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NAS PENSACOLA
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REMEDIAL INVESTIGATION REPORT ADDENDUM 2 SITE 38 NAS PENSACOLA FL

11/14/2001

ENSAFE/ALLEN AND HOSHALL

REMEDIAL INVESTIGATION REPORT
ADDENDUM 2

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

November 14, 2001

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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:	November 14, 2001
Signature:	Allison Harris
Name:	Allison Harris
Title:	Task Order Manager

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LIST OF ABBREVIATIONS

amsl	Above Mean Sea Level
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
DCE	Dichloroethene
DO	Dissolved Oxygen
FS	Feasibility Study
IDW	Investigation Derived Waste
MCL	Maximum Contaminant Level
µg/L	Micrograms per Liter
mg/L	Milligrams per liter
ml	Milliliter
MNA	Monitored Natural Attenuation
mS/cm	MilliSiemens per Centimeter
MSL	Mean Sea Level
NO_3	Nitrate
NTU	Nephelometric Turbidity Unit
ORP	Oxidation Reduction Potential
OSWER	Office of Solid Waste and Emergency Response
ppb	Part per billion
ppm	Part per million
PQL	Practical Quantitation Limit
PVC	Polyvinyl chloride
QA	Quality Assurance
QC	Quality Control
RI	Remedial Investigation
SMCL	Secondary Maximum Contaminant Level

TCE	Trichloroethene
TOC	Total Organic Carbon
USEPA	United States Environmental Protection Agency
VC	Vinyl Chloride
VOC	Volatile Organic Compound

SITE 38 (OPERABLE UNIT 11)
EXECUTIVE SUMMARY

This report summarizes additional groundwater sampling activities conducted at Site 38 (Operable Unit 11) at the Naval Air Station Pensacola. Groundwater samples were collected from December 7-13, 2000, using low-flow techniques to obtain samples exhibiting low turbidity. The samples were submitted for selected volatile organic compound (VOC), semi-volatile organic compound (SVOC) and metal analysis as outlined in the Site 38 Re-Sampling Memorandum. Selected wells were also sampled for monitored natural attenuation (MNA) parameters. This report presents the results of the sampling and evaluates the applicability of MNA at the site.

1.0 INTRODUCTION

In response to comments from the NAS Pensacola Tier I Partnering Team, EnSafe conducted re-sampling of selected monitoring wells at Site 38 (Operable Unit 11). Before sampling, EnSafe evaluated the existing data and presented the data to the Tier 1 Partnering Team at the September 25 and 26, 2000 meeting in Atlanta, Georgia. Agreements reached at the Tier 1 meeting on which wells to sample and the associated analyses were summarized in a memorandum titled *Recommendation for Re-Sampling, Site 38* (EnSafe, October 6, 2000), which is provided in Appendix A. In addition to the agreed upon analysis, groundwater was also sampled for monitored natural attenuation (MNA) parameters from previously identified MNA wells. This document summarizes the findings of the resampling event and also presents an evaluation of the natural attenuation data.

Because this report is an addendum to the RI report, this document will present only the methods and results of the current investigation. The reader is referred to the RI report for additional information regarding the site description, history and features, regional geology and hydrogeology, and previous investigations. For previous monitored natural attenuation evaluations, the reader is referred to the FS report.

2.0 FIELD INVESTIGATION AND METHODOLOGY

Groundwater from the eight Building 71 monitoring wells and 16 Building 604 monitoring wells was sampled for volatile organic compounds (VOCs) and metals. Monitoring wells, 38GS02 and 38GS12 at Building 71 and 38GS15 and 38GS18 at Building 604, were also sampled for SVOCs. Selected monitoring wells were sampled for specific geochemical parameters to evaluate the effectiveness of natural attenuation. Tables 2-1 and 2-2 summarize the sampled monitoring wells and the analysis for Buildings 604 and 71, respectively. Figures 2-1 and 2-2 show the locations of the monitoring wells.

Table 2-1
Wells Proposed for Resampling — Building 604 Area

Well ID	TAL Metals	TCL SVOCs	TCL VOCs	MNA
38GS07	X		X	
38GS08	X		X	X
38GS09	X		X	
38GS14	X		X	
38GS15	X	X	X	
38GS17	X		X	X
38GS18	X	X	X	
38GS19	X		X	X
38GS20	X		X	X
38GS21	X		X	
38GS22	X		X	
38GS24	X		X	
38GS29	X		X	
38GS32	X		X	X
38GS28				X
38GI04	X		X	
38GI08	X		X	

Notes:
MNA — Monitored Natural Attenuation
TCL — Target Compound List
SVOCs — Semivolatile Organic Compounds
VOCs — Volatile Organic Compounds
MNA — Monitored Natural Attenuation Parameters

Table 2-2
Wells Proposed for Resampling — Building 71 Area

Well ID	TAL Metals	TCL SVOCs	TCL VOCs	MNA
38GS01	X		X	X
38GS02	X	X	X	X
38GS03	X		X	X
38GS05	X		X	
38GS10	X		X	X
38GS11	X		X	
38GS12	X	X	X	X
38GS13	X		X	

Notes:
MNA — Monitored Natural Attenuation
TCL — Target Compound List
SVOCs — Semivolatile Organic Compounds
VOCs — Volatile Organic Compounds
MNA — Monitored Natural Attenuation Parameters

Before collecting groundwater samples, a depth to water measurement was collected from each well. Groundwater samples were collected using the low-flow sampling technique. Purging before sampling continued until pH, conductivity, and temperature stabilized. Final stabilization readings are summarized in Table 2-3. Groundwater samples for offsite laboratory analysis were collected and analyzed in accordance with the technical memorandum and procedures contained in the *Comprehensive Sampling and Analysis Plan* (EnSafe/Allen & Hoshall, 1994). Field sample collection and geochemical analysis were performed in accordance with USEPA 1998 protocols listed in Appendix B. Groundwater sampling forms and field geochemical analysis are presented in Appendix C.

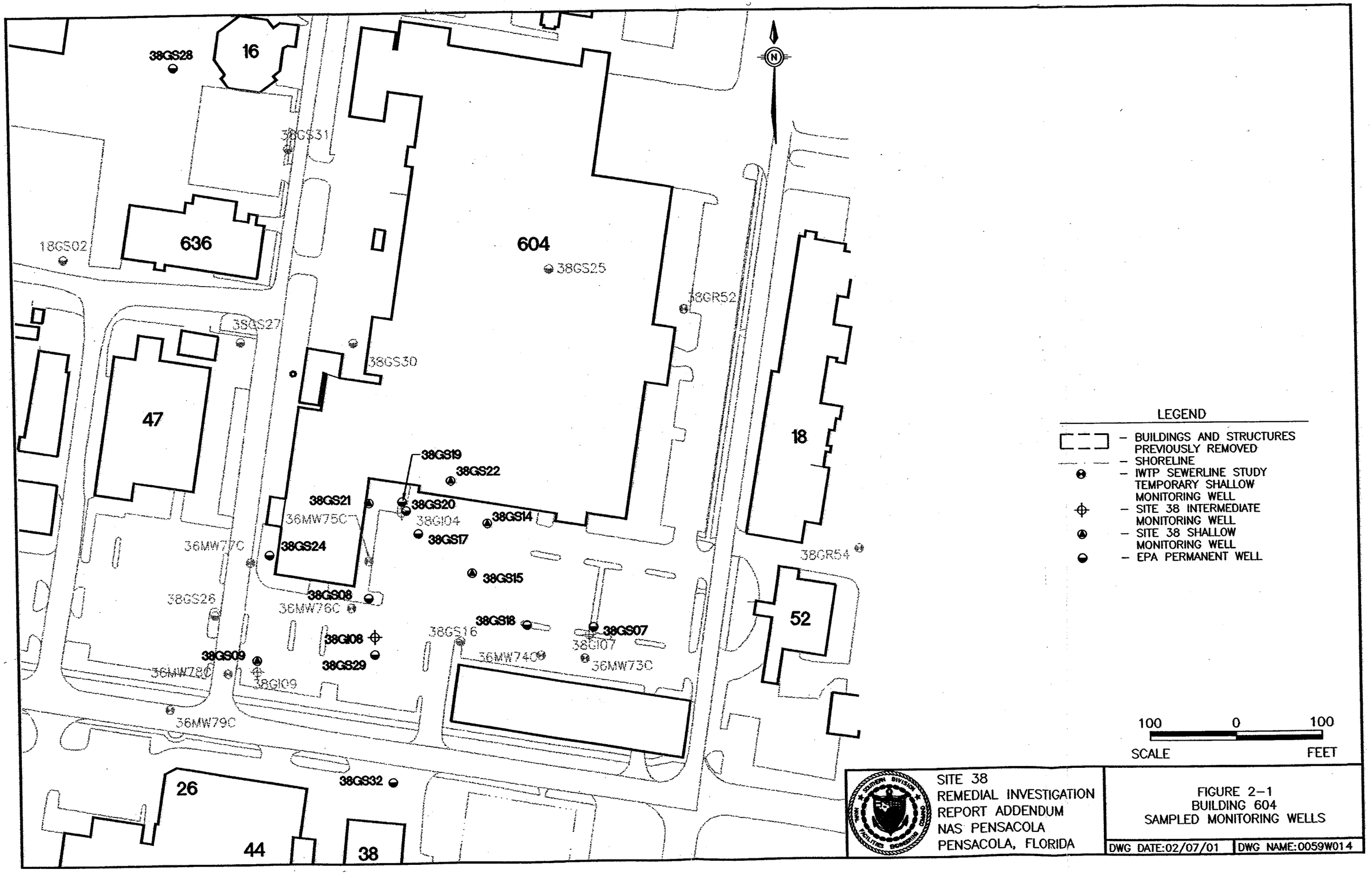

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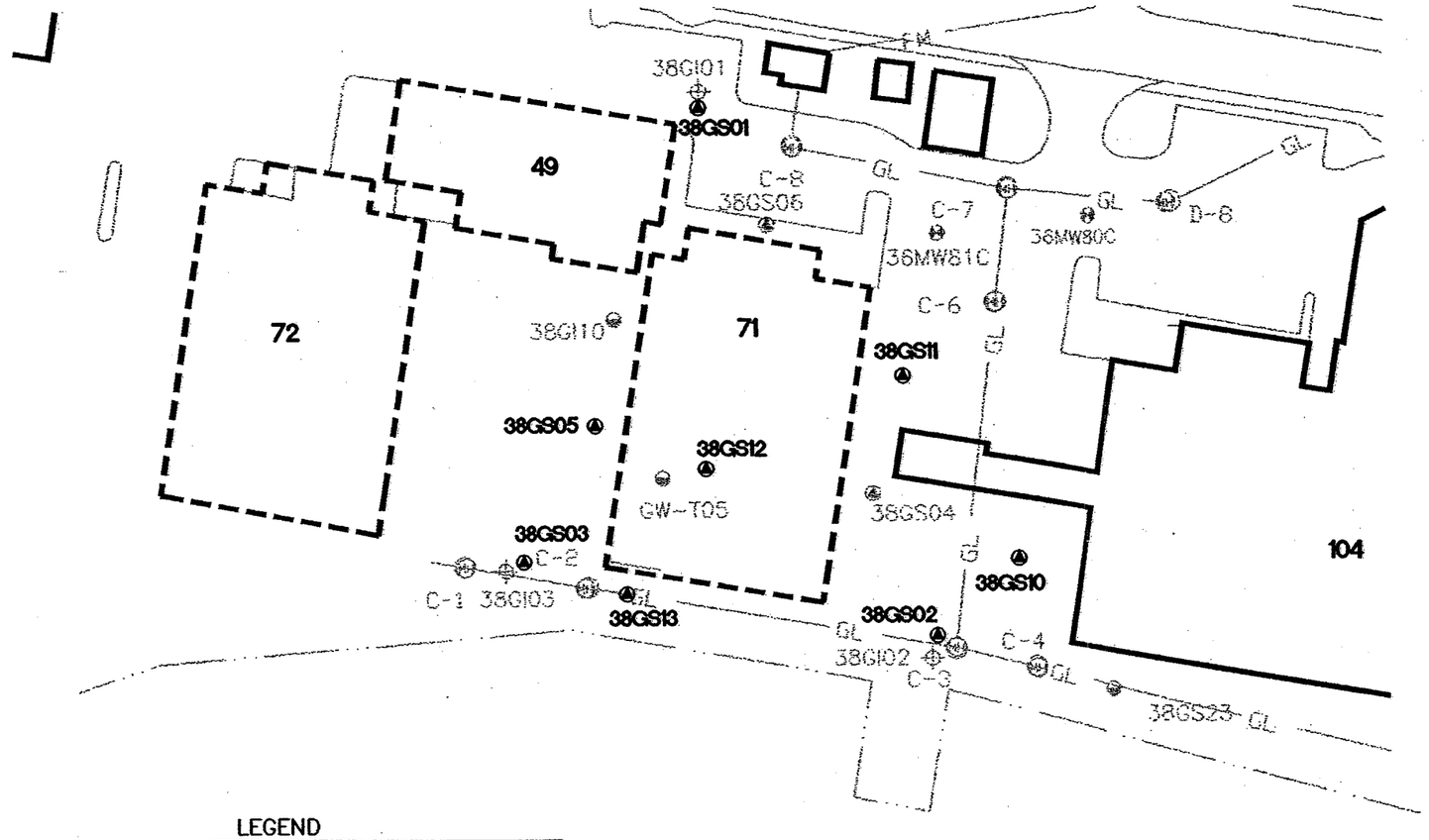
FIGURE 2-1
BUILDING 604
SAMPLED MONITORING WELLS

DWG DATE:02/07/01 | DWG NAME:0059W014



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)
- MANHOLE

70 0 70
SCALE FEET

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PENSACOLA, FLORIDA

FIGURE 2-2
BUILDING 71 AREA
SAMPLED MONITORING WELLS

DWG DATE: 02/07/01 | DWG NAME: 0059W015

Table 2-3

Stabilization Parameters

Well ID	pH (standard units)	Conductivity (mS/cm)	Water Temperature (°C)	Turbidity (NTUs)
Building 71 Area				
38GS01	6.61	0.225	21.21	0
38GS02	6.93	0.768	20.71	0
38GS03	6.91	0.292	22.34	0
38GS05	7.58	0.305	21.84	0
38GS10	7.02	0.579	22.05	0
38GS11	7.70	0.279	21.31	23.6
38GS12	7.22	0.285	20.93	0
38GS13	7.72	0.314	21.8	0
Building 604 Area				
38GS07	7.33	0.385	22.63	0
38GS08	8.12	0.334	20.89	0
38GS09	7.44	0.328	22.5	0
38GS14	7.5	0.339	19.87	0
38GS15	7.05	0.398	22.21	0
38GS17	7.16	0.326	24.48	0
38GS18	7.56	0.281	21.95	0
38GS19	7.73	0.345	22.95	0
38GS20	7.60	0.332	23.35	0
38GS21	7.92	0.243	21.41	0
38GS22	7.10	0.208	22..11	0
38GS24	7.67	0.282	21.58	2.7
38GS28	6.73	0.144	18.73	0.4
38GS29	7.97	0.354	22.89	0
38GS32	7.52	0.470	20.22	0
38GI04	8.24	0.464	22.09	15
38GI08	8.29	0.721	20.99	12.8

3.0 HYDROGEOLOGY

Depth to groundwater was measured for each of the monitoring wells. Groundwater elevations were then calculated as presented in Table 3-1 for the Building 604 and 71 areas, and potentiometric maps were constructed. Groundwater flows to the southeast in the Building 604 area as shown on Figure 3-1 and to the south-southeast in the Building 71 area as shown on Figure 3-2.

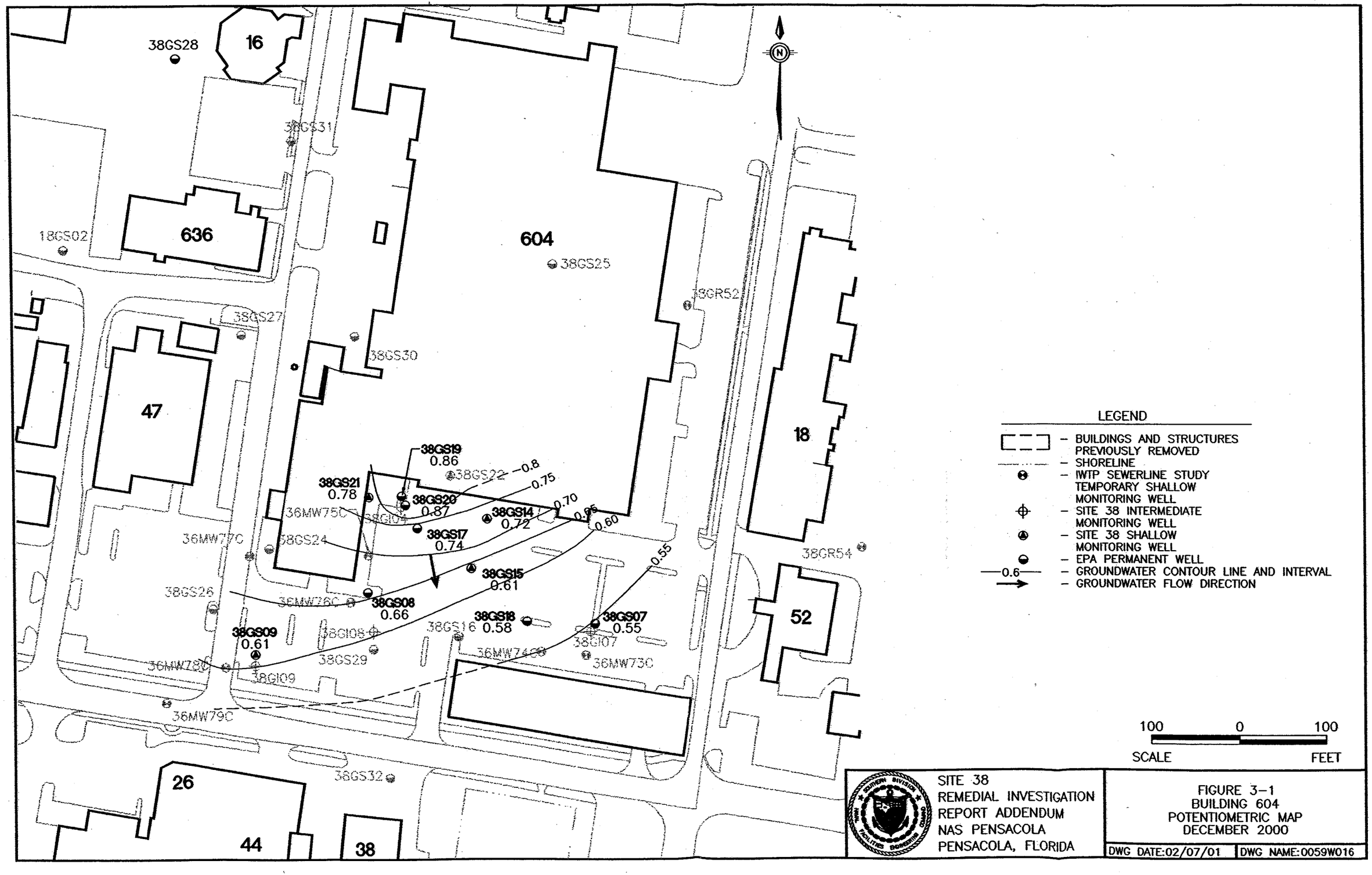
38GS28
16
38GS31
18GS02
636
604
38GS25
38GR52
38GS27
38GS30
47
18
38GS19
0.86
38GS22
38GS21
0.78
38GS20
0.87
38GS14
0.72
38GS17
0.74
36MW75C
36MW77C
38GS24
38GS26
38GS15
0.61
38GS08
0.66
38GS18
0.58
38GS07
0.55
38GS09
0.61
38GS16
38GI08
38GI07
38GI09
38GS29
36MW78C
36MW79C
36MW73C
38GR54
52
38GS32
26
44
38
0.8
0.75
0.70
0.65
0.60
0.55
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
100 0 100
SCALE FEET
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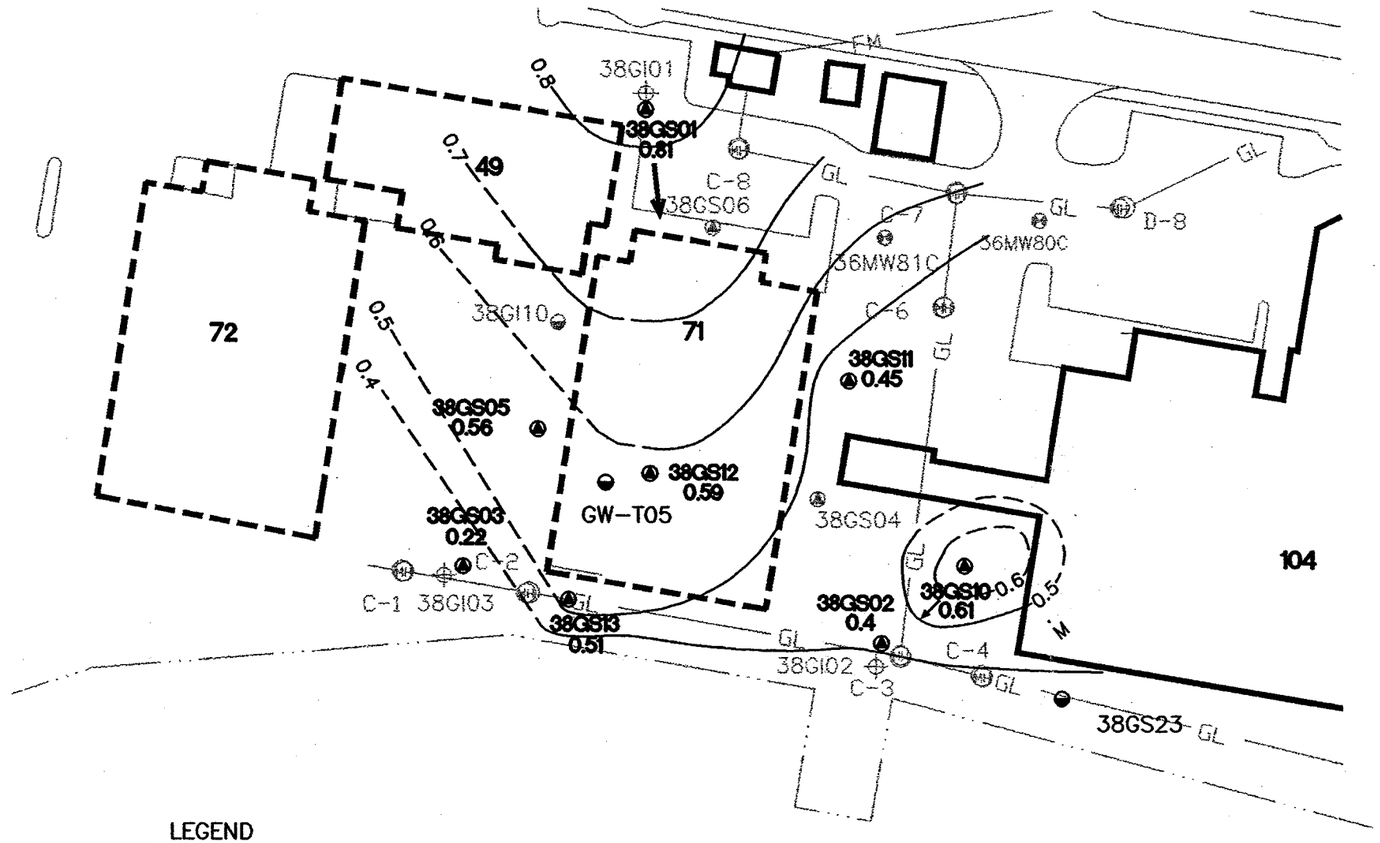
FIGURE 3-1
BUILDING 604
POTENTIOMETRIC MAP
DECEMBER 2000
DWG DATE:02/07/01
DWG NAME:0059W016



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

SCALE 70 0 70 FEET

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FIGURE 3-2
BUILDING 71
POTENTIOMETRIC MAP
DECEMBER 7-13, 2000

DWG DATE: 03/19/01 | NAME: 0059001WO01

Table 3-1
Groundwater Elevation Data

Monitoring Well ID	Top of Casing Elevation (amsl)	Depth to Water	Groundwater Elevation
Building 604 Monitoring Wells			
38GS07	7.34	6.79	0.55
38GS08	7.29	6.63	0.66
38GS09	6.25	5.64	0.61
38GS14	8.43	7.71	0.72
38GS15	7.98	7.37	0.61
38GS17	7.71	6.97	0.74
38GS18	7.18	6.60	0.58
38GS19	7.87	7.01	0.86
38GS20	6.81	5.94	0.87
38GS21	7.62	6.84	0.78
38GS22	NS	7.62	NS
38GS24	NS	5.94	NS
38GS28	NS	4.67	NS
38GS29	NS	5.49	NS
38GS32	NS	5.35	NS
38GI04*	7.21	9.16	-1.95
38GI08*	6.49	5.86	0.63
Building 71			
38GS01	5.74	4.93	0.81
38GS02	4.18	3.78	0.4
38GS03	3.88	3.66	0.22
38GS05	4.38	3.82	0.56
38GS10	4.69	4.08	0.61
38GS11	4.3	3.85	0.45
38GS12	4.6	4.01	0.59
38GS13	4.04	3.53	0.51

Notes:
amsl — above mean sea level
Depth to water measurements were collected from December 7-13, 2000.
NS — top of casing elevations were not supplied by USEPA, therefore, the groundwater elevation could not be calculated.
Monitoring wells, 38GI04 and 38GI08, are completed at the base of the surficial aquifer and are not used to determine groundwater flow.

4.0 NATURE AND EXTENT OF CONTAMINATION

Analytical data collected from groundwater samples were compared with Groundwater Cleanup Target Levels (GCTLs; Groundwater Criteria), Surface Water Cleanup Target Levels (SWCTLs; Marine Surface Water Criteria), and reference concentrations to evaluate the nature and extent of contamination. The background criteria used for inorganic compounds are discussed briefly in Section 4.1. The GCTLs and SWCTLs are taken from Chapter 62-777, F.A.C., which is applicable only to brownfields, underground storage tank, 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. Section 4.2 summarizes the contaminants detected in groundwater, which are further evaluated in the monitored natural attenuation section (Section 5). Analytical results are presented in Appendix D.

Uncertainty is inherent in most environmental sample data, caused by matrix characteristics, heterogeneity, and the precision and accuracy of sampling, preparation, and analysis methods. Although data are typically considered to be exact values, they are in reality the laboratory's best estimate within a range defined by method control limits. As a result, reported concentrations for any chemical can under or overestimate actual concentrations.

4.1 Background and Reference Criteria

Inorganics are naturally occurring parameters as well as from man-made influences. 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 basewide background groundwater quality for the shallow and intermediate zones. A reference concentration has been calculated for each inorganic parameter, equal to two times the parameter's mean concentration, to approximate the upper extent of the ambient concentration range for analyzed inorganic parameters. These reference concentrations were presented in the approved *Final Site 1 Remedial Investigation Report* dated January 5, 1996, completed by EnSafe.

As noted on Table 4-1, concentrations of aluminum and iron detected in reference samples exceeded secondary drinking water criteria for all well intervals, indicating these metals naturally occur at relatively high concentrations at NAS Pensacola. This is also consistent with regional reference data for Escambia County (FGS 1992).

Table 4-1
Base-Wide Shallow and Intermediate
Reference Groundwater Concentrations
(All results in µg/L)

Parameter	GCTL	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	.55	1.1
Cadmium	5	1.7	3.4
Calcium	NS	8,780.0	17,560.0
Chromium	100	17.5	35.0
Cobalt	NS	2.05	4.1
Copper	1000	8.1	16.2
Iron	300	***853.9***	***1,707.8***
Lead	15	.8	1.6
Magnesium	NS	1,436.3	2,872.6
Manganese	50	11.0	22.0
Mercury	2	.1	.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	NS	4.8	9.6
Zinc	5000	76.60	153.20

Notes:
µg/L — Micrograms per liter
GCTL — From Chapter 62-777, F.A.C.
Bold Italics — The reported value exceeds the GCTL
NS — No standard established
This table taken from the *Final Site 1 Remedial Investigation Report*, EnSafe Inc. (1996).

4.2 Building 604 Groundwater Analytical Results

The identified site monitoring wells were sampled for VOCs, SVOCS, and inorganics as part of the supplemental groundwater investigation outlined in Section 2. Analytical data indicate the presence of VOCs, SVOCs, and metals in groundwater.

4.2.1 Building 604 Inorganics

As presented in Table 4-2, cadmium, iron, lead and manganese are the only parameters to exceed both their GCTL and background concentrations. Cadmium exceeded its MCL (5 μg/L) at 38GS14 (19 μg/L), 38GS19 (79 μg/L), 38GS21 (150 μg/L), and 38GS24 (12 μg/L). These wells are adjacent to the southernmost end of Building 604. Cadmium concentrations in wells (38GS18 [0.67 μg/L], 38GS09 [1.2 μg/L], and 38GS08 [3.9 μg/L]) downgradient of the identified exceedance wells were below their GCTL.

Iron and lead exceeded their respective GCTL and reference concentration at one location each. Monitoring well 38GS24 had an iron concentration (6,100 μg/L) above its standard (300 μg/L) and reference concentration (1,707 μg/L). Iron concentrations in wells downgradient of the exceedance well did not exceed both the GCTL and reference concentration. Lead exceeded its GCTL (15 μg/L) and reference concentration (1.6 μg/L) at location 38GS18 (59 μg/L).

Manganese exceeded its GCTL (50μg/L) and reference concentration at two monitoring wells, 38GS32 (83 μg/L) and 38GS29 (190 μg/L).

Calcium and magnesium also exceeded their reference concentrations in most monitoring wells, but these parameters do not have established GCTLs.

Table 4-2
Inorganics Detected in Groundwater, Building 604 Area (ug/L)

Parameter	GCTL	Reference Concentration	038GGS0704		038GGS0804		038GGS0904		038GGS1404		038GGS1504		038GGS1704		038GGS1804	
Aluminum	200	3882.75	75	U	46	U	72	U	89	U	71	U	5.9	U	110	U
Antimony	6	30.2	2.3	U	3.7	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
Arsenic	50	2.8	2.6	J	5.7	J	3	J	2.2	U	2.3	J	2.2	U	6.3	J
Barium	2000	13.225	99		110		72		66		81		68		60	
Cadmium	5	3.4	0.4	U	3.9	J	1.2	J	**19**		0.4	U	0.4	U	0.67	J
Calcium	NA	17560	**54000**		**40000**		**45000**		**48000**		**55000**		**45000**		**39000**	
Chromium	100	34.975	0.8	U	15		0.8	U	15		8.3	J	5.3	J	6.7	J
Copper	1000	16.2	1.4	U	40		3	U	15	J	3.5	U	0.7	UJ	20	
Iron	300	1707.825	82	J	15	U	150		18	J	44	J	110		560	
Lead	15	1.6	2	J	3.9	J	8.3		9.4		1.3	U	1.3	U	**59**	
Magnesium	NA	2872.5	**6100**		2700		**3100**		**5900**		**8600**		**4300**		**4100**	
Manganese	50	21.925	7.8	J	29		28		1.4	J	22		34		0.5	U
Mercury	2	0.2	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.46	
Nickel	100	39.9	1	U	1.2	U	2	J	1.4	J	1	U	1	U	1	U
Potassium	NA	12167.5	7500		5700		3700		5400		7300		4100		4400	
Selenium	50	3.9	3	U	4.5	U	3	U	3.1	J	3	U	3	U	3	U
Sodium	160000	18345	16000		26000		17000		11000		12000		14000		9400	
Vanadium	49	9.575	0.9	U	1.5	J	1.9	J	1.4	J	0.9	U	0.9	U	1.2	J
Zinc	5000	153.2	13	J	21		49	J	140	J	4.4	U	2.1	U	370	J

Notes:
All results are in micrograms per liter or parts per billion
J = Estimated Value
U = Not detected
GCTL exceedances are shown in **bold.**

Table 4-2
Building 604 Inorganics Groundwater Criteria Exceedances (mg/L)

Parameter	GCTL	Reference Concentration	038GGS1904		038GGS2004		038GGS2104		038GGS2204		038GGS2404		038GGS2804		038GGS2904		038GGS3204	
Aluminum	200	3882.75	6.9	J	8.4	J	98	U	71	U	110	U	550		19	J	28	U
Antimony	6	30.2	2.9	J	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	3.7	U
Arsenic	50	2.8	2.3	J	2.2	U	3.5	J	3.5	J	31		2.2	U	2.2	U	3.7	J
Barium	2000	13.225	110		61		57		38		44		27		110		71	
Cadmium	5	3.4	**79**		0.4	U	**150**		0.4	U	**12**		0.4	U	0.4	U	0.5	U
Calcium	NA	17560	**44000**		**53000**		**30000**		**29000**		**42000**		13000		**44000**		**49000**	
Chromium	100	34.975	19		0.8	U	14		32		33		0.84	J	1.2	J	2.1	J
Copper	1000	16.2	6.9	J	0.7	U	12	J	2.3	U	8.4	J	5.7	J	2.9	J	1.2	U
Iron	300	1707.825	19	U	300		19	J	40	J	**6100**		270		670		1200	
Lead	15	1.6	1.3	U	1.3	U	4.3	J	1.8	J	7.6		1.3	U	1.3	U	11	
Magnesium	NA	2872.5	**4800**		**3800**		**3100**		**2900**		**3100**		1400		**3500**		**4700**	
Manganese	50	21.925	12	J	33	J	12		0.5	U	6.3	J	0.5	U	**190**		**83**	
Mercury	2	0.2	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	100	39.9	1	U	1	U	1	U	1	U	4.4	J	1	U	1	J	1.2	J
Potassium	NA	12167.5	4800		4000		2000		3500		2400		1700		5500		3600	
Selenium	50	3.9	3	U	3	U	3	U	3	U	3	U	3	U	3	U	4.5	U
Sodium	160000	18345	19000		13000		13000		8000		8200		14000		23000		35000	
Vanadium	49	9.575	1	J	0.9	U	2.3	J	0.9	U	0.92	J	3.2	J	0.9	U	1.2	U
Zinc	5000	153.2	38		10	U	45	J	6.9	U	29	J	69		11	J	72	

Notes:
All results are in micrograms per liter or parts per billion
J = Estimated Value
U = Not detected
GCTL exceedances are shown in **bold.**

4.2.2 Building 604 Organics

Semivolatile Organic Compounds

Only monitoring wells 38GS15 and 38GS 18 were sampled for SVOCs based on their previous analytical results. The results are summarized in Table 4-3. Acenapthene, dibenzofuran, and napthalene were the only SVOCs to exceed its groundwater criteria. Both acenapthene and dibenzofuran exceeded their respective GCTL (20 μg/L and 28 μg/L) in monitoring well 38GS18 (79 μg/L and 91 μg/L). Napthalene exceeded its GCTL of 20 μg/L at 38GS15 (150 μg/L).

Volatile Organic Compounds

Groundwater from all selected site monitoring wells were analyzed for VOCs. Chlorinated solvents were detected most frequently and at the highest concentrations and are shown on Figure 4-1. All detected VOCs are presented in Table 4-4.

VOCs detected above their respective GCTL included tetrachlorethene (PCE) and its breakdown products: trichloroethene (TCE) and vinyl chloride (VC). Detected concentrations for each of these parameters are provided in Figure 4-1.

PCE equaled or exceeded its GCTL of 3μg/L in six monitoring 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). Except for 38GS09, these wells are located near the sourthernmost portion of Building 604.

TCE equaled or exceeded its GCTL of 3μg/L in eight monitoring 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 (7 μg/L). Except for 38GS09 and 38GS19, these wells are located near the sourthernmost portion of Building 604.

FLORIDA GCTLS	
PCE	3 ppb
TCE	3 ppb
CIS-1,2-DCE	70 ppb
TRANS-1,2-DCE	100 ppb
VC	1 ppb

FLORIDA GCTLS EXCEEDANCES ARE SHOWN IN BLUE.

