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**UNITED STATES AIR FORCE  
ELMENDORF AIR FORCE BASE, ALASKA**

*ENVIRONMENTAL QUALITY PROGRAM*

**2006 ANNUAL REPORT  
MONITORING OF COMPLIANCE PROGRAM SITES  
ELMENDORF AFB, ALASKA**

**FINAL**

**JULY 2007**



**FINAL 2006 ANNUAL REPORT  
MONITORING OF COMPLIANCE  
PROGRAM SITES**

**ELMENDORF AFB, ALASKA**

**Prepared for:  
3<sup>rd</sup> Civil Engineer Squadron, Environmental Flight, Quality Element**

**and**

**Air Education and Training Command**

**July 2007**

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## LIST OF ACRONYMS

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3 CES/CEVQ	3 <sup>rd</sup> Civil Engineer Squadron, Environmental Flight, Quality Element
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AETC	Air Education and Training Command
AFB	Air Force Base
ASTM	American Society for Testing and Materials
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental, Response, Compensation, and Liability Act
cy	cubic yard(s)
CSM	conceptual site model
DRMO	Defense Reutilization and Marketing Office
DRO	diesel range organics
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
GRO	gasoline range organics
HVOC	halogenated volatile organic compound
HSA	hollow stem auger
ID	inside diameter
JP-4	jet propulsion fuel number 4
JP-8	jet propulsion fuel number 8
MDL	method detection limit
mg/kg	milligrams per kilogram
MOGAS	motor vehicle gasoline
MNA	monitored natural attenuation
NOAA	National Oceanic and Atmospheric Administration



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**LIST OF ACRONYMS** *(continued)*

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OWS	oil/water separator
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
PID	photoionization detector
POL	petroleum, oil, and lubricant
PSF	public sector financed
PVC	polyvinyl chloride
QA	quality assurance
QC	quality control
RCRA	Resource Conservation Recovery Act
RL	reporting limit
RRO	residual range organics
SERA	State-Elmendorf Environmental Restoration Agreement
SIM	select ion monitoring
SVOC	semi-volatile organic compound
TCE	trichloroethylene
TPH	total petroleum hydrocarbons
USAF	United States Air Force
UST	underground storage tank
VOC	volatile organic compound
µg/L	micrograms per liter



## **1.0 INTRODUCTION**

Under contract agreement with the United States Air Force (USAF) Air Education and Training Command (AETC), this Annual Report has been prepared for the AETC Statement of Objectives entitled, *Statement of Objectives, Compliance Monitoring and Assessment, Elmendorf AFB, Alaska, Multiple Projects*, dated 27 March 2006. This project is directed and coordinated by the USAF, 3rd Civil Engineer Squadron, Environmental Flight, Quality Element (3 CES/CEVQ) on Elmendorf Air Force Base (AFB).

### **1.1 PURPOSE AND SCOPE**

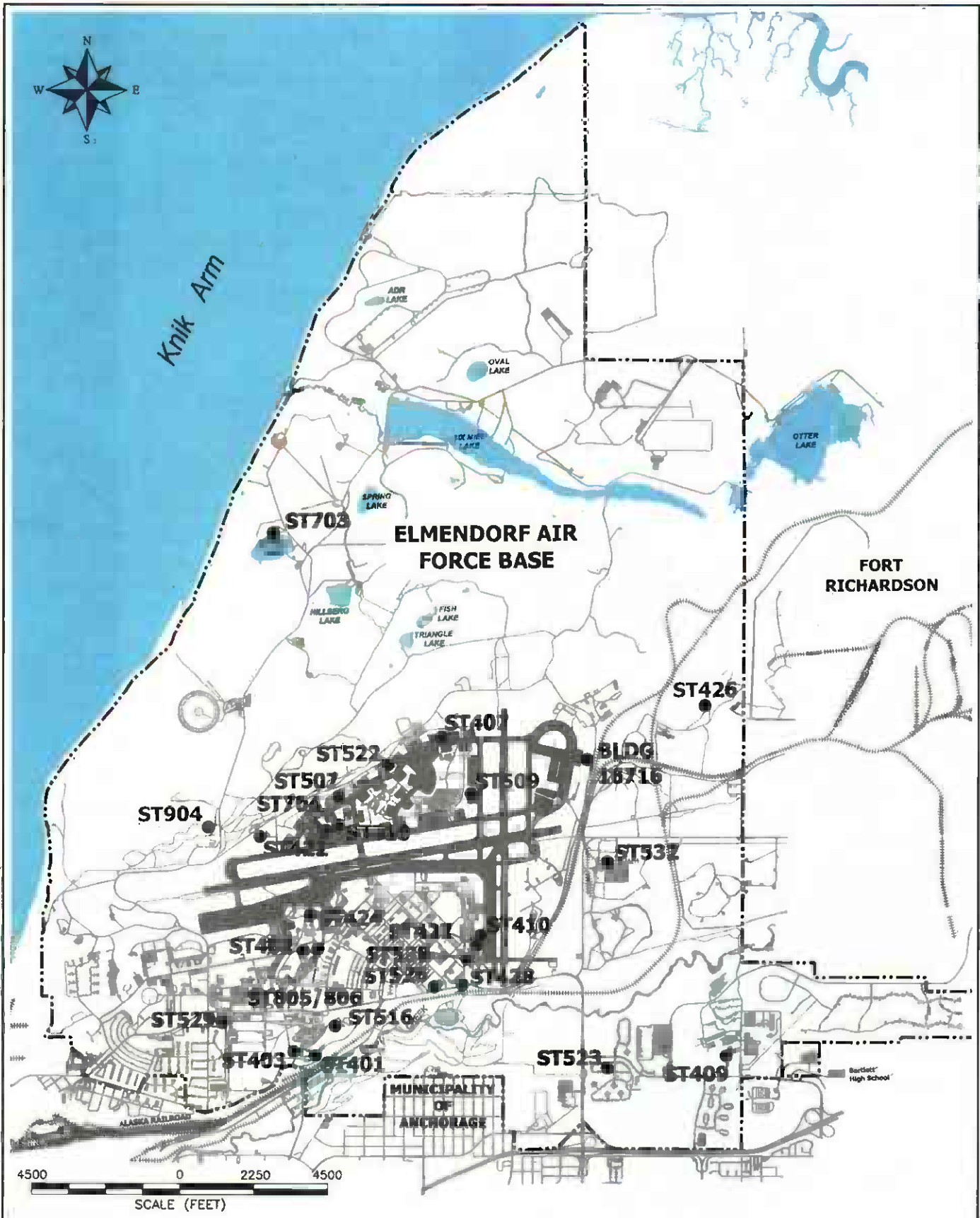
In accordance with State of Alaska Title 18 of the Alaska Administrative Code (AAC) Chapter 75 (18 AAC 75) and a July 26, 2004, letter from the Alaska Department of Environmental Conservation (ADEC) (ADEC, 2004), the 3 CES/CEVQ on Elmendorf AFB is responsible for cleaning up contaminated sites throughout Elmendorf AFB that are not administered under the substantive requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) program. The cleanup requirements for these sites are administered under 18 AAC 75. Currently, the 3 CES/CEVQ is required by ADEC to monitor the degree to which certain regulated contaminants are naturally attenuating on 26 sites throughout the Base. The natural attenuation of each of these sites is being monitored by sampling and analyzing the soil and groundwater underneath the contaminated source.

### **1.2 SITE LOCATION AND DESCRIPTION**

Elmendorf AFB is located adjacent to the northern border of the Municipality of Anchorage, Alaska, at an approximate elevation of 195 feet above mean sea level. Elmendorf AFB is bordered on the east by the U.S. Army's Fort Richardson, on the south by the City of Anchorage, and on the north and west by the Knik Arm of Cook Inlet. The Base encompasses approximately 13,103 acres, of which approximately 6,000 acres have been developed for airfield operations, base support operations, personnel housing, and recreational facilities.

Compliance Program Sites encompass those plumes that were categorized as former State-Elmendorf Environmental Restoration Agreement (SERA) sites and are distributed throughout Elmendorf AFB. Some Compliance Program Sites are located in the northern section of the Base in remote areas, and others located within the central part of the Base near hangars, taxiways, and buildings. Contaminant sources associated with Compliance Program Sites consist solely of fuel materials and sometimes waste oil. Specifically, underground fuel storage tanks, oil/water separators (OWSs), fuel spills, and fuel line leaks were identified as contributors to soil and groundwater contamination at these sites. The location of each site monitored under the Compliance Program is shown on Figure 1-1.





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UNITED STATES AIR FORCE  
**COMPLIANCE MONITORING SITE LOCATIONS**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



**FIGURE I-1**

### 1.3 DOCUMENT ORGANIZATION

This document is organized with the following sections:

- Section 1 provides a brief introduction, presents the project purpose and scope, and the document organization;
- Section 2 provides the Compliance Program requirements including monitoring parameters and cleanup levels;
- Section 3 provides a summary of the fieldwork completed for this project in 2006;
- Sections 4 through 29 provide information on each site, including a brief overview of the site background, a discussion of the 2006 field activities and results, and site conclusions and recommendations;
- Section 30 provides a table summarizing the conclusions and recommendations for each site discussed in this report; and
- Section 31 provides references used to prepare this document.

The following three appendices have also been included:

- Appendix A provides the Groundwater Sample Records used to document sample collection data;
- Appendix B provides the Monitoring Well Completion Logs for groundwater monitoring wells installed during this project; and
- Appendix C provides the Analytical Data Quality Assurance/Quality Control (QA/QC) Summary Report and a completed ADEC Laboratory Data Review Checklist for each laboratory analytical data report.

Attachment 1 provides the Laboratory Analytical Data Reports on CD-ROM.



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## 2.0 COMPLIANCE REQUIREMENTS

A review of the conceptual site model (CSM) for all 26 Compliance Sites was performed during the summer of 2006. The Draft CSM reviews (USAF, 2006b) briefly summarized the known historical information on the sites and identified data gaps and deficiencies in the current monitoring program.

Significant data gaps that were discovered during the draft CSM reviews were due to the following deficiencies in the well network:

1. No in-source groundwater monitoring well existed or was being used to monitor the site. With no in-source monitoring well, it would be unclear when contamination has been remediated and/or;
2. The downgradient monitoring wells used to monitor the site were too far away from the source. It would be unclear if/how far downgradient groundwater contamination existed, and some or all of the wells were/could be affected by other contaminated sources.

Correction of these deficiencies was initiated during the 2006 Compliance Program, including identifying existing monitoring wells and/or installing additional monitoring wells at sites where needed. A decision tree was created to guide this initial effort during 2006 and is provided as Figure 2-1. In addition, a decision tree to determine the constituents requiring monitoring was prepared and is provided as Figure 2-2.

These decision trees were prepared in response to a meeting between 3 CES/CEVQ and Mr. Louis Howard of ADEC on 15 September 2006. The decision trees were prepared to capture agreements made between the parties (for example, PAHs are only required to be sampled once, and from the in-source well only, if not found above cleanup levels). Both of these decision trees were provided in the meeting minutes (USAF, 2006d) and the approved workplan (USAF, 2006c) for this project.

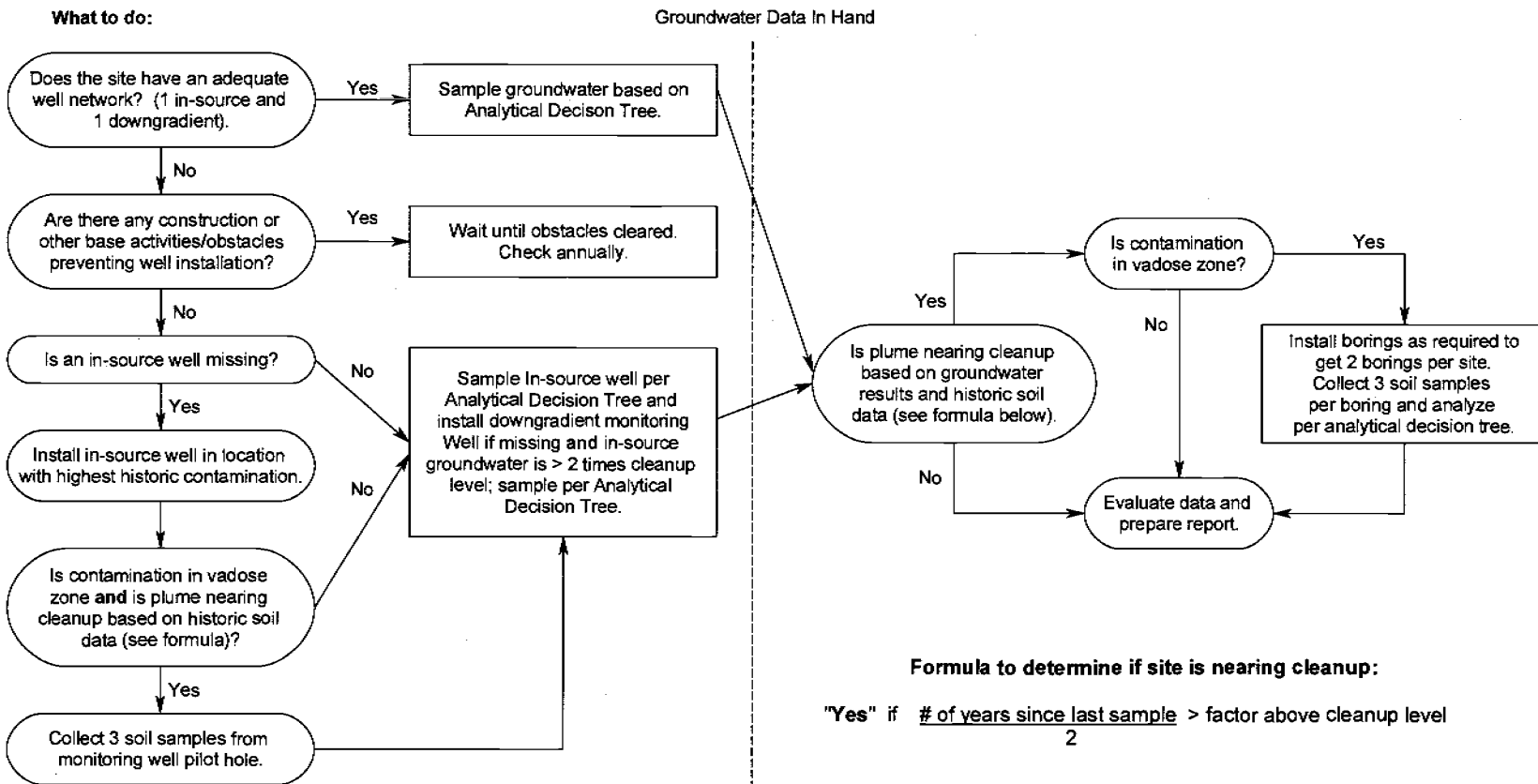
The Compliance Program Decision Tree, Figure 2-1, is the logic that was followed during the 2006 field effort to determine if additional wells were needed to be installed and when to collect groundwater and soil samples. The decision tree basically calls for each site to have at least one in-source well and one downgradient well (if contaminants are greater than two times cleanup level in the in-source well). If the site is nearing cleanup levels, the decision tree calls for collecting soil samples to confirm that vadose zone contamination is in-fact below cleanup level concentrations.

The Analytical Decision Tree, Figure 2-2, provides the logic to be followed to determine what constituents should be sampled for at each site. The ADEC required parameters are discussed in Section 2.1. Both decision trees reference a formula to determine if a site is nearing cleanup levels; the formula is provided within Figure 2-1. The formula assumes that contamination is remediating at a rate of one factor (measured concentration/cleanup level) above cleanup levels every two years. This formula may require some modification once additional soil sample data is available and actual remediation rates are compared to the assumption.



