility Study
Unrestricted Scenario

Soil Boring	Contains Parameter Exceeding Acute Toxicity or 3X RSCTL?	Contains Parameter Exceeding Leachability Criteria?	Surface Soil	Subsurface Soil
B-T15	X	X	X	—
B-T16	X	—	X	—
B-T17	X	—	X	—
B-T18	X	—	X	—
B-T19	X	—	X	—
B-T20	X	—	X	—
B-T23	X	—	X	—
B-T25	X	—	X	—
B-T27	X	—	X	—
B-T29	—	X	X	—
B-T31	X	—	X	—
B-T37	—	X	X	—
B-T38	—	X	X	—
B-T39	X	—	X	—
B-T41	X	X	X	—
B-T42	X	X	X	—

Under the unrestricted use scenario, the total volume of impacted soil is approximately 3,600 cubic yards (yd^3) for the Building 71 area and 22,400 yd^3 for the Building 604 area. The following parameters are listed as COCs for Building 71: arsenic, chromium, copper, lead, vanadium, aroclor-1254, BEQs, 2-methyphenol, 4-methylphenol, phenol, 1,2-dichloroethane, PCE, and TCE. The following parameters are listed as COCs for Building 604: antimony, arsenic, cadmium, chromium, copper, lead, vanadium, beta-BHC, delta-BHC, dieldrin, BEQs, acetone, methylene chloride, and PCE.

Areas where surface and subsurface contamination exceeds industrial RGs are shown on Figures 2-17 and 2-18. If the areas around Buildings 71 and 604 continue their industrial use, structures and pavement would remain in place to serve as a "cap" protective of human health. Only soil in grassy or pervious (not paved with concrete or asphalt) would require removal. The summary table showing all locations exceeding 3X SCTLs and descriptions of these locations is in Appendix I. Table 2-21 summarizes locations requiring a feasibility study for industrial use, thereby creating an estimate of soil volume for feasibility study.



LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- E/A&H SITE 38 SOIL BORING
- IWTP SEWERLINE STUDY SOIL BORING
- EPA SOIL BORING
- GRASSY AREA

NOTES: BORING 38S28 IS INCLUDED WITH BUILDING 604 DISCUSSION.
NO BORINGS WITH A GRASS SURFACE EXCEED 3X ISCTL AND/OR LEACHABILITY CRITERIA, THEREFORE, NO SOIL REQUIRING FEASIBILITY STUDY FOR INDUSTRIAL USE.

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FIGURE 2-17
BUILDING 71
SOIL FEASIBILITY STUDY AREAS
INDUSTRIAL SCENARIOS

DWG DATE:10/25/04 | NAME: 0059001B039

LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- E/A&H SITE 38 SOIL BORING
- IWTP SEWERLINE STUDY SOIL BORING
- EPA SOIL BORING
- EXCEEDS 3X ISCTL AND/OR LEACHABILITY CRITERIA
- REMOVAL AREA TO 2 FEET DEEP
- REMOVAL AREA TO 5 FEET DEEP
- GRASSY AREA

NOTES: BORING 38S28 IS SHOWN ON FIGURES FOR BUILDING 71. LOCATIONS EXCEEDING 3X ISCTL AND/OR LEACHABILITY AND ARE GRASS SURFACE ARE PROPOSED FOR REMOVAL.

100 0 100
SCALE FEET

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FOCUSED FEASIBILITY STUDY
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FIGURE 2-18
BUILDING 604
SOIL FEASIBILITY STUDY AREAS
INDUSTRIAL SCENARIOS

DWG DATE:10/26/04 | NAME: 0059001B026

Table 2-21
Locations Listed for Feasibility Study
Industrial Scenario

Soil Boring	Contains Parameter Exceeding 3X ISCTL?	Contains Parameter Exceeding Leachability Criteria?	Surface Soil Removal	Subsurface Soil Removal
Building 71				
None				
Building 604				
36SB78S	—	X	X	—
38S26*	X	—	X	—
38S35	X	—	X	—
38S37	—	X	X	X
B-T03	—	X	X	—
B-T07	—	X	X	—
B-T15	—	X	X	—
B-T37	—	X	X	—
B-T38	—	X	X	—
B-T41	—	X	X	—
B-T42	—	X	X	—

Note:
* = Locations 38S26 is under asphalt pavement, but is included in this table because it is adjacent to a grassy median.

Under the industrial-use scenario, an asphalt or concrete cap limits the risk of exposure and leachability to groundwater. Therefore, locations under a cap and/or building are not included in the remedial or removal volume, totaling approximately 1,100 yd^3 for Building 604 area. Antimony, arsenic, cadmium, chromium, beta-BHC, dieldrin, benzo(a)pyrene, and acetone are COCs for this area. No areas requiring a feasibility study were identified in the Building 71 area.

2.2.3.2 Groundwater

Extent of contamination for groundwater was based on RG exceedances. With the exception of the three wells from each area compared to MSWQ, groundwater RGs for both study areas are the GC/RC. For wells 38GS02, 38GS03, and 38GS13 at Building 71 and wells 38GS07, 38GS18, and 38GS32 at Building 604, the MSWQ is the RG. Constituents exceeding RGs, are listed as COCs. Groundwater RGs are maximum contaminant levels (MCLs). Inorganics exceeding MCLs but below RCs, are considered naturally occurring concentrations. Tables 2-22 and 2-23 list COCs and the RGs.

Table 2-22
Chemicals of Concern and Remedial Goals for MSWQ Wells

COC	RG (µg/L)	Source
Barium	14.55	MSWQ
Copper	16.2	RC
Lead	5.6	MSWQ
Mercury	0.2	RC
Zinc	153.2	RC
Acenaphthene	3	MSWQ
Anthracene	0.3	MSWQ
Dibenzofuran	67	MSWQ
Fluoranthene	0.3	MSWQ
Phenanthrene	0.031	MSWQ
Pyrene	0.3	MSWQ
Bis(2-Ethylhexyl)phthalate (BEHP)	0.02	MSWQ
Tetrachloroethene	8.85	MSWQ

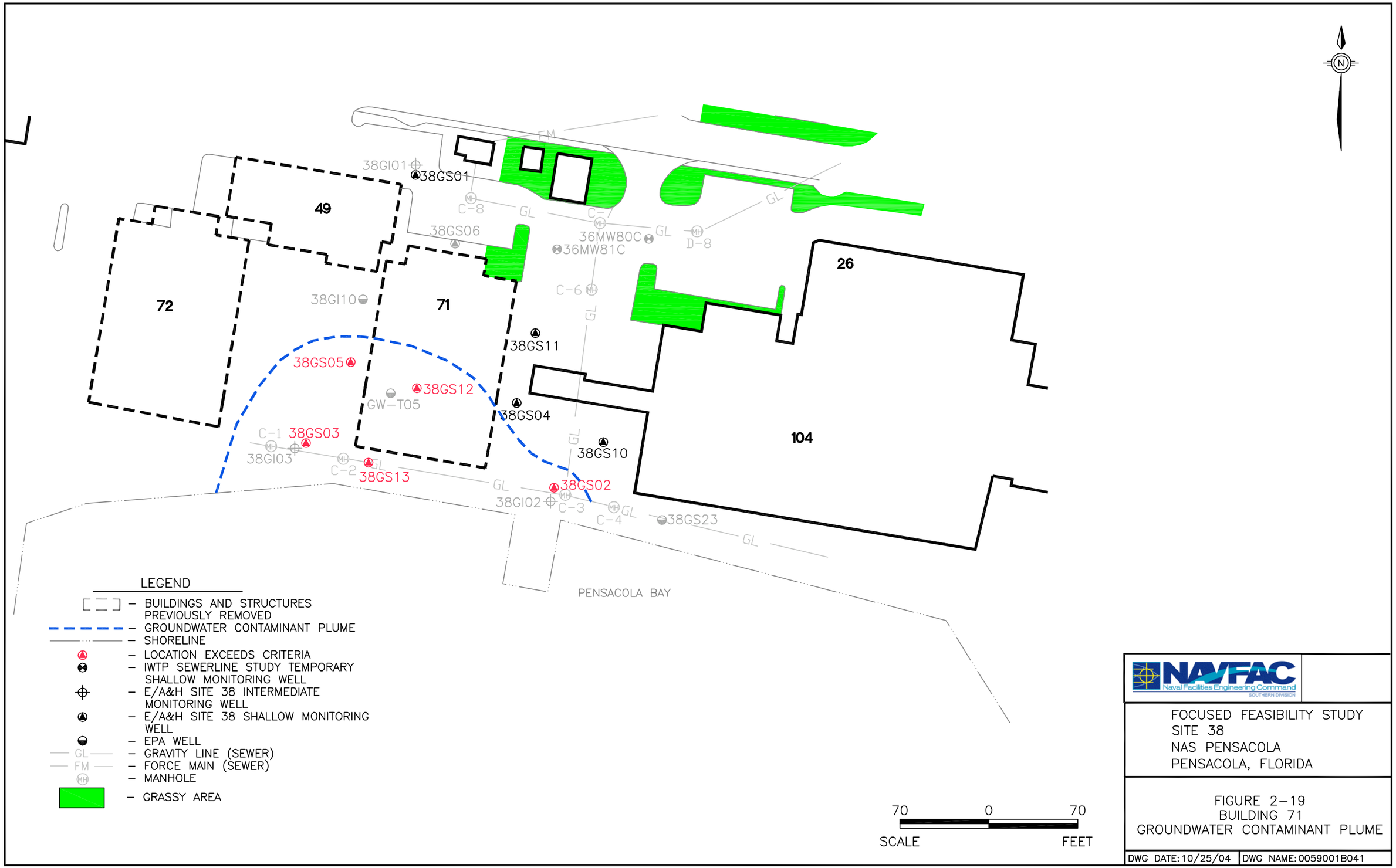
Notes:
COC = chemical of concern
RG = Remedial Goal
µg/L = micrograms per liter
MSWQ = Marine Surface Water Quality Criteria
RC = Reference Concentration

Table 2-23
Chemicals of Concern and Remedial Goals for Non-MSWQ Wells

COC	RG (µg/L)	Source
Cadmium	5	GC
Iron	1,707.8	RC
Lead	15	GC
Manganese	50	GC
Naphthalene	20	GC
Dibenzofuran	28	GC
Ethylbenzene	30	GC
1,2-Dibromo-3-chloropropane	0.2	GC
Tetrachloroethene	3	GC
Trichloroethene	3	GC
Vinyl Chloride	1	GC

Notes:
COC = chemical of concern
RG = Remedial Goal
µg/L = micrograms per liter
GC = General Criteria
RC = Reference Concentration

Using the remedial goals listed above, the volume of contaminated groundwater is estimated to be 1.1 million gallons for the Building 71 study area and 12 million gallons for the Building 604 study area. These volumes are assuming 13 feet of contaminated aquifer thickness and an average of 40 percent porosity. Figures 2-19 and 2-20 show groundwater contaminant plume maps for both Buildings 71 and 604 study areas.



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SITE 38
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FIGURE 2-19
BUILDING 71
GROUNDWATER CONTAMINANT PLUME

DWG DATE: 10/25/04 | DWG NAME: 0059001B041

LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- GROUNDWATER CONTAMINANT PLUME
- SHORELINE
- SAMPLED 2000
- LOCATION EXCEEDS CRITERIA
- IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
- E/A&H SITE 38 INTERMEDIATE MONITORING WELL
- E/A&H SITE 38 SHALLOW MONITORING WELL
- EPA WELL
- GRASSY AREA

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SITE 38
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PENSACOLA, FLORIDA

FIGURE 2-20
BUILDING 604
GROUNDWATER CONTAMINANT PLUME

DWG DATE: 10/25/04 | DWG NAME: 0059001B040

3.0 IDENTIFICATION AND SCREENING OF TECHNOLOGIES

This section describes the initial steps of remedy selection: identification and screening of applicable technologies. After technologies are identified, they are reviewed for effectiveness, implementability, and cost, then they are either eliminated from further consideration or retained for further consideration. From the retained technologies, the alternatives for remedial action at Site 38 will be developed.

3.1 CERCLA Response Actions

USEPA has established program goals, management principles, and expectations for CERCLA response actions at areas such as Site 38. These goals and principles are outlined in the National Contingency Plan (NCP), which provides guidance for conducting the RI/FS and selecting a remedy. As outlined in the NCP, the remedy selection is to ensure that implemented technologies protect human health and the environment by eliminating, reducing, and/or controlling risks posed through each pathway. Contamination above protective levels and remedial volumes is identified in Section 2. Remedial action objectives, general response actives, remedial technology types, and process options for developing and screening of technologies are summarized in Table 3-1. The program goal, principles, and expectations are outlined below.

3.1.1 Program Goal

The goal of the FFS is to select remedies based on protecting human health and the environment, complying with ARARs, and reducing untreated hazardous waste.

3.1.2 Program Management Principles

To implement this goal, the NCP outlines the following principles to manage the response actions. Sites should be remediated in operable units (OUs) when significant risk must be reduced quickly, a phased analysis and response is necessary or appropriate, given the site's size or complexity, or when the expected final remedy must be expedited. Interim responses should implement the expected final remedy. Site-specific data needs, alternatives evaluation, and the selected remedy's documentation should reflect the scope and complexity of site problems being addressed.

Table 3-1
Remedial Action Objectives, Response Actions, Remedial Technology Types, and Process Options for the Development and Screening of Technologies

Media	Remedial Action Objectives (from site characterization)	General Response Actions (for all remedial action objectives)	Remedial Technology Types (for general response actions)	Process Options
Soil	For Human Health: Prevent ingestion and direct contact with soil having contaminants greater than SCTLs. For Environmental Protection: Prevent migration of contaminants to groundwater.	No Action/Limited Action: No Action Natural Attenuation: • Dilution • Dispersion • Advection • Biotic Degradations Institutional Controls: Limit public exposure Removal/Excavation: Excavation and disposal Containment Actions: Containment Treatment Actions: • Ex situ Treatment • In situ treatment	No Action/Limited Action Natural Attenuation Institutional Controls: • Fencing • Restrictions • Deed Restrictions Removal/Excavation Containment Technologies: Capping Treatment Technologies: • Ex situ technologies: -Soil washing -Landfarming -Thermal Desorption -Solidification/ stabilization • In situ technologies: -In situ vitrification -In situ bionutrification -In situ solidification/ stabilization	No action. Contaminants degrade over time. Fencing to restrict access. Restrictions on exposure to soil. Deed restrictions upon sale of property. Excavation of solids and proper disposal. Asphalt or concrete cap. Excavated soil is washed to separate from contaminants. Enhanced biodegradation is enhanced through cultivation. High temperatures heat soil and collect/treat gas vapors. Contaminants are physically bound or encased or chemical reaction stabilizes mass. Soil is heated to glass-like matrix, preventing leaching. Naturally occurring microbes are enhanced by circulating water-based solutions. Contaminants are physically by mixing with cement, lime, or chemical reagent.
Groundwater	For Human Health: Prevent ingestion of water having contaminants in excess of drinking water standards. For Environmental Protection: Restore groundwater aquifer to concentrations less than GC.	No Action/Limited Action: No Action Natural Attenuation: • Dilution • Dispersion • Advection • Biotic Degradations Institutional Controls: Limit public exposure	No Action/Limited Action Natural Attenuation Institutional Controls: • Restrictions • Deed Restrictions Removal Containment Technologies:	No action. Contaminants degrade over time. Groundwater monitoring. Restrictions on use of groundwater. Deed restrictions upon sale of property. Groundwater extraction.

Table 3-1
Remedial Action Objectives, Response Actions, Remedial Technology Types, and Process Options for the Development and Screening of Technologies

Media	Remedial Action Objectives (from site characterization)	General Response Actions (for all remedial action objectives)	Remedial Technology Types (for general response actions)	Process Options
		Removal: Extraction and discharge Containment Actions: Containment Treatment Actions: • Ex situ Treatment • In situ treatment	Vertical Barriers Treatment Technologies: • Ex situ technologies: -Groundwater extraction -Air Stripping -Bioreactor -Carbon absorption -Coagulation/ precipitation and solids separation • In situ technologies: -Air sparging -Treatment walls -Geochemical fixation -Cosolvent/surfactant flushing -Electrokenetic remediation -Enhanced Bioremediation	Trench filled with slurry to form barrier for groundwater. Well(s) used to pump groundwater and create a hydraulic barrier. Usually combined with treatment after extraction. Extracted groundwater is exposed to air. Extracted groundwater is combined with microorganisms. Carbon absorbs contamination during filtering. Chemicals are added to extracted groundwater to form contaminant solids that will settle or be filtered. Air is injected into contaminated groundwater. Contaminants react with wall material. Reductant is injected into extracted groundwater and reinjected downgradient. Solvent/surfactant is applied to solubilize contaminants. Soils are electrically charged to induce migration of contaminants in an electrical field. Naturally occurring microbes are stimulated through circulating water solutions.

3.1.3 Expectations

In the NCP, USEPA broadly categorizes remedial action alternatives into general response actions for consideration in the FFS. Table 3-1 summarizes remedial action objectives, response actions, remedial technology types, and process options for the development and screening of technologies.

Response Actions

- **Treatment:** Use treatment to address the principal threats posed by a site where practical.

- **Containment:** Use engineering controls such as containment for waste that poses a relatively low long-term threat or where treatment is impractical.

- **Combination:** Combine appropriate methods to protect human health and the environment.

- **Institutional Controls:** Use institutional controls such as water and deed restrictions to supplement engineering controls (as appropriate) to prevent or limit exposure to hazardous substances, pollutants, or contaminants in the short- or long-term.

- **Innovative Technology:** Consider an innovative technology when it offers the potential for comparable or better treatment, performance, or ease of implementation, fewer adverse impacts, or lower costs than demonstrated technologies.

- **Groundwater Restoration:** Restore usable groundwater to its beneficial uses, whenever practical, in a reasonable amount of time. Where this cannot be accomplished, USEPA expects the selected remedial response to prevent further plume migration, prevent exposure to contaminated groundwater, and evaluate further risk reduction.

3.1.4 General Response Actions

General response actions are media-specific actions that can achieve remedial action objectives alone or in combination. Response action alternative types are summarized in the remainder of this section.

Response Action Alternative Types

- **Source Control Actions:** This range of alternatives reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants by treatment. The range considered in an FFS should include an alternative that removes or destroys these constituents of concern to the maximum extent feasible, eliminating or reducing the need for long-term management. In addition, alternatives are to be considered that treat the principal threats posed by the site but vary in the degree of treatment and the quantities and characteristics of residuals and untreated waste that must be managed.

- **Containment Actions:** One or more alternatives should be considered that protect human health and the environment, primarily by preventing or controlling exposure to site contaminants through engineering or institutional controls. Engineering controls include extraction or injection wells; institutional controls include deed or access restrictions.

- **Groundwater Response Actions:** Groundwater remediation actions should be assessed that attain site-specific goals within different restoration time periods. These alternatives should use one or more methods such as groundwater extraction, treatment, and in situ actions.

3.2 Identification of Technologies

This section describes technology types that may be applied to meet the response actions described above.

3.2.1 No Action/Limited Action

The NCP requires evaluation of a no-action alternative as a basis of comparison with other remedial alternatives. Because no action may result in contaminants remaining onsite, CERCLA requires a review and evaluation of site conditions every 5 years if this alternative is selected.

3.2.2 Natural Attenuation

Natural attenuation refers to dilution, dispersion, advection, and biotic degradation of contaminants in surficial groundwater and surface soils. Consideration of this option requires modeling and evaluating contaminant degradation rates and transport during remedial design. Sampling and analysis must be conducted throughout the process to confirm that degradation is proceeding at rates consistent with meeting remediation objectives and to ensure that receptors are not threatened.

3.2.3 Institutional Controls

The responses associated with institutional controls reduce potential hazards by limiting public exposure, not by reducing hazardous substances volume, mobility, or toxicity. The following are examples of institutional controls.

Types of Institutional Controls

- Land-use Restriction Agreements (LURA)
- Site-access controls
- Public awareness, education
- Groundwater-use restrictions
- Long-term monitoring
- Deed restrictions
- Warning against excavation, soil use

3.2.4 Removal/Excavation

Removal/excavation provides complete removal of contaminated media. Removal/excavation includes excavating soil with heavy equipment, subsurface drains (interceptor trenches/ French drains), and groundwater extraction/recovery wells

3.2.5 Containment

Groundwater is contained by installing a network of groundwater extraction wells or subsurface drains to produce a hydraulic barrier and eliminate or reduce groundwater migration.

Vertical barriers such as slurry walls, high-density polyethylene (HDPE) sheeting or sheet piling may also be used to reduce horizontal contaminant transport in groundwater from contaminated soil zones.

A surface cap of asphalt, concrete, soil barriers, or synthetic membranes indirectly provides containment by reducing contaminant transport through soil by minimizing the percolation of water through soils. These containment options can be used alone or together to isolate contaminated soil and/or groundwater.

3.2.6 Ex Situ Treatment

Groundwater ex situ treatment technologies include groundwater extraction, air stripping, bioreactor, carbon absorption, and precipitation. Soil may be treated ex situ by multiple technologies such as excavation and offsite disposal, soil washing, landfarming, thermal desorption, and ex situ solidification and stabilization.

3.2.7 In Situ Treatment

Groundwater in situ treatment technologies include air sparging, vertical barriers, treatment walls, geochemical fixation, cosolvent/surfactant flushing, electrokenetic remediation, and enhanced bioremediation. Soil may be treated in situ by multiple technologies such as vitrification, bionutrification, in situ solidification and stabilization, and thermal extraction.

3.2.8 Discharge/Disposal

Groundwater may be treated and discharged to the federally owned treatment works (FOTW), treated and discharged to surface water, or reinjected into the aquifer. Excavated soil may be disposed of either offsite at a hazardous or nonhazardous waste landfill, used as site fill material, or isolated in an onsite containment unit.

3.3 Preliminary Technology Screening

Tables 3-2 to 3-3, present the treatment technologies that are potentially applicable to site contaminants. These tables are consistent with technology screening techniques presented in the

Table 3-2
Soil Technology Screening for Site 38

Technology	Objectives	Implementability	Effectiveness	Cost	Retain
No Action	Leave contaminated soil and groundwater in place.	No Action	Does not reduce, treat, or remove contaminants, though natural attenuation mechanisms within the aquifer appear to be sufficient to prevent offsite migration of groundwater exceeding remedial goals (RGs).	No capital cost; 5-year evaluation cost is required by the NCP, if contamination is left onsite.	Yes, required by NCP
Institutional Controls	Placing administrative controls on Buildings 71 and 604 areas would limit use of the land such as industrial use only or require workers to contact the Environmental Department prior to excavation activities for further instructions. Groundwater can be restricted for potable or other industrial use.	Institutional controls are implementable at Site 38. They can be implemented through the use of signs, fences, and/or a land-use restriction agreement (LURA).	Institutional controls are effective at protecting human health by administratively limiting contact with the contaminated media.	Low capital cost; 5-year evaluation cost is required by the NCP, if contamination is left onsite.	Yes
Institutional Controls and Monitoring	Same as above, except contaminant plume migration would be monitored to ensure offsite migration does not occur at levels posing risk to potential receptors.	Site access would be controlled and sampling would be required. Forty monitoring wells have been installed at Site 38 with downgradient wells that delineate the extent of the groundwater plume.	Does not reduce, treat, or remove contaminants. However, institutional controls with monitoring can prevent excessive exposure to contaminated soil and groundwater, and ensure contamination does not migrate offsite unchecked. Monitoring would likely be performed on an annual basis.	Low capital cost; low to moderate operation and maintenance (O&M) cost depending on number of samples.	Yes

Table 3-2
Soil Technology Screening for Site 38

Technology	Objectives	Implementability	Effectiveness	Cost	Retain
Soil In Situ Technologies					
Surface Cap	Capping is a containment technology that will limit human contact with soil and reduce infiltration of rainwater through contaminated soil.	This technology is implementable at Site 38. All of Building 71 area is covered with asphalt pavement or concrete. Building 604 area is mostly covered with the concrete building and asphalt pavement, however, there are some grass medians in the parking lot and alongside the adjacent road.	This technology is effective at reducing contact, ingestion, or inhalation risks. Capping significantly reduces leachate generation by minimizing infiltration of rainwater. Capping is inappropriate for locations with exposed grass surface; therefore, they will require separate study.	Low capital cost; low O&M cost.	Yes
In Situ Vitrification	Electrical heating is used to melt contaminated soils producing a glass-like matrix with very low leaching characteristics.	This technology is still in development with a limited number of vendors. The high voltages and off-gases present health and safety concerns. Also, shallow groundwater tends to interfere with the process making implementation questionable at Site 38, where the water table is relatively shallow (3.5 to 9 ft below ground surface (bgs).	While in situ vitrification is used to immobilize non-volatile inorganic elements, temperatures reaching 3000°F will destroy organic contaminants by pyrolysis. The process must be conducted under a hood to ensure that no contaminants are released to the air. Organic contaminants of concern (COCs) at Site 38 would be destroyed by this technology.	High capital cost; high O&M cost.	No

Table 3-2
Soil Technology Screening for Site 38

Technology	Objectives	Implementability	Effectiveness	Cost	Retain
Soil In Situ Technologies					
In Situ Bionutrification	Naturally occurring microbes are stimulated by circulating water-based solutions through contaminated soils. Nutrients, oxygen, and other amendments may enhance biodegradation and contaminant desorption from subsurface materials.	This is a fully developed technology with many available vendors. Circulation of water-based solutions through the soil may increase contaminant mobility and necessitate use of an aboveground water treatment system prior to re-injection or disposal. This should only be used in areas with shallow groundwater that is already contaminated and may require use of a containment system to ensure that contaminants do not migrate offsite.	In situ bionutrification most readily treats non-halogenated volatile, semivolatile, and fuel hydrocarbons. It has minimal success against halogenated volatiles and is not applicable at sites that have heavy metal or chlorinated organics, such as those at Site 38. Therefore, this technology is considered inappropriate for Site 38.	Moderate capital cost; moderate O&M cost.	No
In Situ Solidification/ Stabilization	In situ stabilization is used to immobilize contaminants by mixing site soil with Portland cement, lime, or chemical reagent to reduce the mobility of the contaminant. Large augering equipment is used to mix soils in place with the reagent.	Standard in situ soil stabilization equipment used for foundation stabilization in roads and buildings can be used to perform in situ stabilization at Site 38. This technology would likely leave a solid mass, similar to concrete.	This method will reduce the mobility of inorganics and pesticides but will not remove the potential for contact. It has limited effectiveness at treating SVOCs and is ineffective at treating VOCs.	Moderate to high capital cost; low to moderate O&M cost.	No

Table 3-2
Soil Technology Screening for Site 38

Technology	Objectives	Implementability	Effectiveness	Cost	Retain
Soil Ex Situ Technologies					
Soil Washing	Excavated soil is washed with aqueous-based solutions to separate contaminants sorbed onto fine particles from the rest of the soil matrix. This technology only separates the contaminants and does not destroy them. Further treatment or disposal of the process water is required.	This is a fully developed technology. Many vendors are available with this capability. Soil excavation increases risk to workers, and proper personal protective equipment (PPE) must be used.	This technology is effective at removing SVOCs and inorganics. It is less effective at treating VOCs. This technology would not be effective at removing contaminants from Site 38 soils.	High capital cost; moderate to high O&M cost. This technology is not cost effective for sites with small quantities of soil like Site 38.	No
Landfarming	Contaminated soil is cultivated to enhance biodegradation of contaminants. In low risk areas where leaching of contaminants is not a concern, it can be performed in situ. Some contaminants may require anaerobic conditions, which require the use of ex situ technology.	Ex situ landfarming could be implemented and would require the construction of lined water-tight cells and addition of organic materials to sustain the microorganisms.	This technology is effective at treating non-halogenated volatile compounds and fuels. It is less effective at treating halogenated compounds and SVOCs. It is ineffective at treating inorganics. This technology would be ineffective at treating arsenic in situ and is thereby considered inappropriate.	Low to moderate capital cost; low to high O&M cost. O&M costs would likely be moderate to high for ex situ treatment.	No
Thermal Desorption	Wastes are heated from 200° to 600°F to volatilize water and organic contaminants. A vacuum system transports the off-gas to a gas treatment system. This is a physical separation process and is not designed to destroy inorganics.	This technology is implementable at Site 38. The waste must be screened and separated prior to desorption, but it is an available and fully developed technology. The waste must be excavated to implement this technology. High temperatures would be required to remove the SVOCs from soil.	This technology is effective at removing the volatile contaminants. It would be effective at removing organic contamination in soil. However, most inorganics would be unaffected.	Moderate to high capital cost; low O&M cost. High energy requirements would be necessary to destroy contaminants, significantly increasing cost.	No

Table 3-2
Soil Technology Screening for Site 38

Technology	Objectives	Implementability	Effectiveness	Cost	Retain
Soil Ex Situ Technologies					
Solidification/ Stabilization	Contaminants are physically bound or encased within a stabilized mass, or chemical reactions are induced with stabilizing agents. The contaminants are not removed or destroyed, but their mobility is reduced.	This technology is implementable at Site 38. Some processes may significantly increase the volume of waste, making replacement difficult. Some Site 38 contaminants are compatible with the process, with exception of SVOCs.	This technology is effective at reducing the mobility of inorganic and some organic contaminants. This is the best demonstrated achievable technology (BDAT) for inorganic soil contamination and is considered appropriate.	Moderate to high capital cost; low O&M cost.	No

Table 3-3
Groundwater Technology Screening for Site 38

Technology	Objectives	Implementability	Effectiveness	Cost	Retain
Groundwater In Situ Technologies					
Air Sparging	Air is injected into groundwater within or below the contaminated zone. Contaminants are removed from the aquifer through volatilization. Air sparging must be operated with an aboveground soil-vapor extraction (SVE) system to capture the volatilized contaminants. Additionally, this technology can be used to provide oxygen for biological activity to support biodegradation.	This fully developed technology has many available vendors. The surface must be covered with an impervious layer to prevent the soil-vapor extraction system from short circuiting and to allow capture of the contaminants.	This technology is effective in removing volatile compounds from the groundwater. It has minimal effect on SVOCs and no effect on inorganics. Although this technology would be effective at treating the isolated occurrences of TCE and vinyl chloride, it would be ineffective at treating inorganics in groundwater at Site 38. Therefore, this technology is considered not applicable.	Moderate to low capital cost; moderate to low O&M cost.	No
Vertical Barriers	Subsurface barriers such as a vertically excavated trench filled with slurry form a barrier to restrict groundwater flow and contain contaminated leachate.	For a vertical barrier to be effective at Site 38, the wall would need to be keyed into an impermeable layer. High sand content of site soil and the potential for instability would make implementation of this technology difficult; however, this technology is implementable.	This technology is effective in preventing groundwater migration from the site; however, it must be used in conjunction with a surface cap or a water management system to prevent hydraulic failure of the vertical barriers. This technology would not reduce future risk posed by groundwater, and therefore, is not applicable.	High capital cost; low to moderate O&M cost. Site-specific conditions (depth to confining layer and site soil) make implementation costly.	No
Treatment Walls	Impermeable slurry walls are used to channel contaminated groundwater through a permeable reactive wall or gate, where contaminants react with the wall material and are either destroyed or changed to a less harmful form.	For a vertical barrier to be effective at Site 38, the wall would need to be keyed into an impermeable layer. High sand content of site soil and the potential for instability would make implementation difficult; however, this technology is implementable. Many low level compounds are in Site 38 groundwater from VOCs and inorganics. To treat all compounds would require many layers of reactive material to address all COCs.	This technology is effective in treating halogenated volatile and semivolatile compounds and inorganics. It is less effective in treating nonhalogenated compounds and fuels. Site 38 primary groundwater COCs are chlorinated solvents and metals.	High capital cost; low O&M cost. Site-specific conditions (depth to confining layer and site soil) make implementation costly.	No

Table 3-3
Groundwater Technology Screening for Site 38

Technology	Objectives	Implementability	Effectiveness	Cost	Retain
Groundwater In Situ Technologies					
Natural Attenuation	Natural attenuation is not a technology but more of a management philosophy. Natural subsurface processes such as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials are allowed to reduce contaminants to acceptable concentrations. Attenuation processes are monitored and modeled to evaluate attainment of remedial goals within reasonable time frames.	Natural attenuation is implementable at Site 38. Natural attenuation should only be used in low-risk situations, such as Site 38 (no receptors) because contaminant migration is a risk.	Metals and VOCs are the only COCs that have significant mass in the aquifer. Downgradient monitoring performed as an addendum to the RI indicates that contaminants are attenuated onsite; metals and PCE were quantified above RGs in downgradient wells. Natural attenuation mechanisms appear sufficient, given low groundwater concentrations onsite and the absence of contamination offsite.	Low capital costs; low O&M costs.	Yes
Geochemical Fixation	Water removed from the plume is treated with a reductant and reinjected at the downgradient boundary of the plume. Subsequent reactions occur with the excess reductant in the aquifer creating a precipitate. This allows for in situ reduction and precipitation of the contaminant.	This technology requires that relatively small volumes of groundwater be extracted, mixed with reagents, and reinjected into the aquifer. The aquifer can be pumped easily, and the aquifer's high permeability will make injection easy. Therefore this technology could be implemented at Site 38.	This technology has been proven effective for hexavalent chromium. It is believed to work on uranium, selenium, and arsenic. The COCs in Site 38 groundwater are not believed to be affected by this technology; therefore it is considered inappropriate.	Moderate capital; moderate O&M	No
Cosolvent/ Surfactant Flushing (In Situ)	In situ solvent/surfactant flushing involves applying a solvent/surfactant to the surface, vadose zone, or saturated zone to extract organic and inorganic contaminants. Cosolvent/surfactant flushing can be applied to soils or groundwater to solubilize either the source of contamination or the contaminant plume emanating from it. Additionally, some cationic surfactants can be used to immobilize organics, such as hydrophobic organic contaminants.	In situ flushing is implemented as a means to mobilize contaminants such as non-aqueous phase liquids (NAPLs) and pesticides, which are relatively immobile in the environment. This technology is implementable at Site 38, but would be part of a larger groundwater extraction and injection/surficial application system.	A methanol/water cosolvent has been shown to improve the supercritical CO_2 extraction of DDT from soil. However, the effects of this technology on cadmium are not documented. Only one site has been documented for this technology for metals, and it is expected to go to field demonstration. Without further data or field studies related to site-specific contaminants, this technology is considered inappropriate at Site 38.	High capital cost; high O&M cost	No

Table 3-3
Groundwater Technology Screening for Site 38

Technology	Objectives	Implementability	Effectiveness	Cost	Retain
Groundwater In Situ Technologies					
Electrokinetic remediation	Soils are electrically charged to induce migration of subsurface contaminants in an electrical field via electro-osmosis, electro-migration, and/or electrophoresis.	Implementability is questionable at Site 38, due to the presence of high salinity and potential for buried metallic objects and seashells. This technology can be used by itself or in conjunction with groundwater extraction.	Electrokinetic remediation has had success in remediating heavy metals in their elemental form. Potential problems affecting treatment such as salinity and buried objects make this technology inappropriate.	Moderate to high capital cost; high O&M cost	No
Enhanced Bioremediation	Naturally occurring microbes are stimulated by circulating water-based solutions through contaminated soils to enhance biodegradation. Nutrients, oxygen, hydrogen peroxide, and other amendments may enhance biodegradation and contaminant desorption from subsurface materials. Bioremediation may occur in aerobic and anaerobic conditions.	Enhanced Bioremediation is implementable at Site 38. RI Addendum 2 indicates contaminant concentrations naturally decreasing. Enhanced Bioremediation can speed up this process.	In situ bioremediation most readily treats non-halogenated volatile, semivolatile, and fuel hydrocarbons. High concentrations of heavy metals, highly chlorinated organics, long-chain hydrocarbons, or inorganic salts can be toxic to microorganisms.	Moderate capital cost; moderate O&M cost	Yes
Groundwater Ex Situ Technology					
Groundwater Extraction	A well or series of wells can be used to pump groundwater and create a hydraulic barrier preventing further groundwater contamination and offsite migration.	Groundwater recovery is technically implementable at Site 38. This is a well developed technology that has been used for many years and would require minimal pilot testing to determine final designs.	Hydraulic barriers have been used effectively at many sites to contain and in some cases recover groundwater plumes. The groundwater must be treated after recovery, which can add significant cost. This alternative will only be considered if an ex situ treatment technology is considered.	Moderate capital costs; moderate O&M costs.	Depends on selection of treatment technology
Air Stripping	This technology would treat extracted groundwater at Site 38. Volatile organics are partitioned from water by greatly increasing the surface area of water exposed to air. Types of aeration methods include packed towers, diffused aeration, tray aeration, and spray aeration.	Air stripping is implementable at Site 38. The potential exists for inorganic or biological fouling of equipment or clogging of the stripping column packing material due to inorganics in groundwater. When clogging occurs, air strippers must be taken out of service and packing materials acid-washed.	Air stripping is effective at removing VOCs. Site 38 has a few monitoring wells with exceedances of VOCs, indicating little mass present. This process would need to be used as a finishing step after a coagulation/precipitation step to remove heavy metals at which time VOCs would likely volatilize. However, VOCs are present at relatively low concentrations; therefore, this technology is not considered.	Moderate capital cost; moderate to high O&M cost.	No

Table 3-3
Groundwater Technology Screening for Site 38

Technology	Objectives	Implementability	Effectiveness	Cost	Retain
Groundwater Ex Situ Technology					
Bioreactor	Contaminants in extracted groundwater are put into contact with microorganisms through attached or suspended biological systems. In suspended growth systems, such as activated sludge, contaminated groundwater circulates in an aeration basin, where a microbial population aerobically degrades organic matter. In attached growth systems, such as trickling filters, microorganisms are established on an inert support matrix to aerobically degrade groundwater contaminants.	Bioreactor is not technically implementable at Site 38 due to the low contaminant concentrations in the groundwater, which would not support biological growth. Based on technical implementability, this technology is considered inappropriate.	Biological reactors can destroy organic contaminants. The low level of organic contaminants present in Site 38 groundwater would not be sufficient to support the growth of microbes. Heavy metals (cadmium, iron) would not be affected by this process; therefore, this technology is not applicable.	High capital costs; high O&M costs.	No
Carbon Adsorption	Contaminated groundwater is pumped through activated carbon to which dissolved organic contaminants adsorb. The spent carbon must be reactivated (cleaned) or disposed of.	Carbon adsorption is a fully developed technology with many available vendors. Dissolved metals in groundwater can foul the system and increase O&M costs.	A significant mass of VOCs is not present in site groundwater, and the carbon would not be effective at treating the identified site metals in their dissolved state.	Moderate capital cost; high O&M costs.	No
Coagulation/ precipitation and solids separation	Chemicals are added to extracted groundwater to form insoluble, agglomerated solids, with separation by settling or mechanical filtration. Significant mass of contaminants in groundwater is not present and removal would not be cost-effective on a mass-removal basis.	As a result of separation technology, residuals are generated that require further treatment or disposal.	Coagulation/precipitation with solids separation is designed to treat inorganic compounds.	Low to moderate capital cost; moderate to high O&M cost. Chemicals used for treatment can significantly increase the cost.	No
Disposal	Groundwater is extracted and discharged to the FOTW where it is treated along with the sanitary sewage.	The FOTW can treat the groundwater generated. The water must meet general pretreatment standards before being accepted by the treatment works.	The FOTW should be able to achieve remedial goals for groundwater. This alternative can only be considered if groundwater extraction is selected as well.	Low to moderate capital cost; moderate O&M cost.	Yes

NCP and USEPA guidance because they include containment, removal, disposal, and treatment options. The screening criteria are implementability, effectiveness, and relative cost.

Implementability encompasses a technology's technical and administrative feasibility. Technical implementability is used to eliminate technology types and process options that are clearly ineffective or unworkable. Information from RI site characterization is used to screen out technologies and process options. Administrative implementability emphasizes institutional aspects such as the ability to obtain necessary permits for offsite actions; the availability of treatment, storage, and disposal services (including capacity); and the availability of necessary equipment and skilled workers to implement the technology.

Effectiveness screening is based on how effective each technology would be in protecting human health and the environment. Each technology should be evaluated with regard to its effectiveness in providing protection and reducing contaminants' toxicity, mobility, or volume. Both short- and long-term effectiveness should be evaluated; short-term refers to construction and implementation; long-term refers to the period after the remedial action is complete.

Costs play a limited role in the screening process. Relative capital and operation and maintenance (O&M) costs are used rather than detailed estimates. At this stage in the process, the cost analysis is based on engineering judgment, and each process is evaluated based on whether costs are high, low, or medium relative to other process options.

3.4 Technology Screening Results

Implementability, effectiveness, and cost were used to screen the technologies and to draw the following conclusions. The following technologies were all screened from further consideration:

Soil Technologies

- **In Situ Vitrification's** implementability is questionable due to shallow groundwater and would likely require dewatering of the area. This technology would effectively destroy all

organic contaminants; however, use of this technology for inorganics is not the best demonstrated available technology and therefore considered inappropriate.

- **In Situ Solidification/Stabilization** at Site 38 is not appropriate, because it is not effective for SVOCs and VOCs. It also would not reduce the potential for contact.

- **In Situ Thermal Extraction** would not remove arsenic from soils. The presence of shallow groundwater at Site 38 makes this technology ineffective without either dewatering or treating large volumes of water vapor. Therefore, this technology is considered inappropriate.

- **Soil Washing** is effective at removing SVOCs and inorganics. It is less effective at removing VOCs and is not cost effective for soil volumes less than 10,000 yd^3. Under the industrial-use scenario, only 1,100 yd^3 are proposed for remedial action; therefore, soil washing is not considered. Under the unrestricted use, 22,400 yd^3 are proposed for removal. However, since this technology is only effective for SVOCs and metals, combination with another technology would make this technology cost prohibitive.

- **Landfarming** is less effective at treating SVOCs and not applicable to inorganics. The areas to be landfarmed would be too small to be cost effective. Landfarming uses the process of degradation and the organics at the site (PCBs and PAHs) are difficult to degrade.

- **Thermal Desorption** is effective at removing SVOCs and pesticides but would leave inorganics in soil at concentrations that present risk and is associated with high costs. Combination with another technology could be used; however, this will further increase costs.

- **Solidification/Stabilization** is not appropriate for SVOCs and is associated with high costs. Some processes may significantly increase the volume of waste, making replacement difficult.

Groundwater Technologies

- **Air Sparging** is not considered appropriate, because a significant mass of VOCs is not present. Also, it has minimal effects on SVOCs and no effects on inorganics.

- A **Vertical Barrier** is a high capital cost item that would contain the contamination; however, it would not reduce volume or toxicity. It must be used in conjunction with a surface cap or water management system to prevent hydraulic failure. This technology would not reduce future risk posed by groundwater; therefore, is not applicable.

- **Treatment Walls** are effective for treating the contamination. However, to treat all the COCs, many layers would be required, which would result in high capital costs; thus, this treatment method is not cost effective for the low concentrations at this site.

- **Geochemical Fixation** is not effective for treating Site 38 groundwater contaminants.

- **Cosolvent/Surfactants** are best suited for treatment of sites with NAPL and dense non-aqueous phase liquid (DNAPL). However, NAPL and DNAPL are not a concern at Site 38. Also, the effect of this technology on cadmium has not been documented. Only one site has been documented for treatment of inorganics using this technology; therefore, this technology is considered inappropriate.

- **Electrokinetic Remediation's** implementability is questionable due to high salinity, potential for sea shells, and potentially buried metallic objects.

- **Groundwater Extraction** is considered only if an ex situ groundwater disposal or treatment method is considered applicable.

- **Air Stripping** is not considered appropriate, because a significant mass of VOCs is not present. Also, SVOCs and metals would not be treated with this technology. A coagulation/precipitation step would be needed to remove heavy metals at which time the VOCs would likely volatilize.

- **Bioreactors** can destroy organic contaminants; however, the low levels of organics present would not be sufficient to support the growth of microbes. Also, this technology is not appropriate for use with inorganic contaminants. Combination with another technology could be considered to treat inorganics; however, this would increase the already high costs associated with this technology.

- **Carbon Absorption** is not considered appropriate, because a significant mass of VOCs is not present. In addition, carbon would not be effective a treating the identified site metals in the dissolved state. Combination with another technology could be considered; however, this would increase costs.

- **Coagulation/precipitation** is an appropriate technology for removal of dissolved inorganics from extracted groundwater. This technology would not be cost-effective on a mass-removal basis.

Soil technologies retained for further consideration:

- **No Action:** No action.

- **Existing Surface Cap with Institutional Controls:** Use of existing cap along with institutional and engineering controls.

- **Offsite Disposal:** Excavation with disposal to an appropriate landfill.

- **Capping:** Cap using soil, asphalt, concrete, or geomembrane cover.

Groundwater technologies retained for additional consideration:

- **No Action:** No action.
- **Monitored Natural Attenuation with Institutional Controls:** Institutional controls with monitoring.
- **Enhanced Bioremediation:** Enhancing groundwater conditions for contaminant degradation.
- **Groundwater Extraction and Discharge to FOTW:** Extract groundwater and discharge to the onsite FOTW.

The NCP requires evaluation of a no-action alternative as a basis for comparison to other remedial alternatives. Because no action may result in contaminants remaining onsite, CERCLA, as amended, requires a review and evaluation of site conditions every 5 years. The no-action alternative will be carried through and analyzed throughout the FFS process.

4.0 DEVELOPMENT AND SCREENING OF ALTERNATIVES

After technologies have been identified and screened, general response actions and process options are combined to form preliminary alternatives that address the entire site. In assembling alternatives, the NCP goal of evaluating a range of alternatives was considered, but due to small quantities, limited extent of contamination, and relatively low risk, the number of alternatives was limited. Alternatives range from no action to institutional controls, monitored natural attenuation, removal actions, and enhanced bioremediation. The alternatives are presented for soil and groundwater separately to facilitate development and evaluation. The evaluation is based on overall site implementability, effectiveness, and estimated cost to the extent necessary to evaluate the alternative.

Eight alternatives have been retained from the preliminary screening and are evaluated further in this section.

Soil Alternatives

- S1: No Action
- S2: Existing Surface Cap with Institutional Controls
- S3: Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal
- S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal
- S5: Capping

Groundwater

- G1: No Action
- G2: Monitored Natural Attenuation with Institutional Controls
- G3: Enhanced Bioremediation
- G4: Groundwater Extraction and Discharge to FOTW

4.1 Soil Alternative Screening

The following alternatives were developed for response action related to soil.

4.1.1 Alternative S1: No Action

Under this alternative, no response action would be conducted to reduce volume, mobility, or toxicity of contaminated surface soil, and no controls will be initiated to restrict future use or exposure to contaminated media. Soil with the potential to leach to groundwater would be left onsite.

The current and projected future-use scenario for this site is industrial; however, since the no-action alternative does not provide any controls to restrict future land use, the worst-case scenario (residential use) must be evaluated.

Implementability: No initial actions are required; therefore, this alternative is readily implementable. The NCP requires any alternative that leaves contamination onsite to be re-evaluated every 5 years to ensure adequacy of the alternative. Therefore, the no-action alternative would require the Navy to establish a program for these re-evaluations.

Effectiveness: If no controls are instituted at Site 38, potential exposure to future residents exists due to contaminant concentrations exceeding RSCTLs or RCs. Under the residential scenario, it is assumed that the existing buildings and pavement would be removed, increasing the potential for exposure to surface soils. As discussed in Section 2, several PAHs, copper, and arsenic averages exceed their RSCTLs. Only benzo(a)pyrene and dibenz(a,h)anthracene averages exceed their ISCTLs.

Contaminated subsurface soil could impact groundwater in the surficial aquifer through leaching. At many Site 38 locations, contaminants exceeded leachability criteria in soil. However, most of these locations are under asphalt or concrete pavement, minimizing the amount of surface water infiltration and contaminant leaching to groundwater. Locations where detections exceeded

leachability criteria for the Building 71 area are under concrete or asphalt pavement. Only a few such locations in the Building 604 area are not under concrete or asphalt pavement (Figure 2-17): 36SB78S, 38S37, B-T03, B-T07, B-T15, B-T37, B-T38, B-T41, and B-T42. Under a residential scenario, the buildings and pavement would likely be removed, allowing surface water infiltration, to transport contaminants to the aquifer. Currently, groundwater is approximately 5 to 7 feet bgs and fluctuations are typically less than 1 foot. It is assumed that the soil-to-groundwater interface does not typically extend into the upper 5 feet of the vadose zone.

For soil contamination at Site 38, a 5-year re-evaluation would likely consist of an adequacy-of-controls review to evaluate the current use of the property and ensure that pavements, site use, and future planning do not change drastically from the assumptions stated in this report. If a drastic change such as removal of paved surfaces or future plans for residential site use were indicated during the re-evaluation, additional measures would likely be required.

Cost: The 30-year present worth cost for the no-action alternative is the 5-year evaluation cost over a 30-year period, estimated at $10,000 per event for the no-action alternative for soils. The present worth of re-evaluation every 5 years for 30 years is approximately $24,400, assuming a 6% discount factor.

4.1.2 Alternative S2: Existing Surface Cap with Institutional Controls

Under this alternative, no direct response action would be taken to reduce, treat, or decrease the mobility or toxicity of onsite contamination. The existing asphalt and concrete covering the site would be designated as a cap and maintained as necessary. Institutional controls such as a land-use control agreement would be implemented to limit access and property use to industrial/commercial, thereby limiting potential exposure to contamination. The LUCA would also limit usage of groundwater onsite due to the potential for soil-to-groundwater impacts. Natural attenuation mechanisms and the existing surface cap would minimize the potential of offsite impacts due to leaching.

This alternative does not require any change to existing activities since current activities at Site 38 are industrial/commercial. However, to minimize exposures pavement would have to be maintained, and personnel must notify the base environmental office for proper instruction and health and safety procedures before invasive activities.

Implementability: Implementation of this alternative does not require any innovative technologies or construction activities, because the existing surface layer serves as a cap. This alternative would require the Navy to control site access to the property, keep its use industrial or commercial, and manage any intrusive activities at locations where concentrations exceed ISCTLs. Routine inspections, maintenance, and repairs would be required to maintain the integrity of the cap over time. Site access can be controlled through the LUCA and/or warnings against excavation. If the property was no longer under direct Navy control, development of a deed restriction would be necessary. The Navy has base planners and attorneys on staff with experience in developing and implementing proper institutional controls for Site 38. The possibility of transferring Site 38 to civilian control is highly unlikely in the near future; therefore, proper controls can be implemented through planning.

The NCP requires any alternative that leaves contamination onsite be re-evaluated every 5 years to ensure adequacy of the alternative. Therefore, this alternative would require a monitoring program be established by the Navy to provide for this re-evaluation.

Effectiveness: Management of the existing surface cap with institutional controls at Site 38 would be reasonably effective; however, the site could still pose a risk of exposure under the industrial scenario due to locations with ISCTL and leachability criteria exceedances that are not under the existing asphalt and concrete pavement. These locations are only within the Building 604 study area, because the Building 71 study area is covered by the existing pavement. These locations within the Building 604 study area are grassy medians or areas adjacent to parking lots or buildings; therefore, any exposure to impacted soil is expected to be less than the duration that is typically assumed for risk/exposure calculations for the industrial worker scenario.

This alternative provides no additional protection from exposure to surface soils for the site worker; however, institutional controls would limit construction or intrusive activities in areas where concentrations exceed ISCTLs without proper notification and health and safety procedures. With the use of institutional controls, this alternative eliminates the future resident exposure pathway by excluding this property from being used as residential property.

Contaminated subsurface soil with the potential to leach to groundwater would remain in place under this alternative; however, as detailed in *RI Addendum 2*, contaminants are attenuating via natural mechanisms, and there are no risks to offsite receptors. The LUCA would prevent groundwater use and thus protect current and future site workers from consumption of groundwater.

Cost: The 30-year present worth cost of the institutional controls with existing surface cap management is estimated at $135,400 at a 6% discount factor. The Navy assumes implementation of institutional controls will cost approximately $50,000, which consists of completion of the documentation necessary to implement institutional controls. In addition, a 5-year re-evaluation of site conditions would be required for 30 years. The estimated cost of this 5-year evaluation is $10,000 per event for soils. A value of $5,000 was assumed for a 5-year inspection of the surface cap plus an assumed value of $20,000 for necessary maintenance (i.e., asphalt resurfacing) each 5-year period for 30 years. This value is an estimate and may change significantly depending on site conditions and use. It is assumed that paved areas used as major roadways or high traffic parking areas would be maintained as part of facility operations; therefore, costs for maintenance of these areas is not included. The 30-year present worth cost for the 5-year re-evaluation of site conditions is approximately $24,400 (same as no-action alternative). The 30-year present worth cost for existing surface cap management is approximately $61,000.

4.1.3 Alternative S3: Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal

Under this alternative, soil would be excavated in areas where contaminants exceed 3X RSCTLs and leachability criteria, and disposed of in an appropriate landfill. Contaminated material would be excavated/removed and transported to permitted offsite disposal facilities. Elements of excavation with offsite disposal operation often include: (1) delineation sampling, (2) excavation, (3) confirmation sampling, (4) waste characterization, (5) transportation of excavated material offsite, (6) disposal at a Subtitle D facility, (7) backfilling, and (8) site restoration.

Under this unrestricted use scenario, locations will be removed if they have exceedances for "hot spots" or acute toxicity under residential use or exceedances of the leachability criteria. This would remove the risk of exposure for the residential-use scenario and be protective of groundwater. This would also lower the average concentration for COCs below the RSCTL. Institutional controls would not be required. Under this alternative, Building 604 is assumed to require demolition, thereby significantly adding to the amount of the overall cost and difficulty of this alternative.

Building 71

The estimated impacted soil volume at Building 71 is 3,600 yd^3. Excavation depth may vary from 2 to 5 feet. The impacted area is approximately 0.89 acres.

Due to the loose, granular soil, it may be necessary to use a 3:1 slope (approximately the angle of repose for sand) to allow backhoes to enter the excavation area. Excavation adjacent to building foundations would likely require shoring and structural support.

Building 604

The estimated impacted soil volume at Building 604 is 22,400 yd^3. Excavation depth may vary from 2 to 5 feet. The impacted areas represent a total of 6.72 acres.

Due to the loose, granular soil, it would be necessary to use a 3:1 slope (approximately the angle of repose for sand) to allow construction equipment and workers to enter the excavation area. Excavation adjacent to surrounding buildings might require shoring and structural support.

Implementability of S3: Excavation with offsite disposal to 3X RSCTLs and leachability criteria would be difficult to implement at this site. Specifically, the demolition of Building 604 and the presence of underground utilities would significantly increase the complexity and the cost of this response action.

In general, excavation is a common and reliable method of removing contaminated soil. This alternative would require an excavation and transportation contractor. Because of the relatively shallow excavation depth (2 to 5 feet), standard excavation equipment would be used. For this evaluation, it is assumed that all excavated soil would be disposed of in a Subtitle D landfill as a nonhazardous special waste. It is also assumed that no future soil remedial actions would be required after this alternative is completed.

Effectiveness of S3: Soil excavation is a highly effective source-removal alternative, because it removes impacted soil and essentially eliminates any future risk for the unrestricted use scenario. This alternative would protect human health and the environment by removing soil where contaminant concentrations exceed 3X RSCTLs, reduce site wide average concentrations to less than the RSCTL, and be protective of groundwater by eliminating the potential for leaching from the upper 5 feet of contaminated soil.

No long-term maintenance or monitoring would be required after excavating soil and hauling it offsite for disposal.

Cost of S3: The cost of implementing this action is very high compared with the other actions, because several additional costs are to be included: construction of a temporary storage warehouse, relocation of activities for Building 604, demolition, and reconstruction. The 30-year present worth cost of this alternative is $28,095,300, assuming a 6% discount factor. The 30-year present worth cost is equivalent to removal action, because no monitoring or institutional controls are assumed. Given the unknown variables with implementing an excavation response action, a contingency of 15% was assumed. Estimated costs for Alternative S3 are presented in Table 4-1.

Cost Estimate Assumptions

- Common excavation equipment can be used
- Excavated material is non-hazardous
- Under the unrestricted use scenario, relocation and rebuilding of Building 604 is required
- No costs are included for utility relocation or unexpected subsurface conditions
- Dewatering is not required

Table 4-1
Alternative S3 — Estimated Costs for Excavation to Unrestricted Use Standards

	Quantity	Cost per Unit	Total Cost
Removal Action			
Relocation of Building 604 activities	LS	$20,000	$20,000
Temporary Storage Building construction for Building 604 activities	LS	$10,800,000	$10,800,000
Building 604 Demolition (including engineering, slab, footers, hauling, disposal)	180,000 ft^2	$5/$ft^2$	$900,000
Project Design/Engineering	LS	$50,000	$50,000
Soil Excavation	26,000 yd^3	$20/$yd^3$	$520,000
Shoring/Stabilizing	LS	$50,000	$50,000
Confirmation Sampling (total metals, VOCs, SVOCs)	50 samples	$675/each	$33,800
Backfill	26,000 yd^3	$15/$yd^3$	$390,000
Transportation (Perdido Landfill) 30 miles	1,300 loads @ 20 yd^3 per load	$105/load	$136,500
Soil Disposal	39,000 tons (assume 1.5 tons/yd^3)	$36/ton	$1,404,000
Oversight/Field Engineering	LS	10% cost	$348,400
Contingency	LS	15% cost	$522,600
		Subtotal Removal Action	**$15,175,300**
Remedial Contractor Cost			
Overhead, Operations, Profit	LS	$100,000	$100,000
Reconstruction of Building 604			
Building 604 Reconstruction	LS	$12,800,000	$12,800,000
Relocation of Building 604 activities	LS	$20,000	$20,000
		Total Capital/Removal Action	**$28,095,300**
		Alternative S3(a) Total	**$28,095,300**

Notes:
LS = Lump Sum
ft^2 = square feet
yd^3 = cubic yards
Costs are rounded

4.1.4 Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal

Under this alternative, soil where contaminant concentrations exceed 3X ISCTLs and leachability criteria would be excavated, and disposed of in an appropriate landfill. Under the industrial-use scenario, locations not under the existing surface cap would be removed if they had exceedances of 3X ISCTL and leachability criteria. Under the industrial-use scenario, an asphalt or concrete surface limits the risk of exposure and leachability to groundwater; therefore, contaminated soil is not excavated. Institutional controls would be implemented to limit access and property use to industrial, minimizing potential exposure to contamination left in place. The existing asphalt and concrete covering exceeding 3X ISCTLs and leachability criteria would be designated as a cap and maintained. Controls would be required for contaminated areas left in place, including maintenance of pavement and notifying the base environmental office for proper instruction and health and safety procedures before invasive activities. Under this alternative, Building 604 does not require demolition.

Building 71

All locations with 3X ISCTL and/or leachability criteria exceedances are located under the existing asphalt/pavement surface. Therefore, under the industrial-use scenario, no removal is required at Building 71.

Building 604

The estimated impacted volume of subsurface and surface soil at Building 604 is approximately 1,100 yd^3. Excavation depth may vary from 2 to 5 feet. The impacted areas, defined by borings 36SB75S, 38S26, 38S35, 38S37, B-T03, B-T07, B-T15, B-T38, B-T41, and B-T42, represent an approximate total of 0.25 acres. This area is shown in Figure 2-17. All identified locations have a grass surface. Contaminants at these locations would be removed under the industrial use scenario.

Implementability of S4: Excavation with offsite disposal to meet 3X ISCTLs and leachability criteria can be implemented at this site.

Excavation is a common and reliable method for removing contaminated soil. This alternative would require an excavation and transportation contractor. Because of the relatively shallow exaction depth (2 to 5 feet), standard excavation equipment can be used. For this evaluation, it is assumed that all excavated soil would be disposed of in a subtitle D landfill as a nonhazardous special waste.

This alternative would require the Navy to control site access, keep use industrial/commercial, manage any intrusive activities where concentrations exceed ISCTLs, and inspect and maintain the surface cap where contamination has been left in place.

Institutional controls are readily implementable. Site access can be controlled through LUCA and/or warnings against excavation for materials left in place. If the Navy no longer directly controlled the property, development of a deed restriction would be necessary. The Navy has base planners and attorneys on staff with experience in developing and implementing proper institutional controls for Site 38. The possibility of transferring Site 38 to civilian control is highly unlikely in the near future; therefore, proper controls can be implemented through planning.

The NCP requires any alternative that leaves contamination onsite, to be re-evaluated every 5 years to ensure adequacy of the alternative. Therefore, this alternative would require a monitoring program.

Effectiveness of S4: This alternative would provide additional protection to human health and the environment through removal of soil in areas with concentrations exceeding 3X ISCTLs. Institutional controls and surface cap management would minimize exposure and precipitation infiltration and restrict future use to industrial.

This alternative would not limit leaching from areas not excavated or located below the groundwater table; however, groundwater data from the RI and RI Addendum 2 indicate that subsurface contamination at Buildings 71 and 604 is attenuating and does not pose a threat to downgradient (offsite) groundwater.

Cost of S4: The 30-year present worth cost of implementing S4 is estimated at $450,700 assuming a 6% discount factor. This cost covers surface and subsurface excavation to 3X ISCTLs and leachability criteria, combined with institutional controls and existing surface cap management. Estimated costs for Alternative S4 are presented in Table 4-2. Given the unknown variables with implementing an excavation response action, a contingency of 15% was assumed.

Table 4-2
Alternative S4 — Estimated Costs for Excavation to Industrial Standards

	Quantity	Cost Per Unit	Total Cost
Removal Action			
Project Design/Engineering	LS	$30,000	$30,000
Building 71 Soil Excavation	0 yd^3	$20/$yd^3$	$0
Building 604 Soil Excavation	1,100 yd^3	$20/$yd^3$	$22,000
Shoring/ Stabilization	LS	$25,000	$25,000
Confirmation Sampling	20 samples	$675/each	$13,500
Backfill/Compaction	1,100 yd^3	$15/$yd^3$	$16,500
Transportation (Perdido Landfill)	55 loads (assuming 20 yd^3 trucks)	$105/load	$5,800
Soil Disposal	1,650 tons (assume 1.5 tons/yd^3)	$36/ton	$59,400
Engineering Oversight	LS	10% cost	$17,200
Contingency	LS	15% cost	$25,800
Institutional Controls	LS	$50,000	$50,000
		Subtotal Removal Action	**$265,200**
Remedial Contractor Cost			
Overhead, Operations, Profit	LS	$100,000	$100,000
		Total Capital/Removal Action	**$365,200**
Re-evaluation and Surface Cap Management			
5-Year Re-evaluation	LS	$10,000	$10,000
5-Year Cap Inspection	LS	$5,000	$5,000
5-Year value for surface cap maintenance	LS	$20,000	$20,000
		Subtotal 5-Year	**$35,000**
		Present worth every 5 years for 30 years at 6%	**$85,500**
		Total Cost of Alternative S4	**$450,700**

Notes:
LS = lump sum
yd^3 = cubic yard
Sampling assumes SVOCs, VOCs, and total metals

4.1.5 Alternative S5: Capping

Capping is a source control alternative that reduces the risk of exposure by placing a cover system (cap) over the contaminated area. Under this alternative, uncovered areas with 3X ISCTLs and leachability criteria exceedances at the site would be covered with a cap, creating a system that functions as a continuous cap over the contaminated area. The primary purpose of a cap is to prevent direct contact with, and ingestion of, contaminated materials. The secondary purpose is to prevent precipitation infiltration, minimizing the potential for contaminant leaching from soil to groundwater. For this alternative, only the industrial-use scenario was considered applicable; therefore, institutional controls would be required to limit site use.

The estimated uncovered surface area exceeding 3X ISCTLs and leachability criteria is approximately 11,000 square feet (or 1,200 square yards) at Building 604. All contaminated areas exceeding these criteria at Building 71 are under existing asphalt/concrete cover.

There are many types of caps and configurations (i.e., single layer, multi-layer), each constituting a variation of the basic technology. Typical capping materials include low permeability soil, asphalt, concrete, synthetic materials, or combinations of materials. Other materials are commonly used and the choice depends of site-specific conditions. Each material is described briefly as follows.

Low Permeability Soil Cap: A soil cap typically consists of a protective soil layer (clay or bentonite) with a cover layer acting as a drainage layer installed to match existing conditions. Soil caps are generally installed to meet specific permeability specifications (generally 10^{-6} centimeters per second [cm/sec] or lower) depending on site-specific conditions and regulations. Construction consists of installing the material in lifts to achieve a thickness of 1 to 2 feet.

Asphalt or Concrete Cap: An asphalt or concrete cap consists of a surface layer of paved asphalt or concrete, essentially creating a paved road or parking lot.

Synthetic Cap: A synthetic cap typically consists of a thin geomembrane liner such as polyethylene (PE) or polyvinyl chloride (PVC) and a soil cover drainage layer. Geomembranes are supplied in large rolls of varying lengths and thicknesses. They are highly impermeable and require a high level of skill to install. Generally, a geotextile layer is placed below and above the geomembrane to prevent damage from the drainage layer (i.e. sand or granular material) installed above the geotextile and the natural material below. Topsoil and vegetation would be replaced as final cover.

The exact cover technology would be determined in the remedial design phase. Given the area proposed for cover and its current use (grassy areas and medians adjacent to buildings), it is possible that a soil cap or synthetic material would be advantageous. For this evaluation, a geomembrane cap was assumed.

Institutional controls would be required to ensure that the site use remains industrial, minimize the potential for exposure, and maintain the integrity of the cap. As previously discussed, the NCP requires any alternative that leaves contamination onsite be re-evaluated every 5 years to ensure adequacy of the alternative. Therefore, the capping alternative would require the Navy to establish a program for these re-evaluations.

Implementability: A cap with institutional controls is technically and administratively feasible at this site. This alternative would require that a contractor to construct the cap to in accordance with design specifications. Conventional earthwork equipment would be used. Implementation may be affected by existing utilities within the proposed excavation area or surface structures such as utility poles, transformers, or other equipment.

Institutional controls would limit the site use to industrial. Surface cap inspection and maintenance is relatively straightforward and would not require any extraordinary services or materials.

Effectiveness: Although this alternative would not directly reduce the volume, mobility, or toxicity of the contaminants, the cover system would be highly effective in preventing exposure to contaminated soil, minimizing precipitation infiltration, and contaminant leaching to groundwater. In general, the effectiveness of a cover system is related to the attention given to selecting, installing, and inspecting and maintaining the system over time.

Cover systems are most effective when contaminants are located above the water table. The cover system would not limit leaching from contaminants below the year-round maximum groundwater elevation. Under this alternative, natural attenuation would reduce contaminant concentrations leached from soils below the water table. Previous groundwater data and MNA assessments indicate that contaminants at Buildings 71 and 604 are attenuating and do not pose a threat to offsite receptors.

Natural attenuation mechanisms would decrease the contaminant concentrations over time, while institutional controls would ensure both short-term and long-term effectiveness.

Cost: The estimated cost for Alternative S5 is presented in Table 4-3, assuming a geomembrane cover system with geotextile and sand drainage layer. This cost estimate assumes 4 inches of existing soil would be removed and disposed of offsite. The 30-year present worth cost including institutional controls, 5-year re-evaluation, and cap inspection and maintenance is estimated at $313,300.

Table 4-3
Alternative S5 — Estimated Costs for Capping

Action	Quantity	Cost Per Unit	Total Cost
Cap Design and Installation			
Pre-Design Evaluation Selection of Cover system, Design	LS	$20,000	$20,000
Grading/Site Preparation	1,200 yd^2	$2.00/$yd^2$	$2,400
Geomembrane	1,500 yd^2 (add 25% for coverage)	$5.00/$yd^2$	$7,500
Geotextile	3,000 yd^2 (top and bottom)	$4.50/$yd^2$	$13,500

Table 4-3 Alternative S5 — Estimated Costs for Capping			
Action	**Quantity**	**Cost Per Unit**	**Total Cost**
Soil Excavation (assume 4 inches of top cover removed)	150 yd^3	$20/$yd^3$	$3,000
Transportation (Perdido Landfill)	8 trucks (assuming 20 yd^3 trucks)	$105/load	$900
Soil Disposal	225 tons (assume 1.5 tons/ yd^3)	$36/ton	$8,100
Drainage Layer Backfill (assume sand)	200 yd^3	$20/$yd^3$	$4,000
Cover soil	150 yd^3	$10/$yd^3$	$1,500
Seeding/Mulching	LS	$1,000	$1,000
Confirmation Sampling	14 samples (plus 2 QA/QC)	$675/sample	$10,800
Field Engineering/Oversight	LS	$10,000	$10,000
Institutional Controls	LS	$50,000	$50,000
Subtotal Cover System Installation and Institutional Controls			**$132,700**
Remedial Action Contractor			
Overhead, Operations, Profit	LS	$100,000	$100,000
Total Capital (Start-up) Cost			**$232,700**
Operation and Maintenance Cost – 5 year interval			
5-year Re-Evaluation	LS	$10,000	$10,000
5-year Cap Inspection	LS	$3,000	$3,000
5-year Cap Maintenance	LS	$20,000	$20,000
5-Year O&M Subtotal			$33,000
O&M Present Value (at 6% discount over 30 years)			**$80,600**
Total Cost of Alternative S5			**$313,300**

Notes:
LS = Lump Sum
yd^2 = square yard
yd^3 = cubic yard
QA/QC = Quality Assurance/Quality Control
Costs are rounded

4.2 Groundwater Alternative Screening

4.2.1 Alternative G1: No Action

This alternative is required by the NCP as a baseline for comparison with other alternatives. Under this alternative, no action is taken to treat or prevent potential exposure to contaminated groundwater, or reduce volume, toxicity, or mobility of contaminants. This action would rely on natural attenuation processes to reduce contaminant concentrations over time. This action does not include any institutional controls. Future site use would be uncontrolled and the site could be used for residential purposes.

Implementability: No actions are required to implement this alternative; however, the NCP requires any alternative that leaves contamination onsite to be re-evaluated every 5 years to ensure adequacy of the alternative. Therefore, the no-action alternative would require a monitoring program be established by the Navy to provide for this re-evaluation. This alternative is technically and administratively feasible.

Effectiveness: The effectiveness of the no-action alternative is due to natural attenuation. This alternative would not prevent consumption or use of contaminated groundwater under either the future residential or industrial-use scenario. However, the surficial aquifer at NAS Pensacola is not a potable water supply due to its poor ambient water quality, and is not used as such given the proximity of better quality water supplies north of the base. NAS Pensacola derives most of its water from Corry Station and has one well that supplements this supply. NAS Pensacola's supplemental well is upgradient from Site 38 and set in the main producing zone (beneath the low permeability zone that separates the surficial and main producing aquifers). However, future residents could be at risk if they are not notified of the contaminated groundwater and use it as a water source.

Cost: The no-action alternative requires re-evaluation of the site every 5 years for 30 years. It is assumed that groundwater sampling would be performed every 5 years during this evaluation. Analyses include metals, VOCs, and SVOCs. The estimated cost of one monitoring event is $40,800 as shown in Table 4-4. The present worth of re-evaluation sampling every 5 years for 30 years at a 6% discount rate is $99,600.

Table 4-4
Alternative G1 — Estimated Costs for No Action

Action	Quantity	Unit Cost	Total
Sampling (field work and preparation)	2 person crew – 10 days	$172/hr per crew	$13,800
Miscellaneous Equipment, Field Supplies, Travel, etc.	LS	$5,000	$5,000
Reporting/engineering	40 hours	$99/hr	$4,000
Groundwater Analysis	34 samples; 6 QA/QC samples per sampling event	$450/sample	$18,000
		Subtotal	**$40,800**
		Present Worth at 6% discount for 30 years	**$99,600**
		Alternate G1 Cost	**$99,600**

Notes:
QA/QC = Quality assurance/quality control
LS = Lump sum
All costs are rounded
Groundwater analysis include metals, VOCs, and SVOCs

4.2.2 Alternative G2: Monitored Natural Attenuation with Institutional Controls

This alternative would consist of an MNA response action combined with institutional controls. MNA relies on the natural attenuation processes that control plume migration and reduce contaminant mass to achieve remedial objectives within a reasonable time frame. It applies to organic contamination such as chlorinated solvents, as well as inorganic materials.

MNA processes may include natural biological transformation/destruction, advection, sorption, dilution, dispersion, volatilization, and chemical transformation that act to effectively reduce contaminant toxicity, mobility, and volume. With this response action, the contaminant concentrations and geochemical parameters are monitored over time to ensure that the contaminants are attenuating, and the technology is protective of human health and the environment.

The results of an MNA evaluation, in accordance the USEPA MNA testing and analysis protocol (EPA/600/R-98/128, September, 1998), were reported in the *RI Addendum 2* (EnSafe, 2001). This protocol uses a scoring table methodology that takes into account chemical and geochemical data from groundwater monitoring wells and attaches a value to each parameter. This value system is

then used to rank the adequacy or scale of evidence of the site to support natural attenuation. This evaluation also confirmed the site's continuing conduciveness and potential for MNA activity.

For convenience and to demonstrate the applicability of MNA, the evaluation of MNA discussed in the *RI Addendum 2* report is summarized here. Refer to the *RI Addendum 2* report for additional information on the MNA assessment.

As part of the MNA evaluation for this FFS, groundwater concentrations were compared to NADS and summarized in Sections 4.2.2.4 and 4.2.2.6 for Building 71 and 604 study areas, respectively.

4.2.2.1 Technology Background and Demonstration

Natural biological attenuation uses naturally occurring microorganisms to break down or degrade hazardous substances into less toxic or nontoxic ones. Degradation can occur via several metabolic pathways depending on the chemistry and geochemistry of the site groundwater, which can be broadly classified as being anaerobic, aerobic, or co-metabolic. The most common metabolic pathway for chlorinated solvents is anaerobic reductive dechlorination. The process occurs when chlorine atoms in compounds such as PCE and TCE are substituted with hydrogen to successively transform these compounds into the daughter products, cis-1,2-dichloroethene(cis-1,2-DCE) and vinyl chloride(VC). In this pathway, the chlorinated solvent is the electron acceptor. Reductive dechlorination generally occurs more favorably under reducing conditions, i.e., the aquifer must be reduced or anaerobic (low in dissolved oxygen). The reductive-dechlorination process can proceed beyond VC to eventually produce innocuous end-products such as ethene. Because of the natural reductive-dechlorination process, intermediate biological breakdown products (cis-1,2-DCE and VC) are often formed and can then degrade via different metabolic pathways such as aerobic co-metabolism or direct oxidation.

4.2.2.2 Geochemistry

Direct evidence of natural attenuation evidence typically involves evaluation of analytical site data to determine the presence of parent compounds (PCE and TCE) as opposed to daughter products

cis-1,2-DCE and VC. If daughter products are identified, some degree of natural attenuation is occurring.

Based on the discussions on various metabolic pathways, aquifer geochemistry is the most important factor that governs the feasibility of natural attenuation. The USEPA has suggested a list of geochemical parameters for groundwater MNA evaluation (USEPA, 1998). These data can either be quantified in screening tables or analyzed quantitatively to support MNA occurrence and feasibility. Generally, a qualitative understanding of geochemistry is essential in evaluating MNA feasibility. Each parameter bears its own significance in the determination of MNA occurrence.

The following briefly discusses chemical and geochemical parameters and their significance in MNA valuation of chlorinated solvents.

Dissolved Oxygen: The dissolved oxygen (DO) concentration indicates whether the aquifer is aerobic or anaerobic. Oxygen provides the most thermodynamically favorable respiratory pathway (or electron acceptor) used by microorganisms for biodegradation. DO concentrations are critical to natural attenuation of chlorinated solvents. Because anaerobic bacteria generally cannot function at DO concentrations greater than approximately 0.5 mg/L, reductive dechlorination generally does not proceed effectively when concentrations exceed this level.

Generally, the sequence of electronic-acceptor use proceeds from DO to nitrate, followed by ferric iron (Fe [III]), sulfate, and finally carbon dioxide (methanogenesis). Each sequential microbial reaction or geochemical condition renders the aquifer more anaerobic, creating favorable conditions for complete reductive dechlorination. These biochemical mechanisms can also occur simultaneously, particularly under strongly anaerobic conditions.

Oxidation-Reduction Potential (ORP): The ORP is an indicator of the relative oxidized or reduced state of groundwater in an aquifer. Biological processes generally occur within a

prescribed ORP range (USEPA, 1998). ORP levels below -100 millivolts (mV) are ideal for reductive dechlorination.

Nitrate: Nitrate is the next-favored electron acceptor used by microorganisms. Nitrate concentrations greater than 1.0 mg/L in the contaminated portion of the aquifer can inhibit natural reductive dechlorination.

Total Organic Carbon (TOC): TOC concentrations in the aquifer are used to assess the amount and distribution of electron donors that microorganisms require to degrade chlorinated solvents. The USEPA has specified that 20 mg/L is a desirable TOC concentration for biodegradation (USEPA, 1998). However, 20 mg/L is relative to the amount of chlorinated solvents in the aquifer and the type of TOC present. Additionally, the chemical nature of natural organic carbon could also influence its usefulness. In other words, TOC utilization involves a qualitative understanding of site degradation characteristics in addition to the USEPA stipulated criteria. At some sites, TOC at significantly lower concentrations could be sufficient to carry out the reductive dechlorination of chlorinated solvents.

Ferrous Iron: Ferrous Iron (Fe[II]) can be produced from ferric iron (Fe[III]) by microbial activity. Reduction from Fe(III) to Fe(II) can occur during anaerobic degradation of natural or anthropogenic carbon, or during reductive dechlorination of the lesser chlorinated by-products of PCE and TCE, namely DCE and VC. As such, Fe(II) concentrations in the aquifer indicate the possibility of chlorinated solvent degradation (particularly VC). In addition to Fe(II) measurements, total iron measurements can indicate the amount of iron that is available for iron-mediated biological oxidation.

Sulfate and Sulfide: After microbes have utilized DO, nitrate, and iron, sulfate is the next-preferred electron acceptor. Sulfate reduction results in the production of sulfide. Sulfate concentrations greater than 20 mg/L can reduce the efficiency of reductive dechlorination,

because it can compete with chlorinated solvents as the preferred electron acceptor. The presence of sulfide in the aquifer indicates conditions conducive to reductive dechlorination.

Methane: During methanogenesis, carbon dioxide is used as an electron acceptor and converted to methane. Methanogenesis generally occurs after microorganisms have used the available oxygen, nitrate, and sulfate. The presence of methane in the aquifer indicates strongly reducing conditions (commonly ORP is less than -250 mV).

Dissolved Hydrogen: Dissolved hydrogen in groundwater is the most reliable tool available for evaluating redox processes in natural attenuation investigations. Nitrate-, ferric-, sulfate-, and carbon dioxide-reducing microorganisms exhibit different efficiencies in utilizing hydrogen in groundwater (USEPA, 1998). The first two (nitrate and Fe[III]) are very efficient hydrogen utilizers, and therefore maintain lower steady-state hydrogen concentrations in groundwater. The latter two (sulfate and carbon dioxide) are less efficient and maintain relatively higher hydrogen concentrations in groundwater. TCE degrades best under sulfate-reducing or carbon dioxide-reducing conditions (methanogenesis). Therefore, groundwater hydrogen measurements can be used very effectively to distinguish among the various redox zones of plumes in a contaminated aquifer, and indirectly, the potential efficacy of MNA. Hydrogen concentrations of 3 nanoMolar (nM) or higher typically indicate conditions more conducive to complete reductive dechlorination of chlorinated solvent biodegradation.

Alkalinity: Alkalinity commonly increases when chlorinated VOCs are completely degraded. Therefore, groundwater alkalinity in a plume — relative to background concentrations — could indicate the level of microbial activity and indirectly indicate chlorinated solvent biodegradation.

Chloride: Chloride produced by reductive dechlorination is generally inert and can serve as a conservative indicator of chlorinated solvent degradation in the aquifer.

Carbon Dioxide: Carbon dioxide concentrations in groundwater may be used to distinguish zones of heightened bioactivity in the subsurface. Often, contaminated areas that contain carbon dioxide concentrations considerably higher than background indicate greater biological activity.

pH and Temperature: pH and temperature are common environmental parameters that affect microbial activity. Microorganisms that can degrade chlorinated solvents generally prefer a pH between 6 and 8 standard units. Groundwater temperature also affects microbial activity, which tends to increase with temperature up to a certain level.

4.2.2.3 MNA Evaluation at Site 38

The Building 71 and 604 areas were examined separately during MNA evaluation. Tables 4-5 and 4-6 summarize the geochemical and chemical analysis results for the December 2000 sampling event. For additional information, refer to the *RI Addendum 2*.

Data summarized in Tables 4-5 and 4-6 were processed using USEPA's MNA ranking system to assess MNA's adequacy or feasibility at the site. The following interpretation of the scoring or points system is adapted from USEPA's MNA protocol. Tables 4-7 and 4-8 summarize the scores for Building 71 and Building 604 area, respectively.