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

ISOCONCENTRATION LINES FOR PCE COULD NOT BE DRAWN FOR THIS AREA BECAUSE OF THE NUMBER OF NON-DETECTS.

100 0 100

SCALE FEET

SITE 38
REMEDIAL INVESTIGATION
REPORT ADDENDUM
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 4-1
CHLORINATED SOLVENTS DETECTED
IN GROUNDWATER BUILDING 604 AREA
DECEMBER 2000

DWG DATE:10/22/01 | NAME: 0059001W006

Table 4-3
SVOCs Detected in Groundwater, Building 604 Area

Parameter	GCTL	038GGS1504		038GGS1804	
2-Methylnaphthalene	20	1	J	5	U
Acenaphthene	20	5	U	**79**	
Anthracene	2100	5	U	11	
Dibenzofuran	28	5	U	**91**	
Fluoranthene	280	5	U	24	
Fluorene	280	5	U	28	
Naphthalene	20	**170**	**D**	5	U
Phenanthrene	210	5	U	190	D
Pyrene	210	5	U	11	

Notes:
All results are in micrograms per liter or parts per billion
J = Estimated Value
U = Not detected
D = Diluted
GCTL exceedances are shown in **bold.**

Table 4-4
VOCs Detected in Groundwater, Building 604 Area (ug/L)

Parameter	GCTL	038GGI0404		038GGI0804		038GGS0704		038GGS0804		038GGS0904		038GGS1404		038GGS1504	
1,1,1-Trichloroethane	200	1	U	1	U	1	U	1		0.4	J	2		1	U
1,1-Dichloroethane	70	1	U	1	U	0.7	J	2		1	U	0.8	J	14	
1,1-Dichloroethene	7	1	U	1	U	1	U	0.7	J	1	U	1	U	1	U
1,2,4-Trichlorobenzene	70	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dibromo-3-Chloropropane	0.2	1	U	**1**		1	U	1	U	1	U	1	U	1	U
1,2-Dichlorobenzene	600	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,4-Dichlorobenzene	75	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Acetone	700	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Benzene	1	0.3	J	1	U	1	U	0.4	J	1	U	1	U	1	U
Carbon disulfide	700	1	U	0.3	J	1	U	1	U	1	U	1	U	0.8	J
Chloroform	5.7	1	U	1	U	1	U	1	U	1	U	0.7	J	1	U
Chloromethane	2.7	1	U	1	U	1	U	1	U	1	U	1	U	1	U
cis-1,2-Dichloroethene	70	1	U	1	U	2		56		11		3		0.9	J
Ethylbenzene	30	1	U	1	U	1	U	1	U	1	U	1	U	**53**	
Tetrachloroethene	3	1	U	1	U	1	U	**4**		**3**		**12**		1	U
Toluene	40	1	U	1	U	1	U	1	U	1	U	1	U	1	U
trans-1,2-Dichloroethene	100	1	U	1	U	2		15		9		1	U	4	
Trichloroethene	3	1	U	1	U	1	U	**17**		**10**		**18**		0.6	J
Vinyl chloride	1	0.7	J	0.8	J	0.9	J	**22**		**3**		1	U	**3**	
Xylene (Total)	20	1	U	1	U	1	U	1	U	1	U	1	U	1	U

Notes:
J = Estimated Value
U = Not detected
All results are in micrograms per liter or parts per billion
GCTL exceedances are shown in **bold.**

Table 4-4
VOCs Detected in Groundwater, Building 604 Area (ug/L)

Parameter	GCTL	038GGS1704		038GGS1804		038GGS1904		038GGS2004		038GGS2104		038GGS2204		038GGS2404		038GGS2804		038GGS2904		038GGS3204	
1,1,1-Trichloroethane	200	1	U	0.4	J	0.5	J	1	U	1	U	1	U	0.6	J	1	U	1	U	1	U
1,1-Dichloroethane	70	2		0.8	J	0.5	J	1		1	U	4		1	U	1	U	2		1	U
1,1-Dichloroethene	7	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2,4-Trichlorobenzene	70	1	U	1		1	U	1	U	1	U	1	U	0.7	J	1	U	1	U	1	U
1,2-Dibromo-3-Chloropropane	0.2	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
1,2-Dichlorobenzene	600	2		1	U	1	U	1	U	1	U	1	U	1	U	1	U	0.2	J	1	U
1,4-Dichlorobenzene	75	0.4	J	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
Acetone	700	5	U	5	U	5	U	20		5	U	5	U	5	U	5	U	5	U	5	U
Benzene	1	1	U	1	U	1	U	1	U	1	U	1	U	0.2	J	1	U	1	U	1	U
Carbon disulfide	700	1	U	0.4	J	1	U	1	U	1	U	1		0.2	J	1	U	1	U	1	U
Chloroform	5.7	1	U	1	U	0.3	J	1	U	1	U	1	U	0.6	J	0.6	J	1	U	1	U
Chloromethane	2.7	1	U	0.6	J	1	U	1	U	1	U	1	U	1	U	1	U	1	U	1	U
cis-1,2-Dichloroethene	70	1	U	2		42		0.6	J	0.7	J	4		2		1	U	5		2	
Ethylbenzene	30	6		1	U	1	U	0.8	J	1	U	1	U	1	U	1	U	1	U	1	U
Tetrachloroethene	3	1	U	**14**		**25**		1	U	**27**		1		1		1	U	1	U	1	U
Toluene	40	0.5	J	1	U	1	U	1	U	1	U	1	U	0.3	J	1	U	1	U	1	U
trans-1,2-Dichloroethene	100	1	U	0.7	J	10		0.5	J	0.8	J	2		0.6	J	1	U	4		1	
Trichloroethene	3	1	U	**15**		**20**		1	U	**3**		**4**		**7**		1	U	0.5	J	1	U
Vinyl chloride	1	**7**		1	U	**16**		**12**		1	U	**20**		1	U	1	U	**6**		**2**	
Xylene (Total)	20	2		1	U	1	U	1	U	1	U	1	U	0.5	J	1	U	1	U	1	U

Notes:
J = Estimated Value
U = Not detected
All results are in micrograms per liter or parts per billion
GCTL exceedances are shown in **bold.**

Vinyl chloride exceeded its GCTL (1 μg/L) in nine monitoring wells in the Building 604 area. The highest detected concentrations were located in the southeastern corner of the building. Concentrations in the area ranged from 3 μg/L at 38GS15 to 20 μg/L at 38GS22. The most downgradient well in the area, 38GS18, was non-detect for vinyl chloride. Vinyl chloride was detected in monitoring well 38GS32 at 2 μg/L.

1,2-Dibromo-3-Chloropropane was detected at 1 μg/L at 38GI08 above its GCTL of 0.2 μg/L. Ethylbenzene was detected at 53 μg/L at 38GS15 above its standard of 30 μg/L. All other VOCs were detected below criteria.

4.2.3 Groundwater Analytical Results Compared to SWCTLs (Marine Surface Water Criteria)

The wells closest to the surface water at Building 604 were compared to FDEP's SWCTLs (marine surface water criteria) to assess potential impact to Pensacola Bay. The monitoring wells evaluated are 38GS07, 38GS18, and 38GS32. Results are summarized in Tables 4-5, 4-6, and 4-7. The distances to the seawall from the monitoring wells are noted below.

Monitoring Well	Distance to Seawall
38GS07	200 feet
38GS18	200 feet
38GS32	90 feet

Except for 38GS32, the monitoring wells are approximately 200 feet from the seawall. Contaminants detected in groundwater would likely decrease in concentration because of physical and chemical attenuation before discharge to Pensacola Bay.

Table 4-5
Detected Inorganics Compared to SWCTLs (Marine Surface Water Quality Criteria)
Monitoring Wells Closest to the Seawall
Building 604 Area

Parameter	GCTL	SWCTL	Reference Concentration	38GS07		38GS18		38GS32	
		Distance to Seawall		200 feet		200 feet		90 feet	
Arsenic	50	50	2.8	2.60	J	6.30	J	3.70	J
Barium	2000	14.54	13.2	99.00		60.00		71.00	
Cadmium	5	9.3	3.4	0.40	U	0.67	J	0.50	U
Calcium	NC	NC	17560	54000.00		39000.00		49000.00	
Chromium	100	50	35	0.80	U	6.70	J	2.10	J
Copper	1000	2.9	16.2	1.40	U	**20.00**		1.20	U
Iron	300	300	1707	82.00	J	560.00		1200.00	
Lead	15	5.6	1.6	2.00	J	**59.00**		**11.00**	
Magnesium	NC	NC	2872.6	6100.00		4100.00		4700.00	
Manganese	50	NC	22	7.80	J	0.50	U	83.00	
Mercury	2	0.025	0.2	0.10	U	**0.46**		0.10	J
Nickel	100	8.3	39.9	1.00	U	1.00	U	1.20	J
Potassium	NC	NC	12167.6	7500.00		4400.00		3600.00	
Sodium	160,000	NC	18345	16000.00		9400.00		35000.00	
Vanadium	49	NC	9.6	0.90	U	1.20	J	1.20	U
Zinc	5000	86	153	13.00	J	**370.00**	J	72.00	

Notes:
All results are in micrograms per liter or parts per billion
NC = No criteria established
ND = Not detected
J = Estimated value
Detections exceeding SWCTL and reference concentrations are in **bold.**

Table 4-6
Detected SVOCs Compared to SWCTLs (Marine Surface Water Quality Criteria)
Monitoring Wells Closest to the Seawall
Building 604 Area

Sample ID	Parameter	GCTL	SWCTL	Result	
038GGS1804	Acenaphthene	NC	3	**79.0**	
038GGS1804	Anthracene	2100	0.3	**11.0**	
038GGS1804	Dibenzofuran	28	67	**91.0**	
038GGS1804	Fluoranthene	280	0.3	**24.0**	
038GGS1804	Fluorene	280	30	28.0	
038GGS1804	Phenanthrene	210	0.31 (AA)	**190.0**	D
038GGS1804	Pyrene	210	0.3	**11.0**	
038GGS1504	Napthalene	20	26.0	**170.0**	

Notes:
All results are in parts per billion or micrograms per liter.
NC = No criteria established.
D = Diluted sample
AA = Annual average
SWCTL exceedances are shown in **bold.**
Monitoring well 38GS18 is approximately 200 feet from the seawall.

Table 4-7
Detected VOCs Compared to SWCTLs (Marine Surface Water Quality Criteria)
Monitoring Wells Closest to the Seawall
Building 604 Area

Parameter	GCTL	SWCTL	38GS07		38GS18		38GS32	
	Distance to Seawall		200 feet		200 feet		90 feet	
1,1,1-Trichloroethane	200	270	1.00	U	0.40	J	1.00	U
1,1-Dichloroethane	70	NC	0.70	J	0.80	J	1.00	U
1,2,4-Trichlorobenzene	70	22.5	1.00	U	1.00		1.00	U
Carbon disulfide	700	105	1.00	U	0.40	J	1.00	U
Chloromethane	2.7	470.8 (AA)	1.00	U	0.60	J	1.00	U
cis-1,2-Dichloroethene	70	NC	2.00		2.00		2.00	
Tetrachloroethene	5	8.85 (AA)	1.00	U	**14.00**		1.00	U
trans-1,2-Dichloroethene	100	11000	2.00		0.70	J	1.00	
Trichloroethene	5	80.7 (AA)	1.00	U	15.00		1.00	U
Vinyl chloride	2	NC	0.90	J	1.00	U	2.00	

Notes:
All results are in micrograms per liter or parts per billion
ND = Not detected
J = estimated
NC = no criteria established
AA = Annual average
SWCTL exceedances are shown in **bold**

Inorganics

Barium, copper, iron, lead, mercury, and zinc were compared to their SWCTLs (marine surface water quality criteria) contained in Chapter 62-777, F.A.C.. Although this rule is applicable and relevant and appropriate only for Brownfields, UST, and drycleaning sites, it does incorporate marine surface water criteria provided for in Chapter 62-302, F.A.C. Iron exceeded its SWCTL (300 μg/L) in two monitoring wells, 38GS18 (560 μg/L) and 38GS32 (1,200 μg/L). However, both of the detected concentrations are below the reference concentration for iron in groundwater of 1,707 μg/L.

Barium exceeded its SWCTL criteria (14.54 μg/L) in three monitoring wells, 38GS18 (60 μg/L), 38GS32 (71 μg/L) and 38GS07 (99 μg/L). The barium SWCTL of 14.54 μg/L is based on 10% greater than its background concentration of 13.22 μg/L in groundwater in accordance with Chapter 62-777.

Lead exceeded its SWCTL (5.6 μg/L) in two monitoring wells, 38GS18 (59 μg/L) and 38GS32 (11 μg/L). Copper (20 μg/L), mercury (0.46 μg/L), and zinc (370 μg/L) exceeded their respective SWCTL of 2.9 μg/L, 0.012 μg/L, and 86 μg/L in one monitoring well, 38GS18.

Organics

Tetrachloroethene was the only VOC to exceed its SWCTL of 8.85 μg/L in one monitoring well, 38GS18 (14 μg/L).

Fluorene was the only SVOC to exceed its SWCTL (20 μg/L) in monitoring well 38GS18 (28 μg/L).

4.3 Building 71 Groundwater Analytical Results

The identified site monitoring wells were sampled for VOCs, SVOCs and inorganics as part of the groundwater investigation as presented in Section 2. Analytical data indicate the presence of VOCs, SVOCs, and metals in groundwater.

4.3.1 Building 71 Inorganics

As presented in Table 4-8, cadmium was the only parameter to exceed both its GCTL and background concentration. Cadmium exceeded its GCTL (5 μg/L) at 38GS05 (5.9 μg/L). Calcium and magnesium also exceeded their reference concentrations, but these parameters do not have groundwater criteria established.

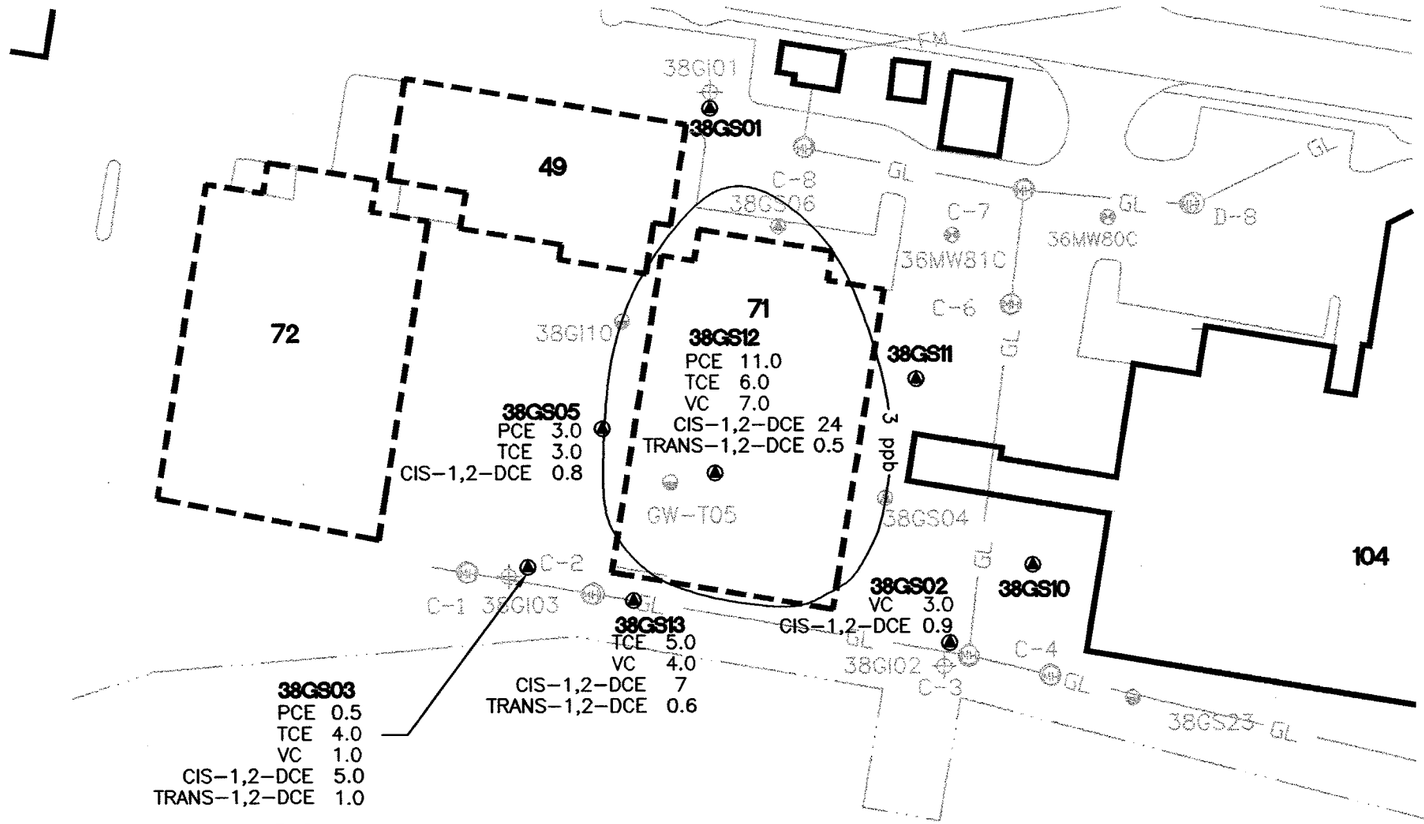
4.3.2 Building 71 Organics

Semivolatile Organic Compounds

Only monitoring wells 38GS02 and 38GS12 were sampled for SVOCs based on their previous results. The results are summarized in Table 4-9. None of the detected parameters exceeded their respective GCTL.

Volatile Organic Compounds

Groundwater from all selected site monitoring wells were analyzed for VOCs. Chlorinated solvents were detected most frequently and at the highest concentrations and are shown on Figure 4-2. All detected VOCs are presented in Table 4-10.



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

FLORIDA GCTLS	
PCE	3 ppb
TCE	3 ppb
VC	1 ppb
CIS-1,2-DCE	70 ppb
TRANS-1,2-DCE	100 ppb

FLORIDA GCTL EXCEEDANCES ARE SHOWN IN BLUE
ISOCONCENTRATION LINE DEPICTS PCE CONCENTRATIONS IN GROUNDWATER

70 0 70
SCALE FEET

SITE 38
REMEDIAL INVESTIGATION
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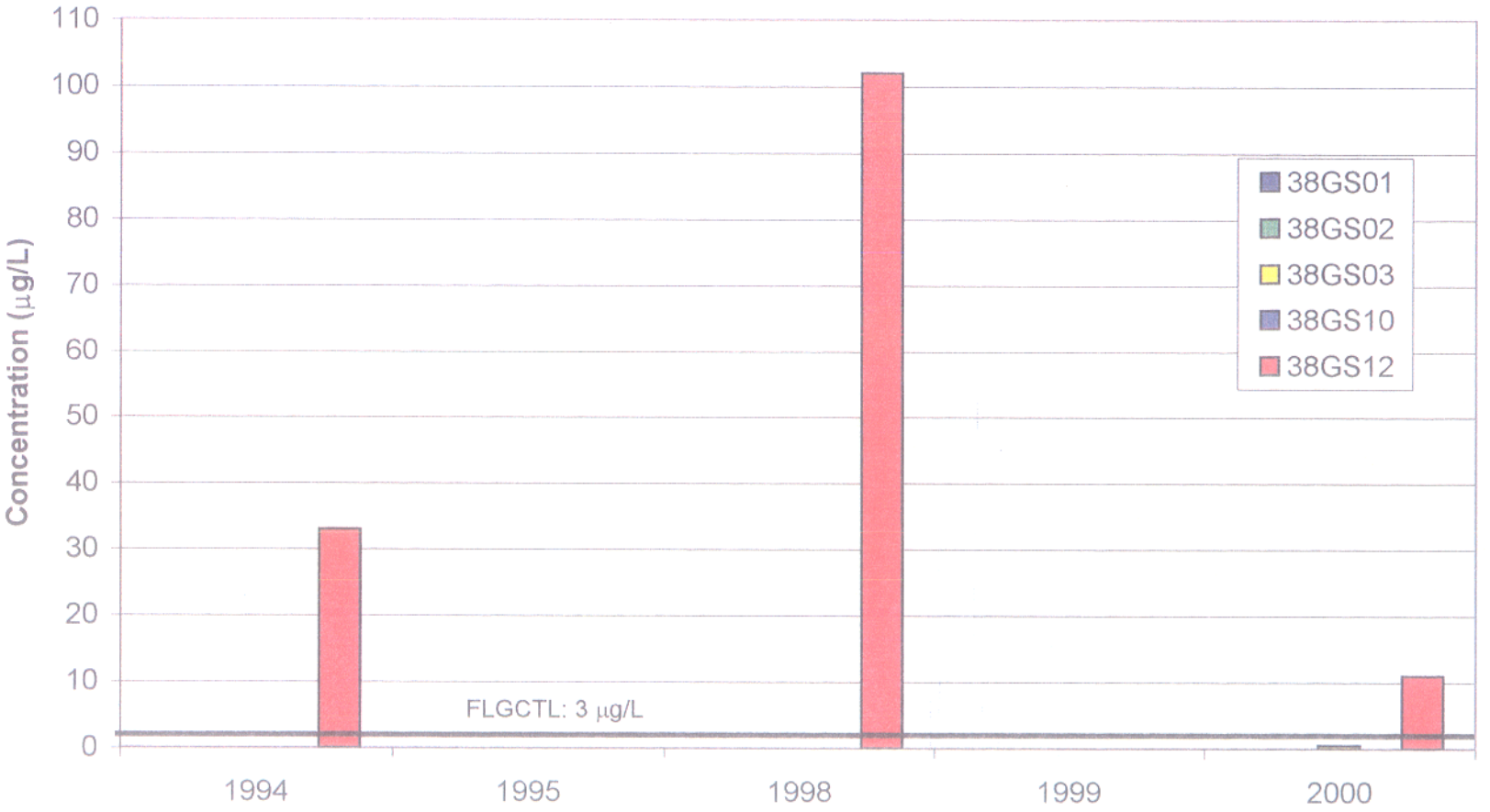
NAS PENSACOLA
PENSACOLA, FLORIDA

FIGURE 4-2
CHLORINATED SOLVENTS DETECTED IN GROUNDWATER
BUILDING 71 AREA
DECEMBER 2000

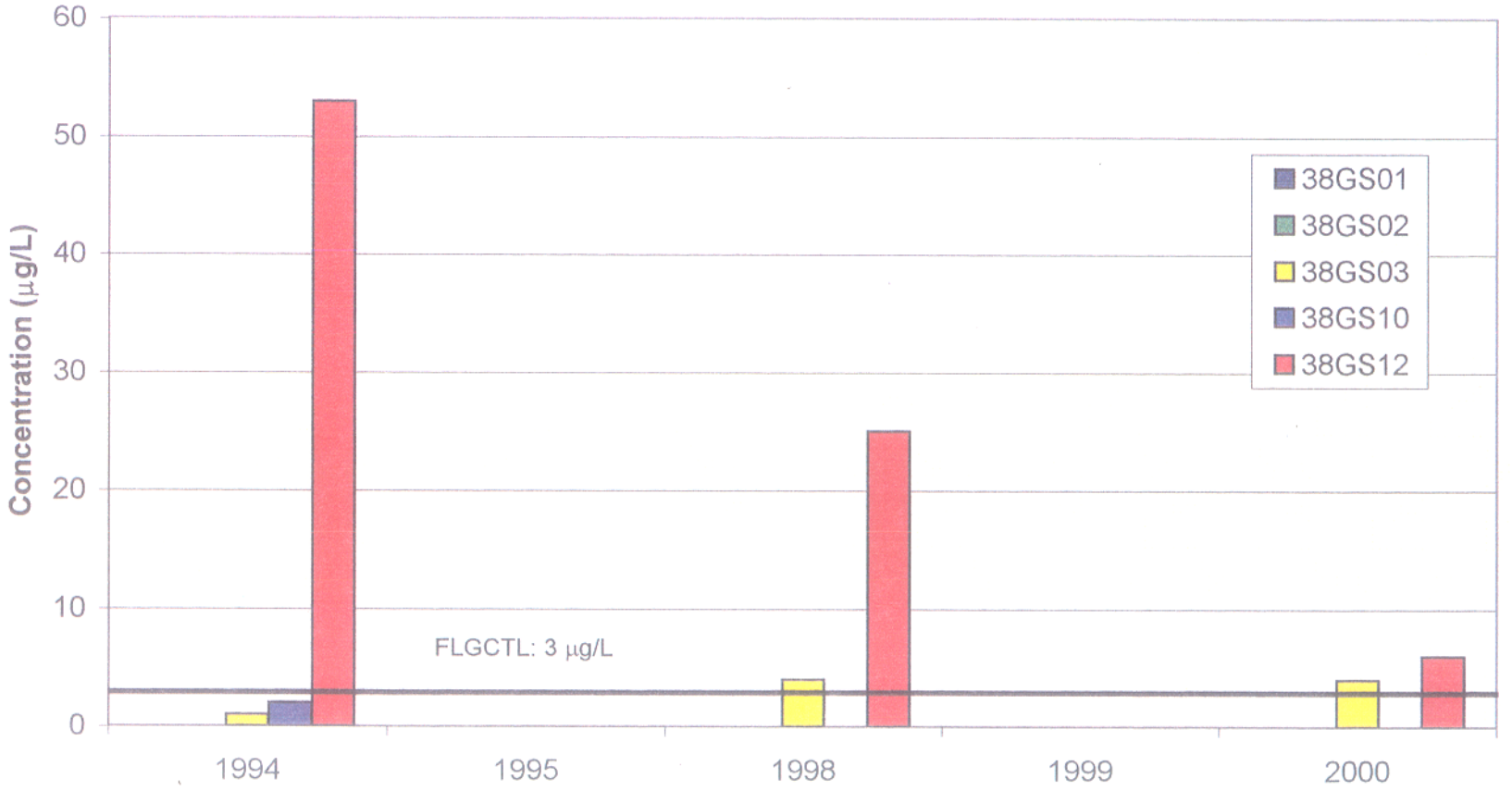
DWG DATE: 10/22/01 | NAME: 0059001W005

Figure 5.1 Tetrachloroethene Building 71 Well Concentrations



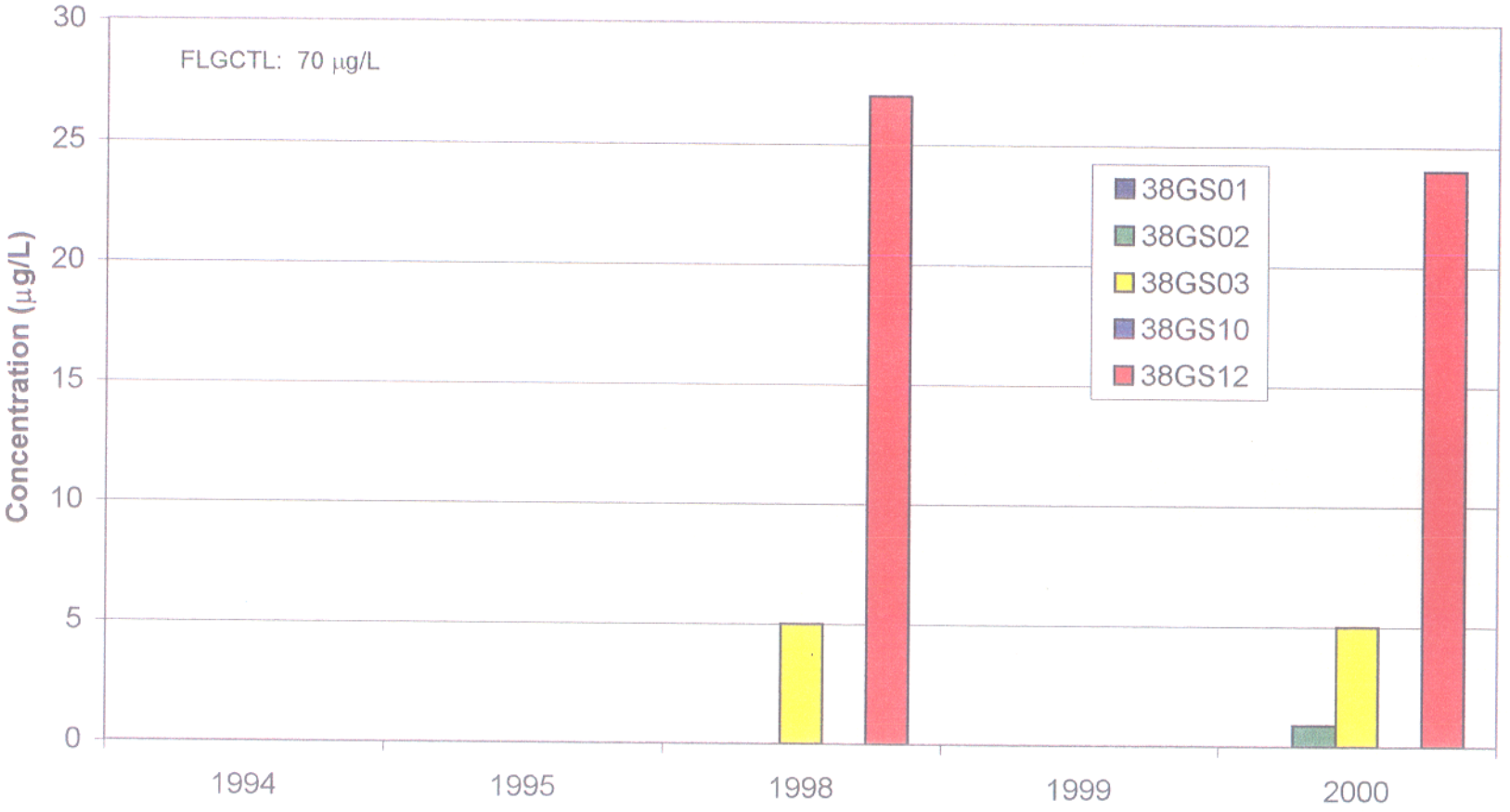
Note: Non Detect readings were not included.
No wells were sampled in 1995.
Wells 38GS02 and 38GS10 were not sampled in 1998.
Wells 38GS01, 38GS03 and 38GS12 were not sampled in 1999.
FLGCTL = Florida Groundwater Cleanup Target Level

Figure 5.2 Trichloroethene Building 71 Well Concentrations



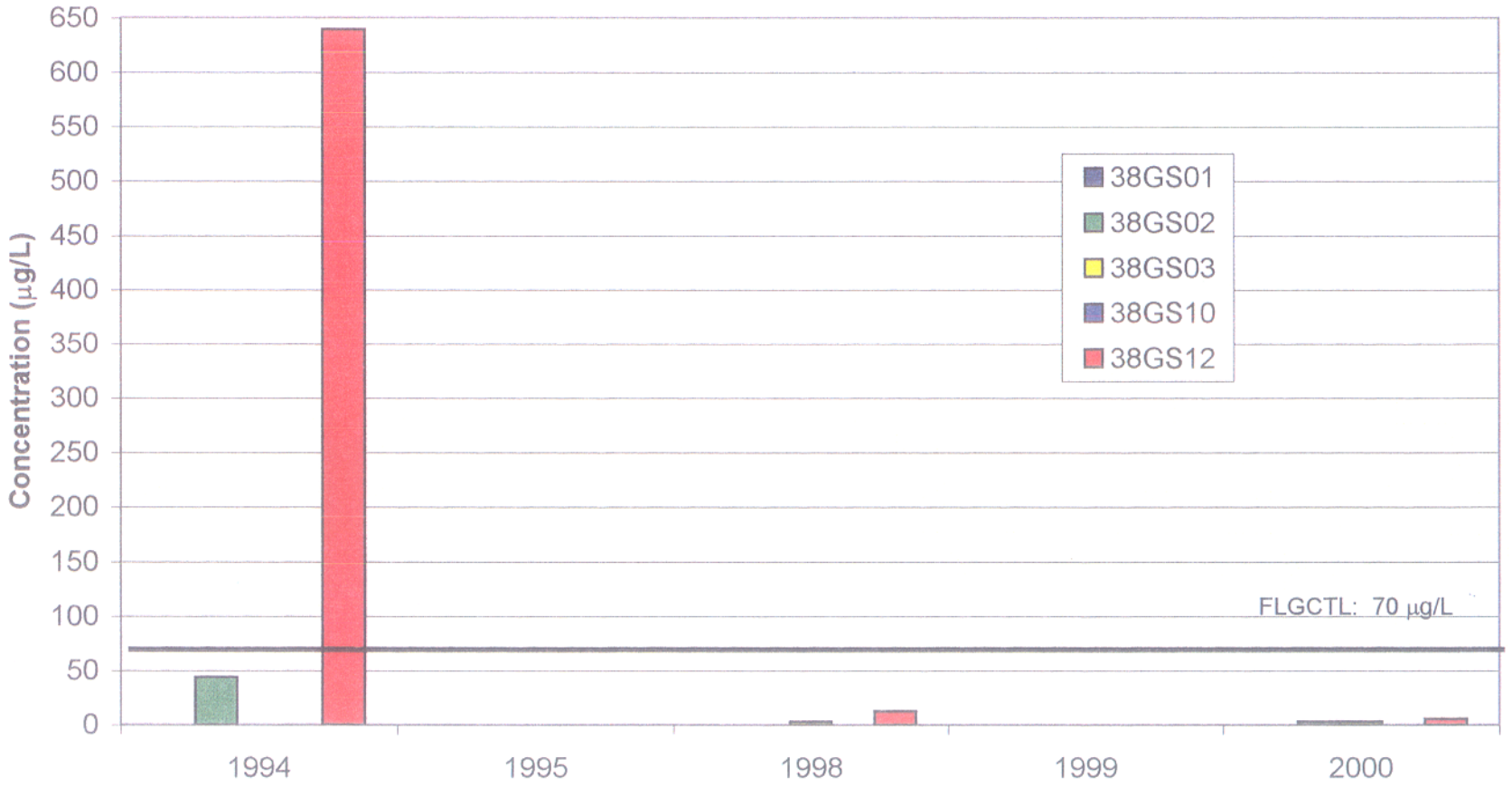
Note: Non Detect readings were not included.
No wells were sampled in 1995.
Wells 38GS02 and 38GS10 were not sampled in 1998.
Wells 38GS01, 38GS03 and 38GS12 were not sampled in 1999.
FLGCTL = Florida Groundwater Cleanup Target Level