**Figure 2-1 Initial Compliance Program Decision Tree**

For correcting deficiencies in Compliance Program sites well network during the 2006 field effort



**Formula to determine if site is nearing cleanup:**

"Yes" if  $\frac{\# \text{ of years since last sample}}{2} > \text{factor above cleanup level}$

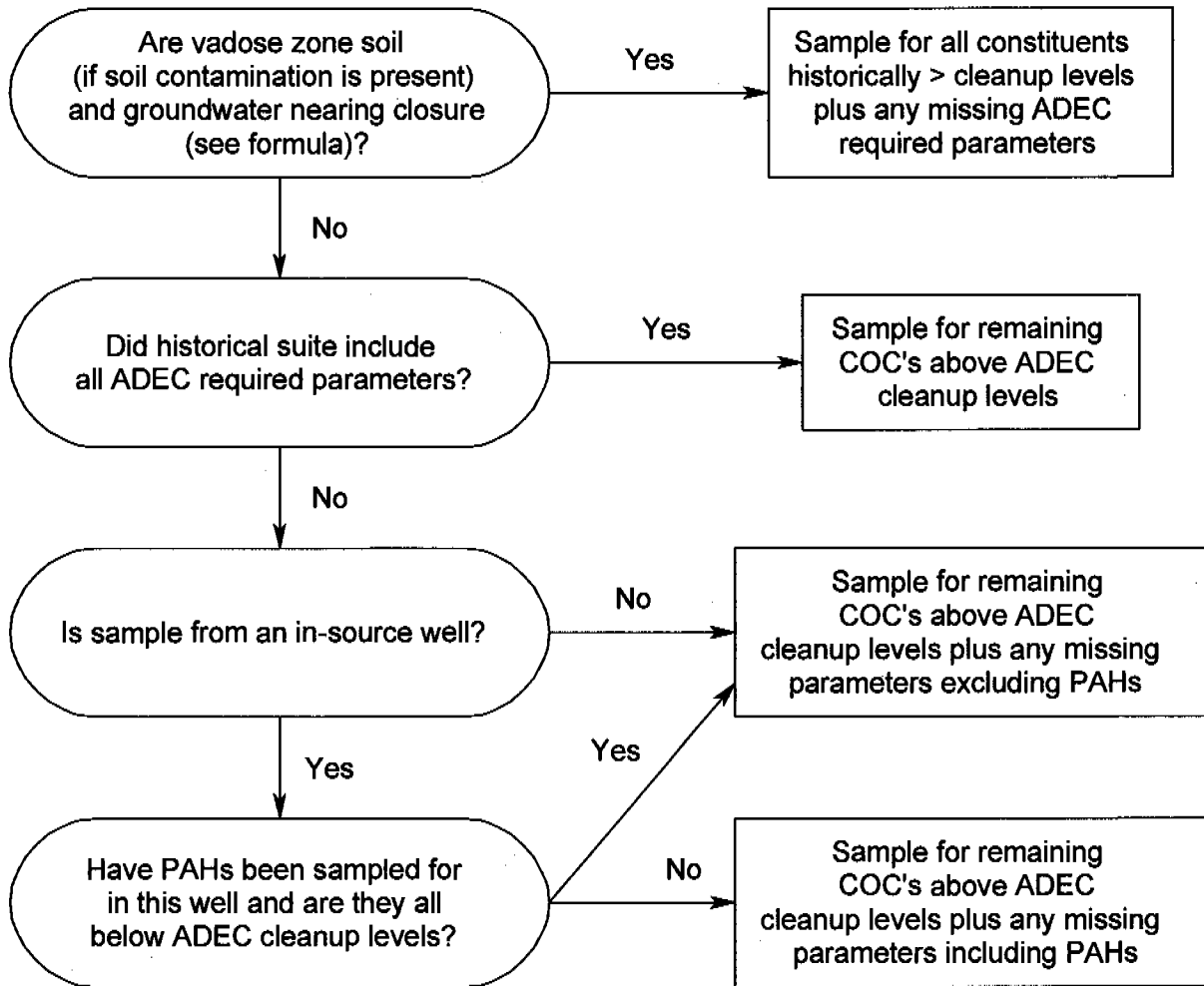
Example 1:  
 6 years ago [DRO] = 1,000 ppm  
 $6/2 = 3$  and  $1,000/250 = 4$   
 $3 < 4$ , so "No"

Example 2:  
 6 years ago [GRO] = 600 ppm  
 $6/2 = 3$  and  $600/300 = 2$   
 $3 > 2$ , so "Yes"

**Note:** factor above cleanup level = measured concentration/cleanup level



Figure 2-2 Analytical Decision Tree



## 2.1 MONITORING PARAMETERS

The Analytical Decision Tree in Figure 2-2 references sampling for ADEC required parameters. The parameters referred to are those listed in Table 2A (Determination of Sampling and Laboratory Analysis for Soil and Groundwater) and Table 2B (Indicator Compounds For Petroleum Contaminated Sites) of the *Underground Storage Tank (UST) Procedures Manual* (ADEC, 2002). A summary of those parameters are listed in Table 2-1.

**Table 2-1 ADEC Required Parameters for Petroleum Contaminated Sites**

For Sites Contaminated With:	Sample For:
Gasoline	GRO, BTEX compounds, and PAHs
Diesel	DRO, BTEX compounds, and PAHs
Jet fuel	GRO, DRO, BTEX compounds, and PAHs
Waste Oil	GRO, DRO, RRO, BTEX compounds, PAHs, metals, and chlorinated solvents

Notes:

BTEX = benzene, toluene, ethylbenzene, and xylene      DRO = diesel range organics  
 GRO = gasoline range organics      PAHs = polynuclear aromatic hydrocarbons  
 RRO = residual range organics

The metals referenced in Table 2B of the *UST Procedures Manual* include: arsenic, barium, cadmium, chromium, lead, nickel, and vanadium. Polynuclear Aromatic Hydrocarbons (PAHs) include acenaphthene, anthracene, benzo-a-anthracene, benzo-a-pyrene, benzo-b-fluoranthene, benzo-b-fluoranthene, benzo-k-fluoranthene, chrysene, dibenzo-a,h-anthracene, fluorene, ideno-123-cd-pyrene, naphthalene, and pyrene.

Groundwater and soil samples sent to an analytical laboratory during 2006 were analyzed by the following methods:

- Gasoline Range Organics (GRO) by Alaska Method AK101;
- Diesel Range Organics (DRO) by Alaska Method AK102;
- Residual Range Organics (RRO) by Alaska Method AK103;
- Benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds by Environmental Protection Agency (EPA) Method SW8021B;
- Volatile Organic Compounds (VOCs) by EPA Method SW8260B;
- Metals by EPA Method SW6020; and
- PAHs by EPA Method SW8270C select ion monitoring (SIM).

## 2.2 CLEANUP LEVELS

Analytical sample results are compared to cleanup levels throughout this report. Contaminant concentrations in soil and groundwater must be remediated to below these levels to close a site and receive a “no further action” letter from ADEC. Unless otherwise stated, the cleanup levels



for the Elmendorf Compliance Program sites discussed in this report are the "Method Two" cleanup levels from the following tables in 18 AAC 75.341:

- For BTEX compounds, metals (except arsenic and chromium), PAHs, and VOCs in soil: Table B1, Method Two – Soil Cleanup Levels Table;
- For petroleum hydrocarbons in soil (GRO, DRO, RRO): Table B2, Method Two – Petroleum Hydrocarbon Soil Cleanup Levels; and
- For all contaminants in groundwater: Table C, Groundwater Cleanup Levels.

Arsenic and chromium concentrations are naturally high in Elmendorf AFB area soils, at concentrations exceeding the cleanup levels in 18 AAC 75.341 Table B1. The cleanup levels for arsenic and chromium in soil are the maximum background levels from studies conducted on Elmendorf AFB in 1993. These concentrations have previously been recognized as acceptable alternative cleanup levels for contaminated sites on Elmendorf AFB by ADEC and EPA (USAF, 2002). Table 2-2 provides the cleanup levels for these and several other parameters.



**Table 2-2 Soil and Groundwater Cleanup Levels for Compliance Program Sites**

Compound	Soil Cleanup Level <sup>1</sup> (mg/kg)	Groundwater Cleanup Level <sup>2</sup> (µg/L)
Gasoline Range Organics by AK101	300	1,300
Diesel Range Organics by AK102	250	1,500
Residual Range Organics by AK103	11,000	1,100
<b>Aromatic Hydrocarbons by SW8021B</b>		
Benzene	0.02	5
Toluene	5.4	100
Ethylbenzene	5.5	700
Total Xylenes	78	10,000
<b>Metals by SW6020</b>		
Arsenic	16.2	50
Barium	1,100	2,000
Cadmium	5	5
Chromium	76.1	100
Lead	400	15
Nickel	87	100
Vanadium	710	260
<b>Polynuclear Aromatic Hydrocarbons (PAHs) by SW8270C SIM</b>		
Acenaphthene	210	2,200
Anthracene	4,300	11,000
Benzo-a-anthracene	6	1
Benzo-a-pyrene	1	0.2
Benzo-b-fluoranthene	11	1
Benzo-k-fluoranthene	110	10
Chrysene	620	100
Dibenzo-a,h-anthracene	1	0.1
Fluorene (µg/L)	270	1,460
Ideno-123-cd-pyrene	11	1
Naphthalene	21	700
Pyrene	1,500	1,100
<b>Volatile Organic Compounds (VOCs) by SW8260B Above Cleanup Levels<sup>3</sup></b>		
Chlorobenzene	0.6	100
Trichloroethene	0.027	5

**Notes:**

1 The soil cleanup levels are those from 18 AAC 75.341, Tables B1 and B2 except for arsenic and chromium. The cleanup levels for arsenic and chromium are the maximum background levels from studies conducted on Elmendorf AFB.

2 The groundwater cleanup levels are those from 18 AAC 75.341 Table C.

3 Only those volatile organic compounds (VOCs) found to exceed the cleanup level in any sample during 2006 are listed.

SIM – Select Ion Monitoring

mg/kg – milligram per kilogram

µg/L – microgram per liter.



### 3.0 2006 FIELD EFFORT

This section provides a summary of the field efforts completed for the Elmendorf Compliance Program in 2006. The following sections provide more details about each site, including the site's background and sample results.

#### 3.1 GROUNDWATER MONITORING WELL INSTALLATION

During the CSM reviews for the Elmendorf Compliance Program Sites, significant data gaps were discovered. At some sites, no in-source groundwater monitoring well existed or was being used to monitor the site. At some sites, the downgradient monitoring wells used to monitor the site were too far away from the source. It would be unclear if/how far downgradient groundwater contamination existed.

Correction of these deficiencies was initiated during the 2006 Compliance Program. Activities included identifying existing monitoring wells and/or installing additional monitoring wells at sites where needed. In October 2006, thirteen new groundwater monitoring wells were installed as close as possible to the location with the highest known concentrations of soil contamination, or as close to the contaminant source as possible at thirteen sites, as recommended by the *Draft Conceptual Site Model Reviews* (USAF, 2006b).

Rather than conventional monitoring wells installed with a hollow stem auger (HSA) drill rig, wells were installed using direct-push technology and Geoprobe<sup>®</sup> prepacked well screens. Some of the advantages to this include the following:

- No cuttings generated during installation;
- Minimal disturbance of natural formation;
- Meets all requirements of a Resource Conservation and Recovery Act (RCRA) well;
- Well seal and grouting meet EPA and American Society for Testing and Materials (ASTM) D-5092 requirements; and
- Minimal development and purge water generated for sampling, reducing disposal costs.

Geoprobe<sup>®</sup> prepacked well screens are designed for setting small-diameter monitoring wells. First, probe rods were driven to depth with a Geoprobe<sup>®</sup> 6610DT direct-push machine. The well assembly was then lowered into the probe rod string with threaded polyvinyl chloride (PVC) riser pipe.

The small diameter pre-pack well screen assembly used 0.75-inch inside diameter (ID) PVC riser pipe and was installed with 2.125-inch outside diameter probe rods. Once the well assembly had been lowered to the bottom of the probe rod string, the probe rods were retracted to a point above the screen. The wells were equipped with 10 feet of 0.10-inch machine slotted screen. The top of the screen was placed between one and five feet above the high water line. The screens were prepacked with 20/40 grade silica sand. A sand barrier, consisting of 20/40 grade sand, was then installed at least 2 feet directly above the screened interval. With the barrier in place, granular bentonite was installed in the annulus to form a well seal.



Well completion included aboveground steel protective covers. All wells were secured using corrosion-resistant locks, keyed identical to other monitoring wells on Elmendorf AFB. Completion diagrams for the new wells are provided in Appendix B.

According to the Compliance Program Decision Tree (Figure 2-1), if contaminants in the in-source well did not exceed two times the cleanup level, no downgradient well was to be installed. Samples were collected from the thirteen new in-source wells and the other existing in-source wells in 2006. At each site where a new downgradient well was proposed, sample results from the in-source well confirmed that contaminant concentrations were not two times greater than cleanup levels. Therefore, no new downgradient wells were installed in 2006.

Table 3-1 provides a summary of the monitoring wells installed for the Compliance Program in 2006. The location and elevation of each well was surveyed in the spring of 2007. The survey data is provided on the installation reports provided in Appendix B.

**Table 3-1 2006 Monitoring Well Installation Summary**

Site ID	Well Name	Surface Completion	Approximate Depth to Groundwater (feet from TOC)	Approximate Depth of Well (feet from TOC)	Approximate Screen Interval (feet from TOC)
ST403	403MW-IN	Flush	34.3	43.6	33.6-43.6
ST410	410MW-IN	Flush	24.1	31.3	21.3-31.3
ST422	422MW-IN	Flush	14.6	23.0	13.0-23.0
ST424	424MW-IN	Stick-up	15.8	23.8	13.8-23.8
ST427	427MW-IN	Flush	25.7	31.7	21.7-31.7
ST509	509MW-IN	Flush	34.3	43.5	33.5-43.5
ST516	516MW-IN	Flush	34.4	41.7	31.7-41.7
ST522	522MW-IN	Flush	25.3	33.4	23.4-33.4
ST526	526MW-IN	Stick-up	35.8	43.0	33.0-43.0
ST529	529MW-IN	Stick-up	27.2	37.1	27.1-37.1
ST532	532MW-IN	Stick-up	47.2	56.3	46.3-56.3
ST703	703MW-IN	Flush	3.65	14.3	4.3-14.3
Bldg 16716	16716MW-IN	Flush	49.0	58.0	48-58

Notes:  
TOC = Top of casing

### 3.2 GROUNDWATER SAMPLING

Groundwater samples were collected following the procedures in Section 3 of the Field Sampling Plan (FSP) provided with the project Work Plan (USAF, 2006c). Procedures for sample collection, water level measurements, well purging, field measurements, and sample management followed the procedures provided in the FSP. Table 3-2 provides a list of the groundwater samples collected in 2006. The following sections provide a summary of the results for each sample.



**Table 3-2 Groundwater Sampling Locations and Analysis**

Site ID	Well ID	GRO	BTEX	DRO	RRO	VOC	PAH	Metals
ST401	401WL-02	X	X	X			X	
	401WL-03	X	X	X				
	SP2/6-05	X	X	X				
ST402	402WL-02	X	X	X	X	X	X	X
ST403	403MW-IN	X	X	X	X	X	X	X
	OU5KM-03	X	X	X	X	X		X
ST409	409WL-06			X				
ST410	410MW-IN	X	X	X			X	
ST422	422MW-IN	X	X	X			X	
	59WL-35	X	X	X				
ST424	424MW-IN		X	X				
ST426	44785WL-01			X				
	44785WL-02			X				
ST427	427MW-IN			X			X	
ST428	1836WL-01	X	X	X				
ST507	43WL-11	X	X	X			X	
	43WL-02	X	X	X				
ST509	509MW-IN	X	X	X			X	
ST510	SP7/10-01	X	X	X				
ST516	516MW-IN	X	X	X	X	X	X	X
ST522	522MW-IN	X	X	X				
ST526	526MW-IN	X	X	X	X	X	X	X
	SP4/11-03	X	X	X	X	X		X
ST529	529MW-IN			X				
	OU5MW-34			X				
ST532	532MW-IN			X				
ST538	538BV-03	X	X	X		X		
	538WL-02	X	X	X		X		
ST703	703MW-IN		X	X			X	
	703WL-02		X	X				
SS704	SP7/10-04	X	X	X				
	SP7/10-01	X	X	X				
	W-4	X	X	X				
ST805/806	805WL-01	X	X	X				
ST904	59-WL-26			X			X	
	59-WL-05			X			X	
Building 16716	16716MW-IN			X				
	IS6-01			X				



### 3.3 SOIL SAMPLING

Soil samples were collected at sites that were considered to be close to cleanup levels according to the criteria established in the Compliance Program Decision Tree (Figure 2-1). Of the sites that were considered close to cleanup according to the formula, only ST403, ST428, and ST526 had remaining vadose zone contamination. Soil samples were to be collected from each of two borings at these three sites; however, according to the Decision Tree, samples from a second boring would not be collected if there were contaminants in the in-source well (groundwater) or soil collected from the first boring with concentrations greater than the cleanup level.

The borings were placed at the locations with the highest known concentration of remaining contamination. Samples collected at ST403 and ST526 were taken from the pilot hole drilled for the new in-source groundwater monitoring well. Three soil samples were collected from each boring, except for the boring at ST403. Groundwater was encountered before reaching the depth planned for the third sample. Table 3-3 provides the soil boring locations and sample collection summary.

At ST403, the sample collected from 31 feet below ground surface (bgs) had a result for trichloroethylene (TCE) that exceeded the cleanup level for TCE in soil. At ST526, the groundwater sample collected from the in-source well had a result for TCE that exceeded the cleanup level for TCE in water. No samples from a second boring were collected at these sites.