Score	**Interpretation**
0 to 5	Inadequate evidence
6 to 14	Limited evidence
15 to 20	Adequate evidence
> 20	Strong evidence

4.2.2.4 Building 71 Evaluation

Geochemical data and scoring results indicate that natural reduction of chlorinated solvents in the aquifer is occurring. The best evidence of the favorable conditions is at well 38GS12, where TCE concentrations have reduced from 25 µg/L to 6 µg/L. Downgradient locations 38GS02 and 38GS10 continue to show not detected concentrations of PCE and TCE and very low level detections

of VC. The following discusses each geochemical parameter, its significance, and contribution to the overall natural reductive dechlorination process at the Building 71 area.

Dissolved Oxygen: Low or not detected concentrations of DO support natural reductive dechlorination, because high DO hinders, or even prevents, chlorinated solvent degradation. Table 4-8 data indicate the aquifer DO is relatively low, making it an anaerobic, highly reducing environment.

Table 4-5
Summary of Chemical and Geochemical Analysis — Building 71 Area
(December 2000, except as noted)

Parameter	Background Sample 38GS01	Shallow Monitoring Wells			
		38GS02	38GS03	38GS10	38GS12
DO, Winkler Method (mg/L)	2.8	0	0.4	0	0.2
ORP (mV)	-53	-159	-86	-117	-128
Temperature (°C)	21.2	20.7	22.3	22.1	20.9
Alkalinity (mg/L)	80	130	135	140	90
Chloride (mg/L)	40	200	40	120	40
Ferrous Iron (Iron II) (mg/L)	0.02	0.04	0.1	0.1	0.28
Total Iron (mg/L)	0.04	0.024	0.079	0.077	0.255
Sulfide, S 2- (mg/L)	0.002	2.14*	0.146	0.38	2.58*
Sulfate, S04 2- (mg/L)	15	0	12	28	7
Nitrate* (mg/L)	0.5	NS	ND	NS	ND
Hydrogen (nM)	1.4	2.1	1.2	1.1	<0.03
Methane (µg/L)	7.4	1,600	2,500	190	1,300
Total Organic Carbon (TOC) (mg/L)	2.8	5.6	3.3	4.5	4.3
PCE (µg/L)	ND	ND	0.5	ND	11
TCE (µg/L)	ND	ND	4	ND	6
TCA (µg/L)	ND	ND	1	ND	0.6
Cis-1,2-DCE (µg/L)	ND	0.9	5	ND	24
Vinyl Chloride (µg/L)	ND	3	1	ND	7
Chloroethane (µg/L)	ND	6	ND	ND	ND
Benzene (µg/L)	ND	0.5	0.9	ND	ND
1,1, DCE (µg/L)	ND	ND	ND	ND	ND
1,1, DCA (µg/L)	ND	2.0	3.0	ND	6.0

Notes:
* = Sampled in May 1999
mg/L = milligram per liter
µg/L = microgram per liter
ND = not detected
NS = not sampled during this event

Table 4-6
Summary of Chemical and Geochemical Analysis — Building 604 Area
(December 2000, except as noted)

Parameter	Background Sample 38GS28	Shallow Monitoring Wells				
		38GS08	38GS17	38GS19	38GS20	38GS32
DO, Winkler Method (mg/L)	2.8	1.8	0.2	2.4	1.2	1.3
ORP (mV)	-67	-13	-207	-3	-167	-64
Temperature (^{o}C)	18.7	20.9	24.5	22.9	23.3	20.2
Alkalinity (mg/L)	40	110	125	110	125	130
Chloride (mg/L)	40	40	60	40	40	120
Ferrous Iron (Iron II) (mg/L)	0.09	0.02	0.11	0.03	0.22	0.6
Total Iron (mg/L)	0.051	0.027	0.098	0.103	0.223	1.005
Sulfide, S 2- (mg/L)	0.018	0.006	2.13*	0.007	1.395*	0.009
Sulfate, S04 2- (mg/L)	14	20	0	0	30	1
Nitrate* (mg/L)	0.136	0.737	NS	1.86	NS	ND
Hydrogen (nM)	<0.03	0.71	4.6	0.38	1.6	2.3
Methane (µg/L)	0.23	490	9,700	10	5,600	2,100
Total Organic Carbon (TOC) (mg/L)	3.6	3.1	3.6	1.3	2.9	2.3
PCE (µg/L)	ND	4	ND	25	ND	ND
TCE (µg/L)	ND	17	ND	20	ND	ND
TCA (µg/L)	ND	1	ND	0.5	ND	ND
Cis-1,2-DCE (µg/L)	ND	56	ND	42	0.6	2
Vinyl Chloride (µg/L)	ND	22	7	16	12	2
Chloroethane (µg/L)	ND	ND	ND	ND	ND	ND
Benzene (µg/L)	ND	0.4	ND	ND	ND	ND
1,1, DCE (µg/L)	ND	0.7	ND	ND	ND	ND
1,1, DCA (µg/L)	ND	ND	2.0	0.5	1.0	ND

Notes:

*	=	Sampled in May 1999
mg/L	=	milligram per liter
µg/L	=	microgram per liter
ND	=	not detected
NS	=	not sampled during this event

Table 4-7
Ranking of Chemical and Geochemical Analysis for MNA — Building 71 Area
(December 2000, except as noted)

	Shallow Monitoring Wells			
Parameter	**38GS02**	**38GS03**	**38GS10**	**38GS12**
DO, Winkler Method (mg/L)	3	3	3	3
ORP (mV)	2	1	2	2
Temperature (^{o}C)	1	1	1	1
Alkalinity (mg/L)	0	0	0	0
Chloride (mg/L)	2	0	2	0
Ferrous Iron (Iron II) (mg/L)	0	0	0	0
Sulfide, S 2- (mg/L)	3	1	2	3
Sulfate, S04 2- (mg/L)	2	2	0	2
Nitrate* (mg/L)	NS	2	NS	2
Hydrogen (nM)	3	3	2	0
Methane (µg/L)	3	3	3	3
Total Organic Carbon (TOC) (mg/L)	0	0	0	0
Cis-1,2-DCE (µg/L)	2	2	0	2
Vinyl Chloride (µg/L)	2	2	0	2
Chloroethane (µg/L)	—	ND	ND	ND
Benzene (µg/L)	—	—	ND	ND
1,1-DCE (µg/L)	ND	ND	ND	ND
1,1-DCA (µg/L)	—	—	ND	—
Total	23	20	15	20
Interpretation/Effectiveness Evidence	Strong	Adequate	Adequate	Adequate

Table 4-8
Ranking of Chemical and Geochemical Analysis for MNA — Building 604 Area

Parameter	Shallow Monitoring Wells				
	38GS08	**38GS17**	**38GS19**	**38GS20**	**38GS32**
DO, Winkler Method (mg/L)	-3	3	-3	-3	-3
ORP (mV)	1	2	1	2	1
Temperature (°C)	1	1	1	1	1
Alkalinity (mg/L)	1	1	1	1	1
Chloride (mg/L)	0	0	0	0	2
Ferrous Iron (Iron II) (mg/L)	0	0	0	0	0
Sulfide, S 2- (mg/L)	0	3	0	3	0
Sulfate, S04 2- (mg/L)	2	2	2	0	2
Nitrate* (mg/L)	2	NS	0	NS	2
Hydrogen (nM)	0	3	0	3	3
Methane (µg/L)	3	3	0	3	3
Total Organic Carbon (TOC) (mg/L)	0	0	0	0	0
Cis-1,2-DCE (µg/L)	2	0	2	2	2
Vinyl Chloride (µg/L)	2	2	2	2	
Chloroethane (µg/L)	ND	ND	ND	ND	ND
Benzene (µg/L)	—	ND	ND	ND	ND
1,1-DCE (µg/L)	—	ND	ND	ND	ND
1,1-DCA (µg/L)	ND	—	—	—	—
Total	12	20	6	14	16
Interpretation/Effectiveness Evidence	Limited	Strong	Limited	Adequate	Adequate

Notes:
°C = Celsius
mg/L = milligrams per liter
m/V = millivolts
n/M = nanometers
µg/L = micrograms per liter
ND = not detected
NS = not sampled during this sampling event

Oxidation-Reduction Potential: ORP measurements in groundwater indicated values less than -50 mV, providing further evidence of the reductive nature of the aquifer.

Nitrate: Nitrate was not sampled during the December 2000 sampling event. Therefore, nitrate data collected in May 1999 were included in the assessment. Based on the data, it does not appear that nitrate is interfering with reductive dechlorination.

Sulfate and Sulfide: Sulfate concentrations up to 20 mg/L generally do not significantly interfere with reductive dechlorination. However, at higher concentrations, sulfate may compete with TCE and PCE for microbial respiration. Sulfate concentrations at well 38GS10 exceeded 20 mg/L, but TCE and PCE were not detected at these wells.

The presence of sulfide indicates reducing conditions in the aquifer, which facilitate reductive pathways for TCE and PCE. Sulfide was detected in all area wells, with a maximum concentration of 2.58 mg/L at 38GS12.

Hydrogen: Hydrogen concentrations support reductive dechlorination. The range of hydrogen detections (1.1 to 2.1 nM) further indicates that most of the aquifer is in the sulfate-reducing mode of anaerobic activity which is conducive to reductive dechlorination.

Methane: Methane was detected in the aquifer with a maximum concentration of 2,500 µg/L at 38GS03, indicating methanogenesis is occurring. Methanogenic conditions are considered the most favorable for reductive dechlorination of PCE, TCE, and their daughter products. The higher the methane concentrations (1,000 µg/L and above are considered optimal), the more likely that PCE and TCE will degrade completely to innocuous end-products such as ethane and ethene.

Chloride: The end-product of reductive dechlorination is chloride, a nonreactive (conservative) constituent often used as an indicator parameter to demonstrate chlorinated solvent breakdown. Two wells (38GS02 and 38GS10) show concentrations significantly higher than background.

Total Organic Carbon: For reductive dechlorination to occur, the microorganisms must have an adequate supply of natural or anthropogenic carbon. The 20 mg/L value listed in the USEPA protocol is an optimal concentration for reductive dechlorination and is relative to the concentrations of TCE and PCE. However, a TOC concentration much less than this value is generally sufficient to drive reductive dechlorination with adequate reducing conditions. In the Building 71 Area, TOC concentrations (2 to 5 mg/L) appear to be sufficient to sustain continuing degradation of chlorinated solvents.

Natural Attenuation Default Source

To further evaluate MNA within the Building 71 study area, contaminant concentrations were compared to NADS.

Building 71 — Inorganics

No inorganic parameters exceeded their respective NADS within the Building 71 study area during the 2000 sampling event. NADS exceedances for inorganics at Building 71 from all sampling events are summarized in Table 4-9. As shown in this table, inorganic concentrations have decreased to below detection limits or below NADS at wells recently sampled.

Table 4-9
Building 71 Natural Attenuation Default Source Criteria Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**NADS**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
36MW80C	Aluminum	2,000	7,080	NS	NS	NS
	Iron	3,000	8,450	NS	NS	NS
	Lead	150	220	NS	NS	NS
38GI01	Iron	3,000	3,490	NS	NS	NS
38GI10	Aluminum	2,000	NS	2,600	NS	NS
38GS01	Aluminum	2,000	6,420	NS	NE	NE
	Iron	3,000	6,820	NS	NE	ND
	Lead	150	276	NS	NE	ND
38GS02	Iron	3,000	7,470	NS	ND	NE
	Lead	150	362	NS	ND	ND
38GS03	Aluminum	2,000	2,700	NS	ND	NE
	Antimony	60	ND	NS	70	ND
	Copper	10,000	NE	NS	ND	NE
	Iron	3,000	4,930	NS	ND	ND
38GS05	Aluminum	2,000	3,210	NS	NS	NS

Table 4-9
Building 71 Natural Attenuation Default Source Criteria Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**NADS**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS10	Aluminum	2,000	8,940	NS	NS	NE
	Iron	3,000	15,700	NS	NS	ND
38GS12	Aluminum	2,000	11,400	NS	ND	NE
	Antimony	60	ND	NS	180	ND
	Cadmium	50	NE	NS	50	ND
	Iron	3,000	17,600	NS	NE	NE
	Lead	150	280	NS	NE	NE
38GS13	Aluminum	2,000	2,320	NS	NS	NE
	Iron	3,000	4,560	NS	NS	NE
	Lead	150	158	NS	NS	NE

Notes:
µg/L = micrograms per liter
ND = not detected
NE = did not exceed criteria
NS = not sampled during this sampling event

Building 71 — Semivolatile Organic Compounds

No SVOCs exceeded their respective NADS within the Building 71 study area during the 2000 sampling event or during any of the previous sampling events.

Building 71 — Volatile Organic Compounds

No VOCs exceeded their respective NADS within the Building 71 study area during the 2000 sampling event. For historical purposes, Table 4-10 summarizes exceedances for VOCs at Building 71.

Table 4-10
Building 71 Natural Attenuation Default Source Criteria Exccedances for VOCs (µg/L)

			Sample Results			
Well ID	**Parameter**	**NADS**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
038GS12	1,1,2,2-Tetrachloroethane	20	ND	NS	100	ND

Notes:
µg/L = micrograms per liter
ND = not detected
NE = did not exceed criteria
NS = not sampled during this sampling event

4.2.2.5 Building 71 Area Chemical Data and Historical Trends

Table 4-11 summarizes chlorinated solvent concentrations in the Building 71 area since sampling first began in January 1994. Figures 4-1 to 4-5 depict changes in concentrations of chlorinated solvents and their daughter breakdown products in each well since 1994. Figures 4-6 through 4-8 show changes in concentrations in the approximate direction of groundwater flow in the area. Chlorinated solvent concentrations decrease in the direction of groundwater flow from well 38GS12 to the downgradient wells indicates that PCE and TCE are undergoing reductive dechlorination before migrating to the downgradient wells. Overall, since sampling began in 1994, concentrations have also decreased. PCE and TCE exceed screening concentrations at 38GS12, the "center" of the plume but have decreased considerably.

The products of reductive dechlorination, cis-1,2-DCE, and vinyl chloride, exhibit similar trends to their parent compounds, indicating that these by-products are not accumulating in the aquifer.

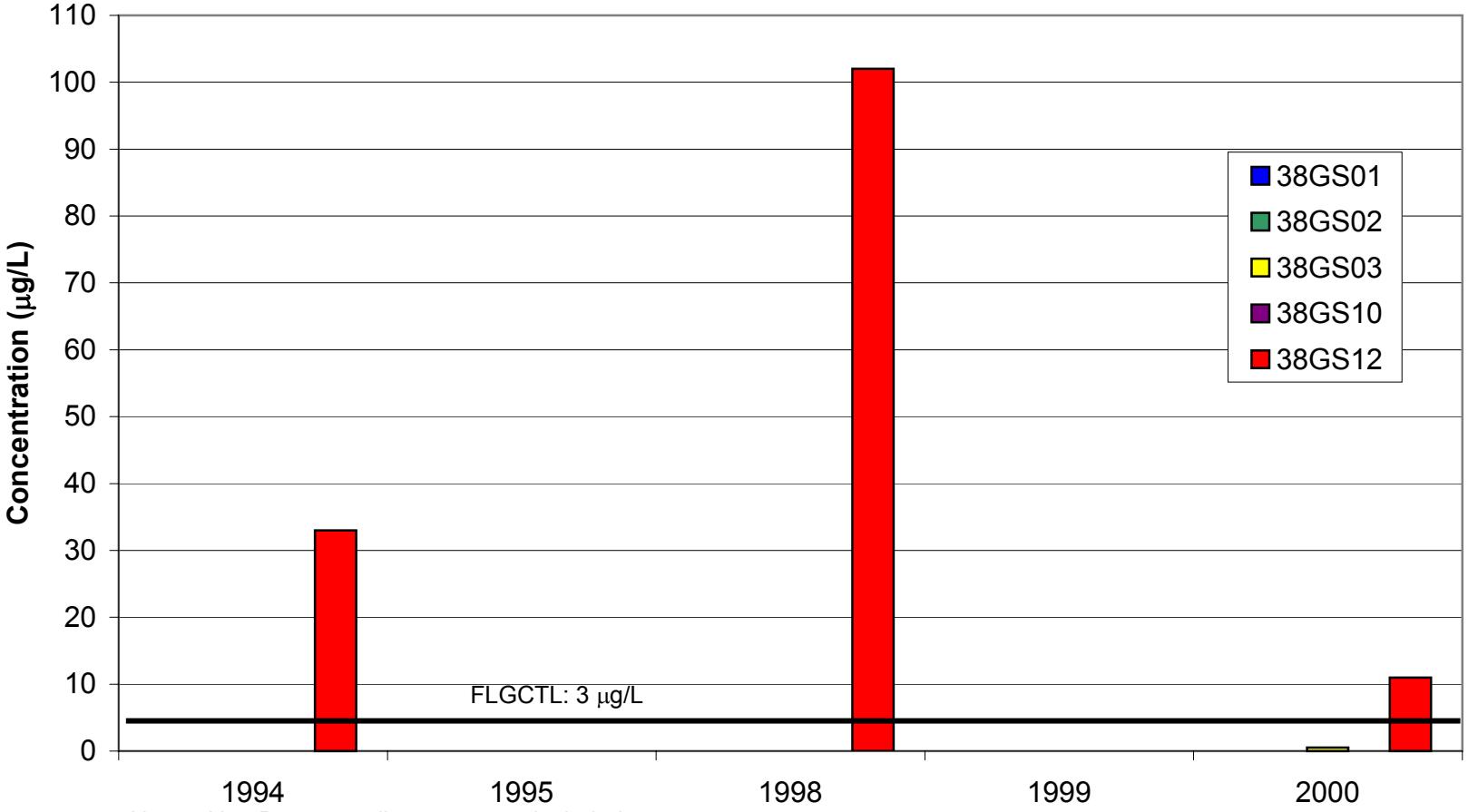
Detections at well 38GS03 for TCE (4.0 µg/L) and VC (1.0 µg/L) are equal to or less than their screening concentrations, respectively. VC at 38GS12 has decreased from 15 µg/L in December 1998 to 7 µg/L in December 2000. The overall geochemical screening indicated that conditions are still favorable for reductive dechlorination at this location, indicating that downgradient accumulation of parent or daughter compounds is not likely.

4.2.2.6 Building 604 Evaluation

Geochemical data and scoring results indicate natural reduction of chlorinated solvents in the aquifer. Except for DO, which was above 1.0 mg/L at several locations, most geochemical parameters indicate continuing evidence of reductive dechlorination. The following discusses each geochemical parameter, its significance, and contribution to the overall reductive dechlorination process at the Building 604 area.

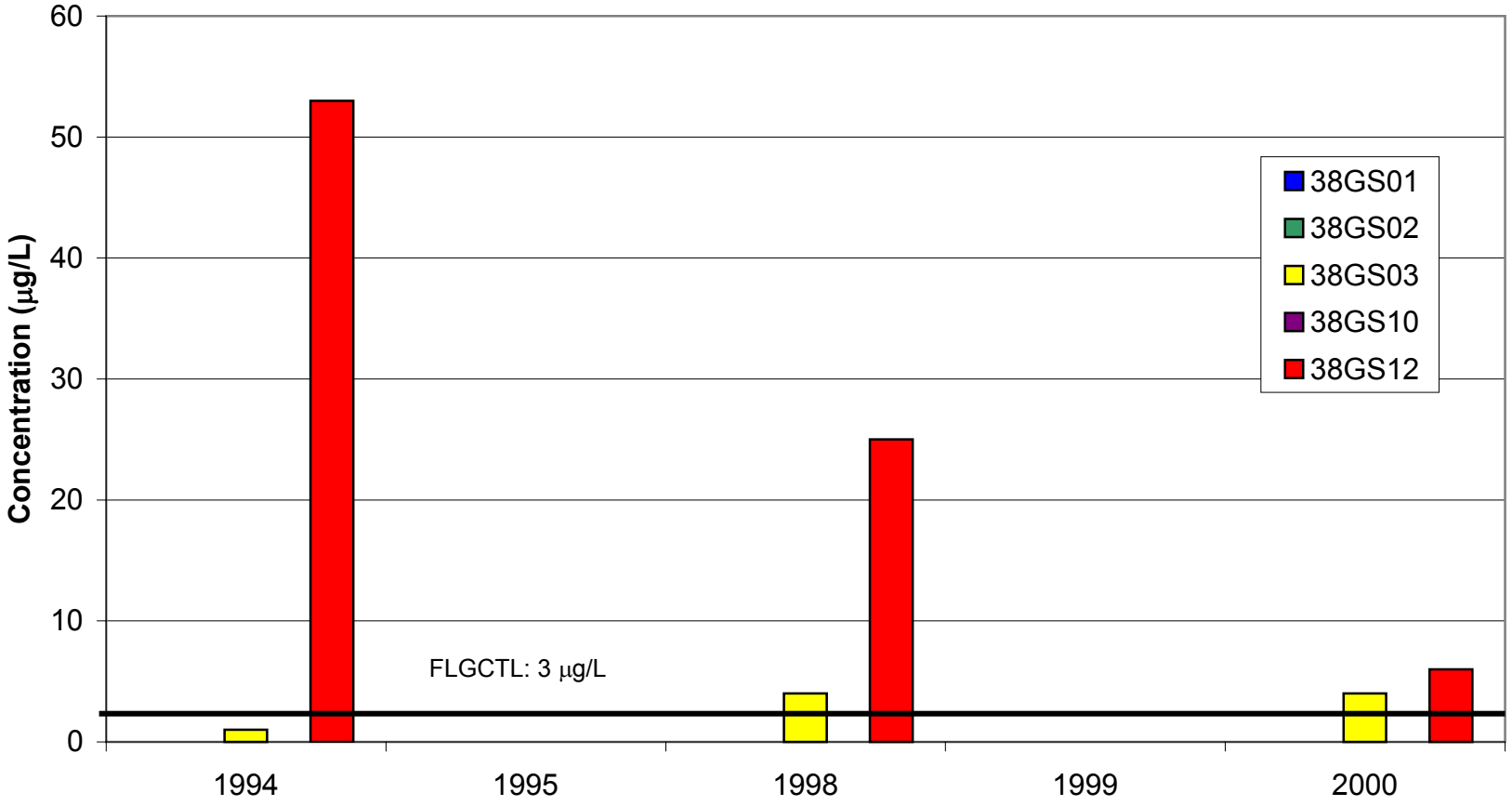
Dissolved Oxygen: DO concentrations appear to have temporarily increased. However, this is likely to be temporary and the result of tidal fluctuations. Also, when these numbers are correlated with ORP and hydrogen, it appears that the aquifer continues to be reducing.

Figure 4.1 Tetrachloroethene Building 71 Well Concentrations



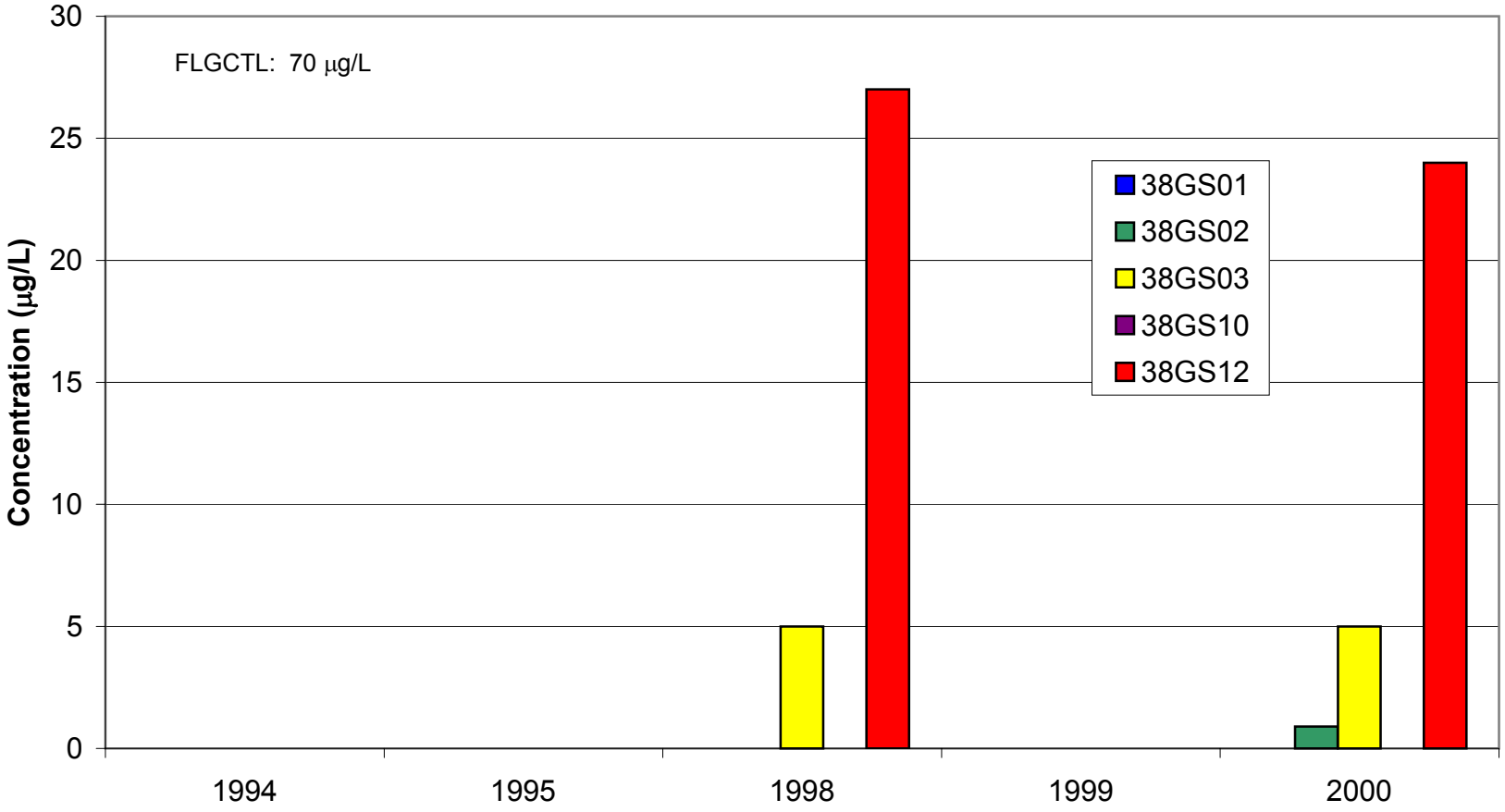
Note: Non Detect readings were not included.
No wells were sampled in 1995.
Wells 38GS02 and 38GS10 were not sampled in 1998.
Wells 38GS01, 38GS03 and 38GS12 were not sampled in 1999.
FLGCTL = Florida Groundwater Cleanup Target Level

Figure 4.2 Trichloroethene Building 71 Well Concentrations



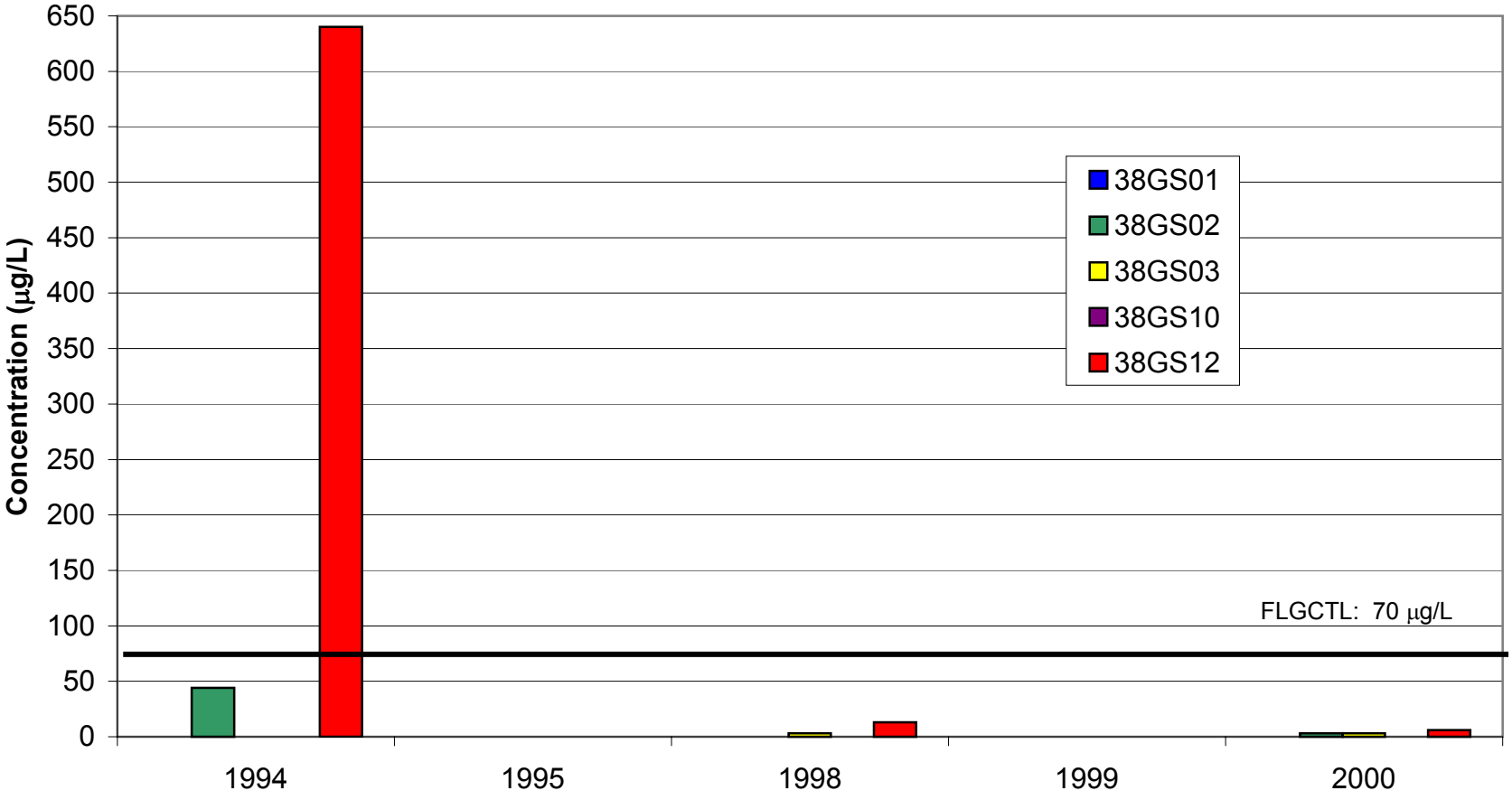
Note: Non Detect readings were not included.
No wells were sampled in 1995.
Wells 38GS02 and 38GS10 were not sampled in 1998.
Wells 38GS01, 38GS03 and 38GS12 were not sampled in 1999.
FLGCTL = Florida Groundwater Cleanup Target Level

Figure 4.3 cis-1,2-Dichloroethene Building 71 Well Concentrations



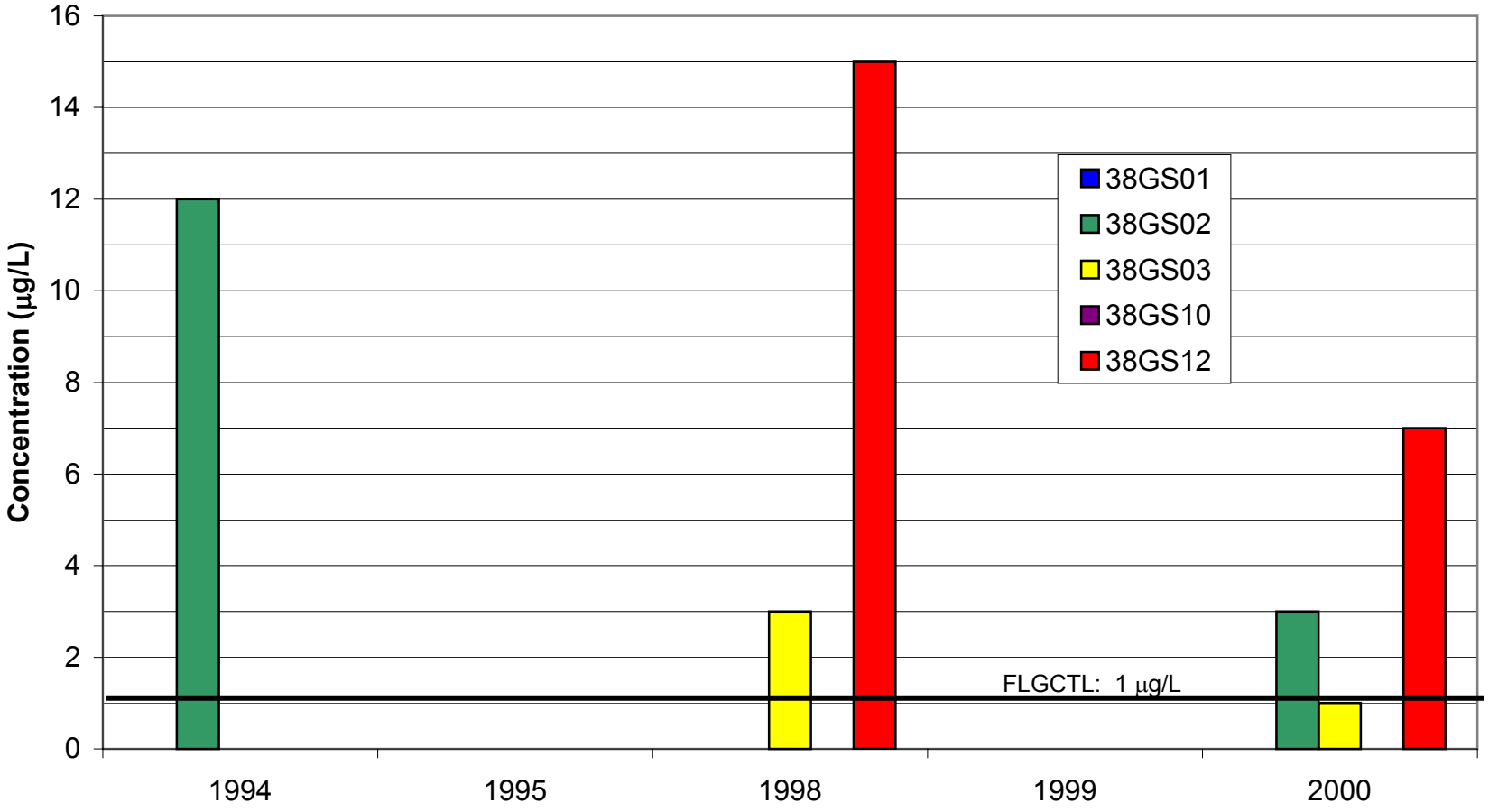
Note: Non Detect readings were not included. FLGCTL = Florida Groundwater Cleanup Target Level
Readings from wells 38GS01, 38GS02, 38GS03 and 38GS12 were not available for 1994.
No wells were sampled in 1995.
Wells 38GS02 and 38GS10 were not sampled in 1998.
Wells 38GS01, 38GS03 and 38GS12 were not sampled in 1999.

Figure 4.4 1,1-Dichloroethane Building 71 Well Concentrations



Note: Non Detect readings were not included.
No wells were sampled in 1995.
Wells 38GS02 and 38GS10 were not sampled in 1998.
Wells 38GS01, 38GS03 and 38GS12 were not sampled in 1999.
FLGCTL = Florida Groundwater Cleanup Target Level

Figure 4.5 Vinyl Chloride Building 71 Well Concentrations



Note: Non Detect readings were not included. FLGCTL = Florida Groundwater Cleanup Target Level
No wells were sampled in 1995.
Wells 38GS02 and 38GS10 were not sampled in 1998.
Wells 38GS01, 38GS03 and 38GS12 were not sampled in 1999.

Figure 4.6 Bldg 71 1994 Natural Attenuation of Chlorinated Solvents

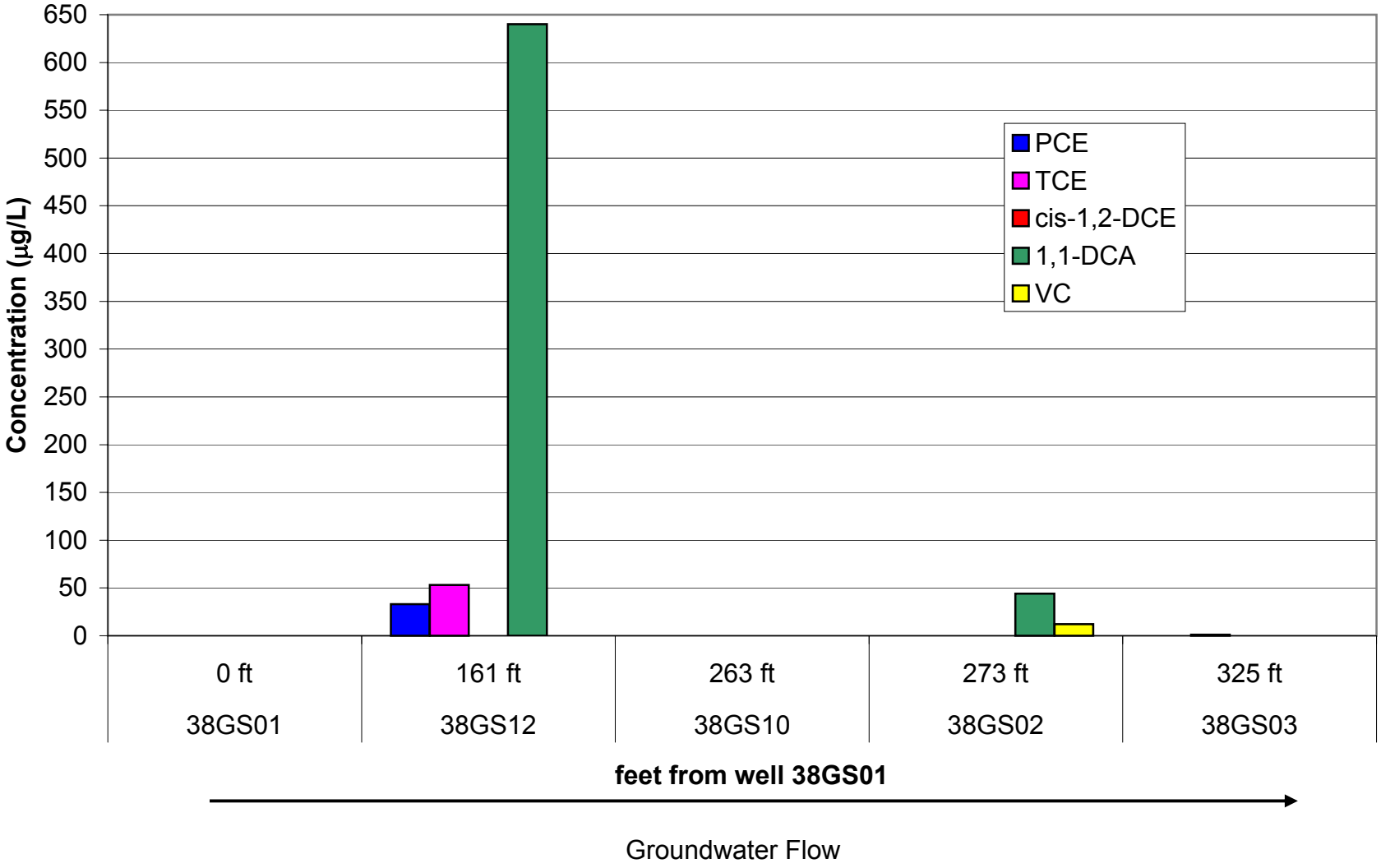


Figure 4.7 Bldg 71 1998 Natural Attenuation of Chlorinated Solvents

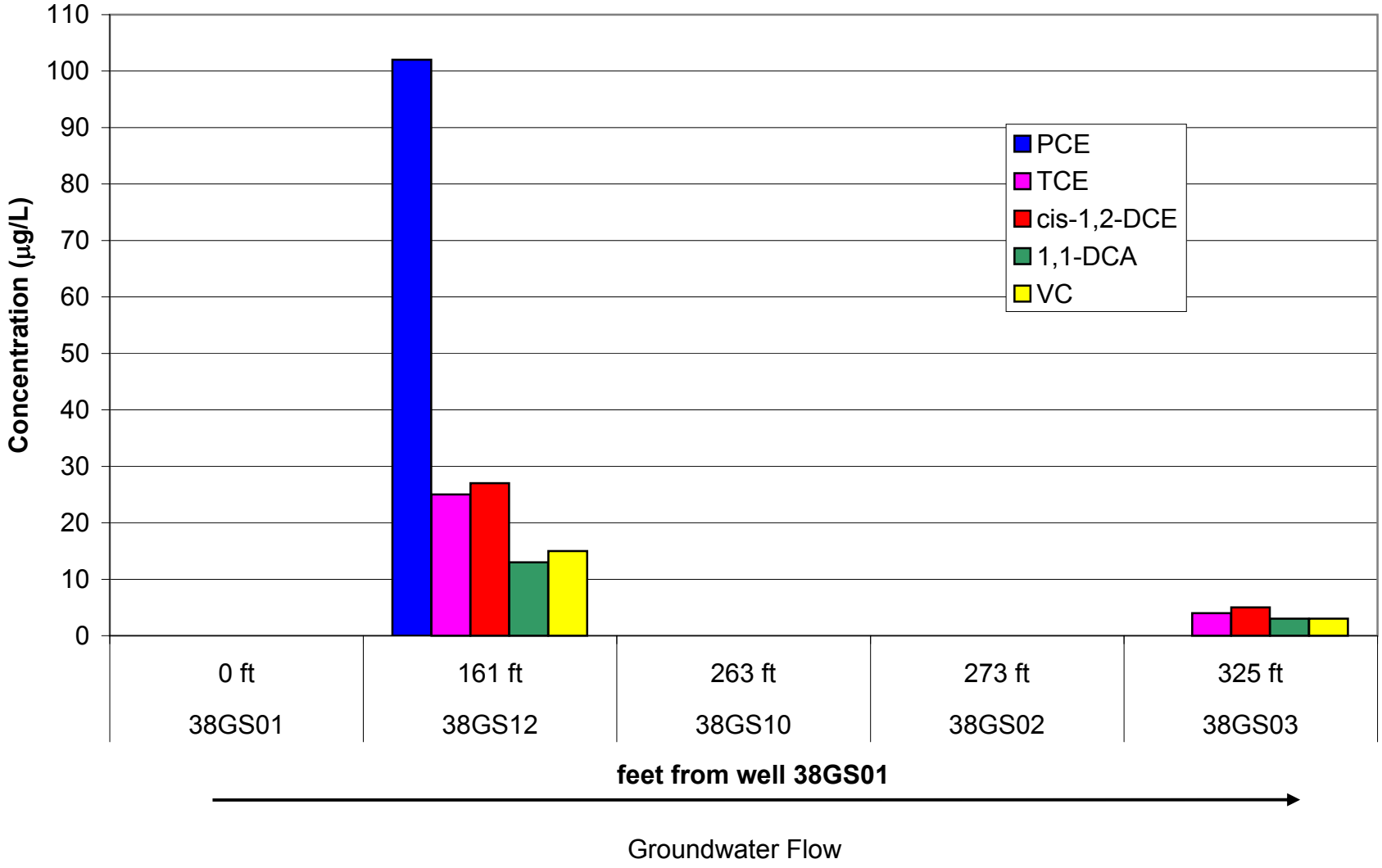


Figure 4.8 Bldg 71 2000 Natural Attenuation of Chlorinated Solvents

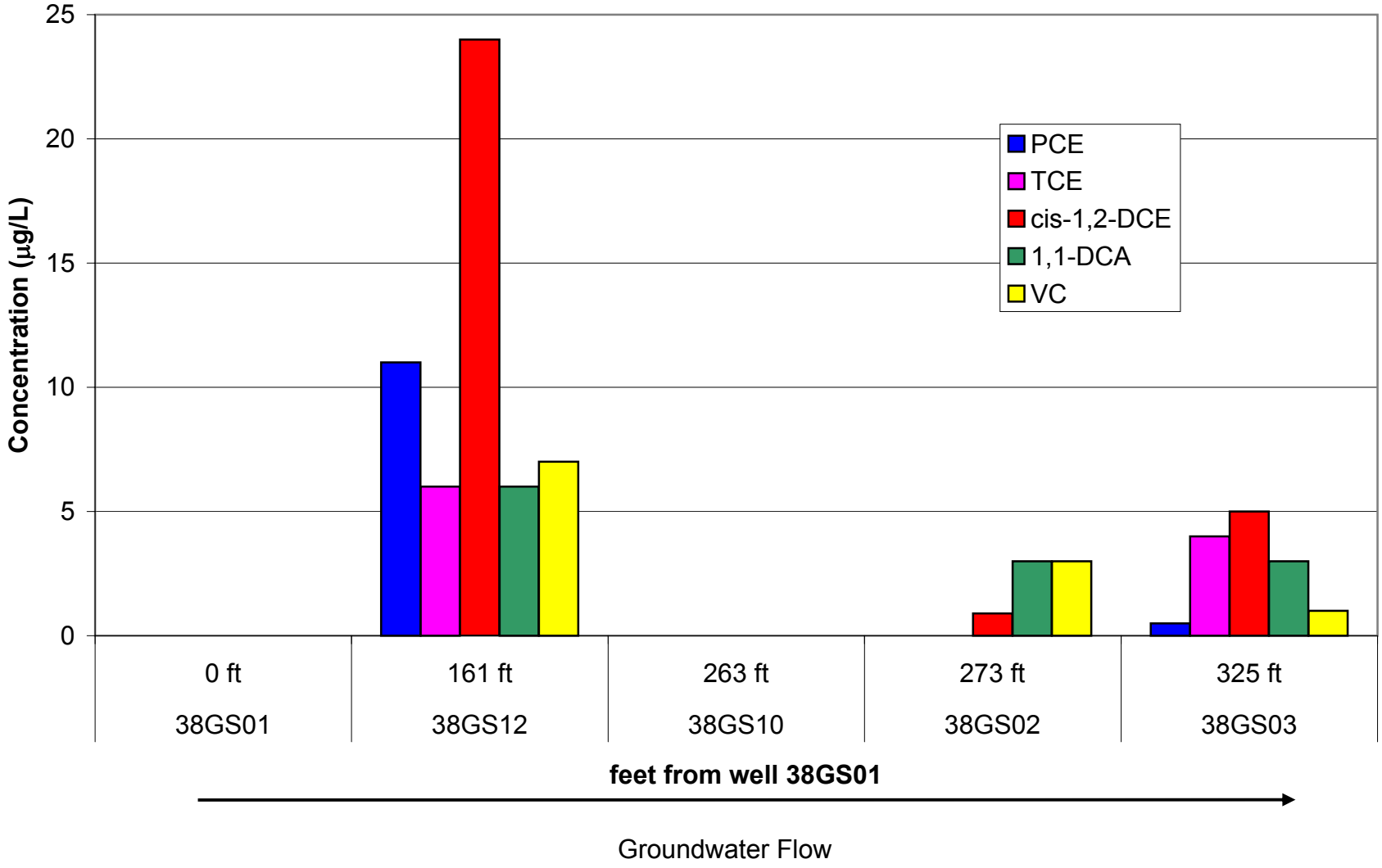


Table 4-11
Chlorinated Solvents in Groundwater — Building 71 (µg/L)
(1994-2000)

Parameter	Location	RI Samples (Jan 1994)	USEPA Samples (Oct 1995)	Samples (Dec 1998)	Samples (May 1999)	Samples (Dec 2000)	Screening Concentration	Screening Source
1,1-Dichloroethane	38GS01	ND	NS	ND	NS	ND	700	FGGC
	38GS02	44	NS	NS	ND	3.0		
	38GS03	ND	NS	3	NS	3.0		
	38GS10	ND	NS	NS	ND	ND		
	38GS12	640	NS	13	NS	6.0		
cis-1,2-Dichloroethene	38GS01	NA	NS	ND	NS	ND	70	FPDWS/FGGC
	38GS02	NA	NS	NS	ND	0.9		
	38GS03	NA	NS	5	NS	5.0		
	38GS10	ND	NS	NS	ND	ND		
	38GS12	NA	NS	27	NS	24		
Tetrachloroethene	38GS01	ND	NS	ND	NS	ND	3	FPDWS
	38GS02	ND	NS	NS	ND	ND		
	38GS03	ND	NS	ND	NS	0.5		
	38GS10	ND	NS	NS	ND	ND		
	38GS12	**33**	NS	**102**	NS	**11**		
Trichloroethene	38GS01	ND	NS	ND	NS	ND	3	FPDWS
	38GS02	ND	NS	NS	ND	ND		
	38GS03	1	NS	**4**	NS	**4**		
	38GS10	2	NS	NS	ND	ND		
	38GS12	**53**	NS	**25**	NS	**6**		
Vinyl Chloride	38GS01	ND	NS	ND	NS	ND	1	FPDWS
	38GS02	**12**	NS	NS	ND	**3**		
	38GS03	ND	NS	**3**	NS	**1**		
	38GS10	ND	NS	NS	ND	ND		
	38GS12	ND	NS	**15**	NS	**7**		

Notes:
FPDWS = Florida Primary Drinking Water Standards
FGGC = Florida General Groundwater Criteria
ND = not detected in sample
NA = not analyzed for this sample
NS = not sampled during this event
RI = Remedial Investigation
USEPA = United States Environmental Protection Agency
Concentrations exceeding screening values are shown in bold

Oxidation-Reduction Potential: ORP measurements in groundwater are all less than 0 mV, which provides evidence of the reductive nature of the aquifer.

Nitrate: Nitrate was not sampled during December 2000. To aid in this investigation, nitrate data collected in May 1999 were included in the assessment. Based on this data, it does not appear that nitrate is interfering with reductive dechlorination.

Sulfate and Sulfide: Sulfate concentrations up to 20 mg/L generally do not significantly interfere with reductive dechlorination. However, at higher concentrations, sulfate may compete with TCE and PCE for microbial respiration. Sulfate concentrations at well 38GS20 exceeded 20 mg/L, but TCE and PCE were below screening levels at this location.

The presence of sulfide indicates reducing conditions in the aquifer, which facilitates reductive pathways for TCE and PCE. Sulfide was detected in all area wells with a maximum concentration of 2.13 mg/L at 38GS17.

Hydrogen: Hydrogen concentrations support chlorinated reductive dechlorination. The range of detections (0.38 to 4.6 nM) further indicates that most of the aquifer is in the sulfate-reducing mode of anaerobic activity, which is conducive to reductive dechlorination.

Methane: Methane was detected in the aquifer with a maximum concentration of 9,700 µg/L at 38GS17. Methane detections indicate methanogenesis. Methanogenic conditions are considered the most favorable for reductive dechlorination of PCE, TCE, and their daughter products. The higher the methane concentrations (1,000 µg/L and above are considered optimal), the more likely that PCE and TCE will degrade completely to innocuous end-products such as ethane and ethene.

Total Organic Carbon: For reductive dechlorination to occur, the microorganisms must have an adequate supply of natural or anthropogenic carbon. The 20 mg/L value listed in the USEPA protocol is an optimal concentration for reductive dechlorination and is relative to the concentrations of TCE and PCE. However, TOC concentrations much less than this value is

sufficient to drive reductive dechlorination, with adequate reducing conditions. In the Building 604 area, it appears that TOC concentrations are adequate to sustain reductive dechlorination.

Natural Attenuation Default Source

To further evaluate MNA within the Building 604 study area, contaminant concentrations were compared to NADS.

Building 604 – Inorganics

During the 2000 sampling event, two inorganic parameters exceeded its NADS within the Building 604 study area (cadmium and iron). Cadmium exceeded its NADS (50µg/L) in two wells. In 2000, well 38GS19 reported a cadmium concentration of 79 µg/L, which decreased from 382 µg/L reported in 1994. Cadmium also exceeded at well 38GS21 in 2000 (150 µg/L) decreasing from sampling events collected in 1993/1994. Iron exceeded its NADS (3,000 µg/L) at well 38GS24 (6,100 µg/L). Iron concentrations for this well have increased since the last time it was sampled in 1995 (3,200 µg/L). However, all other inorganic constituents have decreased to below detection limits or below NADS. Table 4-12 summarizes NADS exceedances for inorganic constituents at Building 604.

Table 4-12
Building 604 Natural Attenuation Default Source Criteria Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**NADS**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
36MW73C	Aluminum	2,000	14,000	NS	NS	NS
	Iron	3,000	11,800	NS	NS	NS
	Lead	150	265	NS	NS	NS
36MW74C	Lead	150	367	NS	NS	NS
36MW76C	Aluminum	2,000	9,120	NS	NS	NS
	Iron	3,000	7,510	NS	NS	NS
	Lead	150	374	NS	NS	NS
36MW77C	Aluminum	2,000	4,100	NS	NS	NS
	Iron	3,000	4,210	NS	NS	NS
36MW79C	Aluminum	2,000	7,820	NS	NS	NS
	Iron	3,000	7,840	NS	NS	NS
38GI04	Aluminum	2,000	9,110	NE	NS	ND
38GS08	Antimony	60	NE	NS	210	ND
	Manganese	500	NE	NS	1,990	NE
38GS09	Aluminum	2,000	3,050	NS	NS	ND
	Iron	3,000	4,660	NS	NS	NE
38GS19	Lead	150	180	NS	NE	ND

Table 4-12
Building 604 Natural Attenuation Default Source Criteria Exceedances for Inorganics (µg/L)

			Sample Results			
Well ID	**Parameter**	**NADS**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS20	Aluminum	2,000	20,000	NS	NS	NE
	Iron	3,000	24,900	NS	NS	NE
38GS21	Aluminum	2,000	2,710	NS	NS	NE
	Iron	3,000	4,520	NS	NS	NE
	Lead	150	639	NS	NS	NE
38GS24	Iron	3,000	NS	3,200	NS	6,100
38GS32	Antimony	60	NS	ND	190	ND

Notes:
µg/L = micrograms per liter
NADS = Natural Attenuation Default Source Concentration
ND = not detected
NE = did not exceed criteria
NS = not sampled during this sampling event

Building 604 – Semivolatile Organic Compounds

No SVOCs exceeded their respective NADS within the Building 604 study area during the 2000 sampling event or during any of the previous sampling events.

Building 604 – Volatile Organic Compounds

No VOCs exceeded their respective NADS criteria within the Building 604 study area during the 2000 sampling event. No VOC parameters have been detected above their respective NADS criteria within the Building 604 study area since the 1995 sampling event, as shown in Table 4-13.

Table 4-13
Building 604 Natural Attenuation Default Source Criteria Exceedances for VOCs (µg/L)

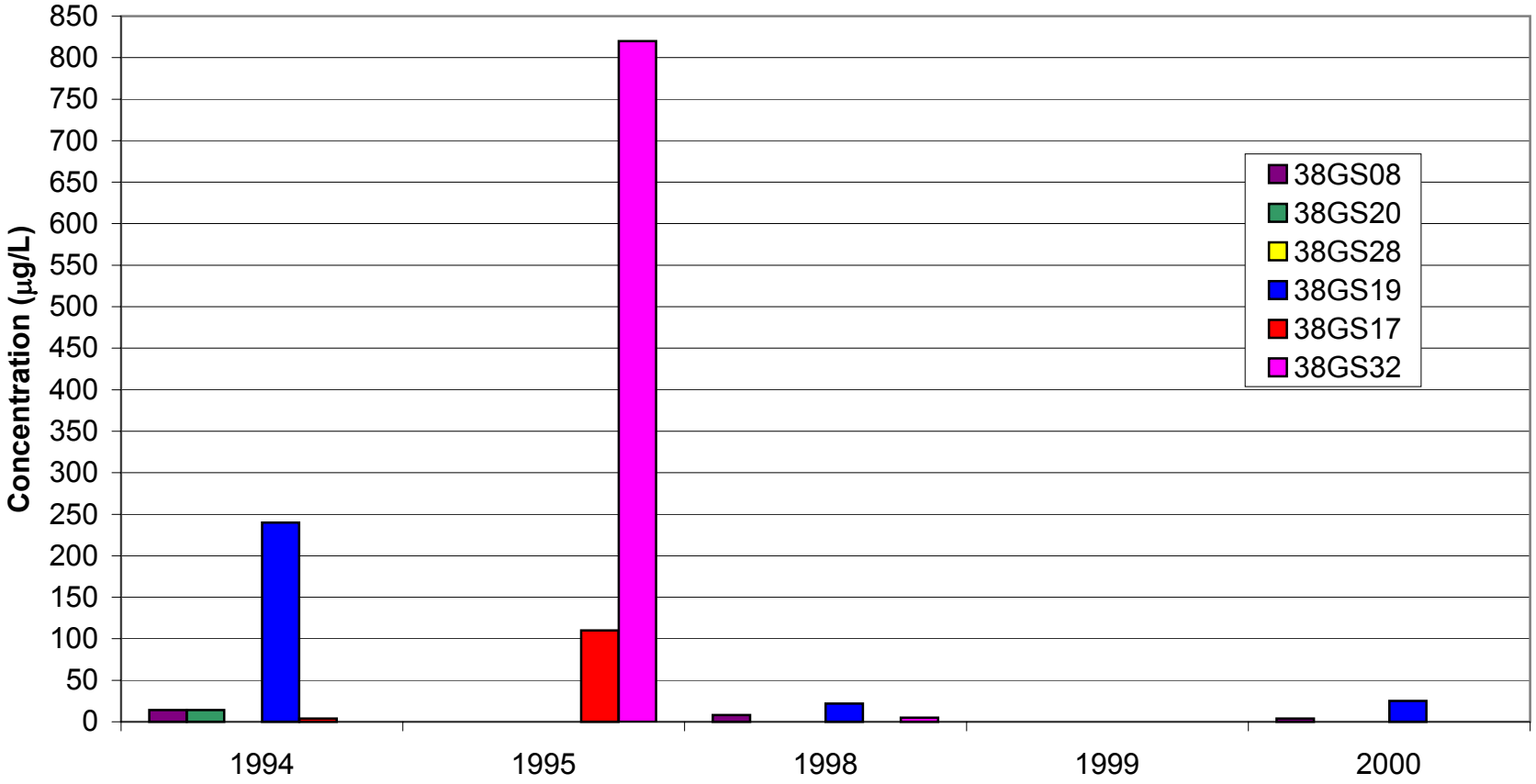
			Sample Results			
Well ID	**Parameter**	**NADS**	**1993/1994**	**1995/1996**	**1998/1999**	**2000**
38GS17	Vinyl Chloride	100	1,600	3,700	NS	NE
38GS20	1,2-Dichloroethene (total)	630	970	NS	ND	ND
	Vinyl Chloride	100	1,100	NS	ND	NE
38GS32	Tetrachloroethene	300	NS	820	NE	ND
	Trichloroethene	300	NS	340	NE	ND
	Vinyl Chloride	100	NS	130	NE	NE

Notes:
µg/L = micrograms per liter
NADS = Natural Attenuation Default Source Concentrations
ND = not detected
NE = did not exceed criteria
NS = not sampled during this sampling event

4.2.2.7 Building 604 Area Chemical Data and Historical Trends

Table 4-14 summarizes chlorinated solvent concentrations in the Building 604 area since sampling first began in January 1994. Figures 4-9 to 4-13 depict changes in concentrations of chlorinated solvents and their daughter breakdown products in each well since 1994. Figures 4-14 to 4-17 show changes in concentration in the approximate direction of groundwater flow in the area. TCE was not detected in groundwater from wells 38GS17, 38GS20, and 38GS32. Data from wells 38GS08 and 38GS19 showed reduced TCE, but indicated that daughter compounds cis-1,2-DCE and VC may be increasing slightly. Because these are daughter compounds, their increases can suggest continued reductive dechlorination of PCE and TCE. The data indicated that these daughter products appear to be degrading before they reach downgradient locations as indicated by concentrations at 38GS32. Concentrations of chlorinated solvents show an overall decreasing trend in the direction of groundwater flow from well 38GS19 to the downgradient wells 38GS20, 38GS17, and 38GS19. This indicates that PCE and TCE are undergoing reductive dechlorination before reaching the downgradient wells.

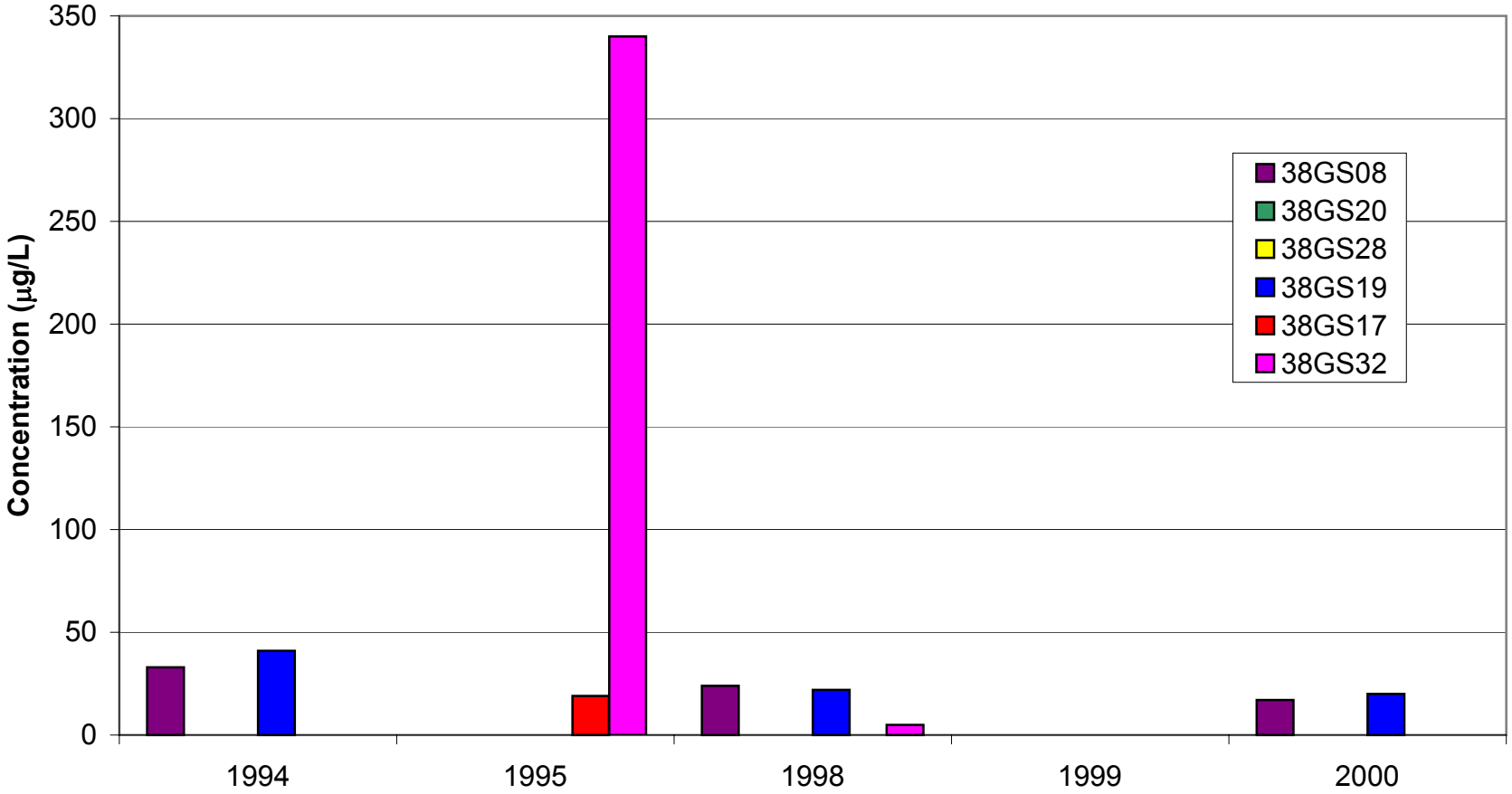
Figure 4.9 Tetrachloroethene Building 604 Well Concentrations



Note: Non Detect readings were not included.
Wells 38GS28 and 38GS32 were not sampled in 1994.
Wells 38GS08, 38GS19 and 38GS20 were not sampled in 1995.
Wells 38GS17 and 38GS20 were not sampled in 1998.
Wells 38GS08, 38GS19, 38GS28 and 38GS32 were not sampled in 1999.

FLGC: 3 µg/L

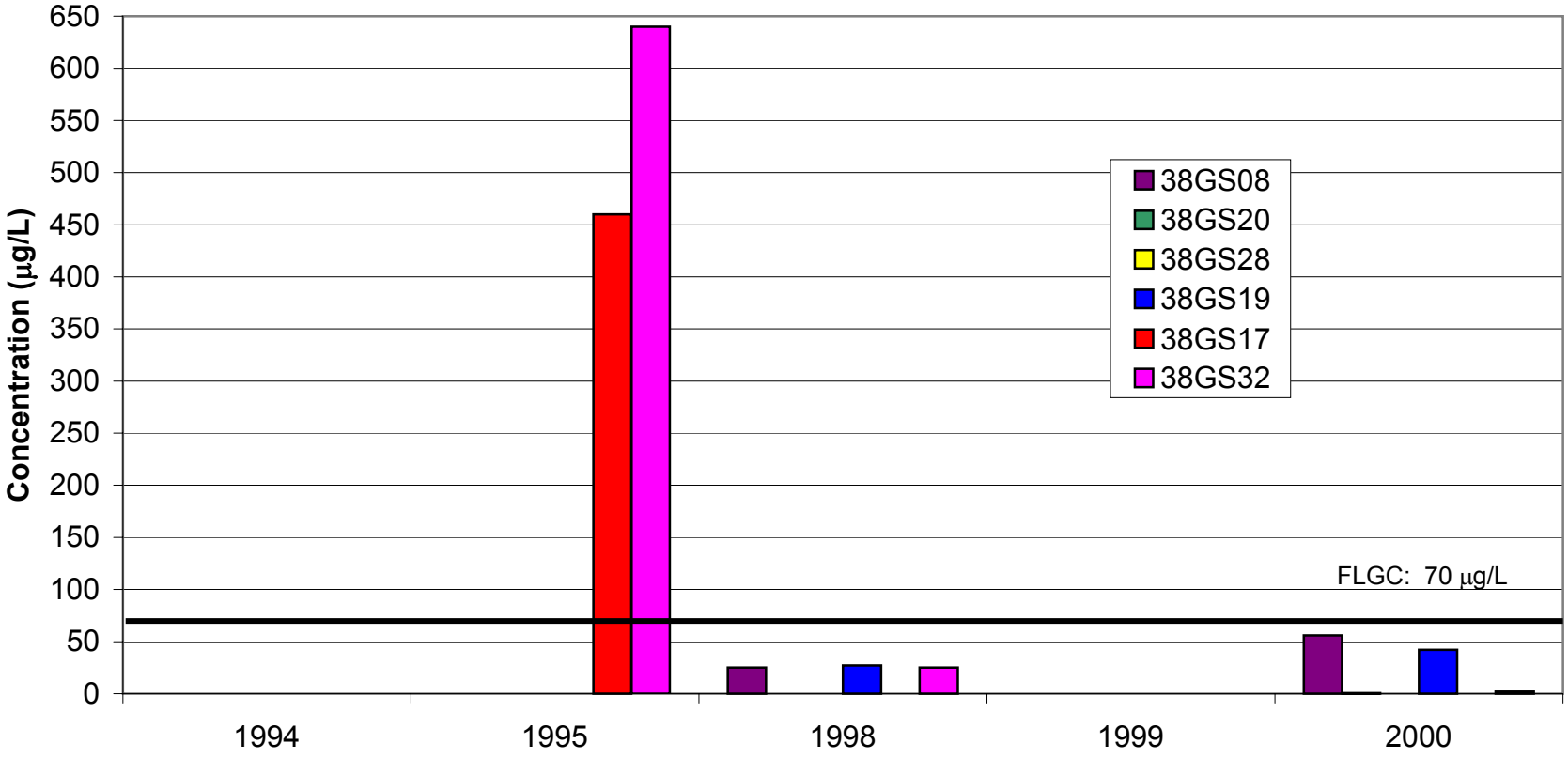
Figure 4.10 Trichloroethene Building 604 Well Concentrations



Note: Non Detect readings were not included.
Wells 38GS28 and 38GS32 were not sampled in 1994.
Wells 38GS08, 38GS19 and 38GS20 were not sampled in 1995.
Wells 38GS17 and 38GS20 were not sampled in 1998.
Wells 38GS08, 38GS19, 38GS28 and 38GS32 were not sampled in 1999.

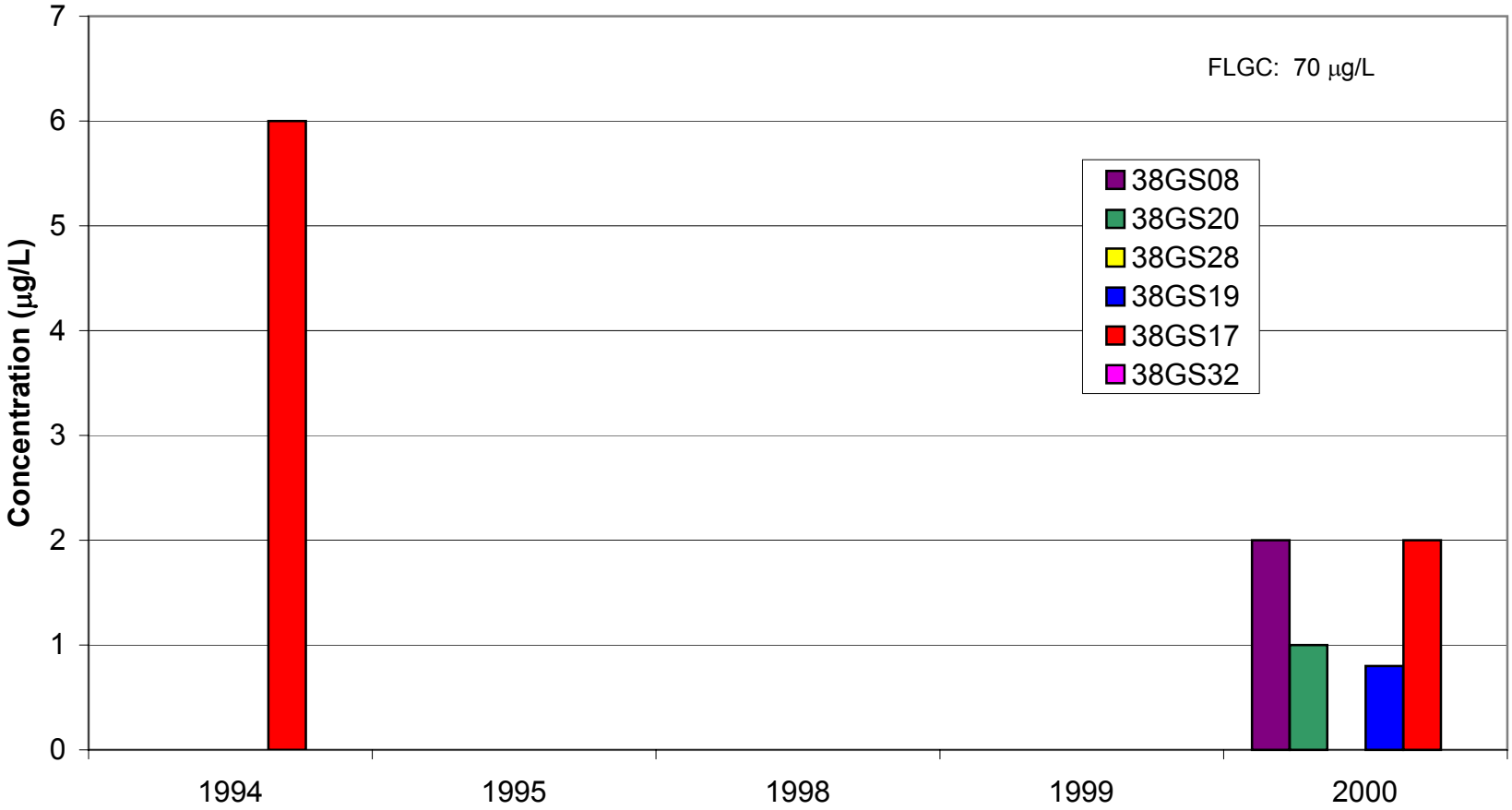
FLGC: 3 µg/L

Figure 4.11 cis-1,2-Dichloroethene Building 604 Well Concentrations



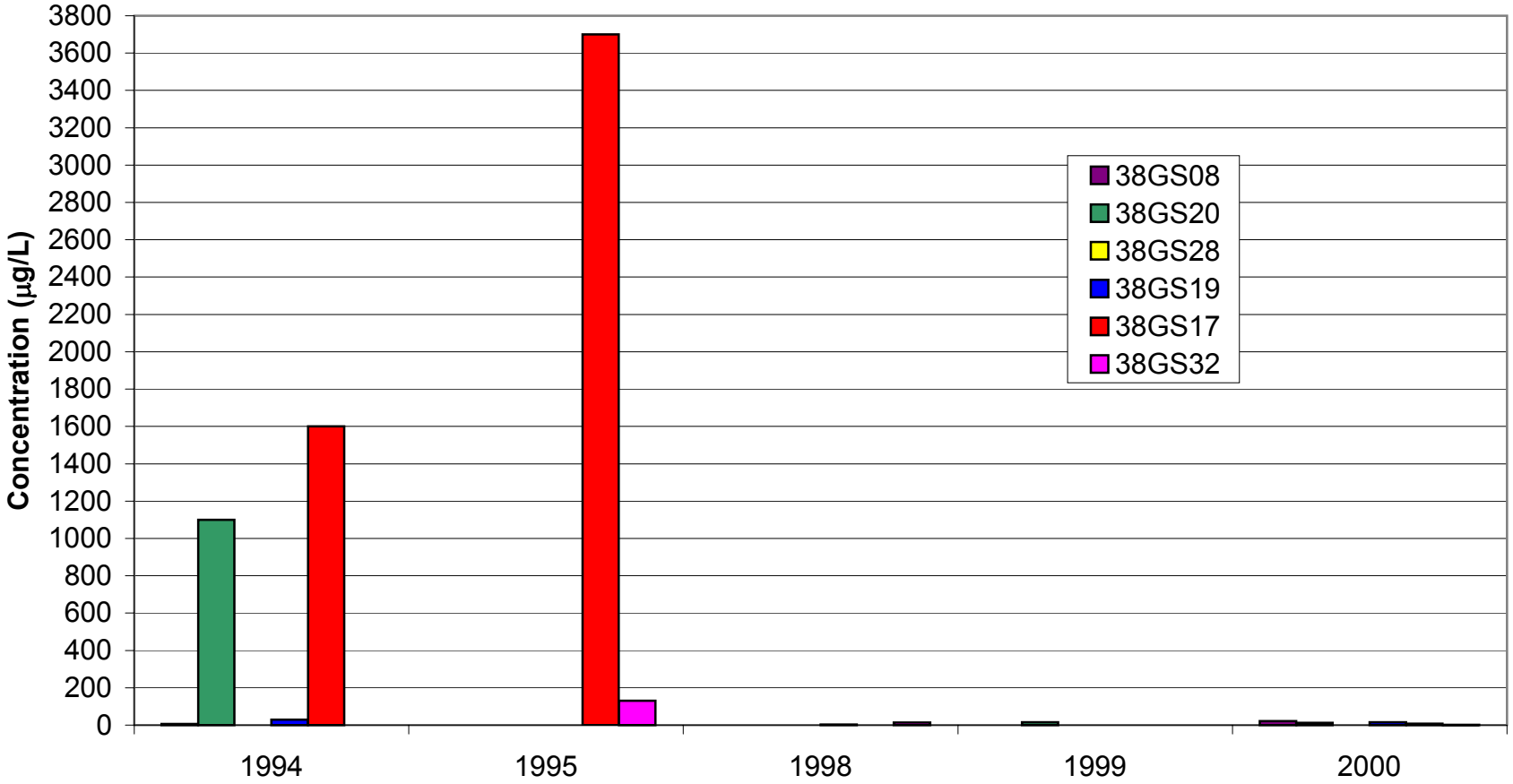
Note: Non Detect readings were not included.
Wells 38GS28 and 38GS32 were not sampled in 1994.
Readings for wells 38GS08, 38GS17, 38GS19 and 38GS20 were not available for 1994
Wells 38GS08, 38GS19 and 38GS20 were not sampled in 1995.
Wells 38GS17 and 38GS20 were not sampled in 1998.
Wells 38GS08, 38GS19, 38GS28 and 38GS32 were not sampled in 1999.
FLGC = Florida Groundwater Criteria

Figure 4.12 1,1-Dichloroethane Building 604 Well Concentrations



Note: Non Detect readings were not included.
Wells 38GS28 and 38GS32 were not sampled in 1994.
Wells 38GS08, 38GS19 and 38GS20 were not sampled in 1995.
Wells 38GS17 and 38GS20 were not sampled in 1998.
Wells 38GS08, 38GS19, 38GS28 and 38GS32 were not sampled in 1999.

Figure 4.13 Vinyl Chloride Building 604 Well Concentrations



Note: Non Detect readings were not included. FLGC = Florida Groundwater Criteria FLGC: 1 µg/L

Wells 38GS28 and 38GS32 were not sampled in 1994.

Wells 38GS08, 38GS19 and 38GS20 were not sampled in 1995.

Wells 38GS17 and 38GS20 were not sampled in 1998.

Wells 38GS08, 38GS19, 38GS28 and 38GS32 were not sampled in 1999.