Figure 5.3 cis-1,2-Dichloroethene Building 71 Well Concentrations



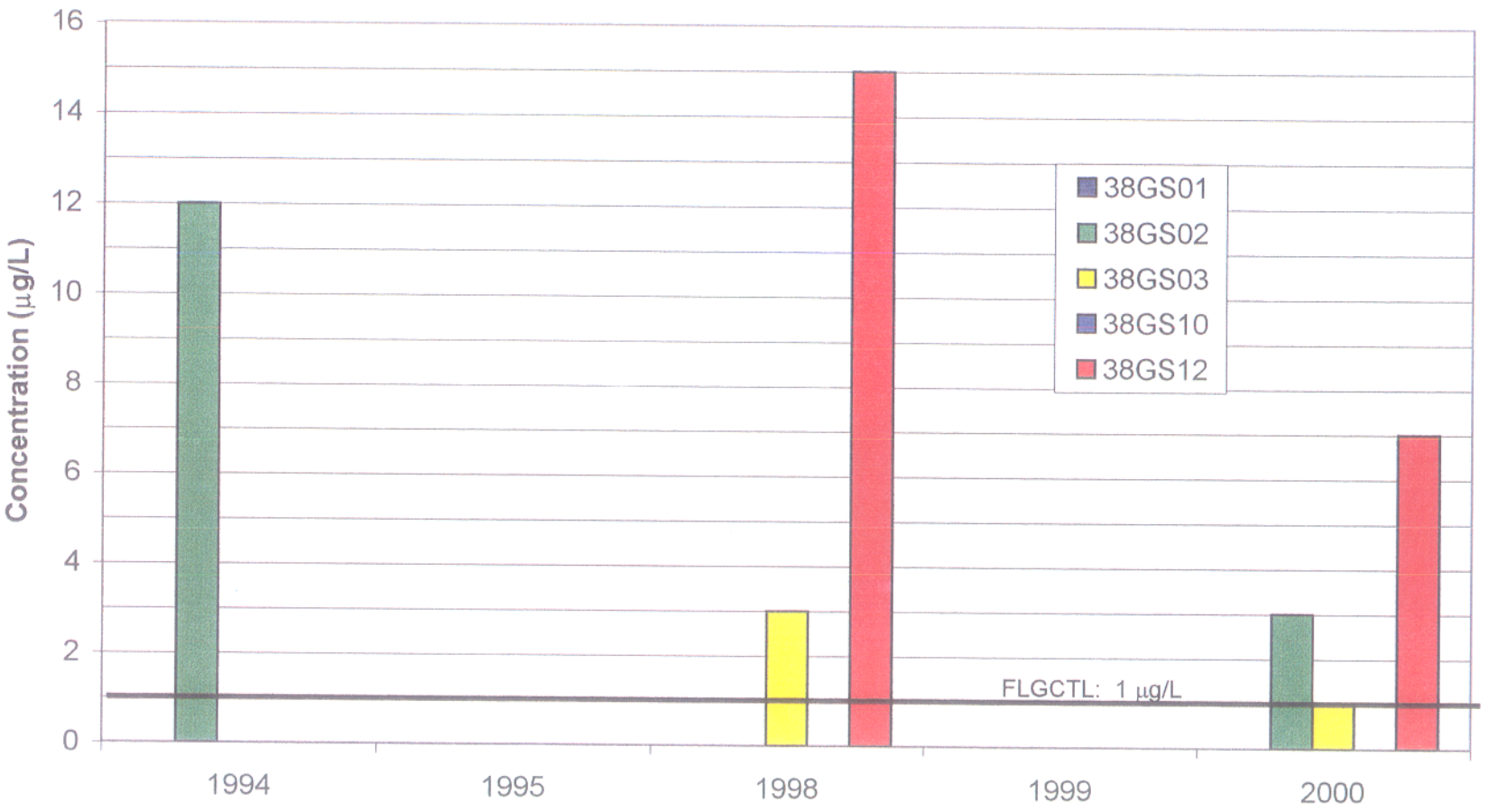
Note: Non Detect readings were not included. FLGCTL = Florida Groundwater Cleanup Target Level
Readings from wells 38GS01, 38GS02, 38GS03 and 38GS12 were not available for 1994.
No wells were sampled in 1995.
Wells 38GS02 and 38GS10 were not sampled in 1998.
Wells 38GS01, 38GS03 and 38GS12 were not sampled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

Figure 5.4 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 5.5 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 5.6 Bldg 71 1994 Natural Attenuation of Chlorinated Solvents

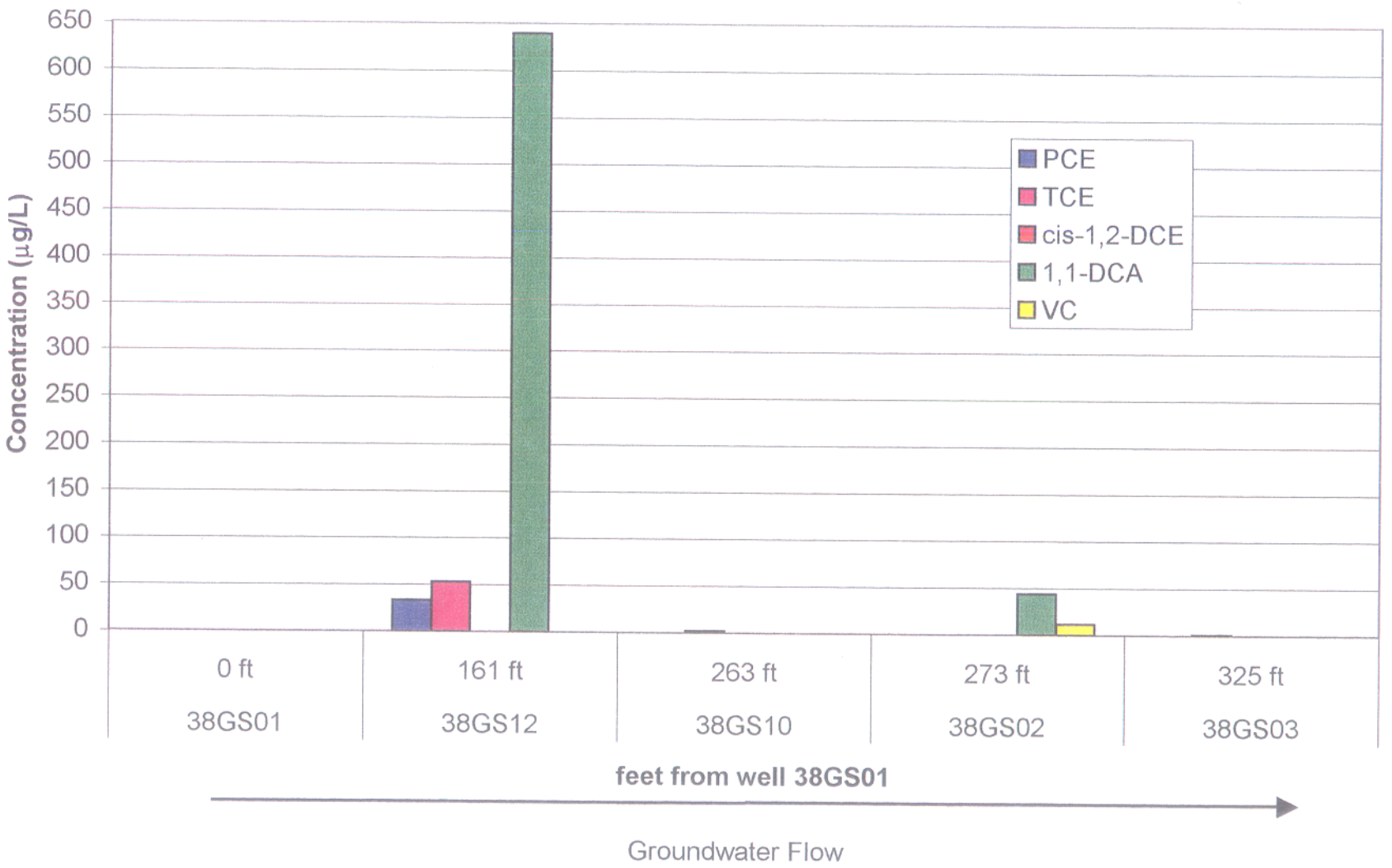


Figure 5.7 Bldg 71 1998 Natural Attenuation of Chlorinated Solvents

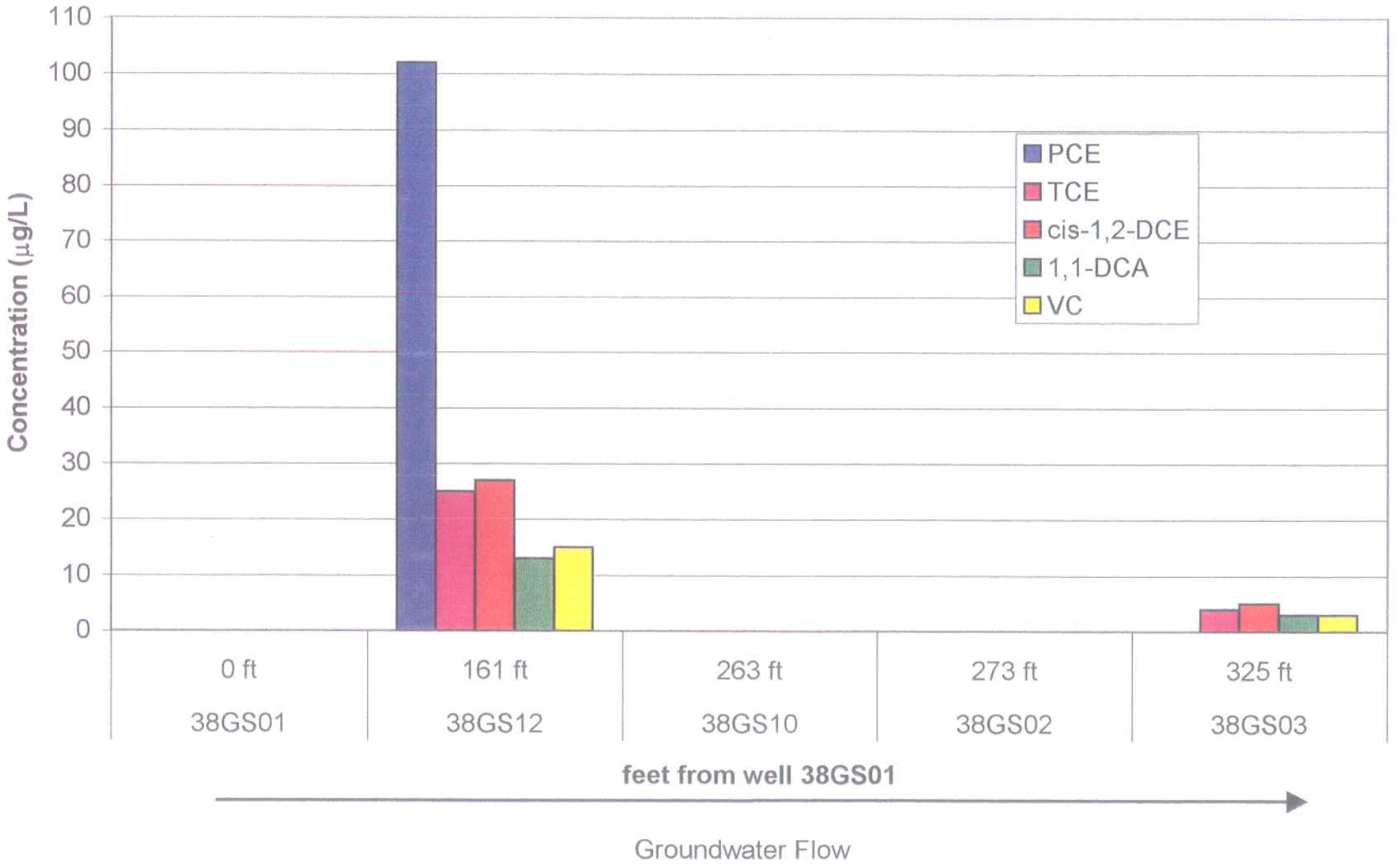


Figure 5.8 Bldg 71 2000 Natural Attenuation of Chlorinated Solvents

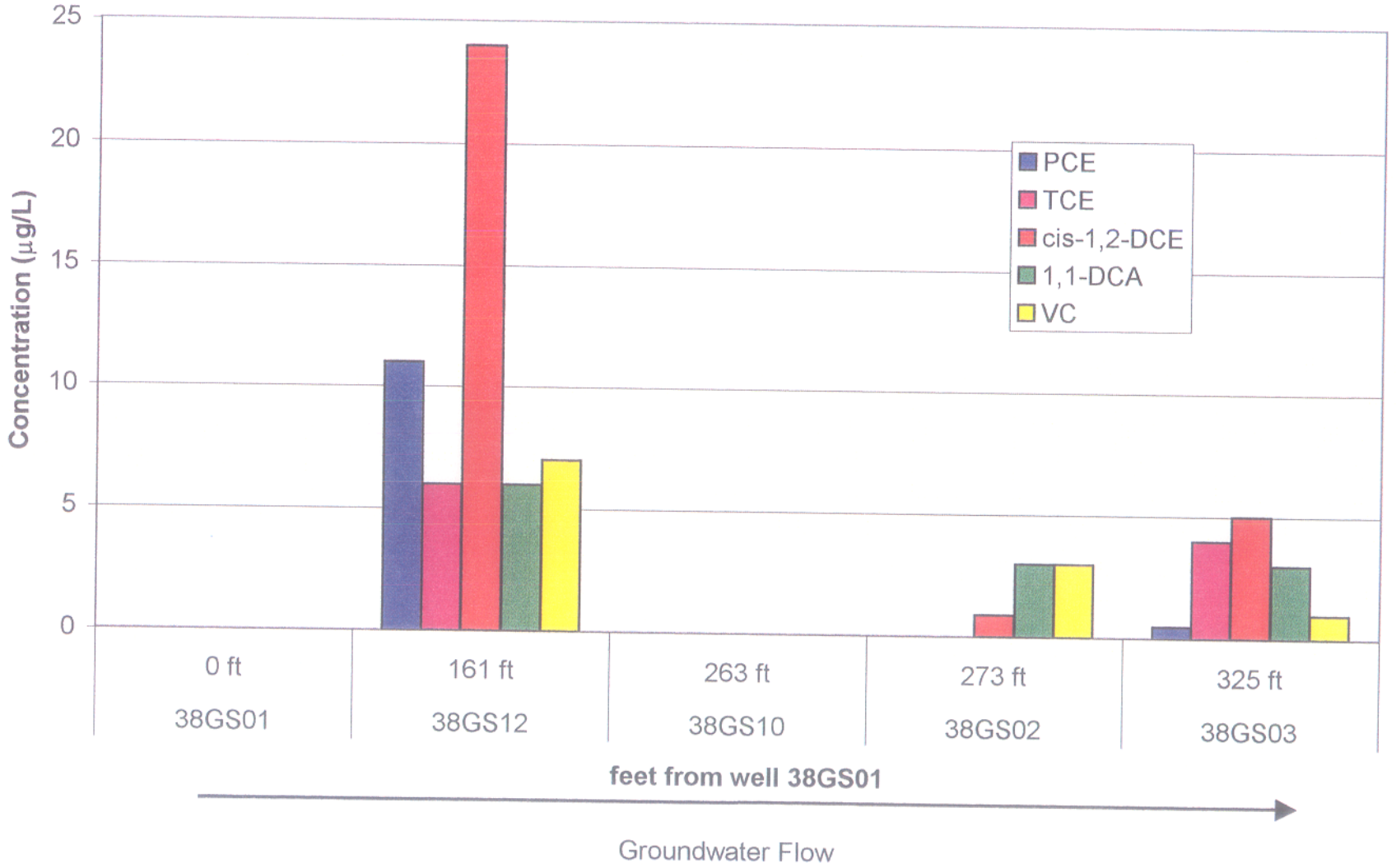


Table 4-8
Inorganics Detected in Groundwater, Building 71 Area (ug/L)

Parameter	GCTL	Reference Concentration	038GGS0104		038GGS0204		038GGS0304		038GGS0504		038GGS1004		038GGS1104		038GGS1204		038GGS1304	
Aluminum	200	3882.75	39	J	12	J	76	J	76	U	5.9	J	74	U	18	J	92	U
Arsenic	50	2.8	4	J	2.2	U	2.2	U	3	J	2.2	U	4.5	J	4.5	J	2.2	U
Barium	2000	13.225	68		26		41		38		64		68		29		21	
Cadmium	5	3.4	0.4	U	0.4	U	3.6	J	**5.9**		0.4	U	0.95	J	0.4	U	0.41	J
Calcium	NA	17560	**34000**		**50000**		**40000**		**37000**		**47000**		**30000**		**40000**		**35000**	
Chromium	100	34.975	0.8	U	1.2	J	3.9	J	2.6	J	0.8	U	31		2.5	J	2.4	J
Copper	1000	16.2	4	J	2.8	J	3.2	J	3	U	8.3	J	9.4	J	14	J	17	J
Iron	300	1707.825	48	U	98		230		170		110		78	J	220		55	J
Lead	15	1.6	1.3	U	1.3	U	3.3	J	2.4	J	1.3	U	14		2.7	J	2.7	J
Magnesium	NA	2872.5	**3800**		**20000**		**8500**		**6100**		**11000**		**5900**		**7400**		**6500**	
Manganese	50	21.925	30	J	14	J	33	J	11	J	9.6	J	8.9	J	23	J	21	
Nickel	100	39.9	1	U	1	U	1	U	3	J	1	U	6.9	J	1	U	1	U
Potassium	NA	12167.5	3300		9500		4700		6100		7300		4100		5300		4300	
Silver	100	4	0.6	UJ	0.6	UJ	0.6	UJ	0.74	J	0.6	UJ	0.6	U	0.6	UJ	0.6	U
Sodium	160000	18345	18000		100000		22000		16000		84000		17000		19000		23000	
Vanadium	49	9.575	0.9	U	0.9	U	0.9	U	2	J	0.9	U	1.7	J	0.9	U	0.9	U
Zinc	5000	153.2	74		1.8	U	500		210	J	11	U	61	J	9.2	U	21	J

Notes:
All results are in micrograms per liter or parts per billion
J = Estimated Value
U = Not detected
GCTL and reference concentration exceedances are shown in **bold.**

Table 4-9
SVOCs Detected in Groundwater, Building 71 Area

Parameter	GCTL	038GGS0204	038GGS1204
2-Methylnaphthalene	20	3 J	3 J
Acenaphthene	20	1 J	5 U
Dibenzofuran	28	1 J	5 U
Fluorene	280	1 J	0.7 J
Naphthalene	20	4 J	5 U

Notes:

All results are in micrograms per liter or parts per billion

J = Estimated Value

U = Not detected

GCTL exceedances are shown in **bold.**

Table 4-10

VOCs Detected in Groundwater, Building 71 Area (ug/L)

Parameter	GCTL	038GGS0104		038GGS0204		038GGS0304		038GGS0504		038GGS1004		038GGS1104		038GGS1204		038GGS1304	
1,1,1-Trichloroethane	200	1	U	1	U	1		7		1	U	0.5	J	0.6	J	0.8	J
1,1-Dichloroethane	70	1	U	3		3		5		1	U	0.4	J	6		4	
1,2-Dichlorobenzene	600	1	U	5		0.4	J	0.4	J	0.4	J	1	U	2		1	
1,3-Dichlorobenzene	10	1	U	0.4	J	1	U	0.3	J	1	U	1	U	0.4	J	1	U
1,4-Dichlorobenzene	75	1	U	0.9	J	1	U	0.3	J	1	U	1	U	1		0.4	J
Benzene	1	1	U	0.5	J	0.9	J	1	U	1	U	1	U	1	U	1	U
Carbon disulfide	700	1	U	2		0.4	J	0.4	J	1	U	1	U	1		1	U
Chlorobenzene	100	1	U	2		1	U	0.2	J	1	U	1	U	1	U	0.3	J
Chloroethane	12	1	U	6		1	U	1	U	1	U	1	U	1	U	1	U
Chloroform	5.7	1	U	1	U	1	U	1	U	1	U	1	U	0.9	J	1	U
cis-1,2-Dichloroethene	70	1	U	0.9	J	5		0.8	J	1	U	1	U	24		7	
Ethylbenzene	30	1	U	20		1	U	1	U	1	U	1	U	1	U	1	U
Tetrachloroethene	3	1	U	1	U	0.5	J	3		1	U	1	U	**11**		1	U
Toluene	40	1	U	2		1	U	0.2	J	1	U	1	U	1	U	0.2	J
trans-1,2-Dichloroethene	100	1	U	1	U	1		1	U	1	U	1	U	0.5	J	0.6	J
Trichloroethene	3	1	U	1	U	**4**		**3**		1	U	1	U	**6**		**5**	
Vinyl chloride	1	1	U	**3**		**1**		1	U	1	U	1	U	**7**		**4**	
Xylene (Total)	20	1	U	4		1	U	1	U	1	U	0.4	J	1	U	0.4	J

Notes:

J = Estimated Value

U = Not detected

All results are presented in micrograms per liter or parts per billion.

GCTL exceedances are shown in **bold.**

VOCs detected above their respective GCTLs included tetrachlorethene (PCE) and its breakdown products: trichloroethene (TCE) and vinyl chloride (VC). Detected concentrations for each of these parameters are provided in Figure 4-1.

PCE equaled or exceeded its GCTL of 3 μg/L in two monitoring wells: 38GS05 (3 μg/L) and 38GS12 (11 μg/L). Groundwater samples from wells downgradient from these two wells did not have detections of PCE greater than the GCTL.

TCE equaled or exceeded its GCTL of 3 μg/L in four monitoring wells: 38GS05 (3 μg/L), 38GS03 (4 μg/L), 38GS13 (5 μg/L), and 38GS12 (6 μg/L).

Vinyl chloride exceeded its GCTL (1 μg/L) in four monitoring wells in the Building 71 area: 38GS03 (1 μg/L), 38GS02 (3 μg/L), 38GS13 (4 μg/L), and 38GS12 (7 μg/L).

All other VOCs were detected below their respective GCTL.

4.3.3 Groundwater Analytical Results Compared to SWCTLs (Marine Surface Water Criteria)

The wells closest to the surface water at Building 71 were compared to their SWCTLs (marine surface water criteria) to assess potential impact to Pensacola Bay. The monitoring wells evaluated are 38GS02, 38GS03, and 38GS13. These wells are all less than 35 feet from the seawall. Results are summarized in Tables 4-11, 4-12, and 4-13.

Table 4-11
Dectected Inorganic Concentrations in Groundwater Compared to SWCTLs (Marine Surface Water Quality Criteria)
Monitoring Wells Closest to the Seawall
Building 71 Area

Parameters	GCTL	SWCTL	Groundwater Reference Concentrations	38GS02		38GS03		38GS13	
Aluminum	200	1,500	3882	12.00	J	76.00	J	92.00	U
Barium	2000	14.54	13.2	**26.00**		**41.00**		**21.00**	
Cadmium	5	9.3	3.4	0.40	U	3.60	J	0.41	J
Calcium	NC	NC	17560	50000.00		40000.00		35000.00	
Chromium	100	50	35	1.20	J	3.90	J	2.40	J
Copper	1000	2.9	16.2	2.80	J	3.20	J	**17.00**	J
Iron	300	300	1707	98.00		230.00		55.00	J
Lead	15	5.6	1.6	1.30	U	3.30	J	2.70	J
Magnesium	NC	NC	2872.6	20000.00		8500.00		6500.00	
Manganese	50	NC	22	14.00	J	33.00	J	21.00	
Potassium	NC	NC	12167.6	9500.00		4700.00		4300.00	
Sodium	160000	NC	18345	100000.00		22000.00		23000.00	
Zinc	5000	86	153.2	1.80	U	**500.00**		21.00	J

Notes:
All results are in micrograms per liter or parts per billion.
NC = No criteria established
J = Estimated value
U = Not detected
Detected concentrations exceeding both the SWCTL and reference concentration are shown in **bold**.

Table 4-12
Detected SVOCs Compared to SWCTLs (Marine Surface Water Quality Criteria)
Wells Closest to the Seawall
Building 71 Area

Parameters	GCTL	SWCTL	38GS02		38GS03	38GS12	
2-Methylnaphthalene	20	30	3.00	J	NS	3.00	J
Acenaphthene	20	3	1.00	J	NS	5.00	U
Dibenzofuran	28	28	1.00	J	NS	5.00	U
Fluorene	280	280	1.00	J	NS	0.70	J
Naphthalene	20	26	4.00	J	NS	5.00	U

Notes:
All results are in micrograms per liter or parts per billion
J = Estimated value
U = Not detected
NS = Not sampled for SVOCs
SWCTL exceedances are in **bold.**

Table 4-13

Detected VOC Concentrations in Groundwater Compared to SWCTLs (Marine Surface Water Quality Criteria)

Monitoring Wells Closest to the Seawall

Building 71 Area

Parameter	GCTL	SWCTL	38GS02		38GS03		38GS13	
1,1,1-Trichloroethane	200	270	1.00	U	1.00		0.80	J
1,1-Dichloroethane	70	NC	3.00		3.00		4.00	
1,2-Dichlorobenzene	600	99	5.00		0.40	J	1.00	
1,3-Dichlorobenzene	10	85	0.40	J	1.00	U	1.00	U
1,4-Dichlorobenzene	75	100	0.90	J	1.00	U	0.40	J
Benzene	1	71.28 (AA)	0.50	J	0.90	J	1.00	U
Carbon disulfide	700	105	2.00		0.40	J	1.00	U
Chlorobenzene	100	17	2.00		1.00	U	0.30	J
Chloroethane	NC	NC	6.00		1.00	U	1.00	U
cis-1,2-Dichloroethene	70	NC	0.90	J	5.00		7.00	
Ethylbenzene	700	605	20.00		1.00	U	1.00	U
Tetrachloroethene	5	8.85 (AA)	1.00	U	0.50	J	1.00	U
Toluene	1000	475	2.00		1.00	U	0.20	J
trans-1,2-Dichloroethane	100	11000	1.00	U	1.00		0.60	J
Trichloroethene	5	80.7 (AA)	1.00	U	4.00		5.00	
Vinyl chloride	2	NC	3.00		1.00		4.00	
Xylene (Total)	10000	370	4.00		1.00	U	0.40	J

Notes:

All results are in micrograms per liter or parts per billion

J = Estimated value

U = Not detected

SWCTL exceedances are shown in **bold**

Inorganics

Barium, copper, and zinc were the only inorganics to exceed their SWCTL. The barium SWCTL criteria of 14.54 μg/L is based on 10% greater than its background concentration of 13.22 μg/L in groundwater in accordance with Chapter 62-770. All barium detected concentrations in the identified wells exceeded the SWCTL.

Detected concentrations of copper exceeded its SWCTL in monitoring wells 38GS03 (3.2 μg/L) and 38GS13 (17 μg/L). However, the established background concentration for copper in groundwater is 16.2 μg/L which demonstrates that groundwater at NAS Pensacola could not be expected to meet the SWCTL on a consistent basis. The detected concentration of zinc (500 μg/L) in monitoring well 38GS03 exceeded itsSWCTL (86 μg/L). However, the background concentration for zinc in groundwater is 152 μg/L which demonstrates that groundwater at NAS Pensacola could not be expected to meet the surface water quality criteria.

Organics

None of the detected concentrations of VOCs or SVOCs exceeded their respective SWCTLs.

5.0 RESULTS AND EVALUATION OF MNA SAMPLING AND ANALYSIS

5.1 MNA Sampling

Groundwater samples were collected and analyzed for MNA parameters in December 2000. This sampling event was a follow up to similar events performed in December 1998/January 1999, and May 1999. The Final RI/FS Report (1999) and the RI/FS Addendum (2000) demonstrated the site's strong potential for MNA. The December 2000 sampling event is intended to:

(a) confirm the site's continuing conduciveness and potential for MNA activity;

(b) examine whether TCE and daughter product degradation is continuing to occur at the site;

(c) examine metals reduction at the site due to natural attenuation activity, and

(d) help establish a long-term MNA sampling protocol to verify appropriate geochemical conditions for MNA activity.

Samples for MNA parameters were collected along with VOC and inorganic samples in December 2000. Sampling protocol in December 2000 was similar to that performed during previous events. The US EPA has set up an MNA testing and analysis protocol (EPA/600/R-98/128, September, 1998), which establishes a screening or scoring table 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 exercise demonstrates the site's potential to continue the supporting natural attenuation decision. The following sections briefly summarize the role of geochemistry in MNA, geochemical results and interpretation of the December 2000 sampling event, and make conclusions and recommendations on MNA effectiveness at the site.

5.2 Role of Geochemistry in MNA Evaluation

Aquifer geochemistry governs the potential for MNA and provides an indication of the natural degradation capacity of the aquifer. In the evaluation process, biological degradation is a destructive process which transforms contaminants into innocuous products, compared to the non-destructive processes of retardation, dispersion, and dilution by recharge, which reduce contaminant concentrations but does not destroy them. Therefore, biodegradation is a critical degradation pathway that should be demonstrated as the primary process in contaminant reduction in the MNA process.

USEPA protocol lists the various groundwater physical, chemical, and biological parameters that require analysis to determine if aquifer geochemistry is favorable for natural attenuation. Groundwater samples are collected from wells in the center of the plume area, and upgradient and downgradient of the center. These results are compared with values designated in the USEPA protocol, which attaches a scoring or ranking to each geochemical parameter. The total score for each individual well is then used to determine if that particular location shows inadequate evidence, limited evidence, adequate evidence, or strong evidence of degradation. Using these scores, overall site suitability for MNA can be evaluated. Appendix D lists the parameters that require geochemical analysis, the analytical methods for their determination, and USEPA's screening and scoring system and interpretations. The following description explains the significance and role of each geochemical parameter in the MNA process.

Volatile Organic Compounds (VOCs) and Semi-Volatile Organic Compounds (SVOCs): VOCs and SVOCs are used to determine the type, concentration, and distribution of contaminants and daughter products in the aquifer. They provide information on the amount of anthropogenic carbon available (in the form of BTEX) that can be used for microbial activity. VOC and SVOC concentrations also determine if contaminants are present at levels toxic to indigenous microbes, in which case natural attenuation would be infeasible until they are reduced

to non-toxic levels. The presence and distribution of daughter products indicates the extent of parent compound degradation.

VOC data can also be used to infer if the contaminant or its daughter breakdown products are decreasing in the direction of groundwater flow and to determine whether contaminant concentration or mass is decreasing over time.

Dissolved Oxygen (DO): DO provides the most thermodynamically favorable respiratory pathway (or electron acceptor) used by microorganisms for biodegradation. DO concentrations are very critical to natural attenuation of chlorinated solvents. Because anaerobic bacteria generally cannot function at DO concentrations greater than 0.5 milligrams per liter (mg/L), reductive dechlorination will not proceed effectively above this concentration. Since native microorganisms prefer to use oxygen for respiration, the DO must be depleted before they begin utilizing other electron acceptors. The general sequence of electronic acceptor use proceeds from DO to nitrate, followed by ferric iron (Iron (III), sulfate, and finally carbon dioxide (methanogenesis). Each sequential microbial reaction renders the aquifer more anaerobic, creating favorable conditions for reductive dechlorination.

Once the parent compound is reduced to less chlorinated compounds, aerobic conditions could play a more significant role in further degrading these by-products. This often occurs at the downgradient or leading edge of a plume, resulting in microbial destruction of daughter products such as cis-1,2-DCE and VC.

Nitrate: After DO has been used by microorganisms, nitrate is the next favored electron acceptor for anaerobic degradation. Nitrate concentrations in the contaminated portion of the aquifer less

than 1.0 mg/L are more favorable for reductive dechlorination to occur. Nitrate at concentrations exceeding 1.0 mg/L sometimes interferes with or impede the natural degradation of chlorinated solvents.

Total Organic Carbon (TOC): TOC concentrations in the aquifer are used to determine the amount of electron donor that microorganisms require to metabolically degrade chlorinated solvents. TOC could be natural organic carbon or anthropogenic carbon (BTEX and other petroleum constituents). The USEPA has specified that TOC in the aquifer must be greater than 20 mg/L to supply sufficient carbon for microorganisms. However, 20 mg/L is relative to the amount of chlorinated solvents in the aquifer or the type of TOC present. In other words, TOC utilization involves a qualitative understanding in addition to USEPA's stipulated criteria. At some sites, TOCs at concentrations of 2 to 5 mg/L could be sufficient to carry out the reductive dechlorination of chlorinated solvents.

Iron (II): Ferrous iron (Fe [II]) could be produced from ferric iron (Fe III) through microbial activity. Reduction from Iron (III) to Iron (II) could occur during anaerobic degradation of natural or anthropogenic carbon during reductive dechlorination of the lesser chlorinated by-product of PCE and TCE, namely DCE and VC. Therefore, ferrous iron concentrations in the aquifer can be used to indicate the feasibility of chlorinated solvent degradation, particularly VC.

Sulfate and Sulfide: After microbes have depleted DO and nitrate, sulfate may be used as the next electron acceptor. This process, termed "sulfate reduction" results in the production of sulfide. Sulfate at concentrations greater than 20 mg/L could inhibit reductive dechlorination. The presence of sulfide in the aquifer indicates that conditions are conducive to the reductive dechlorination process.

Methane: During methanogenesis, carbon dioxide is used as an electron acceptor and converted to methane. Methanogenesis generally occurs after microorganisms have already utilized oxygen, nitrate, and sulfate. The presence of methane in the aquifer is indicative of strongly reducing conditions.

Hydrogen: The amount of hydrogen in the aquifer indicates its reduced or anaerobic nature. Hydrogen concentrations can thus be used to delineate the site with respect to oxidation-reduction potential and confirm or establish methanogenic, sulfate-reducing, ferric-reducing, iron-reducing, nitrate-reducing, or aerobic zones. At some sites, this information is critical and adds to the weight of evidence for the occurrence of natural attenuation.

Alkalinity: Alkalinity sometimes increases above background in areas with significant natural microbial activity. Therefore, groundwater alkalinity in the plume could indicate the level of microbial activity and enhance the likelihood of reductive dechlorination.

Oxidation-Reduction Potential (ORP): The ORP of groundwater, also known as redox indicates the relative oxidized or reduced state of the aquifer. Biological processes generally occur within a prescribed ORP range. For instance, an ORP of <50 millivolts (mVs) indicates reducing conditions depleted of DO. ORP levels greater than this indicate aerobic conditions exist that could hinder reductive dechlorination. ORP levels less than -100 mV are ideal for reductive dechlorination.

pH and Temperature: pH affects microbial activity and some types of microbial reactions. Microorganisms capable of degrading 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. Below certain temperatures (generally 10° C), microbial activity decreases until it stops completely at freezing temperatures.

Chloride: Chloride produced by reductive dechlorination is generally inert and can serve as a conservative indicator parameter in the aquifer. Reductive dechlorination generally results in chloride concentrations above background in the contaminated portion of the aquifer, and could therefore, be an indirect estimator of microbial activity.

5.3 Effect of Groundwater Geochemistry on Lead and Cadmium Concentrations

Geochemical conditions in the aquifer have a direct impact on the ionic and chemical nature of lead and cadmium in the aquifer. Sulfate ions limit the lead concentration in solution by forming lead sulfate which precipitates. In reduced groundwater (a condition which can be inferred from ORP, sulfate/sulfide concentrations, DO, and hydrogen concentrations), sulfur tends to exist in the reduced form, i.e., sulfide. In solutions with high concentrations of sulfide, lead precipitates to form lead sulfide, PbS. PbS is the most stable solid in reduced conditions with sulfur. The end result is that under these conditions, lead concentrations in groundwater decrease. This type of physical-chemical reaction is the most common form of natural attenuation for lead in groundwater. As long as reducing conditions exist in the vicinity of lead occurrences, concentrations of the metal in groundwater should continue to decrease, resulting in an effective natural remedy.

Cadmium in groundwater also follows the same chemical reaction as lead. In reducing environments, cadmium precipitates with sulfide to form cadmium sulfide, CdS. Cadmium precipitation forms an effective natural remedy that controls its mobility and concentration in groundwater as long as reducing conditions exist.

5.4 Summary of MNA Data

Site 38 has been divided into two areas due to historical reasons and remedial investigation results. Therefore, the Building 71 Area and the Building 604 Area were examined separately during MNA evaluation. Tables 5-1 and 5-2 summarize the geochemical and chemical analysis results for the December 2000 sampling event. Appendix B contains the tables which detail the geochemical sampling list and sampling protocol.