The procedures for drilling and soil sample collection followed the procedures in Section 3 of the FSP provided with the project Work Plan (USAF, 2006c).

**Table 3-3 Soil Boring Locations and Sample Collection Summary**

Site ID	Sample Location	Depths	GRO	BTEX	DRO	RRO	PAHs	VOCs	Metals
ST403	Well 403MW-IN Pilot Hole	25, 31	X	X	X	X	X	X	X
ST428	Near well 1836WL-01	16, 20, 25	X	X	X				
	Near well 1836WL-01	16, 20, 25	X	X	X				
ST526	Well 526MW-IN Pilot Hole	10, 12, 16	X	X	X	X	X	X	X

### 3.4 WELL CLOSURE AND ABANDONMENT

Several wells that are no longer required by the Elmendorf Compliance Program were abandoned in 2006. Wells abandoned during the 2006 field season are presented in Table 3-4. Each well casing was completely removed and their annular space filled with a bentonite slurry. The procedures for well abandonment followed the procedures in Section 3.4.3 of the FSP provided with the project Work Plan (USAF, 2006c).



**Table 3-4 2006 Well Abandonment List**

Well I.D.	Site	Reason for Abandonment	Well I.D.	Site	Reason for Abandonment
TWNMW-4	Taxiway-N	No longer needed	TWNMW-46	Taxiway-N	No longer needed
TWNMW-15	Taxiway-N	No longer needed	TWNMW-54	Taxiway-N	No longer needed
TWNMW-19	Taxiway-N	No longer needed	TWNMW-55	Taxiway-N	No longer needed
TWNMW-21	Taxiway-N	No longer needed	TWNMW-56	Taxiway-N	No longer needed
TWNMW-22	Taxiway-N	No longer needed	TWNMW-57	Taxiway-N	No longer needed
TWNMW-28	Taxiway-N	No longer needed	TWNMW-58	Taxiway-N	No longer needed
TWNMW-30	Taxiway-N	No longer needed	TWNMW-61	Taxiway-N	No longer needed
TWNMW-31	Taxiway-N	No longer needed	TWNMW-62	Taxiway-N	No longer needed
TWNMW-32	Taxiway-N	No longer needed	TWNMW-63	Taxiway-N	No longer needed
TWNMW-35	Taxiway-N	No longer needed	TWNMW-65	Taxiway-N	No longer needed
TWNMW-36	Taxiway-N	No longer needed	TWNMW-66	Taxiway-N	No longer needed
TWNMW-37	Taxiway-N	No longer needed	TWNMW-67	Taxiway-N	No longer needed
TWNMW-38	Taxiway-N	No longer needed	TWNMW-68	Taxiway-N	No longer needed
TWNMW-39	Taxiway-N	No longer needed	TWNMW-69	Taxiway-N	No longer needed
TWNMW-41	Taxiway-N	No longer needed	TWNMW-71	Taxiway-N	No longer needed
TWNMW-43	Taxiway-N	No longer needed	TWNMW-75	Taxiway-N	No longer needed
TWNMW-45	Taxiway-N	No longer needed			

### 3.5 WASTE MANAGEMENT

Wastes accumulated during sampling activities included the following:

- General refuse (e.g., paper towels, plastic bags, plastic water containers);
- Expended personal protective equipment (PPE);
- Removed well casings; and
- Wastewater from purging of wells and decontamination activities.

General refuse, removed well casings, and expended PPE were disposed of at the Anchorage Municipal Landfill. Purge water and decontamination water from sampling activities were consolidated in drums and disposed of as non-hazardous waste by Emerald, Alaska. The water was characterized as non-hazardous using groundwater sampling results.

Because direct-push technology was used to install monitoring wells, no soil cuttings requiring disposal were generated.



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#### 4.0 ST401

Elmendorf AFB site ST401 is located east of Building 4309 and north of 2nd Street (Figure 4-1). ST401 is the location of a former diesel and motor vehicle gas (MOGAS) pump station, north of 2nd Street. This site is located on the south side of the East/West Runway. Nine regulated steel USTs ranging in capacity from 12,000 gallons to 50,000 gallons were located at ST401. The tanks were installed in 1946 and used for diesel storage until 1993 (USAF, 2004a).

#### 4.1 ST401 SUMMARY OF PREVIOUS INVESTIGATIONS

1994 UST Removal: Hydrocarbon contamination was found beneath the former USTs and associated piping when they were removed in 1994. Maximum concentrations of soil contaminants were 7,000 milligrams per kilogram (mg/kg) DRO, 2,700 mg/kg GRO, and 1.1 mg/kg benzene. Groundwater was not encountered during the UST removal. This investigation indicated that a release had occurred.

SERA IV: Eight soil borings were installed during the SERA Phase IV investigation in 1996. Two soil samples were collected from each boring and analyzed for GRO, DRO, and BTEX compounds. DRO concentrations exceeded the soil cleanup level in nine of sixteen samples (concentrations ranging from 259 to 41,400 mg/kg) collected between 6 and 31 feet bgs in the vadose and smear zones.

Limited Site Investigation: In 2002, two soil borings were installed downgradient of the former UST locations. Both borings were completed as monitoring wells (401WL03 and 401WL04). A total of three soil samples were collected from the two borings and analyzed for GRO, DRO, RRO, and BTEX compounds. GRO (316 mg/kg), DRO (2,080 mg/kg), and benzene (0.0633 mg/kg) concentrations exceeded cleanup levels in one sample collected in the smear zone (35 feet bgs) in boring 401WL03. All other results were below cleanup levels.

Groundwater samples were collected from wells 401WL03 and 401WL04 during the Limited Site Investigation. DRO concentrations (13,200 and 38,600 micrograms per liter [ $\mu\text{g/L}$ ]) exceeded the cleanup levels in wells 401WL04 and 401WL03, respectively (USAF, 2004a).

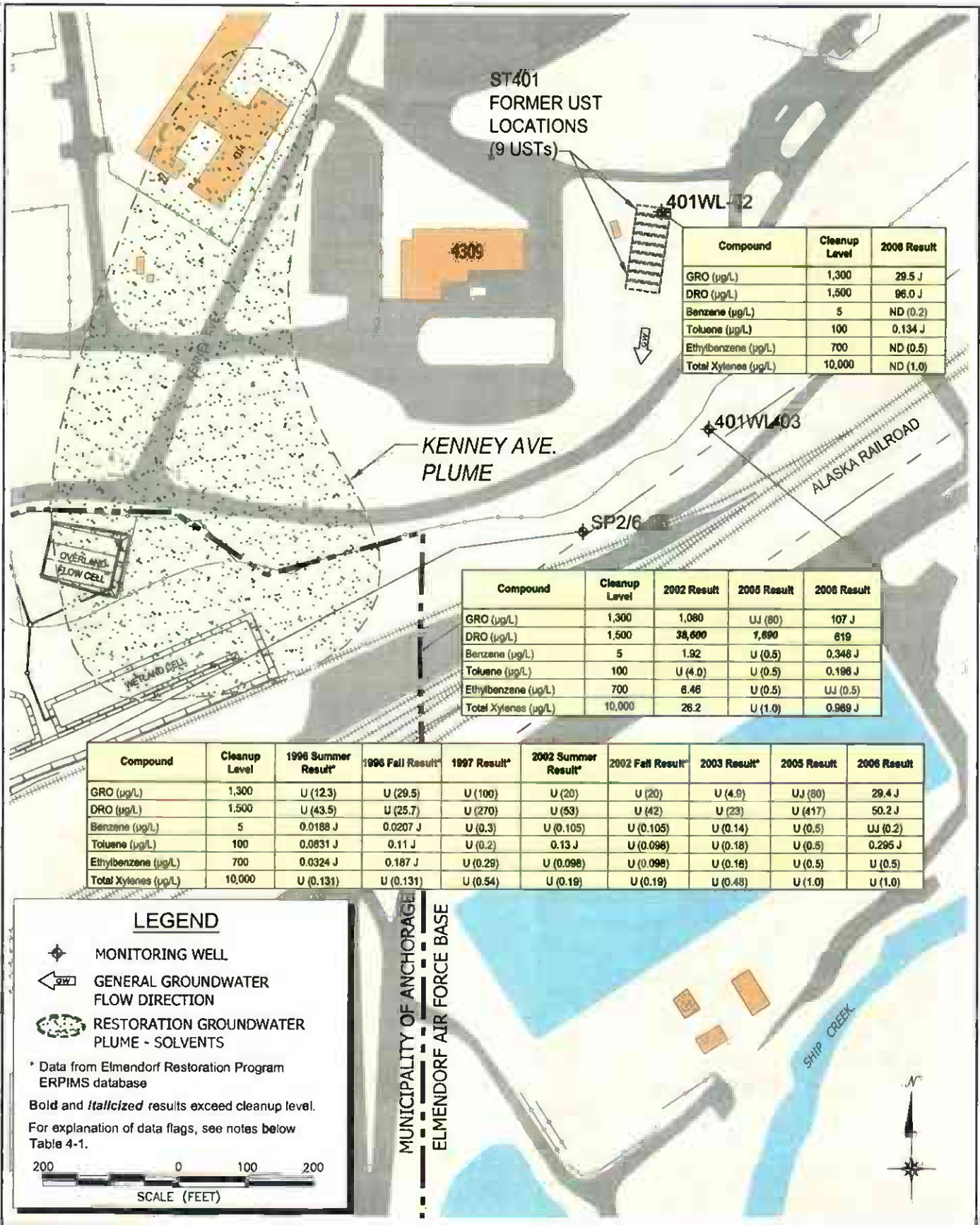
Compliance Monitoring: During the 2005 Compliance Monitoring, groundwater monitoring wells 401WL-03 and SP2/6-05 were sampled for GRO DRO, BTEX and PAHs. The sample from well SP2/6-05 was also analyzed for VOCs. DRO concentrations were detected in well 401WL-03 at 1,690  $\mu\text{g/L}$ , above the cleanup level of 1,500  $\mu\text{g/L}$ . No other constituents were reported with concentrations above cleanup levels in either sample.

#### 4.2 ST401 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling in-source well 401WL-02 and downgradient wells 401WL-03 and SP2/6-05 to monitor ST401. Because ST401 originated from diesel and gas USTs, the contaminants of concern include GRO, DRO, BTEX compounds and PAHs.



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UNITED STATES AIR FORCE

**ST401 SITE MAP**

ELMENDORF AIR FORCE BASE

ALASKA



Monitoring wells 401WL-02, 401WL-03, and SP2/6-05 were sampled using the approved procedures provided in the 2006 Final Work Plan (USAF, 2006c). Samples from each well were analyzed at an analytical laboratory for GRO, DRO, and BTEX compounds. Only the in-source well, 401WL-02, was sampled for PAHs. No contaminants were reported in any sample with concentrations exceeding their cleanup level. Results of the samples are summarized in Table 4-1.

**Table 4-1 ST401 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well		
		401WL-02	401WL-03	SP2/6-05
Gasoline Range Organics by AK101 (µg/L)	1,300	29.5 J	107 J	29.4 J
Diesel Range Organics by AK102 (µg/L)	1,500	96.0 J	619	50.2 J
<b>Aromatic Hydrocarbons by SW8021B</b>				
Benzene (µg/L)	5	UJ (0.2)	0.348 J	UJ (0.2)
Toluene (µg/L)	100	0.134 J	0.196 J	0.295 J
Ethylbenzene (µg/L)	700	UJ (0.5)	UJ (0.5)	U (0.5)
Total Xylenes (µg/L)	10,000	UJ (1.0)	0.989 J	U (1.0)
<b>Polynuclear Aromatic Hydrocarbons by SW8270C SIM</b>				
Acenaphthene (µg/L)	2,200	U (0.102)	--	--
Anthracene (µg/L)	11,000	U (0.102)	--	--
Benzo-a-anthracene (µg/L)	1	U (0.102)	--	--
Benzo-a-pyrene (µg/L)	0.2	U (0.102)	--	--
Benzo-b-fluoranthene (µg/L)	1	U (0.102)	--	--
Benzo-k-fluoranthene (µg/L)	10	U (0.102)	--	--
Chrysene (µg/L)	100	U (0.102)	--	--
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.102)	--	--
Fluorene (µg/L)	1,460	U (0.102)	--	--
Ideno-123-cd-pyrene (µg/L)	1	U (0.102)	--	--
Naphthalene (µg/L)	700	U (0.102)	--	--
Pyrene (µg/L)	1,100	U (0.102)	--	--

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL)

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

UJ = The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

µg/L = micrograms per liter.

### 4.3 ST401 CONCLUSIONS AND RECOMMENDATIONS

Data from the 2006 sampling activities suggests that hydrocarbon contaminants have naturally attenuated in the groundwater at ST401; contaminant concentrations did not exceed cleanup levels. Remaining contaminant concentrations in soil exceeded cleanup levels at ST401 when last sampled in 2002, however.



Annual groundwater sampling should continue for GRO, DRO, and BTEX compounds from the in-source well 401WL-02 and downgradient wells 401WL-03 and SP2/6-05. Because PAHs were not detected above cleanup levels in the in-source groundwater well, they should be removed as a contaminant of concern for annual monitoring in groundwater.

Although the in-source well does not have any contaminant concentrations greater than two times the cleanup level, monitoring of the two downgradient wells should continue because soil contamination was detected downgradient of the in-source well when it was sampled last in 2002.

Soil samples should again be collected from ST401 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



## 5.0 ST402

Elmendorf AFB site ST402 is located on the northwest side of Building 8326, the AGE Storage Facility Shop, off of Fighter Drive (Figure 5-1). This site is located on the south side of the East/West Runway. One regulated 500-gallon, steel UST was located at ST402. This tank stored oil from an OWS inside Building 8326. The USTs were removed in 1994 (USAF, 2004b).

### 5.1 ST402 SUMMARY OF PREVIOUS INVESTIGATIONS

1994 UST Removal: Soil contamination was detected in 49 of 58 soil samples during the UST removal in October 1994. Maximum concentrations of soil contaminants were 7,000 mg/kg DRO, 2,700 mg/kg GRO, and 1.1 mg/kg benzene. Groundwater was not encountered during the UST removal.

1996 SERA IV Investigation: In 1996, five soil borings were installed to groundwater during the SERA IV investigation. Groundwater was encountered at approximately 15 feet bgs. Two soil samples were collected from each boring and analyzed for GRO, DRO, RRO, BTEX compounds and total lead. DRO was detected in excess of cleanup levels in four samples ranging from 2,000 to 8,090 mg/kg. GRO was detected in excess of cleanup levels in one sample (1,550 mg/kg), and benzene was detected in excess of cleanup levels in three samples ranging from 0.12 to 0.43 mg/kg (USAF, 2004b).

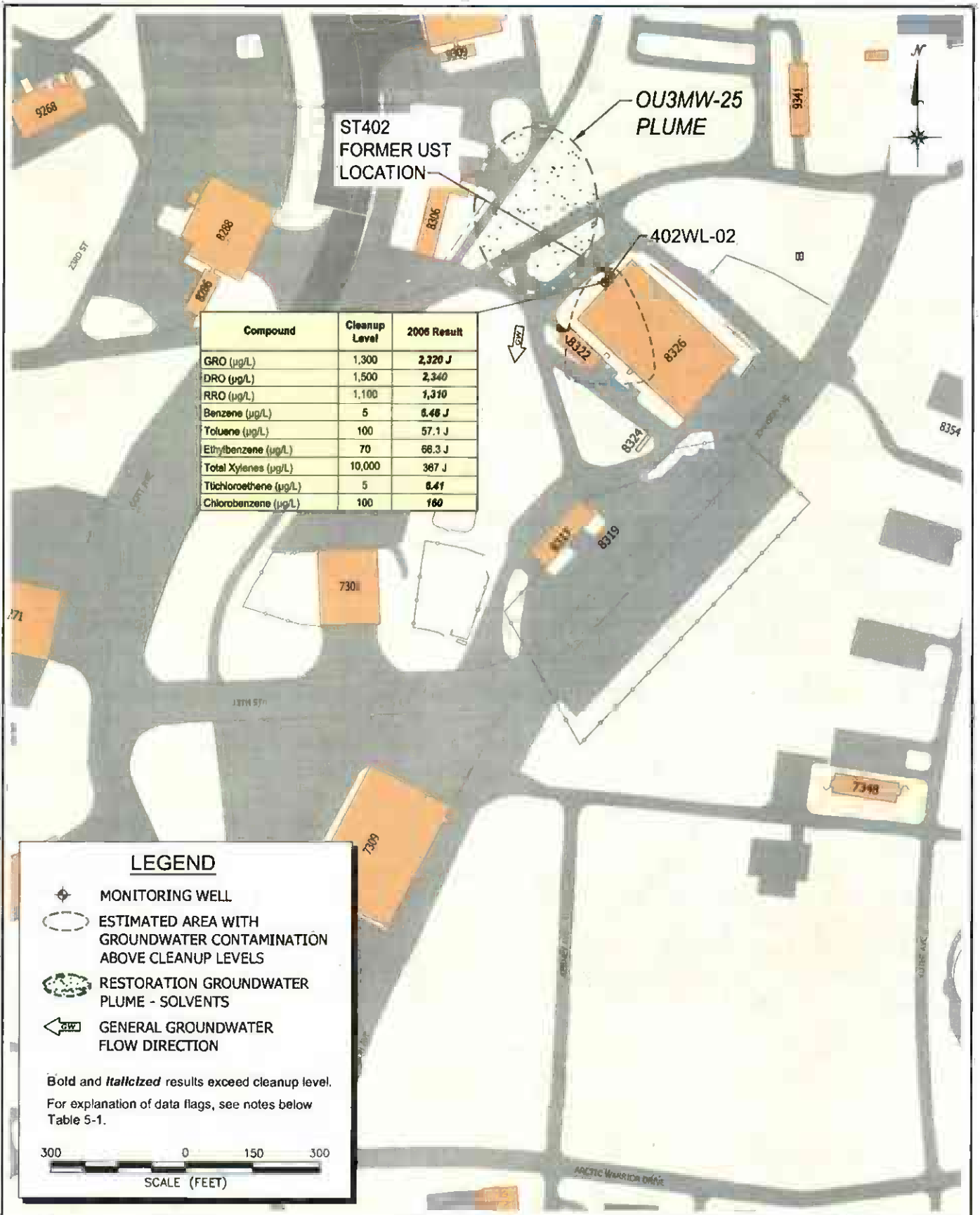
### 5.2 ST402 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling in-source well 402WL-02 and installing an additional downgradient well. Because ST402 originated from a waste oil UST, the contaminants of concern include GRO, DRO, RRO, BTEX compounds VOCs, PAHs, and metals.