Figure 4.14 Bldg 604 1994 Natural Attenuation of Chlorinated Solvents

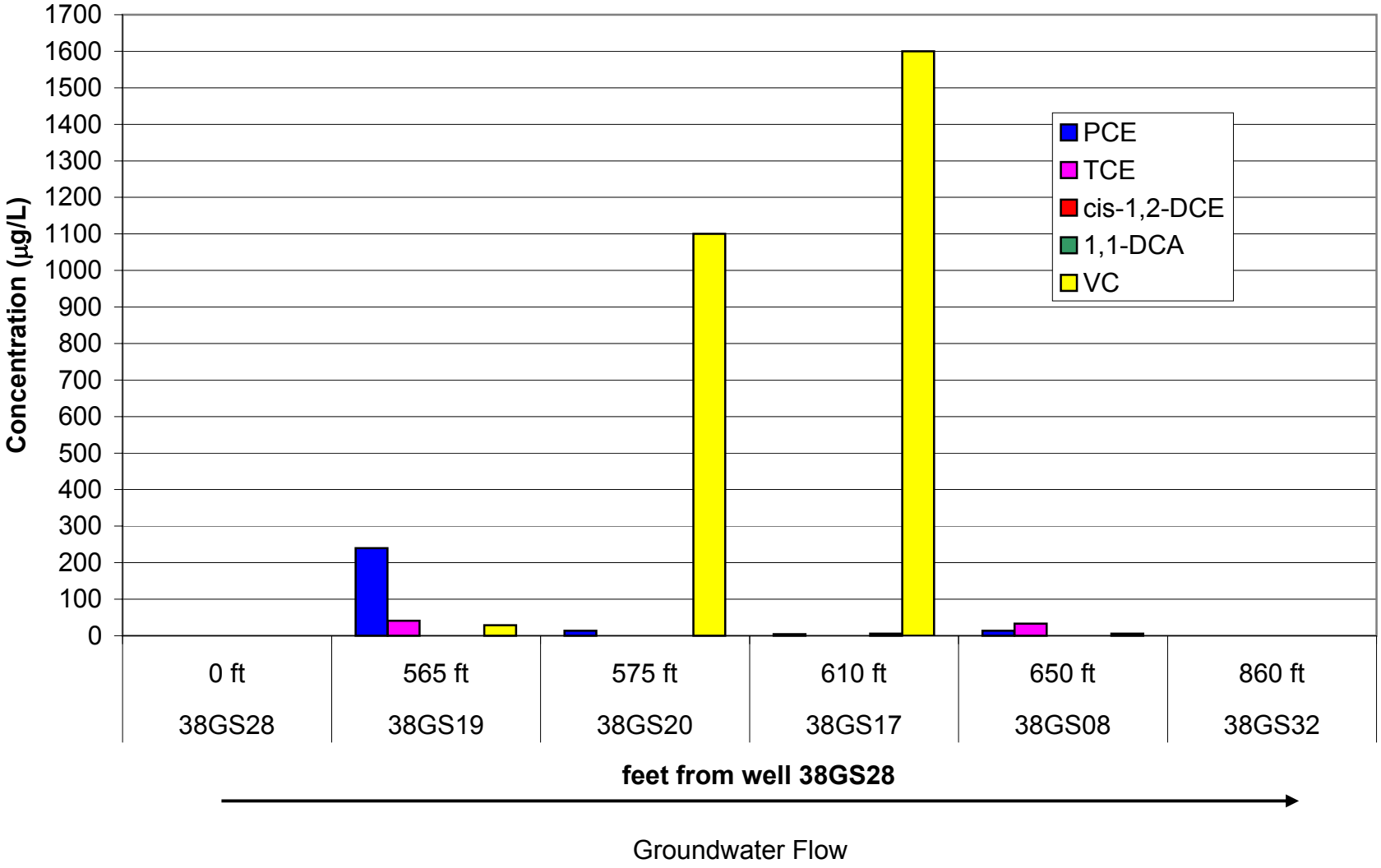


Figure 4.15 Bldg 604 1995 Natural Attenuation of Chlorinated Solvents

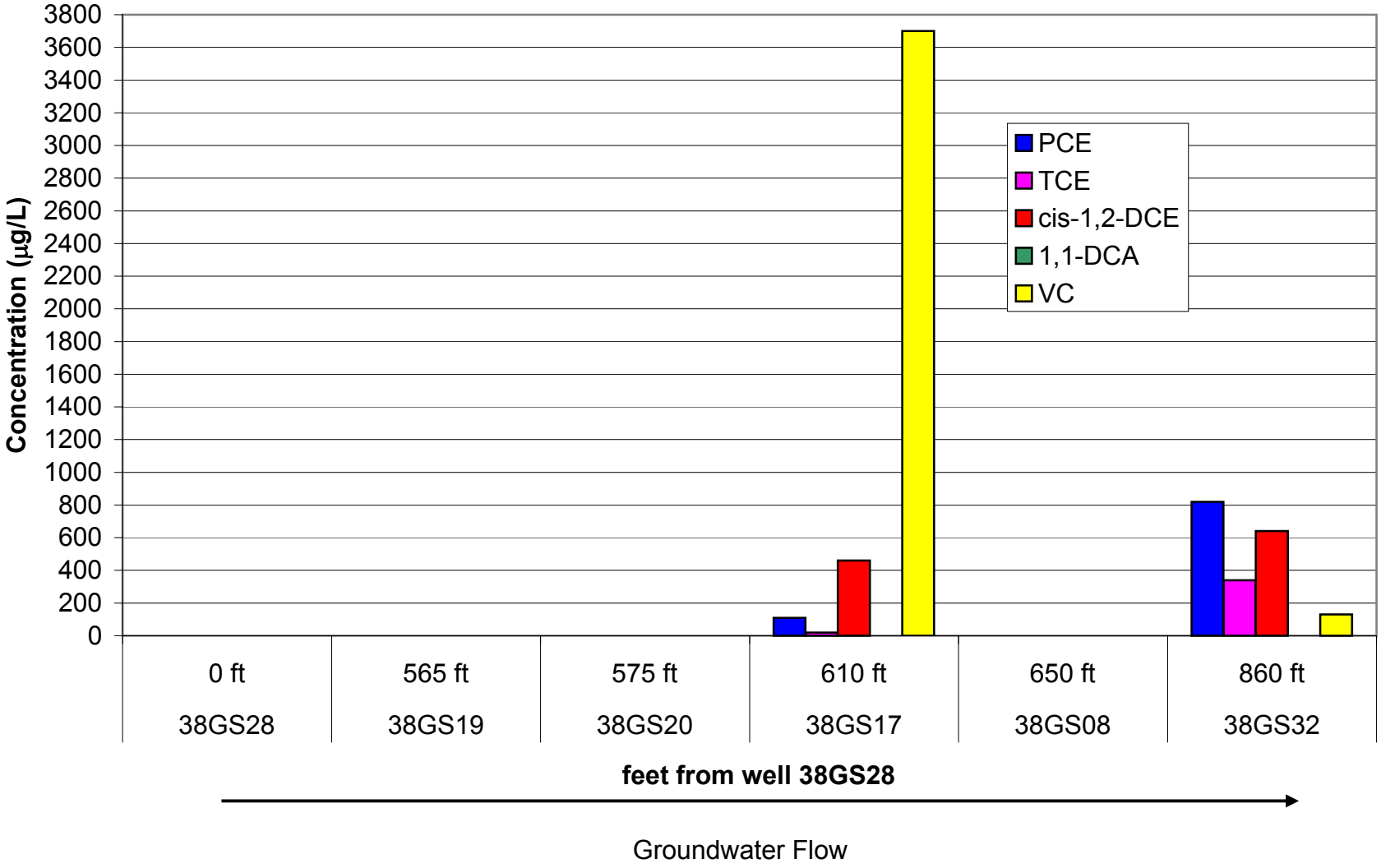


Figure 4.16 Bldg 604 1998 Natural Attenuation of Chlorinated Solvents

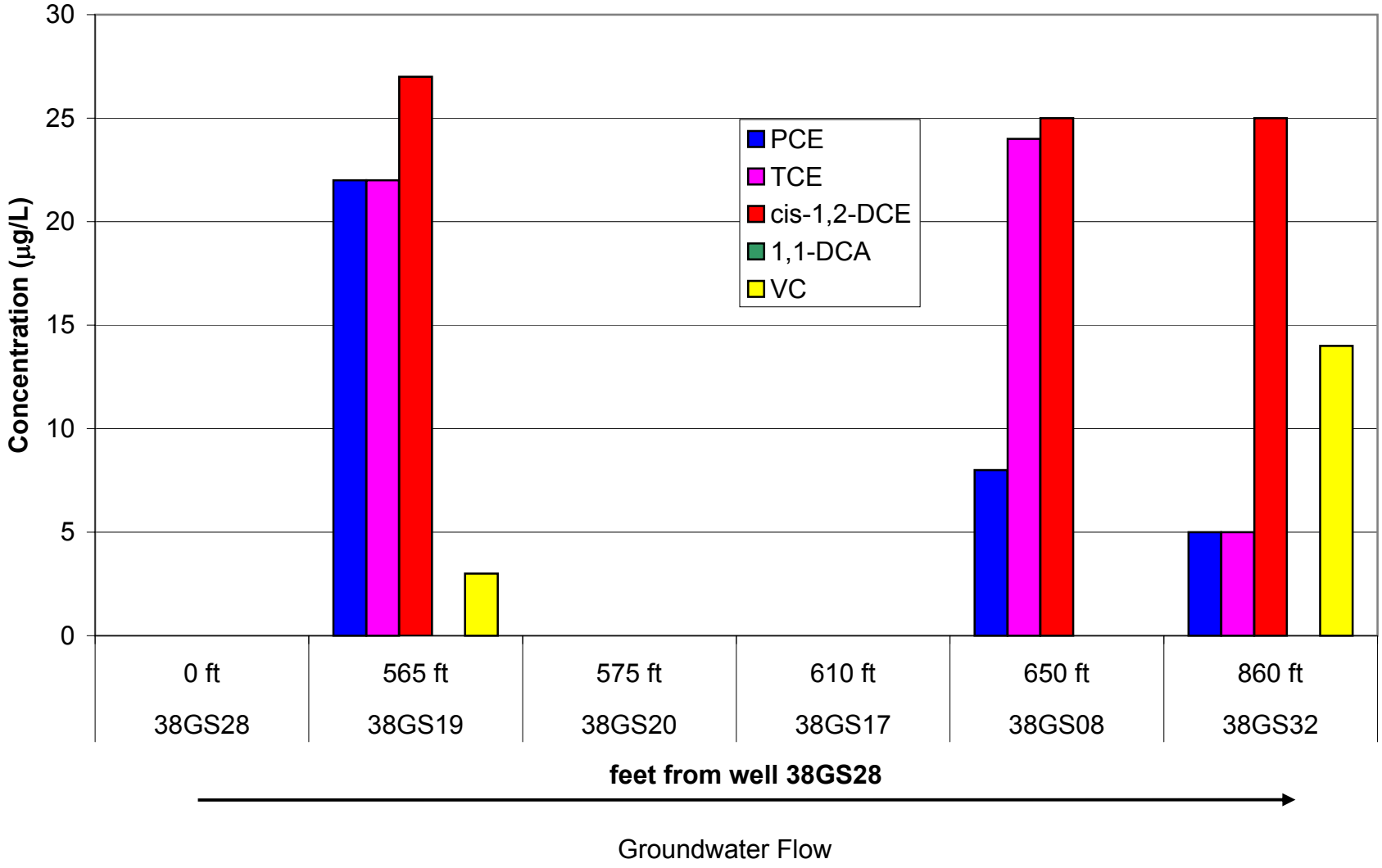


Figure 4.17 Bldg 604 2000 Natural Attenuation of Chlorinated Solvents

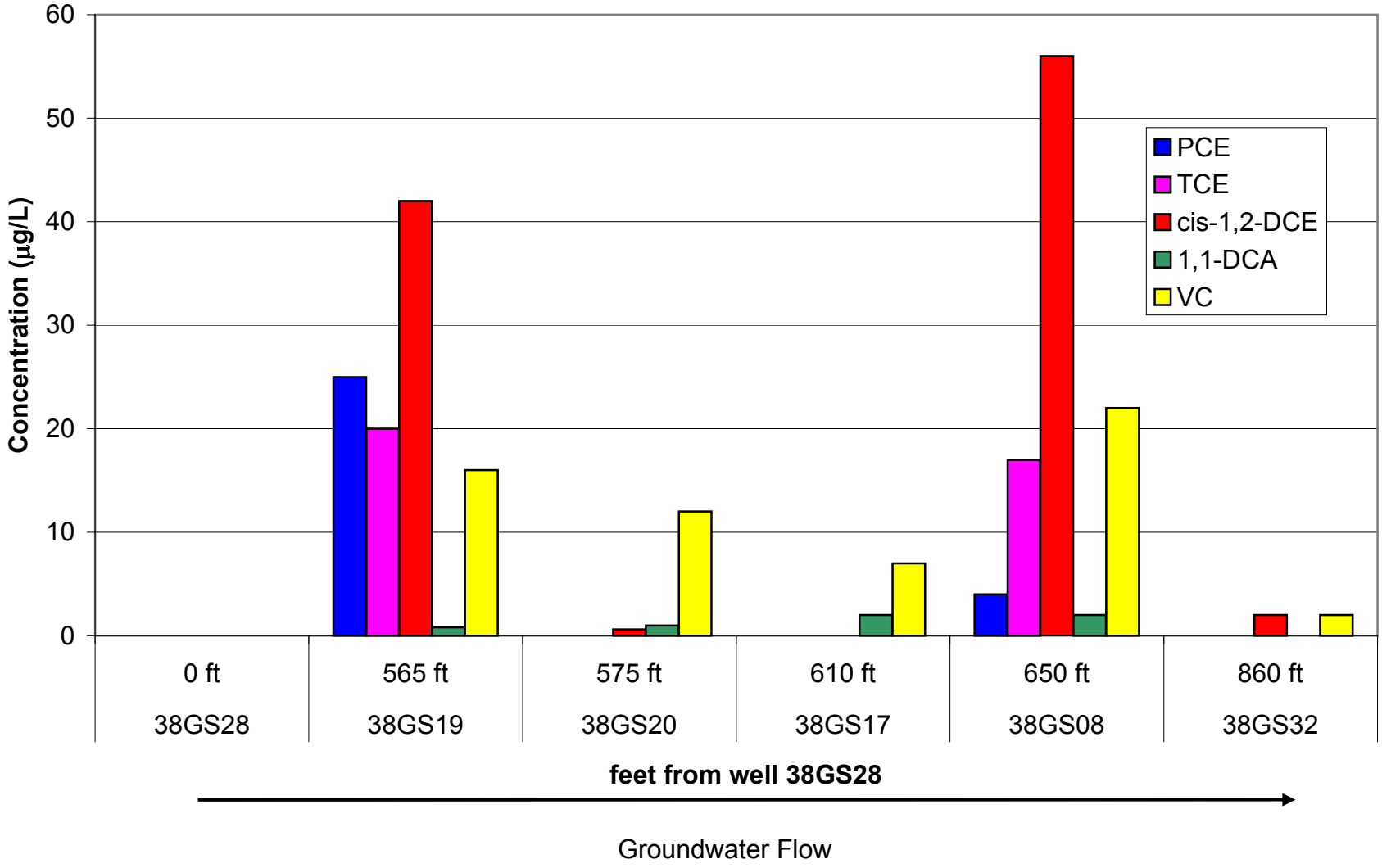


Table 4-14
Chlorinated Solvents in Groundwater – Building 604 (µg/L)
(1994-2000)

Parameter	Location	RI Samples (Jan 1994)	USEPA Samples (Oct 1995)	Samples (Dec 1998)	Samples (May 1999)	Samples (Dec 2000)	Screening Concentration	Screening Source
1,1-Dichloroethane	38GS08	ND	NS	ND	NS	2	700	FGGC
	38GS17	6	ND	NS	ND	2		
	38GS19	ND	NS	ND	NS	0.5		
	38GS20	ND	NS	NS	ND	1		
	38GS28	NS	ND	ND	NS	ND		
	38GS32	NS	ND	ND	NS	ND		
cis-1,2-Dichloroethene	38GS08	NA	NS	25	NS	56	70	FPDWS/FGGC
	38GS17	NA	**460**	NS	ND	ND		
	38GS19	NA	NS	27	NS	42		
	38GS20	NA	NS	NS	ND	0.6		
	38GS28	NS	ND	ND	NS	ND		
	38GS32	NS	**640**	25	NS	ND		
Tetrachloroethene	38GS08	**14**	NS	**8**	NS	**4.0**	3	FPDWS
	38GS17	**4**	**110**	NS	ND	ND		
	38GS19	**240**	NS	**22**	NS	**25.0**		
	38GS20	**14**	NS	NS	ND	ND		
	38GS28	NS	ND	ND	NS	ND		
	38GS32	NS	**820**	**5**	NS	ND		
Trichloroethene	38GS08	**33**	NS	**24**	NS	**17**	3	FPDWS
	38GS17	ND	**19**	NS	ND	ND		
	38GS19	**41**	NS	**22**	NS	**20.0**		
	38GS20	ND	NS	NS	ND	ND		
	38GS28	NS	ND	ND	NS	ND		
	38GS32	NS	**340**	**5**	NS	ND		
Vinyl Chloride	38GS08	**6**	NS	ND	NS	**22.0**	1	FPDWS
	38GS17	**1,600**	**3,700**	NS	ND	**7.0**		
	38GS19	**29**	NS	**3**	NS	**16.0**		
	38GS20	**1,100**	NS	NS	**15**	**12.0**		
	38GS28	NS	NS	ND	NS	ND		
	38GS32	NS	**130**	**14**	NS	**2.0**		

Notes:
FPDWS = Florida Primary Drinking Water Standards
FGGC = Florida General Groundwater Criteria
ND = not detected in sample
NA = not analyzed for this sample
NS = not sampled during this event
RI = Remedial Investigation
USEPA = United States Environmental Protection Agency
Concentrations exceeding screening values are shown in bold.

4.2.2.8 Effect of Geochemistry on Lead Concentrations

Building 71 Area

Lead concentrations have generally decreased over the entire site since sampling began in 1994 (Table 4-15). Data from wells 38GS02 and 38GS10 were not detected in 1998 and 2000. Well 38GS03 had a lead concentration of 3.3 µg/L in 2000 and was nondetect during the last sampling event (December 1998). Lead concentrations at 38GS12, which is in the center of the area, decreased from 128 µg/L in December 1998 to 2.7 µg/L in December 2000. Lead concentrations also decreased in upgradient well 38GS01 from 117 µg/L in 1998 to not detected concentrations.

Table 4-15
Lead Concentrations in Groundwater (µg/L)
1994-2000

Well	RI Samples (Jan 1994)	USEPA Samples (Oct 1995)	Addendum Samples (Dec 1998)	Addendum 2 Samples (Dec 2000)
Building 71				
38GS01	276	NS	117	ND
38GS02	362	NS	ND	ND
38GS03	88.5	NS	ND	3.3
38GS10	54	NS	ND	ND
38GS12	280	NS	128	2.7
Building 604				
38GS28	—	ND	4	NS
38GS08	79.2	NS	116	3.9
38GS17	65.2	ND	NS	ND
38GS19	180	NS	58	ND
38GS20	110	NS	NS	ND
38GS32	ND	NS	24	11

Notes:
µg/L = micrograms per liter
NS = Not Sampled
ND = Not Detected
RI = Remedial Investigation

The decrease in Building 71 lead concentrations can be linked to site geochemistry and the presence of sulfate, sulfide, and the overwhelming evidence of sulfate-reducing conditions in the aquifer. The presence of sulfide in sufficient quantities results in the ready precipitation of lead to form lead sulfide (PbS). This precipitation immobilizes the metal and is an effective natural mechanism for remediation.

Building 604 Area

Lead concentrations have decreased at locations 38GS17, 38GS19, and 38GS20 (Table 4-12) to not detected levels. Concentrations at 38GS08 and 38GS32 have continued to decrease, most likely due to sulfate in groundwater and the conversion of sulfates to sulfide under anaerobic conditions (as indicated by hydrogen measurements, ORP values, and sulfide concentrations), followed by lead precipitation.

4.2.2.9 Effect of Geochemistry on Cadmium Concentrations

Building 71 Area

Cadmium levels have decreased to not detected concentrations, except at monitoring well 38GS03, since sampling efforts began in January 1994 (Table 4-12). Likely, the same process (reducing conditions, presence of sulfate/sulfide, and metal precipitation) that is reducing lead concentrations in groundwater is also facilitating the decrease in cadmium concentrations.

Building 604 Area

Cadmium was not detected in 38GS17, 38GS20, 38GS28, and 38GS32 (Table 4-16). It was detected at 3.9 µg/L in 38GS08 and 79 µg/L in 38GS19; both concentrations have significantly decreased compared to December 1998. Downgradient well 38GS32 continues to be not detected for cadmium. December 2000 data indicate that cadmium is decreasing.

Table 4-16
Cadmium Concentrations in Groundwater (µg/L)
1994-2000

Well	RI Samples (Jan 1994)	USEPA Samples (Oct 1995)	Addendum Samples (Dec 1998)	Addendum 2 Samples (Dec 2000)
Building 71				
38GS01	ND	NS	ND	ND
38GS02	ND	ND	NS	ND
38GS03	ND	NS	ND	3.6
38GS10	ND	NS	NS	ND
38GS12	3	NS	50	ND
Building 604				
38GS28	—	ND	ND	ND
38GS08	14.7	NS	50	3.9
38GS17	ND	ND	NS	ND
38GS19	382	NS	250	79

Table 4-16
Cadmium Concentrations in Groundwater (µg/L)
1994-2000

Well	RI Samples (Jan 1994)	USEPA Samples (Oct 1995)	Addendum Samples (Dec 1998)	Addendum 2 Samples (Dec 2000)
Building 604				
38GS20	34.1	NS	NS	ND
38GS32	—	ND	ND	ND

Notes:
µg/L = micrograms per liter
ND = Not detected
NS = Not sampled
RI = Remedial Investigation

Implementability: This alternative is considered technically feasible. No initial construction, operation, or maintenance tasks are required. Implementation would consist of developing a conceptual site model to demonstrate MNA's ability to meet remedial action objectives and establishing a remedial time frame. Preliminary modeling was conducted to provide a very gross estimate of the expected time for remediation under a monitored natural attenuation (MNA) scenario. The modeling was completed using the Natural Attenuation Software (NAS) developed by Mark Widdowson and Eduardo Mendez, III of Virginia Tech University. Per the developers of the software, "NAS calculates the natural attenuation capacity (NAC) of various contaminants at a site". Using those estimates of NAC and contaminant source data, "the NAS software was designed to calculate estimates for the period of time required to achieve site-specific remediation goals at sites contaminated with either petroleum or chlorinated solvents". Per the publication below, the NAS software is designed for application to ground-water systems consisting of porous, homogenous, saturated media (such as sands and gravels), ideal for use at the Pensacola site. Appendix K provides a proprietary output listing all input parameters and output results.

Some assumptions used for the Site 38 simulations were:

- High, low, and average values for various parameters were utilized for the hydrogeology, and contaminant masses (the minimum mass was greater than what was estimated mathematically)

- PCE was assumed as being 100% of the contaminant component (PCE provides the most conservative estimate for the time of remediation problem as it is estimated to take the longest to degrade completely)

- Simulations were run assuming no source removal of contaminants

- The point of compliance was the bay wall

It should be noted that the default longitudinal/transverse dispersivity ratio utilized in the program is 20; this could not be changed. The effect of using a ratio of 20 (as opposed to 3 to 5 that would be expected for Site 38) is that the frontal edge of the plume is shorter but wider. Therefore, use of a ratio of 3 to 5 could result in a longer remedial timeframe using a centrally located downgradient compliance.

The modeling was performed using the average fractional organic carbon (Foc) value of 0.002 over a range of masses from 5 pounds to 25 pounds. This yielded time of remediation (TOR) is less than 5 years.

Again, the scope of this effort was merely to provide a gross estimate of remedial timeframes. More detailed analytical and/or numerical modeling will be performed as additional data are collected as part of the MNA remedial action.

A long-term groundwater monitoring plan would also be developed to assess plume migration over time and to verify that MNA is occurring at rates sufficient to protect potential downgradient receptors and achieve remedial action objectives.

The contaminants and MNA processes would be monitored over time using existing monitoring wells. Long-term sampling frequency would depend on groundwater flow velocity, the location of the point-of-compliance monitoring well(s), and other regulatory issues. Additional

monitoring wells could be required for long-term monitoring. No technology specific regulations would apply.

Both MNA and institutional controls are administratively feasible. Institutional controls would be implemented where RGs are exceeded and potential exposures may occur, while MNA processes occur over time. Specifically, institutional controls would be implemented to restrict groundwater use, thereby minimizing the potential for exposure to contamination. This alternative does not require any changes to existing activities, since current activities at Site 38 do not use the surficial aquifer as potable water or for other non-potable uses.

Effectiveness: The effectiveness and validity of MNA have been described extensively in previous reports. Lines of evidence in the USEPA technical protocol have been demonstrated. The data presented in the *RI Addendum 2* demonstrated overall decreases in concentrations of identified VOC COCs: PCE and TCE. Historical decreases in concentrations of PCE and TCE in the aquifer, particularly in the center of the plume areas, strongly indicate that the mass of parent compounds that is being degraded is not being replenished. That is, there is no evidence of a real or apparent source of a constant flux of chlorinated solvents into the groundwater. Identified inorganic COCs, lead, and cadmium have decreased at the site over time in critical locations in both study areas, which has been attributed to favorable geochemical conditions in the aquifer.

Protection of human health and the environment in the short-term is accomplished by institutionally controlling potential exposure to site groundwater and its use. Long-term effectiveness would be accomplished through reduced contaminant toxicity, mobility, and volume via the natural attenuation.

In addition, the monitoring program would assess the groundwater plume migration and ensure that concentrations of COCs are below RGs at the site boundary (i.e., MSWQ criteria at discharge to Pensacola Bay).

Restoration of site groundwater to concentrations below RGs is possible upon completion of the MNA program. Significant attenuation has been demonstrated over the past 4 to 5 years; data suggest that remedial time frames would be less than the 5-year period assumed for this scenario.

Cost: Tasks for the MNA alternative would include the following:

- Remedial design — including a complete round of groundwater sampling in the Site 38 area to assess current conditions, develop a conceptual site MNA model to estimate time frame, and develop a monitoring plan

- First year startup program — including collecting 1 year of quarterly data to evaluate seasonal variation of contaminants and validate conceptual site model

- Annual monitoring program — assuming one sampling event per year after the first year

- Institutional controls — includes a LUCA to restrict groundwater use in the Site 38 area

Estimated costs are presented in Table 4-17.

Table 4-17
Alternative G2 – Estimated Costs for MNA

	Quantity	Cost	Total Cost
Remedial Design Event			
Groundwater sampling (field work and preparation)	Two-person crew — 10 days	$172/hr per crew	$13,800
Groundwater analysis	34 samples — 6 QA/QC	$675/sample	$27,000
Natural Attenuation Evaluation (includes conceptual site model)	260 hrs	$99/hr	$25,700
Misc: Equipment, Travel, Field Supplies, Software, etc.	LS	$5,000	$5,000
Reporting/engineering	LS	20% cost	$14,300
		Subtotal	**$85,800**

Table 4-17
Alternative G2 – Estimated Costs for MNA

	Quantity	Cost	Total Cost
MNA Implementation: First Year			
Quarterly Groundwater sampling (field work and preparation)	Four events (Two-person crew — 60 hrs/event)	$172/hr per crew	$41,200
Quarterly Groundwater analysis	Four events (20 samples – seven QA/QC)	$675/sample	$72,900
Misc: equipment, travel, supplies	LS – four events	$5,000 per event	$20,000
Reporting/engineering	LS	20% cost	$26,800
Institutional controls	LS	$50,000	$50,000
		MNA Implementation Subtotal	**$210,900**
Remedial Action Contractor			
Overhead, Operations, and Profit	LS	$100,00	$100,000
		Total Capital (Startup) Costs	**$310,900**
MNA Monitoring Annual Program			
Groundwater sampling (field work and preparation)	Two-person crew — 60 hrs/event	$172/hr per crew	$10,300
Groundwater analysis	20 samples per year Seven QA/QC per sampling event	$675/sample	$18,200
Evaluation/Project Management	120 hrs	$99/hr	$11,900
Misc: equipment, supplies, travel	LS	$5,000	$5,000
Reporting/engineering	LS	20% cost	$9,000
		Annual Monitoring Program Subtotal	**$54,400**
		Monitoring Program Present Value (subtotal at 6% for 5 years)	**$229,200**
		Alternative G2 Cost	**$625,900**

Notes:
QA/QC = Quality assurance/Quality control
LS = lump sum
Groundwater analytical samples include total metals, VOCs, SVOCs, and MNA parameters, except where indicated
Costs are rounded

4.2.3 Alternative G3: Enhanced Bioremediation

This alternative enhances subsurface conditions to maximize the rate and efficiency of contaminant biodegradation or transformation. The efficiency by which contaminants are affected depends on site-specific factors such as electron acceptors, electron donors, nutrients, bioavailability, competing substances, population of microorganisms, pH, temperature, and contaminant concentrations.

Numerous technologies and products are currently available to promote desirable aquifer conditions for enhancement, including oxidizing and reducing agents, supplemental nutrients, engineered

microbial populations, etc. The product selection depends on the type of contaminant(s) (i.e., inorganic, VOCs, SVOCs) and site-specific conditions. Chlorinated VOCs were identified as the primary COC in groundwater and are the main focus of this section.

As previously discussed, chlorinated VOCs are most commonly bioremediated by anaerobic reductive dechlorination. This process occurs when microorganisms gain energy from a biological reaction and use the chlorinated compound as an electron acceptor in the absence of oxygen or other electron acceptors. The dechlorination reaction occurs when hydrogen replaces a chlorine atom on the chlorinated compound.

Technology Description: Chlorinated VOC enhanced bioremediation consists of adding a supplemental carbon source to manipulate oxidation/reduction conditions within the aquifer. The addition of molasses, proprietary carbon-releasing compounds, or similar simple-sugar solutions provides a source of carbon within the aquifer, thus enhancing microbial activity and depleting dissolved oxygen and other competing electron acceptors. Enhancement attempts to maintain oxidation/reduction conditions in the sulfate-reducing or methanogenic range (ORP approximately -200 mV or less), which is desirable for optimum chlorinated VOC reductive dechlorination.

The carbon source can be applied to the subsurface via a one-time direct injection, reoccurring direct injections, or semicontinuous injection with groundwater recirculation. Typically, direct injection involves injecting the additives directly into the aquifer through a series of injection points (soil borings or injection wells). In groundwater re-circulation, contaminated groundwater is extracted, amendments are added, and the groundwater is reinjected slightly upgradient of the source zone through injection wells.

Data suggest that complete degradation of PCE and TCE is occurring at the site, as vinyl chloride is not accumulating onsite and contaminants have reduced to RGs in several wells. Considering the concentration of contaminants, site conditions, and the established lines of evidence for natural attenuation, the enhanced bioremediation concept chosen for preliminary evaluation in the

FFS is injection of Hydrogen Release Compound® (HRC). This methodology is categorized as a one-time application via push-point injection.

HRC is a proprietary slow release product supplied by Regenesis, Inc. HRC is an environmentally safe, polylactate ester that slowly releases lactic acid upon hydration. The lactic acid carbon source promotes the reduction of dissolved oxygen and other electron acceptors to achieve optimum reducing conditions for chlorinated VOC reductive dechlorination.

HRC is typically injected into the subsurface via push-point injection in soil borings. The HRC is then left in place where it passively releases lactic acid over time to stimulate chlorinated VOC reduction. Using this methodology, no permanent pumping equipment, tanks, electrical power, or ongoing O&M is necessary. Installation requires a direct-push drill rig (i.e., Geoprobe®) and an injection pump; thus, facility operations would not be significantly affected. After the HRC is injected, the soil borings are closed and patched to match the existing surface conditions. HRC can generally be expected to continue to release lactic acid for up to 1 year. During this time, aquifer geochemical conditions will be monitored to determine if the desired reductive conditions have been established and the remedial objectives achieved.

A conceptual methodology has been developed for this technology to help estimate costs and provide a basis for comparison with other alternatives. A preliminary approach was developed using existing site analytical data, aquifer geochemistry, and aquifer properties. The conceptual design, which is discussed as follows, includes full-scale design, implementation, and system monitoring.

The following design variables were used in the conceptual design:

- Plume area requiring treatment: Building 71 – 29,000 square feet, Building 604 – 357,000 square feet (assumed maximum area).

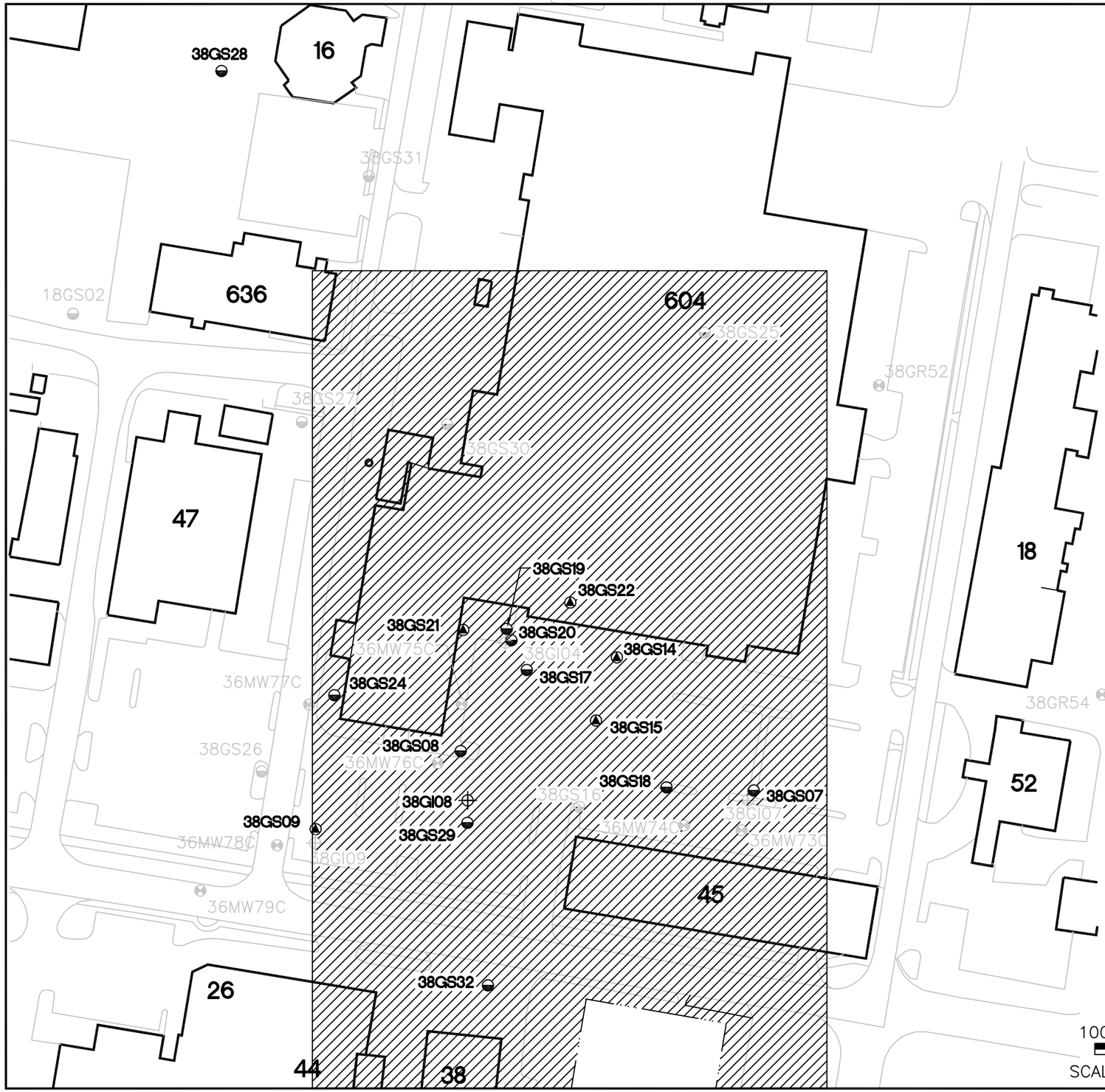
- Representative chlorinated VOC concentrations were the maximum detected chlorinated VOCs concentrations from the 2000 sampling event for the respective study area.

- Average treatment zone thickness of 20 feet.

The delivery system would consist of a grid-based application of HRC to reduce chlorinated VOCs concentrations in the identified plume areas at Buildings 71 and 604. The conceptual design assumed injection points installed on 30-foot centers or approximately 36 injection points at Building 71 and 435 injection points at Building 604. At an assumed application rate of 4 pounds per foot (lbs/ft), the yielded injection is approximately 2,900 pounds of HRC at Building 71 and 34,800 pounds of HRC at Building 604. These estimates would need to be refined in the remedial design phase. Treatment areas and application rates per foot may change depending on current site conditions and subsurface/surface constraints. The conceptual areas for the HRC injection are shown in Figure 4-18 and 4-19.

After HRC application, groundwater samples would be collected monthly for approximately 6 months. Samples would be analyzed for contaminant concentrations, field parameters, and geochemical parameters. As soon as biodegradation and geochemical trends have been established, the sampling frequency would be reduced to semiannually for approximately 2 years and annually thereafter until RGs are met. For this evaluation, a remedial time frame of 10 years was assumed to a achieve RGs.

Subsequent polishing HRC treatments may be required if performance is lower than expected. System performance and other technical or regulatory considerations will determine whether a reapplication is necessary. One or two HRC reapplications could be necessary, although each reapplication would cover a smaller area. For this evaluation, a reapplication was assumed in year 5, estimated at 25% of the total year 1 startup, installation, monitoring cost.



LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
- SITE 38 INTERMEDIATE MONITORING WELL
- SITE 38 SHALLOW MONITORING WELL
- EPA PERMANENT WELL
- INJECTION AREA

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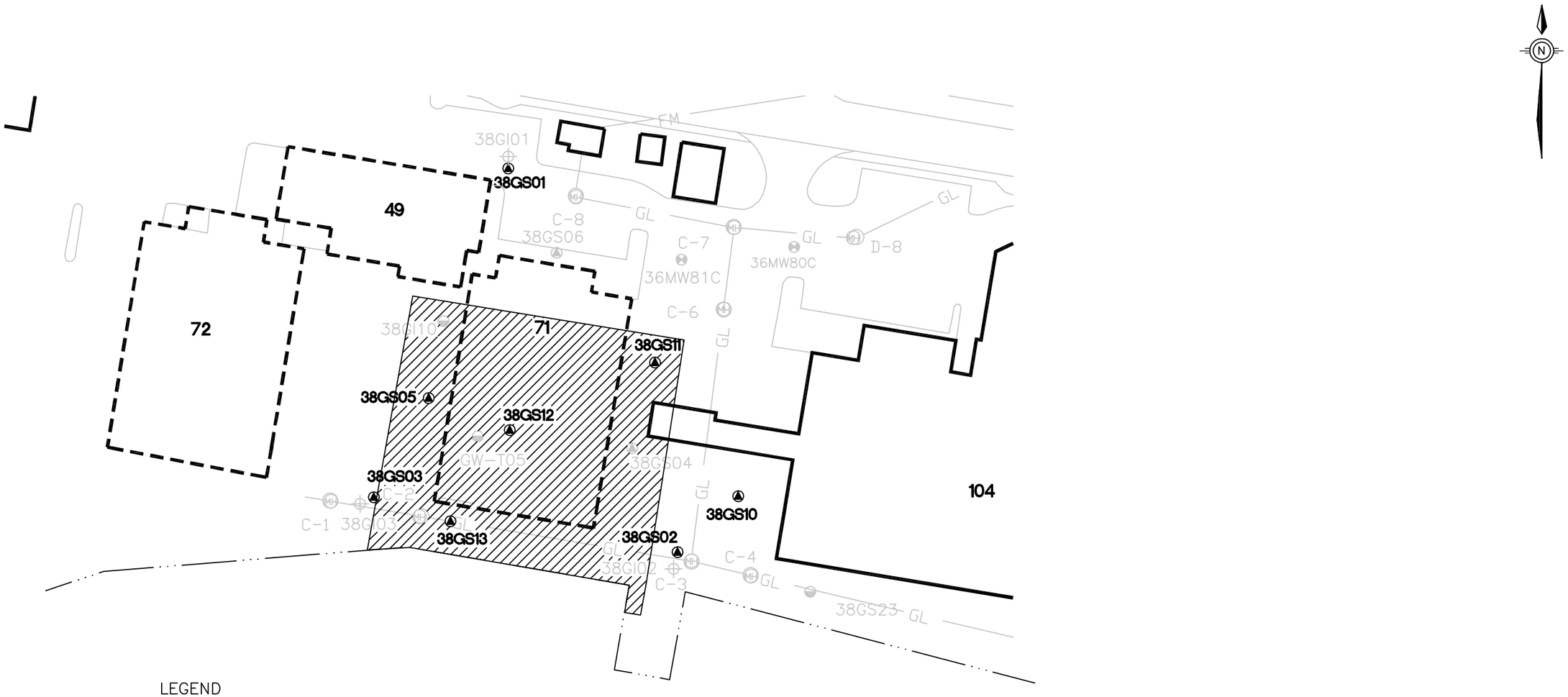
SITE 38
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 4-18
BUILDING 604 AREA
HRC INJECTION AREA

DWG DATE: 10/25/04 | NAME: 0059001B036



LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- SHORELINE
- IWTP SEWERLINE STUDY TEMPORARY SHALLOW MONITORING WELL
- E/A&H SITE 38 INTERMEDIATE MONITORING WELL
- E/A&H SITE 38 SHALLOW MONITORING WELL
- EPA WELL
- GL – GRAVITY LINE (SEWER)
- FM – FORCE MAIN (SEWER)
- MH – MANHOLE
- INJECTION AREA

70 0 70
SCALE FEET

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PENSACOLA, FLORIDA

FIGURE 4-19
BUILDING 71 AREA
HRC INJECTION AREA

DWG DATE: 10/25/04 | NAME: 0059001B038

Enhanced Bioremediation Elements

- Final selection of injection/delivery technique
- Pilot study to determine system design parameters
- Remedial design/engineering
- Injection and implementation
- Monthly monitoring of aquifer geochemistry and contaminant concentrations to evaluate enhancement processes for approximately 6 months
- Semi-annual monitoring for 2 years
- Long-term annual monitoring of site contaminant trends and geochemical parameters
- Re-application in year 5

Implementability: Enhanced bioremediation using HRC is readily implementable at Site 38. Natural biodegradation mechanisms are clearly ongoing within the aquifer, and bioenhancement appears to be easily achievable. Technical implementability issues (e.g., the ability to inject/infiltrate, subsurface conditions, and distribute HRC) are manageable through system design and engineering controls. The application strategy (conventionally drilled boreholes) is expected to minimally impact the site. No surface structures (except for additional monitoring wells) or equipment are required for this delivery option, thus eliminating operation and maintenance difficulties.

This alternative is administratively feasible. Site 38 can be designated an industrial area, and the use of groundwater beneath the site can be restricted through institutional controls.

Effectiveness: Protection of human health in the short term is accomplished by institutionally controlling exposure to site groundwater and its use. This alternative would prevent future use of groundwater under residential or industrial use scenarios, thus eliminating the potential risk posed by contaminated groundwater. This aquifer is not used by NAS Pensacola as a potable water source due to its poor ambient water quality and limiting its use is not anticipated to cause any major concerns.

Long-term effectiveness would be accomplished through reduced contaminant toxicity, mobility, and volume through the enhanced bioremediation processes. If vinyl chloride, (formed during the dechloroniation of PCE, TCE, and cis-1,2-DCE) begins to accumulate in the aquifer, oxidative enhancements can be used to modify the oxidation/reduction state of the aquifer and enhance aerobic degradation of vinyl chloride. Based on existing site data, this appears unlikely. The groundwater monitoring program would assess plume migration and ensure that concentrations of VOCs are below RGs (i.e., MSWQ criteria at discharge to Pensacola Bay at the site boundary).

Remedial time frames for the enhanced bioremediation system are unknown but can be predicted following the remedial design, conceptual site model analysis, and pilot scale testing. It is expected that enhanced bioremediation would be faster than natural attenuation processes at the site.

Cost: The estimated 30-year present worth cost of implementing enhanced bioremediation using HRC is estimated at $1,098,600 assuming a 6% discount factor. Estimated costs are presented in Table 4-18.

Table 4-18
Alternative G3 – Estimated Cost for Enhanced Bioremediation with HRC

	Quantity	Cost	Total Cost
Baseline Sampling/Pilot Scale/Remedial Design			
Baseline sampling (field work and preparation)	Two-person crew – 10 days	$172/hr per crew	$13,800
Groundwater analysis	34 samples 6 QA/QC	$675/sample	$27,000
Pilot Test Design	40 hrs	$99/hr	$4,000
Pilot Test Implementation	LS	$30,000	$30,000
Pilot Test Monitoring	LS	$15,000	$15,000
Data Evaluation (includes modeling)	160 hrs	$99/hr	$16,000
Misc: equipment, travel, supplies, software, etc.	LS	$15,000	$15,000
Reporting/Engineering/Remedial Design	LS	20% cost	$24,200
		Subtotal Baseline/Pilot Scale/Design	**$145,000**
Remedial Implementation: First Year			
HRC Compound	40,000 lbs	$6.00 per pound	$240,000
Installation/Implementation	Three direct push rigs — 12 days	$1,750/rig per day	$63,000
Field Oversight/Field Engineering	Two-person crew — 12 days	$172/hr per crew	$16,500
Project Management	LS	$10,000	$10,000
Misc: equipment, travel, supplies, procurement.	LS	$20,000	$20,000

Table 4-18
Alternative G3 – Estimated Cost for Enhanced Bioremediation with HRC

	Quantity	Cost	Total Cost
Institutional controls	LS	$50,000	$50,000
Groundwater sampling	Six monthly for first 6 months Two-person crew — 4 days	$172/hr per crew per event	$33,000
Groundwater Analysis (VOCs, bioremediation package)	Six monthly for first 6 months 20 total samples per event	$400/sample	$48,000
		Remedial Implementation: First Year Subtotal	**$480,500**
Remedial Action Contractor			
Overhead, Operations, and Profit	LS	$100,000	$100,000
		Total Capital (Startup) Costs	**$580,500**
Bioremediation Monitoring: Years 2 and 3 (Semiannual)			
Groundwater sampling (including preparation)	Two events Two-person crew — 4 days	$172/hr per crew	$11,000
Groundwater Analysis (VOCs, bioremediation package)	Two events 20 total samples per event	$400/sample	$16,000
Misc: equipment, supplies, travel	Two events — LS	$5,000	$10,000
Annual Reporting	LS	$5,000	$5,000
		Annual O&M Subtotal	**$42,000**
		O&M Present Value Subtotal (at 6% for 2 years)	**$77,000**
Annual Monitoring: Years 4 though 13 (Semiannual)			
Groundwater sampling (including preparation)	Two-person crew — 10 days	$172/hr per crew	$13,800
Groundwater Analysis (VOCs, SVOCs, total metals, bioremediation package)	34 samples Six QA/QC	$675/sample	$27,000
Misc. equipment, supplies, travel	LS	$5,000	$5,000
Reporting	LS	$5,000	$5,000
		Annual O&M Subtotal	$50,800
		O&M Present Value Subtotal (at 6% for 10 years)	**$332,700**
HRC Reapplication at Year 5			
HRC Reapplication – Assumed at 25% of Total Capital	LS	$145,000	$145,000
		HRC Reapplication Present Value Subtotal	**$108,400**
		Alternative G3 Total	**$1,098,600**

Notes:
QA/QC = Quality assurance/quality control
LS = lump sum
lb = pounds
Groundwater analytical samples include total metals, VOCs, and geochemical parameters except where indicated
Costs are rounded

HRC is one of many methods to perform enhanced bioremediation. Several others, such as molasses injection via injection wells, are considered viable. The final methodology would be selected during the initial stages of this alternative. If another enhanced bioremediation methodology is selected, costs may vary.

4.2.4 Alternative G4: Groundwater Extraction and Discharge to FOTW

The overall objective of the groundwater recovery system would be containment of groundwater, in which contaminants exceed RGs to prevent offsite migration.

Groundwater recovery is possible using various extraction system configurations, including extraction wells, interceptor trenches, or vacuum extraction. For this evaluation, groundwater recovery using extraction wells was assumed. Preliminary plume recovery was modeled using CAPZONE and GWPATH. Based on this model, it appears that one extraction well would be required to collect groundwater at Building 71, and one extraction well would be required at Building 604. A more thorough explanation of the groundwater modeling and recovery system developed for this site is presented in Appendix J, Site 38 Groundwater Recovery System Calculations. This modeling effort is intended to demonstrate the feasibility of groundwater recovery and is not a final design.

Figure 4-20 illustrates the location of proposed extraction wells and the estimated capture zones. The Building 604 area well projected pump rate is 75 gallons per minute (gpm); the Building 71 area projected well pump rate is 50 gpm. At these rates, one pore volume underlying the Building 604 area surficial aquifer is captured in 1 year, and one pore volume of the surficial aquifer under the Building 71 area is captured in 180 days.

In this alternative, treated groundwater would be discharged to the FOTW through the sanitary sewer system. The FOTW should have sufficient capacity for the maximum projected 125 gpm flow rate from both the building areas. FOTW discharge limits are listed in Table 4-19.

LEGEND

- BUILDINGS AND STRUCTURES PREVIOUSLY REMOVED
- EXISTING BUILDINGS OR STRUCTURES
- SHORELINE
- GL — GRAVITY LINE (SEWER)
- FM — FORCE MAIN (SEWER)
- MH — MANHOLE
- IWTP SEWER LINE STUDY TEMPORARY SHALLOW MONITORING WELL
- E/A&H SITE 38 INTERMEDIATE MONITORING WELL
- E/A&H SITE 38 SHALLOW MONITORING WELL
- EPA WELL
- EPA TEMPORARY WELL
- PROPOSED RECOVERY WELL

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SITE 38
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PENSACOLA, FLORIDA

FIGURE 4-20
SITE 38
CAPTURE ZONES
GROUNDWATER RECOVERY SYSTEM

DWG DATE: 10/26/04 | DWG NAME: 0059G024

Table 4-19
FOTW Pretreatment Standards (mg/L)

Contaminant	1-Day Maximum	Maximum Monthly Average
Cadmium	0.26	0.1
Chromium	1.06	0.65
Copper	1.29	0.79
Lead	0.26	0.16
Nickel	1.52	0.91
Silver	0.16	0.09
Zinc	1.0	0.57
Cyanide	0.46	0.25
Total Toxic Organics	0.81	—
Oil & Grease	20	10
Total Suspended Solids	22.93	11.85
pH	6.0 to 9.0	6.0 to 9.0

Note:
mg/L = milligrams per liter

Based on 2000 sampling data, it appears that site groundwater will meet these limits without pretreatment and can be directly discharged to the FOTW. To verify whether site groundwater will meet discharge limits, a full groundwater sampling round is proposed as the initial phase of remedial design. As soon as data have been obtained from the sampling round and from the aquifer pumping tests, application for pretreatment can be made. For this FFS, it is assumed that the FOTW can accept a direct discharge of the groundwater pumped from the Building 71 and 604 areas.

Implementability: Groundwater extraction with extraction wells and direct discharge is a readily implementable alternative for mass removal at Site 38 because subsurface conditions are amenable for a groundwater recovery system. Assuming no pretreatment is required, operations would be expected to be reliable and require little maintenance. Implementation would require installation of extraction wells, pumping equipment, and piping. Groundwater recovery is administratively feasible, as it is commonly employed as a remedial alternative.

Because Site 38 is near Pensacola Bay, groundwater extraction may induce migration of the groundwater/saltwater interface inland toward the recovery wells. Extraction rates should be optimized to reduce the probability of saline intrusion.

Preliminary review of groundwater data suggests direct discharge is possible. However, a full groundwater sampling is recommended to determine current groundwater conditions, as well as groundwater sampling during the aquifer test to determine average concentrations over a 24- or 48-hour period. These data can be used during remedial design to apply for necessary permits for the Site 38 area.

Effectiveness: Short-term effectiveness is accomplished by institutional controls and removal of mass. Long-term effectiveness is accomplished through removal of mass. Groundwater extraction and discharge offers additional protection for current and future-use scenarios when combined with institutional controls.

This alternative would effectively contain and remove contaminated groundwater, as well as reduce the toxicity and mobility of the contaminants by extraction from the aquifer and treatment at the FOTW. Currently, it is difficult to estimate the volume of groundwater that would need to be extracted and removed to achieve adequate contaminant containment. For this evaluation, it is assumed that groundwater extraction would continue for 5 years.

Cost: Costs were estimated based on one extraction well in each building's area with a combined flow rate of 125 gpm, including capital, annual operation and maintenance, and discharge costs. Cost analysis is based on preliminary data and modeling for feasibility purposes and cannot be considered a final design. The cost estimate assumes a remedial time frame of 5 years; while realistic, this time frame does not reflect the worst-case scenario. Groundwater extraction could last longer, depending on aquifer characteristics and contaminant-transport mechanisms. The cost to discharge to the FOTW was based on a unit price cost of $4.56 per thousand gallons given to the Navy by the FOTW operator. This results in a present worth of disposal at $1,943,700 over a 5-year period at a discount rate of 6%. Estimated costs are summarized in Table 4-20.

Table 4-20
Alternative G4 – Estimated Costs for Groundwater Recovery and Discharge

	Quantity	Cost	Total Cost
Capital Costs			
Aquifer test	1	$30,000	$30,000
Extraction well construction	2	$5,000/well	$10,000
Pumps and switches	2	$3,000/pump	$6,000
Piping and connections/excavation and backfill	LS	$20,000	$20,000
Engineering support/report preparation	LS	$20,000	$20,000
Misc. supplies, equipment, travel	LS	$25,000	$25,000
Institutional controls	LS	$50,000	$50,000
		Subtotal	**$161,000**
Remedial Action Contractor			
Overhead, Operations, and Profit	LS	$100,000	$100,000
		Total Capital (Startup) Costs	**$261,000**
Annual Operation and Maintenance and Monitoring Costs			
Maintenance	12 month	$2,000/month	$24,000
Electricity	10,000 kWhr	$0.07/kwhr	$700
Replacement pumps	2	$3,000/pump	$6,000
Permitting/Engineering support/Project Mgmt.	LS	20% Cost	$6,100
Misc. equipment, supplies, travel, etc.	LS	25% Cost	$7,700
FOTW (@ 125 gpm - 365 days/year)	65.7 million gallons	$4.56/1000 gallons	$300,000
Groundwater Sampling	2 people – 10 days	$ 172/hr per crew	$13,800
Groundwater Analysis	34 samples Six QA/QC	$675/sample	$27,000
Misc. equipment, supplies, travel, etc.	LS	$5,000	$5,000
Engineering support / report preparation	LS	20% of cost	$9,200
		Annual O&M and Monitoring Subtotal	**$399,500**
		Present value cost at 6% discount over 5 years	**$1,682,700**
		Alternative G4 Total	**$1,943,700**

Notes:
QA/QC = Quality assurance/quality control
LS = lump sum
kWhr = kilowatt hour
gal = gallons
gpm = gallons per minute
Groundwater analytical samples include total metals, VOCs, and SVOCs
All costs rounded

5.0 DETAILED ANALYSIS OF ALTERNATIVES

In this section, the remedial alternatives discussed in Section 4 are compared with requirements in CERCLA as amended, the NCP, OSWER Directive No. 9355.9-19 (*Interim Guidance on Superfund Selection of Remedy,* December 24, 1986), and factors described in *Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA*.

5.1 Evaluation Process

The detailed analysis of alternatives provides decision makers with the information needed to select an appropriate site remedy. During the detailed analysis, each alternative is assessed against the evaluation criteria described in the OSWER Directive No. 9355.3-01 and the other alternatives. Assessment results are arrayed to compare the alternatives and identify key tradeoffs among them. The results of the detailed analysis provide the basis for identifying a preferred alternative and preparing a proposed plan. This approach is designed to provide decision makers with sufficient information to adequately compare the alternatives, select an appropriate remedy for a site, and satisfy CERCLA requirements for selecting the remedial action.

Nine evaluation criteria have been developed to address the CERCLA requirements and considerations and their additional technical and policy considerations, which have proven important for selecting remedial alternatives. The following are evaluation criteria with the associated statutory considerations:

Threshold Criteria

- Overall protection of human health and the environment
- Compliance with ARARs

Balancing Criteria

- Long-term effectiveness and permanence
- Reduction of toxicity, mobility, or volume
- Short-term effectiveness

- Implementability
- Cost

Modifying Criteria

- Support agency acceptance
- Community acceptance

Each remedial alternative is evaluated against the criteria above, as described in the following sections. In Section 6, each alternative's statutory factors and the nine criteria listed above are compared against each alternative to aid in the remedy selection.

5.1.1 Threshold Criteria: Overall Protection of Human Health and the Environment

Each alternative must satisfy this criterion to be eligible for selection. Analysis in this section should provide a final check to assess whether each alternative adequately protects human health and the environment. The overall assessment of protection draws on the assessments conducted under other evaluation criteria, especially long-term effectiveness and permanence, short-term effectiveness, and compliance with ARARs.

Evaluation of an alternative's overall protectiveness should focus on whether it achieves adequate protection by eliminating, reducing, or controlling the risks posed through each pathway through treatment, engineering, or institutional controls. This evaluation considers whether an alternative poses any unacceptable short-term risk or cross-media impacts.

5.1.2 Threshold Criteria: Compliance with ARARs

Alternatives must meet this criterion to be considered for selection. Compliance with ARARs is used to determine whether each alternative will meet all the federal and state ARARs identified in previous stages of the remedial process. The detailed analysis should identify which requirements are applicable or relevant and appropriate to an alternative. The actual determination of which requirements are applicable or relevant and appropriate is made by the lead agency (the Navy) in consultation with the support agencies (USEPA and FDEP). Compliance with the following ARARs

should be addressed for each alternative during the detailed analysis: chemical-specific, location-specific, and action-specific ARARs.

5.1.3 Balancing Criteria: Long-Term Effectiveness and Permanence

The evaluation of alternatives under this balancing criterion addresses the results of a remedial action in terms of the risk remaining at the site after response objectives have been met. The primary focus of this evaluation is the extent and effectiveness of the controls that may be required to manage the risk posed by treatment residuals and/or untreated wastes. The following should be addressed for each alternative:

- **Magnitude of Residual Risk:** This factor assesses the residual risk from untreated waste or treatment residuals at the conclusion of remedial activities. This risk may be measured by numerical standards such as cancer risk levels or the volume or concentration of constituents in waste, media, or treatment residuals remaining onsite.

- **Adequacy and Reliability of Controls:** This factor assesses the adequacy and suitability of any controls used to manage treatment residuals or untreated wastes remaining onsite. It may include an assessment of containment systems and institutional controls to determine if they sufficiently ensure that any exposure to human and environmental receptors is within protective levels.

5.1.4 Balancing Criteria: Reduction of Toxicity, Mobility, or Volume

This criterion addresses the statutory preference for remedial actions employing treatment technologies that permanently and significantly reduce the toxicity, mobility, or volume of hazardous substances. This is one of the primary balancing criteria on which the detailed analysis is based. The evaluation should consider the following specific factors:

- The treatment processes, the remedies they will employ, and the materials they will treat.
- The amount of hazardous materials that will be destroyed or treated, including how principal threat(s) will be addressed.
- The degree of expected reduction in toxicity, mobility, or volume, measured as a percentage of reduction (or order of magnitude) when possible.
- The degree to which the treatment will be irreversible.
- The type and quantity of treatment residuals that will remain following treatment.
- Whether the alternative would satisfy the statutory preference for treatment as a principal element.

5.1.5 Balancing Criteria: Short-Term Effectiveness

The short-term effectiveness of a remedial alternative is evaluated against its effect on human health and the environment during implementation. This is one of the primary balancing criteria on which the detailed analysis is based. Short-term effectiveness is based on four key factors:

- Risks to the community during implementation of the remedial action
- Risks to workers during implementation of the remedial action
- Potential for adverse environmental impact as a result of implementation
- Time until remedial response objectives are achieved

5.1.6 Balancing Criteria: Implementability

The implementability criterion addresses the technical and administrative feasibility of implementing an alternative and the availability of various services and materials required during its implementation. Specifically, this criterion addresses the following:

Technical Feasibility

- Construction and operation relating to the technical difficulties and unknowns associated with a technology.

- Reliability of technology, focusing on the likelihood that technical problems associated with implementation will lead to schedule delays.

- Ease of undertaking remedial action, discussing future remedial actions that may be required, and how difficult it would be to implement such additional actions.

- Feasibility of monitoring the remedy's effectiveness, including an evaluation of the risks of exposure should monitoring be insufficient to detect a system failure.

Administrative Feasibility

Activities needed to coordinate with other offices and agencies.

Availability of Services and Materials

- Availability of adequate offsite treatment, storage capacity, and disposal services.

- Availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources.

- Availability of services and materials, plus the potential to obtain competitive bids, which may be particularly important for innovative technologies.
- Availability of prospective technologies.

5.1.75.1.7 Balancing Criteria: Cost

Detailed cost estimates for each remedial alternative are based on engineering analyses and suppliers' estimates of necessary technology. Costs for similar actions (such as excavation) at other CERCLA and RCRA sites were provided in Section 4. This is the final primary balancing criteria on which detailed analysis is based. Costs are expressed in present-worth dollars. The

cost estimate for a remedial alternative consists of four principal elements: capital cost, O&M costs, costs for evaluation reports, and present-worth analysis. These four elements are further explained as follows.

Capital Costs

- *Direct costs* for equipment, labor, and materials used to develop, construct, and implement a remedial action.

- *Indirect costs* for engineering, financial, and other services that are not actually part of construction, but are required to implement a remedial alternative. The methodology used to estimate the indirect cost varies with the degree of difficulty associated with construction and/or implementation of the alternative. In this FFS, the indirect costs include health and safety items, permitting and legal fees, bid and scope contingencies, engineering design and services, and miscellaneous supplies or costs.

Annual O&M Costs

O&M costs refer to post-construction costs necessary to ensure the continued effectiveness of a remedial action. They typically refer to long-term power and material costs (such as the operational cost of a treatment facility), equipment maintenance and replacement, and long-term monitoring.

Evaluation Reports

This refers to the costs associated with reports prepared every 5 years to evaluate the results of the selected alternative.

Present-Worth Analysis

This analysis makes it possible to compare remedial alternatives on the basis of a single cost representing an amount that would be sufficient to cover all costs associated with the remedial action during its planned life, if invested in the base year and disbursed as needed. A performance period appropriate to each alternative is assumed for present-worth analyses. Discount rates of 6% are assumed for base calculations.

The cost elements for each remedial alternative were provided in Section 4 and are summarized in the cost analysis section. The estimated costs provided for the alternatives are intended to reflect actual costs with an accuracy of minus 30% to plus 50%, in accordance with USEPA guidelines.

5.1.8 Support Agency Acceptance

This assessment evaluates the technical and administrative issues and concerns USEPA and FDEP may have regarding each alternative. This criterion is largely satisfied through state involvement in the entire remedial process, including review of the FFS. State/support agency acceptance is one of the two modifying criterion in the FFS process.

5.1.9 Community Acceptance

This assessment evaluates the public's potential issues and concerns regarding each alternative. As with state acceptance, this criterion will be addressed in the Record of Decision when comments on the FFS have been received. Community acceptance is the second modifying criteria.

5.2 Evaluation of Soil Alternatives

The following sections analyze the soil alternatives presented in Section 4:

- Alternative S1: No Action
- Alternative S2: Existing Surface Cap with Institutional Controls
- Alternative S3: Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal
- Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal
- Alternative S5: Capping

5.2.1 Alternative S1: No Action

The no-action alternative involves no active remedial effort. No actions would be taken to contain, remove, or treat soil contamination exceeding RGs. Soil would remain in place. No engineering or institutional controls would be implemented. Under this alternative, the future use of this property is unknown, and the worst-case scenario (residential use) was assumed for this evaluation. The no-action alternative provides a baseline against which other alternatives can be compared.

5.2.1.1 No Action: Threshold Criteria

Overall Protection of Human Health and the Environment: The no-action alternative provides no additional protection to human health or the environment. If no controls are instituted at Site 38, the potential for future residents to be exposed at concentrations exceeding SCTLs would remain (Section 2). These exceedances would remain onsite, unmitigated.

Soils in which contaminants exceed leachability criteria would remain; however, natural attenuation would prevent offsite migration. The future use of this aquifer as a potable water source is highly unlikely.

Compliance with ARARs: The no-action alternative does not comply with Site 38 RGs; moreover, contaminants will pose risk under an uncontrolled future use scenario. Florida Proposed Rule 62-777 is a TBC (to be considered) criteria for Site 38. No location- or action-specific ARARs are triggered by the no-action alternative.

5.2.1.2 No Action: Balancing Criteria

Long-Term Effectiveness and Permanence: The no-action alternative provides no treatment, removal, or means to prevent exposure. Soil volumes and concentrations would not be directly affected, other than by natural attenuation. Soil locations exceeding leachability criteria would also remain. Long-term effectiveness is considered minimal.

Facility policy and features currently serving as controls in place at the site — military security, limited access to/use of the site, and asphalt/concrete cover — would remain under the

industrial-use scenario. If site use were unrestricted, no controls would be in place to prevent future uncontrolled site use.

Reduction of Toxicity, Mobility, or Volume through Treatment: This alternative would not reduce soil contaminant mobility, toxicity, or volume, other than by natural attenuation. Contaminants would remain untreated and in place.

Short-Term Effectiveness: No action does not present any short-term risks.

Implementability: The no-action alternative is technically feasible and easily implemented. No construction, operation, or reliability issues are associated with this alternative. Current access controls — including military security and limited access to personnel — have historically been reliable.

The NCP requires that any alternative that leaves contamination onsite to be re-evaluated every 5 years to ensure adequacy of the alternative. Therefore, the no-action alternative would require that the Navy establish a program for these re-evaluations.

Cost: Costs include a site review and report preparation every 5 years for 30 years. The cost for this review is estimated at $10,000. The present worth of re-evaluation every 5 years for 30 years is approximately $24,400 at a 6% discount factor.

5.2.1.3 No Action: Modifying Criteria

The modifying criteria are formally assessed after the public-comment period. However, the criteria are factored into identification of the preferred alternative as far as they are known.

Support Agency Acceptance: FDEP and the USEPA are involved in the partnering team process and will both have the opportunity to review and comment on this FFS.

Community Acceptance: Community acceptance for the no-action alternative will be established after the public comment period for the FFS.

5.2.2 Alternative S2: Existing Surface Cap and Institutional Controls

The alternative for Site 38 involves no active remedial effort. No direct actions would be taken to contain, remove, or treat soil contamination above RGs. Under this alternative, the existing asphalt and concrete surface/covering at Buildings 71 and 604 study areas would be designated and maintained as a surface cap. Soil would remain in place and institutional controls would be implemented to limit access, restrict property use, and minimize exposure to contamination. This alternative does not require any changes to existing activities; current activities at Site 38 are industrial/commercial.

5.2.2.1 Existing Surface Cap with Institutional Controls: Threshold Criteria

Overall Protection of Human Health and the Environment: The alternative provides additional protection of human health and the environment by reducing the potential for uncontrolled site access and restricting site use to industrial/commercial. Under the industrial/commercial scenario, human health and the environment would be protected by the designated cap which minimizes risk of exposure to contaminated soils beneath the asphalt/concrete surface. At Building 604, several grassy areas have exposed surface in which soil concentrations exceed 3X ISCTLs. Fences or signs would be installed to prevent unrestricted access to these areas. No soils with ISCTL exceedances are exposed in the Building 71 area.

Soil contaminants exceeding leachability criteria are not expected to pose a threat to human health or the environment due to natural attenuation.

Compliance with ARARs: Alternative S2 does not comply with the RGs established for Site 38; 21 locations have RG exceedances, but only six have a viable exposure pathway. Florida Proposed Rule 62-777 for soil cleanup target levels is a TBC criteria. No location- or action-specific ARARs would be triggered by the institutional controls alternative. Contaminated soil would remain at concentrations above RGs.

5.2.2.2 Existing Surface Cap with Institutional Controls: Balancing Criteria

The primary balancing criteria are the technical criteria on which the detailed analysis is based.

Long-Term Effectiveness and Permanence: A surface cap would be effective for current and future site workers by limiting their exposure to soil contamination. Surface cap maintenance and inspection would be implemented to properly maintain the cap. The long-term effectiveness of institutional controls is due to the ability to control and limit access to contaminated soil. Soil volumes and concentrations would not be affected by direct treatment.

Reduction of Toxicity, Mobility, or Volume Through Treatment: A treatment or removal action would not be performed with this alternative. Surface cap management with institutional controls would not directly reduce the mobility, toxicity, or volume of soil contaminants. Contaminants would remain untreated and in place onsite and would only be reduced by natural attenuation. The cap would minimize infiltration of surface water to groundwater.

Short-Term Effectiveness: No short-term risks would be presented by implementing the surface cap with institutional controls.

Implementability: The institutional controls/surface cap management alternative is technically feasible and easily implemented. No construction is required with this alternative, except for fencing, or other restrictions to exposed surface soils. Current access controls — including military security and limited personnel access to the site — are reliable and will be maintained through property-use restrictions. Administrative coordination is required to implement institutional controls, but no offsite services, materials, specialists, or innovative technologies would be required.

Implementation of the surface cap with institutional controls alternative requires that the Navy formally document Site 38's use as industrial/commercial properties in the LUCA. This alternative would also require that the Navy re-evaluate site conditions and limitations in light of any significant changes to NAS Pensacola, such as base closure and redevelopment.

Administratively, given the potential historical significance of the older parts of NAS Pensacola, including Building 604, this alternative is likely preferred, because it provides adequate protection with minimum disturbance. If future archaeological work is undertaken in this area, the LUCA would ensure that site controls and health and safety measures are used to address site contamination.

The NCP requires that any alternative that leaves contamination onsite be re-evaluated every 5 years to ensure adequacy of the alternative. Therefore, this alternative would require the Navy to establish a program for these re-evaluations.

Cost: Costs include the 5-year re-evaluation (soil monitoring and report preparation) for 30 years, cap inspection and maintenance at an assumed frequency of every 5 years for 30 years, and the cost of establishing the institutional controls. The estimated 30-year present-worth cost of this alternative is $61,000.

5.2.2.3 Existing Surface Cap with Institutional Controls: Modifying Criteria

The modifying criteria are formally assessed after the public comment period. However, the criteria are factored into the identification of the preferred alternative as far as they are known.

Support Agency Acceptance: FDEP and the USEPA are involved in the partnering team process and will both have the opportunity to review and comment on this FFS.

Community Acceptance: Community acceptance for this alternative would be established after the public comment period for the FFS.

5.2.3 Alternative S3: Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal

Under this alternative soil locations where contaminants exceed 3X RSCTLs and leachability criteria would be excavated and disposed offsite in an appropriate landfill. Building 604 and the remaining foundation at Building 71 would have to be demolished. The estimated volume of surface and

subsurface soil to be removed under this alternative would be approximately 26,000 yd^3 (see Section 4.1.3.1 for details).

5.2.3.1 Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal: Threshold Criteria

Overall Protection of Human Health and the Environment: This alternative would remove all soil posing risk to human health under the unrestricted use scenario and soil with the potential for contaminant leaching. Areas in which soil is removed would be backfilled with clean soil. By removing all surface and subsurface soil that presents risk and potential for leaching to groundwater, a long-term permanent solution to exposure is obtained, and Site 38's future use will be unrestricted.

Compliance with ARARs: Florida goals for leaching are to be considered; though exceedances were noted onsite and groundwater exceeds MCLs, contamination has not migrated offsite, and attenuation mechanisms in groundwater appear to minimize the possibility of offsite migration. This alternative removes locations exceeding leachability criteria.

During removal, site grading would need to comply with federal, state, and local air emissions and storm water control regulations. Implementation of this alternative at Site 38 may trigger two of the following ARARs:

- Floodplain requirements as outlined in the *National Environmental Policy Act* (40 CFR Part 6 Appendix A), *Fish and Wildlife Coordination Act* (40 CFR 6.302).

- Storm water discharge requirements outlined in the *Clean Water Act* (40 CFR 122, 125, 129, 136) and the *Florida Storm Water Discharge Regulations* (FAC 62-25).

5.2.3.2 Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal: Balancing Criteria

The primary balancing criteria are the technical criteria on which the detailed analysis is based.

Long-Term Effectiveness and Permanence: Through removal of all soil posing a risk and risk of contaminant leaching and replacement with clean backfill, Alternative S3 provides a long-term permanent exposure reduction. This alternative is permanent because soil posing risk would be removed.

Reduction of Toxicity, Mobility, or Volume: Alternative S3 would not treat site soil to reduce toxicity, mobility, or volume. The purpose of this alternative is to remove soil and dispose of it in a secured sanitary landfill to prevent exposure and potential contaminant leaching. This alternative would minimize future contaminant mobility due to soil-to-groundwater transfers, but not through treatment.

Short-Term Effectiveness: Alternative S3 would expose construction workers to contaminated soil; however, with proper personal protective equipment (PPE), these exposures would be negligible. The community could be exposed to soils during transportation to the landfill; however, proper controls such as those required by the Department of Transportation would minimize these risks. The more extensive shoring, structural controls, and building demolition associated with Alternative S3 would be more complex.

Implementability: Alternative S3 can be easily implemented. Shoring/structural specialists might be required for work. No innovative technologies are required to perform excavation and disposal of surface soil. Many general contractors are available with the mandatory OSHA 1910.120 training. Disposal facilities that will accept soil with the contaminant concentrations detected in the RI are within 20 to 30 miles of the site.

Cost: Costs include construction of a temporary warehouse, demolition, excavation, disposal, confirmation sampling, and reconstruction of Building 604. The total cost of this alternative is $28,095,300.

5.2.3.3 Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal: Modifying Criteria

The modifying criteria are formally assessed after the public-comment period. However, the criteria are factored into the identification of the preferred alternative as far as they are known.

Support Agency Acceptance: FDEP and the USEPA are involved in the partnering team process and both will have an opportunity to review and comment on this FFS.

Community Acceptance: Community acceptance for this alternative will be established after the public-comment period for the FFS.

5.2.4 Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal

Under the Alternative S4, exposed soil in which contaminants exceed 3X ISCTLs and leachability criteria would be excavated and disposed of in an appropriate landfill. The estimated volume of soil to be removed under this industrial alternative would be 1,100 yd^3 (see Section 4.1.3.1 for details), all from Building 604. Institutional controls would be required to restrict property use and ensure that the pavement serving as a cap at Buildings 71 and 604 remains in place and/or that precautions be taken to ensure worker protection.

5.2.4.1 Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal: Threshold Criteria

Overall Protection of Human Health and the Environment: In Alternative S4, all exposed soil in which contaminants exceed 3X ISCTL and leachability criteria would be removed. Soil meeting this criterion is confined to the Building 604 study area. The entire Building 71 study area is beneath the existing pavement. Removing surface and subsurface soil that presents risk to future site workers and groundwater and implementing institutional controls to limit property use to industrial/commercial would prevent exposure to residual contamination exceeding an industrial-use risk.

Compliance with ARARs: Florida goals for leaching are to be considered; though exceedances were noted onsite and groundwater exceeds MCLs, contamination has not migrated offsite, and attenuation mechanisms in groundwater appear to minimize the possibility of offsite migration. Alternative S4 removes locations exceeding leachability criteria not covered by pavement. The existing pavement will prevent contaminant leaching from surface water to groundwater, thereby protecting groundwater from further contamination.

During removal, site grading would need to comply with federal, state, and local air emissions and storm water control regulations. Implementation of this alternative at Site 38 may trigger two of the following ARARs:

- Floodplain requirements as outlined in the *National Environmental Policy Act* (40 CFR Part 6 Appendix A), *Fish and Wildlife Coordination Act* (40 CFR 6.302).

- Storm water discharge requirements outlined in the *Clean Water Act* (40 CFR 122, 125, 129, 136) and the *Florida Storm Water Discharge Regulations* (FAC 62-25).

5.2.4.2 Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal: Balancing Criteria

The primary balancing criteria are the technical criteria on which the detailed analysis is based.

Long-Term Effectiveness and Permanence: In Alternative S4, removal of soil posing an industrial-use risk and risk of contaminant leaching, and implementation of institutional controls to maintain Site 38's use as industrial/commercial would adequately prevent unacceptable exposures. Institutional controls, in addition to removal activities, would be a permanent solution in preventing exposures posing risk under an industrial-use scenario and removing soil with potential for contaminant leaching.

Reduction of Toxicity, Mobility, or Volume: Alternative S4 would not treat site soil to reduce toxicity, mobility, or volume. The purpose of each alternative is to remove soil and dispose of it in a

secured sanitary landfill to prevent exposure and potential contaminant leaching. This alternative would minimize future contaminant mobility due to soil-to-groundwater transfers but not through treatment.

Short-Term Effectiveness: Each Alternative S4 option would expose construction workers to contaminated soil; however, with proper PPE, these exposures would be negligible. The community could be exposed to soils during transportation to the landfill; however, proper controls such as those required by the Department of Transportation would minimize these risks. Due to the small volume of soil, removal activities could be performed quickly for Alternative S4.

Implementability: Alternative S4 can be easily implemented. No innovative technologies are required to perform excavation and disposal of surface soil. Many general contractors are available with the mandatory OSHA 1910.120 training. Disposal facilities that will accept soil with the contaminant concentrations detected in the RI are within 20 to 30 miles of the site.

The institutional controls, required by this alternative for Site 38, can be easily implemented through use of the LUCA. Navy planners can implement proper controls administratively, which would maintain Site 38's use as an industrial/commercial property. The NCP requires that any alternative that leaves contamination onsite to be re-evaluated every 5 years to ensure adequacy of the alternative.

Cost: Costs include excavation, disposal, confirmation sampling, backfill, and a re-evaluation (inspection, maintenance, and report preparation) at an assumed frequency of every 5 years for 30 years and the cost of establishing the institutional controls. The estimated 30-year present-worth cost of this alternative is $450,700.

5.2.4.3 Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal: Modifying Criteria

The modifying criteria are formally assessed after the public-comment period. However, the criteria are factored into the identification of the preferred alternative.

Support Agency Acceptance: FDEP and the USEPA are involved in the partnering team process and both will have an opportunity to review and comment on this FFS.

Community Acceptance: Community acceptance for this alternative will be established after the public-comment period for the FFS.

5.2.5 Alternative S5: Capping

This alternative uses a physical barrier to cover the exposed surface locations where contaminants exceed RGs. In conjunction with the cover alternative, institutional controls would be implemented to restrict site use to industrial, minimizing uncontrolled access and exposure. This alternative also includes implementing a management program for the existing asphalt/concrete cover acting as a cap over areas in which contaminants exceed RGs. At Building 604, a cap would be installed where exposed surface soil concentrations exceed 3X ISCTLs.

This alternative would not require any changes to existing activities; current activities at Site 38 are industrial/commercial.

5.2.5.1 Capping: Threshold Criteria

Overall Protection of Human Health and the Environment: The asphalt cover would eliminate the threat of dermal and ingestive contact for current and future site workers. Contaminated soil would be left onsite indefinitely, requiring institutional controls and cover maintenance to ensure adequate protection.

This alternative would protect human health and the environment by eliminating reasonable foreseeable receptor pathways and controlling access through land-use restrictions. Cover construction and maintenance would be easily implemented. The cap would be adequate combined with current site controls (site security and access control) and institutional controls.

Short-term risks during implementation from inhalation and dermal contact would be minimal and could be controlled using common engineering techniques and PPE.

Compliance with ARARs: The cap, institutional controls, and surface cap management program would comply with RGs for current and future industrial-use scenarios. The potential for contact with soil in which contaminants exceed ISCTLs is eliminated by removing the primary pathways.

The cover would isolate or eliminate contaminants exceeding RGs in environmental media but not manage solid or hazardous waste. Site grading would need to comply with federal, state, and local air emissions and storm water control regulations. Implementation of this alternative at Site 38 may trigger the two following ARARs:

- Floodplain requirements as outlined in the *National Environmental Policy Act* (40 CFR Part 6 Appendix A), *Fish and Wildlife Coordination Act* (40 CFR 6.302).

- Storm water discharge requirements outlined in the *Clean Water Act* (40 CFR 122, 125, 129, 136) and the *Florida Storm Water Discharge Regulations* (FAC 62-25).

5.2.5.2 Capping: Balancing Criteria

The primary balancing criteria are the technical criteria on which the detailed analysis is based.

Long-term Effectiveness and Permanence: Capping would provide long-term effectiveness. It protects current and future site workers by limiting exposure to soil contamination and management of the cap. Through the LUCA, effective administrative measures can be employed to ensure that officials and workers are aware of potential hazards within a given area before any invasive activities. Engineering controls could be implemented to properly maintain the installed cap and the existing asphalt/concrete surface cover acting as a cap. Concrete/asphalt covers are generally reliable containment controls; if the asphalt degraded or was removed, repairs would be made to re-establish the cover's integrity.

Precipitation infiltration would be minimized; however, soil exceeding leachability criteria would remain in place and potentially pose a risk to groundwater. This risk is minimal due to

natural attenuation process. Institutional controls would be implemented to restrict use of groundwater from the surficial aquifer.

Reduction of Toxicity, Mobility, or Volume Through Treatment: Constructing a cap for the exposed areas, designating the existing asphalt/concrete cover as a cap, and implementing a cap management program would not remove, treat, or remediate the contaminated soil; this alternative would provide containment only. The cover is considered reversible because contaminants exceeding RGs under the cover would remain onsite and the cap could be removed. Should the management program not be effective and the cap fail because of poor maintenance, contaminants might be exposed. This alternative does not satisfy the statutory preference for treatment.

Short-Term Effectiveness: Construction of a surface cap is not anticipated to cause any adverse impacts to the surrounding environment. Engineering controls would be used to manage storm water runoff. Cap construction would be expected to take less than 1 month. During construction, workers would be at risk for dermal contact or ingestion of site contaminants; however, this risk would be minimized through proper health and safety procedures such as proper site work practices and use of PPE.

Implementability: A cap with institutional controls is technically and administratively feasible. This alternative could be readily implemented at the site because the proposed areas for capping are easily accessible. Current access controls have been reliable and would be supplemented through the LUCA; implementing this alternative would merely involve placement of the cover and implementation of the LUCA. Future monitoring and maintenance would involve periodic visual inspections and repairing any damage or degradation. Repairs are easily implemented, and asphalt covering would not require any extraordinary services or materials.

If future work is undertaken in this area, the LUCA would ensure that site controls and health and safety measures are used to address site contamination.

Capping would require that the Navy formally document Site 38's use as an industrial/commercial property in the LUCA and enforce their use as such. This alternative would also require that the Navy re-evaluate site conditions and limitations in light of any significant changes to NAS Pensacola, such as base closure and redevelopment.

The NCP requires that any alternative that leaves contamination onsite be re-evaluated every 5 years to ensure adequacy of the alternative. Therefore, this alternative would require the Navy to establish a program for these re-evaluations.

Administratively, constructing a cap to eliminate exposure pathways for current and future industrial site workers does not impact the historical significance of the Building 604 area.

Cost: The 30-year present worth cost including institutional controls, 5-year re-evaluation, and cap inspection and maintenance is estimated at $313,300.

5.2.5.3 Capping: Modifying Criteria

The modifying criteria are formally assessed after the public-comment period. However, the criteria are factored into the identification of the preferred alternative.

Support Agency Acceptance: FDEP and the USEPA are involved in the partnering team process and both will have the opportunity to review and comment on this FFS.

Community Acceptance: Community acceptance for this alternative would be established after the public-comment period for the FFS.

5.3 Evaluation of Groundwater Alternatives

The following sections analyze the groundwater alternatives presented in Section 4:

- Alternative G1: No Action
- Alternative G2: Monitored Natural Attenuation with Institutional Controls

- Alternative G3: Enhanced Bioremediation
- Alternative G4: Groundwater Extraction and Discharge to FOTW

Each alternative is evaluated according to the criteria discussed in Section 2.1.4. Criteria have been divided into three categories: threshold, balancing, and modifying. These three categories will be discussed in relation to the alternatives.