Table 5-1
Summary of Chemical and Geochemical Analysis Building 71 Area

Parameter	Date sampled	Units	Background Sample	Shallow Monitoring Wells			
			38GS01	38GS02	38GS03	38GS10	38GS12
DO, Winkler Method	December 2000	mg/L	2.8	0	0.4	0	0.2
Oxidation Reduction Potential (ORP)	December 2000	millivolts (mV)	-53	-159	-86	-117	-128
Temperature	December 2000	(°C)	21.2	20.7	22.3	22.1	20.9
Alkalinity	December 2000	mg/L	80	130	135	140	90
Chloride	December 2000	mg/L	40	200	40	120	40
Ferrous Iron (Iron II)*	December 2000	mg/L	0.02	0.04	0.1	0.1	0.28
Total Iron	December 2000	mg/L	0.04	0.024	0.079	0.077	0.255
Sulfide, S 2-	December 2000	mg/L	0.002	2.14*	0.146	0.38	2.58*
Sulfate, S04 2-	December 2000	mg/L	15	0	12	28	7
Nitrate	May 1999	mg/L	0.5	NS	ND	NS	ND
Hydrogen	December 2000	nM	1.4	2.1	1.2	1.1	<0.03
Methane	December 2000	µg/L	7.4	1600	2500	190	1300
Total Organic Carbon (TOC)	December 2000	mg/L	2.8	5.6	3.3	4.5	4.3
TCE	December 2000	µg/L	ND	ND	4	ND	6
TCA	December 2000	µg/L	ND	ND	1	ND	0.6
Cis-1,2-DCE	December 2000	µg/L	ND	0.9	5	ND	24
Vinyl Chloride (VC)	December 2000	µg/L	ND	3	1	ND	7
Chloroethane	December 2000	µg/L	ND	6	ND	ND	ND
Benzene	December 2000	µg/L	ND	0.5	0.9	ND	ND
1,1, DCE	December 2000	µg/L	ND	ND	ND	ND	ND
1,1, DCA	December 2000	µg/L	ND	2.0	3.0	ND	6.0

Table 5-2
Summary of Chemical and Geochemical Analysis Building 604 Area

Parameter	Date sampled	Units	Background Sample	Shallow Monitoring Wells				
			38GS28	38GS08	38GS17	38GS19	38GS20	38GS32
DO, Winkler Method	December 2000	mg/L	2.8	1.8	0.2	2.4	1.2	1.3
Oxidation Reduction Potential (ORP)	December 2000	millivolts (mV)	-67	-13	-207	-3	-167	-64
Temperature	December 2000	°C	18.7	20.9	24.5	22.9	23.3	20.2
Alkalinity	December 2000	mg/L	40	110	125	110	125	130
Chloride	December 2000	mg/L	40	40	60	40	40	120
Ferrous Iron (Iron II)*	December 2000	mg/L	0.09	0.02	0.11	0.03	0.22	0.6
Total Iron	December 2000	mg/L	0.051	0.027	0.098	0.103	0.223	1.005
Sulfide, S 2-	December 2000	mg/L	0.018	0.006	2.13*	0.007	1.395*	0.009
Sulfate, S04 2-	December 2000	mg/L	14	20	0	0	30	1
Nitrate	May 1999	mg/L	0.136	0.737	NS	1.86	NS	ND
Hydrogen	December 2000	nM	<0.03	0.71	4.6	0.38	1.6	2.3
Methane	December 2000	µg/L	0.23	490	9700	10	5600	2100
Total Organic Carbon (TOC)	December 2000	mg/L	3.6	3.1	3.6	1.3	2.9	2.3
TCE	December 2000	µg/L	ND	17	ND	20	ND	ND
TCA	December 2000	µg/L	ND	1	ND	0.5	ND	ND
Cis-1,2-DCE	December 2000	µg/L	ND	56	ND	42	0.6	2
Vinyl Chloride (VC)	December 2000	µg/L	ND	22	7	16	12	2
Chloroethane	December 2000	µg/L	ND	ND	ND	ND	ND	ND
Benzene	December 2000	µg/L	ND	0.4	ND	ND	ND	ND
1,1, DCE	December 2000	µg/L	ND	0.7	ND	ND	ND	ND
1,1, DCA	December 2000	µg/L	ND	ND	2.0	0.5	1.0	ND

Building 71 Area

Figure 2-2 is a site map of the Building 71 Area showing the wells which were sampled for MNA evaluation. Figure 3-2 is a potentiometric map depicting groundwater flow direction in the area. Five wells were sampled during the first event in December 1998-April 1999 including 38GS01 (which is considered an upgradient and background well for MNA evaluation), 38GS02, 38GS03, 38GS10, and 38GS12. During the follow-up sampling event in December 2000, samples were collected and analyzed from the same five wells and analyzed for chemical and geochemical constituents. Table 5-1 summarizes the geochemical and chemical analysis results for the December 2000 sampling event.

Building 604 Area

Figure 2-1 is a site map of the Building 604 Area showing the locations of the MNA wells that were sampled. Figure 3-1 is a potentiometric map depicting groundwater flow direction in the area. As at the Building 71 Area, two major MNA sampling events were performed, the first in December 1998- April 1999, and the second in December 2000. During the first event, samples were collected from wells 38GS28 (which is considered upgradient and the background well), 38GS19, 38GS08, 38GS32, 38GS17 and 38GS20. During the recent (December 2000) sampling event, groundwater samples were collected at each of the six locations listed above and analyzed for chemical and geochemical constituents.

5.5 MNA Scoring Results And Evaluation

Data summarized in Tables 5-1 and 5-2 were processed using USEPA's MNA ranking system to assess the adequacy or feasibility of MNA at the site. The following interpretation of the scoring (Table 5-3), or points system is adapted from USEPA's MNA protocol. Tables 5-4 and 5-5 summarize the scores for Building 71 and building 604 Areas respectively.

Table 5-3
Interpretation Criteria for Examining MNA Feasibility

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

Tables 5.4 and 5.5 summarize the scoring system for the two areas. Wells 38GS01 and 38GS28 were considered background wells and were used primarily to allocate scores for chloride and alkalinity concentrations in each area.

5.5.1 Interpretation of Geochemical and Chemical Analysis and its Effect on Reductive Dechlorination for Building 71

Geochemical data and scoring indicates that there is continuing evidence to show that natural reduction of chlorinated solvents is occurring in the aquifer. The best evidence of the continued 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 non-detect concentrations for PCE and TCE and very low level hits for VC. The following is a discussion of each individual geochemical parameter, its significance, and contribution to the overall natural reductive dechlorination process.

Dissolved Oxygen (DO): Low or non-detect concentrations of DO are supportive of natural reductive dechlorination because high DO hinders, or even prevents chlorinated solvent degradation. Table 5-1 illustrates the aquifer is almost devoid of DO making it an anaerobic or a highly reducing environment.

Table 5-4
Ranking of Chemical and Geochemical Analysis for MNA Building 71 Area

Parameter	Date sampled	Units	Shallow Monitoring Wells			
			38GS02	38GS03	38GS10	38GS12
DO, Winkler Method	December 2000	mg/L	3	3	3	3
Oxidation Reduction Potential (ORP)	December 2000	millivolts (mV)	2	1	2	2
Temperature	December 2000	°C	1	1	1	1
Alkalinity	December 2000	mg/L	0	0	0	0
Chloride	December 2000	mg/L	2	0	2	0
Ferrous Iron (Iron II)*	December 2000	mg/L	0	0	0	0
Sulfide, S 2-	December 2000	mg/L	3	1	2	3
Sulfate, S04 2-	December 2000	mg/L	2	2	0	2
Nitrate	May 1999	mg/L	NS	2	NS	2
Hydrogen	December 2000	nM	3	3	2	0
Methane	December 2000	µg/L	3	3	3	3
Total Organic Carbon (TOC)	December 2000	mg/L	0	0	0	0
Cis-1,2-DCE	December 2000	µg/L	2	2	0	2
Vinyl Chloride (VC)	December 2000	µg/L	2	2	0	2
Chloroethane	December 2000	µg/L	—	ND	ND	ND
Benzene	December 2000	µg/L	—	—	ND	ND
1,1, DCE	December 2000	µg/L	ND	ND	ND	ND
1,1, DCA	December 2000	µg/L	—	—	ND	—
Total			23	20	15	20
Interpretation/Effectiveness Evidence			Strong	Adequate	Adequate	Adequate

Table 5-5
Ranking of Chemical and Geochemical Analysis for MNA Building 604 Area

Parameter	Date sampled	Units	Shallow Monitoring Wells				
			38GS08	38GS17	38GS19	38GS20	38GS32
DO, Winkler Method	December 2000	mg/L	-3	3	-3	-3	-3
Oxidation Reduction Potential (ORP)	December 2000	millivolts (mV)	1	2	1	2	1
Temperature	December 2000	°C	1	1	1	1	1
Alkalinity	December 2000	mg/L	1	1	1	1	1
Chloride	December 2000	mg/L	0	0	0	0	2
Ferrous Iron (Iron II)*	December 2000	mg/L	0	0	0	0	0
Sulfide, S 2-	December 2000	mg/L	0	3	0	3	0
Sulfate, S04 2-	December 2000	mg/L	2	2	2	0	2
Nitrate	May 1999	mg/L	2	NS	0	NS	2
Hydrogen	December 2000	nM	0	3	0	3	3
Methane	December 2000	µg/L	3	3	0	3	3
Total Organic Carbon (TOC)	December 2000	mg/L	0	0	0	0	0
Cis-1,2-DCE	December 2000	µg/L	2	0	2	2	2
Vinyl Chloride (VC)	December 2000	µg/L	2	2	2	2	2
Chloroethane	December 2000	µg/L	ND	ND	ND	ND	ND
Benzene	December 2000	µg/L	—	ND	ND	ND	ND
1,1, DCE	December 2000	µg/L	—	ND	ND	ND	ND
1,1, DCA	December 2000	µg/L	ND	—	—	—	—
Total			12	20	6	14	16
Interpretation/Effectiveness Evidence			Limited	Strong	Limited	Adequate	Adequate

Oxidation-Reduction Potential (ORP): ORP measurements in groundwater continue to be $<$-50 mV providing further evidence of the reductive nature of the aquifer, a condition that is vital to the reductive dechlorination process.

Nitrate: Nitrate was not sampled during the December 2000 sampling event. To aid in this investigation, nitrate data collected in May 1999 was included in the calculation. Nitrate readings do not indicate that this electron acceptor would in any way impede the reductive dechlorination of chlorinates solvents.

Sulfate and Sulfide: Sulfate concentrations up to 20 mg/L generally do not interfere with the reductive dechlorination process. However, at higher concentrations, sulfate could 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 clearly demonstrating the reductive nature of the aquifer.

Hydrogen: Hydrogen concentrations support evidence for reductive dechlorination. The range of hydrogen concentrations detected (1.1 to 2.1 nM) further indicate that the majority 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. Methane detections further indicate that methanogenesis is occurring along with sulfate reduction. 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 it is likely that PCE and TCE will degrade completely to innocuous end-products such as ethane and ethene. Even methane concentrations in the 100 to 500 μg/L range can indicate there are pockets of methanogenic activity in the aquifer.

Chloride: The end-product of reductive dechlorination is chloride, which is a non-reactive (conservative) constituent often used as an indicator parameter to demonstrate chlorinated solvent breakdown. Two of the wells 38GS02 and 38GS10 show significantly higher concentrations compared to background. Therefore, it appears that chlorinated solvents are continuing to degrade in the aquifer.

Total Organic Carbon (TOC): For reductive dechlorination to occur, the microorganisms (which aid in the chemical breakdown process) 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, at most sites, a TOC concentration much less than this is sufficient to drive the reductive dechlorination, provided the aquifer is a reducing one. In the Building 71 Area, TOC concentrations (between 2 and 5 mg/L) appear to be sufficient to sustain continuing degradation of chlorinated solvents.

Building 71 Area Chemical Data and Historical Trends

Table 5-6 summarizes chlorinated solvent concentrations in Building 71 Area since sampling first began in January 1994. Figures 5-1 through 5-6 depict changes in concentration of chlorinated solvents and their daughter breakdown products in each well in the area (for which data are available) since 1994 when sampling began. Figures 5-5 through 5-8 show changes in concentration in the approximate direction of groundwater flow in the area. Concentrations of chlorinated solvents show an overall decreasing trend in the direction of groundwater flow from

Table 5-6
Site 38 — 1994-2000
Historical Data for Chlorinated Solvents
Detected in Groundwater
Building 71

Parameter	Location	RI Samples (Jan 1994)	EPA Samples (Oct 1995)	Samples (Dec 1998)	Samples (May 1999)	Samples (Dec 2000)	Screening Concentration	Screening Source
Volatile Organic Compounds (µg/L)								
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	.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	.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	**6.0**		
Vinyl Chloride	38GS01	ND	NS	ND	NS	ND	1	FPDWS
	38GS02	**12**	NS	NS	ND	**3.0**		
	38GS03	ND	NS	**3**	NS	**1.0**		
	38GS10	ND	NS	NS	ND	ND		
	38GS12	ND	NS	**15**	NS	**7.0**		

Notes:
ND — Parameter not detected in sample.
NA — Parameter not analyzed for this sample.
NS — Well not sampled during this event.
Concentrations exceeding screening values are in bold font.

well 38GS12 to the downgradient wells 38GS03, 38GS02, and 38GS10. This indicates that PCE and TCE are undergoing reductive dechlorination before reaching the downgradient wells. Overall, since sampling began in 1994, concentrations have also decreased over time. PCE and TCE are above screening concentrations at 38GS12 which is in the "center" of the plume but have decreased considerably in the last two years.

The products of reductive dechlorination, cis-1,2-DCE and vinyl chloride shows trends similar to their parent compounds, indicating that these by-products are not accumulating in the aquifer. Detections at well 38GS03 for TCE (5.0 μg/L) and VC (1.0 μg/L) are below and at their screening concentrations (respectively). VC at 38GS12 has decreased from 15 ppb in December 1998 to 7 ppb 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.

5.5.2 Interpretation of Geochemical and Chemical Analysis and its Effect on Reductive Dechlorination for Building 604

Geochemical data and scoring indicates that overall there is continuing evidence to show that natural reduction of chlorinated solvents is occurring in the aquifer. With the exception of DO which appears to have increased above 1.0 mg/L at several locations (an effect which is expected to be temporary and the result of tidal fluctuations), most other geochemical parameters indicate continuing evidence of reductive dechlorination. The following is a discussion of each individual geochemical parameter, its significance, and contribution to the overall reductive dechlorination process.

Dissolved Oxygen (DO): DO concentrations appear to have temporarily increased to levels that are usually supportive of natural reductive dechlorination. However, when these numbers are correlated with ORP and hydrogen, it appears that the aquifer continues to be reducing.

Oxidation-Reduction Potential (ORP): ORP measurements in groundwater are all less than 0 mV which provide further evidence of the reductive nature of the aquifer, a condition that is vital to the reductive dechlorination process.

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

Sulfate and Sulfide: Sulfate concentrations up to 20 mg/L generally do not interfere with the reductive dechlorination process. However, at higher concentrations, sulfate could 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 facilitate reductive pathways for TCE and PCE. Sulfide was detected in all area wells with a maximum concentration of 2.13 mg/L at 38GS17 indicating the reductive nature of the aquifer.

While it does appear that sulfide and sulfate concentrations have changed since the last sampling event, they are still indicative of overall reductive dechlorinating conditions.

Hydrogen: Hydrogen concentrations support evidence for chlorinated reductive dechlorination. The range of hydrogen concentrations detected (0.38 to 4.6 nM) further indicate that the majority 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 further indicate that methanogenesis is occurring along with sulfate reduction. 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. Even methane concentrations in the 100 to 500 μg/L range can indicate there are pockets of methanogenic activity in the aquifer.

Total Organic Carbon (TOC): For reductive dechlorination to occur, the microorganisms (which aid in the chemical breakdown process) 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, at most sites, a TOC concentration much less than this is sufficient to drive reductive dechlorination, provided the aquifer is a reducing one. In the Building 604 Area it appears that TOC concentrations are at sufficiently high levels to sustain the reductive dechlorination process.

Building 604 Area Chemical Data and Historical Trends

Table 5-7 summarizes chlorinated solvent concentrations in the Building 604 Area since sampling first began in January 1994. Figures 5-9 through 5-13 depict changes in concentration of chlorinated solvents and their daughter breakdown products in each well in the area (for which data are available) since 1994 when sampling began. Figures 5-14 through 5-17 show changes in concentration in the approximate direction of groundwater flow in the area.

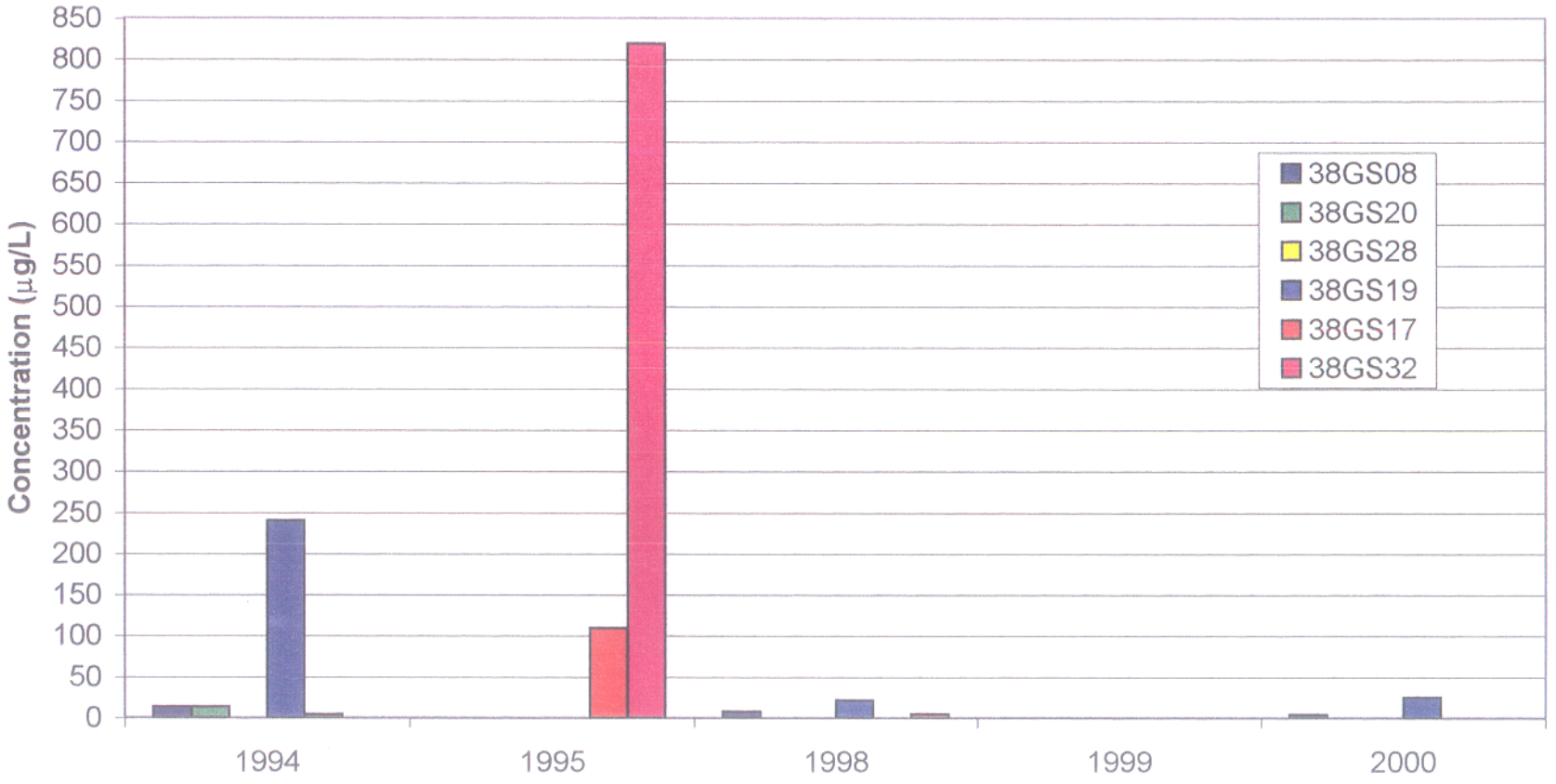
TCE was not detected in groundwater sampling wells 38GS17, 38GS20, and 38GS32. Sampling wells 38GS08 and 38GS10 also indicate a reduction in the parent compound TCE, but indicate that daughter compounds cis-1,2-DCE and VC are increasing slightly. Because these are daughter compounds, their increase can only be reflected as a continuing evidence of reductive dechlorination of PCE and TCE. The important factor to consider is that even these

Table 5-7
Site 38 — 1994-2000
Historical Data for Chlorinated Solvents
Detected in Groundwater
Building 604

Parameter	Location	RI Samples (Jan 1994)	EPA Samples (Oct 1995)	Samples (Dec 1998)	Samples (May 1999)	Samples (Dec 2000)	Screening Concentration	Screening Source
Volatile Organic Compounds (µg/L)								
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	1.0		
	38GS28	NS	ND	ND	NS	1.0		
	38GS32	NS	ND	ND	NS	1.0		
cis-1,2-Dichloroethene	38GS08	NA	NS	25	NS	56	70	FPDWS/FGGC
	38GS17	NA	**460**	NS	ND	1.0		
	38GS19	NA	NS	27	NS	42		
	38GS20	NA	NS	NS	ND	0.6		
	38GS28	NS	ND	ND	NS	1.0		
	38GS32	NS	**640**	25	NS	2.0		
Tetrachloroethene	38GS08	**14**	NS	**8**	NS	**4.0**	3	FPDWS
	38GS17	**4**	**110**	NS	ND	1.0		
	38GS19	**240**	NS	**22**	NS	**25.0**		
	38GS20	**14**	NS	NS	ND	ND		
	38GS28	NS	ND	ND	NS	1.0		
	38GS32	NS	**820**	**5**	NS	ND		
Trichloroethene	38GS08	**33**	NS	**24**	NS	**17.0**	3	FPDWS
	38GS17	ND	**19**	NS	ND	1.0		
	38GS19	**41**	NS	**22**	NS	**20.0**		
	38GS20	ND	NS	NS	ND	1.0		
	38GS28	NS	ND	ND	NS	1.0		
	38GS32	NS	**340**	**5**	NS	1.0		
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	**1.0**		
	38GS32	NS	**130**	**14**	NS	**2.0**		

Notes:
ND — Parameter not detected in sample.
NA — Parameter not analyzed for this sample.
NS — Well not sampled during this event.
Concentrations exceeding screening values are in bold font.

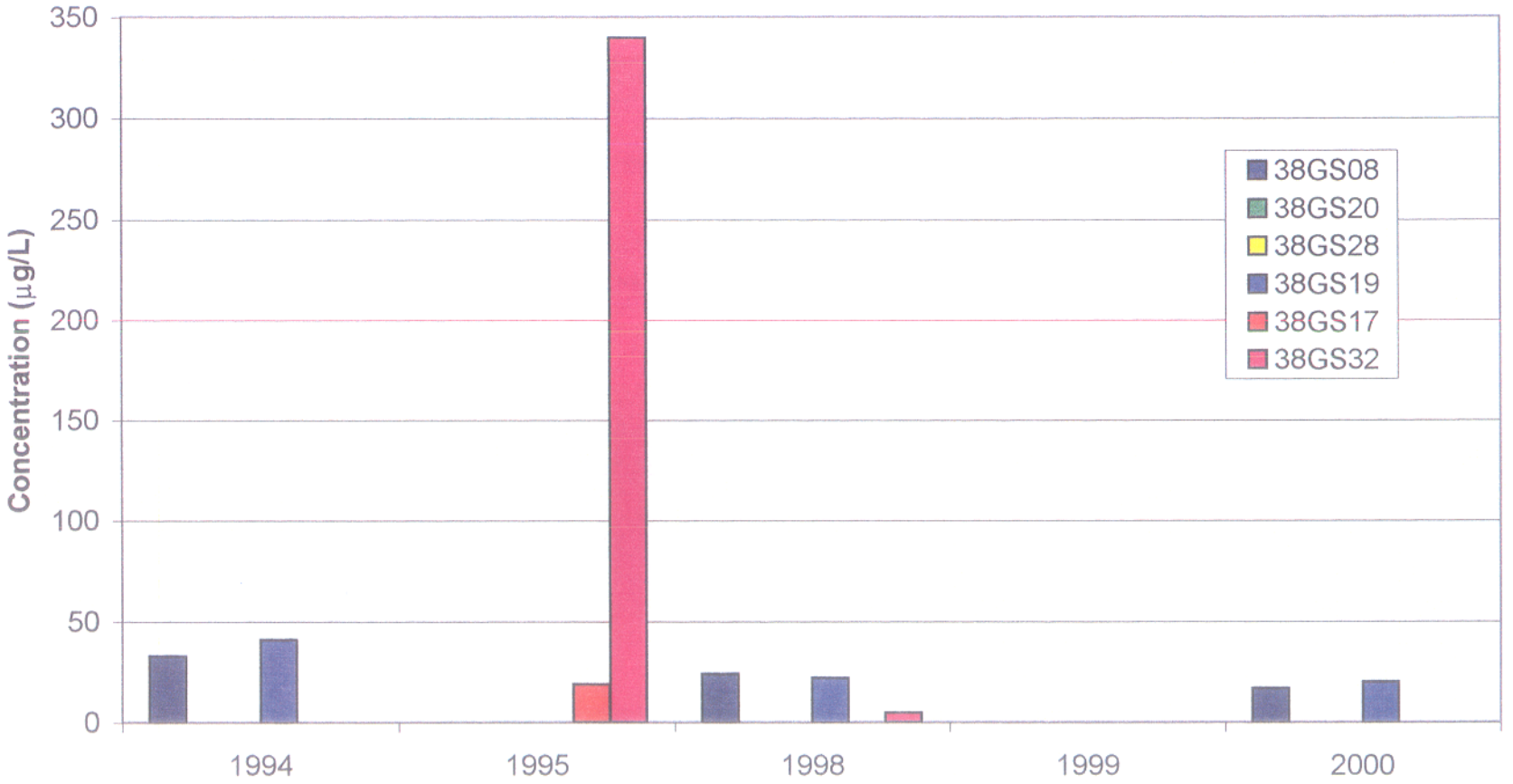
Figure 5.9 Tetrachloroethene Building 604 Well Concentrations



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

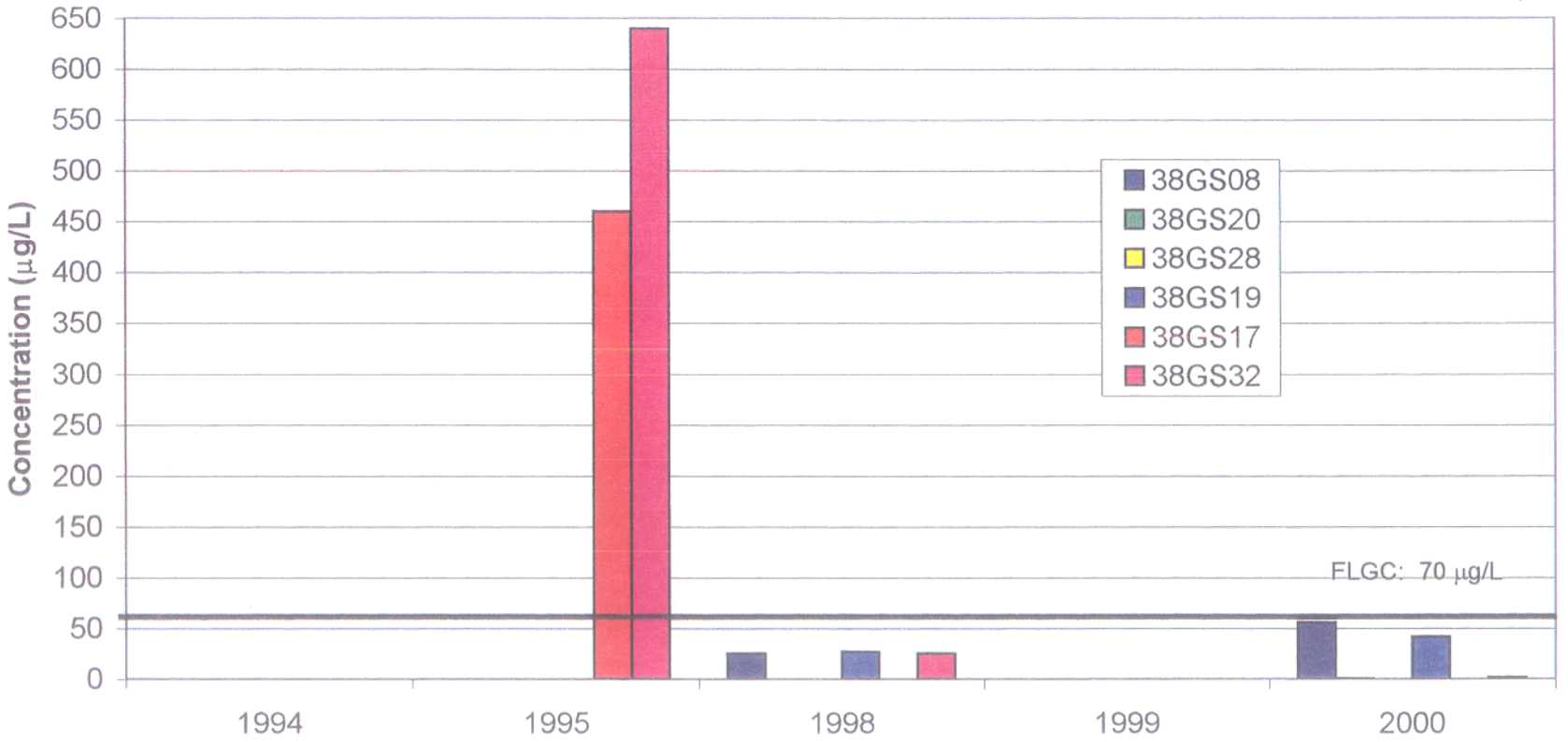
Figure 5.10 Trichloroethene Building 604 Well Concentrations



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.

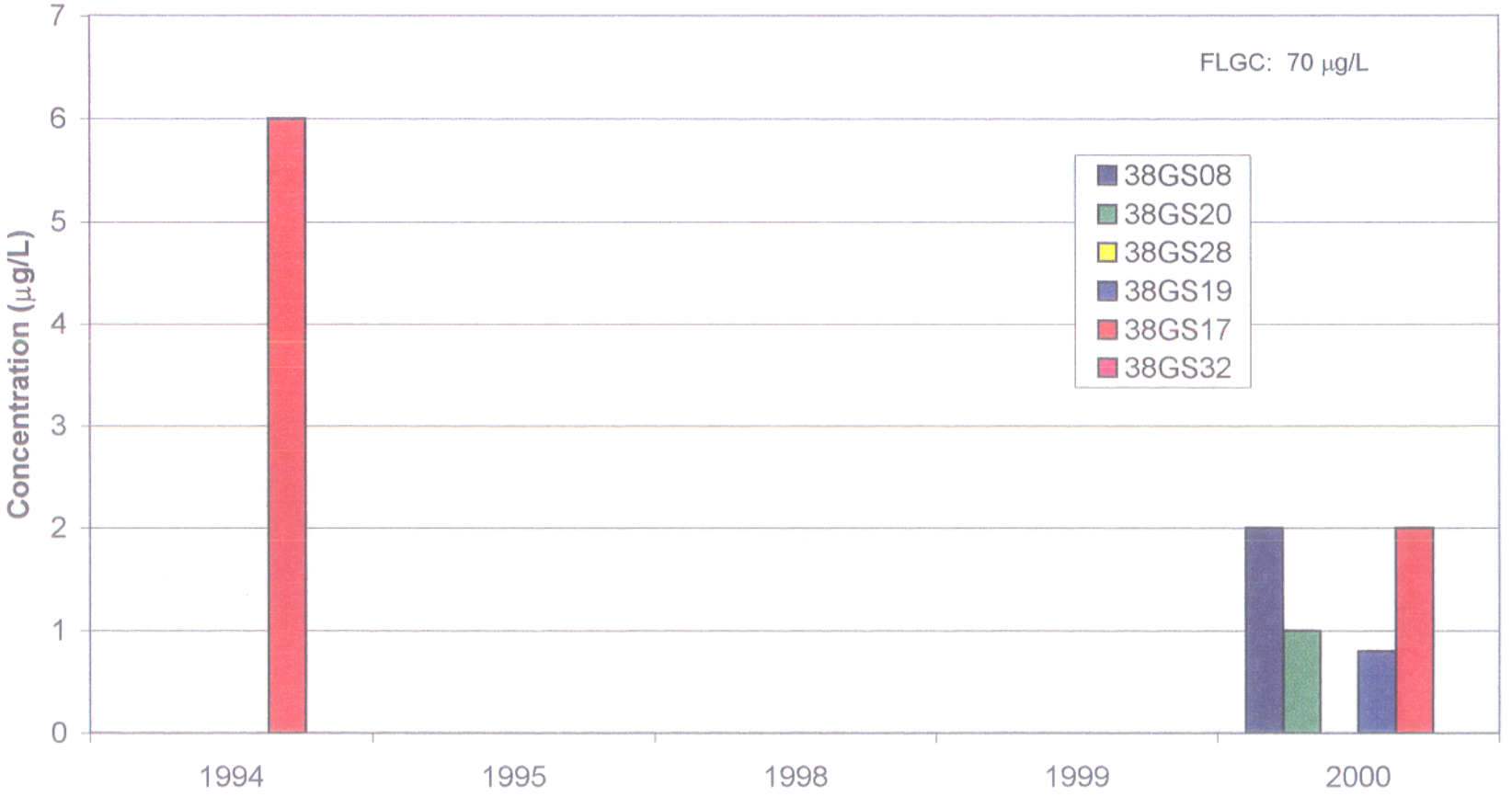
FLGC: 3 µg/L

Figure 5.11 cis-1,2-Dichloroethene Building 604 Well Concentrations



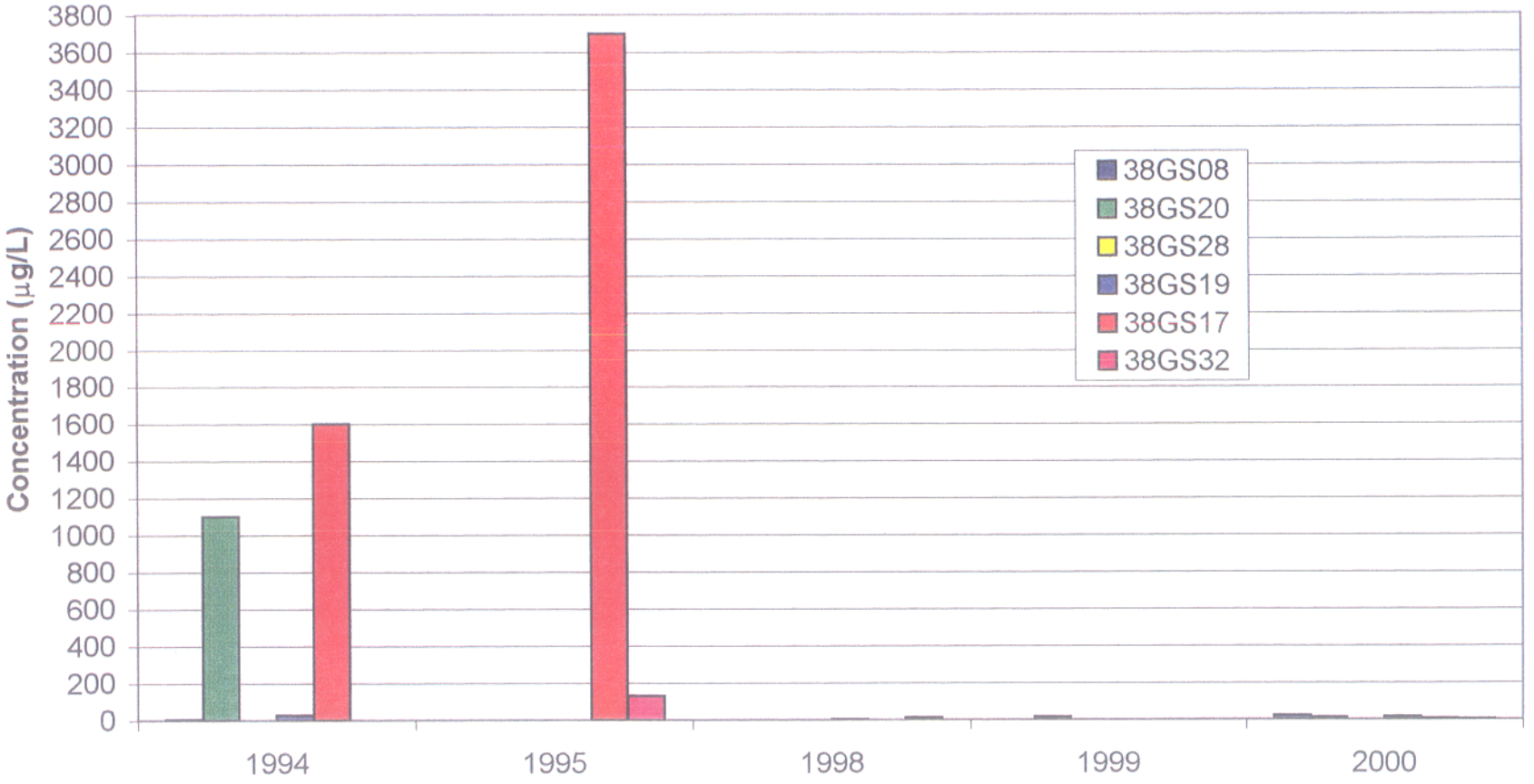
Note: Non Detect readings were not included.
Wells 38GS28 and 38GS32 were not sampled in 1994.
Readings for wells 38GS08, 38GS17, 38GS19 and 38GS20 were not available for 1994
Wells 38GS08, 38GS19 and 38GS20 were not sampled in 1995.
Wells 38GS17 and 38GS20 were not sampled in 1998.
Wells 38GS08, 38GS19,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