In-source well 402WL-02 was sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). Samples were analyzed at an analytical laboratory for GRO, DRO, RRO, BTEX compounds, PAHs, VOCs, and metals. The sample results confirm that GRO, DRO, RRO, benzene, TCE, and chlorobenzene concentrations continue to exceed the cleanup levels in groundwater at the ST402 in-source well. Results of the samples are summarized in Table 5-1.

None of the reported contaminant concentrations were more than two times the cleanup level in the in-source well 402WL-02. According to the Compliance Program Decision Tree (Figure 2-1), a downgradient well will only be installed if groundwater contaminant concentrations are greater than two times the cleanup level in the in-source well; therefore, no new downgradient well was installed.





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**LEGEND**

- MONITORING WELL
- ESTIMATED AREA WITH GROUNDWATER CONTAMINATION ABOVE CLEANUP LEVELS
- RESTORATION GROUNDWATER PLUME - SOLVENTS
- GENERAL GROUNDWATER FLOW DIRECTION

**Bold and *Italicized* results exceed cleanup level.**  
 For explanation of data flags, see notes below Table 5-1.

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 SCALE (FEET)

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UNITED STATES AIR FORCE  
**ST402 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



**FIGURE 5-1**

**Table 5-1 ST402 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well
		402WL-02
Gasoline Range Organics by AK101 (µg/L)	1,300	2,320 J
Diesel Range Organics by AK102 (µg/L)	1,500	2,340
Residual Range Organics by AK103 (µg/L)	1,100	1,310
<b>Aromatic Hydrocarbons by SW8021B</b>		
Benzene (µg/L)	5	6.46 J
Toluene (µg/L)	100	57.1 J
Ethylbenzene (µg/L)	700	66.3 J
Total Xylenes (µg/L)	10,000	367 J
<b>Metals by SW6020</b>		
Arsenic (µg/L)	50	3.5
Barium (µg/L)	2,000	42.7
Cadmium (µg/L)	5	U (1.0)
Chromium (µg/L)	100	1.57
Lead (µg/L)	15	0.550 J
Nickel (µg/L)	100	7.33
Vanadium (µg/L)	260	2.70
<b>Polynuclear Aromatic Hydrocarbons (PAHs) by SW8270C SIM</b>		
Acenaphthene (µg/L)	2,200	U (0.0943)
Anthracene (µg/L)	11,000	U (0.0943)
Benzo-a-anthracene (µg/L)	1	U (0.0943)
Benzo-a-pyrene (µg/L)	0.2	U (0.0943)
Benzo-b-fluoranthene (µg/L)	1	U (0.0943)
Benzo-k-fluoranthene (µg/L)	10	U (0.0943)
Chrysene (µg/L)	100	U (0.0943)
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.0943)
Fluorene (µg/L)	1,460	U (0.0943)
Ideno-123-cd-pyrene (µg/L)	1	U (0.0943)
Naphthalene (µg/L)	700	7.23
Pyrene (µg/L)	1,100	U (0.0943)
<b>Volatile Organic Compounds (VOCs) by SW8260B Above Cleanup Levels<sup>2</sup></b>		
Trichloroethene (µg/L)	5	6.41
Chlorobenzene (µg/L)	100	160

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

<sup>2</sup> Because there are more than 60 reported VOCs in the analytical data package, only those that exceed cleanup levels are provided in this table.

**Bold** values exceed cleanup levels.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.



### 5.3 ST402 CONCLUSIONS AND RECOMMENDATIONS

Remaining contaminant concentrations in vadose zone soil and groundwater exceeded cleanup levels at ST402 in 1996. In 2006, in-source groundwater monitoring well 402WL-02 had concentrations of GRO, DRO, RRO, benzene, TCE, and chlorobenzene that exceeded the cleanup level.

In-source monitoring well 402WL-02 should continue to be sampled annually for GRO, DRO, RRO, BTEX compounds, metals and VOCs. Because PAHs were not detected above cleanup levels in the in-source groundwater well, they should be removed as a contaminant of concern for annual monitoring in groundwater.

Once groundwater contaminant concentrations are below cleanup levels, soil samples should be collected to determine if all vadose zone soil has been remediated. Once all groundwater and vadose zone soil contaminant concentrations are below cleanup levels, this site should be considered for closure.



## 6.0 ST403

Elmendorf AFB site ST403 is located southwest of Building 4314, Hazardous Storage, on Kenney Avenue (Figure 6-1). This site is on the south side of the East/West Runway. The site includes one regulated 500-gallon waste oil tank that received waste oil from an OWS located inside Building 4314 and one former unregulated 2,600-gallon heating oil tank that was taken out of service around 1993 (USAF, 2004c).

### 6.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1993 Heating Oil UST Removal: The 2,600-gallon UST and associated piping were removed in June and July 1993. Although there were reports that the tank was leaking, there were no visual indications of damage or leakage when the tank was excavated. Two samples were collected from the excavation and one sample was collected from the stockpile of excavated soil. These samples were analyzed for DRO only. DRO (5,900 mg/kg) exceeded the cleanup level in one sample collected near the center of the UST excavation at 7 feet bgs. The other two sample results were below the cleanup level. Excavated soil and approximately 100 tons of additional clean soil were used to backfill the excavation.

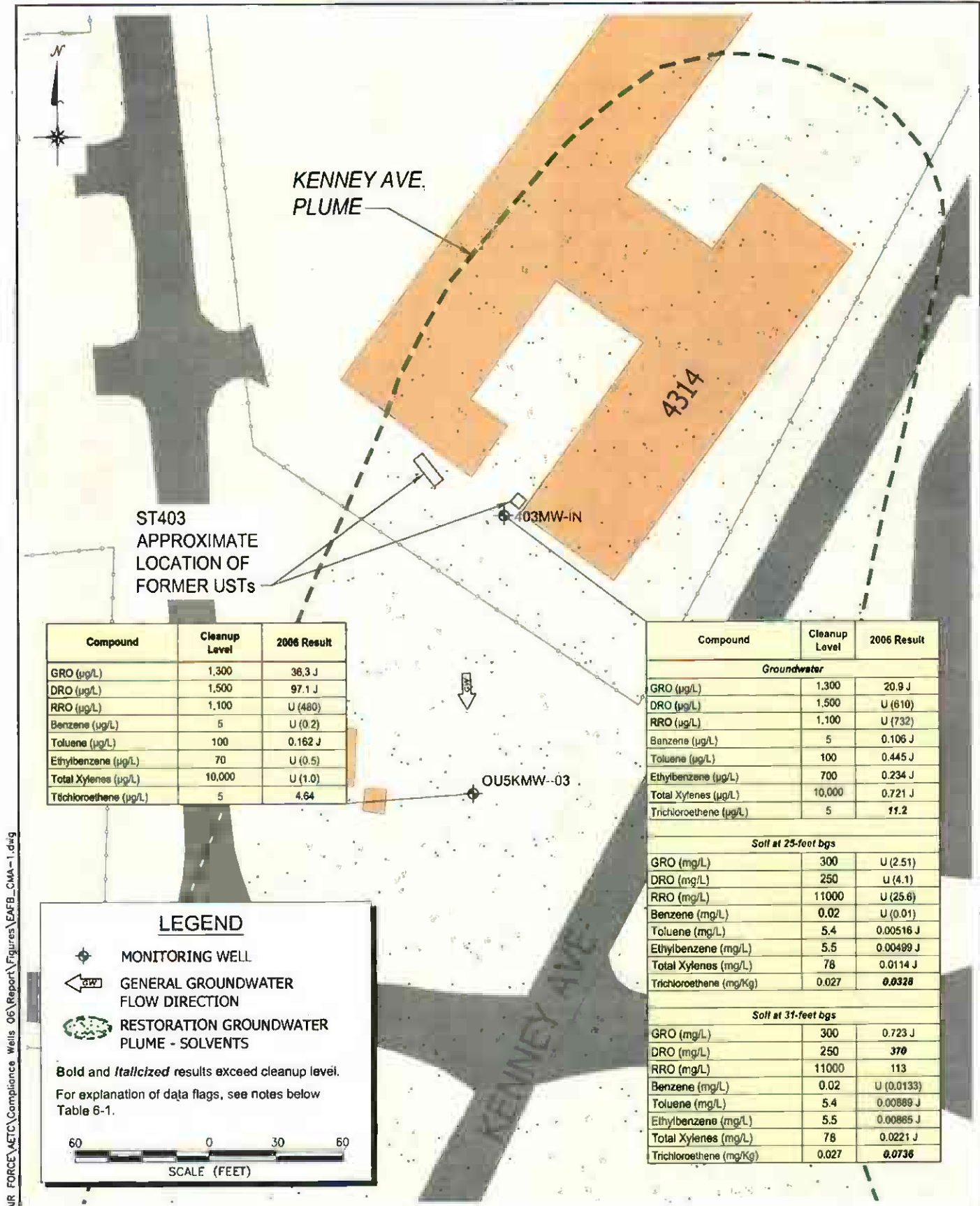
1994 Waste Oil UST Removal: The UST and the piping between the UST and the building were removed in June 1994. The UST and piping appeared to be in good condition and had no visible leaks.

Two samples were collected from the excavation at approximately 9 feet bgs and two samples were collected from excavated, stockpiled soil. These samples were analyzed for GRO, DRO, RRO, BTEX compounds, VOCs, polychlorinated biphenyls (PCBs), and leachable metals (arsenic, cadmium, chromium, and lead). Except for methylene chloride, a VOC, all results were below the cleanup levels. The methylene chloride results were suspected to be from laboratory contamination and are not believed to be associated with the site.

A new UST and associated piping were installed in June 1994 and connected to the original piping at the building edge. The tank pit was backfilled with clean gravel. Stockpiled soil was used as fill in the yard surrounding the building.

In August 1994, approximately 300 gallons of jet propulsion fuel number eight (JP-8) was released from the OWS discharge into a damaged fill-pipe connected to the newly-installed UST. The damaged pipe was within the building foundation and most of the spill appeared to be under Building 4314. Approximately 35 cubic yards (cy) of contaminated soil were excavated from the area between the OWS and the new UST; this soil was transported offsite for remediation. Two soil samples collected from below the piping at 3.5 feet bgs inside the building contained DRO concentrations of 3,860 mg/kg and 3,800 mg/kg. It is assumed these samples were collected from within a utility vault inside the building. Four samples were collected between 1 and 6 feet bgs immediately outside of the building; these samples contained DRO, GRO, and BTEX compound concentrations above cleanup levels (USAF, 2004c).





Compound	Cleanup Level	2006 Result
GRO (µg/L)	1,300	36.3 J
DRO (µg/L)	1,500	97.1 J
RRO (µg/L)	1,100	U (480)
Benzene (µg/L)	5	U (0.2)
Toluene (µg/L)	100	0.162 J
Ethylbenzene (µg/L)	70	U (0.5)
Total Xylenes (µg/L)	10,000	U (1.0)
Trichloroethene (µg/L)	5	4.64

Compound	Cleanup Level	2006 Result
<b>Groundwater</b>		
GRO (µg/L)	1,300	20.9 J
DRO (µg/L)	1,500	U (610)
RRO (µg/L)	1,100	U (732)
Benzene (µg/L)	5	0.106 J
Toluene (µg/L)	100	0.445 J
Ethylbenzene (µg/L)	700	0.234 J
Total Xylenes (µg/L)	10,000	0.721 J
Trichloroethene (µg/L)	5	<b>11.2</b>
<b>Soil at 25-foot bgs</b>		
GRO (mg/L)	300	U (2.51)
DRO (mg/L)	250	u (4.1)
RRO (mg/L)	11000	U (25.6)
Benzene (mg/L)	0.02	U (0.01)
Toluene (mg/L)	5.4	0.00516 J
Ethylbenzene (mg/L)	5.5	0.00499 J
Total Xylenes (mg/L)	78	0.0114 J
Trichloroethene (mg/Kg)	0.027	<b>0.0328</b>
<b>Soil at 31-foot bgs</b>		
GRO (mg/L)	300	0.723 J
DRO (mg/L)	250	<b>370</b>
RRO (mg/L)	11000	113
Benzene (mg/L)	0.02	U (0.0133)
Toluene (mg/L)	5.4	0.00889 J
Ethylbenzene (mg/L)	5.5	0.00885 J
Total Xylenes (mg/L)	78	0.0221 J
Trichloroethene (mg/Kg)	0.027	<b>0.0736</b>

**LEGEND**

- MONITORING WELL
- GENERAL GROUNDWATER FLOW DIRECTION
- RESTORATION GROUNDWATER PLUME - SOLVENTS


**Bold and *italicized* results exceed cleanup level.**  
 For explanation of data flags, see notes below Table 6-1.

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UNITED STATES AIR FORCE  
**ST403 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



**FIGURE 6-1**

SERA IV: During the SERA Phase IV investigation conducted in 1996, nine borings were installed. Two soil samples were collected from each boring and analyzed for GRO, DRO, and BTEX compounds. DRO concentrations exceeded the cleanup level of 250 mg/kg in two samples collected at 31 and 36 feet bgs (12,000 and 4,860 mg/kg, respectively) from one boring located at the 1994 spill area and in one sample collected at 21 feet bgs (1,630 mg/kg) in another boring located near the 2,600-gallon heating oil UST. Groundwater is located at about 38 feet bgs at this location. All other results were below cleanup levels.

## 6.2 ST403 2006 FIELD ACTIVITIES AND RESULTS

The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source monitoring well and sampling downgradient well OU5KMW-03. Because ST403 originated from waste oil and heating oil USTs, the contaminants of concern include GRO, DRO, RRO, BTEX compounds, VOCs, PAHs, and metals.

A new in-source monitoring well, 403MW-IN, was installed at the location known to previously contain the highest concentration of soil contaminants (12,000 mg/kg DRO in 1996). The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.

Monitoring wells 403MW-IN and OU5KMW-03 were sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). Samples were analyzed by an analytical laboratory for GRO, DRO, RRO, BTEX compounds, VOCs, and metals. The in-source well 403MW-IN was also sampled for PAHs.

Only TCE in the in-source well was reported with a concentration exceeding the cleanup level. Results of the samples are summarized in Table 6-1.

According to the formula to determine if a site is nearing cleanup (Figure 2-1), ST403 met the criteria as nearing cleanup in 2006. Two soil samples were collected from the pilot hole for the new in-source monitoring well 403MW-IN. The samples were collected at depths (25 and 31 feet bgs) known to previously contain the highest concentrations of soil contaminants. A third sample was planned at 36 feet bgs, but groundwater was encountered at 34 feet bgs.

TCE was detected in both soil samples with concentrations exceeding the cleanup level. DRO was detected with a concentration exceeding the cleanup level in the sample collected at 31 feet bgs. GRO, RRO, BTEX compounds, metals, and VOCs were not detected in either sample above cleanup levels. Results of the samples are summarized in Table 6-2.