5.3.1 Alternative G1: No Action

The no-action alternative for Site 38 involves no direct remedial effort. No actions would be taken to contain, remove, or treat groundwater contamination. Groundwater contaminants would remain in place and would be reduced by natural attenuation processes. No engineering or institutional controls would be implemented. The no-action alternative provides a baseline against which other alternatives are compared.

5.3.1.1 No Action: Threshold Criteria

The alternatives must meet two threshold criteria to be considered in the FS: overall protection of human health and the environment, and compliance with ARARs.

Overall Protection of Human Health and the Environment: The no-action alternative provides no additional protection for human health and the environment under the current scenario or for any future-use scenario prior to natural attenuation achieving RGs. Under the no-action scenario, groundwater contaminant concentrations that exceed RGs would remain without any controls creating a risk of exposure in an uncontrolled-use scenario. This risk is considered minor considering the surficial/sand-and-gravel aquifer is not currently used as a potable water source and is separated by an aquitard from the main producing zone — the primary source of potable water in the region. Given the brackish water quality and proximity to Pensacola Bay, use of the surficial aquifer at Site 38 as potable water or other source is not likely in the foreseeable future.

Compliance with ARARs: This alternative does not comply with chemical-specific ARARs, because groundwater exceeding RGs could be consumed or otherwise used in an uncontrolled-use scenario. Groundwater in which contaminants exceed RGs would remain.

Contaminant concentrations are attenuating and the groundwater discharge does not negatively impact Pensacola Bay or cause an exceedance of the MSWQ, which is an ARAR. No location- or action-specific ARARs are triggered by the no-action alternative.

5.3.1.2 No Action: Balancing Criteria

The primary balancing criteria are the technical criteria on which the detailed analysis is based.

Long-term Effectiveness and Permanence: The no-action alternative does not provide any additional long-term effectiveness and permanence under an industrial or future residential scenario beyond natural attenuation of contaminants. The long-term effectiveness of the no-action alternative is considered minimal, because the site would be uncontrolled.

Although contaminants are attenuating and significantly reduced concentrations have been observed in the aquifer, the no-action alternative would not reduce the magnitude of potential risks to human health and the environment or provide a means for monitoring. This alternative lacks treatment actions that would provide permanence. Due to the abundant supply of high quality water in the deeper main producing zone, groundwater from the surficial zone is not used as a potable water source in southern Escambia County, nor is it expected to be in the foreseeable future; therefore, the possibility of the risk pathway being completed is minimal.

Controls currently in place at the site — military security and restricted access — would likely continue as site use is projected to remain the same.

Reduction of Toxicity, Mobility, or Volume through Treatment: The no-action alternative would not directly reduce the toxicity, mobility, or volume of groundwater contaminants other than by natural attenuation. Contaminants would remain onsite and would not be treated

during remedial actions. Contaminated groundwater would migrate according to current transport dynamics.

Short-Term Effectiveness: Short-term effectiveness assesses the effects of the alternative on human health and the environment while the remedial alternative is being implemented. No implementation concerns or risks are associated with the no-action alternative. No risk would be posed to the community, workers, or the environment during implementation. This alternative could be implemented immediately and continue indefinitely.

Implementability: The no-action alternative is technically feasible and readily implemented. No construction, operation, or reliability issues are associated with this alternative. No administrative coordination is required for implementation of the no-action alternative, which would not require offsite services, materials, specialists, or innovative technologies.

Cost: Costs associated with the no-action alternative include groundwater monitoring and report preparation every 5 years for 30 years. Each sampling and reporting event is estimated at $40,800, with an estimated 30-year present worth cost of $99,600 assuming a 6% discount factor.

5.3.1.3 No Action: Modifying Criteria

The modifying criteria are assessed formally after the public-comment period. However, the criteria are factored into the identification of the preferred alternative as far as they are known.

State/Support Agency Acceptance: FDEP and USEPA are involved in a partnering team process with the Navy and both agencies would have the opportunity to review and comment on the proposed plan.

Community Acceptance: Community acceptance for the no-action alternative would be established after the public comment period.

5.3.2 Alternative G2: MNA with Institutional Controls

MNA is the process of monitoring the natural attenuation processes over time to meet remedial action objectives in a reasonable time frame. No direct remedial action is taken to reduce the toxicity, mobility, or volume of contaminants. Through the use of institutional controls, MNA would adequately protect human health and the environment by minimizing the potential for exposure.

The MNA portion of this alternative would include a detailed biodegradation assessment and fate-and-transport modeling to predict expected contaminant concentrations over time. Current groundwater sampling data would be required to perform the modeling. A long-term groundwater monitoring program would be implemented to assess the progress of MNA and to ensure that human health is protected until contaminant concentrations are reduced to remedial goals. During this time, institutional controls would be implemented with land-use restrictions to restrict site use and prevent groundwater use. MNA would include monitoring at the sea wall to ensure compliance with the MSWQ criteria at the point of compliance.

5.3.2.1 MNA with Institutional Controls: Threshold Criteria

Overall Protection of Human Health and the Environment: Under this alternative, site access and groundwater use would be restricted through institutional controls. MNA and institutional controls would provide long-term effectiveness and permanence by preventing the use of groundwater, minimizing the potential for exposure, and monitoring natural attenuation processes over time.

As discussed, given the aquifer's overall poor water quality and its proximity to Pensacola Bay, it is an unlikely source of potable water in any future-use scenario. Therefore, protection of human health is accomplished not only by restrictions on groundwater use and attenuation of contaminant concentrations over time, but by the poor quality of the groundwater.

This alternative would not be implemented if initial modeling indicated that RGs or protection of human health would not be met. This alternative would likely comply with chemical-specific ARARs assuming aquifer chemistry remains sufficient to sustain reductive dechlorination.

Protection of the environment and Pensacola Bay would be further monitored at the point of compliance.

Compliance with ARARs: The MNA alternative is projected to comply with the chemical-specific groundwater ARARs in a reasonable amount of time. Modeling using current groundwater data is required to predict degradation of contaminants over time; however, preliminary modeling indicates chlorinated VOC concentrations may be reduced to RGs within 1.5 to 2.5 years. MNA would include monitoring to ensure compliance with MSWQ criteria at the point of compliance.

No location or action-specific ARARs would be triggered by this alternative.

5.3.2.2 MNA with Institutional Controls: Balancing Criteria

Long-term Effectiveness and Permanence: The MNA alternative eliminates potential risk to site workers by restricting property use and using institutional controls to prevent groundwater from being used as potable water or for other purposes. Long-term effectiveness depends on the monitoring program and maintenance of institutional controls.

The Navy has performed several aquifer studies to assess MNA's effectiveness. The study indicates overwhelming evidence that MNA is a feasible and effective option which would provide long-term, permanent aquifer remediation. The consumption of contaminated groundwater would be controlled institutionally (through the LUCA), and groundwater would be monitored until remedial goals are met.

Controls currently in place onsite, including military security and limited access to the site, would remain. These controls are considered reliable for restricting access to the general public, given the current and projected land use onsite.

Reduction of Toxicity, Mobility, or Volume through Treatment: No direct action would be taken to reduce contaminant toxicity, mobility, or volume. Natural attenuation processes would continue to reduce contaminants over time. Contaminants would remain in place onsite. Contaminated groundwater would migrate according to current transport dynamics. Biological degradation is considered irreversible.

Short-Term Effectiveness: No implementation concerns or risks are associated with MNA and institutional controls. The community would be protected through groundwater restrictions and institutional controls. Workers would be protected by groundwater restrictions and education. This alternative could be implemented as institutional controls and the MNA assessment are completed.

The only short-term risks would be associated with sample collection. Sampling wastes would be generated during MNA monitoring activities, and they would be managed in an appropriate manner. Sampling personnel would use appropriate PPE to provide adequate protection.

Implementability: MNA and institutional controls are technically feasible and readily implemented. While an initial screening has already been performed, a remedial design phase is required to assess current site conditions and demonstrate effectiveness across the site. Detailed modeling based on current site data would confirm whether MNA can reduce contaminants to RGs in a reasonable time. Preliminary modeling to estimate the time required for remediation to RGs using Natural Attenuation Software indicated that the remedial time frame for chlorinated VOCs is within 1.5 to 2.5 years from 2000. Preliminary modeling was not performed for inorganic COCs.

No construction, operation, or maintenance issues are initially involved with this alternative; any required additional monitoring wells could be installed without difficulty. Current access controls, including military security and limited personnel access, would remain. Minimal administrative coordination would be required to implement the MNA alternative. MNA would not require offsite treatment services, materials, or innovative technologies.

MNA Cost Components:

- Initial MNA assessment including groundwater sampling and analysis
- Fate-and-transport modeling
- Engineering, institutional controls, and report compilation
- Annual monitoring

MNA costs are conservatively provided for a 5-year remedial timeframe. Estimated capital costs for MNA, including remedial design, groundwater sampling, program development, and institutional

controls, are $310,000. The estimated cost for annual operating and maintenance related to groundwater monitoring and reporting is $54,400 per year. The estimated 5-year present-worth cost of MNA and institutional controls is $625,900.

5.3.2.3 MNA with Institutional Controls: Modifying Criteria

State/Support Agency Acceptance: FDEP and the USEPA are involved in a partnering team process with the Navy and both will have the opportunity to review and comment.

Community Acceptance: Community acceptance for the MNA alternative would be established after the public-comment period. If MNA were selected as the remedial alternative, education of the public on the difference between MNA and no action might be required. This criterion is generally not completed until after public comments are received on the RI/FFS report and the proposed plan.

5.3.3 Alternative G3: Enhanced Bioremediation

Enhanced bioremediation is the process of engineering subsurface conditions to maximize the rate and efficiency of contaminant biodegradation or transformation. In this alternative, molasses, a proprietary carbon-release product, or a similar sugar substrate would be injected into the aquifer to drive oxidation/reduction conditions into the desired sulfate-reducing or methanogenic range, thus facilitating more rapid reductive dechlorination and metals attenuation. The carbon source can be applied to the subsurface via a one-time direct injection, recurring direct injections, or semi-continuous injection with groundwater recirculation.

This alternative includes remedial design, additional groundwater sampling, pilot testing, design and construction of the enhanced bioremediation system. A long-term groundwater monitoring program would be implemented with the O&M program to assess the progress of the enhanced bioremediation system and to ensure that human health is protected. Institutional controls would be implemented to restrict property use and prevent groundwater use.

As discussed in Section 4, considering the concentration of contaminants and site conditions, the enhanced bioremediation concept chosen for evaluation was injection of HRC as a one-time application via push-point injection.

5.3.3.1 Enhanced Bioremediation: Threshold Criteria

Overall Protection of Human Health and the Environment: Under an industrial scenario, enhanced bioremediation addresses the long-term effectiveness and permanence criterion by actively enhancing biological degradation of site contaminants. Protection of human health is accomplished through institutional controls such as restrictions on site use and prevention of groundwater use while contaminants exceed RGs. No short-term impacts would be associated with this alternative. This alternative would comply with chemical-specific ARARs once remediation is complete. Protection of the environment and Pensacola Bay would be ensured through monitoring at the point of compliance.

Compliance with ARARs: This alternative is projected to comply with the chemical-specific groundwater ARARs. Bioenhancement is expected to accelerate degradation processes onsite while modeling and groundwater sampling document degradation of contaminants over time. Monitoring would be required to ensure compliance with MSWQ criteria at the point of compliance.

No location-specific ARARs would be triggered with this alternative. Injection permits would be required for the bioenhancement system.

5.3.3.2 Enhanced Bioremediation: Balancing Criteria

Long-Term Effectiveness and Permanence: The enhanced bioremediation alternative eliminates risk to site workers by enhancing biodegradation processes within the aquifer, managing Site 38 as an industrial area, and using institutional controls to prevent groundwater from being used as potable water or other purposes.

The enhancement requirements and system configuration and design would be developed during remedial design using data from all site wells. The consumption of contaminated groundwater would be controlled institutionally (through the LUCA), and groundwater would be monitored until remedial goals are met.

Any controls currently in place onsite would remain, including military security and limited access to the site. These controls are considered reliable for protecting human health, given the current and projected land use onsite.

This process is expected to be somewhat effective in reducing contaminant concentrations at an increased rate compared to MNA; however, the overall effectiveness compared to MNA is marginal. MNA data indicate that the aquifer currently is capable of supporting biological degradation and achieving RGs in a reasonable amount of time. Therefore, the natural processes without enhancement appear to provide a long-term solution.

Reduction of Toxicity, Mobility, or Volume through Treatment: Enhanced bioremediation directly reduces the volume and toxicity of impacted groundwater through engineered biological processes. Biological degradation is considered irreversible. Contaminated groundwater would migrate according to current transport dynamics.

Short-Term Effectiveness: Minimal implementation concerns are associated with enhanced bioremediation. The community is protected through groundwater restrictions and institutional controls. This alternative could be executed as soon as land-use restrictions and groundwater restrictions are in place.

Workers exposed to risks should be trained according to OSHA standards as required by 29 CFR 1910.120 to protect and mitigate risks during remedial construction. Field personnel contact with site contaminants would be minimal during construction. Workers could be protected by wearing appropriate PPE.
Sampling wastes would be generated during monitoring activities and should be managed in a appropriate manner.

Implementability: Enhanced bioremediation with HRC is technically feasible and easily implemented. Technical implementability issues (e.g., the ability to inject/infiltrate, subsurface conditions, and distribution of HRC) are manageable through system design and engineering controls. The application strategy (conventionally-drilled boreholes) is expected to minimally impact the site. No surface structures (except for additional monitoring wells) or equipment are required for this delivery option, thereby eliminating any operation and maintenance difficulties.

Construction of an injection grid and developing an O&M system would be implementable; additional monitoring wells, if required, could be installed without difficulty. Current access

controls, including military security and limited personnel access, would be required for this alternative.

Enhanced Bioremediation Costs:

- Pilot study
- Remedial design
- Injection and Implementation
- Installation and startup
- Monthly monitoring for 6 months
- Semi-annual monitoring for first 2 years
- Long-term annual monitoring for 10 years
- 5-year reapplication

The estimated capital cost for enhanced bioremediation using HRC including remedial design, pilot study, injection and startup, and the first year of monitoring is $580,500. The estimated present worth costs are $77,000 for semiannual monitoring for the first 2 years, $332,700 for annual monitoring for 10 years, and $108,400 for reapplication in year 5. The total estimated 30-year present-worth cost is $1,098,600 assuming a 6% discount factor.

Considering decreases in contaminant concentrations over time and favorable geochemistry for metals attenuation, it is projected that the remedial time frame for enhanced bioremediation would be considerably less than 30 years.

5.3.3.3 Enhanced Bioremediation: Modifying Criteria

State/Support Agency Acceptance: FDEP and the USEPA are involved in a partnering team process with the Navy and both will have the opportunity to review and comment on this FFS.

Community Acceptance: Community acceptance for Alternative G3 would be established after the FFS public-comment period. This criterion is generally not completed until after public comments on the RI/FFS report and proposed plan are received.

5.3.4 Alternative G4: Groundwater Extraction and Disposal to FOTW

This alternative consists of recovering contaminated groundwater using extraction wells and discharging directly to the FOTW. It appears that pretreatment would not be required to meet FOTW discharge limits.

Mass removal from the shallow aquifer would ensure protection of downgradient receptors and remove contaminant mass. This alternative would contain both areas of concern using two proposed recovery wells: one in the Building 604 area and one in the Building 71 area (Figure 4-20). Institutional controls would be implemented at Site 38 to restrict site access and prevent groundwater use during remedial operations.

5.3.4.1 Groundwater Extraction and Disposal to FOTW: Threshold Criteria

Overall Protection of Human Health and the Environment: Human health is protected by recovering and containing groundwater that exceeds RGs, thus providing assurance that contaminants do not migrate offsite while removing mass in contaminated zones.

In this alternative, extracted groundwater would be discharged directly to the FOTW without pretreatment. Human health and the environment would be protected through the FOTW's treatment processes, which would reduce contaminant concentrations to the FOTW's NPDES permit limits.

Compliance with ARARs: Groundwater extraction and treatment is expected to comply with the chemical-specific ARARs. The contaminated groundwater would be captured by extraction wells, thereby removing groundwater in which contaminants exceed RG. Removal of groundwater from Site 38 is intended to reduce the mass of contaminants in the aquifer and contain the groundwater areas of concern.

Action-specific ARARs may include pretreatment and discharge requirements for wastewater as outlined in the *Florida Industrial Waste Water Facilities* (Chapter 62-660), *Florida Water Quality Based Effluent Limitations* (Chapter 62-650), *Florida Pretreatment Requirements for Existing and New Sources of Pollution* (Chapter 62-625), and *Florida Waste Water Facility Permitting* (Chapter 62-620).

The FOTW is subject to National Pollutant Discharge Elimination System (NPDES) requirements, and FOTW effluent discharges must meet the NPDES permit requirements.

5.3.4.2 Groundwater Extraction and Disposal to FOTW: Balancing Criteria

Long-Term Effectiveness and Permanence: Groundwater extraction would contain contaminants and reduce groundwater contamination by mass removal. Groundwater migration is expected to be arrested by the containment system. This alternative reduces risk through mass removal and offers protection by containing the source. Furthermore, groundwater monitoring effectively assesses mass reduction and contaminant migration potential from areas not contained by groundwater extraction.

For the purpose of the FFS, the projected remedial time frame is 5 years. Risks to human health and the environment onsite are expected to decrease with time as constituents are removed.

Reduction of Toxicity, Mobility, or Volume through Treatment: This alternative is a mass removal/containment alternative. Groundwater removal at Site 38 would reduce groundwater toxicity and contaminant volume. Groundwater containment eliminates contaminant migration. This alternative also reduces mobility or volume through mass removal. Assuming no pretreatment is required, this water would be collected and discharged to the FOTW. Mass removal of chlorinated solvents and primary metals from the surficial aquifer is expected to be permanent.

Short-Term Effectiveness: Adverse impacts to the surrounding environment are not anticipated during groundwater recovery system construction. Approval to discharge to the FOTW needs to be obtained before implementation. After design plans are approved and testing is complete, the groundwater collection system would be constructed. Collection of five pore volumes is estimated to take 5 years.

Workers exposed to risks should be trained according to OSHA standards as required by 29 CFR 1910.120 to protect and mitigate risks during remedial construction. Field personnel contact with site contaminants would be minimal during construction (pump installation, control panel installation, and sanitary sewer connections). Workers could be protected by wearing

appropriate PPE. Compliance with RGs could be determined by monitoring site wells. System performance and mass removal could be evaluated by effluent monitoring. Alternative G4 would be compatible with any additional remedial actions, if required.

Implementability: Extraction of contaminated groundwater from below the site is both technically and administratively feasible. This alternative would not require any extraordinary services, materials, specialists, or innovative technologies. Construction and operation could be achieved with minimal difficulty.

Cost: Estimated capital and startup costs for groundwater extraction are $261,000. Annual operation, maintenance, monitoring, and FOTW sewer-use costs are expected to be $399,500 including groundwater monitoring. The majority of the annual cost is sewer-use fees at the FOTW estimated at $4.56 per 1,000 gallons, for a total of $300,000 per year. The total present-worth cost of this alternative, including implementing institutional controls and the costs for the corrective action contractor, is estimated to be $1,943,700 assuming a 6% discount rate and operation for 5 years.

5.3.4.3 Groundwater Disposal and Discharge to FOTW: Modifying Criteria

State/Support Agency Acceptance: FDEP and the USEPA are involved in the partnering team process with the Navy and both will have the opportunity to review and comment.

Community Acceptance: These criteria are generally not completed until after public comments on the RI/FFS report and the proposed plan are received.

6.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

After the alternatives have been fully described and individually assessed against the nine criteria (Section 5), each alternative's performance relative to the evaluation criteria is assessed to identify the advantages and disadvantages of each alternative relative to one another. This section highlights differences between alternatives for each criterion, especially the balancing criteria. The focus should help determine which options are cost-effective and which remedy uses permanent solutions and treatment to the maximum extent practicable. Tables 6-1 and 6-2 summarize these differences between the alternatives for each criterion. Groundwater alternatives are assessed separately from soil alternatives, consistent with previous sections of this FFS.

6.1 Comparative Analysis of Soil Alternatives

6.1.1 Threshold Criteria

Overall Protection of Human Health and the Environment: All the soil alternatives in this FFS are protective of human health based on risk, assuming the NCP's acceptable risk window is used as the remedial goal. However, all FFS alternatives were evaluated against FDEP's preference of preventing exposures causing risk under unrestricted use and industrial use scenarios. For the unrestricted use scenario, all locations exceeding 3X RSCTL, acute toxicity, and leachability criteria are required for the feasibility study. For the industrial scenario, all locations exceeding 3X ISCTL and leachability criteria that are not covered by the asphalt and concrete pavement are required for feasibility study.

Alternative S1 provides no more protection than current conditions; this alternative presents risk to future residents because property use is not controlled. Current workers are exposed to a few locations exceeding 3X ISCTL within the Building 604 study area because they are not under asphalt and concrete pavement. Alternative S2 provides no more protection to current site workers than Alternative S1 although it would limit use of the property to industrial/commercial, which eliminates a potential higher-risk unrestricted-use scenario. Alternatives S1 and S2 do not address soil-to-groundwater transfer; however, as discussed in previous sections, groundwater concentrations are decreasing. Alternatives S3, S4, and S5 are protective of both future residents and site workers to below 3X SCTLs by removing or capping all soil that contributes risk. These three alternatives also seek to eliminate the long-term threat of soil-to-groundwater

Table 6-1
Individual Evaluation of Soil Alternatives

Criteria	Alternative S1: No Action	Alternative S2: Existing Surface Cap with Institutional Controls	Alternative S3: Excavation of Residential Hot Spots/Acute Toxicity and Leachability Criteria Exceedances with Offsite Disposal	Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal	Alternative S5: Capping
Threshold Criteria					
Overall Protection of Human Health and the Environment	No reduction in risk. No additional protection to human health. Soils exceeding leachability criteria would remain; however, natural attenuation would prevent offsite migration to Pensacola Bay.	Reduces potential for uncontrolled site access and restricting use. Existing cap will remain prevent exposure and fencing will placed around several grassy areas with 3X ISCTL exceedances. Soils exceeding leachability criteria would remain, however, natural attenuation would prevent offsite migration to Pensacola Bay.	All soil posing risk would be removed and replaced with clean backfill. Soils exceeding leachability criteria would also be removed.	All soil posing risk that is not under the existing cap would be removed and replaced with clean backfill. Soils exceeding leachability criteria that are not under the existing cap would also be removed. Institutional controls would be implemented.	All soil posing risk will be capped and maintained to reduce risk. All soil exceeding leachability will be capped and maintained to prevent infiltration. Institutional controls will be implemented.
Compliance with ARARs	Does not comply with RGs. Risk will remain under uncontrolled future use.	Does not comply with RGs. Six locations will have viable exposure pathways.	Complies with residential RGs by removing locations exceeding leachability.	Complies with industrial RGs by removing locations exceeding leachability that are not under the existing cap. Migration from surface water to groundwater will be prevented with existing cap.	Potential for contact with contaminants is eliminated by removing the primary pathways.

Table 6-1
Individual Evaluation of Soil Alternatives

Criteria	Alternative S1: No Action	Alternative S2: Existing Surface Cap with Institutional Controls	Alternative S3: Excavation of Residential Hot Spots/Acute Toxicity and Leachability Criteria Exceedances with Offsite Disposal	Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal	Alternative S5: Capping
Balancing Criteria					
Long-term Effectiveness and Permanence	No means to prevent exposure. Long-term effectiveness is minimal. Soil concentrations will remain, with the exception of natural attenuation.	Limits exposure to soil contamination. Maintenance and inspection program will be required for cap. Site access and control will remain limited.	Provides permanent exposure reduction.	Provides long-term effectiveness by removing soil posing an industrial risk. Removes soil with potential for contaminant leaching.	Provides long-term effectiveness by limiting exposure to soil contamination and management of the cap. Maintenance and inspection program will be required for cap. Site access and control will remain limited.
Reduction of Toxicity, Mobility, or Volume through Treatment	Contaminants will remain untreated and in place. However, natural attenuation will reduce toxicity, mobility, and volume.	Contaminants will remain untreated and in place. However, natural attenuation will reduce toxicity, mobility, and volume.	Contamination is not reduced but removed and disposed of at secure sanitary landfill.	Contamination is not reduced, however, is removed and disposed of at secure sanitary landfill.	Contaminants will remain untreated and in place. However, natural attenuation will reduce toxicity, mobility, and volume.

Table 6-1
Individual Evaluation of Soil Alternatives

Criteria	Alternative S1: No Action	Alternative S2: Existing Surface Cap with Institutional Controls	Alternative S3: Excavation of Residential Hot Spots/Acute Toxicity and Leachability Criteria Exceedances with Offsite Disposal	Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal	Alternative S5: Capping
Short-term Effectiveness	No short-term risks.	No short-term risks.	Construction workers will be at risk for dermal contact or ingestion, however, PPE will reduce exposure. Community will be exposed to soils during transportation; however, controls will be used as required by Department of Transportation to minimize risks. Includes extensive shoring, structural controls, and building demolition.	Construction workers will be at risk for dermal contact or ingestion, however, PPE will reduce exposure. Community will be exposed to soils during transportation; however, controls will be used as required by Department of Transportation to minimize risks.	Will not cause adverse impacts to the surrounding environment. Engineering controls will be used to manage storm water runoff. Construction workers will be at risk for dermal contact or ingestion, however, PPE will reduce exposure.
Implementability	Feasible and easily implemented. Will require re-evaluation every 5 years.	Feasible and easily implemented. Institutional controls can be implemented through administrative coordination. Site will be formally documented as industrial/ commercial use. Re-evaluation will be required for any significant changes to the base.	Easily implemented. Shoring and structural specialists might be required.	Easily implemented. Institutional controls can be implemented through administrative coordination. Site will be formally documented as industrial/ commercial use.	Easily implemented. Institutional controls can be implemented through administrative coordination. Site will be formally documented as industrial/ commercial use. Will require re-evaluation every 5 years.
Cost	$24,400	$61,000	$28,095,300	$450,700	$313,300

Table 6-1
Individual Evaluation of Soil Alternatives

Criteria	Alternative S1: No Action	Alternative S2: Existing Surface Cap with Institutional Controls	Alternative S3: Excavation of Residential Hot Spots/Acute Toxicity and Leachability Criteria Exceedances with Offsite Disposal	Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal	Alternative S5: Capping
Modifying Criteria					
Support Agency Acceptance	FDEP and USEPA are involved in process and have opportunity to comment on FFS.	FDEP and USEPA are involved in process and have opportunity to comment on FFS.	FDEP and USEPA are involved in process and have opportunity to comment on FFS.	FDEP and USEPA are involved in process and have opportunity to comment on FFS.	FDEP and USEPA are involved in process and have opportunity to comment on FFS.
Community Acceptance	Will be established after public-comment period on FFS.	Will be established after public-comment period on FFS.	Will be established after public-comment period on FFS.	Will be established after public-comment period on FFS.	Will be established after public-comment period on FFS.

Table 6-2
Individual Evaluation of Groundwater Alternatives

Criteria	Alternative G1: No Action	Alternative G2: Monitored Natural Attenuation with Institutional Controls	Alternative G3: Enhanced Bioremediation	Alternative G4: Groundwater Extraction and Discharge to POTW
Threshold Criteria				
Overall Protection of Human Health and the Environment	Provides no additional protection under the current scenario or for future use prior to natural attenuation achieving RGs.	Groundwater use and site access will be restricted through institutional controls; thereby, providing long-term effectiveness and permanence.	Actively enhances biological degradation. Groundwater use and site access will be restricted through institutional controls.	Recovers and contains groundwater exceeding RGs. Also removes mass in contaminated zones. Human health and environmental will be protected through FOTW's treatment processes.
Compliance with ARARs	Does not comply with ARARs because groundwater could be consumed or used in an uncontrolled-use scenario. However, concentrations are decreasing and are not discharging into the Pensacola Bay.	Modeling of current groundwater data predicts concentrations degrading to below RGs in the next 5 years.	Monitoring will be required to ensure compliance with MSWQ criteria.	Complies with ARARs. Contaminated groundwater is removed using extraction wells. Subject to NPDES requirements and FOTW effluent discharges must meet the NPDES permit requirements.
Balancing Criteria				
Long-term Effectiveness and Permanence	Does not provide long-term effectiveness and permanence. Contaminants are decreasing but no-action does not reduce the magnitude of risk and does not provide a means for monitoring.	Overwhelming evidence that MNA is feasible and effective which will provide a long-term, permanent aquifer remediation.	Eliminates risk by enhancing degradation process.	Contains and reduces contamination. Monitoring will be required to ensure contaminant removal.
Reduction of Toxicity, Mobility, or Volume through Treatment	Does not reduce toxicity, mobility, or volume with the exception of natural attenuation.	Natural attenuation will continue to reduce contaminants over time.	Directly reduces the volume and toxicity of contaminants. Migration would be towards current transport dynamics.	Reduces toxicity and volume of contaminated groundwater. Eliminates migration. Removal is expected to be permanent.

Table 6-2
Individual Evaluation of Groundwater Alternatives

Criteria	Alternative G1: No Action	Alternative G2: Monitored Natural Attenuation with Institutional Controls	Alternative G3: Enhanced Bioremediation	Alternative G4: Groundwater Extraction and Discharge to POTW
Short-term Effectiveness	No risk would be posed to community, workers, or the environment during implementation.	No risks are associated with implementation of MNA. Restrictions will be implemented to protect community and workers from groundwater. Some short-term risk during sampling, however, PPE will be used to minimize exposure.	Restrictions will be implemented to protect community from groundwater. Some short-term risk during implementation and sampling, however, PPE will be used to minimize exposure.	Impacts to surrounding environment during construction are not anticipated. Approval to FOTW will be required. Some short-term risk during implementation and sampling; however, PPE will be used to minimize exposure.
Implementability	Feasible and readily implemented. Groundwater monitoring and report preparation is required every 5 years for 30 years.	Feasible and readily implemented. A remedial design phase will be required.	Feasible and readily implemented. A pilot study and remedial design phase will be required.	Feasible and construction is minimal in diffulty.
Cost	$99,600	$625,900	$1,098,600	$1,943,700
Modifying Criteria				
Support Agency Acceptance	FDEP and USEPA are involved in process and have opportunity to comment on FFS.	FDEP and USEPA are involved in process and have opportunity to comment on FFS.	FDEP and USEPA are involved in process and have opportunity to comment on FFS.	FDEP and USEPA are involved in process and have opportunity to comment on FFS.
Community Acceptance	Will be established after public-comment period on FFS.	Will be established after public-comment period on FFS.	Will be established after public-comment period on FFS.	Will be established after public-comment period on FFS.

transfer. However, as documented previously, though soil may cause small, localized leachability criteria exceedances within the boundaries of Buildings 71 and 604, natural attenuation mechanisms are adequate to attenuate groundwater concentrations to below groundwater MCLs at the property line. Therefore, passive land management that restricts onsite consumption of groundwater — as offered in Alternatives S2, S4, and S5 — also effectively protects human health.

Compliance with ARARs: All soil alternatives comply with state and federal ARARs; Alternatives S2, S3, S4, and S5 meet FDEP's preference for protection below 3X SCTLs and leachability criteria. Alternative S2 would administratively control access to Buildings 71 and 604 to prevent unacceptable exposure; if current conditions are sustained, locations exceeding 3X ISCTLs and leachability criteria that are not covered by the existing pavement would remain. Alternative S3 would remove all soil presenting risk greater than 3X RSCTLs, acute toxicity, and leachability criteria. Alternative S4 would remove all soil presenting risk to future site workers and impose institutional controls on the property. Alternative S5 would cap all soil presenting risk greater than 3X ISCTLs and leachability that is not under the existing cap.

Alternative S2 addresses exceedances by restricting groundwater use, thus preventing exposure if future soil-to-groundwater transfers occur. Alternative S4 does the same but also eliminates the potential for any future soil-to-groundwater transfers by removing soil with concentrations exceeding leachability criteria that is not under the existing cap. Alternative S5 is similar to S4; instead of removing the soil, the soil posing risk would be capped.

6.1.2 Balancing Criteria

Long-Term Effectiveness and Permanence: Use of Site 38 in the next 5 to 10 years is expected to remain consistent with its current use; in the future the site will likely still remain under Navy control. Risks presented by soil contamination have been identified for both unrestricted and industrial-use scenarios.

Alternatives S2, S3, and S4 provide more protection than the no-action alternative. Alternative S2 formally restricts land use to eliminate unrestricted use. Alternatives S3 and S4 remove all soil presenting risks greater than 3X SCTLs for either S3 residential or S4 industrial scenarios and also removes soil contaminants greater than leachability criteria to be protective of the soil-to-groundwater transport of contaminants. Alternative S5 caps all soil presenting risk under the industrial scenario by capping areas with soil greater than 3X ISCTL and leachability criteria that is not already under the existing cap.

Reduction of Toxicity, Mobility, and Volume: Mobility and exposure to toxicity would be reduced under the capping alternative. The volume of contaminated soil would not be reduced. Soil removal alternatives will reduce the volume, thereby reducing mobility and toxicity.

Residual risks by evaluated alternatives are summarized in Table 6-3.

Table 6-3
Summary of Residual Risk for Each Alternative

Alternative S1: No Action	Residential: Soil exceeding acute toxicity and 3X RSCTLs will remain. Industrial: Soil exceeding 3X ISCTLs and not covered by pavement will remain. Leachability Criteria: Soil exceeding leachability criteria will remain.
Alternative S2: Institutional Controls	Residential: Scenario eliminated through LUCA. Industrial: Soil exceeding 3X ISCTLs and not covered by pavement will remain. Leachability Criteria: Soil exceeding leachability criteria remains onsite, but groundwater use is restricted.
Alternative S3: Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal	Residential: Soil at all locations exceeding acute toxicity and 3X RSCTLs will be removed. Industrial: Soil at all locations exceeding 3X ISCTLs will be removed. Leachability Criteria: Soil at all locations exceeding leachability criteria will be removed.
Alternative S4: Excavation of Industrial Hot Spots/Acute Toxicity and Leachability Criteria Exceedances with offsite disposal	Residential: Scenario eliminated through LUCA. Industrial: Soil at locations exceeding 3X ISCTLs not under existing pavement will be removed. Leachability Criteria: Soil at locations exceeding 3X ISCTLs not under existing pavement will be removed.
Alternative S5: Capping	Residential: Scenario eliminated through LUCA. Industrial: Soil at locations exceeding 3X ISCTLs not under the existing pavement will be capped. Leachability Criteria: Soil at locations exceeding 3X ISCTLs not under existing pavement will be capped.

Short-Term Effectiveness: No short-term risks are posed by the no-action or institutional-control alternatives. No action can be implemented immediately. Institutional controls could be initiated within 30 days. Alternatives S3 and S4: Excavation would present minimal risks to construction workers performing the removal and the community during transportation of soil for disposal. Alternatives S3 and S4 could be implemented and completed within 60 days of notification to proceed.

Implementability: Alternative S1 does not require implementation. Alternatives S2, S4, and S5 require a LUCA on Buildings 71 and 604 areas, limiting their use to industrial or commercial areas. Alternatives S3 and S4 require that the Navy requisition a remedial contractor to remove and may require additional structural engineering specialists because the excavation is close to adjacent buildings. However, this can be addressed during remedial design. Alternative S5 requires that a Navy requisition a remedial contractor to install the cap.

Cost: The estimated costs for each alternative are presented in Table 6-4.

Table 6-4
Soil Alternatives Cost Comparison

Alternative	Total Present Worth Cost
Alternative S1: No Action	$24,000
Alternative S2: Institutional Controls	$61,000
Alternative S3: Excavation of Hot Spots/Acute Toxicity and Leachability Criteria Exceedances for Unrestricted Use with Offsite Disposal	$28,095,300
Alternative S4: Excavation of Industrial Hot Spots and Leachability Criteria Exceedances with Offsite Disposal	$450,700
Alternative S5: Capping	$313,000

6.1.3 Modifying Criteria

These criteria will be evaluated in detail following comments on the FFS report and the proposed plan and addressed during final decision making and record of decision (ROD) preparation.

6.2 Comparative Analysis of Groundwater Alternatives

6.2.1 Threshold Criteria

Overall Protection of Human Health and the Environment: As discussed in Section 5.3, groundwater exceeded federal and state drinking water standards, posing a potential risk to future receptors. Because site groundwater is not used as a potable source, no current pathways exist. The potential for future groundwater consumption exists but is unlikely.

If the Sand-and-Gravel Aquifer is ever used as a potable water source, Alternative G1: No-Action will not provide protection to future site workers. Exposure via ingestion of shallow/intermediate groundwater presents a potential risk and hazard.

Alternative G2 is similar to G1 because no action will be taken to assist or enhance cleanup of contaminants. Alternative G2 requires monitoring of GW to ensure natural attenuation processes are effective at degrading contamination. Alternative G3, enhanced bioremediation, would provide more extensive protection than G2 by enhancing the biodegradation of contaminants while preventing the use of site groundwater onsite as a potable water source. Alternative G4 would protect human health and the environment by removing the contaminated groundwater and treating it, as well as preventing the use of the site groundwater as a potable water source.

Compliance with ARARs: Natural attenuation and degradation form the basis of alternatives G1, G2, and G3; however, G4 does not rely on natural attenuation and degradation. Alternative G1 does not comply with ARARs because it provides no protection to human health or the environment. Alternatives G2 and G3 include monitoring to ensure compliance with ARARs over time to allow natural attenuation/degradation to occur. Alternative G4 ensures compliance with ARARs by the removal and cleanup of groundwater. Under all alternatives, groundwater with chemical concentrations greater than GCTLs would remain. However, the aquifer is not a drinking water source; GCTL exceedances are not impacting receptors at this time. While G1 does not control future use, Alternatives G2, G3, and G4 prevent impacts by eliminating the pathway.

6.2.2 Balancing Criteria

Five primary balancing criteria typically highlight the major differences between alternatives: long-term effectiveness and permanence; reduction of toxicity, mobility, and volume through treatment; short-term effectiveness; implementability; and cost.

Long-Term Effectiveness and Permanence: The long-term effectiveness and permanence criterion assesses the results of a remedial action in terms of the risk remaining onsite, particularly the magnitude of remedial risk and the adequacy and reliability of controls.

Long-term effectiveness for Alternatives G1, G2, and G3 is based on natural processes, which may or may not achieve Florida Primary Drinking Water Standards (FPDWS). The actual site risks are minimal because the aquifer is not used as a drinking water source. Site contaminants would decay naturally; these mechanisms are permanent. Alternatives G2, G3, and G4 provide institutional controls that would prevent consumption of site groundwater, and therefore eliminate risks due to groundwater contamination. Alternative G3, by implementing a monitoring program, would document long-term effectiveness. Alternative G4 is expected to arrest groundwater contaminant migration by containment.

Reduction of Toxicity, Mobility, and Volume through Treatment: Alternative G1 would not reduce the toxicity, mobility, or volume through treatment because no action would be taken, with the exception of contaminants naturally attenuating. Alternatives G2 and G3 reduce toxicity, mobility, and volume through natural attenuation and enhanced degradation (treatment), respectively. Alternative G4 reduces toxicity, mobility, and volume by mass removal.

Short-Term Effectiveness: No short-term effectiveness issues are associated with Alternatives G1 or G2. Alternatives G3 and G4 have been evaluated and are anticipated to have no adverse impacts to the surrounding environment during the construction of each system.

Implementability: All alternatives being considered are implementable. However, Alternatives G3 and G4 would require routine O&M.

Cost: Costs for each alternative are presented in Table 6-5.

Table 6-5
Groundwater Alternatives Cost Comparison

Alternative	Total Present Worth Cost
Alternative G1: No Action	$99,600
Alternative G2: MNA w/ Institutional Controls	$625,900
Alternative G3: Enhanced Bioremediation	$1,098,600
Alternative G4: Groundwater Recovery and Discharge to FOTW	$1,943,700

6.2.3 Modifying Criteria

State Support and Agency Acceptance: USEPA and FDEP will review and comment on all alternatives.

Community Acceptance: Community acceptance for all alternatives would be established during the comment period. Public education may be required to explain the difference between no action and MNA for the public to understand the difference between alternatives G1 and G2.

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Appendix A

Applicable or Relevant and Appropriate Requirements

Table A-1
Summary of Potential Chemical-Specific ARARs
NAS Pensacola Site 38

Requirements	Status	Requirement Synopsis	Application to the RI/FS
Federal Requirements			
Safe Drinking Water Act MCLs 40 CFR 141.11 - 141.16	Applicable	MCLs have been set for toxic compounds as enforceable standards for public drinking water systems. SMCLs are unenforceable goals regulating the aesthetic quality of drinking water.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below Site 38 are above MCLs and SMCLs.
Safe Drinking Water Act MCLGs 40 CFR 141.50-141.51	Relevant and Appropriate	MCLGs are unenforceable goals under the SDWA.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below Site 38 are above MCLGs.
State Requirements			
Florida Drinking Water Standards, Monitoring, and Reporting Title 62 Chapter 62-550	Applicable	Establishes Primary and Secondary MCLs for drinking water.	The surficial zone of the Sand-and-Gravel-Aquifer is a potential, although unlikely, source of drinking water. Some contaminants in the plume below Site 38 are above the state MCLs and SMCLs.
Florida Soil Cleanup Goals (09-25-95, updated 01-19-96)	To Be Considered	Establishes soil cleanup limits for Florida	Should be considered when setting remediation objectives. The goals are not promulgated.
Florida Ground Water Guidance Concentrations (FGGC)	To Be Considered	Establishes guidance concentrations for parameters lacking numerical standards.	Some compounds that affect drinking water quality do not have legislated clean-up standards.
Federal Requirements			
Executive Order 11988 Floodplain Management Policy	To Be Considered	Establishes guidelines for activities conducted within a 100-year floodplain.	Site 38 is located within a 100-year floodplain; however, Executive Order sets forth policy and is not enforceable.
National Environmental Policy Act 40 CFR Part 6, Appendix A	Applicable	Sets forth EPA policy carrying out the provisions of Executive Order 11988, Floodplain Management Policy, and Executive Order 11990, Wetlands Protection Policy.	Site 38 is located within a 100-year flood. Remediation activities may disturb these areas.
Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) 40 CFR 6.302	Applicable	Requires actions to protect fish and wildlife from actions modifying streams or areas affecting streams including floodplain areas.	Site 38 is located within a 100-year flood. Remediation activities may disturb these areas.
RCRA Location Requirements 40 CFR 264.18	Relevant and Appropriate	Sets forth minimum requirements for design, construction, and operation of a facility where treatment, storage, or disposal of hazardous waste will be within a 100-year floodplain.	Treatment, disposal, and storage of hazardous materials may take place during remediation of the site. Some wastes are within the 100-year floodplain.

Table A-1
Summary of Potential Chemical-Specific ARARs
NAS Pensacola Site 38

Requirements	Status	Requirement Synopsis	Application to the RI/FS
State Requirements			
Florida Hazardous Waste Rules Title 62 Chapter 62-730	Relevant and Appropriate	Sets forth minimum requirements for design, construction, and operation of a facility where treatment, storage, or disposal of hazardous waste will be within a 100-year floodplain.	Treatment, disposal, and storage of hazardous wastes may take place during remediation of the site. Site 38 is in the 100-year floodplain.
Federal Requirements			
RCRA Identification of Hazardous Waste 40 CFR 261	Applicable	Criteria for identifying solid wastes subject to regulation as hazardous waste under RCRA.	Suspected hazardous wastes at Site 38 should be identified as RCRA hazardous waste or non-hazardous waste prior to remedial activities.
RCRA Generator Standards 40 CFR 262	Applicable	Establishes standards for generators of RCRA hazardous waste(s).	Generation and storage of RCRA hazardous waste may occur at Site 38 during remediation.
RCRA Facility Standards 40 CFR 265 Subparts C and D	Relevant and Appropriate	Establishes standards for the safe management of RCRA hazardous waste(s).	RCRA hazardous wastes may handled during remediation.
RCRA Storage Requirements 40 CFR 265 Subparts I, J, and L	Relevant and Appropriate	Established requirements for hazardous wastes storage.	RCRA hazardous waste may be stored onsite prior to offsite disposal or onsite treatment.
RCRA Land Disposal Restrictions 40 CFR 268	Applicable	Certain classes of waste are restricted from land disposal without acceptable treatment.	Removal of soil from Site 38 for land disposal may trigger the regulation after its effective date for CERCLA wastes on 5/8/93.
Clean Water Act National Pollutant Discharge Elimination System (NPDES) 40 CFR 122, 125, 129, 136	Applicable	Prohibits unpermitted discharge of any pollutant or combination of pollutants. Standards and limitations are established for discharges to waters of the U.S. from any point source. Requirements for best available technology (BAT) to control toxic pollutants, best conventional pollution control technology (BCT) for conventional pollutants, and best management practices (BMP) to prevent releases of toxic pollutants are established.	Remedial actions may include the discharge of treated groundwater, storm water runoff, or other flows to a surface water.
Clean Water Act General Pretreatment Regulations for Existing and New Sources of Pollution 40 CFR 403	Applicable	Establishes the limits for the discharge of pollutants to publicly owned treatment works and the requirement for pretreatment if applicable.	Remedial actions may include the discharge of treated groundwater, runoff, or other flows to a POTW.

Table A-1
Summary of Potential Chemical-Specific ARARs
NAS Pensacola Site 38

Requirements	Status	Requirement Synopsis	Application to the RI/FS
Executive Order 11988 Floodplain Management Policy	To Be Considered	Establishes guidelines for activities conducted within a 100-year floodplain.	Site 38 is within a 100-year floodplain; however, Executive Order sets forth policy and is not enforceable.
National Environmental Policy Act 40 CFR Part 6, Appendix A	Applicable	Sets forth EPA policy carrying out the provisions of Executive Order 11988, Floodplain Management Policy, and Executive Order 11990, Wetlands Protection Policy.	Site 38 is located within a 100-year flood. Remediation activities may disturb these areas.
Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) 40 CFR 6.302	Applicable	Requires actions to protect fish and wildlife from actions modifying streams or areas affecting streams including floodplain areas.	Site 38 is located within a 100-year flood. Remediation activities may disturb these areas.
Department of Transportation Rules for the Transport of Hazardous Substances 49 CFR Parts 107 and 171-179	Applicable	Regulates the labeling, packaging, placarding, and transportation of solid and hazardous wastes offsite.	Remedial actions may include the offsite transport and disposal of solid and hazardous wastes.
RCRA Facility Standards 40 CFR 264	Relevant and Appropriate	Establishes standards for the permitting and operation of RCRA hazardous wastes treatment facilities.	Applicable if remedial actions involve treatment of soils prior to offsite disposal.
Clean Air Act Permits Regulation 40 CFR 72	Relevant and Appropriate	Establishes requirements for major source permitting and operation (VOAs).	Contaminants in groundwater include hazardous air pollutants and volatile organic compounds. Remedial actions may include technologies that have air emissions.
National Emission Standards for Hazardous Air Pollutants (NESHAPS) 40 CFR 61 Subpart F	Relevant and Appropriate	Establishes emissions standards through Maximum Achievable Control Technology and monitoring, testing, and reporting requirements for vinyl chloride in air emission. Standards regulate emissions from specific source categories.	Vinyl chloride is a ground water contaminant. Remedial actions may include technologies that have air emissions.
State Requirements			
Florida Air Pollution Rules — Stationary Sources Title 62 Chapter 62-210-General Requirements Chapter 62-296-Emission Standards	Applicable	Establishes emission standards, emission rates, baseline areas, and source classifications for protection of health and welfare. Identifies new source requirements, tests, and analysis methods.	Remedial actions may include technologies that have air emissions.

Table A-1
Summary of Potential Chemical-Specific ARARs
NAS Pensacola Site 38

Requirements	Status	Requirement Synopsis	Application to the RI/FS
Florida Air Pollution Rules — Operation Permits for Major Sources of Air Pollution Title 62 Chapter 62-213	Relevant and Appropriate	Establishes the operation permit system for major sources of air pollution (Title V sources).	Contaminants in groundwater include hazardous air pollutants and volatile organic compounds. Remedial actions may include technologies that have air emissions.
Florida Air Pollution Rules — Stationary Sources Preconstruction Review Title 62 Chapter 62-212	Relevant and Appropriate	Establishes the general and specific pre-construction review process for those proposed activities for which a air construction permit applies.	Remedial actions may include technologies that have air emissions.
Florida Rules on Permits Title 62 Chapter 62-4	Relevant and Appropriate	Establishes requirements and procedures for all permitting required by the FDEP, and defines anti-degradation requirements.	Requirements may be applicable to site depending upon remedial actions and discharge options selected.
Florida Stormwater Discharge Regulations Title 62 Chapter 62-25	Applicable	Establishes design and performance standards and permit requirements for stormwater discharge facilities.	Remedial actions may impact stormwater discharge patterns at Site 38.
Florida Surface Water Quality Standards Title 62 Chapter 62-301 and 62-302	Applicable	Establishes water quality standards for all waters of the state.	Remedial objectives require protection of surficial water. Remedial actions may impact surficial water bodies if treated waters are discharged under a NPDES permit..
Florida Hazardous Waste Rules Title 62 Chapter 62-730	Relevant and Appropriate	Establishes standards applicable to owners and operators of hazardous waste treatment, storage and disposal facilities.	Applicable if remedial actions involve treatment of soils prior to offsite disposal.
Florida Water Well Permitting and Construction Title 62 Chapter 62-532	Applicable	Establishes local criteria for design and installation of monitoring wells.	Installation of monitoring wells may be a necessary part of site remediation given any alternative.
Florida Hazardous Waste Rules Title 62 Chapter 62-730	Applicable	Establishes standards for generators and transporters of hazardous wastes	Applicable if remedial actions generate and/or transport hazardous wastes.
Florida Hazardous Substance Release Notification Rules Title 62 Chapter 62-150	Applicable	Establishes notification requirements in the event of a hazardous substance release.	May be applicable if a hazardous substance is released in conjunction with remedial activities.
Florida Industrial Waste Water Facilities Title 62 Chapter 62-660	To Be Considered	Establishes the policy to encourage an applicant to study and evaluate treatment alternative techniques and to discuss alternatives with the FDEP.	Applicable if remedial actions generate waste waters to be treated on site prior to discharge to the navigable water ways of the U.S. by an NPDES permit.

Table A-1
Summary of Potential Chemical-Specific ARARs
NAS Pensacola Site 38

Requirements	Status	Requirement Synopsis	Application to the RI/FS
Florida Water Quality Based Effluent Limitations Title 62 Chapter 62-650	Relevant and Appropriate	Establishes the requirements for the characterization of the effluent to be discharged from by an effected discharger.	Applicable if remedial actions generate waste waters to be treated on site prior to discharge to the navigable water ways of the U.S. by an NPDES permit.
Florida Pretreatment Requirements for Existing and New Sources of Pollution Title 62 Chapter 62-625	Applicable	Establishes the requirements for pretreatment of waste waters prior to discharge to a publicly owned treatment works (POTW).	Applicable if remedial actions generate waste waters to be treated on site prior to discharge to the POTW.
Florida Waste Water Facility Permitting Title 62 Chapter 62-620	Applicable	Establishes the procedure to obtain a permit to construct, modify, or operate a domestic or industrial waste water facility.	Applicable if remedial actions generate waste waters to be treated on site prior to discharge to the navigable water ways of the U.S.

Appendix B

Soil and Groundwater Reference Concentrations

Table B-1 Reference Soil Concentrations (All results in mg/kg)			
Parameter	**RSCTL**	**Mean Concentration**	**Reference Concentration**
Aluminum	72,000	1,916.68	3,833.36
Antimony	26	4.74	9.49
Arsenic	0.8	0.78	***1.56***
Barium	110	2.32	4.63
Beryllium	120	0.21	0.41
Cadmium	75	0.50	1.00
Calcium	NS	456.18	912.37
Chromium	210	3.07	6.13
Cobalt	4,700	0.93	1.87
Copper	110	2.87	5.74
Cyanide	30	0.26	0.52
Iron	23,000	1,372.50	2,745.0
Lead	400	3.66	7.32
Magnesium	NS	66.67	133.33
Manganese	1,600	10.68	21.36
Mercury	3.4	0.05	0.10
Nickel	110	3.19	6.38
Potassium	NS	230.33	460.67
Selenium	390	0.31	0.62
Silver	390	1.03	2.07
Sodium	NS	53.93	107.85
Thallium	5.2	0.41	0.82
Vanadium	15	2.91	5.83
Zinc	23,000	8.43	16.87

Notes:

mg/kg = milligrams per kilogram
RSCTL = Residential Soil Cleanup Target Level
Bold Italics = The reported value exceeds the RSCTL
NS = No standard established

Table B-2 Reference Groundwater Concentrations (All results in µg/L)			
Parameter	**GC**	**Mean Concentration**	**Reference Concentration**
Aluminum	200	***1,941.4***	***3,882.8***
Antimony	6	***15.1***	***30.2***
Arsenic	50	1.4	2.8
Barium	2000	6.6	13.2
Beryllium	4	0.55	1.1
Cadmium	5	1.7	3.4
Calcium	NS	8,780.0	17,560.0
Chromium	100	17.5	35.0
Cobalt	420	2.05	4.1
Copper	1000	8.1	16.2
Iron	300	***853.9***	***1,707.8***
Lead	15	0.8	1.6
Magnesium	NS	1,436.3	2,872.6
Manganese	50	11.0	22.0
Mercury	2	0.1	0.2
Nickel	100	19.95	39.9
Potassium	NS	6,083.8	12,167.6
Selenium	50	1.95	3.9
Silver	100	2.0	4.0
Sodium	160,000	9,172.5	18,345.0
Thallium	2	1.8	***3.6***
Vanadium	49	4.8	9.6
Zinc	5000	76.60	153.20

Notes:

µg/L = Micrograms per liter
GCTL = Groundwater Criteria
Bold Italics = The reported value exceeds the GC
NS = No standard established

Appendix C

Analytical Data Comparisons To Soil Cleanup Target Levels

IWTP Line Data

Surface Soil

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Aluminum			72,000	216,000	NA	NA	***
	036S073C02	297.00					
	036S074C02	649.00					
	036S074N02	2030.00					
	036S074W02	4500.00					
	036S075C02	1330.00 J					
	036S075E02	1440.00 J					
	036S076C02	3130.00 J					
	036S076E02	388.00 J					
	036S076S02	409.00 J					
	036S076W02	200.00 J					
	036S077C02	273.00					
	036S077N02	17.20 J					
	036S077S02	1710.00					
	036S077W02	890.00 J					
	036S078C02	524.00					
	036S078S02	1150.00					
	036S078W02	5010.00					
	036S079C02	82.20					
	036S079W02	963.00					
	036S080C02	292.00					
	036S080S02	1100.00					
	036S081C02	1920.00					
	036S081W02	44.70					
Antimony			26	78	240	720	5
	036S074C02	1.80 J					
	036S077S02	2.60 J					
	036S080S02	2.70 J					
Arsenic	*Note: RC = 1.56 mg/kg		0.8	2.4	3.7	11.1	29
	036S073C02	0.63 J					
	036S074C02	1.20	X				
	036S074N02	6.40	X	X	X		
	036S074W02	3.60	X	X			
	036S075C02	0.85 J	X				
	036S075E02	5.10 J	X	X	X		
	036S076C02	2.00 J	X				
	036S076E02	0.46 J					
	036S076S02	1.30 J	X				
	036S076W02	0.70 J					
	036S077C02	0.33 J					
	036S077S02	1.30 J	X				
	036S077W02	0.91 J	X				
	036S078C02	0.90 J	X				
	036S078E02	3.20 J	X	X			
	036S078S02	1.10 J	X				
	036S078W02	0.21 J					
	036S080C02	1.30 J	X				
	036S080S02	0.47 J					
	036S081C02	0.72 J					

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Barium			110	NA	87,000	261,000	1,600
	036S073C02	11.80 J					
	036S074C02	23.30 J					
	036S074N02	102.00					
	036S074W02	41.60					
	036S075C02	17.00 J					
	036S075E02	62.50					
	036S076C02	44.60					
	036S076E02	6.80 J					
	036S076S02	13.40 J					
	036S076W02	4.50 J					
	036S077C02	11.50 J					
	036S077N02	0.37 J					
	036S077S02	20.70 J					
	036S077W02	9.50 J					
	036S078C02	14.00 J					
	036S078E02	21.50 J					
	036S078S02	19.90 J					
	036S078W02	2.70 J					
	036S079C02	1.70 J					
	036S079W02	28.80 J					
	036S080C02	20.50 J					
	036S080S02	28.10 J					
	036S081C02	10.70 J					
	036S081W02	0.54 J					
Beryllium			120	360	800	2,400	63
	036S074C02	0.12 J					
	036S074N02	0.31 J					
	036S076C02	0.28 J					
Cadmium			75	NA	1,300	3,900	8
	036S074C02	0.64					
	036S074N02	1.20					
	036S075C02	1.70					
	036S075E02	2.60					
	036S076C02	3.20					
	036S076S02	0.97					
	036S076W02	4.40					
Calcium			Not Available				
	036S073C02	422.00 J					
	036S074C02	1670.00					
	036S074N02	1980.00					
	036S074W02	60400.00					
	036S075C02	995.00					
	036S075E02	1140.00					
	036S076C02	11000.00					
	036S076E02	1600.00					
	036S076S02	509.00 J					
	036S076W02	308.00 J					
	036S077C02	5210.00					

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S077N02	20.30 J					
	036S077S02	26300.00					
	036S077W02	551.00 J					
	036S078C02	3490.00					
	036S078E02	1160.00					
	036S078S02	1930.00					
	036S078W02	593.00 J					
	036S079C02	227.00 J					
	036S079W02	3670.00					
	036S080C02	859.00					
	036S080S02	17000.00					
	036S081C02	7920.00					
	036S081W02	30.60 J					
Chromium	(use Chromium VI SCTL)		210	630	420	1,260	38
	036S073C02	1.70					
	036S074C02	2.40					
	036S074N02	6.70					
	036S074W02	8.70					
	036S075C02	29.50 J					
	036S075E02	6.60 J					
	036S076C02	4.40 J					
	036S076E02	1.10 J					
	036S076S02	3.10 J					
	036S076W02	8.80 J					
	036S077C02	1.70					
	036S077N02	5.10					
	036S077S02	18.50					
	036S077W02	2.10					
	036S078C02	2.20					
	036S078S02	8.80					
	036S078W02	8.60					
	036S079W02	7.50					
	036S080C02	2.10					
	036S080S02	3.40					
	036S081C02	12.30					
Cobalt			4,700	14,100	110,000	330,000	***
	036S073C02	0.56 J					
	036S074N02	5.30 J					
	036S074W02	1.20 J					
	036S075C02	0.25 J					
	036S075E02	1.50 J					
	036S076C02	0.41 J					
	036S076S02	0.35 J					
	036S077C02	0.35 J					
	036S077S02	0.38 J					
	036S078E02	0.75 J					
	036S078S02	0.78 J					
	036S080S02	0.49 J					
Copper			110	NA	76,000	228,000	***

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S073C02	21.40					
	036S074C02	15.90					
	036S074N02	607.00	X				
	036S074W02	117.00	X				
	036S075C02	12.30					
	036S075E02	391.00	X				
	036S076C02	28.90					
	036S076E02	32.60					
	036S076S02	12.70					
	036S076W02	16.20					
	036S077C02	16.10					
	036S077N02	0.79 J					
	036S077S02	2.60 J					
	036S077W02	4.40					
	036S078C02	15.60					
	036S078E02	264.00	X				
	036S078S02	75.90					
	036S078W02	1.20 J					
	036S079C02	13.60					
	036S079W02	5.70					
	036S080C02	8.00					
	036S080S02	5340.00	X				
	036S081C02	17.60					
	036S081W02	1.70 J					
Cyanide (CN)			30	NA	39,000	117,000	40
	036S074N02	0.22 J					
	036S075C02	0.23 J					
	036S076S02	0.48					
	036S078E02	0.66					
Iron			23,000	69,000	480,000	1,440,000	***
	036S073C02	763.00					
	036S074C02	629.00					
	036S074N02	24900.00	X				
	036S074W02	3880.00					
	036S075C02	706.00 J					
	036S075E02	4380.00 J					
	036S076C02	2100.00 J					
	036S076E02	287.00 J					
	036S076S02	598.00 J					
	036S076W02	504.00 J					
	036S077C02	993.00 J					
	036S077N02	50.20 J					
	036S077S02	1130.00					
	036S077W02	1250.00 J					
	036S078C02	1070.00					
	036S078S02	1560.00					
	036S078W02	6130.00					
	036S079C02	519.00 J					
	036S079W02	342.00 J					

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S080C02	285.00					
	036S080S02	3800.00					
	036S081C02	3010.00 J					
	036S081W02	70.30					
Lead			400	1,200	920	2,760	***
	036S073C02	103.00					
	036S074C02	146.00					
	036S074N02	949.00	X		X		
	036S074W02	408.00	X				
	036S075C02	56.50 J					
	036S075E02	579.00 J	X				
	036S076C02	104.00 J					
	036S076E02	73.50 J					
	036S076S02	128.00 J					
	036S076W02	32.70 J					
	036S077C02	91.10 J					
	036S077N02	2.00 J					
	036S077S02	6.60 J					
	036S077W02	35.30 J					
	036S078C02	74.60					
	036S078S02	120.00					
	036S078W02	2.50 J					
	036S079C02	16.60 J					
	036S079W02	29.00 J					
	036S080C02	114.00					
	036S080S02	139.00					
	036S081C02	54.50 J					
	036S081W02	12.00					
Magnesium			Not Available				
	036S073C02	71.30 J					
	036S074C02	237.00 J					
	036S074N02	612.00 J					
	036S074W02	14400.00					
	036S075C02	165.00 J					
	036S075E02	269.00 J					
	036S076C02	477.00 J					
	036S076E02	150.00 J					
	036S076S02	37.80 J					
	036S076W02	31.30 J					
	036S077C02	170.00 J					
	036S077S02	5100.00					
	036S077W02	114.00 J					
	036S078C02	164.00 J					
	036S078E02	303.00 J					
	036S078S02	382.00 J					
	036S078W02	157.00 J					
	036S079C02	17.70 J					
	036S079W02	669.00 J					
	036S080C02	77.60 J					

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S080S02	478.00 J					
	036S081C02	197.00 J					
	036S081W02	9.00 J					
Manganese			1,600	4,800	22,000	66,000	***
	036S073C02	13.20					
	036S074C02	59.90					
	036S074N02	185.00					
	036S074W02	232.00					
	036S075C02	97.50					
	036S075E02	63.50					
	036S076C02	184.00					
	036S076E02	9.50					
	036S076S02	30.30					
	036S076W02	8.60					
	036S077C02	37.30 J					
	036S077N02	2.10 J					
	036S077S02	71.50 J					
	036S077W02	19.80					
	036S078C02	20.10					
	036S078E02	25.30					
	036S078S02	84.80					
	036S078W02	6.70					
	036S079C02	8.30 J					
	036S079W02	47.50 J					
	036S080C02	18.60					
	036S080S02	20.90					
	036S081C02	39.30 J					
	036S081W02	2.90					
Mercury			3.4	10.2	26	78	2.1
	036S074C02	0.15					
	036S074N02	0.44					
	036S074W02	0.07					
	036S075E02	0.34					
	036S076C02	0.15					
	036S076S02	0.09					
	036S078C02	0.06					
	036S078E02	0.10					
	036S078S02	0.09					
	036S080S02	0.79					
Nickel			110	NA	28,000	84,000	130
	036S073C02	1.80 J					
	036S074N02	10.70					
	036S074W02	3.70 J					
	036S075C02	3.70 J					
	036S075E02	8.00					
	036S076C02	1.00 J					
	036S077S02	2.00 J					
	036S078C02	2.40 J					
	036S078E02	2.90 J					

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S079W02	2.00 J					
	036S080S02	2.00 J					
Potassium			Not Available				
	036S074C02	94.20 J					
	036S074N02	127.00 J					
	036S074W02	47.20 J					
	036S075C02	40.30 J					
	036S075E02	99.10 J					
	036S076C02	484.00 J					
	036S076E02	43.90 J					
	036S076S02	31.70 J					
	036S077S02	125.00 J					
	036S077W02	35.70 J					
	036S078C02	103.00 J					
	036S078E02	84.50 J					
	036S078S02	86.80 J					
	036S078W02	43.90 J					
	036S079W02	223.00 J					
	036S080S02	115.00 J					
	036S081C02	54.90 J					
Selenium			390	1,170	10,000	30,000	5
	036S076E02	0.18 J					
	036S076S02	0.15 J					
	036S078E02	0.19 J					
	036S078W02	4.10 J					
	036S080C02	0.22 J					
Sodium			Not Available				
	036S073C02	65.40 J					
	036S074C02	22.50 J					
	036S074N02	46.80 J					
	036S074W02	90.70 J					
	036S075C02	20.20 J					
	036S075E02	38.70 J					
	036S076C02	110.00 J					
	036S076E02	19.10 J					
	036S076S02	15.60 J					
	036S076W02	9.30 J					
	036S077C02	12.90 J					
	036S077N02	8.10 J					
	036S077S02	36.00 J					
	036S077W02	18.90 J					
	036S078C02	27.10 J					
	036S078E02	29.70 J					
	036S078S02	77.70 J					
	036S078W02	16.30 J					
	036S079C02	10.60 J					
	036S079W02	45.70 J					
	036S080C02	29.80 J					
	036S080S02	76.00 J					

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S081C02	59.60 J					
	036S081W02	8.10 J					
Thallium*			5.2	15.6	67	201	Not Available
	036S077W02	0.28 J					
	036S078E02	0.38 J					
Vanadium			15	NA	7,400	22,200	980
	036S073C02	1.50 J					
	036S074C02	1.70 J					
	036S074N02	9.90					
	036S074W02	7.30 J					
	036S075C02	1.80 J					
	036S075E02	4.40 J					
	036S076C02	4.10 J					
	036S076E02	0.55 J					
	036S076S02	1.10 J					
	036S077C02	1.00 J					
	036S077N02	0.51 J					
	036S077S02	2.60 J					
	036S077W02	3.00 J					
	036S078C02	1.80 J					
	036S078E02	1.60 J					
	036S078S02	2.00 J					
	036S078W02	15.10 J	X				
	036S080C02	1.00 J					
	036S080S02	3.00 J					
	036S081C02	6.60 J					
Zinc			23,000	69,000	560,000	1,680,000	6,000
	036S073C02	32.10					
	036S074C02	63.90					
	036S074N02	1180.00					
	036S074W02	186.00					
	036S075C02	90.90					
	036S075E02	491.00					
	036S076C02	77.20					
	036S076E02	27.80					
	036S076S02	47.90					
	036S076W02	29.70					
	036S077C02	27.40					
	036S077N02	1.20 J					
	036S077S02	10.90					
	036S077W02	16.30					
	036S078C02	46.80					
	036S078E02	76.30 J					
	036S078S02	102.00					
	036S078W02	0.80 J					
	036S079C02	6.60					
	036S079W02	10.10					
	036S080C02	59.00					
	036S080S02	92.60					

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S081C02	36.90					
	036S081W02	2.40 J					

Notes:
All concentrations and criteria are in milligrams per kilogram (mg/kg).
***Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF PESTICIDE/PCB DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
4,4'-DDD				4,600	13,800	18,000	54,000	4,000
	036S078W02	3.50	J					
4,4'-DDE				3,300	9,900	13,000	39,000	18,000
	036S074W02	12.00						
	036S078W02	8.10						
4,4'-DDT				3,300	9,900	13,000	39,000	11,000
	036S075C02	1.30	J					
	036S078W02	17.00						
alpha-Chlordane	(use Chlordane SCTL)			3,100	9,300	12,000	36,000	9,600
	036S078W02	0.46	J					
Aroclor-1260	(use PCB mixture SCTL)			500	1,500	2,100	6,300	17,000
	036S080C02	25.00	J					
Dieldrin				70	210	300	900	4
	036S075E02	1.40	J					
	036S078E02	0.94	J					
	036S078W02	15.00	J					X
Endrin				21,000	63,000	340,000	1,020,000	1,000
	036S074C02	1.40	J					
	036S075C02	2.70	J					
	036S075E02	9.90						
	036S076C02	1.80	J					
	036S076E02	3.40						
	036S078E02	7.80						
	036S078W02	3.30	J					
Heptachlor epoxide				100	300	400	1,200	600
	036S075E02	0.58	J					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Acenaphthylene			1,100,000	3,300,000	11,000,000	33,000,000	27,000
	036S074W02	240.00 J					
	036S077W02	370.00					
Anthracene			18,000,000	54,000,000	260,000,000	780,000,000	2,500,000
	036S077W02	180.00 J					
Benzo(a)anthracene			1,400	4,200	5,000	15,000	3,200
	036S073C02	210.00 J					
	036S074C02	270.00 J					
	036S074W02	280.00 J					
	036S075C02	360.00 J					
	036S077W02	370.00					
Benzo(a)pyrene			100	300	500	1,500	8,000
	036S073C02	210.00 J	X				
	036S074C02	270.00 J	X				
	036S074W02	350.00 J	X	X			
	036S075C02	310.00 J	X	X			
	036S076W02	180.00 J	X				
	036S077W02	510.00	X	X	X		
Benzo(b)fluoranthene			1,400	4,200	4,800	14,400	10,000
	036S073C02	450.00					
	036S074C02	530.00					
	036S074W02	600.00					
	036S076W02	410.00					
	036S077W02	870.00					
	036S080S02	200.00 J					
Benzo(g,h,i)perylene			2,300,000	6,900,000	41,000,000	123,000,000	32,000,000
	036S077W02	410.00					
Chrysene			140,000	420,000	450,000	1,350,000	77,000
	036S073C02	210.00 J					
	036S074C02	290.00 J					
	036S074W02	290.00 J					
	036S075C02	330.00 J					
	036S077W02	330.00 J					
Fluoranthene			2,900,000	8,700,000	48,000,000	144,000,000	1,200,000
	036S073C02	300.00 J					
	036S074C02	450.00					
	036S074W02	360.00 J					
	036S075C02	340.00 J					
	036S077W02	300.00 J					
Indeno(1,2,3-cd)pyrene			1,500	4,500	5,300	15,900	28,000
	036S077W02	380.00					
Phenanthrene			2,000,000	6,000,000	30,000,000	90,000,000	250,000
	036S074C02	210.00 J					
Pyrene			2,200,000	6,600,000	37,000,000	111,000,000	880,000
	036S073C02	310.00 J					
	036S074C02	450.00					
	036S074W02	410.00					
	036S075C02	500.00					
	036S077W02	430.00					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

ITWP LINE DATA - SURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Acetone			780,000	2,340,000	5,500,000	16,500,000	2,800
	036S074C02	840.00 J					
	036S074N02	35.00					
	036S074W02	490.00					
	036S078C02	500.00 J					
	036S078S02	8600.00					X
	036S078W02	95.00					
	036S080C02	200.00					
	036S080S02	35.00					
	036S081C02	83.00					
Methylene chloride			16,000	48,000	23,000	69,000	20
	036S073C02	730.00 J					X
	036S074C02	4.00 J					
	036S076E02	6.00 J					
	036S077C02	6.00 J					
	036S077S02	6.00 J					
	036S078C02	6.00 J					
	036S078E02	4.00 J					
	036S079C02	4.00 J					
	036S079W02	5.00 J					
	036S080S02	4.00 J					
Tetrachloroethene			8,900	26,700	17,000	51,000	30
	036S076S02	3.00 J					
Toluene			380,000	1,140,000	2,600,000	7,800,000	500
	036S074C02	2.00 J					
	036S078C02	3.00 J					
Trichloroethene			6,000	18,000	8,500	25,500	30
	036S076C02	10.00 J					
	036S076S02	8.00 J					
	036S078C02	5.00 J					
	036S080S02	14.00					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

IWTP Line Data

Subsurface Soil

ITWP LINE DATA - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Aluminum				72,000	216,000	NA	NA	***
	036S073C04	366.00						
	036S074C04	1420.00						
	036S074N04	29.40						
	036S074W04	698.00						
	036S075C04	514.00						
	036S075E06	959.00	J					
	036S076E04	97.80	J					
	036S076W04	994.00	J					
	036S077C04	2500.00						
	036S077N04	15.70	J					
	036S077S04	22.80	J					
	036S077W04	755.00						
	036S078C04	4330.00						
	036S078E04	25.80	J					
	036S078W04	36.30						
	036S079C04	17.30	J					
	036S079W04	31.00	J					
	036S081C04	124.00						
	036S081S03	14.00	J					
	036S081W04	111.00						
Antimony				26	78	240	720	5
	036S078C04	2.20	J					
Arsenic	*Note: RC = 1.56 mg/kg			0.8	2.4	3.7	11.1	29
	036S073C04	0.55	J					
	036S074C04	2.00		X				
	036S074N04	0.16	J					
	036S074W04	0.22	J					
	036S075E06	2.60	J	X	X			
	036S076E04	0.32	J					
	036S076W04	1.30	J	X				
	036S077C04	1.30	J	X				
	036S077W04	0.71	J					
	036S078C04	0.43	J					
	036S078W04	0.22	J					
Barium				110	NA	87,000	261,000	1,600
	036S073C04	7.30	J					
	036S074C04	29.60						
	036S074N04	11.90	J					
	036S074W04	19.50	J					
	036S075C04	11.20	J					
	036S075E06	37.60						
	036S076E04	2.50	J					
	036S076W04	23.70	J					
	036S077C04	53.50						
	036S077N04	0.28	J					
	036S077S04	0.65	J					
	036S077W04	11.80	J					
	036S078C04	18.70	J					

ITWP LINE DATA - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S078E04	1.40	J					
	036S078W04	1.10	J					
	036S079C04	0.34	J					
	036S079W04	0.76	J					
	036S081C04	1.10	J					
	036S081S03	0.71	J					
	036S081W04	0.30	J					
Beryllium				120	360	800	2,400	63
	036S077C04	0.38	J					
Cadmium				75	NA	1,300	3,900	8
	036S074C04	0.34	J					
	036S075C04	4.90						
	036S076W04	4.90						
	036S077C04	1.30						
	036S078C04	0.83						
Calcium				Not Available				
	036S073C04	490.00	J					
	036S074C04	22400.00						
	036S074N04	28.90	J					
	036S074W04	9010.00						
	036S075C04	1520.00						
	036S075E06	2120.00						
	036S076E04	891.00						
	036S076W04	2210.00						
	036S077C04	14200.00						
	036S077N04	9.60	J					
	036S077S04	30.20	J					
	036S077W04	3830.00						
	036S078C04	21600.00						
	036S078E04	98.10	J					
	036S078W04	32.30	J					
	036S079C04	16.80	J					
	036S079W04	96.90	J					
	036S081C04	138.00	J					
	036S081S03	20.60	J					
	036S081W04	35.80	J					
Chromium	(use Chromium VI SCTL)			210	630	420	1,260	38
	036S073C04	1.40	J					
	036S074C04	2.00						
	036S074N04	1.30						
	036S074W04	1.50	J					
	036S075C04	9.90						
	036S075E06	10.90	J					
	036S076E04	1.50	J					
	036S076W04	11.10	J					
	036S077C04	9.90						
	036S077N04	3.00						
	036S077S04	5.50						
	036S077W04	2.00						

ITWP LINE DATA - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S078C04	5.70	J					
	036S078W04	0.77	J					
	036S079C04	1.20	J					
	036S079W04	0.76	J					
	036S081C04	7.20						
	036S081S03	1.10	J					
Cobalt				4,700	14,100	110,000	330,000	***
	036S073C04	0.37	J					
	036S074C04	0.70	J					
	036S074W04	0.41	J					
	036S075E06	10.00	J					
	036S076W04	0.34	J					
	036S077C04	0.83	J					
	036S077W04	0.49	J					
	036S078C04	0.51	J					
Copper				110	NA	76,000	228,000	***
	036S073C04	27.10						
	036S074C04	31.50						
	036S074N04	1.20	J					
	036S074W04	10.40						
	036S075C04	23.80						
	036S075E06	129.00		X				
	036S076E04	79.70						
	036S076W04	20.30						
	036S077C04	26.00						
	036S077N04	5.20						
	036S077S04	0.86	J					
	036S077W04	5.70						
	036S078C04	8.00						
	036S078E04	3.70						
	036S078W04	2.40						
	036S079C04	0.98	J					
	036S079W04	0.44	J					
	036S081C04	0.46	J					
	036S081S03	2.50	J					
Cyanide (CN)				30	NA	39,000	117,000	40
	036S075E06	0.48	J					
	036S076E04	0.21	J					
Iron				23,000	69,000	480,000	1,440,000	***
	036S073C04	856.00						
	036S074C04	2230.00						
	036S074N04	106.00						
	036S074W04	893.00						
	036S075C04	616.00	J					
	036S075E06	32900.00	J	X				
	036S076E04	368.00	J					
	036S076W04	1190.00	J					
	036S077C04	2010.00	J					
	036S077N04	71.40	J					

ITWP LINE DATA - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S077S04	68.00	J					
	036S077W04	795.00						
	036S078C04	2800.00						
	036S078E04	87.70	J					
	036S078W04	44.40						
	036S079C04	25.10						
	036S079W04	33.10	J					
	036S081C04	212.00	J					
	036S081S03	26.00						
	036S081W04	84.40						
Lead				400	1,200	920	2,760	***
	036S073C04	160.00						
	036S074C04	214.00						
	036S074N04	92.10						
	036S074W04	226.00						
	036S075C04	62.40	J					
	036S075E06	62.10	J					
	036S076E04	44.30	J					
	036S076W04	113.00	J					
	036S077C04	160.00	J					
	036S077N04	0.24	J					
	036S077S04	0.95	J					
	036S077W04	31.40						
	036S078C04	49.20						
	036S078E04	15.70	J					
	036S078W04	13.00						
	036S079C04	0.26	J					
	036S079W04	0.38	J					
	036S081C04	6.80	J					
	036S081S03	1.30						
	036S081W04	2.00						
Magnesium				Not Available				
	036S073C04	98.80	J					
	036S074C04	412.00	J					
	036S074N04	6.20	J					
	036S074W04	911.00	J					
	036S075C04	201.00	J					
	036S075E06	379.00	J					
	036S076E04	94.40	J					
	036S076W04	109.00	J					
	036S077C04	2050.00						
	036S077W04	160.00	J					
	036S078C04	662.00	J					
	036S078E04	8.60	J					
	036S078W04	4.40	J					
	036S079C04	4.20	J					
	036S079W04	10.90	J					
	036S081C04	13.00	J					
	036S081S03	4.30	J					

ITWP LINE DATA - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S081W04	4.70	J					
Manganese				1,600	4,800	22,000	66,000	***
	036S073C04	16.40						
	036S074C04	69.10						
	036S074N04	2.80						
	036S074W04	26.40						
	036S075C04	24.40	J					
	036S075E06	987.00						
	036S076E04	21.30						
	036S076W04	37.30						
	036S077C04	154.00	J					
	036S077N04	0.47	J					
	036S077S04	4.10	J					
	036S077W04	18.00						
	036S078C04	32.80						
	036S078E04	3.40						
	036S078W04	1.40						
	036S079C04	0.58	J					
	036S079W04	0.89	J					
	036S081C04	2.80	J					
	036S081S03	0.25	J					
	036S081W04	0.35	J					
Mercury				3.4	10.2	26	78	2.1
	036S073C04	0.14						
	036S075C04	0.09						
	036S076E04	0.08						
	036S076W04	0.14						
	036S077C04	0.09						
	036S077W04	0.15						
Nickel				110	NA	28,000	84,000	130
	036S074C04	1.50	J					
	036S075E06	16.10						
	036S077C04	2.40	J					
Potassium				Not Available				
	036S074C04	158.00	J					
	036S075C04	65.70	J					
	036S075E06	211.00	J					
	036S076E04	39.20	J					
	036S076W04	26.10	J					
	036S077C04	366.00	J					
	036S077W04	60.30	J					
	036S078C04	167.00	J					
	036S078W04	15.80	J					
	036S079C04	39.50	J					
	036S081S03	40.40	J					
Selenium				390	1,170	10,000	30,000	5
	036S074N04	0.17	J					
	036S077C04	0.27	J					
Sodium				Not Available				

ITWP LINE DATA - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	036S073C04	29.00	J					
	036S074C04	222.00	J					
	036S074N04	14.60	J					
	036S074W04	45.70	J					
	036S075C04	30.20	J					
	036S075E06	81.80	J					
	036S076E04	11.30	J					
	036S076W04	18.30	J					
	036S077C04	83.30	J					
	036S077N04	7.80	J					
	036S077S04	8.30	J					
	036S077W04	15.50	J					
	036S078C04	189.00	J					
	036S078E04	9.00	J					
	036S078W04	6.00	J					
	036S079C04	4.80	J					
	036S079W04	10.80	J					
	036S081C04	10.70	J					
	036S081S03	10.80	J					
	036S081W04	8.00	J					
Thallium*				5.2	15.6	67	201	Not Available
	036S077S04	0.46	J					
	036S079W04	0.47	J					
	036S081C04	0.47	J					
Vanadium				15	NA	7,400	22,200	980
	036S073C04	0.84	J					
	036S074C04	3.20	J					
	036S074W04	1.60	J					
	036S075E06	21.50		X				
	036S076W04	2.30	J					
	036S077C04	2.50	J					
	036S077S04	0.56						
	036S077W04	2.10	J					
	036S078C04	6.90	J					
	036S078W04	0.30	J					
Zinc				23,000	69,000	560,000	1,680,000	6,000
	036S073C04	33.00						
	036S074C04	81.10						
	036S074N04	1.70	J					
	036S074W04	62.30						
	036S075C04	44.00						
	036S075E06	29.90						
	036S076E04	56.40						
	036S076W04	53.40						
	036S077C04	95.30						
	036S077N04	2.00	J					
	036S077S04	2.50	J					
	036S077W04	23.80						
	036S078C04	28.40						

ITWP LINE DATA - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

				Residential Exposure		Industrial Exposure		Leachability Based On
Parameter	Sample ID	Result		SCTL	3x SCTL	SCTL	3x SCTL	Groundwater Criteria
	036S078E04	4.80						
	036S078W04	15.30						
	036S079C04	1.50	J					
	036S079W04	2.50	J					
	036S081C04	2.80	J					
	036S081S03	3.00	J					
	036S081W04	0.87	J					

Notes:
All concentrations and criteria are in milligrams per kilogram (mg/kg).
***Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.
* - Region 9 Preliminary Remedial Goals (October 2002) were used for SCTLs.