Figure 5.12 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 5.13 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 5.14 Bldg 604 1994 Natural Attenuation of Chlorinated Solvents

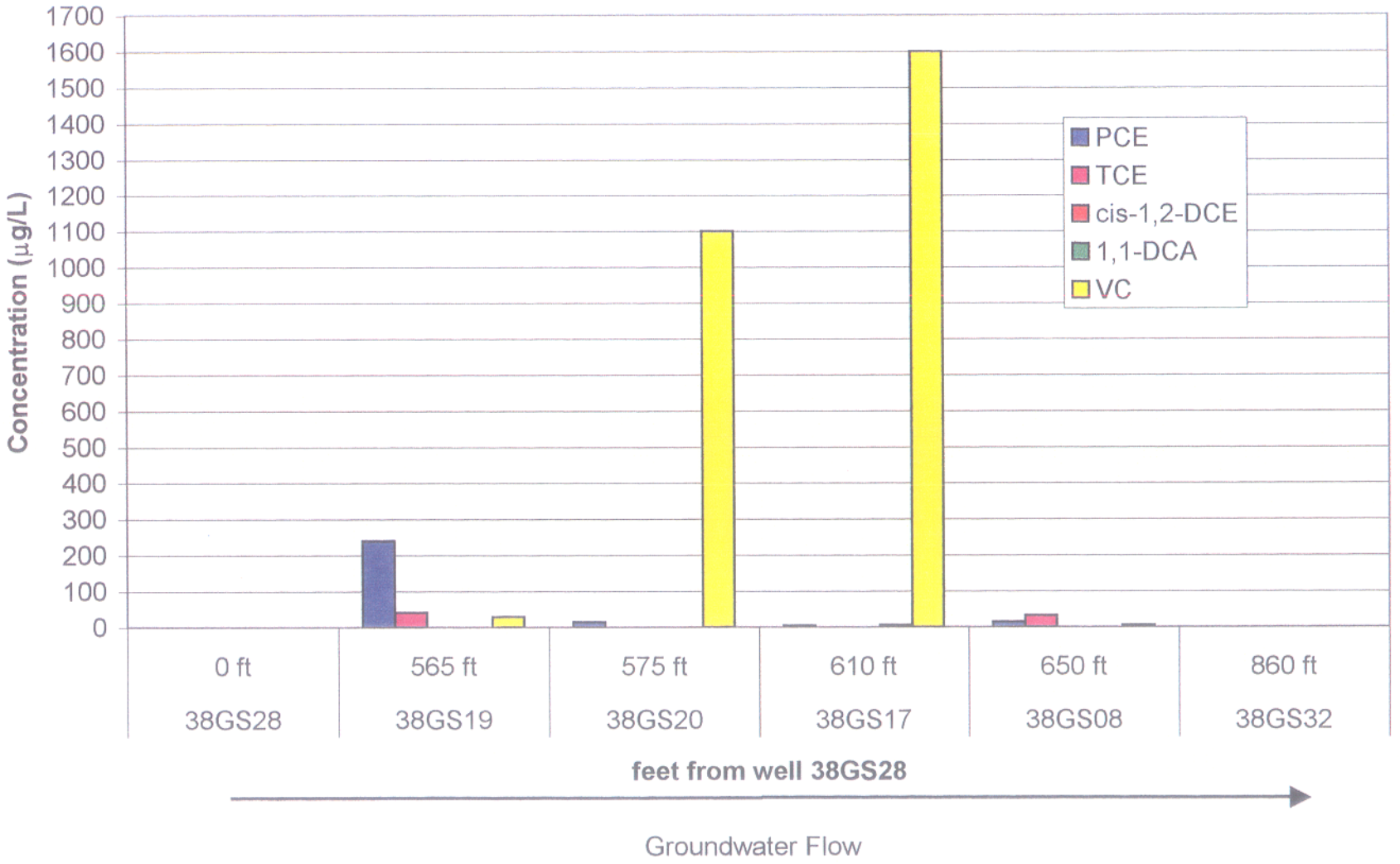


Figure 5.15 Bldg 604 1995 Natural Attenuation of Chlorinated Solvents

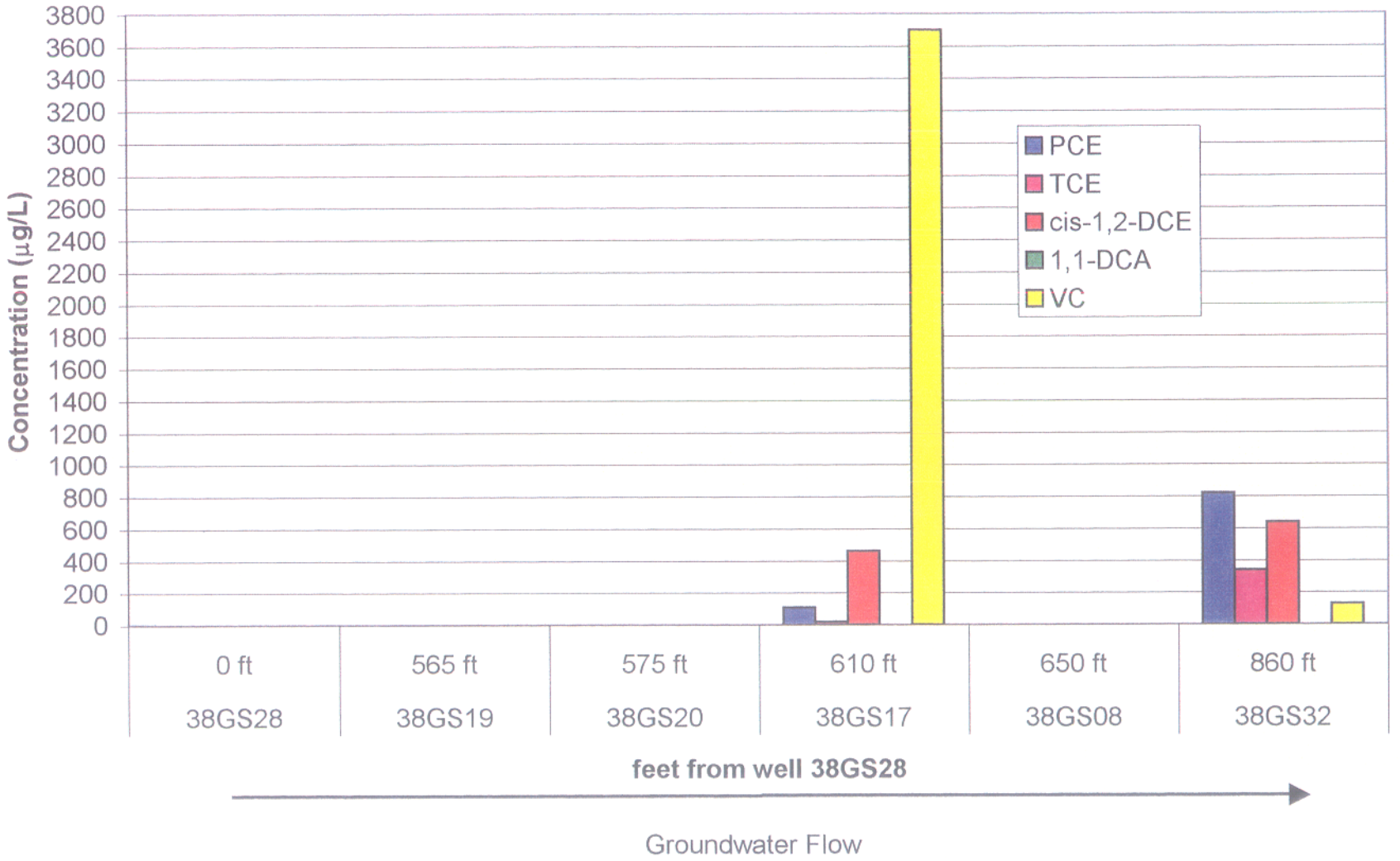


Figure 5.16 Bldg 604 1998 Natural Attenuation of Chlorinated Solvents

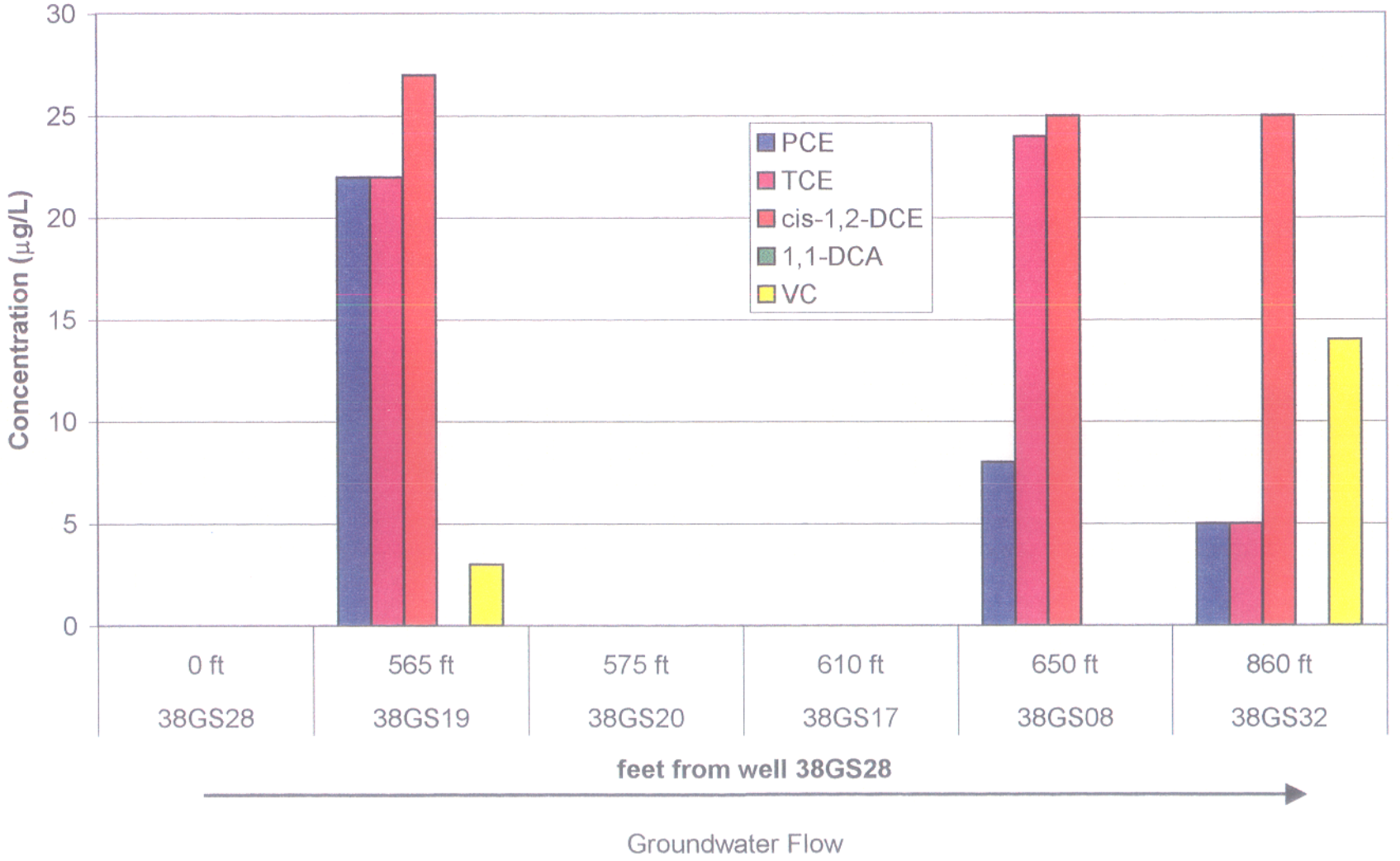
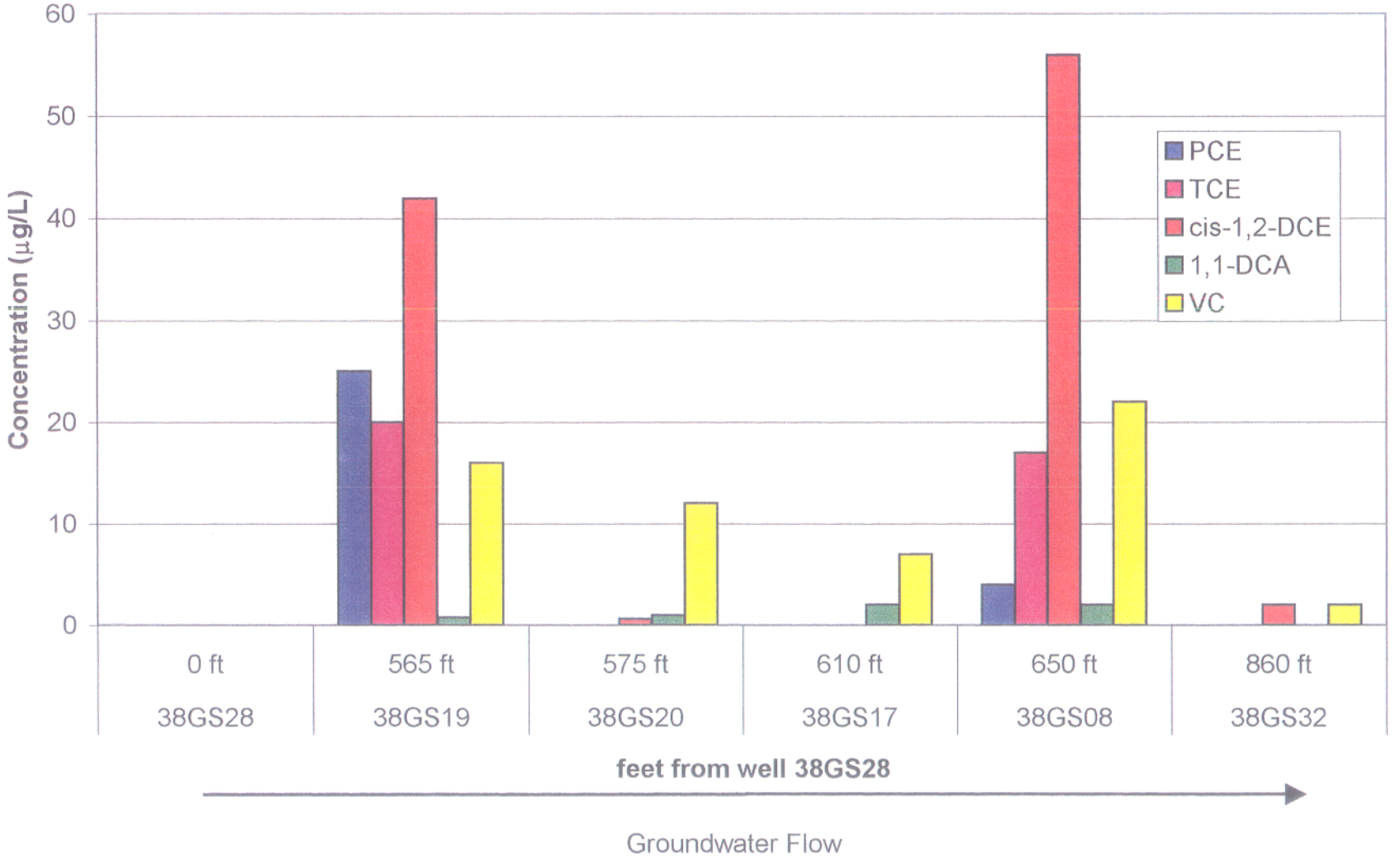


Figure 5.17 Bldg 604 2000 Natural Attenuation of Chlorinated Solvents



daughter products appear to be degrading before they reach downgradient locations as indicated by their 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.

5.6 Effect of Geochemistry on Lead Concentrations

5.6.1 Building 71 Area

Lead concentrations have decreased over the entire site since sampling began in 1994 (see Table 5-8 below). Wells 38GS02 and 38GS10 remain at non-detect concentrations. Well 38GS03 had a lead concentration of 3.3 μg/L, which was non-detected during the last sampling effort (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. In addition, lead concentrations decreased also in upgradient well 38GS01 from 117 μg/L to non-detect.

Table 5-8
Lead Concentrations (μg/L) in Groundwater
Buildings 71 and 604
1994-2000

Building 71 Location	RI Samples (Jan 1994)	EPA Samples (Oct 1995)	Addendum 2 Samples (December 1998)	(December 2000)
38GS01	276	NS	117	ND
38GS02	362	NS	ND	ND
38GS03	388.5	NS	ND	3.3
38GS10	54	NS	ND	ND
38GS12	280	NS	128	2.7
Building 604 Location	**RI Samples (Jan 1994)**	**EPA Samples (Oct 1995)**	**Addendum Samples (December 1998)**	**(December 2000)**
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

The decrease in Area 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.

5.6.2 Building 604 Area

Lead concentrations have decreased at locations 38GS17, 38GS19, 38GS20,and 38GS28 (see Table 5-8) to non-detect levels. Concentrations at 38GS08 and 38GS32 have continued to decrease. This is most likely due to the sulfate present in the groundwater, the conversion of sulfates to sulfide under anaerobic conditions (as indicated by hydrogen measurements, ORP values, and sulfide concentrations), followed by lead precipitation.

5.7 Effect of Geochemistry on Cadmium Concentrations

5.7.1 Building 71 Area

Cadmium levels have continued to decrease, in all cases to non-detect levels with the exception of monitoring well 38GS03, since sampling efforts began in January 1994 (Table 5-9). Recent data from December 2000 indicates that cadmium is not a concern in groundwater at this site. In all likelihood, 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.

5.7.2 Building 604 Area

Cadmium was not detected in monitoring wells 38GS17, 38GS20, 38GS28, and 38GS32 (Table 5-9). Levels of 3.9 μg/L were detected at 38GS08 and 79 μg/L at 38GS19, both values are a significant decrease compared to December 1998 levels. Downgradient well GS3832

continues to be nondetect for cadmium. Current data (December 2000) indicates that cadmium levels are decreasing and not a concern in groundwater at this site.

Table 5-9
Cadmium Concentrations (μg/L) in Groundwater
Buildings 71 and 604
1994-2000

Building 71 Location	RI Samples (Jan 1994)	EPA Samples (Oct 1995)	Addendum 2 Samples (December 1998)	(December 2000)
38GS01	ND	NS	ND	ND
38GS02	ND	ND	NS	ND
38GS03	ND	NS	ND	3.6
38GS10	ND	NS	NS	ND
38GS12	326	NS	50	ND
Building 604 Location	**RI Samples (Jan 1994)**	**EPA Samples (Oct 1995)**	**Addendum Samples (December 1998)**	**(December 2000)**
38GS28	—	ND	ND	ND
38GS08	14.7	NS	50	3.9
38GS17	ND	ND	NS	ND
38GS19	382	NS	250	79
38GS20	34.1	NS	NS	ND
38GS32	—	ND	ND	ND

6.0 CONCLUSIONS

6.1 Building 604 Groundwater Criteria

Concentrations of total VOCs (TVOCs) were elevated during the 1994 RI, with a maximum TVOC concentration of 1,604 µg/L in 38GS17; concentrations had decreased significantly in many impacted wells by the 2000 sampling event. TVOCs in monitoring well 38GS17 have decreased to 19.9 µg/L. Other examples, TVOCs in well 38GS22 have decreased from 4,310 µg/L (1995) to 36 µg/L (2000) and in well 38GS32 concentrations have gone from 2,620 µg/L (1995) to 5 µg/L (1998), effecting a 99 % removal rate. VOC decreases since the RI are attributable to natural attenuation processes, which were discussed in the 1999 *Final Technical Memorandum: Evaluation of Monitored Natural Attenuation* (EnSafe, 1999) contained in the *Final Feasibility Study Report* (EnSafe, 1999).

6.2 Building 71 Groundwater Criteria

VOC concentrations in the Building 71 area are limited in extent to 38GS12, located in the center of the former Building 71's foundation, and 38GS02, 38GS03, and 38GS13, which are slightly down-/side-gradient. TVOC concentrations in 38GS12 during the RI were over 1,400 µg/L. Data collected during the 2000 sampling evaluation suggested that natural attenuation processes are significant in the Building 71 area, with TVOC concentrations in 38GS12 decreasing to 60.4 µg/L. Monitoring wells 38GS02 and 38GS03 also have decreasing concentrations of VOCs. Vinyl chloride has reduced from 12 µg/L in 1994 to 3 µg/L in 2000. TCE has remained constant in monitoring well 38GS03 at 4µg/L, but vinyl chloride has reduced from 3 µg/L in 1998 to 1 µg/L in 2000. Monitoring well 38GS13 has shown an increase in TCE from 4 µg/L in 1994 to 5 µg/L in 1995, but vinyl chloride has reduced from 11 µg/L in 1994 to 4 µg/L in 2000.

During the RI, lead was quantified above its standard in ten wells in the Building 71 area. However, during subsequent sampling events in 1998 and 1999, lead was detected above its

standard in only two of five wells using quiescent or low-flow sampling techniques. During the 2000 sampling event, lead was detected in five monitoring wells and all detected concentrations are below its standard of 15 μg/L.

Arsenic, chromium, and antimony were not quantified in any well above their respective criteria. Cadmium was quantified above its standard in one well, 38GS05 (5.9 μg/L), but the detected concentration has decreased from 9.7 μg/L in previous sampling events. These data indicate that metals concentrations have decreased from previous sampling events.

Napthalene, which was previously quantified in 38GS02 and 38GS12 above its standard, was detected only at 38GS02 at a concentration (4 μg/L) below its standard. All other detected SVOCs were below their respective criteria.

6.3 Conclusions

Geochemical analysis and interpretation of groundwater results at Site 38 show that both Building 71 and 604 Areas continue to be highly conducive to natural biological degradation of chlorinated solvents. Measurements of DO, ORP, hydrogen, and other geochemical parameters have established the occurrence of anaerobic or reducing conditions in the aquifer, a condition which is critical for reductive dechlorination of chlorinated solvents. Even though some of the DO concentrations have increased in the Building 604 Area, this increase is likely to be temporary and the result of tidal fluctuations. Overall, anaerobic conditions dominate in Site 38 groundwater.

Historical trends show an overall decrease in concentrations of PCE and TCE across these two areas and an overall decrease along the direction of groundwater flow. Some fluctuations exist in cis-1,2-DCE concentrations as a result of daughter product formation at one or two locations. However, there is no evidence of daughter product accumulation in the aquifer.

Lead and cadmium concentrations at the site have also decreased over time in critical locations in both areas which is attributed to favorable geochemical conditions in the aquifer.

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. In other words, there is no evidence of a real or apparent source of a constant flux of chlorinated solvents into the groundwater. If such a source did exist, chlorinated solvent concentrations are unlikely to show a decrease over time; rather, concentrations would tend to plateau over time and stabilize. On the other hand, PCE, TCE, and daughter product concentrations have bee decreasing spatially and temporally in the groundwater, pointing to the absence of a source. If future monitoring data shows that the plume is shrinking further, the evidence for the absence of a "residual source" can be established.

7.0 REFERENCES

EnSafe/Allen & Hoshall. *Comprehensive Sampling and Analysis Plan.* July 1994.

USEPA. *Draft EPA Region 4 Suggested Practices for Evaluation of a Site for Natural Attenuation (Biological Degradation) of Chlorinated Solvents.* November 1997.

USEPA. *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites. Directive 92000.4-17.* November, 1997.

USEPA. *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water.* EPA 600/R/R-*98/128*, Office of Research and Development, Washington DC. September 1998.

Q:\T.059\SITE38RI\final\site 38 section 7 and append.wpd

8.0 FLORIDA PROFESSIONAL GEOLOGIST SEAL

I have read and approve of this Remedial Investigation Report Addendum 2, NAS Pensacola Site 38, and seal it in accordance with Chapter 492 of the Florida Statutes. In sealing this document, I certify the geological information contained in it is true to the best of my knowledge and the geological methods and procedures included herein are consistent with currently accepted geological practices.

Name:	Brian Caldwell
License Number:	#1330
State:	Florida
Expiration Date:	July 31, 2002

B Caldwell
Brian Caldwell

11/15/01
Date

Appendix A

Recommendation for Re-Sampling, Site 38

Technical Memorandum
Naval Air Station — Pensacola, Florida

To: NAS Pensacola Partnering Team
From: EnSafe
Date: October 6, 2000

Subject: Recommendation for Re-Sampling, Site 38

In response to comments from the NAS Pensacola Tier I Partnering Team, EnSafe evaluated re-sampling of monitoring wells for Site 38. The evaluation was presented to the Tier 1 Partnering Team at the September 25 and 26, 2000 meeting in Atlanta, Georgia. This document presents the evaluation and presents the recommendations for resampling that were approved by the Tier 1 Team at the September meeting.

1. Groundwater (GW) Evaluation

GW sampling during the remedial investigation (RI) identified multiple contaminants above GW criteria in groundwater around Buildings 71 and 604. These contaminants included heavy metals and volatile organic compounds (VOCs).

To evaluate the extent of monitoring wells requiring resampling at Site 38, the RI evaluation protocol was used.

GW concentrations have been compared to GW cleanup target levels (CTLs) as promulgated in Florida Administrative Code 62-777. Wells with sample detections greater than CTLs were chosen for resampling based on the contaminants exceeding criteria. Only detections greater than GW criteria for metals and VOCs were evaluated for resampling. Tables 1 and 2 show the borings and the associated parameters that exceeded GW criteria.

Table 1

Wells Exceeding Criteria – Building 71 Area

Well ID	Antimony	Arsenic	Cadmium	Chromium	Lead	SVOC	VOC
38GS01					X		
38GS02					X	X	X
38GS03	X				X		X
38GS05			X		X		
38GS10	X				X		
38GS11					X		X
38GS12	X	X	X	X	X	X	X
38GS13			X	X	X		X
36MW80C*					X		
36MW81C*					X		

* Wells were temporary and no longer exist.

Table 2

Wells Exceeding Criteria – Building 604 Area

Well ID	Antimony	Cadmium	Chromium	Lead	VOC	SVOC
38GS07				X	X	
38GS08	X	X	X	X	X	
38GS09				X	X	
38GS14		X		X	X	
38GS15				X	X	X
38GS17				X	X	
38GS18				X	X	X
38GS19	X	X	X	X	X	
38GS20		X	X	X	X	
38GS21		X	X	X	X	
38GS22					X	
38GS24		X			X	
38GS29					X	
38GS32	X			X	X	
38GI04		X	X		X	
38GI08					X	
36MW73C*				X		
36MW74C*				X		
36MW75C*		X		X	X	

Table 2
Wells Exceeding Criteria – Building 604 Area

Well ID	Antimony	Cadmium	Chromium	Lead	VOC	SVOC
36MW76C*		X	X	X		
36MW77C*			X	X		
36MW78C*				X		
36MW79C*				X		

* Wells were temporary and no longer exist.

Monitoring wells proposed for resampling are shown below in Tables 3 and 4 with recommended analysis. The Team agreed that samples would not be analyzed for pesticides/PCBs because there were no exceedances in the initial sampling event. In addition, the Team agreed that locations sampled using temporary wells would not be resampled because the wells no longer exist.

Table 3
Wells Proposed for Resampling – Building 71 Area

Well ID	TAL Metals	TCL SVOCs	TCL VOCs
38GS01	X		X
38GS02	X	X	X
38GS03	X		X
38GS05	X		X
38GS10	X		X
38GS11	X		X
38GS12	X	X	X
38GS13	X		X

Table 4
Wells Proposed for Resampling - Building 604 Area

Well ID	TAL Metals	TCL SVOCs	TCL VOCs
38GS07	X		X
38GS08	X		X
38GS09	X		X
38GS14	X		X

Table 4
Wells Proposed for Resampling - Building 604 Area

Well ID	TAL Metals	TCL SVOCs	TCL VOCs
38GS15	X	X	X
38GS17	X		X
38GS18	X	X	X
38GS19	X		X
38GS20	X		X
38GS21	X		X
38GS22	X		X
38GS24	X		X
38GS29	X		X
38GS32	X		X
38GI04	X		X
38GI08	X		X

As discussed in the Feasibility Study and in the August 2000 Tier 1 Partnering Team meeting, many of the elevated metals may be artifacts of sampling technique (bailing). EnSafe recommends the monitoring wells be resampled using low-flow/low-stress techniques to assess the dissolved metals fraction. Groundwater results will be used to further evaluate soil exceeding guidance criteria for leaching.

Appendix B

Monitored Natural Attenuation

Geochemical Parameters

Ranking System

Scoring Criteria

United States
Environmental Protection
Agency

Office of Research and
Development
Washington DC 20460

EPA/600/R-98/128
September 1998

EPA

Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water

Table 2.1 Soil, Soil Gas, and Ground-water Analytical Methods to Evaluate the Potential for Natural Attenuation of Chlorinated Solvents or Fuel Hydrocarbons in Ground Water. Analyses other than those listed in this table may be required for regulatory compliance.

Matrix	Analysis	Method/Reference	Comments	Data Use	Recommended Frequency of Analysis	Sample Volume, Sample Container, Sample Preservation	Field or Fixed-Base Laboratory
Soil	Aromatic and Chlorinated hydrocarbons (benzene, toluene, ethylbenzene, and xylene [BTEX]; Chlorinated Compounds	SW8260A		Data are used to determine the extent of soil contamination, the contamination mass present, and the potential for source removal.	Each soil sampling round	Sample volume approximately 100 ml; subsample and extract in the field using methanol or appropriate solvent; cool to 4°C.	Fixed-base
Soil	Biologically Available Iron (III)	Under development	HCl extraction followed by quantification of released iron (III)	Optional method that should be used when fuel hydrocarbons or vinyl chloride are present in the ground water to predict the possible extent of removal of fuel hydrocarbons and vinyl chloride via iron reduction.	One round of sampling in five borings, five cores from each boring	Minimum 1 inch diameter core samples collected into plastic liner. Cap and prevent aeration.	Laboratory
Soil	Total organic carbon (TOC)	SW9060 modified for soil samples	Procedure must be accurate over the range of 0.1 to 5 percent TOC	The rate of migration of petroleum contaminants in ground water is dependent upon the amount of TOC in the aquifer matrix.	At initial sampling	Collect 100 g of soil in a glass container with Teflon-lined cap; cool to 4°C.	Fixed-base
Soil Gas	Fuel and Chlorinated VOCs	EPA Method TO-14		Useful for determining chlorinated and BTEX compounds in soil	At initial sampling	1-liter Summa Canister	Fixed-base
Soil Gas	Methane, Oxygen, Carbon dioxide	Field Soil Gas Analyzer		Useful for determining bioactivity in vadose zone.	At initial sampling and respiration testing	3-liters in a Tedlar bag, bags are reusable for analysis of methane, oxygen, or carbon dioxide.	Field

Table 2.1 (Continued)

Matrix	Analysis	Method/Reference	Comments	Data Use	Recommended Frequency of Analysis	Sample Volume, Sample Container, Sample Preservation	Field or Fixed-Base Laboratory
Water	Alkalinity	Hach Alkalinity test kit model AL AP MG-L	Phenolphthalein method	General water quality parameter used (1) as a marker to verify that all site samples are obtained from the same ground-water system and (2) to measure the buffering capacity of ground water.	Each sampling round	Collect 100 mL of water in glass container.	Field
Water	Aromatic and chlorinated hydrocarbons (BTEX, trimethylbenzene isomers, chlorinated compounds)	SW8260A	Analysis may be extended to higher molecular weight alkyl benzenes	Method of analysis for BTEX and chlorinated solvents/byproducts, which are the primary target analytes for monitoring natural attenuation; method can be extended to higher molecular weight alkyl benzenes; trimethylbenzenes are used to monitor plume dilution if degradation is primarily anaerobic.	Each sampling round	Collect water samples in a 40 mL VOA vial; cool to 4°C; add hydrochloric acid to pH 2.	Fixed-base
Water	Arsenic	EPA 200.7 or EPA 200.9		To determine if anaerobic biological activity is solubilizing arsenic from the aquifer matrix material.	One round of sampling	Collect 100 ml in a glass or plastic container that is rinsed in the field with the ground water to be sampled. Unfiltered samples obtained using low flow sampling methods are preferred for analysis of dissolved metals. Adjust pH to 2 with nitric acid. Do not insert pH paper or an electrode into the sample.	Laboratory
Water	Chloride (optional, see data use)	Hach Chloride test kit model 8-P	Silver nitrate titration	As above, and to guide selection of additional data points in real time while in the field.	Each sampling round	Collect 100 mL of water in a glass container.	Field

Table 2.1 (Continued)

Matrix	Analysis	Method/Reference	Comments	Data Use	Recommended Frequency of Analysis	Sample Volume, Sample Container, Sample Preservation	Field or Fixed-Base Laboratory
Water	Chloride	Mercuric nitrate titration A4500-Cl^- C	Ion chromatography (IC) method E300 or method SW9050 may also be used	General water quality parameter used as a marker to verify that site samples are obtained from the same ground-water system. Final product of chlorinated solvent reduction.	Each sampling round	Collect 250 mL of water in a glass container.	Fixed-base
Water	Chloride (optional, see data use)	Hach Chloride test kit model 8-P	Silver nitrate titration	As above, and to guide selection of additional data points in real time while in the field.	Each sampling round	Collect 100 mL of water in a glass container.	Field
Water	Conductivity	E120.1/SW9050, direct reading meter		General water quality parameter used as a marker to verify that site samples are obtained from the same ground-water system.	Each sampling round	Collect 100 to 250 mL of water in a glass or plastic container.	Field
Water	Iron (II) (Fe^{+2})	Colorimetric Hach Method # 8146	Filter if turbid.	May indicate an anaerobic degradation process due to depletion of oxygen, nitrate, and manganese.	Each sampling round	Collect from a flow-through or over-flow cell / analyze at the well head.	Field
Water	Hydrogen (H_2)	Equilibration with gas in the field. Determined with a reducing gas detector.	Optional specialized analysis	Determined terminal electron accepting process. Predicts the possiblity for reductive dechlorination.	One round of sampling on selected wells.	Sampled at well head requires the production of 300 mL per minute of water for 30 minutes.	Field
Water	Manganese	EPA 200.7 or EPA 200.9		To determine if anaerobic biological activity is solubilizing manganese from the aquifer matrix material.	One round of sampling	Collect 100 ml in a glass or plastic container that is rinsed in the field with the ground water to be sampled. Unfiltered samples obtained using low flow sampling methods are preferred for analysis of dissolved metals. Adjust pH to 2 with nitric acid. Do not insert pH paper or an electrode into the sample.	Laboratory

Table 2.1 (Continued)

Matrix	Analysis	Method/Reference	Comments	Data Use	Recommended Frequency of Analysis	Sample Volume, Sample Container, Sample Preservation	Field or Fixed-Base Laboratory
Water	Methane, ethane, and ethene	Kampbell *et al.*, 1989 and 1998 or SW3810 Modified	Method published by researchers at the U.S. Environmental Protection Agency. Limited to few commercial labs.	The presence of CH_4 suggests BTEX degradation via methanogenesis. Ethane and ethene data are used where chlorinated solvents are suspected of undergoing biological transformation.	Each sampling round	Collect water samples in 50 mL glass serum bottles with gray butyl /Teflon-faced septa and crimp caps; add H_2SO_4 to pH less than 2, cool to 4°C.	Fixed-base
Water	Nitrate	IC method E300		Substrate for microbial respiration if oxygen is depleted.	Each sampling round	Collect up to 40 mL of water in a glass or plastic container; add H_2SO_4 to pH less than 2, cool to 4°C.	Fixed-base
Water	Oxidation-reduction potential	A2580B	Measurements made with electrodes; results are displayed on a meter; protect samples from exposure to oxygen. Report results against a silver/silver chloride reference electrode. (Eh) is calculated by adding a correction factor specific to the electrode used.	The ORP of ground water influences and is influenced by the nature of the biologically mediated degradation of contaminants; the ORP (expressed as Eh) of ground water may range from more than 800 mV to less than -400 mV.	Each sampling round	Measure in a flow through cell or an over-flowing container filled from the bottom to prevent exposure of the ground water to the atmosphere.	Field
Water	Oxygen	Dissolved oxygen meter calibrated between each well according to the supplier's specifications	Refer to method A4500 for a comparable laboratory procedure.	The oxygen concentration is a data input to the Bioplume model; concentrations less than 1 mg/L generally indicate an anaerobic pathway.	Each sampling round	Measure dissolved oxygen on site using a flow-through cell or over-flow cell.	Field
Water	pH	Field probe with direct reading meter calibrated in the field according to the supplier's specifications.	Field	Aerobic and anaerobic biological processes are pH-sensitive.	Each sampling round	Measure dissolved oxygen on site using a flow-through cell or over-flow cell.	Field

Table 2.1 (Continued)

Matrix	Analysis	Method/Reference	Comments	Data Use	Recommended Frequency of Analysis	Sample Volume, Sample Container, Sample Preservation	Field or Fixed-Base Laboratory
Water	Sulfate (SO_4^{-2})	IC method E300	If this method is used for sulfate analysis, do not use the field method.	Substrate for anaerobic microbial respiration.	Each sampling round	Collect up to 40 mL of water in a glass or plastic container; cool to 4°C.	Fixed-base
Water	Sulfate (SO_4^{-2})	Hach method # 8051	Colorimetric, if this method is used for sulfate analysis, do not use the fixed-base laboratory method.	Same as above.	Each sampling round	Collect up to 40 mL of water in a glass or plastic container; cool to 4°C.	Field
Water	Temperature	Field probe with direct reading meter.	Field only	To determine if a well is adequately purged for sampling.	Each sampling round	Read from oxygen meter.	Field
Water	Total Organic Carbon also called DOC	SW9060	Laboratory	Used to classify plume and to determine if reductive dechlorination is possible in the absence of anthropogenic carbon.	Each sampling round	Measure using a flow-through cell or over-flow cell.	Laboratory

NOTES:

1. "Hach" refers to the Hach Company catalog, 1990.
2. "A" refers to *Standard Methods for the Examination of Water and Wastewater*, 18th edition, 1992.
3. "E" refers to *Methods for Chemical Analysis of Water and Wastes*, U.S. EPA, 1983.
4. "SW" refers to the *Test Methods for Evaluating Solid Waste, Physical, and Chemical Methods*, SW-846, U.S. EPA, 3rd edition, 1986.