Table 6-1 ST403 Groundwater Analytical Sample Results

Compound	Cleanup Level <sup>1</sup>	Well	
		403MW-IN	OU5KMW-03
Gasoline Range Organics by AK101 (µg/L)	1,300	20.9 J	36.3 J
Diesel Range Organics by AK102 (µg/L)	1,500	U (610)	97.1 J
Residual Range Organics by AK103 (µg/L)	1,100	U (732)	U (480)
<b>Aromatic Hydrocarbons by SW8021B</b>			
Benzene (µg/L)	5	0.106 J	UJ (0.2)
Toluene (µg/L)	100	0.445 J	0.162 J
Ethylbenzene (µg/L)	700	0.234 J	U (0.5)
Total Xylenes (µg/L)	10,000	0.721 J	U (1.0)
<b>Metals by SW6020</b>			
Arsenic (µg/L)	50	0.660 J	0.35 J
Barium (µg/L)	2,000	32.9	22.4
Cadmium (µg/L)	5	0.440 J	0.190 J
Chromium (µg/L)	100	3.67	0.690 J
Lead (µg/L)	15	0.640 J	0.060 J
Nickel (µg/L)	100	12.8	5.54
Vanadium (µg/L)	260	2.23	1.71
<b>Polynuclear Aromatic Hydrocarbons by SW8270C SIM</b>			
Acenaphthene (µg/L)	2,200	U (0.0980)	--
Anthracene (µg/L)	11,000	U (0.0980)	--
Benzo-a-anthracene (µg/L)	1	U (0.0980)	--
Benzo-a-pyrene (µg/L)	0.2	U (0.0980)	--
Benzo-b-fluoranthene (µg/L)	1	U (0.0980)	--
Benzo-k-fluoranthene (µg/L)	10	U (0.0980)	--
Chrysene (µg/L)	100	U (0.0980)	--
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.0980)	--
Fluorene (µg/L)	1,460	U (0.0980)	--
Ideno-123-cd-pyrene (µg/L)	1	U (0.0980)	--
Naphthalene (µg/L)	700	U (0.0980)	--
Pyrene (µg/L)	1,100	U (0.0980)	--
<b>Volatile Organic Compounds by SW8260B Above Cleanup Levels<sup>2</sup></b>			
Trichloroethene (µg/L)	5	11.2	4.64

Notes:

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

<sup>2</sup> Because there are more than 60 reported VOCs in the analytical data package, only those that exceed cleanup levels are provided in this table.

**Bold** values exceed cleanup levels.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

UJ = The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

µg/L = micrograms per liter.



Table 6-2 ST403 Soil Analytical Sample Results

Compound	Cleanup Level <sup>1</sup>	Location	
		403MW-IN at 26-ft. bgs	403MW-IN at 31-ft. bgs
Gasoline Range Organics by AK101 (mg/kg)	300	U (2.51)	0.723 J
Diesel Range Organics by AK102 (mg/kg)	250	U (4.1)	370
Residual Range Organics by AK103 (mg/kg)	11,000	U (25.6)	113
<b>Aromatic Hydrocarbons by SW8021B</b>			
Benzene (µg/L)	0.02	U (0.01)	U (0.0133)
Toluene (mg/kg)	5.4	0.00516 J	0.00889 J
Ethylbenzene (mg/kg)	5.5	0.00499 J	0.00865 J
Total Xylenes (mg/kg)	78	0.0114 J	0.0221 J
<b>Metals by SW6020</b>			
Arsenic (mg/kg)	16.2	5.17	4.20
Barium (mg/kg)	1,100	45.4	53.5
Cadmium (mg/kg)	5	0.169 J	0.175 J
Chromium (mg/kg)	76.1	28.7	30.0
Lead (mg/kg)	400	3.92	3.97
Nickel (mg/kg)	87	28.5	28.5
Vanadium (mg/kg)	710	52.6	57.90
<b>Polynuclear Aromatic Hydrocarbons (PAHs) by SW8270C SIM</b>			
Acenaphthene (mg/kg)	210	U (0.0102)	U (0.0104)
Anthracene (mg/kg)	4,300	U (0.0102)	U (0.0104)
Benzo-a-anthracene (mg/kg)	6	U (0.0102)	U (0.0104)
Benzo-a-pyrene (mg/kg)	1	U (0.0102)	U (0.0104)
Benzo-b-fluoranthene (mg/kg)	11	U (0.0102)	U (0.0104)
Benzo-k-fluoranthene (mg/kg)	110	U (0.0102)	U (0.0104)
Chrysene (mg/kg)	620	U (0.0102)	U (0.0104)
Dibenzo-a,h-anthracene (mg/kg)	1	U (0.0102)	U (0.0104)
Fluorene (mg/kg)	270	U (0.0102)	U (0.0104)
Ideno-123-cd-pyrene (mg/kg)	11	U (0.0102)	U (0.0104)
Naphthalene (mg/kg)	21	U (0.0102)	U (0.0104)
Pyrene (mg/kg)	1,500	U (0.0102)	U (0.0104)
<b>Volatile Organic Compounds (VOCs) by SW8260B Above Cleanup Levels<sup>2</sup></b>			
Trichloroethene (mg/kg)	0.027	0.0328	0.0736

Notes:

<sup>1</sup> Cleanup levels are from the 18 AAC 75.341 Tables B1 and B2. Method 2, under 40-inch zone criteria, the most stringent of the three criteria except for arsenic and chromium which use the maximum background levels. The maximum background levels are from studies conducted on Elmendorf AFB published in 1993.

<sup>2</sup> Because there are more than 60 reported VOCs in the analytical data package, only those that exceed cleanup levels are provided in this table.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

mg/kg = milligrams per kilogram.



### 6.3 ST403 CONCLUSIONS AND RECOMMENDATIONS

Remaining contaminant concentrations in soil and groundwater exceeded the cleanup levels at ST403 in 2006. Groundwater in the in-source well had concentrations of TCE more than two times the cleanup level. TCE and DRO were found in the soil with concentrations exceeding the cleanup level. GRO, RRO, BTEX compounds, metals and PAHs were not found above cleanup levels in soil or groundwater in 2006.

In-source monitoring well 403MW-IN and downgradient well OU5KMW-03 should continue to be sampled annually for DRO and VOCs. According to the Analytical Decision Tree (Figure 2-2), GRO, RRO, BTEX compounds, metals, and PAHs can be removed from annual monitoring requirements.

Once groundwater contaminant concentrations are below cleanup levels, soil samples should be collected to determine if all vadose zone soil has been remediated. Once all groundwater and vadose zone soil contaminant concentrations are below cleanup levels, this site should be considered for closure.



## 7.0 ST407

Elmendorf AFB site ST407 is located southeast of Building 17504, on the north side of the East/West Runway. Building 17504 is Hangar 12 located on 33<sup>rd</sup> Street (Figure 7-1). ST407 is the former location of three USTs that held hydraulic oil, turbine oil and jet propulsion fuel number four (JP-4). The USTs were removed in 1994 (USAF, 2004d).

### 7.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1994 UST Removal: Soil contamination above cleanup levels was detected in 5 of 10 confirmation samples with maximum concentrations of 9,000 mg/kg DRO, 420 mg/kg GRO, and 22.7 mg/kg BTEX when the USTs were removed from ST407 in 1994. Groundwater was not encountered during the UST removal. This investigation indicated that a release had occurred.

SERA IV: In 1996, six soil borings were installed during the SERA Phase IV investigation. Soil samples collected from each boring were analyzed for GRO, DRO, RRO, and BTEX. DRO and benzene concentrations exceeded cleanup levels. All other analytes were below cleanup levels. The maximum DRO concentrations were 2,600 mg/kg, detected at 16 feet bgs, and 1,800 mg/kg, detected at 41 feet bgs. Benzene was detected in one sample at 0.15 mg/kg at 16 feet bgs and at 0.02 mg/kg in a downgradient smear-zone sample. Groundwater was encountered at approximately 42 feet bgs.

2001 Soil Removal: In 2001, 73.5 tons of soil was excavated and removed from site ST407. The excavation extended to a depth of between 15 and 18 feet bgs. Three confirmation samples were collected from the floor of the excavation. The maximum detected DRO concentration was 972 mg/kg, which exceeded the cleanup level. Concentrations of GRO, RRO, BTEX, and PAHs were all below cleanup levels (USAF, 2004d).

### 7.2 ST407 2006 FIELD ACTIVITIES AND RESULTS

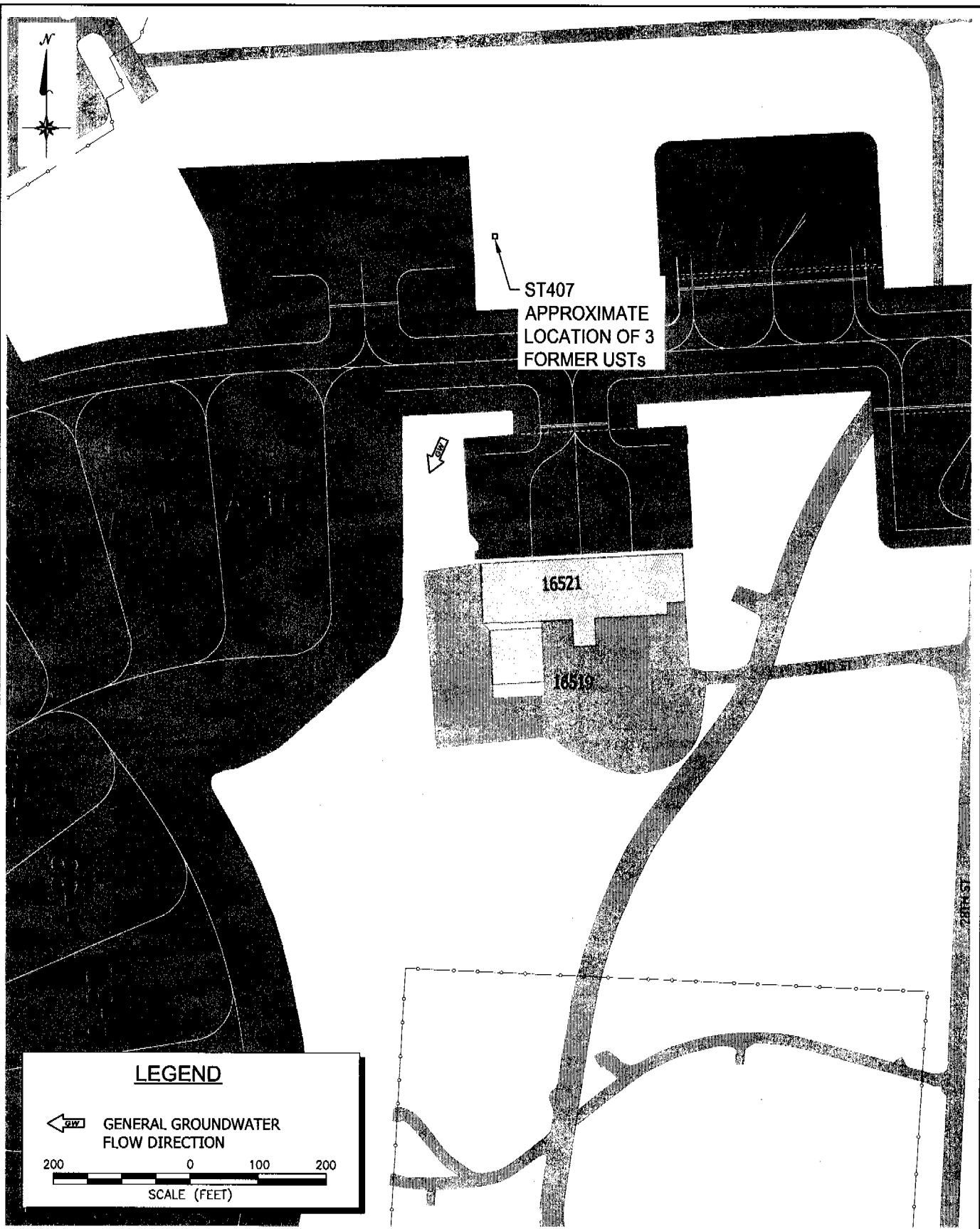
The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source and a new downgradient well to monitor ST407. However, the report also discussed construction of a new C-17 maintenance hangar directly over the ST407 source area. According to the Compliance Program Decision Tree (Figure 2-1), if any construction or other Base activities/obstacles prevent well installation, the installation will be postponed until the obstacle is cleared. The locations for installation of the new wells were checked during the summer of 2006. It was determined that construction activities did interfere with installation of the new monitoring wells for 2006 and they will need to be installed at a later date.

### 7.3 ST407 CONCLUSIONS AND RECOMMENDATIONS

Following excavation of contaminated soil in 2001, concentrations of DRO were found to still exceed the cleanup level in confirmation soil samples collected from the floor of the excavation. No groundwater monitoring wells exist that would be practical for monitoring ST407 groundwater. New monitoring wells were not installed in 2006 due to construction activities occurring directly above the former UST's location.



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UNITED STATES AIR FORCE

### ST407 SITE MAP

ELMENDORF AIR FORCE BASE  
ALASKA



FIGURE 7-1

ST407 soil meets the criteria in the formula to determine if a site is nearing cleanup in 2007, Figure 2-1, as being near cleanup. Vadose zone soil samples should be collected as soon as possible (pending construction activities) to determine if DRO concentrations in soil continue to exceed the cleanup level. In addition, a new monitoring well should be installed as close to location of the former USTs as possible and sampled. (The new C-17 Hangar is being built directly over the site). If DRO concentrations are more than two times the cleanup level in this well, a new downgradient well should also be installed. If both vadose zone soil and groundwater concentrations are below cleanup levels, this site should be considered for closure.



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## 8.0 ST409

Elmendorf AFB site ST409 is located just south of the former Elmendorf AFB Hospital, near Building 4913 (Figure 8-1). ST409 is the former location of an unregulated 20,000-gallon steel heating oil UST associated with the former Elmendorf AFB Hospital. The UST was removed in 1994 (USAF, 2004e).

### 8.1 SUMMARY OF PREVIOUS INVESTIGATIONS

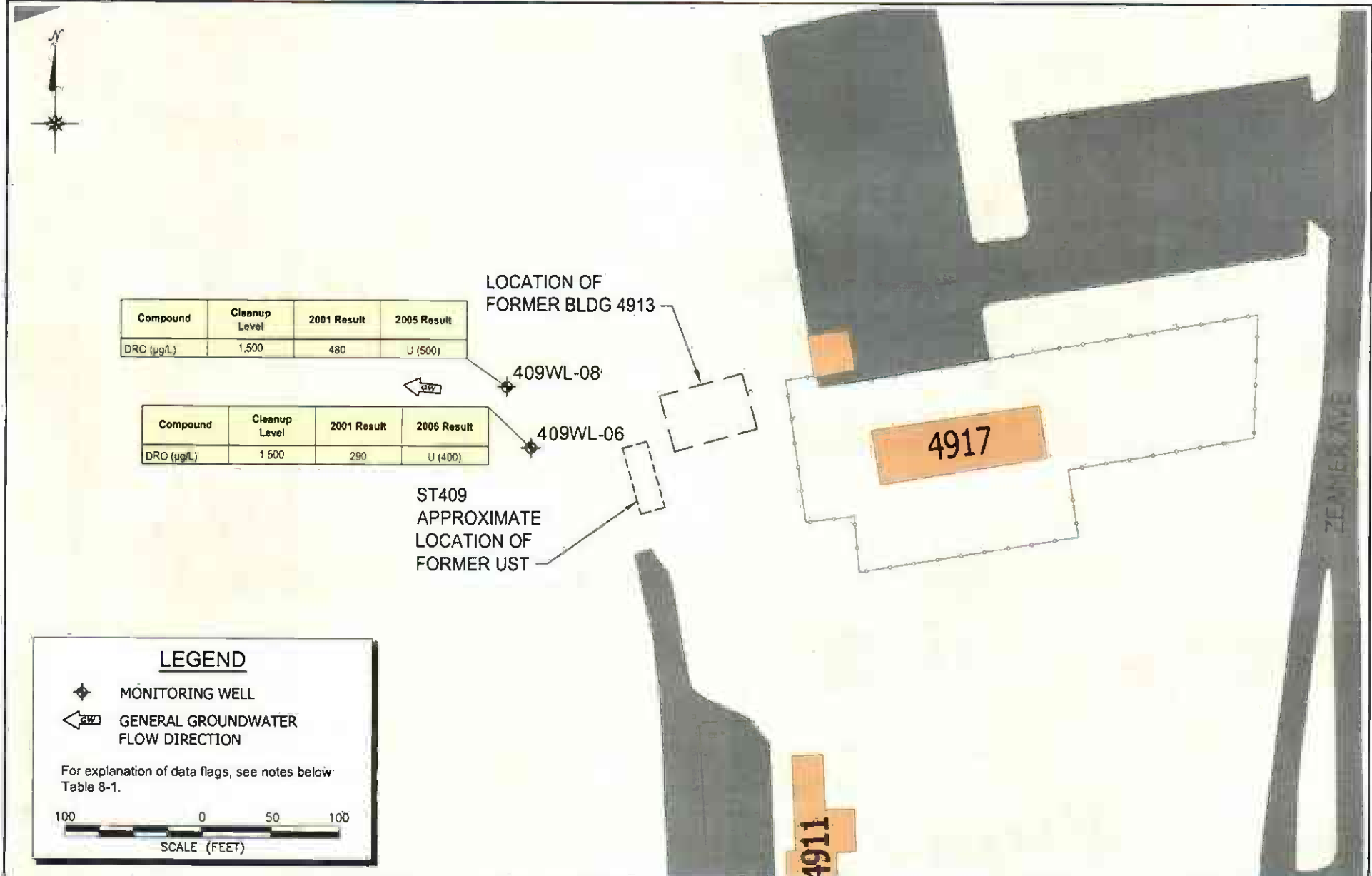
1994 UST Removal: DRO concentrations above cleanup levels were detected in three of six confirmation soil samples collected during the removal of the 20,000-gallon steel UST in 1994. DRO concentrations ranged from 2,900 to 12,000 mg/kg. The samples were collected from approximately 9 to 13 feet bgs. This investigation indicated that a release had occurred.