ITWP LINE DATA - SUBSURFACE SOIL
COMPARISON OF PESTICIDE/PCB DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
4,4'-DDD				4,600	13,800	18,000	54,000	4,000
	036S074C04	11.00	J					
4,4'-DDE				3,300	9,900	13,000	39,000	18,000
	036S074C04	88.00	J					
	036S077C04	140.00	J					
4,4'-DDT				3,300	9,900	13,000	39,000	11,000
	036S074C04	63.00	J					
	036S077C04	20.00						
Aroclor-1254				500	1,500	2,100	6,300	17,000
	036S077C04	30.00	J					
Aroclor-1260				500	1,500	2,100	6,300	17,000
	036S077C04	42.00						
Dieldrin				70	210	300	900	4
	036S078C04	1.60	J					
Endosulfan I	(use Endosulfan [alpha+beta] SCTL)			410,000	1,230,000	6,700,000	20,100,000	3,800
	036S074C04	2.00	J					
Endrin				21,000	63,000	340,000	1,020,000	1,000
	036S074C04	13.00						
	036S075E06	3.40	J					
	036S076W04	0.70	J					
	036S078C04	1.10	J					
Heptachlor epoxide				100	300	400	1,200	600
	036S074C04	1.00	J					
	036S074W04	2.60	J					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

IWTP LINE DATA - SUBSURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Acenaphthylene			1,100,000	3,300,000	11,000,000	33,000,000	27,000
	036S074C04	1800.00					
Anthracene			18,000,000	54,000,000	260,000,000	780,000,000	2,500,000
	036S074C04	1000.00 J					
Benzo(a)anthracene			1,400	4,200	5,000	15,000	3,200
	036S074C04	4500.00	X	X			X
Benzo(a)pyrene			100	300	500	1,500	8,000
	036S074C04	4500.00	X	X	X	X	
Benzo(b)fluoranthene			1,400	4,200	4,800	14,400	10,000
	036S073C04	190.00 J					
	036S074C04	8300.00	X	X	X		
Benzo(g,h,i)perylene			2,300,000	6,900,000	41,000,000	123,000,000	32,000,000
	036S074C04	1900.00					
Chrysene			140,000	420,000	450,000	1,350,000	77,000
	036S074C04	4200.00					
Dibenz(a,h)anthracene			100	300	500	1,500	30,000
	036S074C04	800.00 J	X	X	X		
Fluoranthene			2,900,000	8,700,000	48,000,000	144,000,000	1,200,000
	036S074C04	6700.00					
Indeno(1,2,3-cd)pyrene			1,500	4,500	5,300	15,900	28,000
	036S074C04	1700.00	X				
Phenanthrene			2,000,000	6,000,000	30,000,000	90,000,000	250,000
	036S074C04	3100.00					
Pyrene			2,200,000	6,600,000	37,000,000	111,000,000	880,000
	036S074C04	9300.00					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

IWTP LINE DATA - SUBSURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
1,1,1-Trichloroethane				400,000	1,200,000	3,300,000	9,900,000	1,900
	036S075E06	6.00	J					
Acetone				780,000	2,340,000	5,500,000	16,500,000	2,800
	036S073C04	230.00						
	036S074C04	200.00						
	036S074N04	210.00	J					
	036S074W04	61.00						
	036S075E06	160.00						
	036S077W04	22.00						
	036S078C04	94.00						
	036S078W04	38.00						
	036S079C04	11.00						
	036S081C04	23.00						
Methylene chloride				16,000	48,000	23,000	69,000	20
	036S074C04	7.00	J					
	036S077C04	6.00	J					
	036S078C04	5.00	J					
	036S078W04	4.00	J					
	036S079C04	3.00	J					
	036S079W04	5.00	J					
	036S081C04	4.00	J					
Tetrachloroethene				8,900	26,700	17,000	51,000	30
	036S075E06	19.00						
Toluene				380,000	1,140,000	2,600,000	7,800,000	500
	036S073C04	18.00	J					
Trichloroethene				6,000	18,000	8,500	25,500	30
	036S076W04	6.00	J					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

RI Results

Surface Soil

RI RESULTS - SURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
1,1,1-Trichloroethane			400,000	1,200,000	3,300,000	9,900,000	1,900
	038S000701	21.00					
	038S000901	17.00					
	038S001001	240.00					
	038S001201	1.00 J					
	038S001301	5.00 J					
	038S001401	64.00					
	038S001501	5.00 J					
	038S001701	4.00 J					
	038S001801	5.00 J					
	038S001901	5.00 J					
	038S001902	4.00 J					
	038S002801	2.00 J					
1,1-Dichloroethane			290,000	870,000	2,000,000	6,000,000	200
	038S000701	12.00					
	038S000901	4.00 J					
	038S001001	11.00 J					
	038S001401	6.00 J					
1,2-Dichloroethane			500	1,500	700	2,100	10
	038S000501	5.00 J					
	038S001401	27.00 J					X
1,2-Dichloroethene (total)*			19,000	57,000	130,000	390,000	400
	038S000701	56.00					
	038S000901	21.00					
	038S001301	1.00 J					
2-Butanone (MEK)			3,100,000	9,300,000	21,000,000	63,000,000	17,000
	038S000402	4.00 J					
	038S001101	5.00 J					
	038S001401	22.00 J					
	038S001501	6.00 J					
	038S001601	3.00 J					
	038S001901	7.00 J					
	038S001902	10.00 J					
	038S002201	5.00 J					
4-Methyl-2-Pentanone (MIBK)			220,000	660,000	1,500,000	4,500,000	2,600
	038S003201	38.00					
Acetone			780,000	2,340,000	5,500,000	16,500,000	2,800
	038S001001	91.00					
	038S001101	41.00					
	038S001401	76.00					
	038S001501	54.00					
Benzene			1,100	3,300	1,600	4,800	7
	038S000501	3.00 J					
	038S003201	2.00 J					
Carbon tetrachloride			400	1,200	600	1,800	40
	038S000102	2.00 J					
	038S000102	2.00 J					
	038S000102	2.00 J					

RI RESULTS - SURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S000501	2.00 J					
	038S001301	3.00 J					
	038S001801	1.00 J					
	038S002201	1.00 J					
Chlorobenzene			30,000	120,000	200,000	600,000	1,300
	038S001301	1.00 J					
Chloroform			400	1,200	500	1,500	30
	038S000701	3.00 J					
	038S000901	5.00 J					
	038S001301	2.00 J					
	038S001401	47.00 J					X
	038S001501	1.00 J					
Ethylbenzene			1,100,000	3,300,000	8,400,000	25,200,000	600
	038S000102	1.00 J					
	038S000102	1.00 J					
	038S000102	1.00 J					
	038S000501	4.00 J					
	038S001701	1.00 J					
	038S001801	1.00 J					
	038S002201	3.00 J					
	038S002501	1.00 J					
	038S002901	2.00 J					
	038S003201	2.00 J					
Methylene chloride			16,000	48,000	23,000	69,000	20
	038S001801	9.00 J					
Tetrachloroethene			8,900	26,700	17,000	51,000	30
	038S000501	2.00 J					
	038S000701	17.00					
	038S000901	13.00					
	038S001001	94.00					X
	038S001301	43.00					X
	038S001401	370.00					X
	038S001501	8.00 J					
	038S001701	2.00 J					
	038S001801	15.00					
	038S001901	7.00 J					
	038S001902	5.00 J					
	038S002201	1.00 J					
	038S003201	4.00 J					
	038S004202	6.00 J					
Toluene			380,000	1,140,000	2,600,000	7,800,000	500
	038S000102	10.00 J					
	038S000102	10.00 J					
	038S000102	10.00 J					
	038S000402	2.00 J					
	038S000501	27.00					
	038S000701	13.00					
	038S000801	2.00 J					
	038S000901	140.00					

RI RESULTS - SURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S001001	8.00 J					
	038S001201	29.00					
	038S001301	110.00					
	038S001401	29.00 J					
	038S001501	8.00 J					
	038S001601	4.00 J					
	038S001701	16.00 J					
	038S001801	15.00 J					
	038S002201	80.00					
	038S002601	6.00 J					
	038S002801	4.00 J					
	038S002901	10.00 J					
	038S003201	21.00					
	038S003301	2.00 J					
	038S003501	8.00 J					
	038S003701	2.00 J					
	038S004202	21.00					
Trichloroethene			6,000	18,000	8,500	25,500	30
	038S000301	2.00 J					
	038S000701	110.00					X
	038S000901	36.00					X
	038S001001	23.00 J					
	038S001201	17.00					
	038S001301	34.00					X
	038S001401	390.00					X
	038S001501	14.00					
	038S001801	4.00 J					
	038S001901	10.00 J					
	038S001902	6.00 J					
	038S002201	2.00 J					
	038S002901	1.00 J					
	038S004202	9.00 J					
Xylene (Total)			5,900,000	17,700,000	40,000,000	120,000,000	200
	038S001801	16.00 J					
	038S001901	8.00					
	038S002501	3.00 J					
	038S002801	1.00 J					
	038S002901	4.00 J					
	038S003201	7.00 J					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).
* - No SCTL for 1,2-Dichloroethene (total) was listed. The SCTL for cis-1,2-Dichloroethene was used since it was less than the SCTL for trans-1,2-Dichloroethene.

RI RESULTS - SURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
1,2,4-Trichlorobenzene				560,000	1,680,000	7,500,000	22,500,000	5,300
	038S001301	48.00	J					
	038S001401	88.00	J					
1,2-Dichlorobenzene				650,000	1,950,000	4,600,000	13,800,000	17,000
	038S001301	510.00						
	038S001401	610.00						
1,4-Dichlorobenzene				6,000	18,000	9,000	27,000	2,200
	038S001301	53.00	J					
	038S001401	100.00	J					
2,4-Dimethylphenol				910,000	2,730,000	9,800,000	29,400,000	1,700
	038S001001	160.00	J					
	038S001401	380.00						
2-Methylnaphthalene				80,000	240,000	560,000	1,680,000	6,100
	038S001001	100.00	J					
	038S001401	53.00	J					
	038S001701	270.00	J					
2-Methylphenol (o-Cresol)				2,400,000	7,200,000	28,000,000	84,000,000	300
	038S001301	42.00	J					
	038S001401	340.00	J					X
4-Methylphenol (p-Cresol)				250,000	750,000	3,000,000	9,000,000	30
	038S001401	740.00						X
Acenaphthylene				1,100,000	3,300,000	11,000,000	33,000,000	27,000
	038S000102	85.00	J					
	038S002601	89.00	J					
	038S003201	89.00	J					
	038S003401	92.00	J					
Anthracene				18,000,000	54,000,000	260,000,000	780,000,000	2,500,000
	038S002601	100.00	J					
	038S003201	160.00	J					
Benzo(a)anthracene				1,400	4,200	5,000	15,000	3,200
	038S000102	190.00	J					
	038S000701	61.00	J					
	038S001001	70.00	J					
	038S001401	100.00	J					
	038S001901	78.00	J					
	038S002601	140.00	J					
	038S002901	120.00	J					
	038S003201	480.00	J					
	038S003401	110.00	J					
	038S003501	230.00	J					
Benzo(a)pyrene				100	300	500	1,500	8,000
	038S000102	200.00	J	X				
	038S000701	46.00	J					
	038S001401	67.00	J					
	038S001901	77.00	J					
	038S002601	160.00	J	X				
	038S002901	200.00	J	X				
	038S003201	690.00	J	X	X	X		
	038S003301	41.00	J					
	038S003401	150.00	J	X				
	038S003501	380.00	J	X	X			
	038S003701	260.00	J	X				
Benzo(b)fluoranthene				1,400	4,200	4,800	14,400	10,000
	038S000102	280.00	J					
	038S000701	62.00	J					
	038S000801	43.00	J					
	038S001001	56.00	J					
	038S001401	200.00	J					
	038S001901	200.00	J					
	038S002901	370.00	J					
	038S003101	48.00	J					
	038S003201	580.00	J					
	038S003301	45.00	J					

RI RESULTS - SURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S003401	160.00	J					
	038S003701	500.00	J					
	038S004202	55.00	J					
Benzo(g,h,i)perylene				2,300,000	6,900,000	41,000,000	123,000,000	32,000,000
	038S000102	130.00	J					
	038S002601	140.00	J					
	038S002901	300.00	J					
	038S003101	35.00	J					
	038S003201	530.00	J					
	038S003301	39.00	J					
	038S003401	120.00	J					
	038S003501	290.00	J					
	038S003701	360.00	J					
Benzo(k)fluoranthene				15,000	45,000	52,000	156,000	25,000
	038S000102	220.00	J					
	038S000701	51.00	J					
	038S000801	53.00	J					
	038S001001	38.00	J					
	038S001401	70.00	J					
	038S001901	92.00	J					
	038S002601	190.00	J					
	038S002702	110.00	J					
	038S002901	290.00	J					
	038S003201	720.00	J					
	038S003501	480.00	J					
	038S003701	360.00	J					
bis(2-Ethylhexyl)phthalate (BEHP)				76,000	228,000	280,000	840,000	3,600,000
	038S000102	360.00	J					
	038S000301	74.00	J					
Carbazole				53,000	159,000	190,000	570,000	600
	038S002601	38.00	J					
Chrysene				140,000	420,000	450,000	1,350,000	77,000
	038S000102	220.00	J					
	038S000701	71.00	J					
	038S000801	35.00	J					
	038S001001	85.00	J					
	038S001401	140.00	J					
	038S001901	120.00	J					
	038S002201	73.00	J					
	038S002601	160.00	J					
	038S002702	70.00	J					
	038S002901	110.00	J					
	038S003201	540.00	J					
	038S003401	120.00	J					
	038S003501	420.00	J					
	038S003701	240.00	J					
Dibenz(a,h)anthracene				100	300	500	1,500	30,000
	038S000102	100.00	J	X				
	038S001401	57.00	J					
	038S002901	180.00	J	X				
	038S003201	230.00	J	X				
Dibenzofuran				280,000	840,000	5,000,000	15,000,000	15,000
	038S001001	140.00	J					
Fluoranthene				2,900,000	8,700,000	48,000,000	144,000,000	1,200,000
	038S000102	240.00	J					
	038S000701	60.00	J					
	038S000801	38.00	J					
	038S001001	52.00	J					
	038S001401	140.00	J					
	038S001901	74.00	J					
	038S002601	170.00	J					
	038S002702	140.00	J					
	038S002901	97.00	J					

RI RESULTS - SURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S003201	620.00	J					
	038S003401	160.00	J					
	038S003501	280.00	J					
	038S003701	280.00	J					
Indeno(1,2,3-cd)pyrene				1,500	4,500	5,300	15,900	28,000
	038S000102	190.00	J					
	038S002601	130.00	J					
	038S002901	190.00	J					
	038S003201	570.00	J					
	038S003301	38.00	J					
	038S003501	290.00	J					
	038S003701	210.00	J					
Naphthalene				40,000	120,000	270,000	810,000	1,700
	038S001001	46.00	J					
	038S001401	330.00	J					
	038S001701	640.00	J					
Phenanthrene				2,000,000	6,000,000	30,000,000	90,000,000	250,000
	038S000701	55.00	J					
	038S001001	260.00	J					
	038S001401	190.00	J					
	038S001701	86.00	J					
	038S002601	49.00	J					
	038S003201	270.00	J					
Phenol				900,000	NA	390,000,000	1,170,000,000	50
	038S001201	39.00	J					
	038S001301	59.00	J					X
	038S001401	990.00						X
	038S001501	130.00	J					X
	038S001801	930.00	J					X
	038S001901	370.00	J					X
	038S001902	600.00	J					X
Pyrene				2,200,000	6,600,000	37,000,000	111,000,000	880,000
	038S000102	240.00	J					
	038S000701	87.00	J					
	038S000801	43.00	J					
	038S001001	84.00	J					
	038S001401	150.00	J					
	038S001901	100.00	J					
	038S002601	210.00	J					
	038S002702	110.00	J					
	038S002901	120.00	J					
	038S003201	480.00	J					
	038S003301	40.00	J					
	038S003401	170.00	J					
	038S003501	270.00	J					
	038S003701	190.00	J					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

RI RESULTS - SURFACE SOIL
COMPARISON OF PESTICIDE/PCB DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
4,4'-DDD				4,600	13,800	18,000	54,000	4,000
	038S001301	6.30	J					
	038S001801	77.00						
4,4'-DDE				3,300	9,900	13,000	39,000	18,000
	038S001301	5.80						
	038S001701	3.90	J					
	038S001801	900.00	J					
	038S003701	4.90						
4,4'-DDT				3,300	9,900	13,000	39,000	11,000
	038S001701	3.50	J					
alpha-Chlordane	(use Chlordane SCTL)			3,100	9,300	12,000	36,000	9,600
	038S001301	2.60						
Aroclor-1254	(use PCB mixture SCTL)			500	1,500	2,100	6,300	17,000
	038S001701	100.00						
	038S001801	16000.00	J	X	X	X	X	
Aroclor-1260	(use PCB mixture SCTL)			500	1,500	2,100	6,300	17,000
	038S001201	58.00						
	038S001301	55.00						
	038S003701	570.00	J	X				
Dieldrin				70	210	300	900	4
	038S003701	5.40						X
Endosulfan I	(use Endosulfan SCTL)			410,000	1,230,000	6,700,000	20,100,000	3,800
	038S001801	51.00	J					
Endrin aldehyde	(use Endrin SCTL)			21,000	63,000	340,000	1,020,000	1,000
	038S001801	37.00	J					
	038S003701	29.00	J					
gamma-Chlordane	(use Chlordane SCTL)			3,100	9,300	12,000	36,000	9,600
	038S001701	3.40	J					
	038S001801	630.00	J					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Aluminum				72,000	216,000	NA	NA	***
	038S000102	13500.00						
	038S000301	121.00						
	038S000402	339.00						
	038S000501	661.00						
	038S000701	800.00						
	038S000801	139.00						
	038S000901	132.00						
	038S001001	435.00						
	038S001101	71.20						
	038S001201	305.00						
	038S001301	148.00						
	038S001401	784.00						
	038S001501	450.00						
	038S001601	9860.00						
	038S001701	4220.00						
	038S001801	4180.00						
	038S001901	4580.00						
	038S001902	3090.00						
	038S002201	1000.00						
	038S002501	104.00						
	038S002601	10300.00						
	038S002702	81.00						
	038S002801	921.00						
	038S002901	1540.00						
	038S003001	214.00	J					
	038S003101	207.00	J					
	038S003201	858.00						
	038S003301	21200.00	J					
	038S003401	19000.00	J					
	038S003501	12100.00						
	038S003601	24300.00						
	038S003701	16200.00						
	038S004102	179.00						
	038S004202	1330.00						
Antimony				26	78	240	720	5
	038S002201	3.80						
Arsenic	*Note: RC = 1.56 mg/kg			0.8	2.4	3.7	11.1	29
	038S000102	1.60		X				
	038S000301	1.20		X				
	038S000701	2.40		X	X			
	038S000901	0.52						
	038S001201	0.81	J	X				
	038S001301	0.72						
	038S001401	1.90		X				
	038S001501	0.28						
	038S001601	2.20		X				

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S001701	1.00	X				
	038S001901	1.90	X				
	038S001902	0.83	X				
	038S002201	1.60	X				
	038S002601	4.20	X	X	X		
	038S002901	1.00	X				
	038S003201	3.00	X	X			
	038S003301	3.90	X	X	X		
	038S003401	2.40	X	X			
	038S003501	21.10	X	X	X	X	
	038S003601	7.20	X	X	X		
	038S003701	3.70 J	X	X	X		
	038S004102	1.40	X				
	038S004202	0.91	X				
Barium			110	NA	87,000	261,000	1,600
	038S000102	68.70					
	038S000301	1.20					
	038S000402	3.20					
	038S000501	23.80					
	038S000701	17.20					
	038S000801	2.00					
	038S000901	3.90					
	038S001001	11.90					
	038S001201	6.90					
	038S001301	2.80					
	038S001401	19.20					
	038S001501	6.30					
	038S001601	4.70					
	038S001701	16.90					
	038S001801	11.70					
	038S001901	8.30					
	038S001902	13.60					
	038S002201	12.40					
	038S002501	1.00					
	038S002601	32.70					
	038S002702	0.62					
	038S002801	3.00					
	038S002901	18.00					
	038S003101	1.60					
	038S003201	18.00					
	038S003301	11.70					
	038S003401	9.60					
	038S003501	89.50					
	038S003601	13.30 J					
	038S004102	2.00					
	038S004202	18.90					
Beryllium			120	360	800	2,400	63

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S001001	0.27						
	038S001401	0.18						
	038S001601	0.15						
	038S002201	0.14						
	038S003401	0.25						
	038S003501	0.36	J					
Cadmium				75	NA	1,300	3,900	8
	038S000701	3.40						
	038S001001	4.00						
	038S001201	1.80						
	038S001301	2.90						
	038S001401	18.60						X
	038S001501	1.40						
	038S001601	0.60						
	038S001801	2.10						
	038S002201	0.63						
	038S002901	2.00						
	038S003301	1.20						
	038S004202	1.40						
Calcium				Not Available				
	038S000102	50300.00						
	038S000301	477.00						
	038S000402	2970.00						
	038S000501	6120.00						
	038S000701	4740.00						
	038S000801	1450.00						
	038S000901	402.00						
	038S001001	2220.00						
	038S001101	559.00						
	038S001201	2990.00						
	038S001301	712.00						
	038S001401	972.00						
	038S001501	6320.00						
	038S001601	1810.00	J					
	038S001701	22300.00	J					
	038S001801	5190.00	J					
	038S001901	6600.00	J					
	038S001902	8840.00	J					
	038S002201	1990.00	J					
	038S002501	454.00						
	038S002601	7340.00						
	038S002702	979.00						
	038S002801	314.00						
	038S002901	3210.00						
	038S003001	1160.00						
	038S003101	1370.00						
	038S003201	2330.00						

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S003301	1370.00						
	038S003401	4390.00						
	038S003501	18400.00	J					
	038S003701	2380.00	J					
	038S004102	115.00						
	038S004202	1440.00						
Chromium				210	630	420	1,260	38
	038S000102	22.10						
	038S000301	3.70						
	038S000402	4.70						
	038S000501	10.00						
	038S000701	28.60						
	038S000801	2.40						
	038S000901	6.90						
	038S001001	103.00						X
	038S001101	9.40						
	038S001201	80.20						X
	038S001301	713.00		X	X	X		X
	038S001401	665.00		X	X	X		X
	038S001501	17.50						
	038S001601	12.60						
	038S001701	53.40						X
	038S001801	291.00		X				X
	038S001901	6.60						
	038S001902	6.30						
	038S002201	10.20						
	038S002501	7.00						
	038S002601	11.50						
	038S002702	6.00						
	038S002801	2.00						
	038S002901	15.00						
	038S003001	2.10	J					
	038S003101	4.20	J					
	038S003201	5.00						
	038S003301	18.30	J					
	038S003401	21.10	J					
	038S003501	11.90						
	038S003601	25.40						
	038S003701	15.00						
	038S004202	6.20						
Cobalt				4,700	14,100	110,000	330,000	***
	038S000701	2.60						
	038S003001	6.00						
Copper				110	NA	76,000	228,000	***
	038S000102	9.20						
	038S000301	10.60						
	038S000402	21.70						

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S000501	30.80					
	038S000701	31.60					
	038S000801	4.60					
	038S000901	19.00					
	038S001001	13.50					
	038S001201	13.20					
	038S001301	9.80					
	038S001401	155.00	X				
	038S001501	9.20					
	038S001601	11.80					
	038S001701	9.60					
	038S001801	41.20					
	038S001901	23.20					
	038S001902	31.40					
	038S002201	6.50					
	038S002501	3.00					
	038S002601	33.40					
	038S002702	19.00					
	038S002801	8.00					
	038S002901	26.00					
	038S003001	2.20					
	038S003101	27.20					
	038S003201	131.00	X				
	038S003301	22.00					
	038S003401	6.60					
	038S003501	46.40					
	038S003601	10.60					
	038S003701	9.30					
	038S004102	308.00	X				
	038S004202	14.90					
Cyanide (CN)			30	NA	39,000	117,000	40
	038S001101	2.20					
	038S003701	1.10 J					
Iron			23,000	69,000	480,000	1,440,000	***
	038S000102	4260.00					
	038S000301	476.00					
	038S000402	976.00					
	038S000501	1950.00					
	038S000701	9530.00					
	038S000801	210.00					
	038S000901	893.00					
	038S001001	2410.00					
	038S001101	92.40					
	038S001201	896.00					
	038S001301	442.00					
	038S001401	3260.00					
	038S001501	551.00					

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S001601	7900.00						
	038S001701	3790.00						
	038S001902	2480.00						
	038S002201	6290.00						
	038S002501	540.00						
	038S002601	6860.00						
	038S002702	312.00						
	038S002801	972.00						
	038S002901	2820.00						
	038S003001	179.00						
	038S003101	510.00						
	038S003201	3710.00						
	038S003301	12600.00						
	038S003401	14100.00						
	038S003501	160.00						
	038S003601	18800.00						
	038S003701	9800.00						
	038S004102	471.00						
	038S004202	1540.00						
Lead				400	1,200	920	2,760	***
	038S000102	64.20						
	038S000301	20.10						
	038S000402	151.00						
	038S000501	119.00						
	038S000701	143.00						
	038S000801	30.10						
	038S000901	81.00						
	038S001001	98.40						
	038S001101	9.20						
	038S001201	98.60						
	038S001301	95.40						
	038S001401	270.00						
	038S001501	24.80						
	038S001601	40.10						
	038S001701	70.50						
	038S001801	148.00						
	038S001901	67.00						
	038S001902	60.90						
	038S002201	83.80						
	038S002501	28.00						
	038S002601	119.00						
	038S002702	17.00						
	038S002801	23.00						
	038S002901	139.00						
	038S003001	28.90	J					
	038S003101	30.40	J					
	038S003201	273.00						

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S003301	67.10	J					
	038S003401	22.00	J					
	038S003501	125.00						
	038S003601	38.30						
	038S003701	51.90						
	038S004102	5.20						
	038S004202	70.00						
Magnesium				Not Available				
	038S000102	7210.00						
	038S000301	60.40						
	038S000701	309.00						
	038S000801	61.60						
	038S000901	41.50						
	038S001001	140.00						
	038S001301	47.40						
	038S001401	108.00						
	038S001501	332.00						
	038S001601	107.00						
	038S001701	288.00						
	038S001801	218.00						
	038S001901	223.00						
	038S001902	193.00						
	038S002201	256.00						
	038S002501	11.00						
	038S002601	325.00						
	038S002702	21.00						
	038S002801	87.00						
	038S002901	163.00						
	038S003001	56.30						
	038S003101	88.10						
	038S003201	427.00						
	038S003301	213.00						
	038S003401	360.00						
	038S003501	562.00	J					
	038S003601	115.00	J					
	038S003701	233.00						
	038S004102	94.10						
	038S004202	189.00						
Manganese				1,600	4,800	22,000	66,000	***
	038S000102	337.00						
	038S000301	1.30						
	038S000501	11.80						
	038S000701	27.60						
	038S000801	2.50						
	038S001301	1.90						
	038S001401	11.20						
	038S001501	4.40						

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S001601	14.50					
	038S001701	34.40					
	038S001801	11.70					
	038S001901	28.80					
	038S001902	23.50					
	038S002201	68.50					
	038S002501	7.00					
	038S002601	244.00					
	038S002702	2.00					
	038S002801	12.00					
	038S002901	18.00					
	038S003001	2.10 J					
	038S003101	3.50 J					
	038S003201	27.00					
	038S003301	30.90 J					
	038S003401	30.90 J					
	038S003501	169.00					
	038S003601	69.50					
	038S003701	174.00					
	038S004102	4.00					
	038S004202	28.50					
Mercury			3.4	10.2	26	78	2.1
	038S000102	0.04					
	038S000402	0.12					
	038S000501	0.07					
	038S000701	0.05					
	038S000901	0.05					
	038S001001	0.10					
	038S001201	0.12					
	038S001301	0.05					
	038S001401	0.07					
	038S001501	0.03					
	038S001601	0.05					
	038S001701	0.05					
	038S001801	0.12					
	038S001901	0.06					
	038S001902	0.05					
	038S002601	0.15 J					
	038S003501	0.23					
	038S004202	0.10					
Nickel			110	NA	28,000	84,000	130
	038S000701	2.90 J					
	038S001801	6.80					
	038S002601	4.50					
Potassium			Not Available				
	038S000102	1460.00					
	038S001601	110.00					

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S001801	106.00					
Selenium			390	1,170	10,000	30,000	5
	038S001401	0.21					
Silver			390	1,170	9,100	27,300	17
	038S004102	1.30					
Sodium			Not Available				
	038S000102	302.00					
	038S000402	78.20					
	038S000501	153.00					
	038S000901	23.70					
	038S001001	31.20					
	038S001401	53.20					
	038S001501	39.30					
	038S001601	43.50					
	038S001701	71.50					
	038S001901	84.30					
	038S001902	94.10					
	038S002201	21.60					
	038S002601	85.70					
	038S002901	40.00					
	038S003001	93.40					
	038S003101	57.20					
	038S003301	72.30					
	038S003401	84.70					
	038S003501	163.00 J					
	038S003601	40.80 J					
	038S003701	80.00					
	038S004102	55.90 B					
Vanadium			15	NA	7,400	22,200	980
	038S000102	16.70	X				
	038S000701	3.70					
	038S001001	5.40					
	038S001601	16.60	X				
	038S001701	6.90					
	038S001801	7.50					
	038S001901	7.70					
	038S001902	5.00					
	038S002201	14.50					
	038S002601	16.30	X				
	038S002901	4.00					
	038S003201	4.00					
	038S003301	31.70	X				
	038S003401	33.40	X				
	038S003501	18.00	X				
	038S003601	39.80	X				
	038S003701	26.20	X				
	038S004202	2.90					

RI RESULTS - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Zinc			23,000	69,000	560,000	1,680,000	6,000
	038S000102	309.00					
	038S000301	16.90					
	038S000402	26.40					
	038S000501	40.00					
	038S000701	401.00					
	038S000801	9.40					
	038S000901	40.60					
	038S001001	74.40					
	038S001201	56.70					
	038S001301	54.80					
	038S001401	435.00					
	038S001501	32.60					
	038S001601	17.90					
	038S001701	32.00					
	038S001801	85.20					
	038S001901	30.80					
	038S001902	31.90					
	038S002201	41.20					
	038S002501	9.00					
	038S002601	126.00					
	038S002702	7.00					
	038S002801	21.00					
	038S002901	85.00					
	038S003001	8.50					
	038S003101	23.60					
	038S003201	88.00					
	038S003301	48.30					
	038S003401	11.00					
	038S003501	98.20					
	038S003601	215.00					
	038S003701	35.70					
	038S004102	126.00					
	038S004202	50.40					

Notes:
All concentrations and criteria are in milligrams per kilogram (mg/kg).
***Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.

RI Results

Subsurface Soil

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Aluminum				72,000	216,000	NA	NA	***
	038S000104	181.00						
	038S000106	5610.00						
	038S000303	263.00						
	038S000305	351.00						
	038S000404	134.00						
	038S000503	86.50						
	038S000505	90.80						
	038S000703	741.00						
	038S000705	294.00						
	038S000803	353.00						
	038S000804	388.00						
	038S000903	97.30						
	038S001003	164.00						
	038S001004	51.80						
	038S001103	57.50						
	038S001104	114.00						
	038S001203	166.00						
	038S001204	132.00						
	038S001303	146.00						
	038S001304	78.40						
	038S001403	220.00						
	038S001405	88.60						
	038S001503	326.00						
	038S001603	710.00						
	038S001605	137.00	J					
	038S001703	662.00						
	038S001705	254.00						
	038S001803	469.00						
	038S001805	1010.00						
	038S002203	518.00						
	038S002403	684.00						
	038S002503	69.00						
	038S002603	7310.00						
	038S002605	2730.00						
	038S002704	77.00						
	038S002803	1090.00						
	038S003003	69.70	J					
	038S003103	160.00	J					
	038S003203	185.00						
	038S003205	52.00						
	038S003303	643.00	J					
	038S003403	3650.00						
	038S003503	299.00						
	038S003603	339.00						
	038S003703	1980.00						
	038S004104	43.40						

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S004106	24.90					
	038S004204	1500.00					
	038S004206	368.00					
Antimony			26	78	240	720	5
	038S003703	6.10					X
Arsenic	*Note: RC = 1.56 mg/kg		0.8	2.4	3.7	11.1	29
	038S000106	1.20	X				
	038S000703	2.20	X				
	038S000705	0.71					
	038S001203	1.70	X				
	038S001204	15.60	X	X	X	X	
	038S001303	3.70	X	X	X		
	038S001304	3.20	X	X			
	038S001403	1.30	X				
	038S001405	0.38					
	038S001503	0.66					
	038S001603	0.60					
	038S001703	0.32					
	038S001803	1.20	X				
	038S001805	1.10	X				
	038S002603	3.10	X	X			
	038S002605	7.50	X	X	X		
	038S003205	0.51					
	038S003403	0.60					
	038S003503	3.50	X	X			
	038S003603	8.20	X	X	X		
	038S003703	0.93	X				
	038S004204	1.20	X				
Barium			110	NA	87,000	261,000	1,600
	038S000104	2.60					
	038S000106	10.20					
	038S000303	2.40					
	038S000305	5.00					
	038S000503	3.20					
	038S000505	2.00					
	038S000703	14.30					
	038S000705	26.50					
	038S000803	5.10					
	038S000804	2.40					
	038S000903	1.90					
	038S001003	4.60					
	038S001203	19.20					
	038S001204	7.70					
	038S001303	35.90					
	038S001304	4.50					
	038S001403	8.10					
	038S001405	2.80					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S001503	3.90					
	038S001603	9.00					
	038S001605	2.30					
	038S001703	2.40					
	038S001705	2.40					
	038S001803	10.10					
	038S001805	28.80					
	038S002203	2.80					
	038S002403	6.00					
	038S002603	21.30					
	038S002605	21.70					
	038S002704	1.00					
	038S002803	6.00					
	038S003003	0.58					
	038S003103	1.20					
	038S003203	5.00					
	038S003205	0.62					
	038S003303	1.70					
	038S003403	13.60					
	038S003503	8.00 J					
	038S003603	4.50					
	038S004104	0.61					
	038S004204	16.70					
	038S004206	9.90					
Cadmium			75	NA	1,300	3,900	8
	038S000703	1.50					
	038S000803	2.00					
	038S001003	1.10					
	038S001104	6.20					
	038S001203	1.30					
	038S001303	2.00					
	038S001403	4.60					
	038S001405	2.10					
	038S001503	0.74					
	038S001603	4.20					
	038S001605	0.74					
	038S001803	0.71					
	038S002803	1.00					
	038S003603	0.98					
Calcium			Not Available				
	038S000104	233.00					
	038S000106	20700.00					
	038S000303	2590.00					
	038S000305	3950.00					
	038S000404	277.00					
	038S000503	894.00					
	038S000505	1300.00					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S000703	2660.00						
	038S000705	608.00						
	038S000803	955.00						
	038S000804	4820.00						
	038S000903	113.00						
	038S001003	752.00						
	038S001004	133.00						
	038S001103	392.00						
	038S001104	864.00						
	038S001203	714.00						
	038S001204	287.00						
	038S001303	192.00						
	038S001304	161.00						
	038S001403	438.00						
	038S001405	236.00						
	038S001503	3440.00						
	038S001603	2460.00						
	038S001605	282.00						
	038S001703	2480.00	J					
	038S001705	1380.00	J					
	038S001803	947.00	J					
	038S001805	1950.00	J					
	038S002203	2530.00	J					
	038S002403	1260.00						
	038S002503	656.00						
	038S002603	28500.00						
	038S002605	2660.00						
	038S002704	229.00						
	038S002803	1990.00						
	038S003003	155.00						
	038S003103	603.00						
	038S003203	1660.00						
	038S003205	194.00						
	038S003303	3500.00						
	038S003403	3140.00						
	038S003503	213.00	J					
	038S003603	239.00	J					
	038S003703	1930.00	J					
	038S004104	63.10						
	038S004106	36.90						
	038S004204	1710.00						
	038S004206	347.00						
Chromium				210	630	420	1,260	38
	038S000106	7.10						
	038S000303	3.90						
	038S000305	3.50						
	038S000404	2.60						

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S000703	12.80					
	038S000705	4.90					
	038S000803	6.00					
	038S000804	3.20					
	038S000903	2.30					
	038S001003	31.50					
	038S001004	5.40					
	038S001103	10.50					
	038S001104	13.20					
	038S001203	13.30					
	038S001204	19.40					
	038S001303	553.00	X		X		X
	038S001304	296.00	X				X
	038S001403	331.00	X				X
	038S001405	155.00					X
	038S001503	12.00					
	038S001603	58.80					X
	038S001605	10.50					
	038S001703	17.30					
	038S001705	8.80					
	038S001803	48.50					X
	038S001805	87.80					X
	038S002203	2.20					
	038S002403	4.00					
	038S002503	9.00					
	038S002603	8.80					
	038S002605	5.20					
	038S002704	6.00					
	038S002803	32.00					
	038S003003	1.70 J					
	038S003103	2.90 J					
	038S003203	3.00					
	038S003205	11.00					
	038S003303	1.90 J					
	038S003403	4.20 J					
	038S003703	3.40					
	038S004204	4.00					
Cobalt			4,700	14,100	110,000	330,000	***
	038S000703	5.60					
Copper			110	NA	76,000	228,000	***
	038S000104	13.10					
	038S000106	13.80					
	038S000303	8.30					
	038S000305	8.10					
	038S000404	21.80					
	038S000503	27.60					
	038S000505	8.10					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S000703	86.00					
	038S000705	38.40					
	038S000803	13.40					
	038S000804	3.40					
	038S000903	6.40					
	038S001003	3.60					
	038S001004	3.40					
	038S001203	112.00	X				
	038S001204	29.80					
	038S001303	73.20					
	038S001304	60.10					
	038S001403	390.00	X				
	038S001405	43.00					
	038S001503	44.00					
	038S001603	12.10					
	038S001605	1.90					
	038S001703	5.50					
	038S001705	9.00					
	038S001803	33.60					
	038S001805	51.40					
	038S002203	2.40					
	038S002403	4.00					
	038S002603	177.00	X				
	038S002605	102.00					
	038S002704	27.00					
	038S002803	20.00					
	038S003003	7.40					
	038S003103	43.80					
	038S003203	45.00					
	038S003205	8.00					
	038S003303	19.20					
	038S003403	8.40					
	038S003503	7.80					
	038S003603	10.20					
	038S003703	5.40					
	038S004104	71.40					
	038S004106	11.40					
	038S004204	14.70					
	038S004206	3.70					
Cyanide (CN)			30	NA	39,000	117,000	40
	038S003503	1.00 J					
	038S003603	1.00 J					
	038S003703	1.10 J					
	038S004104	1.00					
	038S004106	1.10					
	038S004204	1.00					
Iron			23,000	69,000	480,000	1,440,000	***

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S000104	499.00						
	038S000106	3490.00						
	038S000303	433.00						
	038S000305	724.00						
	038S000404	1140.00						
	038S000503	1160.00						
	038S000505	466.00						
	038S000703	14100.00						
	038S000705	3600.00						
	038S000803	1730.00						
	038S000804	483.00						
	038S000903	322.00						
	038S001003	721.00						
	038S001004	69.90						
	038S001103	77.20						
	038S001104	153.00						
	038S001203	2340.00						
	038S001204	1610.00						
	038S001303	2310.00						
	038S001304	453.00						
	038S001403	5320.00						
	038S001405	525.00						
	038S001503	1090.00						
	038S001603	1590.00	J					
	038S001605	210.00	J					
	038S001703	922.00						
	038S001705	516.00						
	038S001803	2690.00						
	038S001805	3320.00						
	038S002203	968.00						
	038S002403	4280.00						
	038S002503	122.00						
	038S002603	7330.00						
	038S002605	14800.00						
	038S002704	696.00						
	038S002803	1510.00						
	038S003003	101.00						
	038S003103	916.00						
	038S003203	571.00						
	038S003205	1150.00						
	038S003303	444.00						
	038S003403	2790.00						
	038S003503	513.00						
	038S003603	936.00						
	038S003703	3120.00						
	038S004104	124.00						
	038S004106	58.00						

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S004204	1560.00						
	038S004206	376.00						
Lead				400	1,200	920	2,760	***
	038S000104	18.70						
	038S000106	68.30						
	038S000303	23.50						
	038S000305	25.30						
	038S000404	50.90						
	038S000503	125.00						
	038S000505	60.00						
	038S000703	425.00		X				
	038S000705	130.00						
	038S000803	135.00						
	038S000804	17.40						
	038S000903	31.40						
	038S001003	31.80						
	038S001004	5.70						
	038S001103	7.70						
	038S001104	24.20						
	038S001203	243.00						
	038S001204	126.00						
	038S001303	256.00						
	038S001304	110.00						
	038S001403	148.00						
	038S001405	45.50						
	038S001503	70.00						
	038S001603	119.00	J					
	038S001605	23.00						
	038S001703	44.50						
	038S001705	34.10						
	038S001803	155.00						
	038S001805	491.00		X				
	038S002203	28.90						
	038S002403	6.00						
	038S002503	3.00						
	038S002603	217.00						
	038S002605	897.00		X				
	038S002704	29.00						
	038S002803	49.00						
	038S003003	24.10	J					
	038S003103	46.80	J					
	038S003203	63.00						
	038S003205	14.00						
	038S003303	29.50						
	038S003403	55.30	J					
	038S003503	40.30						
	038S003603	23.00						

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S003703	24.70					
	038S004104	8.20					
	038S004106	1.40					
	038S004204	60.60					
	038S004206	18.00					
Magnesium			Not Available				
	038S000104	31.00					
	038S000106	238.00					
	038S000505	30.10					
	038S000703	717.00					
	038S000705	128.00					
	038S000803	68.00					
	038S000804	193.00					
	038S001003	43.80					
	038S001203	103.00					
	038S001204	51.40					
	038S001303	27.90					
	038S001304	18.90					
	038S001403	68.10					
	038S001405	23.50					
	038S001503	216.00					
	038S001603	111.00					
	038S001605	15.90					
	038S001703	57.00					
	038S001705	22.90					
	038S001803	86.60					
	038S001805	467.00					
	038S002203	84.20					
	038S002403	706.00					
	038S002503	13.00					
	038S002603	469.00					
	038S002605	413.00					
	038S002704	14.00					
	038S002803	226.00					
	038S003003	19.40					
	038S003103	68.10					
	038S003203	120.00					
	038S003205	17.00					
	038S003303	115.00					
	038S003403	185.00					
	038S003503	89.50 J					
	038S003603	39.10					
	038S003703	186.00					
	038S004104	16.20					
	038S004106	7.60					
	038S004204	226.00					
	038S004206	41.30					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Manganese			1,600	4,800	22,000	66,000	***
	038S000104	13.20					
	038S000106	53.00					
	038S000505	3.40					
	038S000703	36.80					
	038S000705	32.00					
	038S000903	3.70					
	038S001203	8.30					
	038S001204	5.00					
	038S001303	3.50					
	038S001304	1.40					
	038S001403	5.60					
	038S001405	1.90					
	038S001503	5.20					
	038S001603	12.30					
	038S001605	2.50					
	038S001703	4.50					
	038S001705	2.50					
	038S001803	5.60					
	038S001805	12.70					
	038S002203	10.20					
	038S002403	16.00					
	038S002503	1.00					
	038S002603	238.00					
	038S002605	138.00					
	038S002704	2.00					
	038S002803	14.00					
	038S003103	3.00 J					
	038S003203	7.00					
	038S003205	2.00					
	038S003303	11.50 J					
	038S003403	31.30 J					
	038S003503	8.60					
	038S003603	13.90					
	038S003703	32.80					
	038S004104	3.90					
	038S004106	0.89					
	038S004204	37.60					
	038S004206	8.50					
Mercury			3.4	10.2	26	78	2.1
	038S000104	0.06					
	038S000106	0.06					
	038S000303	0.04					
	038S000305	0.03					
	038S000404	0.08					
	038S000503	0.12					
	038S000505	0.05					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S000703	0.05					
	038S000705	0.04					
	038S000803	0.07					
	038S001003	0.06					
	038S001004	0.03					
	038S001203	0.12					
	038S001204	0.07					
	038S001303	0.20					
	038S001304	0.10					
	038S001403	0.20					
	038S001405	0.07					
	038S001503	0.03					
	038S001603	0.07					
	038S001605	0.03 J					
	038S001703	0.05					
	038S001705	0.15					
	038S001803	0.06					
	038S001805	0.12					
	038S002203	0.03					
	038S002603	0.13 J					
	038S002605	0.60 J					
	038S003003	0.41					
	038S004204	0.09					
	038S004206	0.10					
Nickel			110	NA	28,000	84,000	130
	038S000703	4.20					
	038S001803	3.80					
	038S001805	81.50					
	038S002603	5.30					
	038S002605	5.90					
Potassium			Not Available				
	038S001603	110.00					
	038S001805	115.00					
	038S004106	216.00					
Silver			390	1,170	9,100	27,300	17
	038S002605	1.40					
	038S003003	0.83					
Sodium			Not Available				
	038S000106	204.00					
	038S001403	29.60					
	038S001503	31.30					
	038S001603	29.70					
	038S001703	23.30					
	038S001803	36.90					
	038S001805	66.50					
	038S002603	216.00					
	038S002605	45.40					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S002803	45.00					
	038S003103	50.70					
	038S003303	128.00					
	038S003403	61.80					
	038S003503	45.80 J					
	038S003703	51.10					
	038S004104	41.10					
	038S004106	43.10					
	038S004204	43.10					
Thallium*			5.2	15.6	67	201	Not Available
	038S001204	0.61					
Vanadium			15	NA	7,400	22,200	980
	038S000106	8.70 J					
	038S000703	4.40					
	038S000705	6.30					
	038S001603	2.90					
	038S001703	1.60					
	038S001803	1.50					
	038S001805	6.10					
	038S002403	15.00	X				
	038S002603	11.20					
	038S002605	6.70					
	038S003403	6.70					
	038S003503	1.90					
	038S003703	5.00					
	038S004204	2.60					
Zinc			23,000	69,000	560,000	1,680,000	6,000
	038S000104	13.30					
	038S000106	22.10					
	038S000303	18.60					
	038S000305	15.30					
	038S000404	29.20					
	038S000503	23.80					
	038S000505	13.50					
	038S000703	396.00					
	038S000705	89.30					
	038S000803	32.80					
	038S000804	5.00					
	038S000903	13.40					
	038S001003	17.90					
	038S001104	84.90					
	038S001203	593.00					
	038S001204	220.00					
	038S001303	63.60					
	038S001304	28.90					
	038S001403	403.00					
	038S001405	58.90					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

			Residential Exposure		Industrial Exposure		Leachability Based On
Parameter	Sample ID	Result	SCTL	3x SCTL	SCTL	3x SCTL	Groundwater Criteria
	038S001503	49.60					
	038S001603	55.60					
	038S001605	9.60					
	038S001703	7.20					
	038S001705	7.60					
	038S001803	38.00					
	038S001805	209.00					
	038S002203	24.00					
	038S002403	7.00					
	038S002503	7.00					
	038S002603	317.00					
	038S002605	296.00					
	038S002704	18.00					
	038S002803	36.00					
	038S003003	3.30					
	038S003103	32.80					
	038S003203	18.00					
	038S003205	16.00					
	038S003303	6.50					
	038S003403	37.20					
	038S003503	19.20					
	038S003603	8.40					
	038S003703	19.50					
	038S004104	10.00					
	038S004106	4.60					
	038S004204	41.40					
	038S004206	20.20					

Notes:
All concentrations and criteria are in milligrams per kilogram (mg/kg).
***Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.
* - Region III Risk-Based Concentrations (April 2002) were used for SCTLs.

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF PESTICIDE/PCB DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
4,4'-DDD				4,600	13,800	18,000	54,000	4,000
	038S001603	5.60	J					
	038S001703	4.80						
	038S001705	5.30						
	038S001803	59.00						
	038S001805	43.00	J					
	038S003403	5.00	J					
4,4'-DDE				3,300	9,900	13,000	39,000	18,000
	038S001603	4.10	J					
	038S001703	4.10						
	038S001705	3.90						
	038S001803	660.00						
	038S001805	480.00						
	038S004204	5.10						
4,4'-DDT				3,300	9,900	13,000	39,000	11,000
	038S001603	4.50	J					
	038S001705	5.50						
	038S002603	5.70	J					
	038S003403	6.30	J					
	038S004204	5.10						
Aroclor-1254	(use PCB mixture SCTL)			500	1,500	2,100	6,300	17,000
	038S001703	86.00	J					
	038S001705	72.00	J					
	038S001803	11000.00	J	X	X	X	X	
	038S001805	8000.00	J	X	X	X	X	
Aroclor-1260	(use PCB mixture SCTL)			500	1,500	2,100	6,300	17,000
	038S001603	120.00	J					
	038S003403	49.00	J					
Dieldrin				70	210	300	900	4
	038S002603	4.40	J					X
Endosulfan I	(use Endosulfan SCTL)			410,000	1,230,000	6,700,000	20,100,000	3,800
	038S001803	61.00	J					
	038S001805	34.00	J					
Endosulfan II	(use Endosulfan SCTL)			410,000	1,230,000	6,700,000	20,100,000	3,800
	038S001603	5.80	J					
	038S001703	4.50	J					
	038S001705	4.60	J					
	038S001805	18.00	J					
Endosulfan sulfate	(use Endosulfan SCTL)			410,000	1,230,000	6,700,000	20,100,000	3,800
	038S003303	3.40						
Endrin ketone	(use Endrin SCTL)			21,000	63,000	340,000	1,020,000	1,000
	038S003403	14.00	J					
gamma-Chlordane	(use Chlordane [alpha+beta] SCTL)			3,100	9,300	12,000	36,000	9,600
	038S001603	1.80	J					
	038S001703	2.30	J					
	038S001705	2.10	J					
	038S001803	410.00	J					
	038S001805	270.00	J					
Heptachlor epoxide				100	300	400	1,200	600
	038S001703	1.70	J					
Methoxychlor				370,000	1,110,000	7,500,000	22,500,000	160,000
	038S003403	25.00	J					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
1,2-Dichlorobenzene			650,000	1,950,000	4,600,000	13,800,000	17,000
	038S001303	280.00 J					
	038S001304	61.00 J					
	038S001403	350.00 J					
	038S001405	80.00 J					
1,4-Dichlorobenzene			6,000	18,000	9,000	27,000	2,200
	038S001403	65.00 J					
2,4-Dimethylphenol			910,000	2,730,000	9,800,000	29,400,000	1,700
	038S001403	210.00 J					
	038S001405	220.00 J					
2-Methylnaphthalene			80,000	240,000	560,000	1,680,000	6,100
	038S001705	88.00 J					
	038S003003	37.00 J					
	038S003205	1400.00					
2-Methylphenol (o-Cresol)			2,400,000	7,200,000	28,000,000	84,000,000	300
	038S001403	250.00 J					
	038S001405	66.00 J					
4-Methylphenol (p-Cresol)			250,000	750,000	3,000,000	9,000,000	30
	038S001403	580.00					X
	038S001405	190.00 J					X
Acenaphthylene			1,100,000	3,300,000	11,000,000	33,000,000	27,000
	038S000106	87.00 J					
	038S000803	48.00 J					
	038S001203	62.00 J					
	038S002603	230.00 J					
	038S002605	71.00 J					
	038S003003	49.00 J					
	038S003303	39.00 J					
Anthracene			18,000,000	54,000,000	260,000,000	780,000,000	2,500,000
	038S000803	43.00 J					
	038S001203	47.00 J					
	038S002603	180.00 J					
	038S003205	120.00 J					
Benzo(a)anthracene			1,400	4,200	5,000	15,000	3,200
	038S000104	43.00 J					
	038S000106	440.00 J					
	038S000703	37.00 J					
	038S000803	250.00 J					
	038S001203	440.00					
	038S001204	42.00 J					
	038S001403	64.00 J					
	038S001603	190.00 J					
	038S002603	260.00 J					
	038S002605	220.00 J					
	038S003303	37.00 J					
Benzo(a)pyrene			100	300	500	1,500	8,000
	038S000104	40.00 J					
	038S000106	440.00 J	X	X			
	038S000803	230.00 J	X				
	038S001203	410.00	X	X			
	038S001204	59.00 J					
	038S002603	300.00 J	X	X			
	038S002605	260.00 J	X				
	038S003303	60.00 J					
	038S004204	190.00 J	X				
Benzo(b)fluoranthene			1,400	4,200	4,800	14,400	10,000
	038S000104	43.00 J					
	038S000106	530.00 J					
	038S000803	200.00 J					
	038S001203	560.00					
	038S001204	65.00 J					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S001403	150.00 J					
	038S001405	84.00 J					
	038S001603	230.00 J					
	038S003003	51.00 J					
	038S003203	120.00 J					
	038S003303	75.00 J					
	038S003403	2100.00 J	X				
	038S003703	73.00 J					
	038S004204	380.00 J					
	038S004206	48.00 J					
Benzo(g,h,i)perylene			2,300,000	6,900,000	41,000,000	123,000,000	32,000,000
	038S000106	360.00 J					
	038S001203	340.00 J					
	038S001204	52.00 J					
	038S002603	120.00 J					
	038S002605	240.00 J					
	038S003003	66.00 J					
	038S003303	56.00 J					
	038S004204	210.00 J					
Benzo(k)fluoranthene			15,000	45,000	52,000	156,000	25,000
	038S000104	51.00 J					
	038S000106	410.00 J					
	038S000703	40.00 J					
	038S000803	300.00 J					
	038S001203	490.00					
	038S001204	71.00 J					
	038S001403	65.00 J					
	038S001603	190.00 J					
	038S002603	330.00 J					
	038S002605	270.00 J					
	038S003203	96.00 J					
	038S003403	910.00 J					
bis(2-Ethylhexyl)phthalate (BEHP)			76,000	228,000	280,000	840,000	3,600,000
	038S000303	300.00 J					
	038S000305	240.00 J					
Chrysene			140,000	420,000	450,000	1,350,000	77,000
	038S000104	52.00 J					
	038S000106	540.00 J					
	038S000703	50.00 J					
	038S000803	280.00 J					
	038S001203	560.00					
	038S001204	65.00 J					
	038S001403	93.00 J					
	038S001405	44.00 J					
	038S001603	240.00 J					
	038S002603	280.00 J					
	038S002605	280.00 J					
	038S003203	77.00 J					
	038S003303	42.00 J					
	038S003403	1800.00					
Dibenz(a,h)anthracene			100	300	500	1,500	30,000
	038S000106	140.00 J	X				
	038S000803	69.00 J					
	038S001203	160.00 J	X				
	038S001403	42.00 J					
	038S003403	590.00 J	X	X	X		
Fluoranthene			2,900,000	8,700,000	48,000,000	144,000,000	1,200,000
	038S000104	59.00 J					
	038S000106	560.00 J					
	038S000703	45.00 J					
	038S000803	350.00 J					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S000804	37.00 J					
	038S001203	940.00					
	038S001204	91.00 J					
	038S001403	89.00 J					
	038S002603	310.00 J					
	038S002605	470.00					
	038S003203	120.00 J					
	038S003205	180.00 J					
	038S003403	3200.00					
Indeno(1,2,3-cd)pyrene			1,500	4,500	5,300	15,900	28,000
	038S000106	300.00 J					
	038S000803	140.00 J					
	038S001203	430.00					
	038S001204	54.00 J					
	038S001403	82.00 J					
	038S001805	180.00 J					
	038S002603	220.00 J					
	038S002605	200.00 J					
	038S003303	53.00 J					
	038S003403	1400.00					
	038S004204	240.00 J					
Naphthalene			40,000	120,000	270,000	810,000	1,700
	038S001403	190.00 J					
	038S001405	150.00 J					
	038S001703	110.00 J					
	038S001705	100.00 J					
	038S003003	38.00 J					
	038S003205	530.00 J					
Phenanthrene			2,000,000	6,000,000	30,000,000	90,000,000	250,000
	038S000106	110.00 J					
	038S000703	58.00 J					
	038S000803	180.00 J					
	038S001003	39.00 J					
	038S001203	320.00 J					
	038S001204	45.00 J					
	038S001403	140.00 J					
	038S001705	190.00 J					
	038S002605	110.00 J					
	038S003205	110.00 J					
Phenol			900,000	NA	390,000,000	1,170,000,000	50
	038S001303	46.00 J					
	038S001403	830.00					X
	038S001405	180.00 J					X
	038S001503	110.00 J					X
	038S001805	360.00 J					X
Pyrene			2,200,000	6,600,000	37,000,000	111,000,000	880,000
	038S000104	59.00 J					
	038S000106	570.00 J					
	038S000703	62.00 J					
	038S000803	410.00					
	038S000804	43.00 J					
	038S001203	750.00					
	038S001204	73.00 J					
	038S001403	93.00 J					
	038S001405	39.00 J					
	038S001603	200.00 J					
	038S002603	360.00 J					
	038S002605	460.00					
	038S003203	89.00 J					
	038S003205	110.00 J					
	038S003303	45.00 J					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

			Residential Exposure		Industrial Exposure		Leachability Based On
Parameter	Sample ID	Result	SCTL	3x SCTL	SCTL	3x SCTL	Groundwater Criteria
	038S003403	2900.00					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
1,1,1-Trichloroethane				400,000	1,200,000	3,300,000	9,900,000	1,900
	038S000703	5.00	J					
	038S000705	18.00						
	038S000803	8.00	J					
	038S000804	7.00	J					
	038S000903	3.00	J					
	038S001003	23.00	D					
	038S001004	3.00	J					
	038S001203	1.00	J					
	038S001204	3.00	J					
	038S001303	12.00						
	038S001304	9.00	J					
	038S001403	150.00						
	038S001405	5.00	J					
	038S001503	3.00	J					
	038S001603	5.00	J					
	038S001705	2.00	J					
	038S001803	2.00	J					
	038S001805	91.00						
	038S002803	17.00						
	038S004204	1.00	J					
1,1,2,2-Tetrachloroethane				700	2,100	1,100	3,300	2
	038S000703	1.00	J					
1,1-Dichloroethane				290,000	870,000	2,000,000	6,000,000	400
	038S000703	3.00	J					
	038S000705	6.00	J					
	038S001204	1.00	J					
	038S001303	4.00	J					
	038S001403	15.00						
	038S001805	3.00	J					
	038S002803	5.00	J					
1,2-Dichloroethane				500	1,500	700	2,100	10
	038S001303	2.00	J					
	038S001403	22.00						X
1,2-Dichloroethene (total)*				19,000	57,000	130,000	390,000	400
	038S000703	30.00						
	038S000705	26.00						
	038S000803	5.00	J					
	038S000804	1.00	J					
	038S000903	3.00	J					
	038S001203	2.00	J					
	038S001303	9.00	J					
	038S001304	1.00	J					
	038S001805	2.00	J					
	038S002803	5.00	J					
2-Butanone (MEK)				3,100,000	9,300,000	21,000,000	63,000,000	17,000
	038S000404	8.00	J					
	038S000503	3.00	J					
	038S001003	5.00	DJ					
	038S001004	6.00	J					
	038S001104	7.00	J					
	038S001403	15.00						

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S001405	17.00	J					
	038S001603	6.00	J					
	038S001805	8.00	J					
	038S002203	3.00	J					
	038S002403	1.00	J					
	038S002704	1.00	J					
	038S002803	2.00	J					
Acetone				780,000	2,340,000	5,500,000	16,500,000	2,800
	038S000903	19.00						
	038S001003	150.00	D					
	038S001004	54.00						
	038S001103	84.00						
	038S001104	120.00						
	038S001403	140.00						
	038S001405	89.00	D					
	038S001503	19.00						
	038S001603	160.00	J					
Benzene				1,100	3,300	1,600	4,800	7
	038S003203	2.00	J					
Carbon disulfide				200,000	600,000	1,400,000	4,200,000	5,600
	038S000703	2.00	J					
Carbon tetrachloride				400	1,200	600	1,800	40
	038S000703	2.00	J					
	038S001104	1.00	J					
	038S001303	1.00	J					
	038S001403	1.00	J					
	038S001703	1.00	J					
	038S001805	3.00	J					
Chlorobenzene				30,000	120,000	200,000	600,000	1,300
	038S001303	11.00						
	038S001304	4.00	J					
	038S001403	2.00	J					
Chloroform				400	1,200	500	1,500	30
	038S000803	3.00	J					
	038S000804	1.00	J					
	038S000903	1.00	J					
	038S001303	8.00	J					
	038S001304	2.00	J					
	038S001403	79.00						X
	038S001805	3.00	J					
Ethylbenzene				1,100,000	3,300,000	8,400,000	25,200,000	600
	038S001303	2.00	J					
	038S001603	1.00	J					
	038S001703	1.00	J					
	038S001805	2.00	J					
	038S002503	1.00	J					
	038S003203	3.00	J					
Methylene chloride				16,000	48,000	23,000	69,000	20
	038S001603	19.00	J					
Tetrachloroethene				8,900	26,700	17,000	51,000	30
	038S000703	16.00						
	038S000705	26.00						

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S000803	11.00	J					
	038S000804	4.00	J					
	038S000903	2.00	J					
	038S001003	27.00						
	038S001004	1.00	J					
	038S001103	1.00	J					
	038S001104	11.00						
	038S001204	3.00	J					
	038S001303	23.00						
	038S001304	17.00						
	038S001403	410.00	J					X
	038S001405	120.00						X
	038S001503	1.00	J					
	038S001603	2.00	J					
	038S001703	2.00	J					
	038S001705	15.00						
	038S001803	3.00	J					
	038S001805	230.00						X
	038S004204	15.00						
	038S004206	4.00	J					
Toluene				380,000	1,140,000	2,600,000	7,800,000	500
	038S000104	6.00	J					
	038S000404	4.00	J					
	038S000503	23.00						
	038S000505	22.00						
	038S000703	34.00						
	038S000705	34.00						
	038S000803	78.00						
	038S000804	24.00						
	038S000903	14.00						
	038S001003	7.00	J					
	038S001004	13.00						
	038S001104	4.00	J					
	038S001203	20.00						
	038S001204	32.00						
	038S001303	97.00						
	038S001304	61.00						
	038S001403	33.00						
	038S001405	6.00	J					
	038S001503	9.00	J					
	038S001603	22.00						
	038S001703	11.00	J					
	038S001705	18.00	J					
	038S001803	9.00	J					
	038S001805	60.00						
	038S002503	4.00	J					
	038S002603	6.00	J					
	038S002605	25.00						
	038S002704	2.00	J					
	038S002803	8.00	J					
	038S003703	2.00	J					
	038S004204	42.00						
	038S004206	5.00	J					

RI RESULTS - SUBSURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Trichloroethene				6,000	18,000	8,500	25,500	30
	038S000303	2.00	J					
	038S000305	3.00	J					
	038S000703	79.00						X
	038S000705	74.00						X
	038S000803	33.00						X
	038S000804	12.00						
	038S000903	4.00	J					
	038S001003	7.00	J					
	038S001203	10.00	J					
	038S001204	21.00						
	038S001303	120.00						X
	038S001304	34.00						X
	038S001403	400.00	J					X
	038S001405	13.00	J					
	038S001503	17.00						
	038S001603	2.00	J					
	038S001705	2.00	J					
	038S001803	2.00	J					
	038S001805	110.00						X
	038S002704	1.00	J					
	038S002803	10.00	J					
	038S004204	21.00						
	038S004206	6.00	J					
Xylene (Total)				5,900,000	17,700,000	40,000,000	120,000,000	200
	038S001603	14.00	J					
	038S001805	11.00	J					
	038S002503	3.00	J					
	038S002605	1.00	J					
	038S002803	2.00	J					
	038S004204	2.00	J					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).
* - No SCTL for 1,2-Dichloroethene (total) was listed. The SCTL for cis-1,2-Dichloroethene was used since it was less than the SCTL for trans-1,2-Dichloroethene.

EPA Data

Surface Soil

EPA DATA - SURFACE SOIL
COMPARISON OF PESTICIDE/PCB DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
4,4'-DDE				3,300	9,900	13,000	39,000	18000
	038S0T0301	10.00	J					
	038S0T0401	3.80	J					
	038S0T0701	15.00	JN					
	038S0T1501	5.80	J					
	038S0T3101	120.00						
	038S0T3601	46.00						
	038S0T3701	100.00						
4,4'-DDT				3,300	9,900	13,000	39,000	11000
	038S0T0401	8.00	J					
	038S0T3101	56.00						
	038S0T3501	11.00	J					
	038S0T3701	45.00						
Aroclor-1260	(use PCB mixture SCTL)			500	1,500	2,100	6,300	17000
	038S0S2301	81.00	J					
	038S0I1001	90.00	J					
	038S0T0101	810.00		X				
	038S0T1801	83.00	J					
beta-BHC				600	1,800	2,100	6,300	1
	038S0T4201	56.00	N					X
delta-BHC				22,000	66,000	420,000	1,260,000	200
	038S0T4201	300.00	N					X
Dieldrin				70	210	300	900	4
	038S0T0301	20.00	J					X
	038S0T0401	3.10	J					
	038S0T0701	9.00	JN					X
	038S0T1501	40.00	J					X
	038S0T3701	84.00		X				X
	038S0T3801	5.30	J					X
Endosulfan I	(use Endosulfan SCTL)			410,000	1,230,000	6,700,000	20,100,000	3800
	038S0T4201	7.40	JN					
Endosulfan II	(use Endosulfan SCTL)			410,000	1,230,000	6,700,000	20,100,000	3800
	038S0T4201	11.00	JN					
Endosulfan sulfate	(use Endosulfan SCTL)			410,000	1,230,000	6,700,000	20,100,000	3800
	038S0T4201	70.00	N					
Endrin				21,000	63,000	340,000	1,020,000	1000
	038S0T4201	7.10	JN					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

EPA DATA - SURFACE SOIL
COMPARISON OF SVOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
1,2-Dichlorobenzene			650,000	1,950,000	4,600,000	13,800,000	17,000
	038S0T0502	280.00					
Acenaphthene			1,900,000	5,700,000	18,000,000	54,000,000	2,100
	038S0T0502	1400.00 J					
Anthracene			18,000,000	54,000,000	260,000,000	780,000,000	2,500,000
	038S0T0502	2000.00 J					
Benzo(a)anthracene			1,400	4,200	5,000	15,000	3,200
	038S0T0502	740.00 J					
	038S0T1101	370.00 J					
	038S0T2701	2600.00 J	X				
Benzo(a)pyrene			100	300	500	1,500	8,000
	038S0T0502	380.00 J	X	X			
	038S0T2701	2200.00 J	X	X	X	X	
Benzo(b)fluoranthene			1,400	4,200	4,800	14,400	10,000
	038S0T0502	530.00 J					
	038S0T1101	670.00 J					
	038S0T1701	470.00 J					
	038S0T2701	3800.00	X				
	038S0T3801	230.00 J					
Benzo(g,h,i)perylene			2,300,000	6,900,000	41,000,000	123,000,000	32,000,000
	038S0T2701	1000.00 J					
	038S0T3801	260.00 J					
Chrysene			140,000	420,000	450,000	1,350,000	77,000
	038S0T0502	1100.00 J					
	038S0T1101	470.00 J					
	038S0T2701	2200.00 J					
Fluoranthene			2,900,000	8,700,000	48,000,000	144,000,000	1,200,000
	038S0T0502	1700.00 J					
	038S0T1101	490.00 J					
	038S0T2701	3700.00					
Fluorene			2,200,000	6,600,000	28,000,000	84,000,000	160,000
	038S0T0502	790.00 J					
Indeno(1,2,3-cd)pyrene			1,500	4,500	5,300	15,900	28,000
	038S0T2701	1000.00 J					
Naphthalene			40,000	120,000	270,000	810,000	1,700
	038S0T0502	440.00 J					
Phenanthrene			2,000,000	6,000,000	30,000,000	90,000,000	250,000
	038S0T0502	17000.00					
	038S0T2701	340.00 J					
Pyrene			2,200,000	6,600,000	37,000,000	111,000,000	880,000
	038S0T0502	1800.00 J					
	038S0T1101	480.00 J					
	038S0T2701	3500.00					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

EPA DATA - SURFACE SOIL
COMPARISON OF VOC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
1,1,1-Trichloroethane			400,000	1,200,000	3,300,000	9,900,000	1,900
	038S0T0502	310.00					
	038S0T2902	7.80 J					
Tetrachloroethene			8,900	26,700	17,000	51,000	30
	038S0I1001	9.20 J					
	038S0I1002	1100.00 J					X
	038S0T0502	810.00 J					X
	038S0T2802	4.80 J					
	038S0T2902	34.00 J					X
	038S0T3002	27.00 J					
	038S0T3101	8.60 J					
	038S0T4102	8.20 J					
Toluene			380,000	1,140,000	2,600,000	7,800,000	500
	038S0T0601	8.70 J					
	038S0T2301	6.90 J					
	038S0T3101	5.80 J					
	038S0T3601	13.00 J					
	038S0T3801	5.90 J					
Trichloroethene			6,000	18,000	8,500	25,500	30
	038S0T0502	200.00					X
	038S0T4102	6.70 J					

Notes:
All concentrations and criteria are in micrograms per kilogram (ug/kg).