Table 2.2 Objectives for Sensitivity and Precision to Implement the Natural Attenuation Protocol. Analyses other than those listed in this table may be required for regulatory compliance.

Matrix	Analysis	Method/Reference	Minimum Limit of Quantification	Precision	Availability	Potential Data Quality Problems
Soil	Aromatic and chlorinated hydrocarbons (benzene, toluene, ethylbenzene, and xylene [BTEX]; chlorinated compounds)	SW8260A	1 mg/Kg	Coefficient of Variation of 20 percent.	Common laboratory analysis.	Volatiles lost during shipment to laboratory; prefer extraction in the field.
Soil	Biologically Available Iron (III)	Under development	50 mg/Kg	Coefficient of Variation of 40 percent.	Specialized laboratory analysis.	Sample must not be allowed to oxidize.
Soil	Total organic carbon (TOC)	SW9060 modified for soil samples	0.1 percent	Coefficient of Variation of 20 percent.	Common laboratory analysis.	Samples must be collected from contaminant-transporting (i.e., transmissive) intervals.
Soil Gas	Fuel and Chlorinated VOCs	EPA Method TO-14	1 ppm (volume/volume)	Coefficient of Variation of 20 percent.	Common laboratory analysis.	Potential for atmospheric dilution during sampling.
Soil Gas	Methane, O_2, CO_2	Field Soil Gas Analyzer	1 percent (volume/volume)	Coefficient of Variation of 20 percent.	Readily available field instrument.	Instrument must be properly calibrated.
Water	Alkalinity	Hach alkalinity test kit model AL AP MG-L	50 mg/L	Standard deviation of 20 mg/L.	Common field analysis.	Analyze sample within 1 hour of collection.
Water	Aromatic and chlorinated hydrocarbons (BTEX, trimethylbenzene isomers, chlorinated compounds)	SW8260A	MCLs	Coefficient of Variation of 10 percent.	Common laboratory analysis.	Volatilization during shipment and biodegradation due to improper preservation.
Water	Chloride	IC method E300	1 mg/L	Coefficient of Variation of 20 percent.	Common laboratory analysis.	----
Water	Chloride (optional, see data use)	Hach Chloride test kit model 8-P	1 mg/L	Coefficient of Variation of 20 percent.	Common field analysis.	Possible interference from turbidity.
Water	Conductivity	E120.1/SW9050, direct reading meter	50 $\mu S/cm^2$	Standard deviation of 50 $\mu S/cm^2$.	Common field probe.	Improperly calibrated instrument.

Table 2.2 (Continued)

Matrix	Analysis	Method/Reference	Minimum Limit of Quantification	Precision	Availability	Potential Data Quality Problems
Water	Hydrogen (H_2)**	See Appendix A	0.1 nM	Standard deviation of 0.1nM.	Specialized field analysis.	Numerous, see Appendix A.
Water	Iron (II) (Fe^{2+}) XX	Colorimetric Hach Method # 8146	0.5 mg/L	Coefficient of Variation of 20 percent.	Common field analysis.	Possible interference from turbidity (must filter if turbid). Keep out of sunlight and analyze within minutes of collection.
Water	Major Cations	SW6010	1 mg/L	Coefficient of Variation of 20 percent.	Common laboratory analysis.	Possible colloidal interferences.
Water	Methane, ethane, and ethene	Kampbell *et al.*, 1989 or SW3810 Modified	1 µg/L	Coefficient of Variation of 20 percent.	Specialized laboratory analysis.	Sample must be preserved against biodegradation and collected without headspace (to minimize volatilization).
Water	Nitrate	IC method E300	0.1 mg/L	Standard deviation of 0.1 mg/L	Common laboratory analysis.	Must be preserved.
Water	Oxidation-reduction potential (ORP)	A2580B	plus or minus 300 mV	plus or minus 50 mV.	Common field probe.	Improperly calibrated electrodes or introduction of atmospheric oxygen during sampling.
Water	Oxygen	Dissolved oxygen meter	0.2 mg/L	Standard deviation of 0.2 mg/L.	Common field instrument.	Improperly calibrated electrodes or bubbles behind the membrane or a fouled membrane or introduction of atmospheric oxygen during sampling.
Water	Sulfate (SO_4^{2-})	IC method E300	5 mg/L	Coefficient of Variation of 20 percent.	Common laboratory.	Fixed-base.
Water	Sulfate (SO_4^{2-}) XX	Hach method # 8051	5 mg/L	Coefficient of Variation of 20 percent.	Common field analysis.	Possible interference from turbidity (must filter if turbid). Keep sample cool.
Water	pH	Field probe with direct reading meter.	0.1 standard units	0.1 standard units.	Common field meter.	Improperly calibrated instrument; time sensitive.
Water	Temperature	Field probe with direct reading meter.	0 degrees Celsius	Standard deviation of 1 degrees Celsius.	Common field probe.	Improperly calibrated instrument; time sensitive.
Water	Total Organic Carbon	SW9060	0.1 mg/L	Coefficient of Variation of 20 percent.	Common laboratory analysis.	

Notes:

** *Filter if turbidity gives a response from the photometer before addition of the reagents that is as large or larger than the specified minimum quantification limit.*

Table 2.3 Analytical Parameters and Weighting for Preliminary Screening for Anaerobic Biodegradation Processes[a/]

Analysis	Concentration in Most Contaminated Zone	Interpretation	Value
Oxygen*	<0.5 mg/L	Tolerated, suppresses the reductive pathway at higher concentrations	3
	>5 mg/L	Not tolerated; however, VC may be oxidized aerobically	-3
Oxygen*	<1 mg/L	At higher concentrations may compete with reductive pathway	2
Nitrate*	>1 mg/L	Reductive pathway possible; VC may be oxidized under Fe(III)-reducing conditions	3
Iron II*			
	<20 mg/L	At higher concentrations may compete with reductive pathway	2
Sulfate*	>1 mg/L	Reductive pathway possible	3
Sulfide*	<0.5 mg/L	VC oxidizes	0
Methane*	>0.5 mg/L	Ultimate reductive daughter product, VC Accumulates	3
	<50 millivolts (mV)	Reductive pathway possible	1
Oxidation Reduction Potential* (ORP) against Ag/AgCl electrode	<-100mV	Reductive pathway likely	2
	5 < pH < 9	Optimal range for reductive pathway	0
pH*	5 > pH >9	Outside optimal range for reductive pathway	-2
	> 20 mg/L	Carbon and energy source; drives dechlorination; can be natural or anthropogenic	2
TOC			
	> 20°C	At T >20°C biochemical process is accelerated	1
Temperature*	>2x background	Ultimate oxidative daughter product	1
Carbon Dioxide	>2x background	Results from interaction between CO_2 and aquifer minerals	1
Alkalinity	>2x background	Daughter product of organic chlorine	2
Chloride*	>1 nM	Reductive pathway possible, VC may accumulate	3
Hydrogen	<1 nM	VC oxidized	0
Hydrogen	> 0.1 mg/L	Intermediates resulting from biodegradation of more complex compounds; carbon and energy source	2
Volatile Fatty Acids			
	> 0.1 mg/L	Carbon and energy source; drives dechlorination	2
BTEX*		Material released	0
Tetrachloroethene		Material released	0
Trichloroethene*		Daughter product of PCE	2[a/]
		Material released	0
DCE*		Daughter product of TCE	2[a/]
		If cis is > 80% of total DCE it is likely a daughter product	
		1,1-DCE can be chemical reaction product of TCA	
		Material released	0
VC*		Daughter product of DCE	2[a/]
		Material released	0
1,1,1-Trichloroethane*		Daughter product of TCA under reducing conditions	2
		Material released	0
DCA		Daughter product of DCA or VC under reducing conditions	2
Carbon Tetrachloride		Daughter product of VC/ethene	2
			3
Chloroethane*		Material released	0
		Daughter product of Carbon Tetrachloride	2
Ethene/Ethane	>0.01mg/L >0.1 mg/L	Material released	0
		Daughter product of Chloroform	2
Chloroform			
Dichloromethane			

* Required analysis. a/ Points awarded only if it can be shown that the compound is a daughter product (i.e., not a constituent of the source NAPL).

Table 2.4 Interpretation of Points Awarded During Screening Step 1

Score	Interpretation
0 to 5	Inadequate evidence for anaerobic biodegradation* of chlorinated organics
6 to 14	Limited evidence for anaerobic biodegradation* of chlorinated organics
15 to 20	Adequate evidence for anaerobic biodegradation* of chlorinated organics
> 20	Strong evidence for anaerobic biodegradation* of chlorinated organics

**reductive dechlorination*

The following two examples illustrate how Step 1 of the screening process is implemented. The site used in the first example is a former fire training area contaminated with chlorinated solvents mixed with fuel hydrocarbons. The presence of the fuel hydrocarbons appears to reduce the ORP of the ground water to the extent that reductive dechlorination is favorable. The second example contains data from a dry cleaning site contaminated only with chlorinated solvents. This site was contaminated with spent cleaning solvents that were dumped into a shallow dry well situated just above a well-oxygenated, unconfined aquifer with low organic carbon concentrations of dissolved organic carbon.

Example 1: Strong Evidence for Anaerobic Biodegradation (Reductive Dechlorination) of Chlorinated Organics

Analyte	Concentration in Most Contaminated Zone	Points Awarded
Dissolved Oxygen	0.1 mg/L	3
Nitrate	0.3 mg/L	2
Iron (II)	10 mg/L	3
Sulfate	2 mg/L	2
Methane	5 mg/L	3
ORP	-190 mV	2
Chloride	3 times background	2
PCE (released)	1,000 µg/L	0
TCE (none released)	1,200 µg/L	2
cis-DCE (none released)	500 µg/L	2
VC (none released)	50 µg/L	2
	Total Points Awarded	23 Points

In this example, the investigator can infer that biodegradation is likely occurring at the time of sampling and may proceed to Step 2.

Example 2: Anaerobic Biodegradation (Reductive Dechlorination) Unlikely

Analyte	Concentration in Most Contaminated Zone	Points Awarded
Dissolved Oxygen	3 mg/L	-3
Nitrate	0.3 mg/L	2
Iron (II)	Not Detected (ND)	0
Sulfate	10 mg/L	2
Methane	ND	0
ORP	+ 100 mV	0
Chloride	background	0
TCE (released)	1,200 µg/L	0
cis-DCE (none released)	ND	0
VC (none released)	ND	0
	Total Points Awarded	1 Point

Appendix C

Field Sample Collection and Geochemical Analysis

SITE 38 GROUNDWATER SAMPLING								
SAMPLE ID	DATE	TIME	VOA	SVOA	METALS	TDS	MNA	REMARKS
BUILDING 71 AREA								
038GGS0104	12/12/00	1545	X		X	X	X	
038GGS0204	12/12/00	1115	X	X	X	X	X	
038GGS0304	12/12/00	1520	X		X	X	X	
038GGS0504	12/8/00	1400	X		X	X		
038GGS1004	12/12/00	1130	X		X	X	X	
038GGS1104	12/8/00	1415	X		X	X		
038GGS1204	12/12/00	1230	X	X	X	X	X	
038GGS1304	12/8/00	1600	X		X	X		
BUILDING 604 AREA								
038GGS0704	12/7/00	1155	X		X	X		
038GGS0804	12/13/00	1100	X		X	X	X	
038GGS0904	12/8/00	1100	X		X	X		
038GGS1404	12/7/00	1130	X		X	X		
038GGS1504	12/7/00	1130	X	X	X	X		
038GGS1704	12/11/00	1400	X		X	X	X	
038GGS1804	12/7/00	1220	X	X	X	X		
038GGS1904	12/8/00	1230	X		X	X	X	
038GGS2004	12/8/00	1230	X		X	X	X	
038GGS2104	12/7/00	1430	X		X	X		
038GGS2204	12/8/00	1030	X		X	X		
038GGS2404	12/7/00	1500	X		X	X		Duplicate

SITE 38 GROUNDWATER SAMPLING								
SAMPLE ID	DATE	TIME	VOA	SVOA	METALS	TDS	MNA	REMARKS
038GGS2804	12/12/00	1630					X	
038GGS2904	12/11/00	1445	X		X	X		Duplicate
038GGS3204	12/13/00	1040	X		X	X	X	
038GGI0404	12/8/00	~~1500~~ 1230	X		X	X		Dupliate
038GGI0804	12/8/00	~~1530~~ 1530	X		X	X		
			X		X	X		
DUPLICATES								
~~038GGH2904~~	12/7/00	1500	X		X	X		
038HGI0404	12/8/00	~~1500~~ 1230	X		X	X		
038HGS2904	12/11/00	1445	X		X	X		
			X		X	X		
BLANKS								
FIELD BLANKS								
038GFB12.11	12/11	1600	X	X	X	X		1645
RINSEATE BLANKS								
038GEB12.11	12/11	1606	X	X	X	X		~~1650~~ 1650
TRIP BLANKS								
038GTB1207	12/7/00	1700	X					
038GTB1208	12/8/00	~~1230~~ 1100	X					
038GTB1211	12/11/00	1300	X					
038GTB1212	12/12/00	1400	X					
038GTB1213	12/13/00	1300	X					

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/12/00

WELL NO. 38GS01 LOCATION 38GS01

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: _____

PURGING DEVICE

Type Device? peri's pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peri's pump

How was the device decontaminated? Per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.76

Depth to water surface from TOC (ft.) 4.93

Length of water (ft.) 8.83

Volume of water (ft.) _____

(gal.) 1.41

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 4.23

PURGING

Time started 1415 Finished 1535

Volume purged 4.25

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1545

Finish _____

IN-SITU TESTING								
Date:	12 Dec							
Time:	1430	1455	1510	1535				
	1	2	3	4	5	6	7	
Well Volume Purged (gal.)	0.75	2.25	3.0	4.25				
Turbidity	0	0	0	0				
Odor								
OVA (ppm)								
pH (units)	6.63	6.64	6.62	6.61				
Conductivity (μmho)	0.234	0.229	0.230	.225				
Water Temperature (°C)	21.44	20.70	20.61	21.21				
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/12/00

WELL NO. 38GS02 LOCATION 38GS02

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peris Pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.59

Depth to water surface from TOC (ft.) 3.78

Length of water (ft.) 8.81

Volume of water (ft.) [illegible]

(gal.) 1.41

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 4 [illegible].23 gal

PURGING

Time started 0950 Finished [illegible] 1055

Volume purged [illegible] 4.25

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1115

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1002	1012	1019	1027	1050		
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		0.75	1.1	2.0	2.8	4gal		
Turbidity		0	0.0	0.7	0	0		
Odor								
OVA (ppm)								
pH (units)		7.61	7.26	7.30	7.03	6.93		
Conductivity (μmho)		1.46	.890	.906	.858	0.768		
Water Temperature (°C)		19.6	20.55	20.54	20.57	20.71		
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/12/00

WELL NO. 38 GS03 LOCATION 38 GS03

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albracht

PURGING DEVICE

Type Device? peri's pump

How was the device decontaminated? per CSAP

How was the line decontaminated? per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peri's pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.78

Depth to water surface from TOC (ft.) 3.66

Length of water (ft.) 9.12

Volume of water (ft.) _____

(gal.) 1.46

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 4.38

PURGING

Time started 1415 Finished 1500 1520

Volume purged 4.50

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1520

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
Date:	12/12							
Time:	1420	1450	1500					
Well Volume Purged (gal.)		1 gal	3 gal	3.75				
Turbidity		0	0	0				
Odor								
OVA (ppm)								
pH (units)		6.94	6.86	6.91				
Conductivity (µmho)		0.309	0.289	0.292				
Water Temperature (°C)		21.19	22.91	22.34				
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/8/00

WELL NO. 38G505 LOCATION 38G505

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: _____

PURGING DEVICE

Type Device? Peris pump

How was the device decontaminated? _____

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peris pump

How was the device decontaminated? _____

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 13.18

Depth to water surface from TOC (ft.) 3.82

Length of water (ft.) 9.36

Volume of water (ft.) _____

(gal.) 1.5

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 4.5

PURGING

Time started 1214 Finished 1340

Volume purged 4.5

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start _____

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
Date:		8 Dec						
Time:		1250	1254	1305	1340			
Well Volume Purged (gal.)		.5 gal	1.5	2.5	4.5			
Turbidity		0	0	0	0			
Odor								
OVA (ppm)								
pH (units)		7.86	7.81	7.77	7.58			
Conductivity (umho)		0.295	.301	.303	0.305			
Water Temperature (°C)		22.86	22.21	21.79	21.84			
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/7/00

WELL NO. 38GS07 LOCATION 38GS07

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albract

PURGING DEVICE

Type Device? peris pump

How was the device decontaminated? _____

How was the line decontaminated? per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 13.68

Depth to water surface from TOC (ft.) 6.79

Length of water (ft.) 6.89

Volume of water (ft.) _____

(gal.) 1.1

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 3.3

PURGING

Time started 1032 Finished 1114

Volume purged 4.0

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1155

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1044	1052	1101				
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		0.75	1.75	3.5				
Turbidity		0	0	0				
Odor								
OVA (ppm)								
pH (units)		7.30	7.34	7.33				
Conductivity (μmho)		0.388	.384	.385				
Water Temperature (°C)		23.4	23.3	22.3				
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/13/00

WELL NO. 38GS08 LOCATION 38 GS08

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardx Albrecht

PURGING DEVICE

Type Device? peris pump

How was the device decontaminated? _____

How was the line decontaminated? per LSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peris pump

How was the device decontaminated? _____

How was the line decontaminated? per LSAP

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.64

Depth to water surface from TOC (ft.) 6.63

Length of water (ft.) _____

Volume of water (ft.) _____

(gal.) _____

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 2.9 gal

PURGING

Time started 0920 Finished 1035

Volume purged 5.0

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1100

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
	Date:	BSec						
	Time:	0950	1026	1035				
Well Volume Purged (gal.)		2 gal	4 gal	5.0 gal				
Turbidity		130	0	0				
Odor								
OVA (ppm)								
pH (units)		7.96	7.80 BM	8.12				
Conductivity (µmho)		0.350	0.466 BM	0.334 0.356				
Water Temperature (°C)		20.77	20.81	20.89				
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/8/00

WELL NO. 38GS09 LOCATION 38GS09

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albright

PURGING DEVICE

Type Device? _____

How was the device decontaminated? _____

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? _____

How was the device decontaminated? _____

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) _____

Stickup (ft.) _____

Depth to bottom of well from TOC (ft.) 13.30

Depth to water surface from TOC (ft.) 5.64

Length of water (ft.) 7.66

Volume of water (ft.) _____

(gal.) 1.22

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 3.66

PURGING

Time started 1000 Finished _____

Volume purged 4 gal

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start _____

Finish _____

IN-SITU TESTING

	Date:	1	2	3	4	5	6	7
	Time:							
Well Volume Purged (gal.)		1 1.00	2 1.14					
Turbidity			0					
Odor								
OVA (ppm)								
pH (units)		7.52	7.44					
Conductivity (μmho)		0.346	.328					
Water Temperature (°C)		22.28	22.50					
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/12/00

WELL NO. 38GS10 LOCATION 38GS10

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? Peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peris Pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 13.106

Depth to water surface from TOC (ft.) 4.08

Length of water (ft.) 9.02

Volume of water (ft.) _____

(gal.) 1.44

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 4.32

PURGING

Time started 1000 Finished 1052

Volume purged 5.0

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1130

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1006	1017	1025	1031	1052		
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		0.8	2.2	3.0	3.5	5.0		
Turbidity		0	1.1	0	0	0		
Odor								
OVA (ppm)								
pH (units)		6.46	6.75	6.9	6.68	7.02		
Conductivity (µmho)		.638	.618	.599	.599	0.599		
Water Temperature (°C)		21.97	20.32	21.77	21.23	22.05		
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/8/00

WELL NO. 38GS11 LOCATION 38GS11

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? peris pump

How was the device decontaminated? _____

How was the line decontaminated? Per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peris pump

How was the device decontaminated? _____

How was the line decontaminated? Per CSAP

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.69

Depth to water surface from TOC (ft.) 3.85

Length of water (ft.) 8.84

Volume of water (ft.) _____

(gal.) 1.4

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 4.2

PURGING

Time started 1243 Finished _____

Volume purged 4.2

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start _____

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
Date:			8 Dec					
Time:		1307	1340	1421				
Well Volume Purged (gal.)		0.25	3.0	9.2				
Turbidity		25	0	23.6				
Odor								
OVA (ppm)								
pH (units)		7.78	7.96	7.70				
Conductivity (μmho)		.260	.319	.279				
Water Temperature (°C)		22.37	21.02	21.31				
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: _____

WELL NO. _____ LOCATION 38QSR

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: _____

PURGING DEVICE

Type Device? Peri's pump

How was the device decontaminated? per CSAP

How was the line decontaminated?

Which well was previously purged?

SAMPLING DEVICE

Type Device? Peri's pump

How was the device decontaminated?

How was the line decontaminated? Per CSAP

Which well was previously sampled?

INITIAL WELL VOLUME

Well diameter (in.) 2 11

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 13.00

Depth to water surface from TOC (ft.) 4.01

Length of water (ft.) 8.99

Volume of water (ft.)

(gal.) 1.44

Amount of sediment at bottom of well (ft.)

3 Volumes of water (gal.) 4.32

PURGING

Time started 1041 Finished 1200

Volume purged 5-25

Comments on Well Recovery

Depth to water (ft.)

Completion

Additional Comments

Sample Collected: Start 1230

Finish

IN-SITU TESTING

		1	2	3	4	5	6	7
Date:		12 Dec						
Time:		~~1006~~ 1045	1100	1125	1204			
Well Volume Purged (gal.)		0.50	1gal	3.75	5.25			
Turbidity		0	0	0	0			
Odor								
OVA (ppm)								
pH (units)		7.25	7.20	7.28	7.22			
Conductivity (µmho)		0.276	0.283	0.273	.285			
Water Temperature (°C)		20.28	20.10	22.10	20.92			
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 2/8/00

WELL NO. 38GS13 LOCATION 38GS13

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albright

PURGING DEVICE

Type Device? Peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peris Pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.81

Depth to water surface from TOC (ft.) 3.53

Length of water (ft.) 9.28

Volume of water (ft.) _____

(gal.) 1.48

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 4.5

PURGING

Time started 1435 Finished 1550

Volume purged 4.5

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1600

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1443	1504	1550				
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		0.75	2.5	4.5				
Turbidity		0	108	0				
Odor								
OVA (ppm)								
pH (units)		7.72	7.61	7.72				
Conductivity (µmho)		.328	.325	.314				
Water Temperature (°C)		22.09	21.93	21.8				
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/7/05

WELL NO. 38GS14 LOCATION 38 GS 14

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy/Albrecht

PURGING DEVICE

Type Device? Peristaltic pump

How was the device decontaminated? _____

per csap

How was the line decontaminated? per csap

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peristaltic pump

How was the device decontaminated? _____

per csap

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.91

Depth to water surface from TOC (ft.) 7.71

Length of water (ft.) 5.20

Volume of water (ft.) _____

(gal.) .84

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 2.50

PURGING

Time started 1003 Finished 1120

Volume purged 3-2

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1130

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
Date:								
Time:		1027	1040	1049	1059	1115		
Well Volume Purged (gal.)		0.6	1.75	2.5	3.00	3.2		
Turbidity		~0.7	0	0	0	0		
Odor								
OVA (ppm)								
pH (units)		6.94	7.3	7.32	7.48	7.50		
Conductivity (µmho)		.395	.345	.339	.343	.339		
Water Temperature (°C)		21.35	22.54	21.92	19.82	19.87		
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.
Turbidity choices: clear, turbid, opaque Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/7/00

WELL NO. 38GS15 LOCATION 38GS15

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albracht

PURGING DEVICE

Type Device? peris pump

How was the device decontaminated? per csap

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peris pump

How was the device decontaminated? per csap

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.93

Depth to water surface from TOC (ft.) 7.37

Length of water (ft.) 4.56

Volume of water (ft.) _____

(gal.) .73

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 2.19

PURGING

Time started 1025 Finished 1113

Volume purged 3.0

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1130

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1037	1047	1057	1107			
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		1.0 gal	1.25	2.0	2.75			
Turbidity		0	14.1	0	0			
Odor								
OVA (ppm)								
pH (units)		6.9	6.96	7.03	7.05			
Conductivity (μmho)		.388	.404	.386	.398			
Water Temperature (°C)		22.7	22.1	22.0	22.2			
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/8/00

WELL NO. 38GS17 LOCATION 38GS17

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? Peris Pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peris Pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.59

Depth to water surface from TOC (ft.) 6.97

Length of water (ft.) 5.62

Volume of water (ft.) _____

(gal.) .90

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 2.7

PURGING

Time started 1037 Finished 1156

Volume purged 6.5

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1400

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
Date:								
Time:		1104	1120	1135	1156			
Well Volume Purged (gal.)		2.5	3.~~75~~	4.5	6.5			
Turbidity		0	0	0	~~20~~ 0			
Odor								
OVA (ppm)								
pH (units)		7.07	7.13	7.08	7.16			
Conductivity (µmho)		.324	.326	.~~3~~35	.326			
Water Temperature (°C)		24.07	24.4	24.29	24.48			
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/7/00

WELL NO. 38GS18 LOCATION 38GS18

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? Peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 13.10

Depth to water surface from TOC (ft.) 6.60

Length of water (ft.) 6.50

Volume of water (ft.) _____

(gal.) 1.04

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 3.12

PURGING

Time started 1015 Finished 1120

Volume purged _____

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1220

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
Date:								
Time:		1035	1044	1054	~~1103~~	1103	1118	
Well Volume Purged (gal.)		.75	1.25	1.75	~~2.0~~	2.0	2.5	
Turbidity		15.6	0	0	0	0	0	
Odor								
OVA (ppm)								
pH (units)		7.28	7.46	7.52	~~7.53~~	7.56	7.56	
Conductivity (μmho)		.283	.284	.288	~~.288~~	.286	0.281	
Water Temperature (°C)		21.31	21.21	20.38	~~22.10~~	20.86	21.95	
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 6/11/00

WELL NO. 38GS19 LOCATION 38GS19

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Handy Albrecht

PURGING DEVICE

Type Device? Peris Pump

How was the device decontaminated? _____

Per CSAP

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peris Pump

How was the device decontaminated? _____

Per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 12.99

Depth to water surface from TOC (ft.) 7.01

Length of water (ft.) 5.98

Volume of water (ft.) _____

(gal.) .956

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 3.0

PURGING

Time started 1026 Finished 1145

Volume purged 5.0

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1230

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1058	1111	1129	1142			
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		2.50	3.0	3.6	5.0			
Turbidity		0	0	0	0			
Odor								
OVA (ppm)			7.66					
pH (units)		6.91	7.80	7.75	7.73			
Conductivity (µmho)		.333	.344	.330	.345			
Water Temperature (°C)		20.49	22.53	22.77	22.95			
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/14/06

WELL NO. 38GS20 LOCATION 38GS20

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: _____

PURGING DEVICE

Type Device? peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 13.02

Depth to water surface from TOC (ft.) 5.94

Length of water (ft.) 7.08 ~~8.08~~

Volume of water (ft.) _____

(gal.) 1.13

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) ~~3.39~~ 3.39

PURGING

Time started 1033 Finished 1146

Volume purged 6.0

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1230

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1101	1114	1131	1146			
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		2.50	3.25	4.0	6.0			
Turbidity		0	0	0	~~20~~ 0			
Odor								
OVA (ppm)								
pH (units)		7.39	7.54	7.61	7.60			
Conductivity (μmho)		.351	.352	.335	.332			
Water Temperature (°C)		22.96	23.34	23.04	23.35			
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.
Turbidity choices: clear, turbid, opaque Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: 0059 DATE: 12/2/00

WELL NO. 38 GS21 LOCATION 38GS21

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy/Albrecht

PURGING DEVICE

Type Device? peristaltic pump

How was the device decontaminated? _____

How was the line decontaminated? Per Csap

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peris pump

How was the device decontaminated? _____

How was the line decontaminated? Per Csap

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) Flush

Depth to bottom of well from TOC (ft.) 13.80

Depth to water surface from TOC (ft.) 6.84

Length of water (ft.) 6.16

Volume of water (ft.) _____

(gal.) .985

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 2.95

PURGING

Time started 1342 Finished 1425

Volume purged 4.0 gal

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1430

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
	Date:	7Dec	7Dec	7Dec				
	Time:	1400	1410	1420				
Well Volume Purged (gal.)		1.25	2.5	4.				
Turbidity		0 ~~7.75~~	0	0				
Odor								
OVA (ppm)								
pH (units)		7.75	7.88	7.92				
Conductivity (μmho)		0.284	0.245	0.243				
Water Temperature (°C)		21.84	21.40	21.41				
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/8/00

WELL NO. 38GS22 LOCATION 38GS22

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy, Albrecht

PURGING DEVICE

Type Device? Peris pump

How was the device decontaminated? _____

Per CSAP

How was the line decontaminated? Per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peris pump

How was the device decontaminated? _____

per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) Flush

Depth to bottom of well from TOC (ft.) 10.20

Depth to water surface from TOC (ft.) 7.62

Length of water (ft.) 2.58

Volume of water (ft.) _____

(gal.) .4128

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 1.20

PURGING

Time started 0925 Finished 1015

Volume purged _____

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1030

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
Date:		8 Dec						
Time:		1000	1015					
Well Volume Purged (gal.)		2 gal	2.5					
Turbidity		0	0					
Odor								
OVA (ppm)								
pH (units)		6.65	7.10					
Conductivity (μmho)		0.313	0.208					
Water Temperature (°C)		21.21	22.11					
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.
Turbidity choices: clear, turbid, opaque Revision Date: 8/5/92

Well smells of H_2S. - BA

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/7/00

WELL NO. 38GS24 LOCATION 38GS24

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? peris pump

How was the device decontaminated? _____

How was the line decontaminated? per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peris pump

How was the device decontaminated? _____

How was the line decontaminated? per CSAP

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 0"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 14.50

Depth to water surface from TOC (ft.) 5.94

Length of water (ft.) 8.66

Volume of water (ft.) _____

(gal.) 1.4

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 4.2

PURGING

Time started 1415 Finished 1520

Volume purged _____

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1500

Finish _____

IN-SITU TESTING

Duplicate collected

		1	2	3	4	5	6	7
Date:		7 Dec						
Time:		1420	1430	1444	1456	1509	1520	
Well Volume Purged (gal.)		0.75	1.5	2.0	3.0	3.50	4	
Turbidity	water rust colored	15	14.6	11.4	6.7	~~6.5~~ 6.7	~~3.6~~ BA 2.7	
Odor								
OVA (ppm)								
pH (units)		7.8	7.76	7.74	7.67	7.84	7.67	
Conductivity (μmho)		0.278	.278	.279	.270	.273	.282	
Water Temperature (°C)		21.72	21.81	22.05	21.94	21.92	21.58	
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/12/00

WELL NO. 38A528 LOCATION 38A528

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? Peri's pump

How was the device decontaminated? per CSAP

How was the line decontaminated? per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peri's Pump

How was the device decontaminated? _____

How was the line decontaminated? per CSAP

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) Flush

Depth to bottom of well from TOC (ft.) 15.15

Depth to water surface from TOC (ft.) 4.67

Length of water (ft.) 10.48

Volume of water (ft.) _____

(gal.) 1.68

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 5.04

PURGING

Time started 1523 Finished ~~1608~~ 1620

Volume purged 5.0

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1630

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1528	1605	1615				
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		0.50	3.5	4.0				
Turbidity		2.5	0.6	0.4				
Odor								
OVA (ppm)								
pH (units)		6.20	6.56	6.73				
Conductivity (µmho)		.244	.15	.144				
Water Temperature (°C)		18.70	18.92	18.73				
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: _____

WELL NO. 386C29 LOCATION 386529

WEATHER CONDITIONS Haze + Overcast AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Landy + ALBRECHT

PURGING DEVICE

Type Device? peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 13.79

Depth to water surface from TOC (ft.) 5.49

Length of water (ft.) 8.30

Volume of water (ft.) 1.32

(gal.) _____

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 3.96

PURGING

Time started 1100 Finished 1155

Volume purged ~~5.0~~ 5.0

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1445

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1108	1124	1139	1151			
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		1.75	3.0	4.5	5.0			
Turbidity		0	36.8	0	0			
Odor								
OVA (ppm)								
pH (units)		7.74	7.89	7.76	7.97			
Conductivity (μmho)		.348	.352	.354	.354			
Water Temperature (°C)		23.39	22.47	22.93	22.89			
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.
Turbidity choices: clear, turbid, opaque Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/13/00

WELL NO. 38 GS32 LOCATION 38GS32

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? peris pump

How was the device decontaminated? Per CSAP

How was the line decontaminated? Per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? Peris pump

How was the device decontaminated? per CSAP

How was the line decontaminated? per CSAP

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) flush

Depth to bottom of well from TOC (ft.) 13.10

Depth to water surface from TOC (ft.) 5.35

Length of water (ft.) _____

Volume of water (ft.) _____

(gal.) _____

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 3.72 gal

PURGING

Time started 0910 Finished 1030

Volume purged 4.75

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1040

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
Date:		13 Dec						
Time:		0945	1020	1030				
Well Volume Purged (gal.)		3 gal	4.5 gal	4.75				
Turbidity		0	0	0				
Odor								
OVA (ppm)								
pH (units)		7.12	7.60	7.52				
Conductivity (µmho)		0.489	0.466	0.470				
Water Temperature (°C)		19.84	20.63	20.22				
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/8/00

WELL NO. 38 GI04 LOCATION 38GI04

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? peri's pump

How was the device decontaminated? per SEAP

How was the line decontaminated? _____

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peri's pump

How was the device decontaminated? _____

How was the line decontaminated? per SEAP

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) _____

Stickup (ft.) _____

Depth to bottom of well from TOC (ft.) 32.80

Depth to water surface from TOC (ft.) 9.16

Length of water (ft.) 22.84

Volume of water (ft.) _____

(gal.) 3.65

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 10.95

PURGING

Time started 0900 Finished 1220

Volume purged _____

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start 1230

Finish _____

IN-SITU TESTING

	Date:							
	Time:	1025	1052	1124	1220			
		1	2	3	4	5	6	7
Well Volume Purged (gal.)		3.5	5.0	8.0	11.0			
Turbidity		0	0	0	15			
Odor								
OVA (ppm)								
pH (units)		7.96	7.95	8.12	8.24			
Conductivity (μmho)		0.477	.471	0.477	.464			
Water Temperature (°C)		24.04	23.8	23.04	22.79			
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

GROUNDWATER SAMPLING

Sample ID: _____

PROJECT NAME _____ JOB NO: _____ DATE: 12/8/00

WELL NO. 38GI08 LOCATION 38GI08

WEATHER CONDITIONS _____ AMBIENT TEMP: _____

REVIEWED BY: _____ Personnel: Hardy Albrecht

PURGING DEVICE

Type Device? Peris pump

How was the device decontaminated? _____

How was the line decontaminated? Per CSAP

Which well was previously purged? _____

SAMPLING DEVICE

Type Device? peris pump

How was the device decontaminated? Per CSAP

How was the line decontaminated? _____

Which well was previously sampled? _____

INITIAL WELL VOLUME

Well diameter (in.) 2"

Stickup (ft.) Flush

Depth to bottom of well from TOC (ft.) 37.00

Depth to water surface from TOC (ft.) 5.86

Length of water (ft.) 31.14

Volume of water (ft.) _____

(gal.) 4.98

Amount of sediment at bottom of well (ft.) _____

3 Volumes of water (gal.) 15

PURGING

Time started 0954 Finished 1330

Volume purged 15.0

Comments on Well Recovery _____

Depth to water (ft.) _____

Completion _____

Additional Comments _____

Sample Collected: Start _____

Finish _____

IN-SITU TESTING

		1	2	3	4	5	6	7
	Date:	8 Dec						
	Time:			1119		1373		
Well Volume Purged (gal.)		3.0	4.25	6.0	10	1500		
Turbidity		7.82 ~~8.0~~	8.0 (159)	7.0	1.2	128		
Odor								
OVA (ppm)								
pH (units)		8.29	8.01	8.3	2.37	8.29		
Conductivity (μmho)		0.649	0.670	0.669	0.680	.721		
Water Temperature (°C)		22.84	22.15	21.74	22.63	20.99		
TDS (mg/l)								
Depth to water (ft.)								