SERA IV: In 1996 and 1997, six soil borings were installed during the SERA Phase IV investigation. Three of the borings were completed as monitoring wells. Soil samples collected from each boring were analyzed for GRO, DRO, RRO, and BTEX compounds. Selected samples were analyzed for PAHs. DRO exceeded cleanup levels in three samples (309 to 2,600 mg/kg) collected in the smear or saturated zones (21 to 31 feet bgs). All other compounds were not detected or detected at concentrations below cleanup levels. Groundwater samples collected from three source monitoring wells were analyzed for DRO, GRO, and BTEX compounds. Concentrations were below groundwater cleanup levels.

SERA VII: In 1998, three soil borings were installed during the SERA Phase VII investigation. Two of the borings were completed as monitoring wells. Seven samples were collected from the three borings and analyzed for GRO, DRO, and BTEX compounds. DRO (1,480 mg/kg) exceeded the cleanup level in one sample. All other compounds were either not detected or detected below cleanup levels. Groundwater samples were collected from five source monitoring wells and analyzed for GRO, DRO, and BTEX compounds. DRO results (2,550 to 23,500 µg/L) exceeded the cleanup level in two of the wells.

SERA IX: In 2001, seven soil borings were installed during the SERA Phase IX investigation. Five borings were installed to delineate the lateral extent of contamination and two borings were installed downgradient of ST409 as sentinel monitoring wells. Three near-surface soil samples were collected from the lateral delineation borings and three subsurface soil samples were collected from each downgradient boring. Samples were analyzed for GRO, DRO, RRO, and BTEX compounds. Select samples were analyzed for PAHs. One near-surface sample had DRO (5,700 mg/kg) in excess of cleanup levels; all other compounds from all samples were either not detected or below cleanup levels. Groundwater samples were collected from the two new sentinel wells and the five monitoring wells installed during the SERA Phase IV and VII investigations. The samples were analyzed for GRO, DRO, RRO, and BTEX compounds. DRO results ranged from 1,500 to 6,700 µg/L in samples collected from monitoring wells installed during the SERA IV investigation.





DATE: 09 MAY 2007	UNITED STATES AIR FORCE  <b>ST409 SITE MAP</b>  ELMENDORF AIR FORCE BASE ALASKA	
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<b>FIGURE 8-1</b>		

The DRO concentrations in 2001 had decreased substantially from the 1998 levels. All other analytical results were below cleanup levels (USAF, 2004e).

2002 Soil Excavation: In 2002, approximately 1,046 tons of contaminated soil was excavated from the ST409 area and transported to Alaska Soil Recycling for thermal treatment. Groundwater was encountered at 25 feet bgs; therefore, the excavation was limited to the interface just above the smear zone at approximately 22 feet bgs. Following receipt of confirmation sample results, the excavation was backfilled with clean soil.

Ten confirmation soil samples were collected from the excavation. All samples were analyzed for DRO, one sample was analyzed for PAHs, and two samples were analyzed for BTEX. DRO exceeded cleanup levels in three of the samples (297 to 3,970 mg/kg). All other analytical results were below cleanup levels.

Compliance Monitoring: During the 2005 Compliance Monitoring, groundwater monitoring well 409WL-08 was sampled for DRO and monitored natural attenuation (MNA) parameters. DRO was not detected in the field sample or the field duplicate sample. MNA parameters showed that high concentrations of electron acceptors (dissolved oxygen and sulfate) were present in groundwater downgradient of ST409. This indicates that the aquifer at this location is capable of supporting biodegradation of fuel constituents. The reduction-oxidation potential measured in well 409WL-08 was negative (-149.9 millivolts [mV]), which may be an indication that biodegradation of fuel constituents is occurring upgradient of this well. However, the ample electron acceptor concentrations detected indicate that any upgradient groundwater "plume" present at ST409 is stable (USAF, 2006a).

## 8.2 ST409 2006 FIELD ACTIVITIES AND RESULTS

The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source monitoring well and sampling downgradient well 409WL-08. Because ST409 originated from a heating oil UST, the contaminants of concern include DRO, BTEX compounds, and PAHs. Previous soil and groundwater sampling events did not find BTEX compounds or PAHs above cleanup levels; therefore, according to the Analytical Decision Tree (Figure 2-2), BTEX compounds and PAHs can be removed from annual sampling.

A Dig/Clearance Permit was attempted to be acquired from the Base Civil Engineering Office to install a new in-source monitoring well. An active sewer line was known to run near the area in which the well was planned to be installed. The Dig/Clearance Permit was going to be granted only if the boring location would be moved more than 50-feet to the southwest. At that location, the existing well 409WL-06 would be better suited to monitor this site. The decision was made by the 3 CES/CEVQ Project Manager to sample only well 409WL-06 to monitor this site in 2006.

Groundwater monitoring well 409WL-06 was sampled using the approved procedures provided in the 2006 *Final Work Plan* (USAF, 2006c). Samples were analyzed by an analytical laboratory for DRO. DRO was not detected above the method detection limit (MDL) in the sample. The result of the sample is summarized in Table 8-1.



Table 8-1 ST409 Groundwater Analytical Sample Results

Compound	Cleanup Level <sup>1</sup>	Well
		409WL-06
Diesel Range Organics by AK102 (µg/L)	1,500	U (400)

Notes:

<sup>1</sup> Cleanup level from 18 AAC 75.345 Table C.

U = Not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

µg/L = micrograms per liter.

### 8.3 ST409 CONCLUSIONS AND RECOMMENDATIONS

DRO contamination remained in the smear zone soil and groundwater in the former UST area at ST409 in 2002. All contaminated vadose zone soil was removed in 2002. In 2005, groundwater at monitoring well 409WL-08, located hydraulically downgradient of ST409, did not have detectable concentrations of DRO. In 2006, groundwater at monitoring well 409WL-06, located just downgradient of ST409, also did not have detectable concentrations of DRO.

If contaminants remain in the smear zone soil and groundwater in the former UST area at ST409, they have not migrated downgradient. Monitoring well 409WL-06 should again be monitored for DRO in 2007. If no contaminants are detected above cleanup levels again, this site should be considered for closure. No additional soil sampling is required at this site because soil contamination is limited to the smear zone.



## 9.0 ST410

Elmendorf AFB site ST410 is located south of Building 9561, a Hush House for jet engine testing. The site is located near the intersection of Slammer Avenue and Simpson Harbor Drive, on the south side of the East/West Runway (Figure 9-1). ST410 is the former location of a 500-gallon UST which received waste oil from an OWS. The piping system associated with the OWS and UST was known to leak, and the UST failed a tightness test conducted prior to 1995. The UST and OWS were removed in 1995 (USAF, 2004f).

### 9.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1995 UST Removal: Five soil samples were collected from the excavation and analyzed for GRO, DRO, BTEX compounds, total petroleum hydrocarbons (TPH), halogenated volatile organics (HVOCs), PCBs, arsenic, cadmium, chromium, lead and PAHs. DRO was detected in two samples at 2,100 and 7,000 mg/kg, both of which exceeded the cleanup level. One sample also contained GRO (730 mg/kg), benzene (0.96 mg/kg) and toluene (9.8 mg/kg) exceeding cleanup levels. All other results were below cleanup levels. Both of these samples were collected from the OWS vault excavation.

SERA IV: In 1996 and 1997, four soil borings were installed during the SERA Phase IV investigation. Two soil samples were collected from each boring and analyzed for GRO, DRO, RRO, and BTEX compounds. GRO (750 mg/kg) and DRO (3,600 mg/kg) exceeded cleanup levels in the sample collected near the former OWS vault at 16 feet bgs. All other results were below cleanup levels (USAF, 2004f).

### 9.2 ST410 2006 FIELD ACTIVITIES AND RESULTS

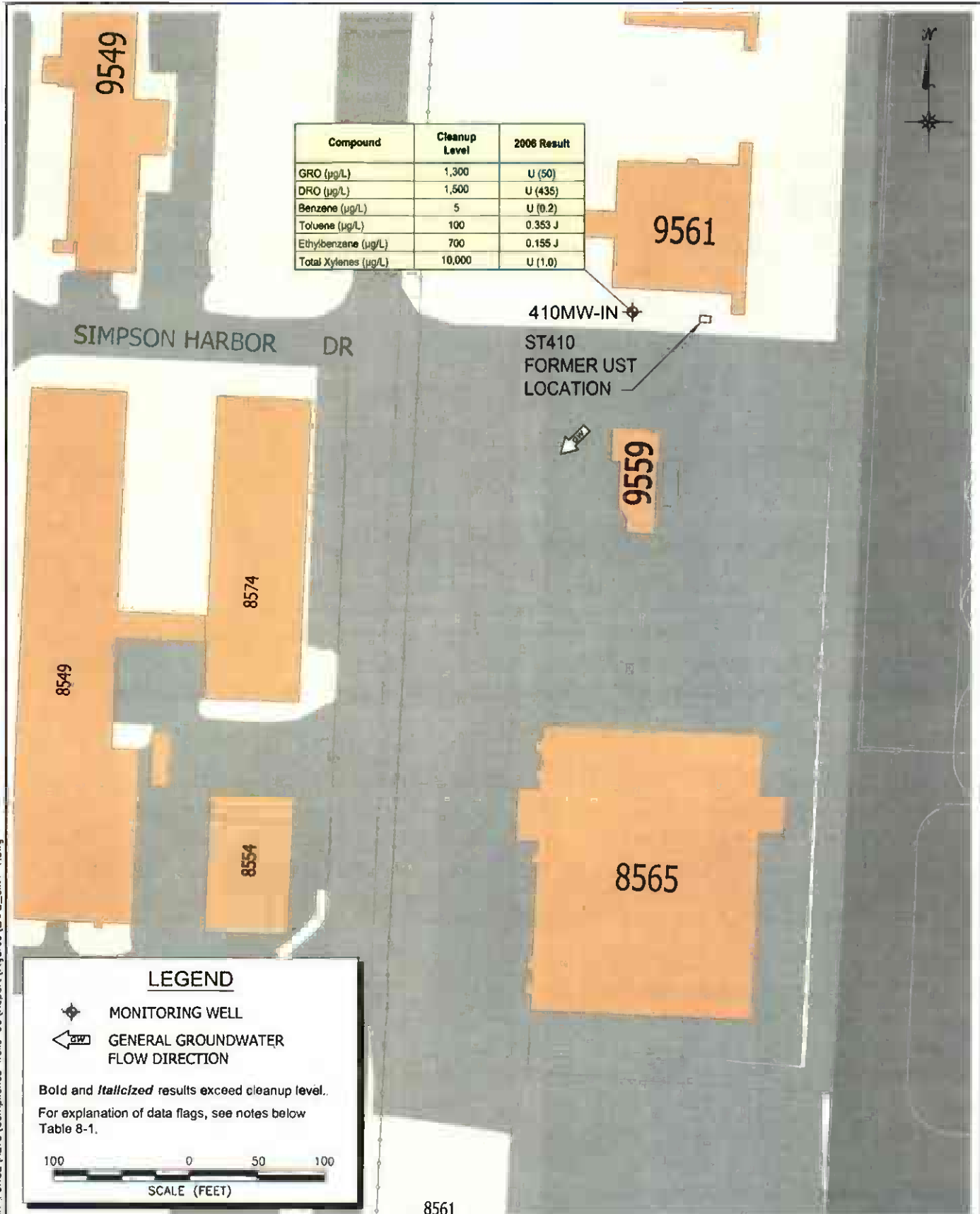
The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling one new in-source monitoring well and one new downgradient monitoring well at ST410. Because ST410 originated from a waste oil UST, the contaminants of concern include GRO, DRO, RRO, BTEX compounds, VOCs, PAHs, and metals. Previous soil sampling eliminated RRO, VOCs, and metals as contaminants for this site.

A new in-source monitoring well, 410MW-IN, was installed at the location known to previously contain the highest concentration of soil contaminants (DRO 7,000 mg/kg and GRO 730 mg/kg in 1995). The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.

Groundwater monitoring well 410MW-IN was sampled using the approved procedures provided in the 2006 *Final Work Plan* (USAF, 2006c). Samples were analyzed by an analytical laboratory for GRO, DRO, BTEX compounds, and PAHs. No contaminants were detected above cleanup levels in the sample. Results of the sample are summarized in Table 9-1.



According to the Compliance Program Decision Tree (Figure 2-1), no downgradient well was to be installed if there were no contaminants in the in-source well with concentrations greater than two times the cleanup level. No downgradient well was installed at this site in 2006.



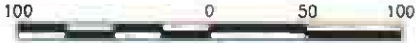


Compound	Cleanup Level	2006 Result
GRO (µg/L)	1,300	U (50)
DRO (µg/L)	1,500	U (435)
Benzene (µg/L)	5	U (0.2)
Toluene (µg/L)	100	0.353 J
Ethylbenzene (µg/L)	700	0.155 J
Total Xylenes (µg/L)	10,000	U (1.0)

**LEGEND**

 MONITORING WELL  
 GENERAL GROUNDWATER FLOW DIRECTION

Bold and *Italicized* results exceed cleanup level.  
 For explanation of data flags, see notes below Table 8-1.

  
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DATE: 09 MAY 2007

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DRAWN BY: SJ

UNITED STATES AIR FORCE

**ST410 SITE MAP**

ELMENDORF AIR FORCE BASE  
ALASKA



**FIGURE 9-1**

**Table 9-1 ST410 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well
		410MW-IN
Gasoline Range Organics by AK101 (µg/L)	1,300	U (50)
Diesel Range Organics by AK102 (µg/L)	1,500	U (435)
<b>Aromatic Hydrocarbons by SW8021B</b>		
Benzene (µg/L)	5	U (0.2)
Toluene (µg/L)	100	0.353 J
Ethylbenzene (µg/L)	700	0.155 J
Total Xylenes (µg/L)	10,000	U (1.0)
<b>Polynuclear Aromatic Hydrocarbons by SW8270C SIM</b>		
Acenaphthene (µg/L)	2,200	U (0.0990)
Anthracene (µg/L)	11,000	U (0.0990)
Benzo-a-anthracene (µg/L)	1	U (0.0990)
Benzo-a-pyrene (µg/L)	0.2	U (0.0990)
Benzo-b-fluoranthene (µg/L)	1	U (0.0990)
Benzo-k-fluoranthene (µg/L)	10	U (0.0990)
Chrysene (µg/L)	100	U (0.0990)
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.0990)
Fluorene (µg/L)	1,460	U (0.0990)
Ideno-123-cd-pyrene (µg/L)	1	U (0.0990)
Naphthalene (µg/L)	700	U (0.0990)
Pyrene (µg/L)	1,100	U (0.0990)

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.

### 9.3 ST410 CONCLUSIONS AND RECOMMENDATIONS

In 1995, 1996, and 1997, concentrations of GRO, DRO, benzene, and toluene remained in the soil and groundwater above cleanup levels at ST410. In 2006, groundwater at the newly installed in-source monitoring well 410MW-IN did not have concentrations of GRO, DRO, BTEX compounds, or PAHs above cleanup levels.

In-source well 410MW-IN should continue to be sampled annually for GRO, DRO, and BTEX compounds. According to the Analytical Decision Tree (Figure 2-2), PAHs can be removed from annual monitoring requirements. Soil samples should be collected from ST410 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



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## 10.0 ST422

Elmendorf AFB site ST422 is located southwest of Building 13262 (formerly Building 41-701), a solid waste disposal facility, off of Airlifter Drive where one regulated 500-gallon UST was located (Figure 10-1). This tank provided diesel fuel for a waste incinerator in Building 13262, which is part of the flight kitchen operations. Subsurface investigation conducted at the time of tank removal in 1995 indicated that there was a release associated with the tank (USAF, 2004g).