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Aluminum			72,000	216,000	NA	NA	***
	038S0I1001	46.00					
	038S0I1002	33.00					
	038S0S2301	930.00					
	038S0S2302	360.00					
	038S0T0101	17000.00					
	038S0T0102	140.00					
	038S0T0201	6600.00					
	038S0T0301	3700.00					
	038S0T0302	1700.00					
	038S0T0401	7600.00					
	038S0T0402	66.00					
	038S0T0501	18.00					
	038S0T0502	27.00					
	038S0T0601	1700.00					
	038S0T0602	110.00					
	038S0T0701	4700.00					
	038S0T0702	42.00					
	038S0T0801	14000.00					
	038S0T0802	900.00					
	038S0T0901	21000.00					
	038S0T0902	76.00					
	038S0T1001	8700.00					
	038S0T1002	330.00					
	038S0T1101	6900.00					
	038S0T1102	280.00					
	038S0T1201	3900.00					
	038S0T1202	380.00					
	038S0T1301	15000.00					
	038S0T1302	440.00					
	038S0T1401	35000.00					
	038S0T1402	20.00					
	038S0T1501	1800.00					
	038S0T1502	290.00					
	038S0T1601	10000.00					
	038S0T1602	39.00					
	038S0T1701	7800.00					
	038S0T1702	650.00					
	038S0T1801	13000.00					
	038S0T1802	1700.00					
	038S0T1901	32000.00					
	038S0T1902	650.00					
	038S0T2001	28000.00					
	038S0T2002	30.00					
	038S0T2201	44.00					
	038S0T2202	120.00					
	038S0T2301	11000.00					
	038S0T2302	47.00					
	038S0T2501	8700.00					
	038S0T2502	130.00					
	038S0T2601	230.00					
	038S0T2602	69.00					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T2701	190.00					
	038S0T2702	60.00					
	038S0T2801	39.00					
	038S0T2802	110.00					
	038S0T2901	3200.00					
	038S0T2902	550.00					
	038S0T3002	87.00					
	038S0T3101	2200.00					
	038S0T3102	100.00					
	038S0T3201	36.00					
	038S0T3202	32.00					
	038S0T3301	320.00					
	038S0T3302	120.00					
	038S0T3401	5400.00					
	038S0T3402	96.00					
	038S0T3501	5400.00					
	038S0T3502	180.00					
	038S0T3601	2800.00					
	038S0T3602	53.00					
	038S0T3701	6700.00					
	038S0T3702	78.00					
	038S0T3801	5900.00					
	038S0T3901	13000.00					
	038S0T4001	8200.00					
	038S0T4002	360.00					
	038S0T4101	8000.00					
	038S0T4102	96.00					
	038S0T4201	1600.00					
Arsenic	*Note: RC = 1.56 mg/kg		0.8	2.4	3.7	11.1	29
	038S0T0101	5.10	X	X	X		
	038S0T1101	4.00	X	X	X		
	038S0T1401	8.70	X	X	X		
	038S0T1501	5.70	X	X	X		
	038S0T1601	5.60	X	X	X		
	038S0T1701	6.30	X	X	X		
	038S0T1802	3.40	X	X			
	038S0T1902	1.90	X				
	038S0T2301	3.20	X	X			
	038S0T2501	3.10	X	X			
Barium			110	NA	87,000	261,000	1,600
	038S0I1001	2.70					
	038S0S2301	5.60					
	038S0S2302	5.00					
	038S0T0101	20.00					
	038S0T0201	11.00					
	038S0T0301	28.00					
	038S0T0302	12.00					
	038S0T0401	14.00					
	038S0T0402	4.60					
	038S0T0601	13.00					
	038S0T0701	23.00					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T0801	3.80					
	038S0T0802	3.70					
	038S0T0901	5.40					
	038S0T1001	12.00					
	038S0T1002	10.00					
	038S0T1101	24.00					
	038S0T1102	1.50					
	038S0T1201	18.00					
	038S0T1202	1.80					
	038S0T1301	29.00					
	038S0T1302	5.30					
	038S0T1401	6.20					
	038S0T1501	21.00					
	038S0T1502	5.20					
	038S0T1601	33.00					
	038S0T1701	46.00					
	038S0T1702	2.50					
	038S0T1801	24.00					
	038S0T1802	110.00	X				
	038S0T1901	6.10					
	038S0T1902	33.00					
	038S0T2001	15.00					
	038S0T2202	1.70					
	038S0T2301	30.00					
	038S0T2501	16.00					
	038S0T2601	6.60					
	038S0T2701	2.80					
	038S0T2802	3.80					
	038S0T2901	2.50					
	038S0T2902	21.00					
	038S0T3002	1.40					
	038S0T3101	9.20					
	038S0T3301	6.60					
	038S0T3401	12.00					
	038S0T3501	18.00					
	038S0T3502	1.30					
	038S0T3601	30.00					
	038S0T3701	13.00					
	038S0T3801	15.00					
	038S0T3901	16.00					
	038S0T4001	16.00					
	038S0T4002	4.10					
	038S0T4101	29.00					
	038S0T4102	2.00					
	038S0T4201	24.00					
Cadmium			75	NA	1,300	3,900	8
	038S0I1001	2.40					
	038S0I1002	2.20					
	038S0S2301	1.20					
	038S0T0301	0.72					
	038S0T0401	0.54					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T0701	1.20						
	038S0T0802	1.70						
	038S0T0901	1.30						
	038S0T1001	0.50						
	038S0T1002	0.94						
	038S0T1101	0.92						
	038S0T1301	1.30						
	038S0T1601	1.50						
	038S0T1701	1.40						
	038S0T2301	1.30						
	038S0T3101	2.00						
	038S0T3401	0.56						
	038S0T3501	1.10						
	038S0T3601	2.00						
	038S0T3801	4.60						
	038S0T3901	2.50						
	038S0T4001	2.40						
	038S0T4002	1.20						
	038S0T4101	17.00						X
	038S0T4102	3.40						
	038S0T4201	21.00						X
Calcium				Not Available				
	038S0S2301	330.00						
	038S0S2302	350.00						
	038S0T0101	4400.00						
	038S0T0201	940.00						
	038S0T0301	2800.00						
	038S0T0302	1500.00						
	038S0T0401	1200.00						
	038S0T0502	54.00						
	038S0T0601	3600.00						
	038S0T0602	83.00						
	038S0T0701	4100.00						
	038S0T0801	260.00						
	038S0T0802	210.00						
	038S0T0901	290.00						
	038S0T1001	510.00						
	038S0T1002	270.00						
	038S0T1101	4100.00	A					
	038S0T1102	150.00						
	038S0T1201	660.00						
	038S0T1202	260.00						
	038S0T1301	22000.00						
	038S0T1302	1600.00						
	038S0T1401	360.00						
	038S0T1501	720.00						
	038S0T1502	160.00						
	038S0T1601	9700.00						
	038S0T1701	7900.00						
	038S0T1702	260.00						
	038S0T1801	2000.00						

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T1802	1800.00						
	038S0T1902	5400.00						
	038S0T2001	5800.00	A					
	038S0T2201	170.00						
	038S0T2202	240.00						
	038S0T2301	3500.00						
	038S0T2501	2000.00						
	038S0T2502	64.00						
	038S0T2601	1400.00						
	038S0T2701	1100.00						
	038S0T2801	170.00						
	038S0T2802	150.00						
	038S0T2901	190.00						
	038S0T2902	2900.00						
	038S0T3002	57.00						
	038S0T3101	380.00						
	038S0T3201	55.00						
	038S0T3202	200.00						
	038S0T3301	430.00						
	038S0T3302	68.00						
	038S0T3401	730.00						
	038S0T3501	2000.00						
	038S0T3502	150.00						
	038S0T3601	1900.00						
	038S0T3701	480.00						
	038S0T3801	620.00						
	038S0T3901	1200.00						
	038S0T4001	1100.00						
	038S0T4002	510.00						
	038S0T4101	1900.00						
	038S0T4102	110.00						
	038S0T4201	1900.00						
Chromium	(use Chromium VI SCTL)			210	630	420	1,260	38
	038S0I1001	93.00						X
	038S0I1002	20.00						
	038S0S2301	3.00						
	038S0S2302	1.70						
	038S0T0101	17.00						
	038S0T0201	5.90						
	038S0T0301	11.00						
	038S0T0302	4.40						
	038S0T0401	8.70						
	038S0T0502	3.80						
	038S0T0601	4.80						
	038S0T0701	9.70						
	038S0T0801	12.00						
	038S0T0802	38.00						X
	038S0T0901	21.00						
	038S0T1001	11.00						
	038S0T1002	3.20						
	038S0T1101	9.30						

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T1201	4.50					
	038S0T1301	13.00					
	038S0T1302	2.80					
	038S0T1401	34.00					
	038S0T1501	6.70					
	038S0T1601	11.00					
	038S0T1701	9.30					
	038S0T1801	12.00					
	038S0T1802	10.00					
	038S0T1901	33.00					
	038S0T1902	1.00					
	038S0T2001	30.00					
	038S0T2301	12.00					
	038S0T2501	13.00					
	038S0T2802	11.00					
	038S0T2901	3.60					
	038S0T2902	3.60					
	038S0T3002	6.00					
	038S0T3101	4.50					
	038S0T3401	6.60					
	038S0T3501	9.90					
	038S0T3601	30.00					
	038S0T3701	12.00					
	038S0T3801	48.00					X
	038S0T3901	20.00					
	038S0T4001	17.00					
	038S0T4002	6.90					
	038S0T4101	36.00					
	038S0T4102	10.00					
	038S0T4201	40.00					X
Cobalt			4,700	14,100	110,000	330,000	***
	038S0T1701	1.20					
	038S0T1802	2.10					
	038S0T2601	2.10					
	038S0T2701	1.90					
	038S0T2901	1.60					
	038S0T3301	37.00					
	038S0T3701	1.10					
	038S0T3801	1.00					
	038S0T4101	1.30					
Copper			110	NA	76,000	228,000	***
	038S0I1001	5.40					
	038S0I1002	2.80					
	038S0S2301	4.10					
	038S0S2302	17.00					
	038S0T0101	9.80					
	038S0T0102	1.10					
	038S0T0201	7.70					
	038S0T0301	35.00					
	038S0T0302	15.00					
	038S0T0401	11.00					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T0502	18.00					
	038S0T0601	7.00					
	038S0T0701	21.00					
	038S0T0801	2.60					
	038S0T0802	31.00					
	038S0T0901	5.40					
	038S0T0902	6.00					
	038S0T1001	6.30					
	038S0T1002	24.00					
	038S0T1101	140.00	X				
	038S0T1102	4.10					
	038S0T1201	7.40					
	038S0T1202	1.50					
	038S0T1301	76.00					
	038S0T1302	14.00					
	038S0T1401	5.20					
	038S0T1402	1.40					
	038S0T1501	43.00					
	038S0T1502	58.00					
	038S0T1601	67.00					
	038S0T1701	25.00					
	038S0T1702	3.90					
	038S0T1801	32.00					
	038S0T1802	100.00					
	038S0T1901	4.80					
	038S0T1902	32.00					
	038S0T2001	7.00					
	038S0T2202	36.00					
	038S0T2301	46.00					
	038S0T2501	7.30					
	038S0T2502	1.10					
	038S0T2601	3.20					
	038S0T2602	3.70					
	038S0T2702	5.70					
	038S0T2802	10.00					
	038S0T2902	35.00					
	038S0T3002	3.70					
	038S0T3101	140.00	X				
	038S0T3102	1.20					
	038S0T3301	3.30					
	038S0T3401	6.50					
	038S0T3501	11.00					
	038S0T3502	1.80					
	038S0T3601	11.00					
	038S0T3701	18.00					
	038S0T3801	28.00					
	038S0T3901	43.00					
	038S0T4001	59.00					
	038S0T4002	17.00					
	038S0T4101	210.00	X				
	038S0T4102	7.80					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T4201	190.00	A	X				
Cyanide (CN)				30	NA	39,000	117,000	40
	038S0T0901	0.27						
	038S0T1002	0.53	A					
	038S0T3601	9.70						
	038S0T4201	0.00	NAI					
Iron				23,000	69,000	480,000	1,440,000	***
	038S0I1001	92.00						
	038S0I1002	35.00						
	038S0S2301	770.00						
	038S0S2302	780.00						
	038S0T0101	10000.00						
	038S0T0102	150.00						
	038S0T0201	3500.00						
	038S0T0301	3400.00						
	038S0T0302	1700.00						
	038S0T0401	4200.00						
	038S0T0402	47.00						
	038S0T0501	24.00						
	038S0T0502	210.00						
	038S0T0601	1800.00						
	038S0T0602	92.00						
	038S0T0701	3000.00						
	038S0T0702	18.00						
	038S0T0801	8100.00						
	038S0T0802	710.00						
	038S0T0901	1300.00						
	038S0T0902	76.00						
	038S0T1001	4500.00						
	038S0T1002	1500.00						
	038S0T1101	6700.00						
	038S0T1102	250.00						
	038S0T1201	2900.00						
	038S0T1202	220.00						
	038S0T1301	10000.00						
	038S0T1302	3700.00						
	038S0T1401	22000.00						
	038S0T1402	14.00						
	038S0T1501	2500.00						
	038S0T1502	860.00						
	038S0T1601	7500.00						
	038S0T1602	24.00						
	038S0T1701	7400.00						
	038S0T1702	680.00						
	038S0T1801	7900.00						
	038S0T1802	6800.00						
	038S0T1901	18000.00						
	038S0T1902	1400.00						
	038S0T2001	16000.00						
	038S0T2002	32.00						
	038S0T2201	170.00						

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T2202	350.00					
	038S0T2301	7000.00					
	038S0T2302	87.00					
	038S0T2501	8800.00					
	038S0T2502	85.00					
	038S0T2601	260.00					
	038S0T2602	110.00					
	038S0T2701	210.00					
	038S0T2702	120.00					
	038S0T2801	34.00					
	038S0T2802	270.00					
	038S0T2901	2000.00					
	038S0T2902	2100.00					
	038S0T3002	180.00					
	038S0T3101	1300.00					
	038S0T3102	160.00					
	038S0T3201	51.00					
	038S0T3202	29.00					
	038S0T3301	400.00					
	038S0T3302	100.00					
	038S0T3401	3400.00					
	038S0T3402	130.00					
	038S0T3501	4200.00					
	038S0T3502	150.00					
	038S0T3601	2100.00					
	038S0T3602	37.00					
	038S0T3701	3200.00					
	038S0T3702	41.00					
	038S0T3801	4600.00					
	038S0T3901	8200.00					
	038S0T4001	4500.00					
	038S0T4002	390.00					
	038S0T4101	3900.00					
	038S0T4102	170.00					
	038S0T4201	2400.00					
Lead			400	1,200	920	2,760	***
	038S0I1001	36.00					
	038S0I1002	12.00					
	038S0S2301	35.00					
	038S0S2302	58.00					
	038S0T0101	58.00					
	038S0T0102	5.30					
	038S0T0201	20.00					
	038S0T0301	210.00					
	038S0T0302	65.00					
	038S0T0401	46.00					
	038S0T0402	13.00					
	038S0T0501	7.60					
	038S0T0502	17.00					
	038S0T0601	74.00					
	038S0T0602	8.90					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T0701	93.00						
	038S0T0702	2.80						
	038S0T0801	3.30						
	038S0T0802	50.00						
	038S0T0901	5.80						
	038S0T0902	1.80						
	038S0T1001	23.00						
	038S0T1002	61.00						
	038S0T1101	240.00						
	038S0T1102	11.00						
	038S0T1201	46.00						
	038S0T1202	5.20						
	038S0T1301	110.00						
	038S0T1302	29.00						
	038S0T1401	6.70						
	038S0T1402	0.80						
	038S0T1501	200.00						
	038S0T1502	37.00						
	038S0T1601	170.00						
	038S0T1602	2.70						
	038S0T1701	180.00						
	038S0T1702	71.00						
	038S0T1801	320.00						
	038S0T1802	350.00						
	038S0T1901	4.00						
	038S0T1902	250.00						
	038S0T2001	22.00						
	038S0T2002	1.00						
	038S0T2202	41.00						
	038S0T2301	110.00						
	038S0T2501	160.00	A					
	038S0T2601	43.00						
	038S0T2602	5.30						
	038S0T2701	9.80						
	038S0T2702	6.20						
	038S0T2802	10.00						
	038S0T2902	92.00						
	038S0T3002	6.80						
	038S0T3101	31.00						
	038S0T3202	4.80						
	038S0T3301	78.00						
	038S0T3302	4.80						
	038S0T3401	53.00						
	038S0T3501	75.00						
	038S0T3502	5.00						
	038S0T3601	240.00						
	038S0T3701	80.00						
	038S0T3801	110.00						
	038S0T3901	110.00						
	038S0T4001	57.00						
	038S0T4002	31.00						

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T4101	360.00						
Magnesium				Not Available				
	038S0T4102	12.00						
	038S0T4201	270.00						
	038S0I1001	16.00						
	038S0S2301	68.00						
	038S0S2302	140.00						
	038S0T0101	260.00						
	038S0T0102	11.00						
	038S0T0201	160.00						
	038S0T0301	700.00						
	038S0T0302	380.00						
	038S0T0401	240.00						
	038S0T0601	540.00						
	038S0T0602	24.00						
	038S0T0701	750.00						
	038S0T0801	120.00						
	038S0T0802	41.00						
	038S0T0901	150.00						
	038S0T0902	11.00						
	038S0T1001	160.00						
	038S0T1002	66.00						
	038S0T1101	410.00						
	038S0T1102	25.00						
	038S0T1201	200.00						
	038S0T1202	29.00						
	038S0T1301	590.00						
	038S0T1302	79.00						
	038S0T1401	130.00						
	038S0T1501	290.00						
	038S0T1502	76.00						
	038S0T1601	430.00						
	038S0T1701	470.00						
	038S0T1702	36.00						
	038S0T1801	730.00						
	038S0T1802	1200.00						
	038S0T1901	100.00						
	038S0T1902	560.00						
	038S0T2001	850.00	A					
	038S0T2201	16.00						
	038S0T2202	28.00						
	038S0T2301	260.00						
	038S0T2501	410.00						
	038S0T2502	16.00						
	038S0T2601	96.00						
	038S0T2602	11.00						
	038S0T2701	48.00						
	038S0T2802	17.00						
	038S0T2901	38.00						
	038S0T2902	290.00						
	038S0T3101	100.00						

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T3102	9.40					
	038S0T3301	92.00					
	038S0T3302	14.00					
	038S0T3401	190.00					
	038S0T3501	440.00					
	038S0T3502	14.00					
	038S0T3601	350.00					
	038S0T3701	150.00					
	038S0T3801	170.00					
	038S0T3901	290.00					
	038S0T4001	160.00					
	038S0T4002	71.00					
	038S0T4101	250.00					
	038S0T4102	12.00					
	038S0T4201	300.00					
Manganese			1,600	4,800	22,000	66,000	***
	038S0S2301	4.30					
	038S0S2302	4.70					
	038S0T0101	210.00					
	038S0T0102	1.70					
	038S0T0201	90.00					
	038S0T0301	63.00					
	038S0T0302	29.00					
	038S0T0401	86.00					
	038S0T0601	50.00					
	038S0T0602	2.90					
	038S0T0701	100.00					
	038S0T0801	11.00					
	038S0T0802	4.70					
	038S0T0901	14.00					
	038S0T1001	100.00					
	038S0T1002	14.00					
	038S0T1101	88.00					
	038S0T1102	3.80					
	038S0T1201	31.00					
	038S0T1202	7.70					
	038S0T1301	82.00					
	038S0T1302	18.00					
	038S0T1401	10.00					
	038S0T1402	1.20					
	038S0T1501	45.00					
	038S0T1502	5.60					
	038S0T1601	110.00					
	038S0T1602	3.10					
	038S0T1701	130.00					
	038S0T1702	8.00					
	038S0T1801	380.00					
	038S0T1901	9.40					
	038S0T1902	20.00					
	038S0T2001	50.00					
	038S0T2201	1.40					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T2202	8.00					
	038S0T2301	100.00					
	038S0T2302	1.30					
	038S0T2501	74.00					
	038S0T2502	1.90					
	038S0T2601	6.10					
	038S0T2602	4.00					
	038S0T2701	3.00					
	038S0T2702	1.50					
	038S0T2802	4.00					
	038S0T2901	3.10					
	038S0T2902	35.00					
	038S0T3002	2.30					
	038S0T3101	30.00					
	038S0T3102	1.90					
	038S0T3301	5.10					
	038S0T3401	80.00					
	038S0T3501	92.00					
	038S0T3502	15.00					
	038S0T3601	79.00					
	038S0T3701	100.00					
	038S0T3702	1.00					
	038S0T3801	87.00					
	038S0T3901	94.00					
	038S0T4001	76.00					
	038S0T4002	7.30					
	038S0T4101	66.00					
	038S0T4102	1.70					
	038S0T4201	34.00					
Mercury			3.4	10.2	26	78	2.1
	038S0S2302	0.09					
	038S0T0301	0.12					
	038S0T0302	0.10					
	038S0T0401	0.07					
	038S0T0402	0.82					
	038S0T0701	0.08					
	038S0T1001	0.17					
	038S0T1002	0.08					
	038S0T1101	0.22					
	038S0T1201	0.12					
	038S0T1301	0.36					
	038S0T1501	0.22					
	038S0T1601	0.14					
	038S0T1702	0.07					
	038S0T1802	1.00					
	038S0T1902	0.05					
	038S0T2002	0.17					
	038S0T2301	0.07					
	038S0T2702	0.07					
	038S0T3101	0.07					
	038S0T3501	0.85					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T3502	0.09						
	038S0T3601	0.08						
	038S0T3801	0.07						
	038S0T3901	0.10						
	038S0T4001	0.08						
	038S0T4101	0.23						
Molybdenum				390	1,170	9,700	29,100	***
	038S0T0101	2.10						
	038S0T4101	1.70						
Nickel				110	NA	28,000	84,000	130
	038S0T0201	2.00						
	038S0T0301	3.10						
	038S0T0302	3.40						
	038S0T0401	3.40						
	038S0T0701	3.30						
	038S0T0802	2.50						
	038S0T1001	3.00						
	038S0T1101	2.90						
	038S0T1301	4.30						
	038S0T1601	4.20						
	038S0T1701	4.00						
	038S0T1802	12.00						
	038S0T2301	4.80						
	038S0T3301	9.50						
	038S0T3401	2.20						
	038S0T3501	3.90						
	038S0T3601	4.10						
	038S0T3701	2.40						
	038S0T3801	4.90						
	038S0T4001	3.40						
	038S0T4101	4.90						
	038S0T4201	18.00	A					
Potassium				Not Available				
	038S0T1501	220.00						
	038S0T1601	220.00						
	038S0T1802	440.00						
	038S0T2901	220.00						
Sodium				Not Available				
	038S0I1001	120.00						
	038S0T0301	490.00						
	038S0T0302	120.00						
	038S0T0601	190.00						
	038S0T0701	140.00						
	038S0T1101	560.00						
	038S0T1301	560.00						
	038S0T1501	400.00						
	038S0T1601	320.00						
	038S0T1701	110.00						
	038S0T1801	660.00						
	038S0T1802	170.00						
	038S0T3801	160.00						

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result		Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
Strontium				47,000	141,000	NA	NA	***
	038S0S2301	1.20						
	038S0S2302	1.20						
	038S0T0101	16.00						
	038S0T0201	3.60						
	038S0T0301	8.80						
	038S0T0302	4.20						
	038S0T0401	3.80						
	038S0T0601	10.00						
	038S0T0701	9.60						
	038S0T0802	1.10						
	038S0T1001	2.40						
	038S0T1002	2.30						
	038S0T1101	8.90						
	038S0T1201	2.70						
	038S0T1301	69.00						
	038S0T1302	4.20						
	038S0T1501	5.00						
	038S0T1502	1.10						
	038S0T1601	27.00						
	038S0T1701	30.00						
	038S0T1801	5.30						
	038S0T1802	16.00						
	038S0T1902	13.00						
	038S0T2001	15.00	A					
	038S0T2301	9.10						
	038S0T2501	5.20						
	038S0T2601	4.60						
	038S0T2701	4.70						
	038S0T2802	1.20						
	038S0T2901	1.80						
	038S0T2902	7.20						
	038S0T3101	1.40						
	038S0T3301	2.70						
	038S0T3401	2.70						
	038S0T3501	8.70						
	038S0T3601	12.00						
	038S0T3701	3.90						
	038S0T3801	4.00						
	038S0T3901	5.50						
	038S0T4001	5.50						
	038S0T4002	1.20						
	038S0T4101	8.00						
	038S0T4201	5.40						
Tin				44,000	132,000	660,000	1,980,000	***
	038S0T1101	16.00						
	038S0T2301	9.70						
	038S0T4101	30.00						
	038S0T4201	16.00	A					
Titanium				Not Available				
	038S0I1001	18.00						

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0I1002	2.60					
	038S0S2301	21.00					
	038S0S2302	9.50					
	038S0T0101	100.00					
	038S0T0102	5.00					
	038S0T0201	74.00					
	038S0T0301	58.00					
	038S0T0302	30.00					
	038S0T0401	80.00					
	038S0T0402	5.80					
	038S0T0501	8.70					
	038S0T0502	1.80					
	038S0T0601	40.00					
	038S0T0602	3.40					
	038S0T0701	60.00					
	038S0T0702	2.10					
	038S0T0801	84.00					
	038S0T0802	14.00					
	038S0T0901	120.00					
	038S0T0902	2.70					
	038S0T1001	75.00					
	038S0T1002	13.00					
	038S0T1101	78.00					
	038S0T1102	5.30					
	038S0T1201	49.00					
	038S0T1202	8.60					
	038S0T1301	110.00					
	038S0T1302	26.00					
	038S0T1401	130.00					
	038S0T1402	1.20					
	038S0T1502	8.20					
	038S0T1601	92.00					
	038S0T1602	1.30					
	038S0T1701	87.00					
	038S0T1702	9.60					
	038S0T1801	120.00					
	038S0T1802	120.00					
	038S0T1901	120.00					
	038S0T1902	16.00					
	038S0T2001	110.00					
	038S0T2002	1.00					
	038S0T2201	1.60					
	038S0T2202	3.40					
	038S0T2301	100.00					
	038S0T2302	1.80					
	038S0T2501	97.00					
	038S0T2502	2.90					
	038S0T2601	7.70					
	038S0T2602	21.00					
	038S0T2701	4.80					
	038S0T2702	3.40					
	038S0T2801	2.40					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T2802	4.60					
	038S0T2901	37.00					
	038S0T2902	28.00					
	038S0T3002	3.60					
	038S0T3101	34.00					
	038S0T3102	5.90					
	038S0T3201	2.20					
	038S0T3202	4.20					
	038S0T3301	11.00					
	038S0T3302	4.80					
	038S0T3401	64.00					
	038S0T3402	4.80					
	038S0T3501	72.00					
	038S0T3502	4.10					
	038S0T3601	56.00					
	038S0T3602	7.60					
	038S0T3701	80.00					
	038S0T3702	4.00					
	038S0T3801	55.00					
	038S0T3901	100.00					
	038S0T4001	71.00					
	038S0T4002	7.60					
	038S0T4101	36.00					
	038S0T4102	3.00					
	038S0T4201	30.00					
Vanadium			15	NA	7,400	22,200	980
	038S0S2301	1.80					
	038S0S2302	1.60					
	038S0T0101	29.00	X				
	038S0T0201	9.30					
	038S0T0301	7.30					
	038S0T0302	3.60					
	038S0T0401	11.00					
	038S0T0601	3.20					
	038S0T0701	8.60					
	038S0T0801	23.00	X				
	038S0T0802	1.30					
	038S0T0901	34.00	X				
	038S0T1001	12.00					
	038S0T1101	14.00					
	038S0T1201	6.20					
	038S0T1301	21.00	X				
	038S0T1302	12.00					
	038S0T1401	55.00	X				
	038S0T1501	4.00					
	038S0T1601	16.00	X				
	038S0T1701	13.00					
	038S0T1702	1.60					
	038S0T1801	19.00	X				
	038S0T1802	5.20					
	038S0T1901	52.00	X				

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T1902	2.00					
	038S0T2001	48.00	X				
	038S0T2301	17.00	X				
	038S0T2501	19.00	X				
	038S0T2901	6.10					
	038S0T2902	1.90					
	038S0T3101	4.40					
	038S0T3401	7.50					
	038S0T3501	8.80					
	038S0T3601	4.10					
	038S0T3701	10.00					
	038S0T3801	9.30					
	038S0T3901	21.00	X				
	038S0T4001	12.00					
	038S0T4101	5.50					
	038S0T4201	2.80					
Yttrium			Not Available				
	038S0T0101	3.50					
	038S0T0201	1.00					
	038S0T0301	1.60					
	038S0T0401	1.70					
	038S0T0601	1.10					
	038S0T1001	1.80					
	038S0T1101	1.80					
	038S0T1301	2.10					
	038S0T1501	1.50					
	038S0T1601	2.60					
	038S0T1701	2.70					
	038S0T1801	4.80					
	038S0T1802	1.80					
	038S0T2301	2.40					
	038S0T2501	2.10					
	038S0T3401	2.80					
	038S0T3501	2.30					
	038S0T3601	1.80					
	038S0T3701	2.20					
	038S0T3801	1.30					
	038S0T4001	1.40					
Zinc			23,000	69,000	560,000	1,680,000	6000
	038S0I1001	38.00					
	038S0I1002	17.00					
	038S0S2301	37.00					
	038S0S2302	28.00					
	038S0T0101	35.00					
	038S0T0102	2.70					
	038S0T0201	26.00					
	038S0T0301	130.00					
	038S0T0302	35.00					
	038S0T0401	42.00					
	038S0T0402	1.30					
	038S0T0502	18.00					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T0601	37.00					
	038S0T0602	3.60					
	038S0T0701	67.00					
	038S0T0801	3.10					
	038S0T0802	54.00					
	038S0T0901	7.00					
	038S0T0902	4.00					
	038S0T1001	57.00					
	038S0T1002	49.00					
	038S0T1101	230.00					
	038S0T1102	7.90					
	038S0T1201	55.00					
	038S0T1202	4.20					
	038S0T1301	100.00					
	038S0T1302	15.00					
	038S0T1401	4.30					
	038S0T1402	1.20					
	038S0T1501	110.00					
	038S0T1601	120.00					
	038S0T1701	110.00					
	038S0T1702	19.00					
	038S0T1801	66.00					
	038S0T1802	96.00					
	038S0T1902	53.00					
	038S0T2001	14.00					
	038S0T2202	42.00					
	038S0T2301	140.00					
	038S0T2302	1.40					
	038S0T2501	30.00					
	038S0T2502	2.90					
	038S0T2601	9.40					
	038S0T2602	3.20					
	038S0T2701	5.00					
	038S0T2702	4.60					
	038S0T2802	12.00					
	038S0T2902	100.00					
	038S0T3002	5.60					
	038S0T3101	73.00					
	038S0T3102	10.00					
	038S0T3202	1.90					
	038S0T3301	44.00					
	038S0T3302	3.20					
	038S0T3401	27.00					
	038S0T3402	7.80					
	038S0T3501	86.00					
	038S0T3502	3.80					
	038S0T3601	98.00					
	038S0T3701	19.00					
	038S0T3702	6.20					
	038S0T3801	99.00					
	038S0T3901	290.00					
	038S0T4001	93.00					

EPA DATA - SURFACE SOIL
COMPARISON OF INORGANIC DETECTIONS TO SCTLs & LEACHABILITY CRITERIA

Parameter	Sample ID	Result	Residential Exposure SCTL	Residential Exposure 3x SCTL	Industrial Exposure SCTL	Industrial Exposure 3x SCTL	Leachability Based On Groundwater Criteria
	038S0T4002	26.00					
	038S0T4101	200.00					
	038S0T4102	36.00					
	038S0T4201	280.00					

Notes:
All concentrations and criteria are in milligrams per kilogram (mg/kg).
***Leachability values may be derived using the SPLP Test to calculate site-specific SCTLs or may be determined using TCLP in the event oily wastes are present.
* - Region 9 Preliminary Remedial Goals (October 2002) were used for SCTLs.

Appendix D

Analytical Data Used For Distribution Testing And 95% UCL Calculations

NAS Pensacola - Site 38
Building 71 - Surface Soil
Data Used for 95% UCL Calculations

	Chromium		Copper	
Sample ID	Result	Value Used	Result	Value Used
036S080C02	2.1	2.1	8	8
036S080S02	3.4	3.4	5340	5340
036S081C02	12.3	12.3	17.6	17.6
036S081W02	0.54 U	0.27	1.7 J	1.7
038S000102	22.1	22.1	9.2	9.2
038S000301	3.7	3.7	10.6	10.6
038S000402	4.7	4.7	21.7	21.7
038S000501	10	10	30.8	30.8
038S000701	28.6	28.6	31.6	31.6
038S000801	2.4	2.4	4.6	4.6
038S000901	6.9	6.9	19	19
038S001001	103	103	13.5	13.5
038S001101	9.4	9.4	1 U	0.5
038S001201	80.2	80.2	13.2	13.2
038S001301	713	713	9.8	9.8
038S001401	665	665	155	155
038S001501	17.5	17.5	9.2	9.2
038S001601	12.6	12.6	11.8	11.8
038S001701	53.4	53.4	9.6	9.6
038S001801	291	291	41.2	41.2
038S001901	6.6	6.6	23.2	23.2
038S001902	6.3	6.3	23.2	23.2
038S002201	10.2	10.2	6.5	6.5
038S002501	7	7	3	3
038S002702	6	6	19	19
038S002901	15	15	26	26
038S003001	2.1 J	2.1	2.2	2.2
038S003101	4.2 J	4.2	27.2	27.2
038S003201	5	5	131	131
038S003301	18.3 J	18.3	22	22
038S003401	21.1 J	21.1	6.6	6.6
038S0I1001	93	93	5.4	5.4
038S0I1002	20	20	2.8	2.8
038S0S2301	3	3	4.1	4.1
038S0S2302	1.7	1.7	17	17
038S0T0501	1 U	0.5	1 U	0.5
038S0T0502	3.8	3.8	18	18

Notes:
One-half the detection limit was used for non-detects.

NAS Pensacola - Site 38
Building 604 - Surface Soil
Data Used for 95% UCL Calculations

	Copper		Iron	
Sample ID	Result	Value Used	Result	Value Used
036S073C02	21.4	21.4	763	763
036S074C02	15.9	15.9	629	629
036S074N02	607	607	24900	24900
036S074W02	117	117	3880	3880
036S075C02	12.3	12.3	706 J	706
036S075E02	391	391	4380 J	4380
036S076C02	28.9	28.9	2100 J	2100
036S076E02	32.6	32.6	287 J	287
036S076S02	12.7	12.7	598 J	598
036S076W02	16.2	16.2	504 J	504
036S077C02	16.1	16.1	993 J	993
036S077N02	0.79 J	0.79	50.2 J	50.2
036S077S02	2.6 J	2.6	1130	1130
036S077W02	4.4	4.4	1250 J	1250
036S078C02	15.6	15.6	1070	1070
036S078E02	264	264	1950 U	975
036S078S02	75.9	75.9	1560	1560
036S078W02	1.2 J	1.2	6130	6130
036S079C02	13.6	13.6	519 J	519
036S079W02	5.7	5.7	342 J	342
038S002601	33.4	33.4	6860	6860
038S002801	8	8	972	972
038S003501	46.4	46.4	160	160
038S003601	10.6	10.6	18800	18800
038S003701	9.3	9.3	9800	9800
038S004102	308	308	471	471
038S004202	14.9	14.9	1540	1540
038S0T0101	9.8	9.8	10000	10000
038S0T0102	1.1	1.1	150	150
038S0T0201	7.7	7.7	3500	3500
038S0T0301	35	35	3400	3400
038S0T0302	15	15	1700	1700
038S0T0401	11	11	4200	4200
038S0T0402	1 U	0.5	47	47
038S0T0601	7	7	1800	1800
038S0T0602	1 U	0.5	92	92
038S0T0701	21	21	3000	3000
038S0T0702	1 U	0.5	18	18
038S0T0801	2.6	2.6	8100	8100
038S0T0802	31	31	710	710
038S0T0901	5.4	5.4	1300	1300
038S0T0902	6	6	76	76
038S0T1001	6.3	6.3	4500	4500
038S0T1002	24	24	1500	1500
038S0T1101	140	140	6700	6700
038S0T1102	4.1	4.1	250	250

NAS Pensacola - Site 38
Building 604 - Surface Soil
Data Used for 95% UCL Calculations

	Copper		Iron	
Sample ID	Result	Value Used	Result	Value Used
038S0T1201	7.4	7.4	2900	2900
038S0T1202	1.5	1.5	220	220
038S0T1301	76	76	10000	10000
038S0T1302	14	14	3700	3700
038S0T1401	5.2	5.2	22000	22000
038S0T1402	1.4	1.4	14	14
038S0T1501	43	43	2500	2500
038S0T1502	58	58	860	860
038S0T1601	67	67	7500	7500
038S0T1602	2.3	2.3	24	24
038S0T1701	25	25	7400	7400
038S0T1702	3.9	3.9	680	680
038S0T1801	32	32	7900	7900
038S0T1802	100	100	6800	6800
038S0T1901	4.8	4.8	18000	18000
038S0T1902	32	32	1400	1400
038S0T2001	7	7	16000	16000
038S0T2002	1 U	0.5	32	32
038S0T2201	1 U	0.5	170	170
038S0T2202	36	36	350	350
038S0T2301	46	46	7000	7000
038S0T2302	1 U	0.5	87	87
038S0T2501	7.3	7.3	8800	8800
038S0T2502	1.1	1.1	85	85
038S0T2601	3.2	3.2	260	260
038S0T2602	3.7	3.7	110	110
038S0T2701	1 U	0.5	210	210
038S0T2702	5.7	5.7	120	120
038S0T2801	1 U	0.5	34	34
038S0T2802	10	10	270	270
038S0T2901	1 U	0.5	2000	2000
038S0T2902	35	35	2100	2100
038S0T3002	3.7	3.7	180	180
038S0T3101	140	140	1300	1300
038S0T3102	1.2	1.2	160	160
038S0T3201	1 U	0.5	51	51
038S0T3202	1 U	0.5	29	29
038S0T3301	3.3	3.3	400	400
038S0T3302	1 U	0.5	100	100
038S0T3401	6.5	6.5	3400	3400
038S0T3402	1 U	0.5	130	130
038S0T3501	11	11	4200	4200
038S0T3502	1.8	1.8	150	150
038S0T3601	11	11	2100	2100
038S0T3602	1 U	0.5	37	37
038S0T3701	18	18	3200	3200

NAS Pensacola - Site 38
Building 604 - Surface Soil
Data Used for 95% UCL Calculations

	Copper		Iron	
Sample ID	**Result**	**Value Used**	**Result**	**Value Used**
038S0T3702	1 U	0.5	41	41
038S0T3801	28	28	4600	4600
038S0T3901	43	43	8200	8200
038S0T4001	59	59	4500	4500
038S0T4002	17	17	390	390
038S0T4101	210	210	3900	3900
038S0T4102	7.8	7.8	170	170
038S0T4201	190 A	190	2400	2400

Notes:
One-half the detection limit was used for non-detects.

NAS Pensacola - Site 38
Building 71 - Subsurface Soil
Data Used for 95% UCL Calculations

	Chromium		Copper	
Sample ID	Result	Value Used	Result	Value Used
036S081C04	7.2	7.2	0.46 J	0.46
036S081S03	1.1 J	1.1	2.5 J	2.5
036S081W04	0.58 U	0.29	0.39 U	0.195
038S000104	2.1 U	1.05	13.1	13.1
038S000106	7.1	7.1	13.8	13.8
038S000303	3.9	3.9	8.3	8.3
038S000305	3.5	3.5	8.1	8.1
038S000404	2.6	2.6	21.8	21.8
038S000503	2.1 U	1.05	27.6	27.6
038S000505	2.3 U	1.15	8.1	8.1
038S000703	12.8	12.8	86	86
038S000705	4.9	4.9	38.4	38.4
038S000803	6	6	13.4	13.4
038S000804	3.2	3.2	3.4	3.4
038S000903	2.3	2.3	6.4	6.4
038S001003	31.5	31.5	3.6	3.6
038S001004	5.4	5.4	3.4	3.4
038S001103	10.5	10.5	1 U	0.5
038S001104	13.2	13.2	2 U	1
038S001203	13.3	13.3	112	112
038S001204	19.4	19.4	29.8	29.8
038S001303	553	553	73.2	73.2
038S001304	296	296	60.1	60.1
038S001403	331	331	390	390
038S001405	155	155	43	43
038S001503	12	12	44	44
038S001603	58.8	58.8	12.1	12.1
038S001605	10.5	10.5	1.9	1.9
038S001703	17.3	17.3	5.5	5.5
038S001705	8.8	8.8	9	9
038S001803	48.5	48.5	33.6	33.6
038S001805	87.8	87.8	51.4	51.4
038S002203	2.2	2.2	2.4	2.4
038S002403	4	4	4	4
038S002503	9	9	2 U	1
038S002704	6	6	27	27
038S003003	1.7 J	1.7	7.4	7.4
038S003103	2.9 J	2.9	43.8	43.8
038S003203	3	3	45	45
038S003205	11	11	8	8
038S003303	1.9 J	1.9	19.2	19.2
038S003403	4.2 J	4.2	8.4	8.4

Notes:
One-half the detection limit was used for non-detects.

NAS Pensacola - Site 38
Building 604 - Subsurface Soil
Data Used for 95% UCL Calculations

	Copper		Iron	
Sample ID	Result	Value Used	Result	Value Used
036S073C04	27.1	27.1	856	856
036S074C04	31.5	31.5	2230	2230
036S074N04	1.2 J	1.2	106	106
036S074W04	10.4	10.4	893	893
036S075C04	23.8	23.8	616 J	616
036S075E06	129	129	32900 J	32900
036S076E04	79.7	79.7	368 J	368
036S076W04	20.3	20.3	1190 J	1190
036S077C04	26	26	2010 J	2010
036S077N04	5.2	5.2	71.4 J	71.4
036S077S04	0.86 J	0.86	68 J	68
036S077W04	5.7	5.7	795	795
036S078C04	8	8	2800	2800
036S078E04	3.7	3.7	87.7 J	87.7
036S078W04	2.4	2.4	44.4	44.4
036S079C04	0.98 J	0.98	25.1	25.1
036S079W04	0.44 J	0.44	33.1 J	33.1
038S002603	177	177	7330	7330
038S002605	102	102	14800	14800
038S002803	20	20	1510	1510
038S003503	7.8	7.8	513	513
038S003603	10.2	10.2	936	936
038S003703	5.4	5.4	3120	3120
038S004104	71.4	71.4	124	124
038S004106	11.4	11.4	58	58
038S004204	14.7	14.7	1560	1560
038S004206	3.7	3.7	376	376

Notes:
One-half the detection limit was used for non-detects.

Appendix E

Benzo(A)Pyrene Equivalents Calculations

Building 71 – Surface Soil

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Surface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
036S080C02	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S080S02	Benzo(a)anthracene	390	U	0.1	19.5	0
	Benzo(a)pyrene	390	U	1	195	0
	Benzo(b)fluoranthene	200	J	0.1	20	20
	Benzo(k)fluoranthene	390	U	0.01	1.95	0
	Chrysene	390	U	0.001	0.195	0
	Dibenz(a,h)anthracene	390	U	1	195	0
	Indeno(1,2,3-cd)pyrene	390	U	0.1	19.5	0
	BEQ				**451.145**	**20**
036S081C02	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S081W02	Benzo(a)anthracene	330	U	0.1	16.5	0
	Benzo(a)pyrene	330	U	1	165	0
	Benzo(b)fluoranthene	330	U	0.1	16.5	0
	Benzo(k)fluoranthene	330	U	0.01	1.65	0
	Chrysene	330	U	0.001	0.165	0
	Dibenz(a,h)anthracene	330	U	1	165	0
	Indeno(1,2,3-cd)pyrene	330	U	0.1	16.5	0
	BEQ				**381.315**	**0**
038S000102	Benzo(a)anthracene	190	J	0.1	19	19
	Benzo(a)pyrene	200	J	1	200	200
	Benzo(b)fluoranthene	280	J	0.1	28	28
	Benzo(k)fluoranthene	220	J	0.01	2.2	2.2
	Chrysene	220	J	0.001	0.22	0.22
	Dibenz(a,h)anthracene	100	J	1	100	100
	Indeno(1,2,3-cd)pyrene	190	J	0.1	19	19
	BEQ				**368.42**	**368.42**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Surface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S000301	Benzo(a)anthracene	680	U	0.1	34	0
	Benzo(a)pyrene	680	U	1	340	0
	Benzo(b)fluoranthene	680	U	0.1	34	0
	Benzo(k)fluoranthene	680	U	0.01	3.4	0
	Chrysene	680	U	0.001	0.34	0
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**785.74**	**0**
038S000402	Benzo(a)anthracene	670	U	0.1	33.5	0
	Benzo(a)pyrene	670	U	1	335	0
	Benzo(b)fluoranthene	670	U	0.1	33.5	0
	Benzo(k)fluoranthene	670	U	0.01	3.35	0
	Chrysene	670	U	0.001	0.335	0
	Dibenz(a,h)anthracene	670	U	1	335	0
	Indeno(1,2,3-cd)pyrene	670	U	0.1	33.5	0
	BEQ				**774.185**	**0**
038S000501	Benzo(a)anthracene	720	U	0.1	36	0
	Benzo(a)pyrene	720	U	1	360	0
	Benzo(b)fluoranthene	720	U	0.1	36	0
	Benzo(k)fluoranthene	720	U	0.01	3.6	0
	Chrysene	720	U	0.001	0.36	0
	Dibenz(a,h)anthracene	720	U	1	360	0
	Indeno(1,2,3-cd)pyrene	720	U	0.1	36	0
	BEQ				**831.96**	**0**
038S000701	Benzo(a)anthracene	61	J	0.1	6.1	6.1
	Benzo(a)pyrene	46	J	1	46	46
	Benzo(b)fluoranthene	62	J	0.1	6.2	6.2
	Benzo(k)fluoranthene	51	J	0.01	0.51	0.51
	Chrysene	71	J	0.001	0.071	0.071
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**251.381**	**58.881**
038S000801	Benzo(a)anthracene	330	U	0.1	16.5	0
	Benzo(a)pyrene	330	U	1	165	0
	Benzo(b)fluoranthene	43	J	0.1	4.3	4.3
	Benzo(k)fluoranthene	53	J	0.01	0.53	0.53
	Chrysene	35	J	0.001	0.035	0.035
	Dibenz(a,h)anthracene	330	U	1	165	0
	Indeno(1,2,3-cd)pyrene	330	U	0.1	16.5	0
	BEQ				**367.865**	**4.865**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Surface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S000901	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S001001	Benzo(a)anthracene	70	J	0.1	7	7
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	56	J	0.1	5.6	5.6
	Benzo(k)fluoranthene	38	J	0.01	0.38	0.38
	Chrysene	85	J	0.001	0.085	0.085
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**380.565**	**13.065**
038S001101	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S001201	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S001301	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Surface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S001401	Benzo(a)anthracene	100	J	0.1	10	10
	Benzo(a)pyrene	67	J	1	67	67
	Benzo(b)fluoranthene	200	J	0.1	20	20
	Benzo(k)fluoranthene	70	J	0.01	0.7	0.7
	Chrysene	140	J	0.001	0.14	0.14
	Dibenz(a,h)anthracene	57	J	1	57	57
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**172.34**	**154.84**
038S001501	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**
038S001601	Benzo(a)anthracene	1700	U	0.1	85	0
	Benzo(a)pyrene	1700	U	1	850	0
	Benzo(b)fluoranthene	1700	U	0.1	85	0
	Benzo(k)fluoranthene	1700	U	0.01	8.5	0
	Chrysene	1700	U	0.001	0.85	0
	Dibenz(a,h)anthracene	1700	U	1	850	0
	Indeno(1,2,3-cd)pyrene	1700	U	0.1	85	0
	BEQ				**1964.35**	**0**
038S001701	Benzo(a)anthracene	680	U	0.1	34	0
	Benzo(a)pyrene	680	U	1	340	0
	Benzo(b)fluoranthene	680	U	0.1	34	0
	Benzo(k)fluoranthene	680	U	0.01	3.4	0
	Chrysene	680	U	0.001	0.34	0
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**785.74**	**0**
038S001801	Benzo(a)anthracene	1700	U	0.1	85	0
	Benzo(a)pyrene	1700	U	1	850	0
	Benzo(b)fluoranthene	1700	U	0.1	85	0
	Benzo(k)fluoranthene	1700	U	0.01	8.5	0
	Chrysene	1700	U	0.001	0.85	0
	Dibenz(a,h)anthracene	1700	U	1	850	0
	Indeno(1,2,3-cd)pyrene	1700	U	0.1	85	0
	BEQ				**1964.35**	**0**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Surface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S001901	Benzo(a)anthracene	78	J	0.1	7.8	7.8
	Benzo(a)pyrene	77	J	1	77	77
	Benzo(b)fluoranthene	200	J	0.1	20	20
	Benzo(k)fluoranthene	92	J	0.01	0.92	0.92
	Chrysene	120	J	0.001	0.12	0.12
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**479.84**	**105.84**
038S001902	Benzo(a)anthracene	680	U	0.1	34	0
	Benzo(a)pyrene	680	U	1	340	0
	Benzo(b)fluoranthene	680	U	0.1	34	0
	Benzo(k)fluoranthene	680	U	0.01	3.4	0
	Chrysene	680	U	0.001	0.34	0
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**785.74**	**0**
038S002201	Benzo(a)anthracene	700	U	0.1	35	0
	Benzo(a)pyrene	700	U	1	350	0
	Benzo(b)fluoranthene	700	U	0.1	35	0
	Benzo(k)fluoranthene	700	U	0.01	3.5	0
	Chrysene	73	J	0.001	0.073	0.073
	Dibenz(a,h)anthracene	700	U	1	350	0
	Indeno(1,2,3-cd)pyrene	700	U	0.1	35	0
	BEQ				**808.573**	**0.073**
038S002501	Benzo(a)anthracene	680	U	0.1	34	0
	Benzo(a)pyrene	680	U	1	340	0
	Benzo(b)fluoranthene	680	U	0.1	34	0
	Benzo(k)fluoranthene	680	U	0.01	3.4	0
	Chrysene	680	U	0.001	0.34	0
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**785.74**	**0**
038S002702	Benzo(a)anthracene	680	U	0.1	34	0
	Benzo(a)pyrene	680	U	1	340	0
	Benzo(b)fluoranthene	680	U	0.1	34	0
	Benzo(k)fluoranthene	110	J	0.01	1.1	1.1
	Chrysene	70	J	0.001	0.07	0.07
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**783.17**	**1.17**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Surface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S002901	Benzo(a)anthracene	120	J	0.1	12	12
	Benzo(a)pyrene	200	J	1	200	200
	Benzo(b)fluoranthene	370	J	0.1	37	37
	Benzo(k)fluoranthene	290	J	0.01	2.9	2.9
	Chrysene	110	J	0.001	0.11	0.11
	Dibenz(a,h)anthracene	180	J	1	180	180
	Indeno(1,2,3-cd)pyrene	190	J	0.1	19	19
	BEQ				**451.01**	**451.01**
038S003001	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S003101	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	48	J	0.1	4.8	4.8
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**380.67**	**4.8**
038S003201	Benzo(a)anthracene	480	J	0.1	48	48
	Benzo(a)pyrene	690	J	1	690	690
	Benzo(b)fluoranthene	580	J	0.1	58	58
	Benzo(k)fluoranthene	720	J	0.01	7.2	7.2
	Chrysene	540	J	0.001	0.54	0.54
	Dibenz(a,h)anthracene	230	J	1	230	230
	Indeno(1,2,3-cd)pyrene	570	J	0.1	57	57
	BEQ				**1090.74**	**1090.74**
038S003301	Benzo(a)anthracene	360	U	0.1	18	0
	Benzo(a)pyrene	41	J	1	41	41
	Benzo(b)fluoranthene	45	J	0.1	4.5	4.5
	Benzo(k)fluoranthene	360	U	0.01	1.8	0
	Chrysene	360	U	0.001	0.18	0
	Dibenz(a,h)anthracene	360	U	1	180	0
	Indeno(1,2,3-cd)pyrene	38	J	0.1	3.8	3.8
	BEQ				**249.28**	**49.3**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Surface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S003401	Benzo(a)anthracene	110	J	0.1	11	11
	Benzo(a)pyrene	150	J	1	150	150
	Benzo(b)fluoranthene	160	J	0.1	16	16
	Benzo(k)fluoranthene	710	U	0.01	3.55	0
	Chrysene	120	J	0.001	0.12	0.12
	Dibenz(a,h)anthracene	710	U	1	355	0
	Indeno(1,2,3-cd)pyrene	710	U	0.1	35.5	0
	BEQ				**571.17**	**177.12**
038S0I1001*	Benzo(a)anthracene	3200	U	0.1	160	0
	Benzo(a)pyrene	3200	U	1	1600	0
	Benzo(b)fluoranthene	3200	U	0.1	160	0
	Chrysene	3200	U	0.001	1.6	0
	Dibenz(a,h)anthracene	3200	U	1	1600	0
	Indeno(1,2,3-cd)pyrene	3200	U	0.1	160	0
	BEQ				**3681.6**	**0**
038S0I1002*	Benzo(a)anthracene	3900	U	0.1	195	0
	Benzo(a)pyrene	3900	U	1	1950	0
	Benzo(b)fluoranthene	3900	U	0.1	195	0
	Chrysene	3900	U	0.001	1.95	0
	Dibenz(a,h)anthracene	3900	U	1	1950	0
	Indeno(1,2,3-cd)pyrene	3900	U	0.1	195	0
	BEQ				**4486.95**	**0**
038S0S2301*	Benzo(a)anthracene	3400	U	0.1	170	0
	Benzo(a)pyrene	3400	U	1	1700	0
	Benzo(b)fluoranthene	3400	U	0.1	170	0
	Chrysene	3400	U	0.001	1.7	0
	Dibenz(a,h)anthracene	3400	U	1	1700	0
	Indeno(1,2,3-cd)pyrene	3400	U	0.1	170	0
	BEQ				**3911.7**	**0**
038S0S2302*	Benzo(a)anthracene	3100	U	0.1	155	0
	Benzo(a)pyrene	3100	U	1	1550	0
	Benzo(b)fluoranthene	3100	U	0.1	155	0
	Chrysene	3100	U	0.001	1.55	0
	Dibenz(a,h)anthracene	3100	U	1	1550	0
	Indeno(1,2,3-cd)pyrene	3100	U	0.1	155	0
	BEQ				**3566.55**	**0**
038S0T0501*	Benzo(a)anthracene	3300	U	0.1	165	0
	Benzo(a)pyrene	3300	U	1	1650	0
	Benzo(b)fluoranthene	3300	U	0.1	165	0
	Chrysene	3300	U	0.001	1.65	0
	Dibenz(a,h)anthracene	3300	U	1	1650	0
	Indeno(1,2,3-cd)pyrene	3300	U	0.1	165	0
	BEQ				**3796.65**	**0**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Surface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T0502*	Benzo(a)anthracene	740	J	0.1	74	74
	Benzo(a)pyrene	380	J	1	380	380
	Benzo(b)fluoranthene	530	J	0.1	53	53
	Chrysene	1100	J	0.001	1.1	1.1
	Dibenz(a,h)anthracene	3700	U	1	1850	0
	Indeno(1,2,3-cd)pyrene	3700	U	0.1	185	0
	BEQ				**2543.1**	**508.1**

Notes:
(a) - One-half the non-detect value was used for calculation.
(b) - Zero was used for the non-detect value for calculation.
* Benzo(k)fluoranthene was not reported for the sample.

Building 71 – Subsurface Soil

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
036S081C04	Benzo(a)anthracene	360	U	0.1	18	0
	Benzo(a)pyrene	360	U	1	180	0
	Benzo(b)fluoranthene	360	U	0.1	18	0
	Benzo(k)fluoranthene	360	U	0.01	1.8	0
	Chrysene	360	U	0.001	0.18	0
	Dibenz(a,h)anthracene	360	U	1	180	0
	Indeno(1,2,3-cd)pyrene	360	U	0.1	18	0
	BEQ				**415.98**	**0**
036S081S03	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S081W04	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S000104	Benzo(a)anthracene	43	J	0.1	4.3	4.3
	Benzo(a)pyrene	40	J	1	40	40
	Benzo(b)fluoranthene	43	J	0.1	4.3	4.3
	Benzo(k)fluoranthene	51	J	0.01	0.51	0.51
	Chrysene	52	J	0.001	0.052	0.052
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**236.162**	**49.162**
038S000106	Benzo(a)anthracene	440	J	0.1	44	44
	Benzo(a)pyrene	440	J	1	440	440
	Benzo(b)fluoranthene	530	J	0.1	53	53
	Benzo(k)fluoranthene	410	J	0.01	4.1	4.1
	Chrysene	540	J	0.001	0.54	0.54
	Dibenz(a,h)anthracene	140	J	1	140	140
	Indeno(1,2,3-cd)pyrene	300	J	0.1	30	30
	BEQ				**711.64**	**711.64**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S000303	Benzo(a)anthracene	680	U	0.1	34	0
	Benzo(a)pyrene	680	U	1	340	0
	Benzo(b)fluoranthene	680	U	0.1	34	0
	Benzo(k)fluoranthene	680	U	0.01	3.4	0
	Chrysene	680	U	0.001	0.34	0
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**785.74**	**0**
038S000305	Benzo(a)anthracene	690	U	0.1	34.5	0
	Benzo(a)pyrene	690	U	1	345	0
	Benzo(b)fluoranthene	690	U	0.1	34.5	0
	Benzo(k)fluoranthene	690	U	0.01	3.45	0
	Chrysene	690	U	0.001	0.345	0
	Dibenz(a,h)anthracene	690	U	1	345	0
	Indeno(1,2,3-cd)pyrene	690	U	0.1	34.5	0
	BEQ				**797.295**	**0**
038S000404	Benzo(a)anthracene	380	U	0.1	19	0
	Benzo(a)pyrene	380	U	1	190	0
	Benzo(b)fluoranthene	380	U	0.1	19	0
	Benzo(k)fluoranthene	380	U	0.01	1.9	0
	Chrysene	380	U	0.001	0.19	0
	Dibenz(a,h)anthracene	380	U	1	190	0
	Indeno(1,2,3-cd)pyrene	380	U	0.1	19	0
	BEQ				**439.09**	**0**
038S000503	Benzo(a)anthracene	680	U	0.1	34	0
	Benzo(a)pyrene	680	U	1	340	0
	Benzo(b)fluoranthene	680	U	0.1	34	0
	Benzo(k)fluoranthene	680	U	0.01	3.4	0
	Chrysene	680	U	0.001	0.34	0
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**785.74**	**0**
038S000505	Benzo(a)anthracene	760	U	0.1	38	0
	Benzo(a)pyrene	760	U	1	380	0
	Benzo(b)fluoranthene	760	U	0.1	38	0
	Benzo(k)fluoranthene	760	U	0.01	3.8	0
	Chrysene	760	U	0.001	0.38	0
	Dibenz(a,h)anthracene	760	U	1	380	0
	Indeno(1,2,3-cd)pyrene	760	U	0.1	38	0
	BEQ				**878.18**	**0**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S000703	Benzo(a)anthracene	37	J	0.1	3.7	3.7
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	40	J	0.01	0.4	0.4
	Chrysene	50	J	0.001	0.05	0.05
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**389.15**	**4.15**
038S000705	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**
038S000803	Benzo(a)anthracene	250	J	0.1	25	25
	Benzo(a)pyrene	230	J	1	230	230
	Benzo(b)fluoranthene	200	J	0.1	20	20
	Benzo(k)fluoranthene	300	J	0.01	3	3
	Chrysene	280	J	0.001	0.28	0.28
	Dibenz(a,h)anthracene	69	J	1	69	69
	Indeno(1,2,3-cd)pyrene	140	J	0.1	14	14
	BEQ				**361.28**	**361.28**
038S000804	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**
038S000903	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S001003	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S001004	Benzo(a)anthracene	370	U	0.1	18.5	0
	Benzo(a)pyrene	370	U	1	185	0
	Benzo(b)fluoranthene	370	U	0.1	18.5	0
	Benzo(k)fluoranthene	370	U	0.01	1.85	0
	Chrysene	370	U	0.001	0.185	0
	Dibenz(a,h)anthracene	370	U	1	185	0
	Indeno(1,2,3-cd)pyrene	370	U	0.1	18.5	0
	BEQ				**427.535**	**0**
038S001103	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S001104	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S001203	Benzo(a)anthracene	440		0.1	44	44
	Benzo(a)pyrene	410		1	410	410
	Benzo(b)fluoranthene	560		0.1	56	56
	Benzo(k)fluoranthene	490		0.01	4.9	4.9
	Chrysene	560		0.001	0.56	0.56
	Dibenz(a,h)anthracene	160	J	1	160	160
	Indeno(1,2,3-cd)pyrene	430		0.1	43	43
	BEQ				**718.46**	**718.46**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S001204	Benzo(a)anthracene	42	J	0.1	4.2	4.2
	Benzo(a)pyrene	59	J	1	59	59
	Benzo(b)fluoranthene	65	J	0.1	6.5	6.5
	Benzo(k)fluoranthene	71	J	0.01	0.71	0.71
	Chrysene	65	J	0.001	0.065	0.065
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	54	J	0.1	5.4	5.4
	BEQ				**250.875**	**75.875**
038S001303	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S001304	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**
038S001403	Benzo(a)anthracene	64	J	0.1	6.4	6.4
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	150	J	0.1	15	15
	Benzo(k)fluoranthene	65	J	0.01	0.65	0.65
	Chrysene	93	J	0.001	0.093	0.093
	Dibenz(a,h)anthracene	42	J	1	42	42
	Indeno(1,2,3-cd)pyrene	82	J	0.1	8.2	8.2
	BEQ				**247.343**	**72.343**
038S001405	Benzo(a)anthracene	370	U	0.1	18.5	0
	Benzo(a)pyrene	370	U	1	185	0
	Benzo(b)fluoranthene	84	J	0.1	8.4	8.4
	Benzo(k)fluoranthene	370	U	0.01	1.85	0
	Chrysene	44	J	0.001	0.044	0.044
	Dibenz(a,h)anthracene	370	U	1	185	0
	Indeno(1,2,3-cd)pyrene	370	U	0.1	18.5	0
	BEQ				**417.294**	**8.444**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S001503	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S001603	Benzo(a)anthracene	190	J	0.1	19	19
	Benzo(a)pyrene	1700	U	1	850	0
	Benzo(b)fluoranthene	230	J	0.1	23	23
	Benzo(k)fluoranthene	190	J	0.01	1.9	1.9
	Chrysene	240	J	0.001	0.24	0.24
	Dibenz(a,h)anthracene	1700	U	1	850	0
	Indeno(1,2,3-cd)pyrene	1700	U	0.1	85	0
	BEQ				**1829.14**	**44.14**
038S001605	Benzo(a)anthracene	670	U	0.1	33.5	0
	Benzo(a)pyrene	670	U	1	335	0
	Benzo(b)fluoranthene	670	U	0.1	33.5	0
	Benzo(k)fluoranthene	670	U	0.01	3.35	0
	Chrysene	670	U	0.001	0.335	0
	Dibenz(a,h)anthracene	670	U	1	335	0
	Indeno(1,2,3-cd)pyrene	670	U	0.1	33.5	0
	BEQ				**774.185**	**0**
038S001703	Benzo(a)anthracene	660	U	0.1	33	0
	Benzo(a)pyrene	660	U	1	330	0
	Benzo(b)fluoranthene	660	U	0.1	33	0
	Benzo(k)fluoranthene	660	U	0.01	3.3	0
	Chrysene	660	U	0.001	0.33	0
	Dibenz(a,h)anthracene	660	U	1	330	0
	Indeno(1,2,3-cd)pyrene	660	U	0.1	33	0
	BEQ				**762.63**	**0**
038S001705	Benzo(a)anthracene	660	U	0.1	33	0
	Benzo(a)pyrene	660	U	1	330	0
	Benzo(b)fluoranthene	660	U	0.1	33	0
	Benzo(k)fluoranthene	660	U	0.01	3.3	0
	Chrysene	660	U	0.001	0.33	0
	Dibenz(a,h)anthracene	660	U	1	330	0
	Indeno(1,2,3-cd)pyrene	660	U	0.1	33	0
	BEQ				**762.63**	**0**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S001803	Benzo(a)anthracene	1700	U	0.1	85	0
	Benzo(a)pyrene	1700	U	1	850	0
	Benzo(b)fluoranthene	1700	U	0.1	85	0
	Benzo(k)fluoranthene	1700	U	0.01	8.5	0
	Chrysene	1700	U	0.001	0.85	0
	Dibenz(a,h)anthracene	1700	U	1	850	0
	Indeno(1,2,3-cd)pyrene	1700	U	0.1	85	0
	BEQ				**1964.35**	**0**
038S001805	Benzo(a)anthracene	1700	U	0.1	85	0
	Benzo(a)pyrene	1700	U	1	850	0
	Benzo(b)fluoranthene	1700	U	0.1	85	0
	Benzo(k)fluoranthene	1700	U	0.01	8.5	0
	Chrysene	1700	U	0.001	0.85	0
	Dibenz(a,h)anthracene	1700	U	1	850	0
	Indeno(1,2,3-cd)pyrene	180	J	0.1	18	18
	BEQ				**1897.35**	**18**
038S002203	Benzo(a)anthracene	680	U	0.1	34	0
	Benzo(a)pyrene	680	U	1	340	0
	Benzo(b)fluoranthene	680	U	0.1	34	0
	Benzo(k)fluoranthene	680	U	0.01	3.4	0
	Chrysene	680	U	0.001	0.34	0
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**785.74**	**0**
038S002403	Benzo(a)anthracene	750	U	0.1	37.5	0
	Benzo(a)pyrene	750	U	1	375	0
	Benzo(b)fluoranthene	750	U	0.1	37.5	0
	Benzo(k)fluoranthene	750	U	0.01	3.75	0
	Chrysene	750	U	0.001	0.375	0
	Dibenz(a,h)anthracene	750	U	1	375	0
	Indeno(1,2,3-cd)pyrene	750	U	0.1	37.5	0
	BEQ				**866.625**	**0**
038S002503	Benzo(a)anthracene	710	U	0.1	35.5	0
	Benzo(a)pyrene	710	U	1	355	0
	Benzo(b)fluoranthene	710	U	0.1	35.5	0
	Benzo(k)fluoranthene	710	U	0.01	3.55	0
	Chrysene	710	U	0.001	0.355	0
	Dibenz(a,h)anthracene	710	U	1	355	0
	Indeno(1,2,3-cd)pyrene	710	U	0.1	35.5	0
	BEQ				**820.405**	**0**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S002704	Benzo(a)anthracene	770	U	0.1	38.5	0
	Benzo(a)pyrene	770	U	1	385	0
	Benzo(b)fluoranthene	770	U	0.1	38.5	0
	Benzo(k)fluoranthene	770	U	0.01	3.85	0
	Chrysene	770	U	0.001	0.385	0
	Dibenz(a,h)anthracene	770	U	1	385	0
	Indeno(1,2,3-cd)pyrene	770	U	0.1	38.5	0
	BEQ				**889.735**	**0**
038S003003	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	51	J	0.1	5.1	5.1
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**380.97**	**5.1**
038S003103	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S003203	Benzo(a)anthracene	730	U	0.1	36.5	0
	Benzo(a)pyrene	730	U	1	365	0
	Benzo(b)fluoranthene	120	J	0.1	12	12
	Benzo(k)fluoranthene	96	J	0.01	0.96	0.96
	Chrysene	77	J	0.001	0.077	0.077
	Dibenz(a,h)anthracene	730	U	1	365	0
	Indeno(1,2,3-cd)pyrene	730	U	0.1	36.5	0
	BEQ				**816.037**	**13.037**
038S003205	Benzo(a)anthracene	750	U	0.1	37.5	0
	Benzo(a)pyrene	750	U	1	375	0
	Benzo(b)fluoranthene	750	U	0.1	37.5	0
	Benzo(k)fluoranthene	750	U	0.01	3.75	0
	Chrysene	750	U	0.001	0.375	0
	Dibenz(a,h)anthracene	750	U	1	375	0
	Indeno(1,2,3-cd)pyrene	750	U	0.1	37.5	0
	BEQ				**866.625**	**0**

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S003303	Benzo(a)anthracene	37	J	0.1	3.7	3.7
	Benzo(a)pyrene	60	J	1	60	60
	Benzo(b)fluoranthene	75	J	0.1	7.5	7.5
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	42	J	0.001	0.042	0.042
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	53	J	0.1	5.3	5.3
	BEQ				**248.242**	**76.542**
038S003403	Benzo(a)anthracene	1900	U	0.1	95	0
	Benzo(a)pyrene	2000	U	1	1000	0
	Benzo(b)fluoranthene	2100	J	0.1	210	210
	Benzo(k)fluoranthene	910	J	0.01	9.1	9.1
	Chrysene	1800		0.001	1.8	1.8
	Dibenz(a,h)anthracene	590	J	1	590	590
	Indeno(1,2,3-cd)pyrene	1400		0.1	140	140
	BEQ				**2045.9**	**950.9**

Notes:
(a) - One-half the non-detect value was used for calculation.
(b) - Zero was used for the non-detect value for calculation.

Building 604 – Surface Soil

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
036S073C02	Benzo(a)anthracene	210	J	0.1	21	21
	Benzo(a)pyrene	210	J	1	210	210
	Benzo(b)fluoranthene	450		0.1	45	45
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	210	J	0.001	0.21	0.21
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**464.91**	**276.21**
036S074C02	Benzo(a)anthracene	270	J	0.1	27	27
	Benzo(a)pyrene	270	J	1	270	270
	Benzo(b)fluoranthene	530		0.1	53	53
	Benzo(k)fluoranthene	330	U	0.01	1.65	0
	Chrysene	290	J	0.001	0.29	0.29
	Dibenz(a,h)anthracene	330	U	1	165	0
	Indeno(1,2,3-cd)pyrene	330	U	0.1	16.5	0
	BEQ				**533.44**	**350.29**
036S074N02	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**
036S074W02	Benzo(a)anthracene	280	J	0.1	28	28
	Benzo(a)pyrene	350	J	1	350	350
	Benzo(b)fluoranthene	600		0.1	60	60
	Benzo(k)fluoranthene	410	U	0.01	2.05	0
	Chrysene	290	J	0.001	0.29	0.29
	Dibenz(a,h)anthracene	410	U	1	205	0
	Indeno(1,2,3-cd)pyrene	410	U	0.1	20.5	0
	BEQ				**665.84**	**438.29**
036S075C02	Benzo(a)anthracene	360	J	0.1	36	36
	Benzo(a)pyrene	310	J	1	310	310
	Benzo(b)fluoranthene	410	U	0.1	20.5	0
	Benzo(k)fluoranthene	410	U	0.01	2.05	0
	Chrysene	330	J	0.001	0.33	0.33
	Dibenz(a,h)anthracene	410	U	1	205	0
	Indeno(1,2,3-cd)pyrene	410	U	0.1	20.5	0
	BEQ				**594.38**	**346.33**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
036S075E02	Benzo(a)anthracene	410	U	0.1	20.5	0
	Benzo(a)pyrene	410	U	1	205	0
	Benzo(b)fluoranthene	410	U	0.1	20.5	0
	Benzo(k)fluoranthene	410	U	0.01	2.05	0
	Chrysene	410	U	0.001	0.205	0
	Dibenz(a,h)anthracene	410	U	1	205	0
	Indeno(1,2,3-cd)pyrene	410	U	0.1	20.5	0
	BEQ				**473.755**	**0**
036S076C02	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S076E02	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S076S02	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S076W02	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	180	J	1	180	180
	Benzo(b)fluoranthene	410		0.1	41	41
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**426.87**	**221**
036S077C02	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
036S077N02	Benzo(a)anthracene	330	U	0.1	16.5	0
	Benzo(a)pyrene	330	U	1	165	0
	Benzo(b)fluoranthene	330	U	0.1	16.5	0
	Benzo(k)fluoranthene	330	U	0.01	1.65	0
	Chrysene	330	U	0.001	0.165	0
	Dibenz(a,h)anthracene	330	U	1	165	0
	Indeno(1,2,3-cd)pyrene	330	U	0.1	16.5	0
	BEQ				**381.315**	**0**
036S077S02	Benzo(a)anthracene	380	U	0.1	19	0
	Benzo(a)pyrene	380	U	1	190	0
	Benzo(b)fluoranthene	380	U	0.1	19	0
	Benzo(k)fluoranthene	380	U	0.01	1.9	0
	Chrysene	380	U	0.001	0.19	0
	Dibenz(a,h)anthracene	380	U	1	190	0
	Indeno(1,2,3-cd)pyrene	380	U	0.1	19	0
	BEQ				**439.09**	**0**
036S077W02	Benzo(a)anthracene	370		0.1	37	37
	Benzo(a)pyrene	510		1	510	510
	Benzo(b)fluoranthene	870		0.1	87	87
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	330	J	0.001	0.33	0.33
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	380		0.1	38	38
	BEQ				**844.03**	**672.33**
036S078C02	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S078E02	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S078S02	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**
036S078W02	Benzo(a)anthracene	370	U	0.1	18.5	0
	Benzo(a)pyrene	370	U	1	185	0
	Benzo(b)fluoranthene	370	U	0.1	18.5	0
	Benzo(k)fluoranthene	370	U	0.01	1.85	0
	Chrysene	370	U	0.001	0.185	0
	Dibenz(a,h)anthracene	370	U	1	185	0
	Indeno(1,2,3-cd)pyrene	370	U	0.1	18.5	0
	BEQ				**427.535**	**0**
036S079C02	Benzo(a)anthracene	330	U	0.1	16.5	0
	Benzo(a)pyrene	330	U	1	165	0
	Benzo(b)fluoranthene	330	U	0.1	16.5	0
	Benzo(k)fluoranthene	330	U	0.01	1.65	0
	Chrysene	330	U	0.001	0.165	0
	Dibenz(a,h)anthracene	330	U	1	165	0
	Indeno(1,2,3-cd)pyrene	330	U	0.1	16.5	0
	BEQ				**381.315**	**0**
036S079W02	Benzo(a)anthracene	330	U	0.1	16.5	0
	Benzo(a)pyrene	330	U	1	165	0
	Benzo(b)fluoranthene	330	U	0.1	16.5	0
	Benzo(k)fluoranthene	330	U	0.01	1.65	0
	Chrysene	330	U	0.001	0.165	0
	Dibenz(a,h)anthracene	330	U	1	165	0
	Indeno(1,2,3-cd)pyrene	330	U	0.1	16.5	0
	BEQ				**381.315**	**0**
038S002601	Benzo(a)anthracene	140	J	0.1	14	14
	Benzo(a)pyrene	160	J	1	160	160
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	190	J	0.01	1.9	1.9
	Chrysene	160	J	0.001	0.16	0.16
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	130	J	0.1	13	13
	BEQ				**381.56**	**189.06**
038S002801	Benzo(a)anthracene	710	U	0.1	35.5	0
	Benzo(a)pyrene	710	U	1	355	0
	Benzo(b)fluoranthene	710	U	0.1	35.5	0
	Benzo(k)fluoranthene	710	U	0.01	3.55	0
	Chrysene	710	U	0.001	0.355	0
	Dibenz(a,h)anthracene	710	U	1	355	0

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
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Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
	Indeno(1,2,3-cd)pyrene	710	U	0.1	35.5	0
	BEQ				**820.405**	**0**
038S003501	Benzo(a)anthracene	230	J	0.1	23	23
	Benzo(a)pyrene	380	J	1	380	380
	Benzo(b)fluoranthene	2200	U	0.1	110	0
	Benzo(k)fluoranthene	480	J	0.01	4.8	4.8
	Chrysene	420	J	0.001	0.42	0.42
	Dibenz(a,h)anthracene	2200	U	1	1100	0
	Indeno(1,2,3-cd)pyrene	290	J	0.1	29	29
	BEQ				**1647.22**	**437.22**
038S003601	Benzo(a)anthracene	1800	U	0.1	90	0
	Benzo(a)pyrene	1800	U	1	900	0
	Benzo(b)fluoranthene	1800	U	0.1	90	0
	Benzo(k)fluoranthene	1800	U	0.01	9	0
	Chrysene	1800	U	0.001	0.9	0
	Dibenz(a,h)anthracene	1800	U	1	900	0
	Indeno(1,2,3-cd)pyrene	1800	U	0.1	90	0
	BEQ				**2079.9**	**0**
038S003701	Benzo(a)anthracene	1800	U	0.1	90	0
	Benzo(a)pyrene	260	J	1	260	260
	Benzo(b)fluoranthene	500	J	0.1	50	50
	Benzo(k)fluoranthene	360	J	0.01	3.6	3.6
	Chrysene	240	J	0.001	0.24	0.24
	Dibenz(a,h)anthracene	1800	U	1	900	0
	Indeno(1,2,3-cd)pyrene	210	J	0.1	21	21
	BEQ				**1324.84**	**334.84**
038S004102	Benzo(a)anthracene	430	U	0.1	21.5	0
	Benzo(a)pyrene	430	U	1	215	0
	Benzo(b)fluoranthene	430	U	0.1	21.5	0
	Benzo(k)fluoranthene	430	U	0.01	2.15	0
	Chrysene	430	U	0.001	0.215	0
	Dibenz(a,h)anthracene	430	U	1	215	0
	Indeno(1,2,3-cd)pyrene	430	U	0.1	21.5	0
	BEQ				**496.865**	**0**
038S004202	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	55	J	0.1	5.5	5.5
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**392.425**	**5.5**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T0101	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**
038S0T0102	Benzo(a)anthracene	4200	U	0.1	210	0
	Benzo(a)pyrene	4200	U	1	2100	0
	Benzo(b)fluoranthene	4200	U	0.1	210	0
	Chrysene	4200	U	0.001	2.1	0
	Dibenz(a,h)anthracene	4200	U	1	2100	0
	Indeno(1,2,3-cd)pyrene	4200	U	0.1	210	0
	BEQ				**4832.1**	**0**
038S0T0201	Benzo(a)anthracene	3400	U	0.1	170	0
	Benzo(a)pyrene	3400	U	1	1700	0
	Benzo(b)fluoranthene	3400	U	0.1	170	0
	Chrysene	3400	U	0.001	1.7	0
	Dibenz(a,h)anthracene	3400	U	1	1700	0
	Indeno(1,2,3-cd)pyrene	3400	U	0.1	170	0
	BEQ				**3911.7**	**0**
038S0T0301	Benzo(a)anthracene	3700	U	0.1	185	0
	Benzo(a)pyrene	3700	U	1	1850	0
	Benzo(b)fluoranthene	3700	U	0.1	185	0
	Chrysene	3700	U	0.001	1.85	0
	Dibenz(a,h)anthracene	3700	U	1	1850	0
	Indeno(1,2,3-cd)pyrene	3700	U	0.1	185	0
	BEQ				**4256.85**	**0**
038S0T0302	Benzo(a)anthracene	3900	U	0.1	195	0
	Benzo(a)pyrene	3900	U	1	1950	0
	Benzo(b)fluoranthene	3900	U	0.1	195	0
	Chrysene	3900	U	0.001	1.95	0
	Dibenz(a,h)anthracene	3900	U	1	1950	0
	Indeno(1,2,3-cd)pyrene	3900	U	0.1	195	0
	BEQ				**4486.95**	**0**
038S0T0401	Benzo(a)anthracene	3700	U	0.1	185	0
	Benzo(a)pyrene	3700	U	1	1850	0
	Benzo(b)fluoranthene	3700	U	0.1	185	0
	Chrysene	3700	U	0.001	1.85	0
	Dibenz(a,h)anthracene	3700	U	1	1850	0
	Indeno(1,2,3-cd)pyrene	3700	U	0.1	185	0
	BEQ				**4256.85**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T0402	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**
038S0T0601	Benzo(a)anthracene	3200	U	0.1	160	0
	Benzo(a)pyrene	3200	U	1	1600	0
	Benzo(b)fluoranthene	3200	U	0.1	160	0
	Chrysene	3200	U	0.001	1.6	0
	Dibenz(a,h)anthracene	3200	U	1	1600	0
	Indeno(1,2,3-cd)pyrene	3200	U	0.1	160	0
	BEQ				**3681.6**	**0**
038S0T0602	Benzo(a)anthracene	3800	U	0.1	190	0
	Benzo(a)pyrene	3800	U	1	1900	0
	Benzo(b)fluoranthene	3800	U	0.1	190	0
	Chrysene	3800	U	0.001	1.9	0
	Dibenz(a,h)anthracene	3800	U	1	1900	0
	Indeno(1,2,3-cd)pyrene	3800	U	0.1	190	0
	BEQ				**4371.9**	**0**
038S0T0701	Benzo(a)anthracene	3600	U	0.1	180	0
	Benzo(a)pyrene	3600	U	1	1800	0
	Benzo(b)fluoranthene	3600	U	0.1	180	0
	Chrysene	3600	U	0.001	1.8	0
	Dibenz(a,h)anthracene	3600	U	1	1800	0
	Indeno(1,2,3-cd)pyrene	3600	U	0.1	180	0
	BEQ				**4141.8**	**0**
038S0T0702	Benzo(a)anthracene	3700	U	0.1	185	0
	Benzo(a)pyrene	3700	U	1	1850	0
	Benzo(b)fluoranthene	3700	U	0.1	185	0
	Chrysene	3700	U	0.001	1.85	0
	Dibenz(a,h)anthracene	3700	U	1	1850	0
	Indeno(1,2,3-cd)pyrene	3700	U	0.1	185	0
	BEQ				**4256.85**	**0**
038S0T0801	Benzo(a)anthracene	4100	U	0.1	205	0
	Benzo(a)pyrene	4100	U	1	2050	0
	Benzo(b)fluoranthene	4100	U	0.1	205	0
	Chrysene	4100	U	0.001	2.05	0
	Dibenz(a,h)anthracene	4100	U	1	2050	0
	Indeno(1,2,3-cd)pyrene	4100	U	0.1	205	0
	BEQ				**4717.05**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T0802	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**
038S0T0901	Benzo(a)anthracene	4000	U	0.1	200	0
	Benzo(a)pyrene	4000	U	1	2000	0
	Benzo(b)fluoranthene	4000	U	0.1	200	0
	Chrysene	4000	U	0.001	2	0
	Dibenz(a,h)anthracene	4000	U	1	2000	0
	Indeno(1,2,3-cd)pyrene	4000	U	0.1	200	0
	BEQ				**4602**	**0**
038S0T0902	Benzo(a)anthracene	3600	U	0.1	180	0
	Benzo(a)pyrene	3600	U	1	1800	0
	Benzo(b)fluoranthene	3600	U	0.1	180	0
	Chrysene	3600	U	0.001	1.8	0
	Dibenz(a,h)anthracene	3600	U	1	1800	0
	Indeno(1,2,3-cd)pyrene	3600	U	0.1	180	0
	BEQ				**4141.8**	**0**
038S0T1001	Benzo(a)anthracene	3400	U	0.1	170	0
	Benzo(a)pyrene	3400	U	1	1700	0
	Benzo(b)fluoranthene	3400	U	0.1	170	0
	Chrysene	3400	U	0.001	1.7	0
	Dibenz(a,h)anthracene	3400	U	1	1700	0
	Indeno(1,2,3-cd)pyrene	3400	U	0.1	170	0
	BEQ				**3911.7**	**0**
038S0T1002	Benzo(a)anthracene	3600	U	0.1	180	0
	Benzo(a)pyrene	3600	U	1	1800	0
	Benzo(b)fluoranthene	3600	U	0.1	180	0
	Chrysene	3600	U	0.001	1.8	0
	Dibenz(a,h)anthracene	3600	U	1	1800	0
	Indeno(1,2,3-cd)pyrene	3600	U	0.1	180	0
	BEQ				**4141.8**	**0**
038S0T1101	Benzo(a)anthracene	370	J	0.1	37	37
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	670	J	0.1	67	67
	Chrysene	470	J	0.001	0.47	0.47
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**3779.47**	**104.47**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T1102	Benzo(a)anthracene	3600	U	0.1	180	0
	Benzo(a)pyrene	3600	U	1	1800	0
	Benzo(b)fluoranthene	3600	U	0.1	180	0
	Chrysene	3600	U	0.001	1.8	0
	Dibenz(a,h)anthracene	3600	U	1	1800	0
	Indeno(1,2,3-cd)pyrene	3600	U	0.1	180	0
	BEQ				**4141.8**	**0**
038S0T1201	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**
038S0T1202	Benzo(a)anthracene	3800	U	0.1	190	0
	Benzo(a)pyrene	3800	U	1	1900	0
	Benzo(b)fluoranthene	3800	U	0.1	190	0
	Chrysene	3800	U	0.001	1.9	0
	Dibenz(a,h)anthracene	3800	U	1	1900	0
	Indeno(1,2,3-cd)pyrene	3800	U	0.1	190	0
	BEQ				**4371.9**	**0**
038S0T1301	Benzo(a)anthracene	3800	U	0.1	190	0
	Benzo(a)pyrene	3800	U	1	1900	0
	Benzo(b)fluoranthene	3800	U	0.1	190	0
	Chrysene	3800	U	0.001	1.9	0
	Dibenz(a,h)anthracene	3800	U	1	1900	0
	Indeno(1,2,3-cd)pyrene	3800	U	0.1	190	0
	BEQ				**4371.9**	**0**
038S0T1302	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**
038S0T1401	Benzo(a)anthracene	3800	U	0.1	190	0
	Benzo(a)pyrene	3800	U	1	1900	0
	Benzo(b)fluoranthene	3800	U	0.1	190	0
	Chrysene	3800	U	0.001	1.9	0
	Dibenz(a,h)anthracene	3800	U	1	1900	0
	Indeno(1,2,3-cd)pyrene	3800	U	0.1	190	0
	BEQ				**4371.9**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T1402	Benzo(a)anthracene	4100	U	0.1	205	0
	Benzo(a)pyrene	4100	U	1	2050	0
	Benzo(b)fluoranthene	4100	U	0.1	205	0
	Chrysene	4100	U	0.001	2.05	0
	Dibenz(a,h)anthracene	4100	U	1	2050	0
	Indeno(1,2,3-cd)pyrene	4100	U	0.1	205	0
	BEQ				**4717.05**	**0**
038S0T1501	Benzo(a)anthracene	3400	U	0.1	170	0
	Benzo(a)pyrene	3400	U	1	1700	0
	Benzo(b)fluoranthene	3400	U	0.1	170	0
	Chrysene	3400	U	0.001	1.7	0
	Dibenz(a,h)anthracene	3400	U	1	1700	0
	Indeno(1,2,3-cd)pyrene	3400	U	0.1	170	0
	BEQ				**3911.7**	**0**
038S0T1502	Benzo(a)anthracene	3700	U	0.1	185	0
	Benzo(a)pyrene	3700	U	1	1850	0
	Benzo(b)fluoranthene	3700	U	0.1	185	0
	Chrysene	3700	U	0.001	1.85	0
	Dibenz(a,h)anthracene	3700	U	1	1850	0
	Indeno(1,2,3-cd)pyrene	3700	U	0.1	185	0
	BEQ				**4256.85**	**0**
038S0T1601	Benzo(a)anthracene	3800	U	0.1	190	0
	Benzo(a)pyrene	3800	U	1	1900	0
	Benzo(b)fluoranthene	3800	U	0.1	190	0
	Chrysene	3800	U	0.001	1.9	0
	Dibenz(a,h)anthracene	3800	U	1	1900	0
	Indeno(1,2,3-cd)pyrene	3800	U	0.1	190	0
	BEQ				**4371.9**	**0**
038S0T1602	Benzo(a)anthracene	3400	U	0.1	170	0
	Benzo(a)pyrene	3400	U	1	1700	0
	Benzo(b)fluoranthene	3400	U	0.1	170	0
	Chrysene	3400	U	0.001	1.7	0
	Dibenz(a,h)anthracene	3400	U	1	1700	0
	Indeno(1,2,3-cd)pyrene	3400	U	0.1	170	0
	BEQ				**3911.7**	**0**
038S0T1701	Benzo(a)anthracene	3800	U	0.1	190	0
	Benzo(a)pyrene	3800	U	1	1900	0
	Benzo(b)fluoranthene	470	J	0.1	47	47
	Chrysene	3800	U	0.001	1.9	0
	Dibenz(a,h)anthracene	3800	U	1	1900	0
	Indeno(1,2,3-cd)pyrene	3800	U	0.1	190	0
	BEQ				**4228.9**	**47**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T1702	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**
038S0T1801	Benzo(a)anthracene	3600	U	0.1	180	0
	Benzo(a)pyrene	3600	U	1	1800	0
	Benzo(b)fluoranthene	3600	U	0.1	180	0
	Chrysene	3600	U	0.001	1.8	0
	Dibenz(a,h)anthracene	3600	U	1	1800	0
	Indeno(1,2,3-cd)pyrene	3600	U	0.1	180	0
	BEQ				**4141.8**	**0**
038S0T1802	Benzo(a)anthracene	4200	U	0.1	210	0
	Benzo(a)pyrene	4200	U	1	2100	0
	Benzo(b)fluoranthene	4200	U	0.1	210	0
	Chrysene	4200	U	0.001	2.1	0
	Dibenz(a,h)anthracene	4200	U	1	2100	0
	Indeno(1,2,3-cd)pyrene	4200	U	0.1	210	0
	BEQ				**4832.1**	**0**
038S0T1901	Benzo(a)anthracene	4100	U	0.1	205	0
	Benzo(a)pyrene	4100	U	1	2050	0
	Benzo(b)fluoranthene	4100	U	0.1	205	0
	Chrysene	4100	U	0.001	2.05	0
	Dibenz(a,h)anthracene	4100	U	1	2050	0
	Indeno(1,2,3-cd)pyrene	4100	U	0.1	205	0
	BEQ				**4717.05**	**0**
038S0T1902	Benzo(a)anthracene	3900	U	0.1	195	0
	Benzo(a)pyrene	3900	U	1	1950	0
	Benzo(b)fluoranthene	3900	U	0.1	195	0
	Chrysene	3900	U	0.001	1.95	0
	Dibenz(a,h)anthracene	3900	U	1	1950	0
	Indeno(1,2,3-cd)pyrene	3900	U	0.1	195	0
	BEQ				**4486.95**	**0**
038S0T2001	Benzo(a)anthracene	4200	U	0.1	210	0
	Benzo(a)pyrene	4200	U	1	2100	0
	Benzo(b)fluoranthene	4200	U	0.1	210	0
	Chrysene	4200	U	0.001	2.1	0
	Dibenz(a,h)anthracene	4200	U	1	2100	0
	Indeno(1,2,3-cd)pyrene	4200	U	0.1	210	0
	BEQ				**4832.1**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T2002	Benzo(a)anthracene	3600	U	0.1	180	0
	Benzo(a)pyrene	3600	U	1	1800	0
	Benzo(b)fluoranthene	3600	U	0.1	180	0
	Chrysene	3600	U	0.001	1.8	0
	Dibenz(a,h)anthracene	3600	U	1	1800	0
	Indeno(1,2,3-cd)pyrene	3600	U	0.1	180	0
	BEQ				**4141.8**	**0**
038S0T2201	Benzo(a)anthracene	2900	U	0.1	145	0
	Benzo(a)pyrene	2900	U	1	1450	0
	Benzo(b)fluoranthene	2900	U	0.1	145	0
	Chrysene	2900	U	0.001	1.45	0
	Dibenz(a,h)anthracene	2900	U	1	1450	0
	Indeno(1,2,3-cd)pyrene	2900	U	0.1	145	0
	BEQ				**3336.45**	**0**
038S0T2202	Benzo(a)anthracene	4000	U	0.1	200	0
	Benzo(a)pyrene	4000	U	1	2000	0
	Benzo(b)fluoranthene	4000	U	0.1	200	0
	Chrysene	4000	U	0.001	2	0
	Dibenz(a,h)anthracene	4000	U	1	2000	0
	Indeno(1,2,3-cd)pyrene	4000	U	0.1	200	0
	BEQ				**4602**	**0**
038S0T2301	Benzo(a)anthracene	3900	U	0.1	195	0
	Benzo(a)pyrene	3900	U	1	1950	0
	Benzo(b)fluoranthene	3900	U	0.1	195	0
	Chrysene	3900	U	0.001	1.95	0
	Dibenz(a,h)anthracene	3900	U	1	1950	0
	Indeno(1,2,3-cd)pyrene	3900	U	0.1	195	0
	BEQ				**4486.95**	**0**
038S0T2302	Benzo(a)anthracene	3200	U	0.1	160	0
	Benzo(a)pyrene	3200	U	1	1600	0
	Benzo(b)fluoranthene	3200	U	0.1	160	0
	Chrysene	3200	U	0.001	1.6	0
	Dibenz(a,h)anthracene	3200	U	1	1600	0
	Indeno(1,2,3-cd)pyrene	3200	U	0.1	160	0
	BEQ				**3681.6**	**0**
038S0T2501	Benzo(a)anthracene	3600	U	0.1	180	0
	Benzo(a)pyrene	3600	U	1	1800	0
	Benzo(b)fluoranthene	3600	U	0.1	180	0
	Chrysene	3600	U	0.001	1.8	0
	Dibenz(a,h)anthracene	3600	U	1	1800	0
	Indeno(1,2,3-cd)pyrene	3600	U	0.1	180	0
	BEQ				**4141.8**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T2502	Benzo(a)anthracene	2800	U	0.1	140	0
	Benzo(a)pyrene	2800	U	1	1400	0
	Benzo(b)fluoranthene	2800	U	0.1	140	0
	Chrysene	2800	U	0.001	1.4	0
	Dibenz(a,h)anthracene	2800	U	1	1400	0
	Indeno(1,2,3-cd)pyrene	2800	U	0.1	140	0
	BEQ				**3221.4**	**0**
038S0T2601	Benzo(a)anthracene	2700	U	0.1	135	0
	Benzo(a)pyrene	2700	U	1	1350	0
	Benzo(b)fluoranthene	2700	U	0.1	135	0
	Chrysene	2700	U	0.001	1.35	0
	Dibenz(a,h)anthracene	2700	U	1	1350	0
	Indeno(1,2,3-cd)pyrene	2700	U	0.1	135	0
	BEQ				**3106.35**	**0**
038S0T2602	Benzo(a)anthracene	3200	U	0.1	160	0
	Benzo(a)pyrene	3200	U	1	1600	0
	Benzo(b)fluoranthene	3200	U	0.1	160	0
	Chrysene	3200	U	0.001	1.6	0
	Dibenz(a,h)anthracene	3200	U	1	1600	0
	Indeno(1,2,3-cd)pyrene	3200	U	0.1	160	0
	BEQ				**3681.6**	**0**
038S0T2701	Benzo(a)anthracene	2600	J	0.1	260	260
	Benzo(a)pyrene	2200	J	1	2200	2200
	Benzo(b)fluoranthene	3800		0.1	380	380
	Chrysene	2200	J	0.001	2.2	2.2
	Dibenz(a,h)anthracene	3100	U	1	1550	0
	Indeno(1,2,3-cd)pyrene	1000	J	0.1	100	100
	BEQ				**4492.2**	**2942.2**
038S0T2702	Benzo(a)anthracene	3300	U	0.1	165	0
	Benzo(a)pyrene	3300	U	1	1650	0
	Benzo(b)fluoranthene	3300	U	0.1	165	0
	Chrysene	3300	U	0.001	1.65	0
	Dibenz(a,h)anthracene	3300	U	1	1650	0
	Indeno(1,2,3-cd)pyrene	3300	U	0.1	165	0
	BEQ				**3796.65**	**0**
038S0T2801	Benzo(a)anthracene	2700	U	0.1	135	0
	Benzo(a)pyrene	2700	U	1	1350	0
	Benzo(b)fluoranthene	2700	U	0.1	135	0
	Chrysene	2700	U	0.001	1.35	0
	Dibenz(a,h)anthracene	2700	U	1	1350	0
	Indeno(1,2,3-cd)pyrene	2700	U	0.1	135	0
	BEQ				**3106.35**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T2802	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**
038S0T2901	Benzo(a)anthracene	3100	U	0.1	155	0
	Benzo(a)pyrene	3100	U	1	1550	0
	Benzo(b)fluoranthene	3100	U	0.1	155	0
	Chrysene	3100	U	0.001	1.55	0
	Dibenz(a,h)anthracene	3100	U	1	1550	0
	Indeno(1,2,3-cd)pyrene	3100	U	0.1	155	0
	BEQ				**3566.55**	**0**
038S0T2902	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**
038S0T3002	Benzo(a)anthracene	3200	U	0.1	160	0
	Benzo(a)pyrene	3200	U	1	1600	0
	Benzo(b)fluoranthene	3200	U	0.1	160	0
	Chrysene	3200	U	0.001	1.6	0
	Dibenz(a,h)anthracene	3200	U	1	1600	0
	Indeno(1,2,3-cd)pyrene	3200	U	0.1	160	0
	BEQ				**3681.6**	**0**
038S0T3101	Benzo(a)anthracene	3600	U	0.1	180	0
	Benzo(a)pyrene	3600	U	1	1800	0
	Benzo(b)fluoranthene	3600	U	0.1	180	0
	Chrysene	3600	U	0.001	1.8	0
	Dibenz(a,h)anthracene	3600	U	1	1800	0
	Indeno(1,2,3-cd)pyrene	3600	U	0.1	180	0
	BEQ				**4141.8**	**0**
038S0T3102	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T3201	Benzo(a)anthracene	3000	U	0.1	150	0
	Benzo(a)pyrene	3000	U	1	1500	0
	Benzo(b)fluoranthene	3000	U	0.1	150	0
	Chrysene	3000	U	0.001	1.5	0
	Dibenz(a,h)anthracene	3000	U	1	1500	0
	Indeno(1,2,3-cd)pyrene	3000	U	0.1	150	0
	BEQ				**3451.5**	**0**
038S0T3202	Benzo(a)anthracene	3500	U	0.1	175	0
	Benzo(a)pyrene	3500	U	1	1750	0
	Benzo(b)fluoranthene	3500	U	0.1	175	0
	Chrysene	3500	U	0.001	1.75	0
	Dibenz(a,h)anthracene	3500	U	1	1750	0
	Indeno(1,2,3-cd)pyrene	3500	U	0.1	175	0
	BEQ				**4026.75**	**0**
038S0T3301	Benzo(a)anthracene	2700	U	0.1	135	0
	Benzo(a)pyrene	2700	U	1	1350	0
	Benzo(b)fluoranthene	2700	U	0.1	135	0
	Chrysene	2700	U	0.001	1.35	0
	Dibenz(a,h)anthracene	2700	U	1	1350	0
	Indeno(1,2,3-cd)pyrene	2700	U	0.1	135	0
	BEQ				**3106.35**	**0**
038S0T3302	Benzo(a)anthracene	3700	U	0.1	185	0
	Benzo(a)pyrene	3700	U	1	1850	0
	Benzo(b)fluoranthene	3700	U	0.1	185	0
	Chrysene	3700	U	0.001	1.85	0
	Dibenz(a,h)anthracene	3700	U	1	1850	0
	Indeno(1,2,3-cd)pyrene	3700	U	0.1	185	0
	BEQ				**4256.85**	**0**
038S0T3401	Benzo(a)anthracene	3700	U	0.1	185	0
	Benzo(a)pyrene	3700	U	1	1850	0
	Benzo(b)fluoranthene	3700	U	0.1	185	0
	Chrysene	3700	U	0.001	1.85	0
	Dibenz(a,h)anthracene	3700	U	1	1850	0
	Indeno(1,2,3-cd)pyrene	3700	U	0.1	185	0
	BEQ				**4256.85**	**0**
038S0T3402	Benzo(a)anthracene	3400	U	0.1	170	0
	Benzo(a)pyrene	3400	U	1	1700	0
	Benzo(b)fluoranthene	3400	U	0.1	170	0
	Chrysene	3400	U	0.001	1.7	0
	Dibenz(a,h)anthracene	3400	U	1	1700	0
	Indeno(1,2,3-cd)pyrene	3400	U	0.1	170	0
	BEQ				**3911.7**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T3501	Benzo(a)anthracene	4100	U	0.1	205	0
	Benzo(a)pyrene	4100	U	1	2050	0
	Benzo(b)fluoranthene	4100	U	0.1	205	0
	Chrysene	4100	U	0.001	2.05	0
	Dibenz(a,h)anthracene	4100	U	1	2050	0
	Indeno(1,2,3-cd)pyrene	4100	U	0.1	205	0
	BEQ				**4717.05**	**0**
038S0T3502	Benzo(a)anthracene	3800	U	0.1	190	0
	Benzo(a)pyrene	3800	U	1	1900	0
	Benzo(b)fluoranthene	3800	U	0.1	190	0
	Chrysene	3800	U	0.001	1.9	0
	Dibenz(a,h)anthracene	3800	U	1	1900	0
	Indeno(1,2,3-cd)pyrene	3800	U	0.1	190	0
	BEQ				**4371.9**	**0**
038S0T3601	Benzo(a)anthracene	4000	U	0.1	200	0
	Benzo(a)pyrene	4000	U	1	2000	0
	Benzo(b)fluoranthene	4000	U	0.1	200	0
	Chrysene	4000	U	0.001	2	0
	Dibenz(a,h)anthracene	4000	U	1	2000	0
	Indeno(1,2,3-cd)pyrene	4000	U	0.1	200	0
	BEQ				**4602**	**0**
038S0T3602	Benzo(a)anthracene	3400	U	0.1	170	0
	Benzo(a)pyrene	3400	U	1	1700	0
	Benzo(b)fluoranthene	3400	U	0.1	170	0
	Chrysene	3400	U	0.001	1.7	0
	Dibenz(a,h)anthracene	3400	U	1	1700	0
	Indeno(1,2,3-cd)pyrene	3400	U	0.1	170	0
	BEQ				**3911.7**	**0**
038S0T3701	Benzo(a)anthracene	4200	U	0.1	210	0
	Benzo(a)pyrene	4200	U	1	2100	0
	Benzo(b)fluoranthene	4200	U	0.1	210	0
	Chrysene	4200	U	0.001	2.1	0
	Dibenz(a,h)anthracene	4200	U	1	2100	0
	Indeno(1,2,3-cd)pyrene	4200	U	0.1	210	0
	BEQ				**4832.1**	**0**
038S0T3702	Benzo(a)anthracene	3600	U	0.1	180	0
	Benzo(a)pyrene	3600	U	1	1800	0
	Benzo(b)fluoranthene	3600	U	0.1	180	0
	Chrysene	3600	U	0.001	1.8	0
	Dibenz(a,h)anthracene	3600	U	1	1800	0
	Indeno(1,2,3-cd)pyrene	3600	U	0.1	180	0
	BEQ				**4141.8**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T3801	Benzo(a)anthracene	4200	U	0.1	210	0
	Benzo(a)pyrene	4200	U	1	2100	0
	Benzo(b)fluoranthene	230	J	0.1	23	23
	Chrysene	4200	U	0.001	2.1	0
	Dibenz(a,h)anthracene	4200	U	1	2100	0
	Indeno(1,2,3-cd)pyrene	4200	U	0.1	210	0
	BEQ				**4645.1**	**23**
038S0T3901	Benzo(a)anthracene	4500	U	0.1	225	0
	Benzo(a)pyrene	4500	U	1	2250	0
	Benzo(b)fluoranthene	4500	U	0.1	225	0
	Chrysene	4500	U	0.001	2.25	0
	Dibenz(a,h)anthracene	4500	U	1	2250	0
	Indeno(1,2,3-cd)pyrene	4500	U	0.1	225	0
	BEQ				**5177.25**	**0**
038S0T4001	Benzo(a)anthracene	4100	U	0.1	205	0
	Benzo(a)pyrene	4100	U	1	2050	0
	Benzo(b)fluoranthene	4100	U	0.1	205	0
	Chrysene	4100	U	0.001	2.05	0
	Dibenz(a,h)anthracene	4100	U	1	2050	0
	Indeno(1,2,3-cd)pyrene	4100	U	0.1	205	0
	BEQ				**4717.05**	**0**
038S0T4002	Benzo(a)anthracene	2800	U	0.1	140	0
	Benzo(a)pyrene	2800	U	1	1400	0
	Benzo(b)fluoranthene	2800	U	0.1	140	0
	Chrysene	2800	U	0.001	1.4	0
	Dibenz(a,h)anthracene	2800	U	1	1400	0
	Indeno(1,2,3-cd)pyrene	2800	U	0.1	140	0
	BEQ				**3221.4**	**0**
038S0T4101	Benzo(a)anthracene	4100	U	0.1	205	0
	Benzo(a)pyrene	4100	U	1	2050	0
	Benzo(b)fluoranthene	4100	U	0.1	205	0
	Chrysene	4100	U	0.001	2.05	0
	Dibenz(a,h)anthracene	4100	U	1	2050	0
	Indeno(1,2,3-cd)pyrene	4100	U	0.1	205	0
	BEQ				**4717.05**	**0**
038S0T4102	Benzo(a)anthracene	3200	U	0.1	160	0
	Benzo(a)pyrene	3200	U	1	1600	0
	Benzo(b)fluoranthene	3200	U	0.1	160	0
	Chrysene	3200	U	0.001	1.6	0
	Dibenz(a,h)anthracene	3200	U	1	1600	0
	Indeno(1,2,3-cd)pyrene	3200	U	0.1	160	0
	BEQ				**3681.6**	**0**