NOTES: 1 ft. length of 4" = 0.087 ft³ or 0.65 gal. 1 ft. length 2" = 0.022 ft³ or 0.16 gal.

Turbidity choices: clear, turbid, opaque

Revision Date: 8/5/92

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GW01	38	12 Dec 00	RA + PH

Dissolved Oxygen (DO) Measurement			
	Time	**Reading (mg/L)**	**Remarks**
DO (titration)	1620	2.8	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	**Reading (mV)**	**Remarks**
Redox Meter #1		-53	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	**Reading (mg/L)**	**Remarks**
Ferrous Iron		0.02	
Total Iron		0.04	
Sulfide		0.002	
Sulfate		15	

Individual Tests			
	Time	**Reading (mg/L)**	**Remarks**
Chloride	✓	40	
Alkalinity		80	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS0204	38	12 Dec 00	BA + PA

Dissolved Oxygen (DO) Measurement			
	Time	**Reading (mg/L)**	**Remarks**
DO (titration)	1200	0	
YSI - 55		0.53	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	**Reading (mV)**	**Remarks**
Redox Meter #1		-159	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	**Reading (mg/L)**	**Remarks**
Ferrous Iron		0.04	
Total Iron		0.024	
Sulfide		2.14	over-range, repeated w/ 5 mL.
Sulfate		0	

Individual Tests			
	Time	**Reading (mg/L)**	**Remarks**
Chloride		200	
Alkalinity	↓	130	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS0304	38	12 Dec 00	PB + PH

Dissolved Oxygen (DO) Measurement			
	Time	Reading (mg/L)	Remarks
DO (titration)	1600	0.4	
YSI - 55		0.61	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	Reading (mV)	Remarks
Redox Meter #1		-86	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	Reading (mg/L)	Remarks
Ferrous Iron		0.1	
Total Iron		0.079	
Sulfide		0.146	
Sulfate		12	

Individual Tests			
	Time	Reading (mg/L)	Remarks
Chloride		40	
Alkalinity		135	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS0804	38	13 Dec 00	BA + PH

Dissolved Oxygen (DO) Measurement			
	Time	Reading (mg/L)	Remarks
DO (titration)	1100	1.8	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	Reading (mV)	Remarks
Redox Meter #1		-13	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	Reading (mg/L)	Remarks
Ferrous Iron		0.02	
Total Iron		0.027	
Sulfide		0.006	
Sulfate		20	

Individual Tests			
	Time	Reading (mg/L)	Remarks
Chloride		40	
Alkalinity		110	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS1004	38	12 Dec 00	BA + AT

Dissolved Oxygen (DO) Measurement			
	Time	**Reading (mg/L)**	**Remarks**
DO (titration)	1220	0	
YSI		0.69	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	**Reading (mV)**	**Remarks**
Redox Meter #1		-117	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	**Reading (mg/L)**	**Remarks**
Ferrous Iron		0.1	
Total Iron		0.077	
Sulfide		0.38	
Sulfate		28	

Individual Tests			
	Time	**Reading (mg/L)**	**Remarks**
Chloride		120	
Alkalinity		140	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS1204	38	12 Dec 00	BA + RH

Dissolved Oxygen (DO) Measurement			
	Time	**Reading (mg/L)**	**Remarks**
DO (titration)	1315	0.2	
YSI		0.81	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	**Reading (mV)**	**Remarks**
Redox Meter #1		-128	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	**Reading (mg/L)**	**Remarks**
Ferrous Iron		0.28	
Total Iron		0.255	
Sulfide		2.58	over range repeated w/ 5 mls.
Sulfate		7	

Individual Tests			
	Time	**Reading (mg/L)**	**Remarks**
Chloride		40	
Alkalinity		90	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS1704	38	11 Dec 00	BT + RH

Dissolved Oxygen (DO) Measurement			
	Time	**Reading (mg/L)**	**Remarks**
DO (titration)	1500	0.2	
YSI		0.56	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	**Reading (mV)**	**Remarks**
Redox Meter #1		-207	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	**Reading (mg/L)**	**Remarks**
Ferrous Iron		0.11	
Total Iron		0.098	
Sulfide		2.13	over range - repeated w/ 5 mls
Sulfate		0	

Individual Tests			
	Time	**Reading (mg/L)**	**Remarks**
Chloride		60	
Alkalinity		125	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS1904	38	11 Dec 00	BS + PH

Dissolved Oxygen (DO) Measurement			
	Time	**Reading (mg/L)**	**Remarks**
DO (titration)	1300	2.4	
1882		~~-3~~ 1.42	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	**Reading (mV)**	**Remarks**
Redox Meter #1		-3	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	**Reading (mg/L)**	**Remarks**
Ferrous Iron		0.03	
Total Iron		0.103	
Sulfide		0.007	
Sulfate		0	

Individual Tests			
	Time	**Reading (mg/L)**	**Remarks**
Chloride		40	
Alkalinity		110	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS2004	38	11 Dec 00	BA + PH

Dissolved Oxygen (DO) Measurement			
	Time	Reading (mg/L)	Remarks
DO (titration)	1445	1.2	
YSI		0.98	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	Reading (mV)	Remarks
Redox Meter #1		-167	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	Reading (mg/L)	Remarks
Ferrous Iron		0.22	
Total Iron		0.223	
Sulfide		1.395	over range - repeated w/ 5 mL -
Sulfate		30	

Individual Tests			
	Time	Reading (mg/L)	Remarks
Chloride		40	
Alkalinity		110	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS204	38	13 Dec 00	RA + PH

Dissolved Oxygen (DO) Measurement			
	Time	**Reading (mg/L)**	**Remarks**
DO (titration)	0945	2.8	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	**Reading (mV)**	**Remarks**
Redox Meter #1		-67	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	**Reading (mg/L)**	**Remarks**
Ferrous Iron		0.09	
Total Iron		0.051	
Sulfide		0.018	
Sulfate		14	

Individual Tests			
	Time	**Reading (mg/L)**	**Remarks**
Chloride		40	
Alkalinity		40	

FIELD DATA RECORDING FORM
NATURAL ATTENUATION FIELD PARAMETER EVALUATION
NAS Pensacola
Site 38

Sample ID:	Site:	Date:	Field Personnel:
38GS3204	38	13 Dec 00	BA + PH

Dissolved Oxygen (DO) Measurement			
	Time	**Reading (mg/L)**	**Remarks**
DO (titration)	1130	1.3	

pH (from GW Quality) =

Oxidation-Reduction Potential Measurement			
	Time	**Reading (mV)**	**Remarks**
Redox Meter #1		-64	

Temperature (from GW Quality) =

Hach 2010 Spectrophotometer Tests			
	Time	**Reading (mg/L)**	**Remarks**
Ferrous Iron		0.6	
Total Iron		1.005	
Sulfide		0.009	
Sulfate		1	

Individual Tests			
	Time	**Reading (mg/L)**	**Remarks**
Chloride		120	
Alkalinity		130	

Appendix D

Analytical Results

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

| HYDROGEN | SAMPLE ID ------->
ORIGINAL ID ----->
LAB SAMPLE ID --->
ID FROM REPORT -->
SAMPLE DATE ----->
MATRIX ---------->
UNITS ----------> | 038-G-GS01-04
38GS01
P0012181-01
38GS01
12/12/00
Water
nM | 038-G-GS02-04
38GS02
P0012181-06
38GS02
12/12/00
Water
nM | 038-G-GS03-04
38GS03
P0012181-05
38GS03
12/12/00
Water
nM | 038-G-GS08-04
38GS08
P0012181-09
38GS08
12/13/00
Water
nM | 038-G-GS10-04
38GS10
P0012181-02
38GS10
12/12/00
Water
nM | 038-G-GS12-04
38GS12-04
P0012181-04
38GS12-04
12/12/00
Water
nM |
|---|---|---|---|---|---|---|---|
| CAS # | Parameter | P0012181 | P0012181 | P0012181 | P0012181 | P0012181 | P0012181 |
| 12408-02-5 | Hydrogen | 1.4 | 2.1 | 1.2 | 0.71 | 1.1 | 0.03 U |

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

HYDROGEN	SAMPLE ID ------->	038-G-GS17-04	038-G-GS19-04	038-G-GS20-04	038-G-GS28-04	038-G-GS32-04	
	ORIGINAL ID ----->	38GS17	38GS19	38GS20A	38GS28-04	38GS32	
	LAB SAMPLE ID --->	P0012181-07	P0012181-08	P0012181-03	P0012181-10	P0012181-11	
	ID FROM REPORT -->	38GS17	38GS19	38GS20A	38GS28-04	38GS32	
	SAMPLE DATE ----->	12/11/00	12/11/00	12/11/00	12/13/00	12/13/00	
	MATRIX ---------->	Water	Water	Water	Water	Water	
	UNITS ---------->	nM	nM	nM	nM	nM	
CAS #	Parameter	P0012181	P0012181	P0012181	P0012181	P0012181	
12408-02-5	Hydrogen	4.6	0.38	1.6	0.03 U	2.3	

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW SVOA									
	SAMPLE ID ------->	038-G-GS02-04		038-G-GS12-04		038-G-GS15-04		038-G-GS18-04			
	ORIGINAL ID ----->	038GGS0204		038GGS1204		038GGS1504		038GGS1804			
	LAB SAMPLE ID --->	S008483*5		S008483*6		S008390*6		S008390*7			
	ID FROM REPORT -->	038GGS0204		038GGS1204		038GGS1504		038GGS1804			
	SAMPLE DATE ----->	12/12/00		12/12/00		12/07/00		12/07/00			
	DATE EXTRACTED -->	12/14/00		12/14/00		12/12/00		12/12/00			
	DATE ANALYZED --->	12/20/00		12/20/00		12/20/00		12/20/00			
	MATRIX ---------->	Water		Water		Water		Water			
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L			
CAS #	Parameter	NASP09	VAL	NASP09	VAL	NASP06	VAL	NASP06	VAL		
108-95-2	Phenol	5.	U	5.	U	5.	U	5.	U		
111-44-4	bis(2-Chloroethyl)ether	5.	U	5.	U	5.	U	5.	U		
95-57-8	2-Chlorophenol	5.	U	5.	U	5.	U	5.	U		
95-48-7	2-Methylphenol (o-Cresol)	5.	U	5.	U	5.	U	5.	U		
108-60-1	2,2'-oxybis(1-Chloropropane)/bis(2-chlor	5.	U	5.	U	5.	U	5.	U		
9999900-32-2	3-Methylphenol/4-Methylphenol	5.	U	5.	U	5.	U	5.	U		
621-64-7	N-Nitroso-di-n-propylamine	5.	U	5.	U	5.	U	5.	U		
67-72-1	Hexachloroethane	5.	U	5.	U	5.	U	5.	U		
98-95-3	Nitrobenzene	5.	U	5.	U	5.	U	5.	U		
78-59-1	Isophorone	5.	U	5.	U	5.	U	5.	U		
88-75-5	2-Nitrophenol	5.	U	5.	U	5.	U	5.	U		
105-67-9	2,4-Dimethylphenol	5.	U	5.	U	5.	U	5.	U		
120-83-2	2,4-Dichlorophenol	5.	U	5.	U	5.	U	5.	U		
91-20-3	Naphthalene	4.	J	5.	U	170.	D	5.	U		
106-47-8	4-Chloroaniline	5.	U	5.	U	5.	U	5.	U		
87-68-3	Hexachlorobutadiene	5.	U	5.	U	5.	U	5.	U		
111-91-1	bis(2-Chloroethoxy)methane	5.	U	5.	U	5.	U	5.	U		
59-50-7	4-Chloro-3-methylphenol	5.	U	5.	U	5.	U	5.	U		
91-57-6	2-Methylnaphthalene	3.	J	3.	J	1.	J	5.	U		
77-47-4	Hexachlorocyclopentadiene	5.	U	5.	U	5.	U	5.	U		
88-06-2	2,4,6-Trichlorophenol	5.	U	5.	U	5.	U	5.	U		
95-95-4	2,4,5-Trichlorophenol	20.	U	20.	U	20.	U	20.	U		
91-58-7	2-Chloronaphthalene	5.	U	5.	U	5.	U	5.	U		
88-74-4	2-Nitroaniline	20.	U	20.	U	20.	U	20.	U		
131-11-3	Dimethylphthalate	5.	U	5.	U	5.	U	5.	U		
208-96-8	Acenaphthylene	5.	U	5.	U	5.	U	5.	U		
606-20-2	2,6-Dinitrotoluene	5.	U	5.	U	5.	U	5.	U		
99-09-2	3-Nitroaniline	20.	U	20.	U	20.	U	20.	U		
83-32-9	Acenaphthene	1.	J	5.	U	5.	U	79.			
51-28-5	2,4-Dinitrophenol	20.	U	20.	U	20.	U	20.	U		
100-02-7	4-Nitrophenol	20.	U	20.	U	20.	U	20.	U		
132-64-9	Dibenzofuran	1.	J	5.	U	5.	U	91.			
121-14-2	2,4-Dinitrotoluene	5.	U	5.	U	5.	U	5.	U		
84-66-2	Diethylphthalate	5.	U	5.	U	5.	U	5.	U		
7005-72-3	4-Chlorophenylphenyl ether	5.	U	5.	U	5.	U	5.	U		
86-73-7	Fluorene	1.	J	0.7	J	5.	U	28.			

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW SVOA	SAMPLE ID ------>	038-G-GS02-04		038-G-GS12-04		038-G-GS15-04		038-G-GS18-04			
	ORIGINAL ID ----->	038GGS0204		038GGS1204		038GGS1504		038GGS1804			
	LAB SAMPLE ID --->	S008483*5		S008483*6		S008390*6		S008390*7			
	ID FROM REPORT -->	038GGS0204		038GGS1204		038GGS1504		038GGS1804			
	SAMPLE DATE ----->	12/12/00		12/12/00		12/07/00		12/07/00			
	DATE EXTRACTED -->	12/14/00		12/14/00		12/12/00		12/12/00			
	DATE ANALYZED --->	12/20/00		12/20/00		12/20/00		12/20/00			
	MATRIX ---------->	Water		Water		Water		Water			
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L			
CAS #	Parameter	NASP09	VAL	NASP09	VAL	NASP06	VAL	NASP06	VAL		
100-01-6	4-Nitroaniline	20.	U	20.	U	20.	U	20.	U		
534-52-1	2-Methyl-4,6-Dinitrophenol	20.	U	20.	U	20.	U	20.	U		
122-39-4	Diphenylamine	5.	U	5.	U	5.	U	5.	U		
101-55-3	4-Bromophenyl-phenylether	5.	U	5.	U	5.	U	5.	U		
118-74-1	Hexachlorobenzene	5.	U	5.	U	5.	U	5.	U		
87-86-5	Pentachlorophenol	20.	U	20.	U	20.	U	20.	U		
85-01-8	Phenanthrene	5.	U	5.	U	5.	U	190.	D		
120-12-7	Anthracene	5.	U	5.	U	5.	U	11.			
84-74-2	Di-n-butylphthalate	5.	U	5.	U	5.	U	5.	U		
206-44-0	Fluoranthene	5.	U	5.	U	5.	U	24.			
129-00-0	Pyrene	5.	U	5.	U	5.	U	11.			
85-68-7	Butylbenzylphthalate	5.	U	5.	U	5.	U	5.	U		
91-94-1	3,3'-Dichlorobenzidine	5.	U	5.	U	5.	U	5.	U		
56-55-3	Benzo(a)anthracene	5.	U	5.	U	5.	U	5.	U		
218-01-9	Chrysene	5.	U	5.	U	5.	U	5.	U		
117-81-7	bis(2-Ethylhexyl)phthalate (BEHP)	5.	U	5.	U	5.	U	5.	U		
117-84-0	Di-n-octylphthalate	5.	U	5.	U	5.	U	5.	U		
205-99-2	Benzo(b)fluoranthene	5.	U	5.	U	5.	U	5.	U		
207-08-9	Benzo(k)fluoranthene	5.	U	5.	U	5.	U	5.	U		
50-32-8	Benzo(a)pyrene	5.	U	5.	U	5.	U	5.	U		
193-39-5	Indeno(1,2,3-cd)pyrene	5.	U	5.	U	5.	U	5.	U		
53-70-3	Dibenz(a,h)anthracene	5.	U	5.	U	5.	U	5.	U		
191-24-2	Benzo(g,h,i)perylene	5.	U	5.	U	5.	U	5.	U		

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA	SAMPLE ID ------->	038-G-GH24-04		038-G-GI04-04		038-H-GI04-04		038-G-GI08-04		038-G-GS01-04		038-G-GS02-04	
	ORIGINAL ID ----->	038GGH2404		038GGI0404		038HGI0404		038GGI0804		038GGS0104		038GGS0204	
	LAB SAMPLE ID --->	S008390*5		S008436*6		S008436*7		S008436*8		S008483*1		S008483*5	
	ID FROM REPORT -->	038GGH2404		038GGI0404		038HGI0404		038GGI0804		038GGS0104		038GGS0204	
	SAMPLE DATE ----->	12/07/00		12/08/00		12/08/00		12/08/00		12/12/00		12/12/00	
	DATE ANALYZED --->	12/15/00		12/15/00		12/15/00		12/15/00		12/17/00		12/17/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ----------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP06	VAL	NASP06	VAL	NASP06	VAL	NASP06	VAL	NASP09	VAL	NASP09	VAL
74-87-3	Chloromethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
74-83-9	Bromomethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-01-4	Vinyl chloride	1.	U	0.7	J	1.		0.8	J	1.	U	3.	
75-00-3	Chloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	6.	
75-09-2	Methylene chloride	2.	U	2.	U	2.	U	2.	U	2.	U	2.	U
67-64-1	Acetone	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
75-15-0	Carbon disulfide	0.4	J	1.	U	1.	U	0.3	J	1.	U	2.	
75-35-4	1,1-Dichloroethene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-34-3	1,1-Dichloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	3.	
156-59-2	cis-1,2-Dichloroethene	2.		1.	U	1.	U	1.	U	1.	U	0.9	J
156-60-5	trans-1,2-Dichloroethene	0.9	J	1.	U	1.	U	1.	U	1.	U	1.	U
67-66-3	Chloroform	0.6	J	1.	U	1.	U	1.	U	1.	U	1.	U
107-06-2	1,2-Dichloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
78-93-3	2-Butanone (MEK)	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
74-97-5	Chlorobromomethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
71-55-6	1,1,1-Trichloroethane	0.6	J	1.	U	1.	U	1.	U	1.	U	1.	U
56-23-5	Carbon tetrachloride	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-27-4	Bromodichloromethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
78-87-5	1,2-Dichloropropane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
10061-01-5	cis-1,3-Dichloropropene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
79-01-6	Trichloroethene	7.		1.	U	1.	U	1.	U	1.	U	1.	U
124-48-1	Dibromochloromethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
79-00-5	1,1,2-Trichloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
71-43-2	Benzene	0.2	J	0.3	J	0.4	J	1.	U	1.	U	0.5	J
10061-02-6	trans-1,3-Dichloropropene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-25-2	Bromoform	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
591-78-6	2-Hexanone	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
127-18-4	Tetrachloroethene	1.		1.	U	1.	U	1.	U	1.	U	1.	U
79-34-5	1,1,2,2-Tetrachloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
106-93-4	1,2-Dibromoethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
108-88-3	Toluene	0.4	J	1.	U	1.	U	1.	U	1.	U	2.	
108-90-7	Chlorobenzene	0.4	J	1.	U	1.	U	1.	U	1.	U	2.	
100-41-4	Ethylbenzene	0.5	J	1.	U	1.	U	1.	U	1.	U	20.	
100-42-5	Styrene	0.3	J	1.	U	1.	U	1.	U	1.	U	1.	U
1330-20-7	Xylene (Total)	2.		1.	U	1.	U	1.	U	1.	U	4.	
541-73-1	1,3-Dichlorobenzene	0.7	J	1.	U	1.	U	1.	U	1.	U	0.4	J

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA												
	SAMPLE ID ------>	038-G-GH24-04		038-G-GI04-04		038-H-GI04-04		038-G-GI08-04		038-G-GS01-04		038-G-GS02-04	
	ORIGINAL ID ----->	038GGH2404		038GGI0404		038HGI0404		038GGI0804		038GGS0104		038GGS0204	
	LAB SAMPLE ID --->	S008390*5		S008436*6		S008436*7		S008436*8		S008483*1		S008483*5	
	ID FROM REPORT -->	038GGH2404		038GGI0404		038HGI0404		038GGI0804		038GGS0104		038GGS0204	
	SAMPLE DATE ----->	12/07/00		12/08/00		12/08/00		12/08/00		12/12/00		12/12/00	
	DATE ANALYZED --->	12/15/00		12/15/00		12/15/00		12/15/00		12/17/00		12/17/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP06	VAL	NASP06	VAL	NASP06	VAL	NASP06	VAL	NASP09	VAL	NASP09	VAL
106-46-7	1,4-Dichlorobenzene	0.8	J	1.	U	1.	U	1.	U	1.	U	0.9	J
95-50-1	1,2-Dichlorobenzene	0.7	J	1.	U	1.	U	1.	U	1.	U	5.	
96-12-8	1,2-Dibromo-3-Chloropropane	1.	U	1.	U	1.	U	1.		1.	U	1.	U
120-82-1	1,2,4-Trichlorobenzene	1.		1.	U	1.	U	1.	U	1.	U	1.	U

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA														
	SAMPLE ID ------>	038-G-GS03-04		038-G-GS05-04		038-G-GS07-04		038-G-GS08-04		038-G-GS09-04		038-G-GS10-04	
	ORIGINAL ID ----->	038GGS0304		038GGS0504		038GGS0704		038GGS0804		038GGS0904		038GGS1004	
	LAB SAMPLE ID --->	S008483*2		S008436*1		S008390*2		S008515*1		S008436*4		S008483*3	
	ID FROM REPORT -->	038GGS0304		038GGS0504		038GGS0704		038GGS0804		038GGS0904		038GGS1004	
	SAMPLE DATE ----->	12/12/00		12/08/00		12/07/00		12/13/00		12/08/00		12/12/00	
	DATE ANALYZED --->	12/17/00		12/15/00		12/15/00		12/17/00		12/15/00		12/17/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP09	VAL	NASP06	VAL	NASP06	VAL	NASP12	VAL	NASP06	VAL	NASP09	VAL
74-87-3	Chloromethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
74-83-9	Bromomethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-01-4	Vinyl chloride	1.		1.	U	0.9	J	22.		3.		1.	U
75-00-3	Chloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-09-2	Methylene chloride	2.	U	2.	U	2.	U	2.	U	2.	U	2.	U
67-64-1	Acetone	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
75-15-0	Carbon disulfide	0.4	J	0.4	J	1.	U	1.	U	1.	U	1.	U
75-35-4	1,1-Dichloroethene	1.	U	1.	U	1.	U	0.7	J	1.	U	1.	U
75-34-3	1,1-Dichloroethane	3.		5.		0.7	J	2.		1.	U	1.	U
156-59-2	cis-1,2-Dichloroethene	5.		0.8	J	2.		56.		11.		1.	U
156-60-5	trans-1,2-Dichloroethene	1.		1.	U	2.		15.		9.		1.	U
67-66-3	Chloroform	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
107-06-2	1,2-Dichloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
78-93-3	2-Butanone (MEK)	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
74-97-5	Chlorobromomethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
71-55-6	1,1,1-Trichloroethane	1.		7.		1.	U	1.		0.4	J	1.	U
56-23-5	Carbon tetrachloride	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-27-4	Bromodichloromethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
78-87-5	1,2-Dichloropropane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
10061-01-5	cis-1,3-Dichloropropene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
79-01-6	Trichloroethene	4.		3.		1.	U	17.		10.		1.	U
124-48-1	Dibromochloromethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
79-00-5	1,1,2-Trichloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
71-43-2	Benzene	0.9	J	1.	U	1.	U	0.4	J	1.	U	1.	U
10061-02-6	trans-1,3-Dichloropropene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-25-2	Bromoform	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
591-78-6	2-Hexanone	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
127-18-4	Tetrachloroethene	0.5	J	3.		1.	U	4.		3.		1.	U
79-34-5	1,1,2,2-Tetrachloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
106-93-4	1,2-Dibromoethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
108-88-3	Toluene	1.	U	0.2	J	1.	U	1.	U	1.	U	1.	U
108-90-7	Chlorobenzene	1.	U	0.2	J	1.	U	1.	U	1.	U	1.	U
100-41-4	Ethylbenzene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
100-42-5	Styrene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
1330-20-7	Xylene (Total)	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
541-73-1	1,3-Dichlorobenzene	1.	U	0.3	J	1.	U	1.	U	1.	U	1.	U

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA													
	SAMPLE ID ------>	038-G-GS03-04		038-G-GS05-04		038-G-GS07-04		038-G-GS08-04		038-G-GS09-04		038-G-GS10-04	
	ORIGINAL ID ----->	038GGS0304		038GGS0504		038GGS0704		038GGS0804		038GGS0904		038GGS1004	
	LAB SAMPLE ID --->	S008483*2		S008436*1		S008390*2		S008515*1		S008436*4		S008483*3	
	ID FROM REPORT -->	038GGS0304		038GGS0504		038GGS0704		038GGS0804		038GGS0904		038GGS1004	
	SAMPLE DATE ----->	12/12/00		12/08/00		12/07/00		12/13/00		12/08/00		12/12/00	
	DATE ANALYZED --->	12/17/00		12/15/00		12/15/00		12/17/00		12/15/00		12/17/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ----------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP09	VAL	NASP06	VAL	NASP06	VAL	NASP12	VAL	NASP06	VAL	NASP09	VAL
106-46-7	1,4-Dichlorobenzene	1.	U	0.3	J	1.	U	1.	U	1.	U	1.	U
95-50-1	1,2-Dichlorobenzene	0.4	J	0.4	J	1.	U	1.	U	1.	U	0.4	J
96-12-8	1,2-Dibromo-3-Chloropropane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
120-82-1	1,2,4-Trichlorobenzene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA																							
	SAMPLE ID ------>	038-G-GS11-04			038-G-GS12-04			038-G-GS13-04			038-G-GS14-04			038-G-GS15-04			038-G-GS17-04		
	ORIGINAL ID ----->	038GGS1104			038GGS1204			038GGS1304			038GGS1404			038GGS1504			038GGS1704		
	LAB SAMPLE ID --->	S008436*2			S008483*6			S008436*3			S008390*1			S008390*6			S008462*1		
	ID FROM REPORT -->	038GGS1104			038GGS1204			038GGS1304			038GGS1404			038GGS1504			038GGS1704		
	SAMPLE DATE ----->	12/08/00			12/12/00			12/08/00			12/07/00			12/07/00			12/11/00		
	DATE ANALYZED --->	12/15/00			12/17/00			12/15/00			12/15/00			12/15/00			12/17/00		
	MATRIX ---------->	Water			Water			Water			Water			Water			Water		
	UNITS ---------->	UG/L			UG/L			UG/L			UG/L			UG/L			UG/L		
CAS #	Parameter	NASP06		VAL	NASP09		VAL	NASP06		VAL	NASP06		VAL	NASP06		VAL	NASP09		VAL
74-87-3	Chloromethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
74-83-9	Bromomethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
75-01-4	Vinyl chloride	1.		U	7.			4.			1.		U	3.			7.		
75-00-3	Chloroethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
75-09-2	Methylene chloride	2.		U	2.		U	2.		U	2.		U	2.		U	2.		U
67-64-1	Acetone	5.		U	5.		U	5.		U	5.		U	5.		U	5.		U
75-15-0	Carbon disulfide	1.		U	1.			1.		U	1.		U	0.8		J	1.		U
75-35-4	1,1-Dichloroethene	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
75-34-3	1,1-Dichloroethane	0.4		J	6.			4.			0.8		J	14.			2.		
156-59-2	cis-1,2-Dichloroethene	1.		U	24.			7.			3.			0.9		J	1.		U
156-60-5	trans-1,2-Dichloroethene	1.		U	0.5		J	0.6		J	1.		U	4.			1.		U
67-66-3	Chloroform	1.		U	0.9		J	1.		U	0.7		J	1.		U	1.		U
107-06-2	1,2-Dichloroethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
78-93-3	2-Butanone (MEK)	5.		U	5.		U	5.		U	5.		U	5.		U	5.		U
74-97-5	Chlorobromomethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
71-55-6	1,1,1-Trichloroethane	0.5		J	0.6		J	0.8		J	2.			1.		U	1.		U
56-23-5	Carbon tetrachloride	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
75-27-4	Bromodichloromethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
78-87-5	1,2-Dichloropropane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
10061-01-5	cis-1,3-Dichloropropene	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
79-01-6	Trichloroethene	1.		U	6.			5.			18.			0.6		J	1.		U
124-48-1	Dibromochloromethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
79-00-5	1,1,2-Trichloroethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
71-43-2	Benzene	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
10061-02-6	trans-1,3-Dichloropropene	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
75-25-2	Bromoform	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.		U	5.		U	5.		U	5.		U	5.		U	5.		U
591-78-6	2-Hexanone	5.		U	5.		U	5.		U	5.		U	5.		U	5.		U
127-18-4	Tetrachloroethene	1.		U	11.			1.		U	12.			1.		U	1.		U
79-34-5	1,1,2,2-Tetrachloroethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
106-93-4	1,2-Dibromoethane	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
108-88-3	Toluene	1.		U	1.		U	0.2		J	1.		U	1.		U	0.5		J
108-90-7	Chlorobenzene	1.		U	1.		U	0.3		J	1.		U	1.		U	1.		U
100-41-4	Ethylbenzene	1.		U	1.		U	1.		U	1.		U	53.			6.		
100-42-5	Styrene	1.		U	1.		U	1.		U	1.		U	1.		U	1.		U
1330-20-7	Xylene (Total)	0.4		J	1.		U	0.4		J	1.		U	1.		U	2.		
541-73-1	1,3-Dichlorobenzene	1.		U	0.4		J	1.		U	1.		U	1.		U	1.		U

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA						
SAMPLE ID ------->	038-G-GS11-04	038-G-GS12-04	038-G-GS13-04	038-G-GS14-04	038-G-GS15-04	038-G-GS17-04
ORIGINAL ID ----->	038GGS1104	038GGS1204	038GGS1304	038GGS1404	038GGS1504	038GGS1704
LAB SAMPLE ID --->	S008436*2	S008483*6	S008436*3	S008390*1	S008390*6	S008462*1
ID FROM REPORT -->	038GGS1104	038GGS1204	038GGS1304	038GGS1404	038GGS1504	038GGS1704
SAMPLE DATE ----->	12/08/00	12/12/00	12/08/00	12/07/00	12/07/00	12/11/00
DATE ANALYZED --->	12/15/00	12/17/00	12/15/00	12/15/00	12/15/00	12/17/00
MATRIX ---------->	Water	Water	Water	Water	Water	Water
UNITS ----------->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