### 10.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1995 UST Removal: During tank removal, two soil samples were collected from the excavation and analyzed for DRO. Only one of the samples contained DRO (4,690 mg/kg) in excess of the cleanup level. This sample was collected from 3 feet bgs along the eastern excavation sidewall. Additional soil was not excavated from this area due to the proximity of the building; additional excavation could have jeopardized the integrity of the building foundation. Contaminated soil was transported offsite for remediation, and the excavation was backfilled with clean fill.

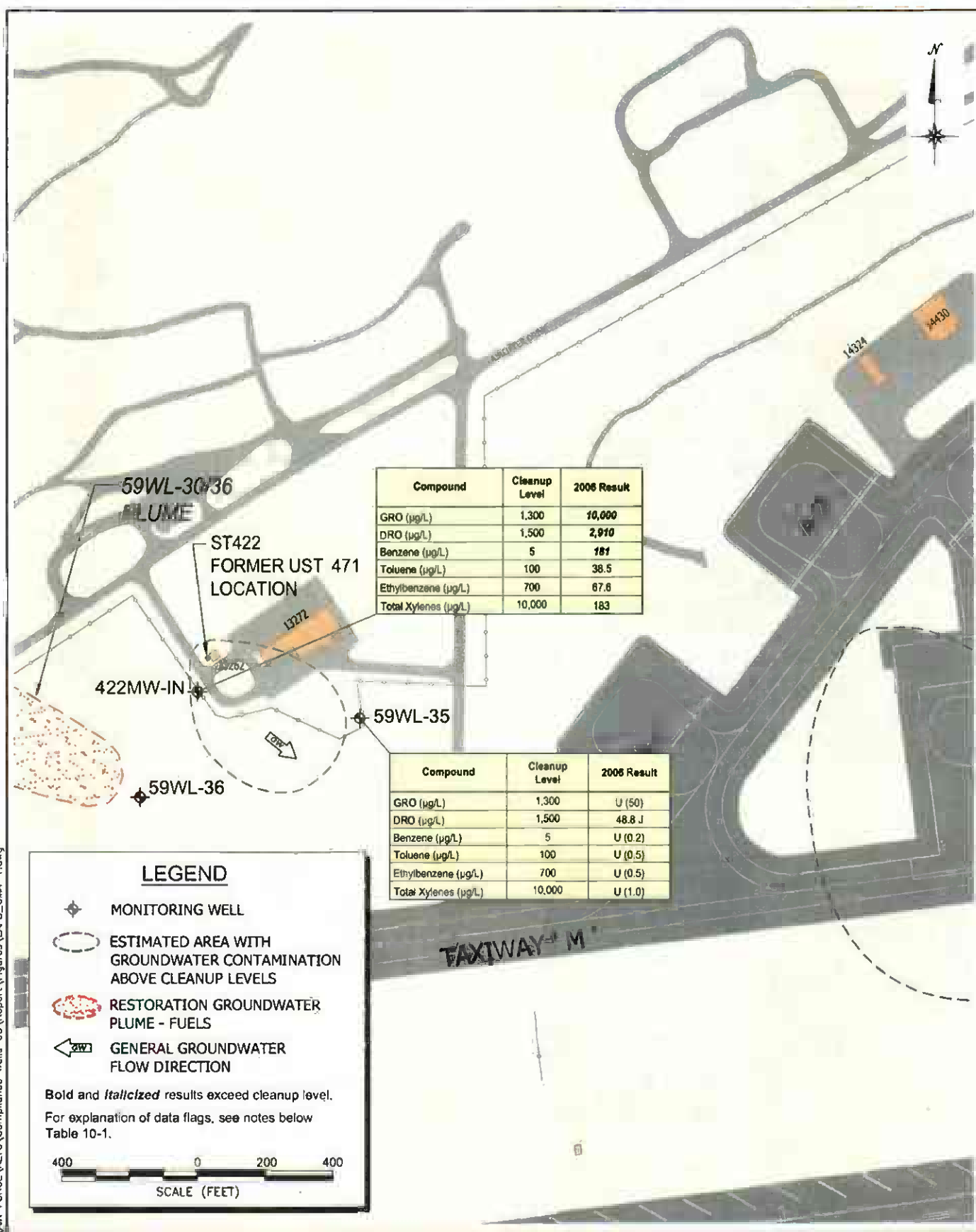
SERA IV: During the SERA Phase IV investigation conducted in 1996, four borings were installed at the site. Soil samples were collected approximately every 5 feet from each boring for lithologic logging and field screening. Two samples were collected from each boring and analyzed for GRO, DRO, and BTEX compounds. GRO concentrations were 344 and 2,100 mg/kg in samples collected from one boring. These results exceeded the soil cleanup level for GRO. Benzene exceeded its cleanup level in four of the eight samples (0.1 to 18.4 mg/kg). Toluene (8.16 mg/kg) also exceeded its cleanup level in the sample with the highest GRO and benzene concentration. All other results were below cleanup levels (USAF, 2004g).

### 10.2 ST422 2006 FIELD ACTIVITIES AND RESULTS

The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling one new in-source monitoring well and sampling downgradient well 59WL-35 at ST422. Because ST422 originated from a diesel fuel UST, the contaminants of concern include DRO, BTEX compounds, and PAHs. Previous soil sampling confirmed that GRO was also present in the soil at concentrations exceeding cleanup levels, therefore, GRO was also included for annual monitoring.

A new in-source monitoring well, 422MW-IN, was installed at the location known to previously contain the highest GRO, benzene and toluene concentrations in soil (GRO 2,100 mg/kg, benzene 18.4 mg/kg, and toluene 18.6 mg/kg). The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B. Groundwater monitoring wells 422MW-IN and 59WL-35 were sampled using the approved procedures provided in the 2006 *Final Work Plan* (USAF, 2006c). Samples were analyzed by an analytical laboratory for GRO, DRO, and BTEX compounds. The in-source well 422MW-IN was also sampled for PAHs.





Compound	Cleanup Level	2006 Result
GRO (µg/L)	1,300	<b>10,000</b>
DRO (µg/L)	1,500	<b>2,910</b>
Benzene (µg/L)	5	<b>181</b>
Toluene (µg/L)	100	<b>38.5</b>
Ethylbenzene (µg/L)	700	<b>87.6</b>
Total Xylenes (µg/L)	10,000	<b>183</b>

Compound	Cleanup Level	2006 Result
GRO (µg/L)	1,300	U (50)
DRO (µg/L)	1,500	48.8 J
Benzene (µg/L)	5	U (0.2)
Toluene (µg/L)	100	U (0.5)
Ethylbenzene (µg/L)	700	U (0.5)
Total Xylenes (µg/L)	10,000	U (1.0)

**LEGEND**

- ◆ MONITORING WELL
- ESTIMATED AREA WITH GROUNDWATER CONTAMINATION ABOVE CLEANUP LEVELS
- RESTORATION GROUNDWATER PLUME - FUELS
- ← GENERAL GROUNDWATER FLOW DIRECTION

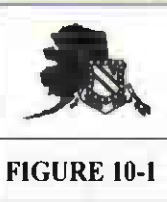
**Bold and italicized results exceed cleanup level.**  
 For explanation of data flags, see notes below Table 10-1.

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UNITED STATES AIR FORCE  
**ST422 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



GRO, DRO, and benzene were detected at concentrations exceeding the cleanup levels in the in-source monitoring well. No contaminants were found with concentrations exceeding the cleanup levels in the downgradient well. Results of the samples are summarized in Table 10-1.

**Table 10-1 ST422 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well	
		422MW-IN	59WL-35
Gasoline Range Organics by AK101 (µg/L)	1,300	<b>10,000</b>	U (50)
Diesel Range Organics by AK102 (µg/L)	1,500	<b>2,910</b>	48.8 J
<b>Aromatic Hydrocarbons by SW8021B</b>			
Benzene (µg/L)	5	<b>181</b>	U (0.2)
Toluene (µg/L)	100	<b>38.5</b>	U (0.5)
Ethylbenzene (µg/L)	700	<b>67.8</b>	U (0.5)
Total Xylenes (µg/L)	10,000	<b>183</b>	U (1.0)
<b>Polynuclear Aromatic Hydrocarbons by SW8270C SIM</b>			
Acenaphthene (µg/L)	2,200	U (0.102)	--
Anthracene (µg/L)	11,000	U (0.102)	--
Benzo-a-anthracene (µg/L)	1	U (0.102)	--
Benzo-a-pyrene (µg/L)	0.2	U (0.102)	--
Benzo-b-fluoranthene (µg/L)	1	U (0.102)	--
Benzo-k-fluoranthene (µg/L)	10	U (0.102)	--
Chrysene (µg/L)	100	U (0.102)	--
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.102)	--
Fluorene (µg/L)	1,460	U (0.102)	--
Ideno-123-cd-pyrene (µg/L)	1	U (0.102)	--
Naphthalene (µg/L)	700	<b>0.380</b>	--
Pyrene (µg/L)	1,100	U (0.102)	--

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

**Bold** values exceed the cleanup level.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.

### 10.3 ST422 CONCLUSIONS AND RECOMMENDATIONS

In 1996, soil at ST422 contained concentrations of contaminants above cleanup levels. Groundwater samples collected from the in-source monitoring well in 2006 confirmed that GRO, DRO, and benzene concentrations exceed their cleanup levels in groundwater.

Monitoring wells 422MW-IN and 59WL-35 should continue to be sampled annually for GRO, DRO, and BTEX compounds. According to the Analytical Decision Tree (Figure 2-2), PAHs can be removed from annual monitoring requirements.



Once groundwater contaminant concentrations are below cleanup levels, soil samples should be collected to determine if all vadose zone soil has been remediated. Once all groundwater and vadose zone soil contaminant concentrations are below cleanup levels, this site should be considered for closure.



## 11.0 ST424

Elmendorf AFB site ST424 is located on the south side of Building 10334, the Auxiliary Power Plant, near the intersection of 24<sup>th</sup> Street and Jerstad Avenue (Figure 11-1). ST424 is the former location of a 10,000-gallon steel UST used to store diesel fuel for emergency generators. The UST was removed from ST424 in 1995 (USAF, 2004h).

### 11.1 SUMMARY OF PREVIOUS INVESTIGATIONS

SERA Phase IV: In 1996, four soil borings were installed during the SERA Phase IV investigation. Groundwater was encountered at approximately 16 feet bgs. Field screening indicated contamination was present from 5 feet bgs to groundwater. Two analytical soil samples were collected from each boring and analyzed for GRO, DRO, and BTEX compounds. The maximum DRO concentration detected was 4,120 mg/kg at 16.5 feet bgs at the location of the former UST. The DRO concentration was 292 mg/kg at 6.5 feet bgs in this same boring. DRO (344 mg/kg) above the cleanup level was also detected in the smear zone approximately 75 feet downgradient of the site. Benzene (0.12 mg/kg) was detected in one sample above the cleanup level of 0.02 mg/kg. Benzene was not detected in other samples. All other results were below cleanup levels (USAF, 2004h).

2001 Contaminated Soil Removal: In 2001, 351 tons of contaminated soil were excavated from site ST424. Contaminated soil was removed to the maximum extent possible within site limitations. Excavation was limited vertically to the interface just above the smear zone at approximately 16 feet bgs. Seven confirmation soil samples were collected from the floor of the excavation and analyzed for DRO. The sample near the maximum DRO concentration detected in 1996 was also analyzed for GRO, BTEX compounds, and PAHs. DRO contamination exceeded the cleanup level in the smear zone at three locations, with a maximum concentration of 4,120 mg/kg. All other results were below cleanup levels (USAF, 2004h).

### 11.2 ST424 2006 FIELD ACTIVITIES AND RESULTS

The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling one new in-source monitoring well and one new downgradient monitoring well at ST424. Because ST424 originated from a diesel fuel UST, the contaminants of concern include DRO, BTEX compounds, and PAHs. No PAHs were detected above cleanup levels during previous soil sampling and these were eliminated for annual monitoring.

A new in-source monitoring well, 424MW-IN, was installed at the location known to previously contain the highest concentration of soil contaminants (DRO 4,120 mg/kg in 1996). The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.

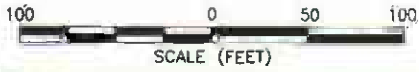
Groundwater monitoring well 424MW-IN was sampled using the approved procedures provided in the 2006 *Final Work Plan* (USAF, 2006c). This sample was analyzed by an analytical laboratory for DRO and BTEX compounds. No DRO or BTEX compounds were detected above cleanup levels in the sample. Results of the sample are summarized in Table 11-1.



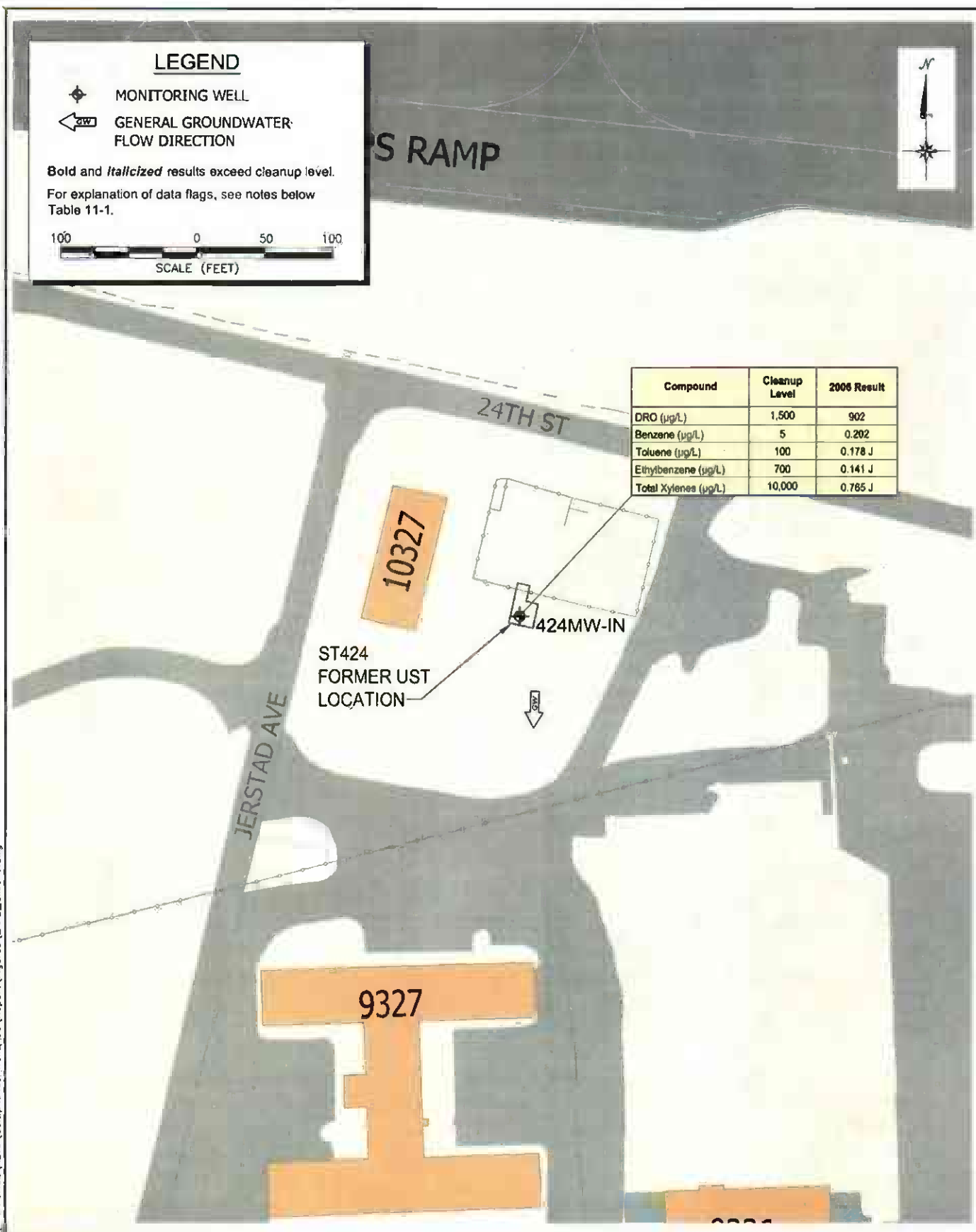
**LEGEND**

-  MONITORING WELL
-  GENERAL GROUNDWATER FLOW DIRECTION

**Bold and *Italicized* results exceed cleanup level.**  
 For explanation of data flags, see notes below Table 11-1.



Compound	Cleanup Level	2006 Result
DRO (µg/L)	1,500	902
Benzene (µg/L)	5	0.202
Toluene (µg/L)	100	0.178 J
Ethylbenzene (µg/L)	700	0.141 J
Total Xylenes (µg/L)	10,000	0.785 J



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UNITED STATES AIR FORCE  
**ST424 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



**Table 11-1 ST424 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well
		424MW-IN
Diesel Range Organics by AK102 (µg/L)	1,500	902
<b>Aromatic Hydrocarbons by SW8021B</b>		
Benzene (µg/L)	5	0.202
Toluene (µg/L)	100	0.178 J
Ethylbenzene (µg/L)	700	0.141 J
Total Xylenes (µg/L)	10,000	0.765 J

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.