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
038S0T4201	Benzo(a)anthracene	20000	U	0.1	1000	0
	Benzo(a)pyrene	20000	U	1	10000	0
	Benzo(b)fluoranthene	20000	U	0.1	1000	0
	Chrysene	20000	U	0.001	10	0
	Dibenz(a,h)anthracene	20000	U	1	10000	0
	Indeno(1,2,3-cd)pyrene	20000	U	0.1	1000	0
	BEQ				**23010**	**0**

Building 604 – Subsurface Soil

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Subsurface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
036S073C04	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	190	J	0.1	19	19
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**394.87**	**19**
036S074C04	Benzo(a)anthracene	4500		0.1	450	450
	Benzo(a)pyrene	4500		1	4500	4500
	Benzo(b)fluoranthene	8300		0.1	830	830
	Benzo(k)fluoranthene	1400	U	0.01	7	0
	Chrysene	4200		0.001	4.2	4.2
	Dibenz(a,h)anthracene	800	J	1	800	800
	Indeno(1,2,3-cd)pyrene	1700		0.1	170	170
	BEQ				**6761.2**	**6754.2**
036S074N04	Benzo(a)anthracene	330	U	0.1	16.5	0
	Benzo(a)pyrene	330	U	1	165	0
	Benzo(b)fluoranthene	330	U	0.1	16.5	0
	Benzo(k)fluoranthene	330	U	0.01	1.65	0
	Chrysene	330	U	0.001	0.165	0
	Dibenz(a,h)anthracene	330	U	1	165	0
	Indeno(1,2,3-cd)pyrene	330	U	0.1	16.5	0
	BEQ				**381.315**	**0**
036S074W04	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S075C04	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S075E06	Benzo(a)anthracene	410	U	0.1	20.5	0

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Subsurface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
	Benzo(a)pyrene	410	U	1	205	0
	Benzo(b)fluoranthene	410	U	0.1	20.5	0
	Benzo(k)fluoranthene	410	U	0.01	2.05	0
	Chrysene	410	U	0.001	0.205	0
	Dibenz(a,h)anthracene	410	U	1	205	0
	Indeno(1,2,3-cd)pyrene	410	U	0.1	20.5	0
	BEQ				**473.755**	**0**
036S076E04	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S076W04	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**
036S077C04	Benzo(a)anthracene	360	U	0.1	18	0
	Benzo(a)pyrene	360	U	1	180	0
	Benzo(b)fluoranthene	360	U	0.1	18	0
	Benzo(k)fluoranthene	360	U	0.01	1.8	0
	Chrysene	360	U	0.001	0.18	0
	Dibenz(a,h)anthracene	360	U	1	180	0
	Indeno(1,2,3-cd)pyrene	360	U	0.1	18	0
	BEQ				**415.98**	**0**
036S077N04	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S077S04	Benzo(a)anthracene	330	U	0.1	16.5	0
	Benzo(a)pyrene	330	U	1	165	0

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Subsurface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
	Benzo(b)fluoranthene	330	U	0.1	16.5	0
	Benzo(k)fluoranthene	330	U	0.01	1.65	0
	Chrysene	330	U	0.001	0.165	0
	Dibenz(a,h)anthracene	330	U	1	165	0
	Indeno(1,2,3-cd)pyrene	330	U	0.1	16.5	0
	BEQ				**381.315**	**0**
036S077W04	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S078C04	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**
036S078E04	Benzo(a)anthracene	330	U	0.1	16.5	0
	Benzo(a)pyrene	330	U	1	165	0
	Benzo(b)fluoranthene	330	U	0.1	16.5	0
	Benzo(k)fluoranthene	330	U	0.01	1.65	0
	Chrysene	330	U	0.001	0.165	0
	Dibenz(a,h)anthracene	330	U	1	165	0
	Indeno(1,2,3-cd)pyrene	330	U	0.1	16.5	0
	BEQ				**381.315**	**0**
036S078W04	Benzo(a)anthracene	380	U	0.1	19	0
	Benzo(a)pyrene	380	U	1	190	0
	Benzo(b)fluoranthene	380	U	0.1	19	0
	Benzo(k)fluoranthene	380	U	0.01	1.9	0
	Chrysene	380	U	0.001	0.19	0
	Dibenz(a,h)anthracene	380	U	1	190	0
	Indeno(1,2,3-cd)pyrene	380	U	0.1	19	0
	BEQ				**439.09**	**0**
036S079C04	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Subsurface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
036S079W04	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S002603	Benzo(a)anthracene	260	J	0.1	26	26
	Benzo(a)pyrene	300	J	1	300	300
	Benzo(b)fluoranthene	710	U	0.1	35.5	0
	Benzo(k)fluoranthene	330	J	0.01	3.3	3.3
	Chrysene	280	J	0.001	0.28	0.28
	Dibenz(a,h)anthracene	710	U	1	355	0
	Indeno(1,2,3-cd)pyrene	220	J	0.1	22	22
	BEQ				**742.08**	**351.58**
038S002605	Benzo(a)anthracene	220	J	0.1	22	22
	Benzo(a)pyrene	260	J	1	260	260
	Benzo(b)fluoranthene	360	U	0.1	18	0
	Benzo(k)fluoranthene	270	J	0.01	2.7	2.7
	Chrysene	280	J	0.001	0.28	0.28
	Dibenz(a,h)anthracene	360	U	1	180	0
	Indeno(1,2,3-cd)pyrene	200	J	0.1	20	20
	BEQ				**502.98**	**304.98**
038S002803	Benzo(a)anthracene	720	U	0.1	36	0
	Benzo(a)pyrene	720	U	1	360	0
	Benzo(b)fluoranthene	720	U	0.1	36	0
	Benzo(k)fluoranthene	720	U	0.01	3.6	0
	Chrysene	720	U	0.001	0.36	0
	Dibenz(a,h)anthracene	720	U	1	360	0
	Indeno(1,2,3-cd)pyrene	720	U	0.1	36	0
	BEQ				**831.96**	**0**
038S003503	Benzo(a)anthracene	670	U	0.1	33.5	0
	Benzo(a)pyrene	670	U	1	335	0
	Benzo(b)fluoranthene	670	U	0.1	33.5	0
	Benzo(k)fluoranthene	670	U	0.01	3.35	0

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Subsurface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
	Chrysene	670	U	0.001	0.335	0
	Dibenz(a,h)anthracene	670	U	1	335	0
	Indeno(1,2,3-cd)pyrene	670	U	0.1	33.5	0
	BEQ				**774.185**	**0**
038S003603	Benzo(a)anthracene	680	U	0.1	34	0
	Benzo(a)pyrene	680	U	1	340	0
	Benzo(b)fluoranthene	680	U	0.1	34	0
	Benzo(k)fluoranthene	680	U	0.01	3.4	0
	Chrysene	680	U	0.001	0.34	0
	Dibenz(a,h)anthracene	680	U	1	340	0
	Indeno(1,2,3-cd)pyrene	680	U	0.1	34	0
	BEQ				**785.74**	**0**
038S003703	Benzo(a)anthracene	700	U	0.1	35	0
	Benzo(a)pyrene	700	U	1	350	0
	Benzo(b)fluoranthene	73	J	0.1	7.3	7.3
	Benzo(k)fluoranthene	700	U	0.01	3.5	0
	Chrysene	700	U	0.001	0.35	0
	Dibenz(a,h)anthracene	700	U	1	350	0
	Indeno(1,2,3-cd)pyrene	700	U	0.1	35	0
	BEQ				**781.15**	**7.3**
038S004104	Benzo(a)anthracene	340	U	0.1	17	0
	Benzo(a)pyrene	340	U	1	170	0
	Benzo(b)fluoranthene	340	U	0.1	17	0
	Benzo(k)fluoranthene	340	U	0.01	1.7	0
	Chrysene	340	U	0.001	0.17	0
	Dibenz(a,h)anthracene	340	U	1	170	0
	Indeno(1,2,3-cd)pyrene	340	U	0.1	17	0
	BEQ				**392.87**	**0**
038S004106	Benzo(a)anthracene	350	U	0.1	17.5	0
	Benzo(a)pyrene	350	U	1	175	0
	Benzo(b)fluoranthene	350	U	0.1	17.5	0
	Benzo(k)fluoranthene	350	U	0.01	1.75	0
	Chrysene	350	U	0.001	0.175	0
	Dibenz(a,h)anthracene	350	U	1	175	0
	Indeno(1,2,3-cd)pyrene	350	U	0.1	17.5	0
	BEQ				**404.425**	**0**
038S004204	Benzo(a)anthracene	1700	U	0.1	85	0
	Benzo(a)pyrene	190	J	1	190	190
	Benzo(b)fluoranthene	380	J	0.1	38	38
	Benzo(k)fluoranthene	1700	U	0.01	8.5	0
	Chrysene	1700	U	0.001	0.85	0

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Subsurface Soil
NAS Pensacola

Sample ID	Chemical	Reported Result (µg/kg)	VQUAL	TEF	Adjusted (a) Concentration (µg/kg)	Adjusted (b) Concentration (µg/kg)
	Dibenz(a,h)anthracene	1700	U	1	850	0
	Indeno(1,2,3-cd)pyrene	240	J	0.1	24	24
	BEQ				**1196.35**	**252**
038S004206	Benzo(a)anthracene	400	U	0.1	20	0
	Benzo(a)pyrene	400	U	1	200	0
	Benzo(b)fluoranthene	48	J	0.1	4.8	4.8
	Benzo(k)fluoranthene	400	U	0.01	2	0
	Chrysene	400	U	0.001	0.2	0
	Dibenz(a,h)anthracene	400	U	1	200	0
	Indeno(1,2,3-cd)pyrene	400	U	0.1	20	0
	BEQ				**447**	**4.8**

Notes:
(a) - One-half the non-detect value was used for calculation.
(b) - Zero was used for the non-detect value for calculation.

Appendix F

Benzo(A)Pyrene Equivalents Comparison

To Soil Cleanup Target Levels

Building 71 – Surface Soil

SCTL Comparison to BEQ Concentrations
Site 38 - Building 71 Area - Surface
NAS Pensacola

Sample ID	Adjusted (a) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500	Adjusted (b) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500
036S080C02	392.87	X	X			0				
036S080S02	451.145	X	X			20				
036S081C02	392.87	X	X			0				
036S081W02	381.315	X	X			0				
038S000102	368.42	X	X			368.42	X	X		
038S000301	785.74	X	X	X		0				
038S000402	774.185	X	X	X		0				
038S000501	831.96	X	X	X		0				
038S000701	251.381	X				58.881				
038S000801	367.865	X	X			4.865				
038S000901	392.87	X	X			0				
038S001001	380.565	X	X			13.065				
038S001101	392.87	X	X			0				
038S001201	392.87	X	X			0				
038S001301	392.87	X	X			0				
038S001401	172.34	X				154.84	X			
038S001501	404.425	X	X			0				
038S001601	1964.35	X	X	X	X	0				
038S001701	785.74	X	X	X		0				
038S001801	1964.35	X	X	X	X	0				
038S001901	479.84	X	X			105.84	X			
038S001902	785.74	X	X	X		0				
038S002201	808.573	X	X	X		0.073				
038S002501	785.74	X	X	X		0				
038S002702	783.17	X	X	X		1.17				
038S002901	451.01	X	X			451.01	X	X		
038S003001	392.87	X	X			0				
038S003101	380.67	X	X			4.8				
038S003201	1090.74	X	X	X		1090.74	X	X	X	
038S003301	249.28	X				49.3				
038S003401	571.17	X	X	X		177.12	X			
038S0I1001*	3681.6	X	X	X	X	0				
038S0I1002*	4486.95	X	X	X	X	0				
038S0S2301*	3911.7	X	X	X	X	0				
038S0S2302*	3566.55	X	X	X	X	0				
038S0T0501*	3796.65	X	X	X	X	0				
038S0T0502*	2543.1	X	X	X	X	508.1	X	X	X	

Notes:
(a) - One-half the non-detect value was used for calculation.
(b) - Zero was used for the non-detect value for calculation.
* Benzo(k)fluoranthene was not reported for the sample.

Building 71 – Subsurface Soil

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Adjusted (a) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500	Adjusted (b) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500
036S081C04	415.98	X	X			0				
036S081S03	392.87	X	X			0				
036S081W04	392.87	X	X			0				
038S000104	236.162	X				49.162				
038S000106	711.64	X	X	X		711.64	X	X	X	
038S000303	785.74	X	X	X		0				
038S000305	797.295	X	X	X		0				
038S000404	439.09	X	X			0				
038S000503	785.74	X	X	X		0				
038S000505	878.18	X	X	X		0				
038S000703	389.15	X	X			4.15				
038S000705	404.425	X	X			0				
038S000803	361.28	X	X			361.28	X	X		
038S000804	404.425	X	X			0				
038S000903	404.425	X	X			0				
038S001003	392.87	X	X			0				
038S001004	427.535	X	X			0				
038S001103	392.87	X	X			0				
038S001104	392.87	X	X			0				
038S001203	718.46	X	X	X		718.46	X	X	X	
038S001204	250.875	X				75.875				
038S001303	392.87	X	X			0				
038S001304	404.425	X	X			0				
038S001403	247.343	X				72.343				
038S001405	417.294	X	X			8.444				
038S001503	392.87	X	X			0				
038S001603	1829.14	X	X	X	X	44.14				
038S001605	774.185	X	X	X		0				
038S001703	762.63	X	X	X		0				
038S001705	762.63	X	X	X		0				
038S001803	1964.35	X	X	X	X	0				

BEQ Concentrations per Sample Location
Site 38 - Building 71 Area - Subsurface
NAS Pensacola

Sample ID	Adjusted (a) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500	Adjusted (b) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500
038S001805	1897.35	X	X	X	X	18				
038S002203	785.74	X	X	X		0				
038S002403	866.625	X	X	X		0				
038S002503	820.405	X	X	X		0				
038S002704	889.735	X	X	X		0				
038S003003	380.97	X	X			5.1				
038S003103	392.87	X	X			0				
038S003203	816.037	X	X	X		13.037				
038S003205	866.625	X	X	X		0				
038S003303	248.242	X				76.542				
038S003403	2045.9	X	X	X	X	950.9	X	X	X	

Notes:
(a) - One-half the non-detect value was used for calculation.
(b) - Zero was used for the non-detect value for calculation.

Building 604 – Surface Soil

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Adjusted (a) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500	Adjusted (b) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500
036S073C02	464.91	X	X			276.21	X			
036S074C02	533.44	X	X	X		350.29	X	X		
036S074N02	404.425	X	X			0				
036S074W02	665.84	X	X	X		438.29	X	X		
036S075C02	594.38	X	X	X		346.33	X	X		
036S075E02	473.755	X	X			0				
036S076C02	392.87	X	X			0				
036S076E02	392.87	X	X			0				
036S076S02	392.87	X	X			0				
036S076W02	426.87	X	X			221	X			
036S077C02	404.425	X	X			0				
036S077N02	381.315	X	X			0				
036S077S02	439.09	X	X			0				
036S077W02	844.03	X	X	X		672.33	X	X	X	
036S078C02	392.87	X	X			0				
036S078E02	392.87	X	X			0				
036S078S02	404.425	X	X			0				
036S078W02	427.535	X	X			0				
036S079C02	381.315	X	X			0				
036S079W02	381.315	X	X			0				
038S002601	381.56	X	X			189.06	X			
038S002801	820.405	X	X	X		0				
038S003501	1647.22	X	X	X	X	437.22	X	X		
038S003601	2079.9	X	X	X	X	0				
038S003701	1324.84	X	X	X		334.84	X	X		
038S004102	496.865	X	X			0				
038S004202	392.425	X	X			5.5				
038S0T0101	4026.75	X	X	X	X	0				
038S0T0102	4832.1	X	X	X	X	0				
038S0T0201	3911.7	X	X	X	X	0				
038S0T0301	4256.85	X	X	X	X	0				

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Adjusted (a) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500	Adjusted (b) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500
038S0T0302	4486.95	X	X	X	X	0				
038S0T0401	4256.85	X	X	X	X	0				
038S0T0402	4026.75	X	X	X	X	0				
038S0T0601	3681.6	X	X	X	X	0				
038S0T0602	4371.9	X	X	X	X	0				
038S0T0701	4141.8	X	X	X	X	0				
038S0T0702	4256.85	X	X	X	X	0				
038S0T0801	4717.05	X	X	X	X	0				
038S0T0802	4026.75	X	X	X	X	0				
038S0T0901	4602	X	X	X	X	0				
038S0T0902	4141.8	X	X	X	X	0				
038S0T1001	3911.7	X	X	X	X	0				
038S0T1002	4141.8	X	X	X	X	0				
038S0T1101	3779.47	X	X	X	X	104.47	X			
038S0T1102	4141.8	X	X	X	X	0				
038S0T1201	4026.75	X	X	X	X	0				
038S0T1202	4371.9	X	X	X	X	0				
038S0T1301	4371.9	X	X	X	X	0				
038S0T1302	4026.75	X	X	X	X	0				
038S0T1401	4371.9	X	X	X	X	0				
038S0T1402	4717.05	X	X	X	X	0				
038S0T1501	3911.7	X	X	X	X	0				
038S0T1502	4256.85	X	X	X	X	0				
038S0T1601	4371.9	X	X	X	X	0				
038S0T1602	3911.7	X	X	X	X	0				
038S0T1701	4228.9	X	X	X	X	47				
038S0T1702	4026.75	X	X	X	X	0				
038S0T1801	4141.8	X	X	X	X	0				
038S0T1802	4832.1	X	X	X	X	0				
038S0T1901	4717.05	X	X	X	X	0				
038S0T1902	4486.95	X	X	X	X	0				

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Adjusted (a) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500	Adjusted (b) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500
038S0T2001	4832.1	X	X	X	X	0				
038S0T2002	4141.8	X	X	X	X	0				
038S0T2201	3336.45	X	X	X	X	0				
038S0T2202	4602	X	X	X	X	0				
038S0T2301	4486.95	X	X	X	X	0				
038S0T2302	3681.6	X	X	X	X	0				
038S0T2501	4141.8	X	X	X	X	0				
038S0T2502	3221.4	X	X	X	X	0				
038S0T2601	3106.35	X	X	X	X	0				
038S0T2602	3681.6	X	X	X	X	0				
038S0T2701	4492.2	X	X	X	X	2942.2	X	X	X	X
038S0T2702	3796.65	X	X	X	X	0				
038S0T2801	3106.35	X	X	X	X	0				
038S0T2802	4026.75	X	X	X	X	0				
038S0T2901	3566.55	X	X	X	X	0				
038S0T2902	4026.75	X	X	X	X	0				
038S0T3002	3681.6	X	X	X	X	0				
038S0T3101	4141.8	X	X	X	X	0				
038S0T3102	4026.75	X	X	X	X	0				
038S0T3201	3451.5	X	X	X	X	0				
038S0T3202	4026.75	X	X	X	X	0				
038S0T3301	3106.35	X	X	X	X	0				
038S0T3302	4256.85	X	X	X	X	0				
038S0T3401	4256.85	X	X	X	X	0				
038S0T3402	3911.7	X	X	X	X	0				
038S0T3501	4717.05	X	X	X	X	0				
038S0T3502	4371.9	X	X	X	X	0				
038S0T3601	4602	X	X	X	X	0				
038S0T3602	3911.7	X	X	X	X	0				
038S0T3701	4832.1	X	X	X	X	0				
038S0T3702	4141.8	X	X	X	X	0				

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Surface Soil
NAS Pensacola

Sample ID	Adjusted (a) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500	Adjusted (b) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500
038S0T3801	4645.1	X	X	X	X	23				
038S0T3901	5177.25	X	X	X	X	0				
038S0T4001	4717.05	X	X	X	X	0				
038S0T4002	3221.4	X	X	X	X	0				
038S0T4101	4717.05	X	X	X	X	0				
038S0T4102	3681.6	X	X	X	X	0				
038S0T4201	23010	X	X	X	X	0				

Notes:
(a) - One-half the non-detect value was used for calculation.
(b) - Zero was used for the non-detect value for calculation.

Building 604 – Subsurface Soil

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Subsurface Soil
NAS Pensacola

Sample ID	Adjusted (a) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500	Adjusted (b) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500
036S073C04	394.87	X	X			19				
036S074C04	6761.2	X	X	X	X	6754.2	X	X	X	X
036S074N04	381.315	X	X			0				
036S074W04	392.87	X	X			0				
036S075C04	392.87	X	X			0				
036S075E06	473.755	X	X			0				
036S076E04	392.87	X	X			0				
036S076W04	404.425	X	X			0				
036S077C04	415.98	X	X			0				
036S077N04	392.87	X	X			0				
036S077S04	381.315	X	X			0				
036S077W04	392.87	X	X			0				
036S078C04	404.425	X	X			0				
036S078E04	381.315	X	X			0				
036S078W04	439.09	X	X			0				
036S079C04	392.87	X	X			0				
036S079W04	392.87	X	X			0				
038S002603	742.08	X	X	X		351.58	X	X		
038S002605	502.98	X	X	X		304.98	X	X		
038S002803	831.96	X	X	X		0				
038S003503	774.185	X	X	X		0				
038S003603	785.74	X	X	X		0				
038S003703	781.15	X	X	X		7.3				
038S004104	392.87	X	X			0				
038S004106	404.425	X	X			0				
038S004204	1196.35	X	X	X		252	X			
038S004206	447	X	X			4.8				

Notes:
(a) - One-half the non-detect value was used for calculation.
(b) - Zero was used for the non-detect value for calculation.

BEQ Concentrations Per Sample Location
Site 38 - Building 604 Subsurface Soil
NAS Pensacola

Sample ID	Adjusted (a) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500	Adjusted (b) Concentration (µg/kg)	RSCTL 100	3X RSCTL 300	ISCTL 500	3X ISCTL 1,500
036S073C04	394.87	X	X			19				
036S074C04	6761.2	X	X	X	X	6754.2	X	X	X	X
036S074N04	381.315	X	X			0				
036S074W04	392.87	X	X			0				
036S075C04	392.87	X	X			0				
036S075E06	473.755	X	X			0				
036S076E04	392.87	X	X			0				
036S076W04	404.425	X	X			0				
036S077C04	415.98	X	X			0				
036S077N04	392.87	X	X			0				
036S077S04	381.315	X	X			0				
036S077W04	392.87	X	X			0				
036S078C04	404.425	X	X			0				
036S078E04	381.315	X	X			0				
036S078W04	439.09	X	X			0				
036S079C04	392.87	X	X			0				
036S079W04	392.87	X	X			0				
038S002603	742.08	X	X	X		351.58	X	X		
038S002605	502.98	X	X	X		304.98	X	X		
038S002803	831.96	X	X	X		0				
038S003503	774.185	X	X	X		0				
038S003603	785.74	X	X	X		0				
038S003703	781.15	X	X	X		7.3				
038S004104	392.87	X	X			0				
038S004106	404.425	X	X			0				
038S004204	1196.35	X	X	X		252	X			
038S004206	447	X	X			4.8				

Notes:
(a) - One-half the non-detect value was used for calculation.
(b) - Zero was used for the non-detect value for calculation.

Appendix G
Lead Modeling Results

Figure G-1

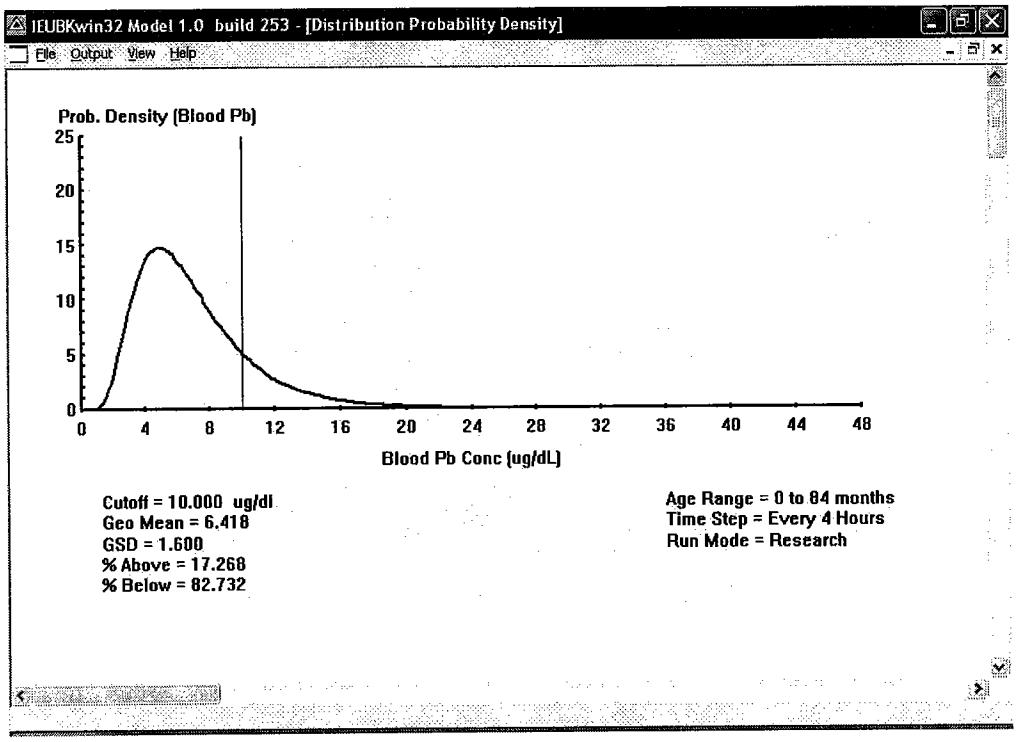
IEUBKwin32 Model 1.0 build 253 - [Distribution Probability Density]
File Output View Help
Prob. Density (Blood Pb)
25
20
15
10
5
0
0 4 8 12 16 20 24 28 32 36 40 44 48
Blood Pb Conc (ug/dL)
Cutoff = 10.000 ug/dl
Geo Mean = 6.418
GSD = 1.600
% Above = 17.268
% Below = 82.732
Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

Table G-1

LEAD MODEL FOR WINDOWS Version 1.0

==========

Model Version: 1.0 Build 253
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research

==========

The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 62.620 ug Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 62.325 ug/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	74.750	62.325
1-2	74.750	62.325
2-3	74.750	62.325
3-4	74.750	62.325
4-5	74.750	62.325
5-6	74.750	62.325
6-7	74.750	62.325

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 2.500 ug Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (ug/dL)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.475	0.000	5.605
1-2	0.034	2.458	0.000	13.315
2-3	0.062	2.804	0.000	14.071
3-4	0.067	2.746	0.000	14.606
4-5	0.067	2.690	0.000	15.416
5-6	0.093	2.860	0.000	16.385
6-7	0.093	3.176	0.000	16.764

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	1.550	9.652	5.2
1-2	2.339	18.147	7.2
2-3	2.377	19.315	7.1
3-4	2.421	19.840	6.9
4-5	1.824	19.997	6.6
5-6	1.654	20.993	6.4
6-7	1.572	21.606	6.0

Figure G-2

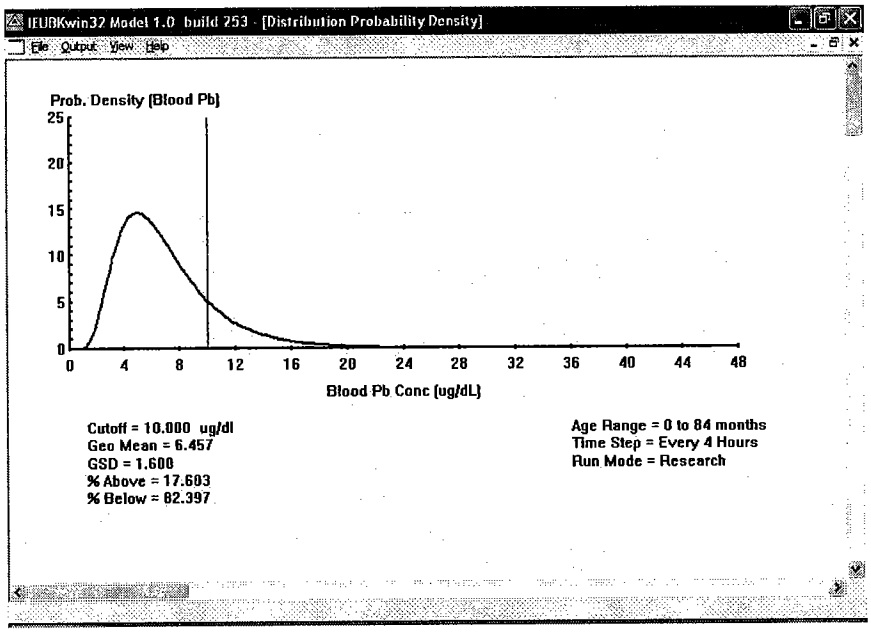
IEUBKwin32 Model 1.0 build 253 - [Distribution Probability Density]
File Output View Help
Prob. Density (Blood Pb)
25
20
15
10
5
0
0 4 8 12 16 20 24 28 32 36 40 44 48
Blood Pb Conc (ug/dL)
Cutoff = 10.000 ug/dl
Geo Mean = 6.457
GSD = 1.600
% Above = 17.603
% Below = 82.397
Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

Table G-2

LEAD MODEL FOR WINDOWS Version 1.0

==========

Model Version: 1.0 Build 253
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research

==========

The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 62.620 ug Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 65.909 ug/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	79.870	65.909
1-2	79.870	65.909
2-3	79.870	65.909
3-4	79.870	65.909
4-5	79.870	65.909
5-6	79.870	65.909
6-7	79.870	65.909

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 2.500 ug Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (ug/dL)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.473	0.000	5.600
1-2	0.034	2.455	0.000	13.300
2-3	0.062	2.802	0.000	14.057
3-4	0.067	2.744	0.000	14.593
4-5	0.067	2.689	0.000	15.407
5-6	0.093	2.859	0.000	16.377
6-7	0.093	3.175	0.000	16.757

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	1.646	9.739	5.2
1-2	2.484	18.273	7.3
2-3	2.524	19.445	7.1
3-4	2.571	19.975	6.9
4-5	1.938	20.100	6.6
5-6	1.758	21.087	6.4
6-7	1.670	21.696	6.1

Figure G-3

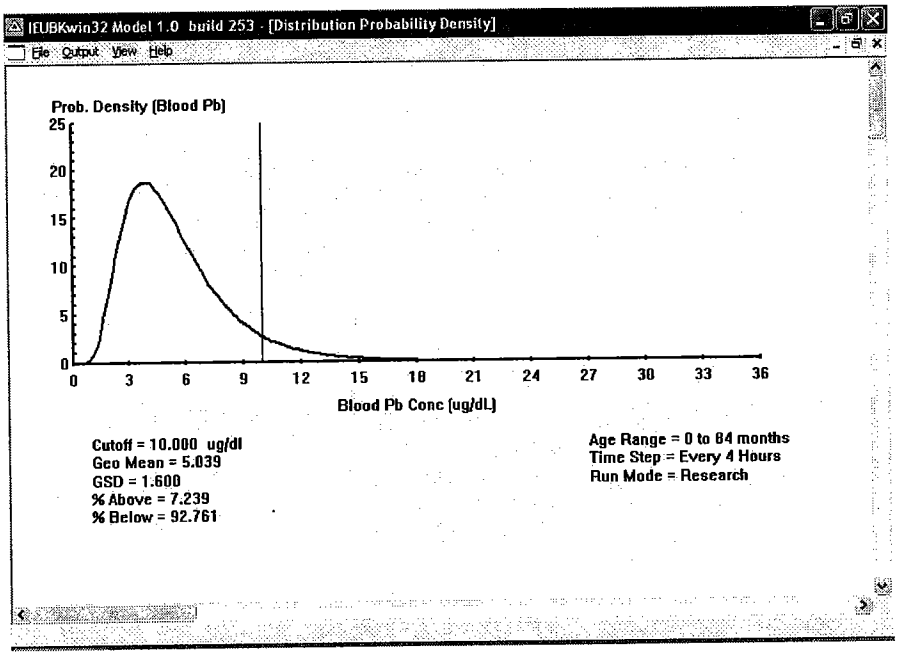
IEUBKwin32 Model 1.0 build 253 - [Distribution Probability Density]
File Output View Help
Prob. Density (Blood Pb)
25
20
15
10
5
0
0 3 6 9 12 15 18 21 24 27 30 33 36
Blood Pb Conc (ug/dL)
Cutoff = 10.000 ug/dl
Geo Mean = 5.039
GSD = 1.600
% Above = 7.239
% Below = 92.761
Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

Table G-3

LEAD MODEL FOR WINDOWS Version 1.0

==========

Model Version: 1.0 Build 253
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research

==========

The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 40.900 ug Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 68.037 ug/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	82.910	68.037
1-2	82.910	68.037
2-3	82.910	68.037
3-4	82.910	68.037
4-5	82.910	68.037
5-6	82.910	68.037
6-7	82.910	68.037

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 2.500 ug Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (ug/dL)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.523	0.000	3.732
1-2	0.034	2.547	0.000	9.012
2-3	0.062	2.896	0.000	9.492
3-4	0.067	2.827	0.000	9.819
4-5	0.067	2.763	0.000	10.344
5-6	0.093	2.934	0.000	10.979
6-7	0.093	3.254	0.000	11.217

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	1.739	8.015	4.3
1-2	2.667	14.260	5.7
2-3	2.701	15.152	5.6
3-4	2.742	15.455	5.4
4-5	2.062	15.235	5.1
5-6	1.868	15.874	4.8
6-7	1.772	16.336	4.6

Figure G-4

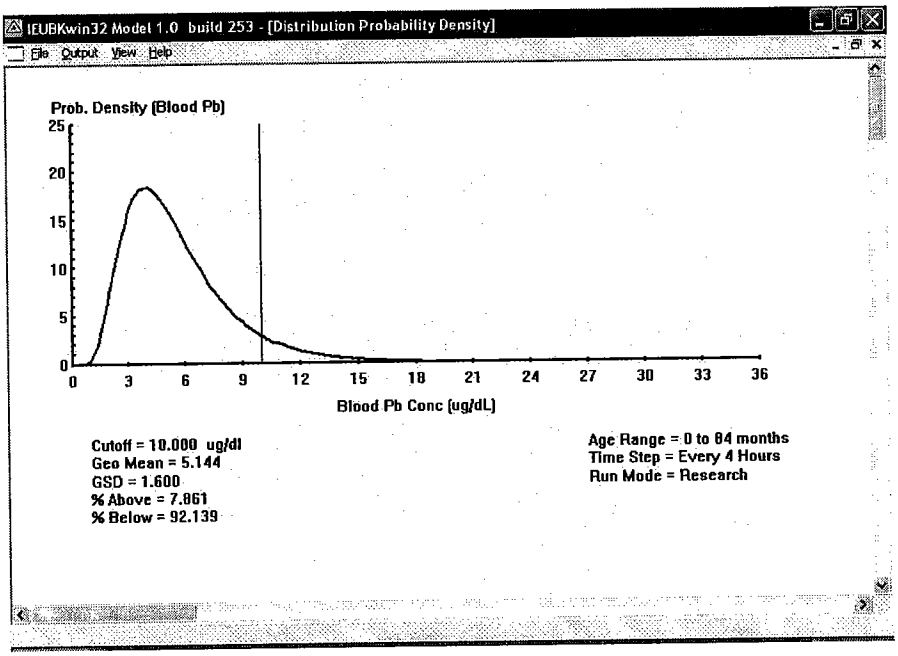
IEUBKwin32 Model 1.0 build 253 - [Distribution Probability Density]
File Output View Help
Prob. Density (Blood Pb)
25
20
15
10
5
0
0 3 6 9 12 15 18 21 24 27 30 33 36
Blood Pb Conc (ug/dL)
Cutoff = 10.000 ug/dl
Geo Mean = 5.144
GSD = 1.600
% Above = 7.861
% Below = 92.139
Age Range = 0 to 84 months
Time Step = Every 4 Hours
Run Mode = Research

Table G-4

LEAD MODEL FOR WINDOWS Version 1.0

==========

Model Version: 1.0 Build 253
User Name:
Date:
Site Name:
Operable Unit:
Run Mode: Research

==========

The time step used in this model run: 1 - Every 4 Hours (6 times a day).

****** Air ******

Indoor Air Pb Concentration: 30.000 percent of outdoor.
Other Air Parameters:

Age	Time Outdoors (hours)	Ventilation Rate (m^3/day)	Lung Absorption (%)	Outdoor Air Pb Conc (ug Pb/m^3)
.5-1	1.000	2.000	32.000	0.100
1-2	2.000	3.000	32.000	0.100
2-3	3.000	5.000	32.000	0.100
3-4	4.000	5.000	32.000	0.100
4-5	4.000	5.000	32.000	0.100
5-6	4.000	7.000	32.000	0.100
6-7	4.000	7.000	32.000	0.100

****** Diet ******

Age	Diet Intake(ug/day)
.5-1	5.530
1-2	5.780
2-3	6.490
3-4	6.240
4-5	6.010
5-6	6.340
6-7	7.000

****** Drinking Water ******

Water Consumption:

Age	Water (L/day)
.5-1	0.200
1-2	0.500
2-3	0.520
3-4	0.530
4-5	0.550
5-6	0.580
6-7	0.590

Drinking Water Concentration: 40.900 ug Pb/L

****** Soil & Dust ******

Multiple Source Analysis Used
Average multiple source concentration: 76.997 ug/g

Mass fraction of outdoor soil to indoor dust conversion factor: 0.700
Outdoor airborne lead to indoor household dust lead concentration: 100.000
Use alternate indoor dust Pb sources? No

Age	Soil (ug Pb/g)	House Dust (ug Pb/g)
.5-1	95.710	76.997
1-2	95.710	76.997
2-3	95.710	76.997
3-4	95.710	76.997
4-5	95.710	76.997
5-6	95.710	76.997
6-7	95.710	76.997

****** Alternate Intake ******

Age	Alternate (ug Pb/day)
.5-1	0.000
1-2	0.000
2-3	0.000
3-4	0.000
4-5	0.000
5-6	0.000
6-7	0.000

****** Maternal Contribution: Infant Model ******

Maternal Blood Concentration: 2.500 ug Pb/dL

****
CALCULATED BLOOD LEAD AND LEAD UPTAKES:
****

Year	Air (ug/dL)	Diet (ug/day)	Alternate (ug/day)	Water (ug/day)
.5-1	0.021	2.516	0.000	3.722
1-2	0.034	2.539	0.000	8.984
2-3	0.062	2.889	0.000	9.466
3-4	0.067	2.820	0.000	9.797
4-5	0.067	2.759	0.000	10.328
5-6	0.093	2.931	0.000	10.966
6-7	0.093	3.250	0.000	11.205

Year	Soil+Dust (ug/day)	Total (ug/day)	Blood (ug/dL)
.5-1	1.982	8.242	4.5
1-2	3.040	14.597	5.9
2-3	3.080	15.497	5.7
3-4	3.127	15.810	5.5
4-5	2.353	15.507	5.2
5-6	2.132	16.122	4.9
6-7	2.023	16.572	4.7

Appendix H

Groundwater Data

Building 71 – Inorganics

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
ALUMINUM				3882.8	200	13	2,000
	036GR80C01	1993	7080.00	X	X		X
	036GR81C01	1993	1160.00		X		
	038GGI0101	1994	1410.00 J		X		
	038GGI0201	1994	1090.00 J		X		
	038GGI0301	1994	895.00 J		X		
	038GGS0101	1994	6420.00	X	X		X
	038GGS0201	1994	1330.00		X	X	
	038GGS0301	1994	2700.00		X	X	X
	038GGS0401	1994	658.00		X		
	038GGS0501	1994	3210.00		X		X
	038GGS0601	1994	30.90				
	038GGS1001	1994	8940.00	X	X		X
	038GGS1101	1994	991.00		X		
	038GGS1201	1994	11400.00	X	X		X
	038GGS1301	1994	2320.00		X	X	X
	038G0I1001	1995	2600.00		X		X
	038G0S2301	1995	260.00		X		
	038G0T0501	1995	1800.00		X		
	038GS01	1998	730.00		X		
	038GGS0104	2000	39.00 J				
	038GGS0204	2000	12.00 J				
	038GGS0304	2000	76.00 J			X	
	038GGS1004	2000	5.90 J				
	038GGS1204	2000	18.00 J				
ANTIMONY				30.2	6	4,300	60
	038GGS1001	1994	25.00 J		X		
	038GS03	1998	70.00	X	X		X
	038GS12	1998	180.00	X	X		X
ARSENIC				2.8	50	50	500
	036GR80C01	1993	4.30 J	X			
	036GR81C01	1993	2.10 J				
	038GGI0301	1994	3.90 J	X			
	038GGS0101	1994	21.80	X			
	038GGS0201	1994	10.80	X			
	038GGS0301	1994	5.70	X			
	038GGS0401	1994	13.00	X			
	038GGS0501	1994	7.30	X			
	038GGS0601	1994	35.70	X			
	038GGS1001	1994	24.00	X			
	038GGS1201	1994	102.00	X	X		
	038GGS1301	1994	7.90	X			
	038GS01	1998	17.00	X			
	038GS12	1998	6.00	X			
	038GGS0104	2000	4.00 J	X			
	038GGS0504	2000	3.00 J	X			
	038GGS1104	2000	4.50 J	X			

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS1204	2000	4.50 J	X			
BARIUM[1]				13.23	2,000	14.55	20,000
	036GR80C01	1993	77.80 J	X			
	036GR81C01	1993	48.50 J	X			
	038GGI0101	1994	25.60	X			
	038GGI0201	1994	47.20 J	X			
	038GGI0301	1994	15.50 J	X			
	038GGS0101	1994	104.00	X			
	038GGS0201	1994	21.60	X		X	
	038GGS0301	1994	79.60	X		X	
	038GGS0401	1994	30.00	X			
	038GGS0501	1994	80.70	X			
	038GGS0601	1994	77.90	X			
	038GGS1001	1994	34.00	X			
	038GGS1101	1994	27.00	X			
	038GGS1201	1994	152.00	X			
	038G0I1001	1995	11.00				
	038G0S2301	1995	22.00	X			
	038G0T0501	1995	15.00	X			
	038GS01	1998	220.00	X			
	038GS03	1998	140.00	X		X	
	038GS12	1998	100.00	X			
	038GGS0104	2000	68.00	X			
	038GGS0204	2000	26.00	X		X	
	038GGS0304	2000	41.00	X		X	
	038GGS0504	2000	38.00	X			
	038GGS1004	2000	64.00	X			
	038GGS1104	2000	68.00	X			
	038GGS1204	2000	29.00	X			
	038GGS1304	2000	21.00	X		X	
BERYLLIUM				1.1	4	0.13	40
	038GGI0301	1994	1.20 J	X			
	038GGS1001	1994	1.00				
CADMIUM				3.4	5	9.3	50
	038GGS0501	1994	9.70	X	X		
	038GGS1201	1994	3.00				
	038GGS1301	1994	11.00	X	X	X	
	038GS12	1998	50.00	X	X		X
	038GGS0304	2000	3.60 J	X			
	038GGS0504	2000	5.90	X	X		
	038GGS1104	2000	0.95 J				
	038GGS1304	2000	0.41 J				
CALCIUM				17,560	NOT AVAILABLE		
	036GR80C01	1993	40800.00	X			
	036GR81C01	1993	56300.00	X			
	038GGI0101	1994	53300.00 J	X			
	038GGI0201	1994	72500.00 J	X			

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGI0301	1994	17100.00				
	038GGS0101	1994	21800.00	X			
	038GGS0201	1994	29600.00	X			
	038GGS0301	1994	37800.00	X			
	038GGS0401	1994	45900.00	X			
	038GGS0501	1994	52700.00	X			
	038GGS0601	1994	43000.00	X			
	038GGS1001	1994	44800.00	X			
	038GGS1101	1994	9190.00				
	038GGS1201	1994	70800.00	X			
	038GGS1301	1994	32500.00	X			
	038G0I1001	1995	12000.00				
	038G0S2301	1995	75000.00	X			
	038G0T0501	1995	18000.00	X			
	038GS01	1998	49400.00	X			
	038GS03	1998	54100.00	X			
	038GS12	1998	42900.00	X			
	038GGS0104	2000	34000.00	X			
	038GGS0204	2000	50000.00	X			
	038GGS0304	2000	40000.00	X			
	038GGS0504	2000	37000.00	X			
	038GGS1004	2000	47000.00	X			
	038GGS1104	2000	30000.00	X			
	038GGS1204	2000	40000.00	X			
	038GGS1304	2000	35000.00	X			
CHROMIUM (TOTAL)				35	100	NA	1,000
	036GR80C01	1993	24.90				
	036GR81C01	1993	6.40 J				
	038GGI0101	1994	4.00				
	038GGI0201	1994	11.00 J				
	038GGI0301	1994	70.60	X			
	038GGS0101	1994	18.80				
	038GGS0201	1994	11.10				
	038GGS0301	1994	74.80	X			
	038GGS0601	1994	4.00				
	038GGS1001	1994	30.00				
	038GGS1101	1994	22.80				
	038GGS1201	1994	326.00	X	X		
	038GGS1301	1994	184.00	X	X		
	038G0I1001	1995	55.00	X			
	038G0T0501	1995	87.00	X			
	038GGS0204	2000	1.20 J				
	038GGS0304	2000	3.90 J				
	038GGS0504	2000	2.60 J				
	038GGS1104	2000	31.00				
	038GGS1204	2000	2.50 J				
	038GGS1304	2000	2.40 J				

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
COBALT				4.1	420	NA	4,200
	038GGS0101	1994	3.70				
	038GGS0201	1994	5.10	X			
	038GGS0301	1994	3.70				
	038GGS0501	1994	3.00				
	038GGS1201	1994	3.60				
	038GS01	1998	20.00	X			
	038GS12	1998	20.00	X			
COPPER				16.2	1,000	2.9	10,000
	036GR80C01	1993	62.30	X			
	036GR81C01	1993	17.10 J	X			
	038GGI0101	1994	6.10				
	038GGI0201	1994	12.50				
	038GGI0301	1994	8.50				
	038GGS0101	1994	91.10	X			
	038GGS0201	1994	311.00	X		X	
	038GGS0301	1994	45.60	X		X	
	038GGS0401	1994	12.00				
	038GGS0501	1994	32.40	X			
	038GGS0601	1994	6.10				
	038GGS1001	1994	70.00	X			
	038GGS1101	1994	17.60	X			
	038GGS1201	1994	100.00	X			
	038GGS1301	1994	319.00	X		X	
	038GS01	1998	30.00	X			
	038GS12	1998	910.00	X			
	038GGS0104	2000	4.00 J				
	038GGS0204	2000	2.80 J				
	038GGS0304	2000	3.20 J			X	
	038GGS1004	2000	8.30 J				
	038GGS1104	2000	9.40 J				
	038GGS1204	2000	14.00 J				
	038GGS1304	2000	17.00 J	X		X	
IRON				1707.8	300	300	3,000
	036GR80C01	1993	8450.00	X	X		X
	036GR81C01	1993	980.00		X		
	038GGI0101	1994	3490.00 J	X	X		X
	038GGI0201	1994	1570.00 J		X		
	038GGI0301	1994	1250.00 J		X		
	038GGS0101	1994	6820.00	X	X		X
	038GGS0201	1994	7470.00	X	X	X	X
	038GGS0301	1994	4930.00	X	X	X	X
	038GGS0401	1994	1400.00		X		
	038GGS0601	1994	949.00		X		
	038GGS1001	1994	15700.00	X	X		X
	038GGS1101	1994	895.00		X		
	038GGS1201	1994	17600.00	X	X		X

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS1301	1994	4560.00	X	X	X	X
	038G0I1001	1995	1200.00		X		
	038G0T0501	1995	1800.00	X	X		
	038GS01	1998	1240.00		X		
	038GS03	1998	160.00				
	038GS12	1998	1150.00		X		
	038GGS0204	2000	98.00				
	038GGS0304	2000	230.00				
	038GGS0504	2000	170.00				
	038GGS1004	2000	110.00				
	038GGS1104	2000	78.00 J				
	038GGS1204	2000	220.00				
	038GGS1304	2000	55.00 J				
LEAD				1.6	15	5.6	150
	036GR80C01	1993	220.00	X	X		X
	036GR81C01	1993	48.90	X	X		
	038GGI0101	1994	4.40 J	X			
	038GGI0201	1994	3.60 J	X			
	038GGS0101	1994	276.00	X	X		X
	038GGS0201	1994	362.00 J	X	X	X	X
	038GGS0301	1994	88.50	X	X	X	
	038GGS0401	1994	14.00	X			
	038GGS0501	1994	55.80	X	X		
	038GGS1001	1994	54.00	X	X		
	038GGS1101	1994	20.10	X	X		
	038GGS1201	1994	280.00	X	X		X
	038GGS1301	1994	158.00	X	X	X	X
	038G0S2301	1995	5.60	X			
	038G0T0501	1995	2.80	X			
	038GS01	1998	117.00	X	X		
	038GS12	1998	128.00	X	X		
	038GGS0304	2000	3.30 J	X			
	038GGS0504	2000	2.40 J	X			
	038GGS1104	2000	14.00	X			
	038GGS1204	2000	2.70 J	X			
	038GGS1304	2000	2.70 J	X			
MAGNESIUM				2,872.5	NOT AVAILABLE		
	036GR80C01	1993	3160.00 J	X			
	036GR81C01	1993	3410.00 J	X			
	038GGI0101	1994	11900.00 J	X			
	038GGI0201	1994	117000.00 J	X			
	038GGI0301	1994	27600.00 J	X			
	038GGS0101	1994	2150.00				
	038GGS0201	1994	4990.00	X			
	038GGS0301	1994	3880.00	X			
	038GGS0401	1994	3990.00	X			
	038GGS0501	1994	180.00				

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS0601	1994	3290.00	X			
	038GGS1001	1994	5480.00	X			
	038GGS1101	1994	1260.00				
	038GGS1201	1994	7510.00	X			
	038GGS1301	1994	2890.00	X			
	038G0I1001	1995	16000.00	X			
	038G0S2301	1995	180000.00	X			
	038G0T0501	1995	24000.00	X			
	038GS01	1998	7480.00	X			
	038GS03	1998	13700.00	X			
	038GS12	1998	15300.00	X			
	038GGS0104	2000	3800.00	X			
	038GGS0204	2000	20000.00	X			
	038GGS0304	2000	8500.00	X			
	038GGS0504	2000	6100.00	X			
	038GGS1004	2000	11000.00	X			
	038GGS1104	2000	5900.00	X			
	038GGS1204	2000	7400.00	X			
	038GGS1304	2000	6500.00	X			
MANGANESE				22	50	NA	500
	036GR80C01	1993	98.70	X	X		
	036GR81C01	1993	57.20	X	X		
	038GGI0101	1994	43.10 J	X			
	038GGI0201	1994	38.00 J	X			
	038GGI0301	1994	28.40 J	X			
	038GGS0101	1994	174.00	X	X		
	038GGS0201	1994	26.50	X			
	038GGS0301	1994	40.60	X			
	038GGS0401	1994	41.00	X			
	038GGS0601	1994	97.80	X	X		
	038GGS1001	1994	101.00	X	X		
	038GGS1101	1994	16.70				
	038GGS1201	1994	128.00	X	X		
	038G0I1001	1995	30.00	X			
	038G0S2301	1995	23.00	X			
	038G0T0501	1995	20.00				
	038GS03	1998	50.00	X	X		
	038GS12	1998	40.00	X			
	038GGS0104	2000	30.00 J	X			
	038GGS0204	2000	14.00 J				
	038GGS0304	2000	33.00 J	X			
	038GGS0504	2000	11.00 J				
	038GGS1004	2000	9.60 J				
	038GGS1104	2000	8.90 J				
	038GGS1204	2000	23.00 J	X			
	038GGS1304	2000	21.00				
MERCURY				0.2	2	0.025	20

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS1001	1994	0.33	X			
MOLYBDENUM				NA	35	NA	350
	038G0I1001	1995	22.00				
	038G0T0501	1995	31.00				
NICKEL				40	100	8.3	1,000
	038GGS0501	1994	15.90				
	038GGS1001	1994	10.00				
	038GS01	1998	20.00				
	038GS03	1998	20.00			X	
	038GS12	1998	30.00				
	038GGS0504	2000	3.00 J				
	038GGS1104	2000	6.90 J				
POTASSIUM				12,167.5	NOT AVAILABLE		
	036GR80C01	1993	2750.00 J				
	036GR81C01	1993	3120.00 J				
	038GGI0101	1994	8880.00 J				
	038GGI0201	1994	72800.00 J	X			
	038GGI0301	1994	39400.00 J	X			
	038GGS0101	1994	2690.00				
	038GGS0201	1994	2990.00				
	038GGS0301	1994	4270.00				
	038GGS0401	1994	2240.00				
	038GGS0601	1994	2990.00				
	038GGS1001	1994	2410.00				
	038GGS1101	1994	1470.00				
	038GGS1201	1994	7850.00				
	038GGS1301	1994	2830.00				
	038G0I1001	1995	21000.00	X			
	038G0S2301	1995	80000.00	X			
	038G0T0501	1995	36000.00	X			
	038GS01	1998	4020.00				
	038GS03	1998	6820.00				
	038GS12	1998	8210.00				
	038GGS0104	2000	3300.00				
	038GGS0204	2000	9500.00				
	038GGS0304	2000	4700.00				
	038GGS0504	2000	6100.00				
	038GGS1004	2000	7300.00				
	038GGS1104	2000	4100.00				
	038GGS1204	2000	5300.00				
	038GGS1304	2000	4300.00				
SELENIUM				3.9	50	71	500
	036GR81C01	1993	2.20 J				
	038GGI0201	1994	3.20 J				
	038GGS0501	1994	2.00				
	038GGS1001	1994	2.00				
	038GGS1201	1994	5.00	X			

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
SILVER				4	100	0.35	1000
	038GGS0504	2000	0.74 J				
SODIUM				18,345	160,000	NA	NA
	036GR80C01	1993	12300.00				
	036GR81C01	1993	8060.00				
	038GGI0101	1994	48100.00 J	X			
	038GGI0201	1994	136000.00 J	X			
	038GGI0301	1994	538000.00 J	X	X		
	038GGS0101	1994	7920.00				
	038GGS0201	1994	11100.00				
	038GGS0301	1994	21800.00	X			
	038GGS0401	1994	5880.00				
	038GGS0501	1994	12600.00				
	038GGS0601	1994	6250.00				
	038GGS1001	1994	622.00				
	038GGS1101	1994	10500.00				
	038GGS1201	1994	17600.00				
	038GGS1301	1994	9390.00				
	038G0I1001	1995	350000.00	X	X		
	038G0S2301	1995	2000000.00	X	X		
	038G0T0501	1995	600000.00	X	X		
	038GS01	1998	31200.00	X			
	038GS03	1998	90800.00	X			
	038GS12	1998	83700.00	X			
	038GGS0104	2000	18000.00				
	038GGS0204	2000	100000.00	X			
	038GGS0304	2000	22000.00	X			
	038GGS0504	2000	16000.00				
	038GGS1004	2000	84000.00	X			
	038GGS1104	2000	17000.00				
	038GGS1204	2000	19000.00	X			
	038GGS1304	2000	23000.00	X			
STRONTIUM				NA	4,200	NA	42,000
	038G0I1001	1995	140.00				
	038G0S2301	1995	1100.00				
	038G0T0501	1995	200.00				
THALLIUM				4	2	6.3	20
	038GGS1001	1994	2.00		X		
TITANIUM				NOT AVAILABLE			
	038G0I1001	1995	97.00				
	038G0S2301	1995	14.00				
	038G0T0501	1995	140.00				
VANADIUM				9.6	49	NA	490
	036GR80C01	1993	19.20 J	X			
	036GR81C01	1993	4.70 J				
	038GGI0101	1994	5.50				
	038GGI0201	1994	13.80	X			

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGI0301	1994	222.00 J	X	X		
	038GGS0101	1994	15.90	X			
	038GGS0201	1994	9.80	X			
	038GGS0301	1994	12.00	X			
	038GGS0401	1994	3.00				
	038GGS0501	1994	12.90	X			
	038GGS0601	1994	4.40				
	038GGS1001	1994	33.00	X			
	038GGS1201	1994	74.60	X	X		
	038GGS1301	1994	11.70	X			
	038G0I1001	1995	140.00	X	X		
	038G0S2301	1995	19.00	X			
	038G0T0501	1995	230.00	X	X		
	038GGS0504	2000	2.00 J				
	038GGS1104	2000	1.70 J				
YTTRIUM				NOT AVAILABLE			
	038G0I1001	1995	23.00				
	038G0T0501	1995	52.00				
ZINC				153.2	5,000	86	50,000
	036GR80C01	1993	158.00	X			
	036GR81C01	1993	24.30				
	038GGI0101	1994	16.00				
	038GGI0201	1994	142.00 J				
	038GGI0301	1994	17.00				
	038GGS0101	1994	668.00	X			
	038GGS0201	1994	133.00			X	
	038GGS0301	1994	819.00	X		X	
	038GGS0401	1994	12.00				
	038GGS0501	1994	527.00	X			
	038GGS0601	1994	206.00	X			
	038GGS1001	1994	52.00				
	038GGS1101	1994	46.90				
	038GGS1201	1994	1230.00	X			
	038GGS1301	1994	684.00	X		X	
	038G0I1001	1995	5.60				
	038GS01	1998	570.00	X			
	038GS03	1998	530.00	X		X	
	038GS12	1998	950.00	X			
	038GGS0104	2000	74.00				
	038GGS0304	2000	500.00	X		X	
	038GGS0504	2000	210.00 J	X			
	038GGS1104	2000	61.00 J				
	038GGS1304	2000	21.00 J				

Notes:
NA - Not Available

SITE 38 - BUILDING 71
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS

RC - Reference Concentration
GC - General Criteria
MSWQ - Marine Surface Water Criteria
NADS - Natural Attenuation Default Source
[1] - Marine Surface Water Criteria for Barium is derived from 10% greater than the reference concentration.
038G0S3201 - Sample compared to Marine Surface Water Criteria

Building 604 – Inorganics

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
ALUMINUM				3882.8	200	13	2,000
	036GR73C01	1993	14000.00	X	X		X
	036GR74C01	1993	1530.00		X		
	036GR75C01	1993	811.00		X		
	036GR76C01	1993	9120.00	X	X		X
	036GR77C01	1993	4100.00	X	X		X
	036GR78C01	1993	1030.00		X		
	036GR79C01	1993	7820.00	X	X		X
	038GGI0401	1994	9110.00 J	X	X		X
	038GGI0701	1994	223.00		X		
	038GGI0801	1994	101.00 J				
	038GGI0901	1994	241.00 J		X		
	038GGS0701	1994	320.00		X	X	
	038GGS0801	1994	792.00		X		
	038GGS0901	1994	3050.00		X		X
	038GGS1401	1994	688.00		X		
	038GGS1501	1994	300.00		X		
	038GGS1601	1994	877.00		X		
	038GGS1701	1994	180.00				
	038GGS1801	1994	1020.00		X	X	
	038GGS1901	1994	1860.00		X		
	038GGS2001	1994	20000.00	X	X		X
	038GGS2101	1994	2710.00		X		X
	038G0I0401	1995	78.00				
	038G0I0701	1995	74.00				
	038G0I0801	1995	56.00				
	038G0I0901	1995	75.00				
	038G0S0701	1995	57.00			X	
	038G0S1701	1995	55.00				
	038G0S1801	1995	64.00			X	
	038G0S2201	1995	52.00				
	038G0S2401	1995	55.00				
	038G0S2501	1995	230.00		X		
	038G0S2601	1995	62.00				
	038G0S2701	1995	250.00		X		
	038G0S2801	1995	240.00		X		
	038G0S2901	1995	190.00				
	038G0S3001	1995	280.00		X		
	038G0S3101	1995	320.00		X		
	038G0S3201	1995	74.00			X	
	038GS08	1998	250.00		X		
	038GS28	1998	90.00				
	038GGS1904	2000	6.90 J				
	038GGS2004	2000	8.40 J				
	038GGS2804	2000	550.00		X		
	038GGS2904	2000	19.00 J				
ANTIMONY				30.2	6	4,300	60
	038GS08	1998	210.00	X	X		X

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GS19	1998	60.00	X	X		X
	038GS32	1998	190.00	X	X		X
	038GGS1904	2000	2.90 J				
ARSENIC				2.8	50	50	500
	036GR73C01	1993	1.80 J				
	036GR74C01	1993	4.60 J	X			
	036GR75C01	1993	4.30 J	X			
	036GR76C01	1993	11.00	X			
	036GR77C01	1993	3.80 J	X			
	036GR78C01	1993	1.50 J				
	036GR79C01	1993	3.20 J	X			
	038GGI0401	1994	4.80	X			
	038GGS0801	1994	4.00	X			
	038GGS0901	1994	5.80	X			
	038GGS1401	1994	4.00	X			
	038GGS1601	1994	6.10	X			
	038GGS1801	1994	5.30	X			
	038GGS1901	1994	12.50	X			
	038GGS2101	1994	5.70	X			
	038G0S2901	1995	12.00	X			
	038G0S3001	1995	17.00	X			
	038G0S3201	1995	8.40	X			
	038GS32	1998	5.00	X			
	038GGS0704	2000	2.60 J				
	038GGS0804	2000	5.70 J	X			
	038GGS0904	2000	3.00 J	X			
	038GGS1504	2000	2.30 J				
	038GGS1804	2000	6.30 J	X			
	038GGS1904	2000	2.30 J				
	038GGS2104	2000	3.50 J	X			
	038GGS2204	2000	3.50 J	X			
	038GGS2404	2000	31.00	X			
	038GGS3204	2000	3.70 J	X			
BARIUM[1]				13.23	2,000	14.55	20,000
	036GR73C01	1993	102.00 J	X			
	036GR74C01	1993	196.00 J	X			
	036GR75C01	1993	111.00 J	X			
	036GR76C01	1993	109.00 J	X			
	036GR77C01	1993	39.40 J	X			
	036GR78C01	1993	84.50 J	X			
	036GR79C01	1993	150.00 J	X			
	038GGI0401	1994	16.60	X			
	038GGI0701	1994	9.30				
	038GGI0801	1994	5.60				
	038GGI0901	1994	11.20				
	038GGS0701	1994	55.80	X		X	
	038GGS0801	1994	173.00	X			

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS0901	1994	59.30	X			
	038GGS1901	1994	104.00	X			
	038GGS2001	1994	98.60	X			
	038GGS2101	1994	168.00	X			
	038G0I0901	1995	22.00	X			
	038G0S0701	1995	68.00	X		X	
	038G0S0901	1995	59.00	X			
	038G0S1701	1995	58.00	X			
	038G0S1801	1995	99.00	X		X	
	038G0S2201	1995	46.00	X			
	038G0S2401	1995	44.00	X			
	038G0S2501	1995	58.00	X			
	038G0S2601	1995	69.00	X			
	038G0S2701	1995	49.00	X			
	038G0S2801	1995	30.00	X			
	038G0S2901	1995	61.00	X			
	038G0S3001	1995	36.00	X			
	038G0S3101	1995	63.00	X			
	038G0S3201	1995	60.00	X		X	
	038GS08	1998	320.00	X			
	038GS19	1998	200.00	X			
	038GS28	1998	100.00	X			
	038GS32	1998	144.00	X		X	
	038GGI0404	2000	2.20 J				
	038GGI0804	2000	0.67 J				
	038GGS0704	2000	99.00	X		X	
	038GGS0804	2000	110.00	X			
	038GGS0904	2000	72.00	X			
	038GGS1404	2000	66.00	X			
	038GGS1504	2000	81.00	X			
	038GGS1704	2000	68.00	X			
	038GGS1804	2000	60.00	X		X	
	038GGS1904	2000	110.00	X			
	038GGS2004	2000	61.00	X			
	038GGS2104	2000	57.00	X			
	038GGS2204	2000	38.00	X			
	038GGS2404	2000	44.00	X			
	038GGS2804	2000	27.00	X			
	038GGS2904	2000	110.00	X			
	038GGS3204	2000	71.00	X		X	
CADMIUM				3.4	5	9.3	50
	036GR75C01	1993	8.10	X	X		
	036GR76C01	1993	45.90	X	X		
	036GR77C01	1993	4.50 J	X			
	038GGI0401	1994	14.50	X	X		
	038GGS0801	1994	14.70	X	X		
	038GGS1401	1994	14.50	X	X		
	038GGS1601	1994	4.50	X			

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS1901	1994	382.00	X	X		X
	038GGS2001	1994	34.10	X	X		
	038GGS2101	1994	336.00	X	X		X
	038G0S2401	1995	11.00	X	X		
	038G0S2701	1995	1.10				
	038G0S2901	1995	1.70				
	038GS08	1998	50.00	X	X		X
	038GS19	1998	0.25				
	038GGS0804	2000	3.90 J	X			
	038GGS0904	2000	1.20 J				
	038GGS1404	2000	19.00	X	X		
	038GGS1804	2000	0.67 J				
	038GGS1904	2000	79.00	X	X		X
	038GGS2104	2000	150.00	X	X		X
	038GGS2404	2000	12.00	X	X		
CALCIUM				17,560	NOT AVAILABLE		
	036GR73C01	1993	48200.00	X			
	036GR74C01	1993	58200.00	X			
	036GR75C01	1993	48700.00	X			
	036GR76C01	1993	45600.00	X			
	036GR77C01	1993	66000.00	X			
	036GR78C01	1993	53000.00	X			
	036GR79C01	1993	39000.00	X			
	038GGI0401	1994	59200.00	X			
	038GGI0701	1994	37000.00	X			
	038GGI0801	1994	26700.00	X			
	038GGI0901	1994	26700.00	X			
	038GGS0701	1994	27400.00	X			
	038GGS0801	1994	66100.00	X			
	038GGS0901	1994	24500.00	X			
	038GGS1401	1994	40300.00	X			
	038GGS1501	1994	32300.00	X			
	038GGS1601	1994	48900.00	X			
	038GGS1701	1994	29100.00	X			
	038GGS1801	1994	44700.00	X			
	038GGS1901	1994	26200.00	X			
	038GGS2001	1994	45600.00	X			
	038GGS2101	1994	43800.00	X			
	038G0I0401	1995	36000.00	X			
	038G0I0701	1995	41000.00	X			
	038G0I0801	1995	32000.00	X			
	038G0I0901	1995	32000.00	X			
	038G0S0701	1995	38000.00	X			
	038G0S0901	1995	39000.00	X			
	038G0S1701	1995	31000.00	X			
	038G0S1801	1995	60000.00	X			
	038G0S2201	1995	33000.00	X			
	038G0S2401	1995	61000.00	X			