CAS #	Parameter	NASP06	VAL	NASP09	VAL	NASP06	VAL	NASP06	VAL	NASP06	VAL	NASP09	VAL
106-46-7	1,4-Dichlorobenzene	1.	U	1.		0.4	J	1.	U	1.	U	0.4	J
95-50-1	1,2-Dichlorobenzene	1.	U	2.		1.		1.	U	1.	U	2.	
96-12-8	1,2-Dibromo-3-Chloropropane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
120-82-1	1,2,4-Trichlorobenzene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA													
	SAMPLE ID ------>	038-G-GS18-04		038-G-GS19-04		038-G-GS20-04		038-G-GS21-04		038-G-GS22-04		038-G-GS24-04	
	ORIGINAL ID ----->	038GGS1804		038GGS1904		038GGS2004		038GGS2104		038GGS2204		038GGS2404	
	LAB SAMPLE ID --->	S008390*7		S008462*2		S008462*3		S008390*3		S008436*5		S008390*4	
	ID FROM REPORT -->	038GGS1804		038GGS1904		038GGS2004		038GGS2104		038GGS2204		038GGS2404	
	SAMPLE DATE ----->	12/07/00		12/11/00		12/11/00		12/07/00		12/08/00		12/07/00	
	DATE ANALYZED --->	12/15/00		12/17/00		12/17/00		12/15/00		12/15/00		12/15/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP06	VAL	NASP09	VAL	NASP09	VAL	NASP06	VAL	NASP06	VAL	NASP06	VAL
74-87-3	Chloromethane	0.6	J	1.	U	1.	U	1.	U	1.	U	1.	U
74-83-9	Bromomethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-01-4	Vinyl chloride	1.	U	16.		12.		1.	U	20.		1.	U
75-00-3	Chloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-09-2	Methylene chloride	2.	U	2.	U	2.	U	2.	U	2.	U	2.	U
67-64-1	Acetone	5.	U	5.	U	20.		5.	U	5.	U	5.	U
75-15-0	Carbon disulfide	0.4	J	1.	U	1.	U	1.	U	1.		0.2	J
75-35-4	1,1-Dichloroethene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-34-3	1,1-Dichloroethane	0.8	J	0.5	J	1.		1.	U	4.		1.	U
156-59-2	cis-1,2-Dichloroethene	2.		42.		0.6	J	0.7	J	4.		2.	
156-60-5	trans-1,2-Dichloroethene	0.7	J	10.		0.5	J	0.8	J	2.		0.6	J
67-66-3	Chloroform	1.	U	0.3	J	1.	U	1.	U	1.	U	0.6	J
107-06-2	1,2-Dichloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
78-93-3	2-Butanone (MEK)	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
74-97-5	Chlorobromomethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
71-55-6	1,1,1-Trichloroethane	0.4	J	0.5	J	1.	U	1.	U	1.	U	0.6	J
56-23-5	Carbon tetrachloride	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-27-4	Bromodichloromethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
78-87-5	1,2-Dichloropropane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
10061-01-5	cis-1,3-Dichloropropene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
79-01-6	Trichloroethene	15.		20.		1.	U	3.		4.		7.	
124-48-1	Dibromochloromethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
79-00-5	1,1,2-Trichloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
71-43-2	Benzene	1.	U	1.	U	1.	U	1.	U	1.	U	0.2	J
10061-02-6	trans-1,3-Dichloropropene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
75-25-2	Bromoform	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
591-78-6	2-Hexanone	5.	U	5.	U	5.	U	5.	U	5.	U	5.	U
127-18-4	Tetrachloroethene	14.		25.		1.	U	27.		1.		1.	
79-34-5	1,1,2,2-Tetrachloroethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
106-93-4	1,2-Dibromoethane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
108-88-3	Toluene	1.	U	1.	U	1.	U	1.	U	1.	U	0.3	J
108-90-7	Chlorobenzene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
100-41-4	Ethylbenzene	1.	U	1.	U	0.8	J	1.	U	1.	U	1.	U
100-42-5	Styrene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
1330-20-7	Xylene (Total)	1.	U	1.	U	1.	U	1.	U	1.	U	0.5	J
541-73-1	1,3-Dichlorobenzene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA													
	SAMPLE ID ------>	038-G-GS18-04		038-G-GS19-04		038-G-GS20-04		038-G-GS21-04		038-G-GS22-04		038-G-GS24-04	
	ORIGINAL ID ----->	038GGS1804		038GGS1904		038GGS2004		038GGS2104		038GGS2204		038GGS2404	
	LAB SAMPLE ID --->	S008390*7		S008462*2		S008462*3		S008390*3		S008436*5		S008390*4	
	ID FROM REPORT -->	038GGS1804		038GGS1904		038GGS2004		038GGS2104		038GGS2204		038GGS2404	
	SAMPLE DATE ----->	12/07/00		12/11/00		12/11/00		12/07/00		12/08/00		12/07/00	
	DATE ANALYZED --->	12/15/00		12/17/00		12/17/00		12/15/00		12/15/00		12/15/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP06	VAL	NASP09	VAL	NASP09	VAL	NASP06	VAL	NASP06	VAL	NASP06	VAL
106-46-7	1,4-Dichlorobenzene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
95-50-1	1,2-Dichlorobenzene	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
96-12-8	1,2-Dibromo-3-Chloropropane	1.	U	1.	U	1.	U	1.	U	1.	U	1.	U
120-82-1	1,2,4-Trichlorobenzene	1.		1.	U	1.	U	1.	U	1.	U	0.7	J

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA													
	SAMPLE ID ------->	038-G-GS28-04		038-G-GS29-04		038-H-GS29-04		038-G-GS32-04					
	ORIGINAL ID ----->	038GGS2804		038GGS2904		038HGS2904		038GGS3204					
	LAB SAMPLE ID --->	S008483*4		S008462*4		S008462*5		S008515*2					
	ID FROM REPORT -->	038GGS2804		038GGS2904		038HGS2904		038GGS3204					
	SAMPLE DATE ----->	12/12/00		12/11/00		12/11/00		12/13/00					
	DATE ANALYZED --->	12/17/00		12/17/00		12/17/00		12/17/00					
	MATRIX ---------->	Water		Water		Water		Water					
	UNITS ----------->	UG/L		UG/L		UG/L		UG/L					
CAS #	Parameter	NASP09	VAL	NASP09	VAL	NASP09	VAL	NASP12	VAL				
74-87-3	Chloromethane	1.	U	1.	U	1.	U	1.	U				
74-83-9	Bromomethane	1.	U	1.	U	1.	U	1.	U				
75-01-4	Vinyl chloride	1.	U	6.		6.		2.					
75-00-3	Chloroethane	1.	U	1.	U	1.	U	1.	U				
75-09-2	Methylene chloride	2.	U	2.	U	2.	U	2.	U				
67-64-1	Acetone	5.	U	5.	U	5.	U	5.	U				
75-15-0	Carbon disulfide	1.	U	1.	U	1.	U	1.	U				
75-35-4	1,1-Dichloroethene	1.	U	1.	U	1.	U	1.	U				
75-34-3	1,1-Dichloroethane	1.	U	2.		2.		1.	U				
156-59-2	cis-1,2-Dichloroethene	1.	U	5.		5.		2.					
156-60-5	trans-1,2-Dichloroethene	1.	U	4.		4.		1.					
67-66-3	Chloroform	0.6	J	1.	U	1.	U	1.	U				
107-06-2	1,2-Dichloroethane	1.	U	1.	U	1.	U	1.	U				
78-93-3	2-Butanone (MEK)	5.	U	5.	U	5.	U	5.	U				
74-97-5	Chlorobromomethane	1.	U	1.	U	1.	U	1.	U				
71-55-6	1,1,1-Trichloroethane	1.	U	1.	U	1.	U	1.	U				
56-23-5	Carbon tetrachloride	1.	U	1.	U	1.	U	1.	U				
75-27-4	Bromodichloromethane	1.	U	1.	U	1.	U	1.	U				
78-87-5	1,2-Dichloropropane	1.	U	1.	U	1.	U	1.	U				
10061-01-5	cis-1,3-Dichloropropene	1.	U	1.	U	1.	U	1.	U				
79-01-6	Trichloroethene	1.	U	0.5	J	0.4	J	1.	U				
124-48-1	Dibromochloromethane	1.	U	1.	U	1.	U	1.	U				
79-00-5	1,1,2-Trichloroethane	1.	U	1.	U	1.	U	1.	U				
71-43-2	Benzene	1.	U	1.	U	1.	U	1.	U				
10061-02-6	trans-1,3-Dichloropropene	1.	U	1.	U	1.	U	1.	U				
75-25-2	Bromoform	1.	U	1.	U	1.	U	1.	U				
108-10-1	4-Methyl-2-Pentanone (MIBK)	5.	U	5.	U	5.	U	5.	U				
591-78-6	2-Hexanone	5.	U	5.	U	5.	U	5.	U				
127-18-4	Tetrachloroethene	1.	U	1.	U	1.	U	1.	U				
79-34-5	1,1,2,2-Tetrachloroethane	1.	U	1.	U	1.	U	1.	U				
106-93-4	1,2-Dibromoethane	1.	U	1.	U	1.	U	1.	U				
108-88-3	Toluene	1.	U	1.	U	1.	U	1.	U				
108-90-7	Chlorobenzene	1.	U	1.	U	1.	U	1.	U				
100-41-4	Ethylbenzene	1.	U	1.	U	1.	U	1.	U				
100-42-5	Styrene	1.	U	1.	U	1.	U	1.	U				
1330-20-7	Xylene (Total)	1.	U	1.	U	1.	U	1.	U				
541-73-1	1,3-Dichlorobenzene	1.	U	1.	U	1.	U	1.	U				

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

LOW VOA									
	SAMPLE ID ------>	038-G-GS28-04		038-G-GS29-04		038-H-GS29-04		038-G-GS32-04			
	ORIGINAL ID ----->	038GGS2804		038GGS2904		038HGS2904		038GGS3204			
	LAB SAMPLE ID --->	S008483*4		S008462*4		S008462*5		S008515*2			
	ID FROM REPORT -->	038GGS2804		038GGS2904		038HGS2904		038GGS3204			
	SAMPLE DATE ----->	12/12/00		12/11/00		12/11/00		12/13/00			
	DATE ANALYZED --->	12/17/00		12/17/00		12/17/00		12/17/00			
	MATRIX ---------->	Water		Water		Water		Water			
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L			
CAS #	Parameter	NASP09	VAL	NASP09	VAL	NASP09	VAL	NASP12	VAL		
106-46-7	1,4-Dichlorobenzene	1.	U	1.	U	1.	U	1.	U		
95-50-1	1,2-Dichlorobenzene	1.	U	0.2	J	1.	U	1.	U		
96-12-8	1,2-Dibromo-3-Chloropropane	1.	U	1.	U	1.	U	1.	U		
120-82-1	1,2,4-Trichlorobenzene	1.	U	1.	U	1.	U	1.	U		

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

METAL													
	SAMPLE ID ------->	038-G-GH24-04		038-G-GI04-04		038-H-GI04-04		038-G-GI08-04		038-G-GS01-04		038-G-GS02-04	
	ORIGINAL ID ----->	038GGH2404		038GGI0404		038HGI0404		038GGI0804		038GGS0104		038GGS0204	
	LAB SAMPLE ID --->	S008390*5		S008436*6		S008436*7		S008436*8		S008483*1		S008483*5	
	ID FROM REPORT -->	038GGH2404		038GGI0404		038HGI0404		038GGI0804		038GGS0104		038GGS0204	
	SAMPLE DATE ----->	12/07/00		12/08/00		12/08/00		12/08/00		12/12/00		12/12/00	
	DATE EXTRACTED -->	12/12/00		12/12/00		12/12/00		12/12/00		12/14/00		12/14/00	
	DATE ANALYZED --->	12/14/00		12/14/00		12/14/00		12/14/00		12/15/00		12/15/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ---------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP06	VAL	NASP06	VAL	NASP06	VAL	NASP06	VAL	NASP09	VAL	NASP09	VAL
7439-97-6	Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
7429-90-5	Aluminum	100.	U	72.	U	78.	U	95.	U	39.	J	12.	J
7440-36-0	Antimony	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
7440-38-2	Arsenic	24.		2.2	U	2.2	U	2.2	U	4.	J	2.2	U
7440-39-3	Barium	42.		2.2	J	2.2	J	0.67	J	68.		26.	
7440-41-7	Beryllium	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ	0.1	UJ
7440-43-9	Cadmium	10.		0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
7440-70-2	Calcium	44000.		46000.		46000.		31000.		34000.		50000.	
7440-47-3	Chromium	28.		0.8	U	0.84	J	0.8	U	0.8	U	1.2	J
7440-48-4	Cobalt	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
7440-50-8	Copper	7.4	J	0.95	U	0.8	U	0.7	U	4.	J	2.8	J
7439-89-6	Iron	5000.		23.	J	31.	J	40.	J	48.	U	98.	
7439-92-1	Lead	5.9		1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
7439-95-4	Magnesium	3300.		12000.		12000.		12000.		3800.		20000.	
7439-96-5	Manganese	5.5	J	24.	J	24.	J	0.5	UJ	30.	J	14.	J
7440-02-0	Nickel	5.3	J	1.	U	1.	U	1.	U	1.	U	1.	U
7440-09-7	Potassium	2500.		5800.		5900.		13000.		3300.		9500.	
7782-49-2	Selenium	3.	U	3.	U	3.	U	3.	U	3.	U	3.	U
7440-22-4	Silver	0.6	U	0.6	U	0.73	J	0.6	U	0.6	UJ	0.6	UJ
7440-23-5	Sodium	8700.		37000.		37000.		110000.		18000.		100000.	
7440-28-0	Thallium	3.4	U	3.4	U	3.4	U	3.4	U	3.4	UJ	3.4	UJ
7440-62-2	Vanadium	0.9	U	0.9	U	0.9	U	1.1	J	0.9	U	0.9	U
7440-66-6	Zinc	24.	J	1.4	U	1.4	U	1.4	U	74.		1.8	U

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

METAL	SAMPLE ID ------->	038-G-GS03-04		038-G-GS05-04		038-G-GS07-04		038-G-GS08-04		038-G-GS09-04		038-G-GS10-04	
	ORIGINAL ID ----->	038GGS0304		038GGS0504		038GGS0704		038GGS0804		038GGS0904		038GGS1004	
	LAB SAMPLE ID --->	S008483*2		S008436*1		S008390*2		S008515*1		S008436*4		S008483*3	
	ID FROM REPORT -->	038GGS0304		038GGS0504		038GGS0704		038GGS0804		038GGS0904		038GGS1004	
	SAMPLE DATE ----->	12/12/00		12/08/00		12/07/00		12/13/00		12/08/00		12/12/00	
	DATE EXTRACTED -->	12/14/00		12/12/00		12/12/00		12/15/00		12/12/00		12/14/00	
	DATE ANALYZED --->	12/15/00		12/14/00		12/14/00		12/18/00		12/14/00		12/15/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ----------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP09	VAL	NASP06	VAL	NASP06	VAL	NASP12	VAL	NASP06	VAL	NASP09	VAL
7439-97-6	Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
7429-90-5	Aluminum	76.	J	76.	U	75.	U	46.	U	72.	U	5.9	J
7440-36-0	Antimony	2.3	U	2.3	U	2.3	U	3.7	U	2.3	U	2.3	U
7440-38-2	Arsenic	2.2	U	3.	J	2.6	J	5.7	J	3.	J	2.2	U
7440-39-3	Barium	41.		38.		99.		110.		72.		64.	
7440-41-7	Beryllium	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	UJ
7440-43-9	Cadmium	3.6	J	5.9		0.4	U	3.9	J	1.2	J	0.4	U
7440-70-2	Calcium	40000.		37000.		54000.		40000.		45000.		47000.	
7440-47-3	Chromium	3.9	J	2.6	J	0.8	U	15.		0.8	U	0.8	U
7440-48-4	Cobalt	0.5	U	0.5	U	0.5	U	0.7	U	0.5	U	0.5	U
7440-50-8	Copper	3.2	J	3.	U	1.4	U	40.		3.	U	8.3	J
7439-89-6	Iron	230.		170.		82.	J	15.	U	150.		110.	
7439-92-1	Lead	3.3	J	2.4	J	2.	J	3.9	J	8.3		1.3	U
7439-95-4	Magnesium	8500.		6100.		6100.		2700.		3100.		11000.	
7439-96-5	Manganese	33.	J	11.	J	7.8	J	29.	J	28.		9.6	J
7440-02-0	Nickel	1.	U	3.	J	1.	U	1.2	U	2.	J	1.	U
7440-09-7	Potassium	4700.		6100.		7500.		5700.		3700.		7300.	
7782-49-2	Selenium	3.	U	3.	U	3.	U	4.5	U	3.	U	3.	U
7440-22-4	Silver	0.6	UJ	0.74	J	0.6	U	0.8	U	0.6	U	0.6	UJ
7440-23-5	Sodium	22000.		16000.		16000.		26000.		17000.		84000.	
7440-28-0	Thallium	3.4	UJ	3.4	U	3.4	U	4.	U	3.4	U	3.4	UJ
7440-62-2	Vanadium	0.9	U	2.	J	0.9	U	1.5	J	1.9	J	0.9	U
7440-66-6	Zinc	500.		210.	J	13.	J	21.		49.	J	11.	U

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

METAL																							
	SAMPLE ID ------->	038-G-GS11-04		038-G-GS12-04		038-G-GS13-04		038-G-GS14-04		038-G-GS15-04		038-G-GS17-04	
	ORIGINAL ID ----->	038GGS1104		038GGS1204		038GGS1304		038GGS1404		038GGS1504		038GGS1704	
	LAB SAMPLE ID --->	S008436*2		S008483*6		S008436*3		S008390*1		S008390*6		S008462*1	
	ID FROM REPORT -->	038GGS1104		038GGS1204		038GGS1304		038GGS1404		038GGS1504		038GGS1704	
	SAMPLE DATE ----->	12/08/00		12/12/00		12/08/00		12/07/00		12/07/00		12/11/00	
	DATE EXTRACTED -->	12/12/00		12/14/00		12/12/00		12/12/00		12/12/00		12/14/00	
	DATE ANALYZED --->	12/14/00		12/15/00		12/14/00		12/14/00		12/14/00		12/15/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ----------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP06	VAL	NASP09	VAL	NASP06	VAL	NASP06	VAL	NASP06	VAL	NASP09	VAL
7439-97-6	Mercury	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
7429-90-5	Aluminum	74.	U	18.	J	92.	U	89.	U	71.	U	5.9	U
7440-36-0	Antimony	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U	2.3	U
7440-38-2	Arsenic	4.5	J	4.5	J	2.2	U	2.2	U	2.3	J	2.2	U
7440-39-3	Barium	68.		29.		21.		66.		81.		68.	
7440-41-7	Beryllium	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	UJ
7440-43-9	Cadmium	0.95	J	0.4	U	0.41	J	19.		0.4	U	0.4	U
7440-70-2	Calcium	30000.		40000.		35000.		48000.		55000.		45000.	
7440-47-3	Chromium	31.		2.5	J	2.4	J	15.		8.3	J	5.3	J
7440-48-4	Cobalt	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
7440-50-8	Copper	9.4	J	14.	J	17.	J	15.	J	3.5	U	0.7	UJ
7439-89-6	Iron	78.	J	220.		55.	J	18.	J	44.	J	110.	
7439-92-1	Lead	14.		2.7	J	2.7	J	9.4		1.3	U	1.3	U
7439-95-4	Magnesium	5900.		7400.		6500.		5900.		8600.		4300.	
7439-96-5	Manganese	8.9	J	23.	J	21.		1.4	J	22.		34.	J
7440-02-0	Nickel	6.9	J	1.	U	1.	U	1.4	J	1.	U	1.	U
7440-09-7	Potassium	4100.		5300.		4300.		5400.		7300.		4100.	
7782-49-2	Selenium	3.	U	3.	U	3.	U	3.1	J	3.	U	3.	U
7440-22-4	Silver	0.6	U	0.6	UJ	0.6	U	0.6	U	0.6	U	0.6	UJ
7440-23-5	Sodium	17000.		19000.		23000.		11000.		12000.		14000.	
7440-28-0	Thallium	3.4	U	3.4	UJ	3.4	U	3.4	U	3.4	U	3.4	UJ
7440-62-2	Vanadium	1.7	J	0.9	U	0.9	U	1.4	J	0.9	U	0.9	U
7440-66-6	Zinc	61.	J	9.2	U	21.	J	140.	J	4.4	U	2.1	U

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

METAL	SAMPLE ID ------->	038-G-GS18-04		038-G-GS19-04		038-G-GS20-04		038-G-GS21-04		038-G-GS22-04		038-G-GS24-04	
	ORIGINAL ID ----->	038GGS1804		038GGS1904		038GGS2004		038GGS2104		038GGS2204		038GGS2404	
	LAB SAMPLE ID --->	S008390*7		S008462*2		S008462*3		S008390*3		S008436*5		S008390*4	
	ID FROM REPORT -->	038GGS1804		038GGS1904		038GGS2004		038GGS2104		038GGS2204		038GGS2404	
	SAMPLE DATE ----->	12/07/00		12/11/00		12/11/00		12/07/00		12/08/00		12/07/00	
	DATE EXTRACTED -->	12/12/00		12/14/00		12/14/00		12/12/00		12/12/00		12/12/00	
	DATE ANALYZED --->	12/14/00		12/15/00		12/15/00		12/14/00		12/14/00		12/14/00	
	MATRIX ---------->	Water		Water		Water		Water		Water		Water	
	UNITS ----------->	UG/L		UG/L		UG/L		UG/L		UG/L		UG/L	
CAS #	Parameter	NASP06	VAL	NASP09	VAL	NASP09	VAL	NASP06	VAL	NASP06	VAL	NASP06	VAL
7439-97-6	Mercury	0.46		0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
7429-90-5	Aluminum	110.	U	6.9	J	8.4	J	98.	U	71.	U	110.	U
7440-36-0	Antimony	2.3	U	2.9	J	2.3	U	2.3	U	2.3	U	2.3	U
7440-38-2	Arsenic	6.3	J	2.3	J	2.2	U	3.5	J	3.5	J	31.	
7440-39-3	Barium	60.		110.		61.		57.		38.		44.	
7440-41-7	Beryllium	0.1	U	0.1	UJ	0.1	UJ	0.1	U	0.1	U	0.1	U
7440-43-9	Cadmium	0.67	J	79.		0.4	U	150.		0.4	U	12.	
7440-70-2	Calcium	39000.		44000.		53000.		30000.		29000.		42000.	
7440-47-3	Chromium	6.7	J	19.		0.8	U	14.		32.		33.	
7440-48-4	Cobalt	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
7440-50-8	Copper	20.		6.9	J	0.7	UJ	12.	J	2.3	U	8.4	J
7439-89-6	Iron	560.		19.	U	300.		19.	J	40.	J	6100.	
7439-92-1	Lead	59.		1.3	U	1.3	U	4.3	J	1.8	J	7.6	
7439-95-4	Magnesium	4100.		4800.		3800.		3100.		2900.		3100.	
7439-96-5	Manganese	0.5	U	12.	J	33.	J	12.		0.5	U	6.3	J
7440-02-0	Nickel	1.	U	1.	U	1.	U	1.	U	1.	U	4.4	J
7440-09-7	Potassium	4400.		4800.		4000.		2000.		3500.		2400.	
7782-49-2	Selenium	3.	U	3.	U	3.	U	3.	U	3.	U	3.	U
7440-22-4	Silver	0.6	U	0.6	UJ	0.6	UJ	0.6	U	0.6	U	0.6	U
7440-23-5	Sodium	9400.		19000.		13000.		13000.		8000.		8200.	
7440-28-0	Thallium	3.4	U	3.4	UJ	3.4	UJ	3.4	U	3.4	U	3.4	U
7440-62-2	Vanadium	1.2	J	1.	J	0.9	U	2.3	J	0.9	U	0.92	J
7440-66-6	Zinc	370.	J	38.		10.	U	45.	J	6.9	U	29.	J

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

METAL													
	SAMPLE ID ------->	038-G-GS28-04		038-G-GS29-04		038-H-GS29-04		038-G-GS32-04					
	ORIGINAL ID ----->	038GGS2804		038GGS2904		038HGS2904		038GGS3204					
	LAB SAMPLE ID --->	S008483*4		S008462*4		S008462*5		S008515*2					
	ID FROM REPORT -->	038GGS2804		038GGS2904		038HGS2904		038GGS3204					
	SAMPLE DATE ----->	12/12/00		12/11/00		12/11/00		12/13/00					
	DATE EXTRACTED -->	12/14/00		12/14/00		12/14/00		12/15/00					
	DATE ANALYZED --->	12/15/00		12/15/00		12/15/00		12/18/00					
	MATRIX ---------->	Water		Water		Water		Water					
	UNITS ----------->	UG/L		UG/L		UG/L		UG/L					
CAS #	Parameter	NASP09	VAL	NASP09	VAL	NASP09	VAL	NASP12	VAL				
7439-97-6	Mercury	0.1	U	0.1	U	0.1	U	0.1	U				
7429-90-5	Aluminum	550.		19.	J	20.	J	28.	U				
7440-36-0	Antimony	2.3	U	2.3	U	2.3	U	3.7	U				
7440-38-2	Arsenic	2.2	U	2.2	U	2.2	J	3.7	J				
7440-39-3	Barium	27.		110.		110.		71.					
7440-41-7	Beryllium	0.1	UJ	0.1	UJ	0.1	UJ	0.1	U				
7440-43-9	Cadmium	0.4	U	0.4	U	0.4	U	0.5	U				
7440-70-2	Calcium	13000.		44000.		44000.		49000.					
7440-47-3	Chromium	0.84	J	1.2	J	1.7	J	2.1	J				
7440-48-4	Cobalt	0.5	U	0.5	U	0.5	U	0.7	U				
7440-50-8	Copper	5.7	J	2.9	J	6.3	J	1.2	U				
7439-89-6	Iron	270.		670.		680.		1200.					
7439-92-1	Lead	1.3	U	1.3	U	1.3	U	11.					
7439-95-4	Magnesium	1400.		3500.		3500.		4700.					
7439-96-5	Manganese	0.5	UJ	190.		190.		83.					
7440-02-0	Nickel	1.	U	1.	J	1.7	J	1.2	J				
7440-09-7	Potassium	1700.		5500.		5400.		3600.					
7782-49-2	Selenium	3.	U	3.	U	3.	U	4.5	U				
7440-22-4	Silver	0.6	UJ	0.6	UJ	0.6	UJ	0.8	U				
7440-23-5	Sodium	14000.		23000.		23000.		35000.					
7440-28-0	Thallium	3.4	UJ	3.4	UJ	3.4	UJ	4.	U				
7440-62-2	Vanadium	3.2	J	0.9	U	0.9	U	1.2	U				
7440-66-6	Zinc	69.		11.	U	15.	U	72.					

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

METHANE	SAMPLE ID ------>	038-G-GI12-04	038-G-GS01-04	038-G-GS02-04	038-G-GS03-04	038-G-GS08-04	038-G-GS10-04
	ORIGINAL ID ----->	038GGI1204	038GGS0104	038GGS0204	038GGS0304	038GGS0804	038GGS1004
	LAB SAMPLE ID --->	S008483A*6	S008483A*1	S008483A*5	S008483A*2	S008515A*1	S008483A*3
	ID FROM REPORT -->	038GGI1204	038GGS0104	038GGS0204	038GGS0304	038GGS0804	038GGS1004
	SAMPLE DATE ----->	12/12/00	12/12/00	12/12/00	12/12/00	12/13/00	12/12/00
	DATE ANALYZED --->	12/15/00	12/15/00	12/15/00	12/15/00	12/18/00	12/15/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ---------->	UG/L	UG/L	UG/L	UG/L	UG/L	UG/L

CAS #	Parameter	NASP11	VAL	NASP11	VAL	NASP11	VAL	NASP11	VAL	NASP13	VAL	NASP11	VAL
74-82-8	METHANE	1300.		7.4		1600.		2500.		490.		190.	

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

METHANE	SAMPLE ID ------->	038-G-GS17-04	038-G-GS19-04	038-G-GS20-04	038-G-GS28-04	038-G-GS32-04	
	ORIGINAL ID ----->	038GGS1704	038GGS1904	038GGS2004	038GGS2804	038GGS3204	
	LAB SAMPLE ID --->	S008462A*1	S008462A*2	S008462A*3	S008483A*4	S008515A*2	
	ID FROM REPORT -->	038GGS1704	038GGS1904	038GGS2004	038GGS2804	038GGS3204	
	SAMPLE DATE ----->	12/11/00	12/11/00	12/11/00	12/12/00	12/13/00	
	DATE ANALYZED --->	12/14/00	12/14/00	12/14/00	12/15/00	12/18/00	
	MATRIX ---------->	Water	Water	Water	Water	Water	
	UNITS ---------->	UG/L	UG/L	UG/L	UG/L	UG/L	

CAS #	Parameter	NASP10	VAL	NASP10	VAL	NASP10	VAL	NASP11	VAL	NASP13	VAL	
74-82-8	METHANE	9700.		10.		5600.		0.23		2100.		

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

TDS						
SAMPLE ID ------->	038-G-GH24-04	038-G-GI04-04	038-H-GI04-04	038-G-GI08-04	038-G-GI12-04	038-G-GS01-04
ORIGINAL ID ----->	038GGH2404	038GGI0404	038HGI0404	038GGI0804	038GGI1204	038GGS0104
LAB SAMPLE ID --->	S008390A*5	S008436A*6	S008436A*7	S008436A*8	S008483A*6	S008483A*1
ID FROM REPORT -->	038GGH2404	038GGI0404	038HGI0404	038GGI0804	038GGI1204	038GGS0104
SAMPLE DATE ----->	12/07/00	12/08/00	12/08/00	12/08/00	12/12/00	12/12/00
DATE EXTRACTED -->	12/12/00	12/12/00	12/12/00	12/12/00	12/15/00	12/15/00
DATE ANALYZED --->	12/13/00	12/13/00	12/13/00	12/13/00	12/18/00	12/18/00
MATRIX ---------->	Water	Water	Water	Water	Water	Water
UNITS ----------->	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L

CAS #	Parameter	NASP07	VAL	NASP08	VAL	NASP08	VAL	NASP08	VAL	NASP11	VAL	NASP11	VAL
9999900-07-2	Total Dissolved Solids (TDS)	170.		310.		310.		470.		210.		160.	

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

TDS	SAMPLE ID ------->	038-G-GS02-04	038-G-GS03-04	038-G-GS05-04	038-G-GS07-04	038-G-GS08-04	038-G-GS09-04
	ORIGINAL ID ----->	038GGS0204	038GGS0304	038GGS0504	038GGS0704	038GGS0804	038GGS0904
	LAB SAMPLE ID --->	S008483A*5	S008483A*2	S008436A*1	S008390A*2	S008515A*1	S008436A*4
	ID FROM REPORT -->	038GGS0204	038GGS0304	038GGS0504	038GGS0704	038GGS0804	038GGS0904
	SAMPLE DATE ----->	12/12/00	12/12/00	12/08/00	12/07/00	12/13/00	12/08/00
	DATE EXTRACTED -->	12/15/00	12/15/00	12/12/00	12/12/00	12/15/00	12/12/00
	DATE ANALYZED --->	12/18/00	12/18/00	12/13/00	12/13/00	12/18/00	12/13/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ---------->	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L

CAS #	Parameter	NASP11	VAL	NASP11	VAL	NASP08	VAL	NASP07	VAL	NASP13	VAL	NASP08	VAL
9999900-07-2	Total Dissolved Solids (TDS)	500.		200.		180.		230.		210.		200.	

*** Validation Complete ***

TDS							
	SAMPLE ID ------->	038-G-GS10-04	038-G-GS11-04	038-G-GS13-04	038-G-GS14-04	038-G-GS15-04	038-G-GS17-04
	ORIGINAL ID ----->	038GGS1004	038GGS1104	038GGS1304	038GGS1404	038GGS1504	038GGS1704
	LAB SAMPLE ID --->	S008483A*3	S008436A*2	S008436A*3	S008390A*1	S008390A*6	S008462A*1
	ID FROM REPORT -->	038GGS1004	038GGS1104	038GGS1304	038GGS1404	038GGS1504	038GGS1704
	SAMPLE DATE ----->	12/12/00	12/08/00	12/08/00	12/07/00	12/07/00	12/11/00
	DATE EXTRACTED -->	12/15/00	12/12/00	12/12/00	12/12/00	12/12/00	12/15/00
	DATE ANALYZED --->	12/18/00	12/13/00	12/13/00	12/13/00	12/13/00	12/18/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ---------->	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
CAS #	Parameter	NASP11 VAL	NASP08 VAL	NASP08 VAL	NASP07 VAL	NASP07 VAL	NASP10 VAL
9999900-07-2	Total Dissolved Solids (TDS)	410.	180.	200.	200.	240.	170.

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

TDS	SAMPLE ID ------->	038-G-GS18-04	038-G-GS19-04	038-G-GS20-04	038-G-GS21-04	038-G-GS22-04	038-G-GS24-04
	ORIGINAL ID ----->	038GGS1804	038GGS1904	038GGS2004	038GGS2104	038GGS2204	038GGS2404
	LAB SAMPLE ID --->	S008390A*7	S008462A*2	S008462A*3	S008390A*3	S008436A*5	S008390A*4
	ID FROM REPORT -->	038GGS1804	038GGS1904	038GGS2004	038GGS2104	038GGS2204	038GGS2404
	SAMPLE DATE ----->	12/07/00	12/11/00	12/11/00	12/07/00	12/08/00	12/07/00
	DATE EXTRACTED -->	12/12/00	12/15/00	12/15/00	12/12/00	12/12/00	12/12/00
	DATE ANALYZED --->	12/13/00	12/18/00	12/18/00	12/13/00	12/13/00	12/13/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ---------->	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L

CAS #	Parameter	NASP07	VAL	NASP10	VAL	NASP10	VAL	NASP07	VAL	NASP08	VAL	NASP07	VAL
9999900-07-2	Total Dissolved Solids (TDS)	170.		160.		200.		140.		130.		170.	

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

TDS							
	SAMPLE ID ------->	038-G-GS28-04	038-G-GS29-04	038-H-GS29-04	038-G-GS32-04		
	ORIGINAL ID ----->	038GGS2804	038GGS2904	038HGS2904	038GGS3204		
	LAB SAMPLE ID --->	S008483A*4	S008462A*4	S008462A*5	S008515A*2		
	ID FROM REPORT -->	038GGS2804	038GGS2904	038HGS2904	038GGS3204		
	SAMPLE DATE ----->	12/12/00	12/11/00	12/11/00	12/13/00		
	DATE EXTRACTED -->	12/15/00	12/15/00	12/15/00	12/15/00		
	DATE ANALYZED --->	12/18/00	12/18/00	12/18/00	12/18/00		
	MATRIX ---------->	Water	Water	Water	Water		
	UNITS ---------->	MG/L	MG/L	MG/L	MG/L		
CAS #	Parameter	NASP11 VAL	NASP10 VAL	NASP10 VAL	NASP13 VAL		
9999900-07-2	Total Dissolved Solids (TDS)	95.	210.	200.	260.		

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

TOC							
	SAMPLE ID ------->	038-G-GI12-04	038-G-GS01-04	038-G-GS02-04	038-G-GS03-04	038-G-GS08-04	038-G-GS10-04
	ORIGINAL ID ----->	038GGI1204	038GGS0104	038GGS0204	038GGS0304	038GGS0804	038GGS1004
	LAB SAMPLE ID --->	S008483A*6	S008483A*1	S008483A*5	S008483A*2	S008515A*1	S008483A*3
	ID FROM REPORT -->	038GGI1204	038GGS0104	038GGS0204	038GGS0304	038GGS0804	038GGS1004
	SAMPLE DATE ----->	12/12/00	12/12/00	12/12/00	12/12/00	12/13/00	12/12/00
	DATE EXTRACTED -->	12/14/00	12/14/00	12/14/00	12/14/00	12/18/00	12/14/00
	DATE ANALYZED --->	12/14/00	12/14/00	12/14/00	12/14/00	12/18/00	12/14/00
	MATRIX ---------->	Water	Water	Water	Water	Water	Water
	UNITS ---------->	MG/L	MG/L	MG/L	MG/L	MG/L	MG/L
CAS #	Parameter	NASP11 VAL	NASP11 VAL	NASP11 VAL	NASP11 VAL	NASP13 VAL	NASP11 VAL
9999900-01-4	Total Organic Carbon (TOC)	4.3	2.8	5.6	3.3	3.1	4.5

*** Validation Complete ***

PENSACOLA, SITE 38
PENSACOLA, SITE 38 NATURAL ATTENUATION

TOC						
	SAMPLE ID ------>	038-G-GS17-04	038-G-GS19-04	038-G-GS20-04	038-G-GS28-04	038-G-GS32-04
	ORIGINAL ID ----->	038GGS1704	038GGS1904	038GGS2004	038GGS2804	038GGS3204
	LAB SAMPLE ID --->	S008462A*1	S008462A*2	S008462A*3	S008483A*4	S008515A*2
	ID FROM REPORT -->	038GGS1704	038GGS1904	038GGS2004	038GGS2804	038GGS3204
	SAMPLE DATE ----->	12/11/00	12/11/00	12/11/00	12/12/00	12/13/00
	DATE EXTRACTED -->	12/14/00	12/14/00	12/14/00	12/14/00	12/18/00
	DATE ANALYZED --->	12/14/00	12/14/00	12/14/00	12/14/00	12/18/00
	MATRIX ---------->	Water	Water	Water	Water	Water
	UNITS ---------->	MG/L	MG/L	MG/L	MG/L	MG/L

CAS #	Parameter	NASP10	VAL	NASP10	VAL	NASP10	VAL	NASP11	VAL	NASP13	VAL
9999900-01-4	Total Organic Carbon (TOC)	3.6		1.3		2.9		3.6		2.3	

*** Validation Complete ***