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038G0S2501	1995	28000.00	X			
	038G0S2601	1995	49000.00	X			
	038G0S2701	1995	23000.00	X			
	038G0S2801	1995	16000.00				
	038G0S2901	1995	27000.00	X			
	038G0S3001	1995	13000.00				
	038G0S3101	1995	14000.00				
	038G0S3201	1995	43000.00	X			
	038GS08	1998	74400.00	X			
	038GS19	1998	46500.00	X			
	038GS28	1998	27500.00	X			
	038GS32	1998	49900.00	X			
	038GGI0404	2000	46000.00	X			
	038GGI0804	2000	31000.00	X			
	038GGS0704	2000	54000.00	X			
	038GGS0804	2000	40000.00	X			
	038GGS0904	2000	45000.00	X			
	038GGS1404	2000	48000.00	X			
	038GGS1504	2000	55000.00	X			
	038GGS1704	2000	45000.00	X			
	038GGS1804	2000	39000.00	X			
	038GGS1904	2000	44000.00	X			
	038GGS2004	2000	53000.00	X			
	038GGS2104	2000	30000.00	X			
	038GGS2204	2000	29000.00	X			
	038GGS2404	2000	42000.00	X			
	038GGS2804	2000	13000.00				
	038GGS2904	2000	44000.00	X			
	038GGS3204	2000	49000.00	X			
CHROMIUM (TOTAL)				35	100	NA	1,000
	036GR73C01	1993	19.30				
	036GR74C01	1993	20.90				
	036GR75C01	1993	81.10	X			
	036GR76C01	1993	472.00	X	X		
	036GR77C01	1993	156.00	X	X		
	036GR78C01	1993	5.20 J				
	036GR79C01	1993	19.80				
	038GGI0401	1994	370.00	X	X		
	038GGI0701	1994	6.20				
	038GGI0901	1994	5.40				
	038GGS0801	1994	233.00	X	X		
	038GGS0901	1994	23.50				
	038GGS1401	1994	77.60	X			
	038GGS1501	1994	31.80				
	038GGS1601	1994	15.20				
	038GGS1701	1994	74.50	X			
	038GGS1801	1994	23.20				
	038GGS1901	1994	544.00	X	X		

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS2001	1994	378.00	X	X		
	038GGS2101	1994	297.00	X	X		
	038G0S1701	1995	4.40				
	038G0S2201	1995	22.00				
	038G0S2901	1995	7.60				
	038GS08	1998	100.00	X	X		
	038GS19	1998	20.00				
	038GGS0804	2000	15.00				
	038GGS1404	2000	15.00				
	038GGS1504	2000	8.30 J				
	038GGS1704	2000	5.30 J				
	038GGS1804	2000	6.70 J				
	038GGS1904	2000	19.00				
	038GGS2104	2000	14.00				
	038GGS2204	2000	32.00				
	038GGS2404	2000	33.00				
	038GGS2804	2000	0.84 J				
	038GGS2904	2000	1.20 J				
	038GGS3204	2000	2.10 J				
COBALT				4.1	420	NA	4,200
	036GR76C01	1993	2.00 J				
	038GGI0401	1994	4.30	X			
	038GGS2001	1994	3.20				
	038G0S3001	1995	3.20				
	038GS08	1998	20.00	X			
	038GS19	1998	20.00	X			
	038GS28	1998	20.00	X			
COPPER				16.2	1,000	2.9	10,000
	036GR73C01	1993	35.90	X			
	036GR74C01	1993	44.70	X			
	036GR75C01	1993	44.60	X			
	036GR76C01	1993	216.00	X			
	036GR77C01	1993	195.00	X			
	036GR78C01	1993	10.70 J				
	036GR79C01	1993	60.90	X			
	038GGI0401	1994	26.90	X			
	038GGI0701	1994	6.10				
	038GGI0801	1994	4.60				
	038GGI0901	1994	8.50				
	038GGS0701	1994	5.70			X	
	038GGS0801	1994	171.00	X			
	038GGS0901	1994	288.00	X			
	038GGS1401	1994	219.00	X			
	038GGS1501	1994	28.50	X			
	038GGS1601	1994	37.30	X			
	038GGS1701	1994	9.10				
	038GGS1801	1994	222.00	X		X	

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS1901	1994	195.00	X			
	038GGS2001	1994	76.10	X			
	038GGS2101	1994	389.00	X			
	038G0S1801	1995	5.30			X	
	038G0S2501	1995	8.20				
	038G0S2801	1995	4.10				
	038G0S2901	1995	26.00	X			
	038G0S3001	1995	3.70				
	038GS08	1998	250.00	X			
	038GS19	1998	90.00	X			
	038GS28	1998	30.00	X			
	038GS32	1998	20.00	X		X	
	038GGS0804	2000	40.00	X			
	038GGS1404	2000	15.00 J				
	038GGS1804	2000	20.00	X		X	
	038GGS1904	2000	6.90 J				
	038GGS2104	2000	12.00 J				
	038GGS2404	2000	8.40 J				
	038GGS2804	2000	5.70 J				
	038GGS2904	2000	2.90 J				
Cyanide (CN)				NA	200	1	2,000
	036GR73C01	1993	2.10 J				
	036GR75C01	1993	9.90				
	036GR76C01	1993	18.80				
	036GR77C01	1993	11.90				
	038G0S2901	1995	17.00 A				
IRON				1707.8	300	300	3,000
	036GR73C01	1993	11800.00	X	X		X
	036GR74C01	1993	2130.00	X	X		
	036GR75C01	1993	584.00		X		
	036GR76C01	1993	7510.00	X	X		X
	036GR77C01	1993	4210.00	X	X		X
	036GR78C01	1993	2170.00	X	X		
	036GR79C01	1993	7840.00	X	X		X
	038GGI0701	1994	646.00		X		
	038GGI0801	1994	235.00				
	038GGI0901	1994	410.00		X		
	038GGS0701	1994	484.00		X	X	
	038GGS0801	1994	496.00		X		
	038GGS0901	1994	4660.00	X	X		X
	038GGS1401	1994	1160.00		X		
	038GGS1501	1994	135.00				
	038GGS1601	1994	1320.00		X		
	038GGS1701	1994	267.00				
	038GGS1801	1994	1170.00		X	X	
	038GGS1901	1994	2650.00	X	X		
	038GGS2001	1994	24900.00	X	X		X

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS2101	1994	4520.00	X	X		X
	038G0I0401	1995	50.00				
	038G0I0701	1995	380.00		X		
	038G0I0801	1995	50.00				
	038G0S0701	1995	100.00				
	038G0S0901	1995	280.00				
	038G0S1701	1995	40.00				
	038G0S2201	1995	90.00				
	038G0S2401	1995	3200.00	X	X		X
	038G0S2501	1995	130.00				
	038G0S2601	1995	230.00				
	038G0S2701	1995	240.00				
	038G0S2801	1995	100.00				
	038G0S2901	1995	610.00		X		
	038G0S3001	1995	380.00		X		
	038G0S3101	1995	180.00				
	038G0S3201	1995	40.00				
	038GS08	1998	120.00				
	038GS19	1998	53.00				
	038GS28	1998	380.00		X		
	038GS32	1998	1100.00		X	X	
	038GGI0404	2000	23.00 J				
	038GGI0804	2000	40.00 J				
	038GGS0704	2000	82.00 J				
	038GGS0904	2000	150.00				
	038GGS1404	2000	18.00 J				
	038GGS1504	2000	44.00 J				
	038GGS1704	2000	110.00				
	038GGS1804	2000	560.00		X	X	
	038GGS2004	2000	300.00		X		
	038GGS2104	2000	19.00 J				
	038GGS2204	2000	40.00 J				
	038GGS2404	2000	6100.00	X	X		X
	038GGS2804	2000	270.00				
	038GGS2904	2000	670.00		X		
	038GGS3204	2000	1200.00		X	X	
LEAD				1.6	15	5.6	150
	036GR73C01	1993	265.00	X	X		X
	036GR74C01	1993	367.00	X	X		X
	036GR75C01	1993	39.80	X	X		
	036GR76C01	1993	374.00	X	X		X
	036GR77C01	1993	47.20	X	X		
	036GR78C01	1993	20.30	X	X		
	036GR79C01	1993	51.70	X	X		
	038GGI0401	1994	13.60	X			
	038GGI0701	1994	2.70	X			
	038GGI0901	1994	3.80	X			
	038GGS0701	1994	18.60	X	X	X	

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GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS0801	1994	79.20	X	X		
	038GGS0901	1994	58.80	X	X		
	038GGS1401	1994	118.00	X	X		
	038GGS1501	1994	52.00	X	X		
	038GGS1601	1994	11.00 J	X			
	038GGS1701	1994	65.20	X	X		
	038GGS1801	1994	71.20 J	X	X	X	
	038GGS1901	1994	180.00	X	X		X
	038GGS2001	1994	110.00	X	X		
	038GGS2101	1994	639.00	X	X		X
	038G0S1801	1995	3.30	X			
	038GS08	1998	116.00	X	X		
	038GS19	1998	58.00	X	X		
	038GS28	1998	4.00	X			
	038GS32	1998	24.00	X	X	X	
	038GGS0704	2000	2.00 J	X			
	038GGS0804	2000	3.90 J	X			
	038GGS0904	2000	8.30	X			
	038GGS1404	2000	9.40	X			
	038GGS1804	2000	59.00	X	X	X	
	038GGS2104	2000	4.30 J	X			
	038GGS2204	2000	1.80 J	X			
	038GGS2404	2000	7.60	X			
	038GGS3204	2000	11.00	X		X	
MAGNESIUM				2,872.5	NOT AVAILABLE		
	036GR73C01	1993	4350.00 J	X			
	036GR74C01	1993	4150.00 J	X			
	036GR75C01	1993	3320.00 J	X			
	036GR76C01	1993	3600.00 J	X			
	036GR77C01	1993	4150.00 J	X			
	036GR78C01	1993	10500.00	X			
	036GR79C01	1993	5040.00	X			
	038GGI0401	1994	13000.00	X			
	038GGI0701	1994	28400.00	X			
	038GGI0801	1994	11000.00	X			
	038GGI0901	1994	15700.00	X			
	038GGS0701	1994	2070.00				
	038GGS0801	1994	3740.00	X			
	038GGS0901	1994	2030.00				
	038GGS1401	1994	2980.00	X			
	038GGS1501	1994	3530.00	X			
	038GGS1601	1994	6080.00	X			
	038GGS1701	1994	3200.00	X			
	038GGS1801	1994	4140.00	X			
	038GGS1901	1994	4130.00	X			
	038GGS2001	1994	4360.00	X			
	038GGS2101	1994	3800.00	X			
	038G0I0401	1995	9300.00	X			

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GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038G0I0701	1995	32000.00	X			
	038G0I0801	1995	11000.00	X			
	038G0I0901	1995	26000.00	X			
	038G0S0701	1995	2900.00	X			
	038G0S0901	1995	2400.00				
	038G0S1701	1995	2500.00				
	038G0S1801	1995	5200.00	X			
	038G0S2201	1995	2600.00				
	038G0S2401	1995	3400.00	X			
	038G0S2501	1995	2000.00				
	038G0S2601	1995	21000.00	X			
	038G0S2701	1995	3800.00	X			
	038G0S2801	1995	1800.00				
	038G0S2901	1995	2800.00				
	038G0S3001	1995	1100.00				
	038G0S3101	1995	910.00				
	038G0S3201	1995	3500.00	X			
	038GS08	1998	5020.00	X			
	038GS19	1998	4730.00	X			
	038GS28	1998	2250.00				
	038GS32	1998	3450.00	X			
	038GGI0404	2000	12000.00	X			
	038GGI0804	2000	12000.00	X			
	038GGS0704	2000	6100.00	X			
	038GGS0804	2000	2700.00				
	038GGS0904	2000	3100.00	X			
	038GGS1404	2000	5900.00	X			
	038GGS1504	2000	8600.00	X			
	038GGS1704	2000	4300.00	X			
	038GGS1804	2000	4100.00	X			
	038GGS1904	2000	4800.00	X			
	038GGS2004	2000	3800.00	X			
	038GGS2104	2000	3100.00	X			
	038GGS2204	2000	2900.00	X			
	038GGS2404	2000	3100.00	X			
	038GGS2804	2000	1400.00				
	038GGS2904	2000	3500.00	X			
	038GGS3204	2000	4700.00	X			
MANGANESE				22	50	NA	500
	036GR73C01	1993	61.40	X	X		
	036GR74C01	1993	28.40	X			
	036GR75C01	1993	52.60	X	X		
	036GR76C01	1993	132.00	X	X		
	036GR77C01	1993	77.60	X	X		
	036GR78C01	1993	48.30	X			
	036GR79C01	1993	217.00	X	X		
	038GGI0401	1994	140.00	X	X		
	038GGI0701	1994	48.00	X			

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GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGI0801	1994	19.30				
	038GGI0901	1994	17.30				
	038GGS0701	1994	11.90				
	038GGS0801	1994	194.00	X	X		
	038GGS0901	1994	33.20	X			
	038GGS1901	1994	155.00	X	X		
	038GGS2001	1994	98.10	X	X		
	038GGS2101	1994	104.00	X	X		
	038G0I0401	1995	24.00	X			
	038G0I0701	1995	14.00				
	038G0I0801	1995	6.20				
	038G0I0901	1995	16.00				
	038G0S0701	1995	24.00	X			
	038G0S0901	1995	24.00	X			
	038G0S1701	1995	33.00	X			
	038G0S1801	1995	15.00				
	038G0S2401	1995	27.00	X			
	038G0S2501	1995	5.30				
	038G0S2601	1995	120.00	X	X		
	038G0S2701	1995	4.80				
	038G0S2801	1995	7.80				
	038G0S2901	1995	130.00	X	X		
	038G0S3001	1995	5.90				
	038G0S3201	1995	26.00	X			
	038GS08	1998	1990.00	X	X		X
	038GS19	1998	950.00	X	X		X
	038GGI0404	2000	24.00 J	X			
	038GGS0704	2000	7.80 J				
	038GGS0804	2000	29.00 J	X			
	038GGS0904	2000	28.00	X			
	038GGS1404	2000	1.40 J				
	038GGS1504	2000	22.00	X			
	038GGS1704	2000	34.00 J	X			
	038GGS1904	2000	12.00 J				
	038GGS2004	2000	33.00 J	X			
	038GGS2104	2000	12.00				
	038GGS2404	2000	6.30 J				
	038GGS2904	2000	190.00	X	X		
	038GGS3204	2000	83.00	X	X		
MERCURY				0.2	2	0.025	20
	036GR73C01	1993	0.28	X			
	036GR74C01	1993	0.28	X			
	036GR76C01	1993	1.00	X			
	038GGI0401	1994	0.20	X			
	038GGS0701	1994	1.00 J	X		X	
	038GGS0801	1994	0.67 J	X			
	038GGS0901	1994	0.31 J	X			
	038GS08	1998	0.20	X			

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GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GS19	1998	0.30	X			
	038GGS1804	2000	0.46	X		X	
MOLYBDENUM				NA	35	NA	350
	038G0S2901	1995	2.30				
NICKEL				40	100	8.3	1,000
	036GR76C01	1993	46.60	X			
	036GR77C01	1993	11.60 J				
	038GGS2001	1994	16.00				
	038G0S2401	1995	12.00				
	038G0S2901	1995	4.30				
	038G0S3001	1995	4.00				
	038GS08	1998	30.00				
	038GS28	1998	30.00				
	038GGS0904	2000	2.00 J				
	038GGS1404	2000	1.40 J				
	038GGS2404	2000	4.40 J				
	038GGS2904	2000	1.00 J				
	038GGS3204	2000	1.20 J				
POTASSIUM				12,167.5	NOT AVAILABLE		
	036GR73C01	1993	6530.00				
	036GR74C01	1993	4240.00 J				
	036GR75C01	1993	4070.00 J				
	036GR76C01	1993	8650.00				
	036GR77C01	1993	2340.00 J				
	036GR78C01	1993	4360.00 J				
	036GR79C01	1993	2570.00 J				
	038GGI0401	1994	6220.00				
	038GGI0701	1994	20500.00	X			
	038GGI0801	1994	10500.00				
	038GGI0901	1994	9000.00				
	038GGS0701	1994	3170.00				
	038GGS0801	1994	3850.00				
	038GGS0901	1994	2750.00				
	038GGS1401	1994	6410.00				
	038GGS1501	1994	5940.00				
	038GGS1601	1994	4920.00 J				
	038GGS1701	1994	2290.00 J				
	038GGS1801	1994	6950.00				
	038GGS1901	1994	2950.00				
	038GGS2001	1994	2840.00				
	038GGS2101	1994	2640.00				
	038G0I0401	1995	5200.00				
	038G0I0701	1995	24000.00	X			
	038G0I0801	1995	11000.00				
	038G0I0901	1995	12000.00				
	038G0S0701	1995	3500.00				
	038G0S0901	1995	2200.00				

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038G0S1701	1995	1600.00				
	038G0S1801	1995	6400.00				
	038G0S2201	1995	4700.00				
	038G0S2401	1995	3000.00				
	038G0S2501	1995	1200.00				
	038G0S2601	1995	2300.00				
	038G0S2701	1995	1800.00				
	038G0S2801	1995	1400.00				
	038G0S2901	1995	5600.00				
	038G0S3001	1995	890.00				
	038G0S3201	1995	2800.00				
	038GS08	1998	3020.00				
	038GS19	1998	5200.00				
	038GS28	1998	1410.00				
	038GS32	1998	3930.00				
	038GGI0404	2000	5800.00				
	038GGI0804	2000	13000.00	X			
	038GGS0704	2000	7500.00				
	038GGS0804	2000	5700.00				
	038GGS0904	2000	3700.00				
	038GGS1404	2000	5400.00				
	038GGS1504	2000	7300.00				
	038GGS1704	2000	4100.00				
	038GGS1804	2000	4400.00				
	038GGS1904	2000	4800.00				
	038GGS2004	2000	4000.00				
	038GGS2104	2000	2000.00				
	038GGS2204	2000	3500.00				
	038GGS2404	2000	2400.00				
	038GGS2804	2000	1700.00				
	038GGS2904	2000	5500.00				
	038GGS3204	2000	3600.00				
SELENIUM				3.9	50	71	500
	036GR74C01	1993	2.20 J				
	036GR76C01	1993	3.10 J				
	036GR78C01	1993	1.40 J				
	036GR79C01	1993	1.40 J				
	038GGI0401	1994	2.00				
	038GGI0901	1994	2.10				
	038GGS1404	2000	3.10 J				
SODIUM				18,345	160,000	NA	NA
	036GR73C01	1993	7090.00				
	036GR74C01	1993	12800.00				
	036GR75C01	1993	9940.00				
	036GR76C01	1993	21900.00	X			
	036GR77C01	1993	5790.00				
	036GR78C01	1993	9400.00				

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GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	036GR79C01	1993	11300.00				
	038GGI0701	1994	219000.00	X	X		
	038GGI0801	1994	80300.00	X			
	038GGI0901	1994	10300.00				
	038GGS0701	1994	7900.00				
	038GGS0801	1994	10000.00				
	038GGS0901	1994	14900.00				
	038GGS1401	1994	7540.00				
	038GGS1501	1994	13200.00				
	038GGS1601	1994	7730.00				
	038GGS1701	1994	10700.00				
	038GGS1801	1994	11100.00				
	038GGS1901	1994	11700.00				
	038GGS2001	1994	6820.00				
	038GGS2101	1994	5510.00				
	038G0I0401	1995	37000.00	X			
	038G0I0701	1995	270000.00	X	X		
	038G0I0801	1995	85000.00	X			
	038G0I0901	1995	200000.00	X	X		
	038G0S0701	1995	5900.00				
	038G0S0901	1995	6900.00				
	038G0S1701	1995	4300.00				
	038G0S1801	1995	11000.00				
	038G0S2201	1995	12000.00				
	038G0S2401	1995	11000.00				
	038G0S2501	1995	13000.00				
	038G0S2601	1995	9300.00				
	038G0S2701	1995	35000.00	X			
	038G0S2801	1995	13000.00				
	038G0S2901	1995	11000.00				
	038G0S3001	1995	14000.00				
	038G0S3101	1995	6400.00				
	038G0S3201	1995	7000.00				
	038GS08	1998	28400.00	X			
	038GS19	1998	20000.00	X			
	038GS28	1998	13800.00				
	038GS32	1998	24700.00	X			
	038GGI0404	2000	37000.00	X			
	038GGI0804	2000	110000.00	X			
	038GGS0704	2000	16000.00				
	038GGS0804	2000	26000.00	X			
	038GGS0904	2000	17000.00				
	038GGS1404	2000	11000.00				
	038GGS1504	2000	12000.00				
	038GGS1704	2000	14000.00				
	038GGS1804	2000	9400.00				
	038GGS1904	2000	19000.00	X			
	038GGS2004	2000	13000.00				

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GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GGS2104	2000	13000.00				
	038GGS2204	2000	8000.00				
	038GGS2404	2000	8200.00				
	038GGS2804	2000	14000.00				
	038GGS2904	2000	23000.00	X			
	038GGS3204	2000	35000.00	X			
STRONTIUM				NA	4,200	NA	42,000
	038G0I0401	1995	240.00				
	038G0I0701	1995	430.00				
	038G0I0801	1995	240.00				
	038G0I0901	1995	270.00				
	038G0S0701	1995	130.00				
	038G0S0901	1995	150.00				
	038G0S1701	1995	110.00				
	038G0S1801	1995	230.00				
	038G0S2201	1995	130.00				
	038G0S2401	1995	220.00				
	038G0S2501	1995	92.00				
	038G0S2601	1995	180.00				
	038G0S2701	1995	62.00				
	038G0S2801	1995	48.00				
	038G0S2901	1995	140.00				
	038G0S3001	1995	59.00				
	038G0S3101	1995	84.00				
	038G0S3201	1995	140.00				
THALLIUM				4	2	6.3	20
	038GGI0401	1994	2.00		X		
TITANIUM				NOT AVAILABLE			
	038G0S2501	1995	2.60				
	038G0S2701	1995	2.50				
	038G0S2801	1995	2.20				
	038G0S3001	1995	2.40				
VANADIUM				9.6	49	NA	490
	036GR73C01	1993	34.40 J	X			
	036GR76C01	1993	15.80 J	X			
	036GR77C01	1993	3.60 J				
	036GR79C01	1993	12.40 J	X			
	038GGI0701	1994	3.10				
	038GGI0901	1994	5.10				
	038GGS0801	1994	5.30				
	038GGS0901	1994	4.50				
	038GGS1401	1994	3.60				
	038GGS1901	1994	5.70				
	038GGS2001	1994	65.80	X	X		
	038GGS2101	1994	7.90				
	038G0S2701	1995	3.50				
	038G0S2801	1995	5.60				

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038G0S3201	1995	6.50				
	038GGI0804	2000	1.10 J				
	038GGS0804	2000	1.50 J				
	038GGS0904	2000	1.90 J				
	038GGS1404	2000	1.40 J				
	038GGS1804	2000	1.20 J				
	038GGS1904	2000	1.00 J				
	038GGS2104	2000	2.30 J				
	038GGS2404	2000	0.92 J				
	038GGS2804	2000	3.20 J				
ZINC				153.2	5,000	86	50,000
	036GR73C01	1993	70.50				
	036GR74C01	1993	127.00				
	036GR75C01	1993	55.00				
	036GR76C01	1993	290.00	X			
	036GR77C01	1993	54.70				
	036GR78C01	1993	32.10				
	036GR79C01	1993	261.00	X			
	038GGI0401	1994	97.60				
	038GGI0701	1994	10.80				
	038GGI0801	1994	6.60				
	038GGI0901	1994	15.40				
	038GGS0701	1994	71.70				
	038GGS0801	1994	123.00				
	038GGS0901	1994	222.00	X			
	038GGS1401	1994	364.00	X			
	038GGS1501	1994	168.00	X			
	038GGS1601	1994	349.00	X			
	038GGS1701	1994	22.40				
	038GGS1801	1994	325.00	X		X	
	038GGS1901	1994	367.00	X			
	038GGS2001	1994	145.00				
	038GGS2101	1994	804.00	X			
	038G0S0701	1995	26.00				
	038G0S0901	1995	39.00				
	038G0S1801	1995	620.00	X		X	
	038G0S2201	1995	21.00				
	038G0S2401	1995	26.00				
	038G0S2501	1995	98.00				
	038G0S2601	1995	24.00				
	038G0S2701	1995	82.00				
	038G0S2801	1995	66.00				
	038G0S2901	1995	19.00				
	038G0S3001	1995	43.00				
	038G0S3101	1995	320.00	X			
	038G0S3201	1995	36.00				
	038GS08	1998	650.00	X			
	038GS19	1998	200.00	X			

SITE 38 - BUILDING 604
GROUNDWATER DATA
INORGANICS (UNITS ARE UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	RC	GC	MSWQ	NADS
	038GS28	1998	190.00	X			
	038GS32	1998	150.00			X	
	038GGS0704	2000	13.00 J				
	038GGS0804	2000	21.00				
	038GGS0904	2000	49.00 J				
	038GGS1404	2000	140.00 J				
	038GGS1804	2000	370.00 J	X		X	
	038GGS1904	2000	38.00				
	038GGS2104	2000	45.00 J				
	038GGS2404	2000	29.00 J				
	038GGS2804	2000	69.00				
	038GGS3204	2000	72.00				

Notes:
NA - Not Available
RC - Reference Concentration
GC - General Criteria
MSWQ - Marine Surface Water Criteria
NADS - Natural Attenuation Default Source
[1] - Marine Surface Water Criteria for Barium is derived from 10% greater than the reference concentration.
038G0S3201 - Sample compared to Marine Surface Water Criteria

Building 71 – SVOCs

SITE 38 - BUILDING 71
GROUNDWATER DATA
SEMIVOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
1,2,4-TRIMETHYLBENZENE					10	217.5	100
	038GS12	1998	23.00		X		
1,2-DICHLOROBENZENE					600	99	6,000
	038GGS0201	1994	5.00	J			
	038GGS1201	1994	9.00	J			
	038GS12	1998	4.00				
	038GGS0204	2000	5.00				
	038GGS0304	2000	0.40	J			
	038GGS0504	2000	0.40	J			
	038GGS1004	2000	0.40	J			
	038GGS1204	2000	2.00				
	038GGS1304	2000	1.00				
1,3,5-TRIMETHYLBENZENE					10	215	100
	038GS12	1998	12.00		X		
1,3-DICHLOROBENZENE					10	85	100
	038GGS0204	2000	0.40	J			
	038GGS0504	2000	0.30	J			
	038GGS1204	2000	0.40	J			
1,4-DICHLOROBENZENE					75	100	7,500
	038GS12	1998	2.00				
	038GGS0204	2000	0.90	J			
	038GGS0504	2000	0.30	J			
	038GGS1204	2000	1.00				
	038GGS1304	2000	0.40	J			
2,4-DIMETHYLPHENOL					140	261	1,400
	038GGS1201	1994	2.00	J			
2-METHYLNAPHTHALENE					20	30	200
	038GGS0201	1994	14.00				
	038GGS1201	1994	10.00	J			
	038GGS1301	1994	2.00	J			
	038GGS0204	2000	3.00	J			
	038GGS1204	2000	3.00	J			
4-METHYLPHENOL (p-Cresol)					4	70	40
	038GGS1201	1994	1.00	J			
ACENAPHTHENE					20	3	200
	038GGS0201	1994	1.00	J			
	038GGS0204	2000	1.00	J			
bis(2-Ethylhexyl)phthalate (BEHP)					6	0.02	600
	038GGI0101	1994	3.00	J			
	038GGI0201	1994	1.00	J			
	038GGI0301	1994	1.00	J			
	038G0S0901	1995	11.00		X		
DIBENZOFURAN					28	67	280
	038GGS0204	2000	1.00	J			
FLUORENE					280	30	2800
	038GGS0204	2000	1.00	J			

SITE 38 - BUILDING 71
GROUNDWATER DATA
SEMIVOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
	038GGS1204	2000	0.70	J			
NAPHTHALENE					20	26	200
	038GGS0201	1994	44.00		X	X	
	038GGS1201	1994	44.00		X		
	038G0T0501	1995	1.40	J			
	038GS12	1998	12.00				
	038GGS0204	2000	4.00	J			
PHENOL					10	6.5	100
	038GGI0201	1994	9.00	J			

Notes:
NA - Not Available
GC - General Criteria
MSWQ - Marine Surface Water Criteria
NADS - Natural Attenuation Default Source
038G0S3201 - Sample compared to Marine Surface Water Criteria

Building 604 – SVOCs

SITE 38 - BUILDING 604
GROUNDWATER DATA
SEMIVOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
1,2,4-TRICHLOROBENZENE					70	22.5	700
	038GGS1804	2000	1.00				
	038GGS2404	2000	0.70	J			
1,2-DICHLOROBENZENE					600	99	6,000
	038GGS1704	2000	2.00				
	038GGS2904	2000	0.20	J			
1,4-DICHLOROBENZENE					75	100	7,500
	038GGS1704	2000	0.40	J			
2,4-DINITROTOLUENE					0.1	9.1	10
	038GGS1801	1994	2.00	J	X		
2-METHYLNAPHTHALENE					20	30	200
	038GGS1501	1994	5.00	J			
	038GGS1701	1994	14.00				
	038GGS1801	1994	1.00	J			
	038GGS2001	1994	4.00	J			
	038G0S1701	1995	14.00				
	038GGS1504	2000	1.00	J			
ACENAPHTHENE					20	3	200
	038GGS1801	1994	4.00	J		X	
	038G0S1801	1995	1.80	J			
	038GGS1804	2000	79.00		X	X	
ANTHRACENE					2,100	0.3	21,000
	038GGS1801	1994	17.00			X	
	038GGS1804	2000	11.00			X	
BENZO(A)ANTHRACENE					0.2	0.031	20
	036GR77C01	1993	8.00	J	X		
BENZO(A)PYRENE					0.2	0.031	20
	036GR77C01	1993	7.00	J	X		
BENZO(B)FLUORANTHENE					0.2	0.031	20
	036GR77C01	1993	6.00	J	X		
BENZO(K)FLUORANTHENE					0.5	0.031	50
	036GR77C01	1993	6.00	J	X		
bis(2-Ethylhexyl)phthalate (BEHP)					6	0.02	600
	038G0S3201	1995	22.00		X	X	
CARBAZOLE					4	46.5	400
	038GGS1801	1994	2.00	J			
CHRYSENE					4.8	0.031	480
	036GR77C01	1993	7.00	J	X		
DIBENZOFURAN					28	67	280
	038GGS1801	1994	14.00				
	038GGS1804	2000	91.00		X	X	
FLUORANTHENE					280	0.3	2,800
	036GR77C01	1993	19.00	J			
	038GGS1801	1994	23.00			X	
	038G0S1801	1995	7.00	J		X	
	038GGS1804	2000	24.00			X	

SITE 38 - BUILDING 604
GROUNDWATER DATA
SEMIVOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
FLUORENE					280	30	2800
	038GGS1804	2000	28.00				
NAPHTHALENE					20	26	200
	038GGS1501	1994	140.00	J	X		
	038GGS1701	1994	15.00				
	038GGS2001	1994	7.00	J			
	038G0S1701	1995	24.00		X		
	038GGS1504	2000	170.00	D	X		
PHENANTHRENE					210	0.031	2,100
	036GR77C01	1993	10.00	J			
	038GGS1801	1994	170.00	J		X	
	038G0T0501	1995	3.70	J			
	038GGS1804	2000	190.00	D		X	
PYRENE					210	0.3	2,100
	036GR77C01	1993	15.00	J			
	038GGS1801	1994	11.00			X	
	038G0S1801	1995	8.80	J		X	
	038GGS1804	2000	11.00			X	

Notes:
NA - Not Available
038G0S3201 - Sample compared to Marine Surface Water Criteria
GC - General Criteria
MSWQ - Marine Surface Water Criteria
NADS - Natural Attenuation Default Source

Building 71 – VOCs

SITE 38 - BUILDING 71
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
1,1,1-TRICHLOROETHANE					200	270	2,000
	038GGS0501	1994	24.0				
	038GGS1101	1994	2.0	J			
	038GGS1201	1994	770.0	J	X		
	038GGS1301	1994	8.0	J			
	038G0I1001	1995	0.6	J			
	038G0T0501	1995	2.4	J			
	038GS12	1998	3.0				
	038GGS0304	2000	1.00				
	038GGS0504	2000	7.00				
	038GGS1104	2000	0.50	J			
	038GGS1204	2000	0.60	J			
	038GGS1304	2000	0.80	J			
1,1,2,2-TETRACHLOROETHANE					0.2	10.8	20
	038GS12	1998	100.0		X		X
1,1-DICHLOROETHANE					70	NA	700
	038GGS0201	1994	44.0				
	038GGS0501	1994	12.0				
	038GGS1201	1994	640.0	J	X		
	038GGS1301	1994	20.0				
	038G0S2301	1995	9.8	A			
	038G0T0501	1995	1.2	J			
	038GS03	1998	3.0				
	038GS12	1998	13.0				
	038GGS0204	2000	3.00				
	038GGS0304	2000	3.00				
	038GGS0504	2000	5.00				
	038GGS1104	2000	0.40	J			
	038GGS1204	2000	6.00				
	038GGS1304	2000	4.00				
1,1-DICHLOROETHENE					7	3.2	700
	038GGS1201	1994	42.0		X		
1,2-DICHLOROETHANE					3	5	300
	038GGS1201	1994	2.0	J			
1,2-DICHLOROETHENE (total)					63	7,000	630
	038GGS0201	1994	2.0	J			
	038GGS0301	1994	2.0	J			
	038GGS1201	1994	14.0				
2-BUTANONE (MEK)					4,200	120,000	42,000
	038GGI0301	1994	34.0	J			
ACETONE					700	1,692	7,000
	038GGI0301	1994	7.0	J			
BENZENE					1	71.28	100
	038GS03	1998	2.0		X		
	038GGI0404	2000	0.30	J			
	038GGS0204	2000	0.50	J			
	038GGS0304	2000	0.90	J			

SITE 38 - BUILDING 71
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
BROMOMETHANE					9.8	35	98
	038GGI0301	1994	3.0	J			
CARBON DISULFIDE					700	105	7,000
	038GGS0204	2000	2.00				
	038GGS0304	2000	0.40	J			
	038GGS0504	2000	0.40	J			
	038GGS1204	2000	1.00				
CHLOROBENZENE					100	17	1,000
	038GGS0201	1994	4.0	J			
	038G0S2301	1995	5.2	A			
	038GGS0204	2000	2.00				
	038GGS0504	2000	0.20	J			
	038GGS1304	2000	0.30	J			
CHLOROETHANE (ETHYL CHLORIDE)					12	NA	1,200
	038GGS0201	1994	8.0	J			
	038GGS0203	1999	13.0		X		
	038GGS0204	2000	6.00				
CHLOROFORM					5.7	470.8	570
	038GGS1101	1994	6.0	J	X		
	038GGS1201	1994	24.0		X		
	038GS12	1998	2.0				
	038GGS1204	2000	0.90	J			
	038GGS1404	2000	0.70	J			
CIS-1,2-DICHLOROETHENE					70	NA	700
	038GS03	1998	5.0				
	038GS12	1998	27.0				
	038GGS0204	2000	0.90	J			
	038GGS0304	2000	5.00				
	038GGS0504	2000	0.80	J			
	038GGS1204	2000	24.00				
	038GGS1304	2000	7.00				
ETHYLBENZENE					30	605	300
	038GGS0201	1994	22.0				
	038GGS1001	1994	3.0	J			
	038GGS1201	1994	1.0	J			
	038GGS0203	1999	14.0				
	038GGS0204	2000	20.00				
METHYL TERT BUTYL ETHER (MTBE)					50	33,600	500
	038GS03	1998	16.0				
N-BUTYLBENZENE					NOT AVAILABLE		
	038GS12	1998	5.0				
N-PROPYLBENZENE					NOT AVAILABLE		
	038GS12	1998	1.0				
SEC-BUTYLBENZENE					NOT AVAILABLE		
	038GS12	1998	4.0				
TETRACHLOROETHENE					3	8.85	300

SITE 38 - BUILDING 71
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
	038GGS0501	1994	1.0	J			
	038GGS1201	1994	33.0	J	X		
	038GGS1301	1994	3.0	J	X		
	038G0I1001	1995	0.8	J			
	038G0T0501	1995	2.8	J			
	038GS12	1998	102.0		X		
	038GGS0304	2000	0.50	J			
	038GGS0504	2000	3.00		X		
	038GGS1204	2000	11.00		X		
TOLUENE					40	475	400
	038GGS0201	1994	3.0	J			
	038GGS0204	2000	2.00				
	038GGS0504	2000	0.20	J			
	038GGS1304	2000	0.20	J			
TRANS-1,2-DICHLOROETHENE					100	11,000	1,000
	038G0S2301	1995	0.7	AJ			
	038GGS0304	2000	1.00				
	038GGS1204	2000	0.50	J			
	038GGS1304	2000	0.60	J			
TRICHLOROETHENE					3	80.7	300
	038GGS0301	1994	1.0	J			
	038GGS0501	1994	2.0	J			
	038GGS1201	1994	53.0		X		
	038GGS1301	1994	4.0	J	X		
	038G0T0501	1995	2.0	J			
	038GS03	1998	4.0		X		
	038GS12	1998	25.0		X		
	038GGS0304	2000	4.00		X		
	038GGS0504	2000	3.00		X		
	038GGS1204	2000	6.00		X		
	038GGS1304	2000	5.00		X		
VINYL CHLORIDE					1	NA	100
	038GGS0201	1994	12.0	J	X		
	038GGS1301	1994	11.0	J	X		
	038GS03	1998	3.0		X		
	038GS12	1998	15.0		X		
	038GGS0204	2000	3.00		X		
	038GGS0304	2000	1.00		X		
	038GGS1204	2000	7.00		X		
	038GGS1304	2000	4.00		X		
XYLENE (TOTAL)					20	370	200
	038GGS0201	1994	3.0	J			
	038GGS0401	1994	3.0	J			
	038GGS1201	1994	2.0	J			
	038GGS0204	2000	4.00				
	038GGS1104	2000	0.40	J			
	038GGS1304	2000	0.40	J			

SITE 38 - BUILDING 71
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	GC	MSWQ	NADS

Notes:
NA - Not Available
038G0S3201 - Sample compared to Marine Surface Water Criteria
GC - General Criteria
MSWQ - Marine Surface Water Criteria
NADS - Natural Attenuation Default Source
**Natural Attenuation Default Source Concentrations were developed by multiplying the Groundwater Criteria by 10X or 100X, depending on the proportion for that parameter used in the current proposed 62-777 criteria.

Building 604 – VOCs

SITE 38 - BUILDING 604
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
1,1,1,2-TETRACHLOROETHANE					1.3	NA	130
	038GS19	1998	22.0		X		
1,1,1-TRICHLOROETHANE					200	270	2,000
	036GR76C01	1993	4.0	J			
	038GGS0801	1994	4.0	J			
	038GGS1401	1994	16.0				
	038GGS1701	1994	3.0	J			
	038GGS1801	1994	6.0	J			
	038G0S0901	1995	0.9	AJ			
	038G0S1801	1995	1.0	J			
	038G0S2201	1995	8.8	A			
	038GGS0804	2000	1.00				
	038GGS0904	2000	0.40	J			
	038GGS1404	2000	2.00				
	038GGS1804	2000	0.40	J			
	038GGS1904	2000	0.50	J			
	038GGS2404	2000	0.60	J			
1,1-DICHLOROETHANE					70	NA	700
	036GR76C01	1993	7.0	J			
	038GGS0701	1994	3.0	J			
	038GGS1401	1994	5.0	J			
	038GGS1501	1994	180.0	DJ	X		
	038GGS1601	1994	4.0	J			
	038GGS1701	1994	6.0	J			
	038GGS1801	1994	4.0	J			
	038G0S0701	1995	0.7	AJ			
	038G0S1801	1995	1.1	J			
	038G0S2201	1995	32.0	A			
	038GGS0704	2000	0.70	J			
	038GGS0804	2000	2.00				
	038GGS1404	2000	0.80	J			
	038GGS1504	2000	14.00				
	038GGS1704	2000	2.00				
	038GGS1804	2000	0.80	J			
	038GGS1904	2000	0.50	J			
	038GGS2004	2000	1.00				
	038GGS2204	2000	4.00				
	038GGS2904	2000	2.00				
1,1-DICHLOROETHENE					7	3.2	700
	038GGS1401	1994	5.0	J			
	038GGS1501	1994	2.0	J			
	038GGS1801	1994	4.0	J		X	
	038G0S1701	1995	21.0	J	X		
	038G0S1801	1995	0.7	J			
	038G0S2201	1995	1.3	AJ			
	038GGS0804	2000	0.70	J			
1,2-DIBROMO-3-CHLOROPROPANE					0.2	NA	20

SITE 38 - BUILDING 604
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
	038GGI0804	2000	1.00		X		
1,2-DICHLOROETHANE					3	5	300
	036GR75C01	1993	70.0		X		
	036GR76C01	1993	19.0		X		
1,2-DICHLOROETHENE (total)					63	7,000	630
	038GGS0701	1994	22.0				
	038GGS0801	1994	36.0				
	038GGS0901	1994	49.0				
	038GGS1401	1994	8.0	J			
	038GGS1501	1994	14.0				
	038GGS1601	1994	2.0	J			
	038GGS1801	1994	6.0	J			
	038GGS1901	1994	130.0	J	X		
	038GGS2001	1994	970.0	D	X		X
	038GGS2101	1994	100.0	J	X		
2-BUTANONE (MEK)					4,200	120,000	42,000
	038GGS1801	1994	8.0	J			
	038GGS2001	1994	150.0				
ACETONE					700	1,692	7,000
	038GGI0401	1994	6.0	J			
	038GGI0701	1994	15.0	J			
	038GGI0901	1994	500.0	J			
	038GGS2001	1994	9.0	J			
	038GGS2004	2000	20.00				
BENZENE					1	71.28	100
	038GGS0804	2000	0.40	J			
	038GGS2404	2000	0.20	J			
CARBON DISULFIDE					700	105	7,000
	038GGI0801	1994	2.0	J			
	038GGI0804	2000	0.30	J			
	038GGS1504	2000	0.80	J			
	038GGS1804	2000	0.40	J			
	038GGS2204	2000	1.00				
	038GGS2404	2000	0.20	J			
CHLOROETHANE (ETHYL CHLORIDE)					12	NA	1,200
	038GGS1501	1994	3.0	J			
CHLOROFORM					5.7	470.8	570
	038G0S2801	1995	1.2	J			
	038GGS1904	2000	0.30	J			
	038GGS2404	2000	0.60	J			
	038GGS2804	2000	0.60	J			
CHLOROMETHANE					2.7	470.8	270
	038GGS1804	2000	0.60	J			
CIS-1,2-DICHLOROETHENE					70	NA	700
	038G0S0701	1995	2.6	AJ			
	038G0S0901	1995	12.0	A			
	038G0S1701	1995	460.0		X		

SITE 38 - BUILDING 604
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
	038G0S1801	1995	1.7	J			
	038G0S2201	1995	12.0	A			
	038G0S2401	1995	1.4	J			
	038G0S3001	1995	0.6	AJ			
	038G0S3201	1995	640.0		X		
	038GS08	1998	25.0				
	038GS19	1998	27.0				
	038GS29	1998	27.0				
	038GS32	1998	25.0				
	038GGS0704	2000	2.00				
	038GGS0804	2000	56.00				
	038GGS0904	2000	11.00				
	038GGS1404	2000	3.00				
	038GGS1504	2000	0.90	J			
	038GGS1804	2000	2.00				
	038GGS1904	2000	42.00				
	038GGS2004	2000	0.60	J			
	038GGS2104	2000	0.70	J			
	038GGS2204	2000	4.00				
	038GGS2404	2000	2.00				
	038GGS2904	2000	5.00				
	038GGS3204	2000	2.00				
ETHYLBENZENE					30	605	300
	038GGS1501	1994	89.0		X		
	038GGS1701	1994	2.0	J			
	038GGS1504	2000	53.00		X		
	038GGS1704	2000	6.00				
	038GGS2004	2000	0.80	J			
TETRACHLOROETHENE					3	8.85	300
	036GR74C01	1993	3.0	J	X		
	036GR75C01	1993	5.0	J	X		
	038GGS0801	1994	14.0		X		
	038GGS0901	1994	2.0	J			
	038GGS1401	1994	20.0		X		
	038GGS1601	1994	1.0	J			
	038GGS1701	1994	4.0	J	X		
	038GGS1801	1994	41.0		X	X	
	038GGS1901	1994	240.0		X		
	038GGS2001	1994	14.0	J	X		
	038GGS2101	1994	280.0		X		
	038G0S0901	1995	2.8	AJ			
	038G0S1701	1995	110.0		X		
	038G0S1801	1995	10.0		X	X	
	038G0S2201	1995	7.0	A	X		
	038G0S2701	1995	1.0	J			
	038G0S2901	1995	1.0	AJ			
	038G0S3001	1995	1.5	AJ			

SITE 38 - BUILDING 604
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	GC	MSWQ	NADS
	038G0S3201	1995	820.0	X	X	X
	038GS08	1998	8.0	X		
	038GS19	1998	22.0	X		
	038GS32	1998	5.0	X		
	038GGS0804	2000	4.00	X		
	038GGS0904	2000	3.00	X		
	038GGS1404	2000	12.00	X		
	038GGS1804	2000	14.00	X	X	
	038GGS1904	2000	25.00	X		
	038GGS2104	2000	27.00	X		
	038GGS2204	2000	1.00			
	038GGS2404	2000	1.00			
TOLUENE				40	475	400
	038GGS1701	1994	2.0 J			
	038GGS1704	2000	0.50 J			
	038GGS2404	2000	0.30 J			
TRANS-1,2-DICHLOROETHENE				100	11,000	1,000
	038G0S0701	1995	2.4 AJ			
	038G0S0901	1995	8.3 A			
	038G0S1701	1995	14.0 J			
	038G0S2201	1995	3.0 AJ			
	038G0S2401	1995	1.4 J			
	038G0S2901	1995	9.3 A			
	038G0S3201	1995	43.0 J			
	038GS08	1998	4.0			
	038GS19	1998	5.0			
	038GS32	1998	11.0			
	038GGS0704	2000	2.00			
	038GGS0804	2000	15.00			
	038GGS0904	2000	9.00			
	038GGS1504	2000	4.00			
	038GGS1804	2000	0.70 J			
	038GGS1904	2000	10.00			
	038GGS2004	2000	0.50 J			
	038GGS2104	2000	0.80 J			
	038GGS2204	2000	2.00			
	038GGS2404	2000	0.60 J			
	038GGS2904	2000	4.00			
	038GGS3204	2000	1.00			
TRICHLOROETHENE				3	80.7	300
	036GR75C01	1993	13.0	X		
	036GR76C01	1993	11.0	X		
	038GGS0801	1994	33.0	X		
	038GGS0901	1994	6.0 J	X		
	038GGS1401	1994	19.0	X		
	038GGS1601	1994	2.0 J			
	038GGS1801	1994	20.0	X		

SITE 38 - BUILDING 604
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT		GC	MSWQ	NADS
	038GGS1901	1994	41.0		X		
	038GGS2101	1994	13.0	J	X		
	038G0S0901	1995	8.4		X		
	038G0S1701	1995	19.0	J	X		
	038G0S1801	1995	7.6		X		
	038G0S2201	1995	9.0	A	X		
	038G0S2401	1995	3.6	J	X		
	038G0S2901	1995	4.0	AJ	X		
	038G0S3201	1995	340.0		X	X	X
	038GS08	1998	24.0		X		
	038GS19	1998	22.0		X		
	038GS32	1998	5.0		X		
	038GGS0804	2000	17.00		X		
	038GGS0904	2000	10.00		X		
	038GGS1404	2000	18.00		X		
	038GGS1504	2000	0.60	J			
	038GGS1804	2000	15.00		X		
	038GGS1904	2000	20.00		X		
	038GGS2104	2000	3.00		X		
	038GGS2204	2000	4.00		X		
	038GGS2404	2000	7.00		X		
	038GGS2904	2000	0.50	J			
VINYL CHLORIDE					1	NA	100
	036GR75C01	1993	38.0		X		
	036GR76C01	1993	21.0		X		
	038GGS0801	1994	6.0	J	X		
	038GGS0901	1994	12.0		X		
	038GGS1501	1994	41.0	J	X		
	038GGS1701	1994	1600.0	D	X		X
	038GGS1901	1994	29.0		X		
	038GGS2001	1994	1100.0	D	X		X
	038GGS2101	1994	15.0	J	X		
	038G0I0401	1995	4.2		X		
	038G0I0801	1995	1.9		X		
	038G0I0901	1995	0.99	J			
	038G0S0701	1995	6.2		X		
	038G0S0901	1995	6.6		X		
	038G0S1701	1995	3700.0		X		X
	038G0S2201	1995	70.0		X		
	038G0S2901	1995	43.0		X		
	038G0S3201	1995	130.0		X		X
	038GS19	1998	3.0		X		
	038GS32	1998	14.0		X		
	038GGS2003	1999	15.0		X		
	038GGI0404	2000	0.70	J			
	038GGI0804	2000	0.80	J			
	038GGS0704	2000	0.90	J			
	038GGS0804	2000	22.00		X		

SITE 38 - BUILDING 604
GROUNDWATER DATA
VOLATILE ORGANIC COMPOUNDS (UNITS IN UG/L)

PARAMETER	SAMPLE ID	DATE	RESULT	GC	MSWQ	NADS
	038GGS0904	2000	3.00	X		
	038GGS1504	2000	3.00	X		
	038GGS1704	2000	7.00	X		
	038GGS1904	2000	16.00	X		
	038GGS2004	2000	12.00	X		
	038GGS2204	2000	20.00	X		
	038GGS2904	2000	6.00	X		
	038GGS3204	2000	2.00	X		
XYLENE (TOTAL)				20	370	200
	038GGI0801	1994	1.0 J			
	038GGS1701	1994	8.0 J			
	038GGS2001	1994	11.0 J			
	038GGS1704	2000	2.00			
	038GGS2404	2000	0.50 J			

Notes:
NA - Not Available
038G0S3201 - Sample compared to Marine Surface Water Criteria
GC - General Criteria
MSWQ - Marine Surface Water Criteria
NADS - Natural Attenuation Default Source

Appendix I

Statistical Analysis Summary Tables

Site 38 - Building 71
Statistical Analysis Summary Table

Parameter	Surface or Subsurface Soil	Number of Samples	Number of Non-detects	Percentage of Nondetects	Pass Normal?	Pass Lognormal?	UCL	Samples Exceeding 3X RSCTL	Surface Description	Samples Exceeding 3X ISCTL	Surface Description
Aroclor-1254	Surface	34	31	91%	N/A	N/A	N/A	038S001801	A	038S001801	A
Aroclor-1254	Subsurface	42	38	90%	N/A	N/A	N/A	038S001803	A	038S001803	A
								038S001805	A	038S001805	A
Arsenic	Surface	37	16	43%	N/A	N/A	N/A	038S003201	B	None	
								038S003301	B		
Arsenic	Subsurface	42	24	57%	N/A	N/A	N/A	038S001204	A	038S001204	A
								038S001303	A		
								038S001304	A		
B(a)P	Surface	37	28	76%	N/A	N/A	N/A	038S000301	B	038S0I1001	B
								038S000402	B	038S0I1002	B
								038S000501	B	038S0S2301	B
								038S001601	A	038S0S2302	B
								038S001701	A	038S0T0501	A
								038S001801	A		
								038S001902	A		
								038S002201	D		
								038S002501	B		
								038S002702	B		
								038S003201	B		
								038S0I1001	B		
								038S0I1002	B		
								038S0S2301	B		
								038S0S2302	B		
								038S0T0501	A		
								038S0T0502	A		
B(a)P	Subsurface	42	36	86%	N/A	N/A	N/A	038S000106	D	None	
								038S000303	B		
								038S000305	B		
								038S000503	B		
								038S000505	B		
								038S001203	A		
								038S001603	A		
								038S001605	A		
								038S001703	A		
								038S001705	A		
								038S001803	A		
								038S001805	A		
								038S002203	D		
								038S002403	B		
								038S002503	B		
								038S002704	B		
								038S003203	B		
								038S003205	B		
								038S003403	B		

Site 38 - Building 71
Statistical Analysis Summary Table

Parameter	Surface or Subsurface Soil	Number of Samples	Number of Non-detects	Percentage of Nondetects	Pass Normal?	Pass Lognormal?	UCL	Samples Exceeding 3X RSCTL	Surface Description	Samples Exceeding 3X ISCTL	Surface Description
B(b)F	Subsurface	42	30	71%	N/A	N/A	N/A	None		None	
Chromium	Surface	37	2	5%	No	Yes	119.7	038S001301	A	None	
								038S001401	A		
Chromium	Subsurface	42	4	10%	No	No	N/A	None		None	
Copper	Surface	37	2	5%	No	No	N/A	036S080S02*	D	None	
								038S001401*	A		
								038S003201*	B		
Copper	Subsurface	42	4	10%	No	No	N/A	038S001203*	A	None	
								038S001403*	A		
D(a,h)A	Surface	37	33	89%	N/A	N/A	N/A	038S000301	B	038S0I1001	
								038S000402	B	038S0I1002	
								038S000501	B	038S0S2301	
								038S001601	A	038S0S2302	
								038S001701	A	038S0T0501	
								038S001801	A	038S0T0502	
								038S001901	A		
								038S001902	A		
								038S002201	D		
								038S002501	B		
								038S002702	B		
								038S003401	B		
								038S0I1001	B		
								038S0I1002	B		
								038S0S2301	B		
								038S0S2302	B		
								038S0T0501	A		
								038S0T0502	A		
D(a,h)A	Subsurface	42	37	88%	N/A	N/A	N/A	038S000303	B	None	
								038S000305	B		
								038S000503	B		
								038S000505	B		
								038S001603	A		
								038S001605	A		
								038S001703	A		
								038S001705	A		
								038S001803	A		
								038S001805	A		
								038S002203	D		
								038S002403	B		
								038S002503	B		
								038S002704	B		
								038S003203	B		
								038S003205	B		
								038S003403	B		

Site 38 - Building 71
Statistical Analysis Summary Table

Parameter	Surface or Subsurface Soil	Number of Samples	Number of Non-detects	Percentage of Nondetects	Pass Normal?	Pass Lognormal?	UCL	Samples Exceeding 3X RSCTL	Surface Description	Samples Exceeding 3X ISCTL	Surface Description
Lead	Subsurface	42	0	0%	No	No	N/A	None		None	
Vanadium	Surface	37	19	51%	N/A	N/A	N/A	038S000102	D	None	
								038S001601	A		
								038S003301	B		
								038S003401	B		

Notes:
Samples that were non-detect and exceeded the SCTL are noted in blue. One-half the non-detect value was used for screening.
* - Direct exposure based on acute toxicity considerations. RSCTL cannot be exceeded for Residential senario.

A - Former Building 71 concrete foundation.
B - Concrete surface.
C - Grass turf surface.
D - Asphalt surface.

Site 38 - Building 604
Statistical Analysis Summary Table

Parameter	Surface or Subsurface Soil	Number of Samples	Number of Non-detects	Percentage of Nondetects	Pass Normal?	Pass Lognormal?	UCL	Samples Exceeding 3X RSCTL	Surface Description	Samples Exceeding 3X ISCTL	Surface Description
Aroclor-1260	Surface	51	48	94%	N/A	N/A	N/A	None		None	
Arsenic	Surface	100	61	61%	N/A	N/A	N/A	036S074N02	A	038S003501	B
								036S074W02	A		
								036S075E02	A		
								036S078E02	A		
								038S002601	B		
								038S003501	B		
								038S003601	A		
								038S003701	B		
								038S0T0101	A		
								038S0T0201	B		
								038S0T0301	B		
								038S0T0401	B		
								038S0T0801	A		
								038S0T0901	A		
								038S0T1101	B		
								038S0T1301	A		
								038S0T1401	A		
								038S0T1501	B		
								038S0T1601	B		
								038S0T1701	B		
								038S0T1801	B		
								038S0T1802	B		
								038S0T1901	A		
								038S0T2001	A		
								038S0T2301	C		
								038S0T2501	B		
								038S0T3901	B		
Arsenic	Subsurface	27	10	37%	N/A	N/A	N/A	036S075E06	A	None	
								038S002603	B		
								038S002605	B		
								038S003503	B		
								038S003603	A		
B(a)A	Surface	100	91	91%	N/A	N/A	N/A	038S0T4201	B	None	
B(a)A	Subsurface	27	24	89%	N/A	N/A	N/A	036S074C04	A	None	
B(a)P	Surface	101	90	89%	N/A	N/A	N/A	036S074W02	A	038S0T0101	A
								036S075C02	B	038S0T0102	A
								036S077W02	A	038S0T0201	B
								038S002801	D	038S0T0301	B
								038S003501	B	038S0T0302	B
								038S0T0101	A	038S0T0401	B

Site 38 - Building 604
Statistical Analysis Summary Table

Parameter	Surface or Subsurface Soil	Number of Samples	Number of Non-detects	Percentage of Nondetects	Pass Normal?	Pass Lognormal?	UCL	Samples Exceeding 3X RSCTL	Surface Description	Samples Exceeding 3X ISCTL	Surface Description
								038S0T0102	A	038S0T0402	B
								038S0T0201	B	038S0T0601	B
								038S0T0301	B	038S0T0602	B
								038S0T0302	B	038S0T0701	B
								038S0T0401	B	038S0T0702	B
								038S0T0402	B	038S0T0801	A
								038S0T0601	B	038S0T0802	A
								038S0T0602	B	038S0T0901	A
								038S0T0701	B	038S0T0902	A
								038S0T0702	B	038S0T1001	B
								038S0T0801	A	038S0T1002	B
								038S0T0802	A	038S0T1101	B
								038S0T0901	A	038S0T1102	B
								038S0T0902	A	038S0T1201	B
								038S0T1001	B	038S0T1202	B
								038S0T1002	B	038S0T1301	A
								038S0T1101	B	038S0T1302	A
								038S0T1102	B	038S0T1401	A
								038S0T1201	B	038S0T1402	A
								038S0T1202	B	038S0T1501	B
								038S0T1301	A	038S0T1502	B
								038S0T1302	A	038S0T1601	B
								038S0T1401	A	038S0T1602	B
								038S0T1402	A	038S0T1701	B
								038S0T1501	B	038S0T1702	B
								038S0T1502	B	038S0T1801	B
								038S0T1601	B	038S0T1802	B
								038S0T1602	B	038S0T1901	A
								038S0T1701	B	038S0T1902	A
								038S0T1702	B	038S0T2001	A
								038S0T1801	B	038S0T2002	A
								038S0T1802	B	038S0T2201	D
								038S0T1901	A	038S0T2301	C
								038S0T1902	A	038S0T2302	C
								038S0T2001	A	038S0T2501	B
								038S0T2002	A	038S0T2602	D
								038S0T2201	D	038S0T2701	D
								038S0T2202	D	038S0T2702	D
								038S0T2301	C	038S0T2802	D
								038S0T2302	C	038S0T2901	C
								038S0T2501	B	038S0T2902	C

Site 38 - Building 604
Statistical Analysis Summary Table

Parameter	Surface or Subsurface Soil	Number of Samples	Number of Non-detects	Percentage of Nondetects	Pass Normal?	Pass Lognormal?	UCL	Samples Exceeding 3X RSCTL	Surface Description	Samples Exceeding 3X ISCTL	Surface Description
								038S0T2502	B	038S0T3002	D
								038S0T2601	D	038S0T3101	B
								038S0T2602	D	038S0T3102	B
								038S0T2701	D	038S0T3202	D
								038S0T2702	D	038S0T3302	D
								038S0T2801	D	038S0T3401	B
								038S0T2802	D	038S0T3402	B
								038S0T2901	C	038S0T3501	B
								038S0T2902	C	038S0T3502	B
								038S0T3002	D	038S0T3601	C
								038S0T3101	B	038S0T3602	C
								038S0T3102	B	038S0T3701	B
								038S0T3201	D	038S0T3702	B
								038S0T3202	D	038S0T3801	B
								038S0T3301	D	038S0T3901	B
								038S0T3302	D	038S0T4001	B
								038S0T3401	B	038S0T4101	B
								038S0T3402	B	038S0T4102	B
								038S0T3501	B	038S0T4201	B
								038S0T3502	B		
								038S0T3601	C		
								038S0T3602	C		
								038S0T3701	B		
								038S0T3702	B		
								038S0T3801	B		
								038S0T3901	B		
								038S0T4001	B		
								038S0T4002	B		
								038S0T4101	B		
								038S0T4102	B		
								038S0T4201	B		
B(a)P	Subsurface	27	23	85%	N/A	N/A	N/A	036S074C04	A	036S074C04	A
								038S002803	D		
								038S003503	B		
								038S003603	A		
								038S003703	B		
B(b)F	Surface	100	89	89%	N/A	N/A	N/A	038S0T4201	B	None	
B(b)F	Subsurface	27	22	81%	N/A	N/A	N/A	036S074C04	A	None	
Copper	Surface	100	15	15%	No	No	N/A	036S074N02*	A	None	
								036S074W02*	A		
								036S075E02*	A		

Site 38 - Building 604
Statistical Analysis Summary Table

Parameter	Surface or Subsurface Soil	Number of Samples	Number of Non-detects	Percentage of Nondetects	Pass Normal?	Pass Lognormal?	UCL	Samples Exceeding 3X RSCTL	Surface Description	Samples Exceeding 3X ISCTL	Surface Description
								036S078E02*	A		
								038S004102*	A		
								038S0T1101*	B		
								038S0T3101*	B		
								038S0T4101*	B		
								038S0T4201*	B		
Copper	Subsurface	27	0	0%	No	No	N/A	036S075E06*	A	None	
								038S002603*	B		
D(a,h)A	Subsurface	27	26	96%	N/A	N/A	N/A	036S074C04	A	None	
								038S002603	B		
								038S002803	D		
								038S003503	B		
								038S003603	A		
								038S003703	B		
								038S004204	C		
Dieldrin	Surface	51	41	80%	N/A	N/A	N/A	None		None	
I(1,2,3-cd)P	Subsurface	27	23	85%	N/A	N/A	N/A	None		None	
Iron	Surface	100	1	1%	No	Yes	8197.2	None		None	
Iron	Subsurface	27	0	0%	No	No	N/A	None		None	
Lead	Surface	100	11	11%	No	No	N/A	None		None	
Lead	Subsurface	27	0	0%	No	No	N/A	None		None	
Vanadium	Surface	107	43	40%	N/A	N/A	N/A	036S078W02*	A	None	
								038S002601*	B		
								038S003501*	B		
								038S003601*	A		
								038S003701*	B		
								038S0T0101*	A		
								038S0T0801*	A		
								038S0T0901*	A		
								038S0T1301*	A		
								038S0T1401*	A		
								038S0T1601*	B		
								038S0T1801*	B		
								038S0T1901*	A		
								038S0T2001*	A		
								038S0T2301*	C		
								038S0T2501*	B		
								038S0T3901*	C		
Vanadium	Subsurface	27	12	44%	N/A	N/A	N/A	036S075E06	A	None	

Notes:

Site 38 - Building 604
Statistical Analysis Summary Table

Parameter	Surface or Subsurface Soil	Number of Samples	Number of Non-detects	Percentage of Nondetects	Pass Normal?	Pass Lognormal?	UCL	Samples Exceeding 3X RSCTL	Surface Description	Samples Exceeding 3X ISCTL	Surface Description

Samples that were non-detect and exceeded the SCTL are noted in blue. One-half the non-detect value was used for screening.
* - Direct exposure based on acute toxicity considerations. RSCTL cannot be exceeded for Residential senario.

A - Asphalt surface.
B - Grass turf surface.
C - Concrete surface.
D - Inside Building 604.

Appendix J

Groundwater Recovery Model

1.0 INTRODUCTION

1.1 General Conditions

A groundwater model was developed for Site 38, NAS Pensacola to support the feasibility study effort. Contamination attributable to the site is present primarily in the shallow zone of the Sand-and-Gravel Aquifer. Contamination, defined for this model as levels of organics and inorganics exceeding agreed upon Preliminary Remediation Goals, is manifested in two general areas (see Section 7.0 of the RI report). Due to the nature and extent of contamination, primarily by organics, it is likely that some type of active remedial groundwater system will be required at the site.

1.2 Model Objectives

The general objective of the model effort was to assess the feasibility of extracting shallow groundwater to the surface where treatment could be executed. Issues to be addressed included:

- Mass removal and containment of groundwater
- Time frames and discharge rates required for removal of one pore volume of contaminated groundwater covering the two areas of PRG exceedances
- Minimization of gradient reversals near the Pensacola Bay shore such that saltwater intrusion is kept to a minimum.

2.0 CONCEPTUAL MODEL

2.1 Aquifer System Framework

This model was addressed to the surficial zone of the Sand-and-Gravel Aquifer. This unit is approximately 45 feet thick at the site, with 40 saturated feet. Monitored zones in this unit include the "shallow zone" (the upper 20 saturated feet) and the "intermediate zone" (the lower 20 saturated feet). There is 100% hydraulic connection between these zones. The unit as a whole is unconfined, and terminates at the top of a laterally persistent clay unit (the

low permeability zone). See Section 3.0 of the RI for further descriptions of the aquifer system framework.

2.2 Groundwater Flow System

Groundwater flows towards the southeast in a manner consistent with the local topography. The horizontal hydraulic gradient ranges from 0.0006 to 0.0027 for the shallow zone and intermediate zone. Using the geometetric mean hydraulic conductivity (K) and a derivation of Darcy's Law, the average pore velocity for groundwater in the shallow zone is 0.47 to 1.58 ft/day, and in the intermediate zone is 0.10 to 0.40 ft/day.

2.3 Hydrologic Boundaries, Sources and Sinks, and Hydraulic Properties

Pensacola Bay lies immediately to the south of the site and is considered an infinite discharge boundary. For the purpose of the model, the upgradient side of the site is considered to be an infinite recharge boundary. The source of groundwater is direct infiltration of precipitation and migration of groundwater from recharge areas upgradient of the site. The geometric mean K of the shallow zone is 241 ft/day, and for the intermediate zone is 59 ft/day. These values were calculated based on the results of 7 specific capacity tests in the shallow zone and 4 in the intermediate zone. See the RI report for additional information concerning hydraulic parameters.

3.0 COMPUTER CODE

3.1 Code Selection

Given the hydrologic simplicity of the site and the model objectives (feasibility and not hard design), an analytical code was selected to model flow at the site. The analytical model CAPZONE was chosen as the preferred code for establishing flow conditions. CAPZONE output is consistent with input for GWPATH, a numerical particle tracking program which was chosen to model advective transport. SURFER was utilized as the pre-and postprocessor for modeling.

3.2 Code Description

CAPZONE is unique for analytical models in that it is capable of importing an infinite number of gradient directions and values (regional piezometric surface) via SURFER input files. In

CAPZONE, drawdowns from theoretical pumping wells are calculated on a flat surface; this surface is then superimposed on SURFER-generated site piezometric surface to establish a pumping piezometric surface. This surface is then input into GWPATH, and particle tracking is accomplished through a number of options; typically, reverse pathline analysis is used with success with this model. Output from both CAPZONE and GWPATH is visually presented using SURFER.

4.0 MODEL CONSTRUCTION

4.1 Grid domain

The general site was equidimensionally gridded to comprise the model domain. The domain consisted of 56 nodes in the x direction and 51 nodes in the y direction. Each grid cell dimension was 30 feet by 30 feet.

4.2 Hydraulic Parameters

Several specific capacity tests were conducted on shallow and intermediate zone wells during the RI, and results were presented in the RI report. Transmissivity (T) in the shallow zone is typically orders of magnitude lower than that in the intermediate zone. Given that a) the shallow and intermediate zones are 100% hydraulically connected, and b)using lower T's create larger capture zones than lower Ts, all other parameters being equal, the shallow zone T of 66,356 gallons per day-foot was chosen to input to CAPZONE. This T was arrived at by calculating the geometric mean of the Ts reported from specific capacity testing. Using this higher T over the aquifer thickness of 40 feet will conservatively estimate the size of the resultant capture zone.

For input into GWPATH, vertical and horizontal hydraulic conductivities (K's) were considered to be equal. This is justified based on a) the geologic evidence supporting the homogeneity of the surficial sands, and b) the lack of hydrogeologic evidence supporting a difference between Kh and Kv.

Storativity: a storativity of 0.1 was assigned to the aquifer. This is a generic value based on typical values fro unconfined aquifers.

Porosity: again, a generic value of 30% was assigned to the aquifer based on the geologic evidence of the nature of the surficial deposits.

5.0 PREDICTIVE SIMULATIONS

5.1 Iterations

Numerous iterations were run to achieve adequate areal capture coupled with reasonable recovery times. The scenarios ranged from one well at 95 gpm to 4 wells, each at 30 gpm. These scenarios resulted in various complications, from too much or too little areal coverage, or intrusion of saltwater into the capture zone.

5.2 Preferred Scenario

The resulting preferred scenario consists of two wells, each centered immediately downgradient of each of the two areas of groundwater contamination. Figure 3-13 in the main report illustrates the location of each of the proposed extraction wells and their capture zones. The well extracting the east area pumps at 75 gpm, and the well extracting the west area pumps at 50 gpm. At these rates, one pore volume underlying the east area is captured in one year, and one pore volume under the west area is captured in 180 days.

6.0 SUMMARY AND CONCLUSIONS

6.1 Model Assumptions and Limitations

Use of an analytical model provides inherent assumptions and limitations into the results. A single value for T and K is assigned to the entire model domain; this is clearly an oversimplification of the system. Additionally, as no stressed piezometric surface was ever measured, no residual analysis or calibration of the predicted simulations were conducted. Given that the objective of the modeling was simply to evaluate the feasibility (and not hard design) of groundwater extraction as a remedial alternative, these limitations should not bear great weight against the model results.

6.2 Recommendations

Results of the modeling effort indicate that groundwater extraction as a remedial alternative is viable from a technical standpoint. It is recommended that, from a feasibility/conceptual standpoint, the relative costs of groundwater extraction be based on installation and operation of two extraction wells, pumping at 75 and 50 gpm respectively. It is further recommended that it be considered that one pore volume of groundwater underlying the east area can be captured at 75 gpm in one year, and, under the west area, at 50 gpm in 180 days.

Appendix K

Natural Attenuation Software Results

Building 71

Facility Name: NAS Pensacola, Florida
Site Name: Site 38 Focused Feasibility Study
Additional Description: Site 71

Length: feet
Time: days
Mass: pounds

Hydrogeologic Data and Contaminant Transport Calculations

	Maximum	Average	Minimum		Value
Hydr. Conductivity [ft/d]	241.0	150.0	59.0	Estimated Plume Length [ft]	208.9
Hydraulic Gradient [ft/ft]	0.0027	0.0027	0.0027	Longitudinal Dispersivity [ft]	11.31
Total Porosity [-]		0.4		Dispersivity Ratio [-]	20.0
Effective Porosity [-]		0.4		Contaminated Aquifer	
Groundwater Vel. [ft/d]	1.627	1.012	0.398	Thickness [ft]	20.0

Contaminant Data (December 2000)

Well Name	Distance [ft]	PCE [µg/L]	TCE [µg/L]	cis-DCE [µg/L]	Vinyl Chl. [µg/L]	Total Chl. Eth. [µg/L]
38GS12	0.0	11	6	24	7	48
38GS13	70.0	1	5	7	4	17
38GS03	94.5	0.5	4	5	1	10.5
38GS02	126.0	BD	BD	0.9	3	3.9
38GS10	189.0	BD	BD	BD	BD	BD

Redox Data (December 2000)

Well Name	Distance [ft]	Oxygen [mg/L]	Nitrate [mg/L]	Iron(II) [mg/L]	Sulfate [mg/L]	Sulfide [mg/L]	Methane [mg/L]
38GS12	0.0	0.2	BD	0.28	7	2.58	1.3
38GS03	94.5	0.4	BD	0.1	12	0.146	2.5
38GS02	126.0	BD	NS	0.04	BD	2.14	1.6
38GS10	189.0	BD	NS	0.1	28	0.38	0.19

Sorption Parameters

Fraction Org. Carbon [-]	
Maximum	0.0056
Average	0.002
Minimum	0.0003

	PCE	TCE	cis-DCE	Vinyl Chl.
Koc [L/kg]	364	126	24	57
Retardation Factor [-]				
Maximum	9.1	3.8	1.53	2.27
Average	3.89	2.0	1.19	1.45
Minimum	1.41	1.14	1.03	1.06

Attenuation Rates

	Total Chl. Eth.	PCE	TCE	cis-DCE	Vinyl Chl.
NAC (Single Zone) [1/ft]	0.0191	0.0331	0.0039	0.024	0.01
Decay Rate [1/d]					
Maximum	0.0378	0.0636	0.0068	0.0473	0.018
Average	0.0235	0.0396	0.0042	0.0295	0.0112
Minimum	0.0093	0.0156	0.0017	0.0116	0.0044

Time of Stabilization(TOS) and Max Source Conc. Calculations

Distance to POC [1/ft]	80.0
Estimated Source Width [ft]	50.0

		Source Concentration [µg/L]				*TOS [years]*	
	RCC [µg/L]	*Well*	*Current*	*Target*	*Maximum*	*Average*	*Minimum*
Total Chl. Eth.	77.0	1	48	None Req'd	N/A	N/A	N/A

Time of Remediation(TOR) Calculations

NAPL Source Width [ft]	150.0
NAPL Source Length [ft]	50.0
Contaminated Aquifer Thickness [ft]	20.0

NAPL Component	*% of NAPL*
PCE	1.00
TCE	0.00
cis-DCE	0.00

	Oxygen [mg/L]	*Nitrate [mg/L]*	*Mn(IV) [mg/kg]*	*Iron(III) [mg/kg]*	*Sulfate [mg/L]*
Background EA Conc.	2.8	0.5	NS	0.1	15.0

	Maximum	*Average*	*Minimum*
NAPL Mass [lb]	25.0	15.0	5.0

	Plan 1
% NAPL Removed	None

Maximum Time of Analysis [yr]	7

	SCC [µg/L]
Total Chl. Eth.	3.0

	NAPL Mass (PCE) [lb]	*Source Removal Plan Plan 1 0% Rem'd*
	25.0	1.5
PCE	15.0	1.4
	5.0	1.2

Hydrogen [mg/L]	*Redox Condition*
BD	SO4/CO2-red.
1.2	SO4/CO2-red.
2.1	SO4/CO2-red.
1.1	SO4/CO2-red.

Building 604

Facility Name: NAS Pensacola 2, Florida
Site Name: Site 38 Focused Feasibility Study
Additional Description: Building 604

Length: feet
Time: days
Mass: pounds

Hydrogeologic Data and Contaminant Transport Calculations

	Maximum	Average	Minimum		Value
Hydr. Conductivity [ft/d]	241.0	150.0	59.0	Estimated Plume Length [ft]	590.2
Hydraulic Gradient [ft/ft]	0.0027	0.0027	0.0027	Longitudinal Dispersivity [ft]	19.39
Total Porosity [-]		0.4		Dispersivity Ratio [-]	20.0
Effective Porosity [-]		0.4		Contaminated Aquifer	
Groundwater Vel. [ft/d]	1.627	1.012	0.398	Thickness [ft]	20.0

Contaminant Data (December 2000)

Well Name	Distance [ft]	PCE [µg/L]	TCE [µg/L]	cis-DCE [µg/L]	Vinyl Chl. [µg/L]	Total Chl. Eth. [µg/L]
38GS19	0.0	25	20	42	16	103
38GS21	40.0	27	3	0.7	BD	30.7
38GS22	60.0	1	4	4	20	29
38GS14	100.0	12	18	3	0.7	33.7
38GS15	110.0	BD	0.6	0.9	3	4.5
38GS08	115.0	4	17	56	22	99
38GS24	160.0	1	7	2	BD	10
38GS29	180.0	BD	0.5	5	6	11.5
38GS18	200.0	14	15	2	BD	31
38GS09	240.0	3	10	11	3	27
38GS32	310.0	BD	BD	2	2	4

Redox Data (December 2000)

Well Name	Distance [ft]	Oxygen [mg/L]	Nitrate [mg/L]	Iron(II) [mg/L]	Sulfate [mg/L]	Sulfide [mg/L]	Methane [mg/L]	Hydrogen [mg/L]	Redox Condition
38GS19	0.0	2.4	1.86	0.03	BD	0.007	0.01	0.38	Oxic
38GS20	20.0	1.2	NS	0.22	30	1.395	5.6	1.6	Oxic
38GS21	40.0	NS	NS	NS	NS	NS	NS	NS	Oxic
38GS17	42.0	0.2	NS	0.11	BD	2.13	9.7	4.6	Methanogenic
38GS22	60.0	NS	NS	NS	NS	NS	NS	NS	Methanogenic
38GS14	100.0	NS	NS	NS	NS	NS	NS	NS	Methanogenic
38GS15	110.0	NS	NS	NS	NS	NS	NS	NS	Methanogenic

38GS08	115.0	1.8	0.737	0.02	20	0.006	490	0.71	Oxic
38GS24	160.0	NS	NS	NS	NS	NS	NS	NS	Oxic
38GS29	180.0	NS	NS	NS	NS	NS	NS	NS	Oxic
38GS18	200.0	NS	NS	NS	NS	NS	NS	NS	Oxic
38GS09	240.0	NS	NS	NS	NS	NS	NS	NS	Oxic
38GS32	310.0	1.3	BD	0.6	1	0.009	2.1	2.3	Oxic

Sorption Parameters

Fraction Org. Carbon [-]	
Maximum	0.0056
Average	0.002
Minimum	0.0003

	PCE	*TCE*	*cis-DCE*	*Vinyl Chl.*
Koc [L/kg]	364	126	24	57
Retardation Factor [-]				
Maximum	9.1	3.8	1.53	2.27
Average	3.89	2.0	1.19	1.45
Minimum	1.41	1.14	1.03	1.06

Attenuation Rates

	Total Chl. Eth.	*PCE*	*TCE*	*cis-DCE*	*Vinyl Chl.*
NAC (Single Zone) [1/ft]	0.0068	0.0027	0.0015	0.0104	Insuff. Data
Decay Rate [1/d]					
Maximum	0.0125	0.0047	0.0025	0.0196	
Average	0.0078	0.0029	0.0016	0.0122	
Minimum	0.0031	0.0011	0.0006	0.0048	
NAC (Zone 1) [1/ft]	0.0303	0.0027 (Est.)	0.0474	0.0104 (Est.)	
Decay Rate [1/d]					
Maximum	0.0781	0.0047	0.1753	0.0196	
Average	0.0486	0.0029	0.1091	0.0122	
Minimum	0.0191	0.0011	0.0429	0.0048	
NAC (Zone 2) [1/ft]	0.0255	0.0027 (Est.)	0.0164	0.0104 (Est.)	
Decay Rate [1/d]					
Maximum	0.0621	0.0047	0.0383	0.0196	

Average	0.0387	0.0029	0.0238	0.0122
Minimum	0.0152	0.0011	0.0094	0.0048
NAC (Zone 3) [1/ft]	0.0114	0.0027 (Est.)	0.0025	0.0104
Decay Rate [1/d]				
Maximum	0.0227	0.0047	0.0044	0.0196
Average	0.0141	0.0029	0.0027	0.0122
Minimum	0.0056	0.0011	0.0011	0.0048

Time of Stabilization(TOS) and Max Source Conc. Calculations

Distance to POC [1/ft]	320.0
Estimated Source Width [ft]	150.0

		Source Concentration [µg/L]				*TOS [years]*	
	RCC [µg/L]	*Well*	*Current*	*Target*	*Maximum*	*Average*	*Minimum*
Total Chl. Eth.	77.0	1	103	None Req'd	N/A	N/A	N/A

Time of Remediation(TOR) Calculations

NAPL Source Width [ft]	50.0
NAPL Source Length [ft]	150.0
Contaminated Aquifer Thickness [ft]	20.0

NAPL Component	*% of NAPL*
PCE	1.00
TCE	0.00
cis-DCE	0.00

	Oxygen [mg/L]	*Nitrate [mg/L]*	*Mn(IV) [mg/kg]*	*Iron(III) [mg/kg]*	*Sulfate [mg/L]*
Background EA Conc.	2.8	0.1	NS	0.0	14.0

	Maximum	*Average*	*Minimum*
NAPL Mass [lb]	25.0	15.0	5.0

	Plan 1
% NAPL Removed	None

Maximum Time of Analysis [yr] 15

	SCC [µg/L]
Total Chl. Eth.	3.0

	NAPL Mass (PCE) [lb]	*Source Removal Plan Plan 1 0% Rem'd*
	25.0	1.5
PCE	15.0	1.4
	5.0	1.2