According to the Compliance Program Decision Tree (Figure 2-1), a downgradient well will only be installed if groundwater contaminant concentrations are greater than two times the cleanup level in the in-source well; therefore, no new downgradient well was installed at ST424 in 2006.

**11.3 ST424 CONCLUSIONS AND RECOMMENDATIONS**

DRO concentrations in smear zone soil exceeded the cleanup level at the former UST location at ST424 in 2001. In 2006, groundwater at the in-source monitoring well 424MW-IN had concentrations of DRO and BTEX compounds below cleanup levels.

Monitoring well 424MW-IN should be sampled again for DRO and BTEX compounds in 2007; if all contaminant concentrations are below cleanup levels again, this site should be considered for closure. No additional soil sampling is required for closure because remaining soil contamination is limited to the smear zone.



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## 12.0 ST426

Elmendorf AFB site ST426 is located on the north side of Building 18877, a communications receiver (Figure 12-1). ST426 is the former location of an unregulated 700-gallon steel UST that contained diesel fuel for an emergency generator at the building. The UST and associated piping were excavated and removed in 1995 (USAF, 2004i).

### 12.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1995 UST Removal: Five soil samples were collected from within the excavation when the UST and associated piping were excavated and removed. The samples were analyzed for DRO. DRO concentrations ranged from 5,700 mg/kg to 12,800 mg/kg, which exceeded the cleanup level. Groundwater was encountered at 6 feet bgs during this removal effort. This investigation indicated that a release had occurred.

SERA IV (1996): In 1996, four soil borings were installed during the SERA Phase IV investigation. One boring was converted into a monitoring well (44-785WL-01). The borings were advanced to a maximum of 41 feet bgs and groundwater was encountered in a perched aquifer at 7 feet bgs and in a sand layer at 24 feet bgs. Two analytical soil samples were collected from each boring and analyzed for GRO, DRO, and BTEX compounds. DRO exceeded the cleanup level in the sample from 6.5 feet bgs in the boring at the former location of the UST (8,870 mg/kg). DRO was not detected at 16.5 feet bgs in this same boring. All other compounds were not detected or were below cleanup levels (USAF, 2004i).

SERA IV (1997): In 1997, two soil borings were installed during the SERA Phase IV investigation. One boring was converted into a monitoring well (44-785WL-02). Soil samples were analyzed for DRO, GRO, RRO, BTEX compounds, and PAHs. All soil sample results were below cleanup levels. Water samples were collected from both monitoring wells (44-785WL-01 and 44-785WL-02). The DRO concentration in well 44-785WL-01 was 7,630 µg/L, exceeding the cleanup level. Other compounds were not detected or were below ADEC cleanup levels (USAF, 2004i).

SERA VI: One soil boring was completed as a monitoring well during the SERA VI investigation in 1998. This well was installed in a downgradient location to the southwest of the site. Two soil samples and one groundwater sample were collected and analyzed for GRO, DRO, RRO, BTEX compounds, and PAHs; all results were below ADEC cleanup levels (USAF, 2004i).

SERA VII: Two soil borings were completed as monitoring wells during the SERA VII investigation in 1998. Two monitoring wells were installed, one at a presumed downgradient location and one at a presumed upgradient location. Soil samples were collected from the soil





Compound	Cleanup Level	1997 Result	1998 Result	2005 Result	2006 Result
DRO (µg/L)	1,500	274	497	U (400)	U (400)

ST426  
APPROXIMATE  
LOCATION FORMER  
OF UST (AFID 785)

44-785-WL-02

44-785-WL-01

18877

Compound	Cleanup Level	1997 Result	1998 Result	2005 Result	2006 Result
DRO (µg/L)	1,500	<b>7,630</b>	<b>5,850</b>	2,130	498



**LEGEND**



MONITORING WELL



GENERAL GROUNDWATER  
FLOW DIRECTION

**Bold and *italicized* results exceed cleanup level.**

For explanation of data flags, see notes below  
Table 12-1.

60 0 30 60

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DATE: 09 MAY 2007

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UNITED STATES AIR FORCE

**ST426 SITE MAP**

ELMENDORF AIR FORCE BASE  
ALASKA



**FIGURE 12-1**

borings and analyzed for GRO, DRO, and BTEX compounds. All results were below cleanup levels. Groundwater samples were collected from four monitoring wells and analyzed for GRO, DRO, BTEX compounds, and PAHs. DRO was detected in all four wells; however, the only sample that exceeded the groundwater cleanup level for DRO was the sample from 44-785WL-01, containing 5,850 µg/L DRO. The 1997 DRO concentration in this well was 7,630 µg/L. All other results were below cleanup levels (USAF, 2004i).

**Compliance Monitoring:** During the 2005 Compliance Monitoring, groundwater monitoring wells 44-785WL-01 and 44-785WL-02 were sampled for DRO and MNA parameters. DRO in the sample collected from well 44-785WL-01 was reported with a concentration of 2,130 µg/L, which exceeded the cleanup level of 1,500 µg/L. DRO was not detected in the sample collected from well 44-785WL-02.

Results of MNA parameters indicated that the aquifer is anaerobic and that several types of electron acceptors are available and were being utilized during biodegradation of fuel constituents at ST426 with a high level of biological activity within the plume. The MNA parameter results supported the conclusion that the plume is stable (USAF, 2006a).

## 12.2 ST426 2006 FIELD ACTIVITIES AND RESULTS

The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling monitoring wells 44-785-WL-01 and 44-785-WL-02. Because ST426 originated from a diesel fuel UST, the contaminants of concern include DRO, BTEX compounds, and PAHs. Previous soil and groundwater sampling events did not find BTEX compounds or PAHs above cleanup levels when sampled for. According to the Analytical Decision Tree (Figure 2-2), BTEX compounds and PAHs can be removed from annual sampling requirements.

Groundwater monitoring wells 44-785WL-01 and 44-785WL-02 were sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). DRO analytical results were below the cleanup level. The sample results are summarized in Table 12-1.

**Table 12-1 ST426 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well	
		44-785WL-01	44-785WL-02
Diesel Range Organics by AK102 (µg/L)	1,500	498	U (400)

**Notes:**

<sup>1</sup> Cleanup level from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter

## 12.3 ST426 CONCLUSIONS AND RECOMMENDATIONS

The groundwater samples collected from in-source wells 44-785WL-01 and 44-785WL-02 in 2006 were reported with DRO concentrations below the cleanup level. In-source well 44-



785WL-01 should be sampled again in 2007 for DRO. If concentrations of DRO are below cleanup levels again in 2007, this site should be considered for closure. Soil sampling is not necessary for closure because previous investigations only found contaminated soil in the smear zone. DRO has not been detected in monitoring well 44-785WL-02 for two consecutive years and continued sampling is not necessary.



### 13.0 ST427

Elmendorf AFB site ST427 is located west of Building 9559, near the intersection of Slammer Avenue and Simpson Harbor Drive (Figure 13-1). ST427 is the former location of two 2,000-gallon USTs that contained JP-4 and MOGAS. The USTs were removed in 1995 (USAF, 2004j)

#### 13.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1995 UST Removal: During the USTs and associated dispensers removal in 1995, seven soil samples were collected and analyzed for GRO, DRO, BTEX compounds, and lead. DRO was detected (4,090 mg/kg) in excess of cleanup levels in one sample from beneath the dispensing island. However, field observations and the case narrative in the laboratory report suggested that this contamination may have been associated with asphalt pipe coating and not the fueling system.

SERA IV: In 1996, three soil borings were installed during the SERA Phase IV investigation. Groundwater was encountered at approximately 27 feet bgs and a petroleum odor was detected at the smear zone in one boring. Two samples were collected from each boring and analyzed for GRO, DRO, and BTEX compounds. DRO concentrations exceeded the cleanup level in one sample (344 mg/kg), located downgradient of the former USTs. All other analytical results were below cleanup levels (USAF, 2004j).

#### 13.2 ST427 2006 FIELD ACTIVITIES AND RESULTS

The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling one new upgradient and one new downgradient well at ST427. Because ST427 originated from jet fuel and MOGAS USTs, the contaminants of concern include GRO, DRO, BTEX compounds and PAHs. GRO and BTEX compounds were sampled for during previous soil sampling events, but were not found above cleanup levels. According to the Analytical Decision Tree (Figure 2-2), GRO and BTEX compounds can be removed from annual sampling.

A new in-source monitoring well, 427MW-IN, was installed just south of the former USTs location, where remaining smear zone soil contamination was found in 1996. The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.

Groundwater monitoring well 427MW-IN was sampled using the approved procedures provided in the 2006 *Final Work Plan* (USAF, 2006c). The sample was analyzed by an analytical laboratory for DRO and PAHs. No DRO or PAHs were detected above MDLs in the sample. A summary of the sample results are provided in Table 13-1.

According to the Compliance Program Decision Tree (Figure 2-1), no downgradient well was to be installed if there were no contaminants in the in-source well with concentrations greater than two times the cleanup level. No downgradient well was installed at this site in 2006.





Compound	Cleanup Level	2006 Result
DRO (µg/L)	1,500	U (417)



SIMPSON HARBOR DR

427MW-IN



ST427  
APPROXIMATE  
LOCATION OF  
FORMER USTs

**LEGEND**

-  MONITORING WELL
-  GENERAL GROUNDWATER FLOW DIRECTION

**Bold and *Italicized* results exceed cleanup level.**  
For explanation of data flags, see notes below Table 13-1.



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UNITED STATES AIR FORCE  
**ST427 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



FIGURE 13-1

**Table 13-1 ST427 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well 427MW-IN
Diesel Range Organics by AK102 (µg/L)	1,500	U (417)
<b>PAHs by SW8270C SIM</b>		
Acenaphthene (µg/L)	2,200	U (0.0952)
Anthracene (µg/L)	11,000	U (0.0952)
Benzo-a-anthracene (µg/L)	1	U (0.0952)
Benzo-a-pyrene (µg/L)	0.2	U (0.0952)
Benzo-b-fluoranthene (µg/L)	1	U (0.0952)
Benzo-k-fluoranthene (µg/L)	10	U (0.0952)
Chrysene (µg/L)	100	U (0.0952)
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.0952)
Fluorene (µg/L)	1,460	U (0.0952)
Ideno-123-cd-pyrene (µg/L)	1	U (0.0952)
Naphthalene (µg/L)	700	U (0.0952)
Pyrene (µg/L)	1,100	U (0.0952)

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter

### 13.3 ST427 CONCLUSIONS AND RECOMMENDATIONS

In 1996, DRO concentrations in smear zone soil exceeded the cleanup levels at ST427. In 2006, groundwater collected from the in-source monitoring well 427MW-IN, did not have detectable concentrations of DRO or PAHs.

A groundwater sample should be collected from well 427MW-IN again in 2007 and analyzed for DRO. If DRO concentrations are below cleanup levels again in 2007, remediation at this site should be considered complete. No additional soil sampling is required for closure because remaining soil contamination is limited to the smear zone.



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## 14.0 ST428

Elmendorf AFB site ST428 is located southeast of Building 7535, Kenai Dining Hall, and northwest of the intersection of Arctic Warrior Drive and Sijan Avenue (Figure 14-1). ST428 is the former location of a regulated 12,000-gallon UST which provided MOGAS for a former service station. The UST was removed in 1996. (USAF, 2004k).

### 14.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1994 Site Assessment: Two borings were installed in 1994 to assess the soil around the UST. One soil sample was collected from each boring at a depth of 14 to 15.5 feet bgs and analyzed for GRO, BTEX compounds, and lead. Benzene was detected at approximately 0.08 mg/kg in one sample, which exceeded the cleanup level. All other results were below cleanup levels (USAF, 2004k).

1996 UST Removal: Four soil samples were collected from the excavation when the 12,000-gallon UST was removed in July 1996. The samples were analyzed for GRO, DRO, BTEX compounds, and lead. The excavation depth was approximately 15 feet bgs at the deepest point. One sample contained 1,900 mg/kg GRO, 795 mg/kg DRO, and 11.29 mg/kg ethylbenzene, which exceeded cleanup levels. This sample was collected below the former dispenser vault at 15 feet bgs. All other results were below cleanup levels.

SERA IV: In 1996, four soil borings were advanced during the SERA Phase IV investigation. One boring was completed as a bioventing injection / monitoring well (well 1836WL-01) and three borings were completed as soil gas monitoring arrays. Two samples from each boring were analyzed for GRO, DRO, and BTEX compounds. Contaminant concentrations exceeded the cleanup level in the sample collected at 31 feet bgs beneath the former UST. Maximum contaminant concentrations detected at this location were 386 mg/kg DRO and 660 mg/kg GRO. Both of these results were from a soil sample collected at the smear zone in well 1836WL-01. All other results were below cleanup levels (USAF, 2004k). Groundwater is found at approximately 35 feet bgs at ST428 (USAF, 2004k).

Compliance Monitoring: During the 2005 Compliance Monitoring, well 1836WL-01 was sampled for GRO, DRO, BTEX compounds, and PAHs. No compounds were detected above MDLs in the sample (USAF, 2006a).

### 14.2 ST428 2006 FIELD ACTIVITIES AND RESULTS

The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling in-source well 1836WL-01. Because ST428 originated from a MOGAS UST, the contaminants of concern include GRO, BTEX compounds, and PAHs. PAHs were sampled for in 2005 from this well and no PAHs were detected above MDLs. According to the Analytical Decision Tree (Figure 2-2), PAHs can be removed as contaminants of concern. DRO was found to exceed the cleanup level for soil at this site in previous investigations and was included as a contaminant of concern.



Compound	Cleanup Level	2002 Result*	2005 Result	2006 Result
GRO (µg/L)	1,300	not sampled	UJ (80)	44.6 J
DRO (µg/L)	1,500	not sampled	U (417)	54.6 J
Benzene (µg/L)	5	U (0.105)	U (0.5)	0.108 J
Toluene (µg/L)	100	U (0.098)	U (0.5)	0.284 J
Ethylbenzene (µg/L)	700	U (0.098)	U (0.5)	0.161 J
Total Xylenes (µg/L)	10,000	0.59	U (1.0)	U (1.0)

Compound	Cleanup Level	2006 Result
<b>Soil at 16-foot bgs</b>		
GRO (mg/L)	300	2.38 J
DRO (mg/L)	250	26.4
Benzene (mg/L)	0.02	U (0.0119)
Toluene (mg/L)	5.4	0.0214 J
Ethylbenzene (mg/L)	5.5	0.0109 J
Total Xylenes (mg/L)	78	0.0843 J
<b>Soil at 20-foot bgs</b>		
GRO (mg/L)	300	2.04 J
DRO (mg/L)	250	7.96
Benzene (mg/L)	0.02	0.00887
Toluene (mg/L)	5.4	0.0367 J
Ethylbenzene (mg/L)	5.5	0.00736 J
Total Xylenes (mg/L)	78	0.09 J
<b>Soil at 25-foot bgs</b>		
GRO (mg/L)	300	2.59 J
DRO (mg/L)	250	5.88
Benzene (mg/L)	0.02	0.00532
Toluene (mg/L)	5.4	0.0361 J
Ethylbenzene (mg/L)	5.5	0.0102 J
Total Xylenes (mg/L)	78	0.116 J

Compound	Cleanup Level	2006 Result
<b>Soil at 16-foot bgs</b>		
GRO (mg/L)	300	25.0
DRO (mg/L)	250	15.8
Benzene (mg/L)	0.02	0.0153
Toluene (mg/L)	5.4	0.0382 J
Ethylbenzene (mg/L)	5.5	0.0631
Total Xylenes (mg/L)	78	0.161 J
<b>Soil at 20-foot bgs</b>		
GRO (mg/L)	300	8.53 J
DRO (mg/L)	250	4.97
Benzene (mg/L)	0.02	<b>0.0451</b>
Toluene (mg/L)	5.4	0.253
Ethylbenzene (mg/L)	5.5	0.0186 J
Total Xylenes (mg/L)	78	0.261 J
<b>Soil at 25-foot bgs</b>		
GRO (mg/L)	300	2.24 J
DRO (mg/L)	250	2.34 J
Benzene (mg/L)	0.02	0.0129
Toluene (mg/L)	5.4	0.0609 J
Ethylbenzene (mg/L)	5.5	0.00992 J
Total Xylenes (mg/L)	78	0.105 J



**LEGEND**

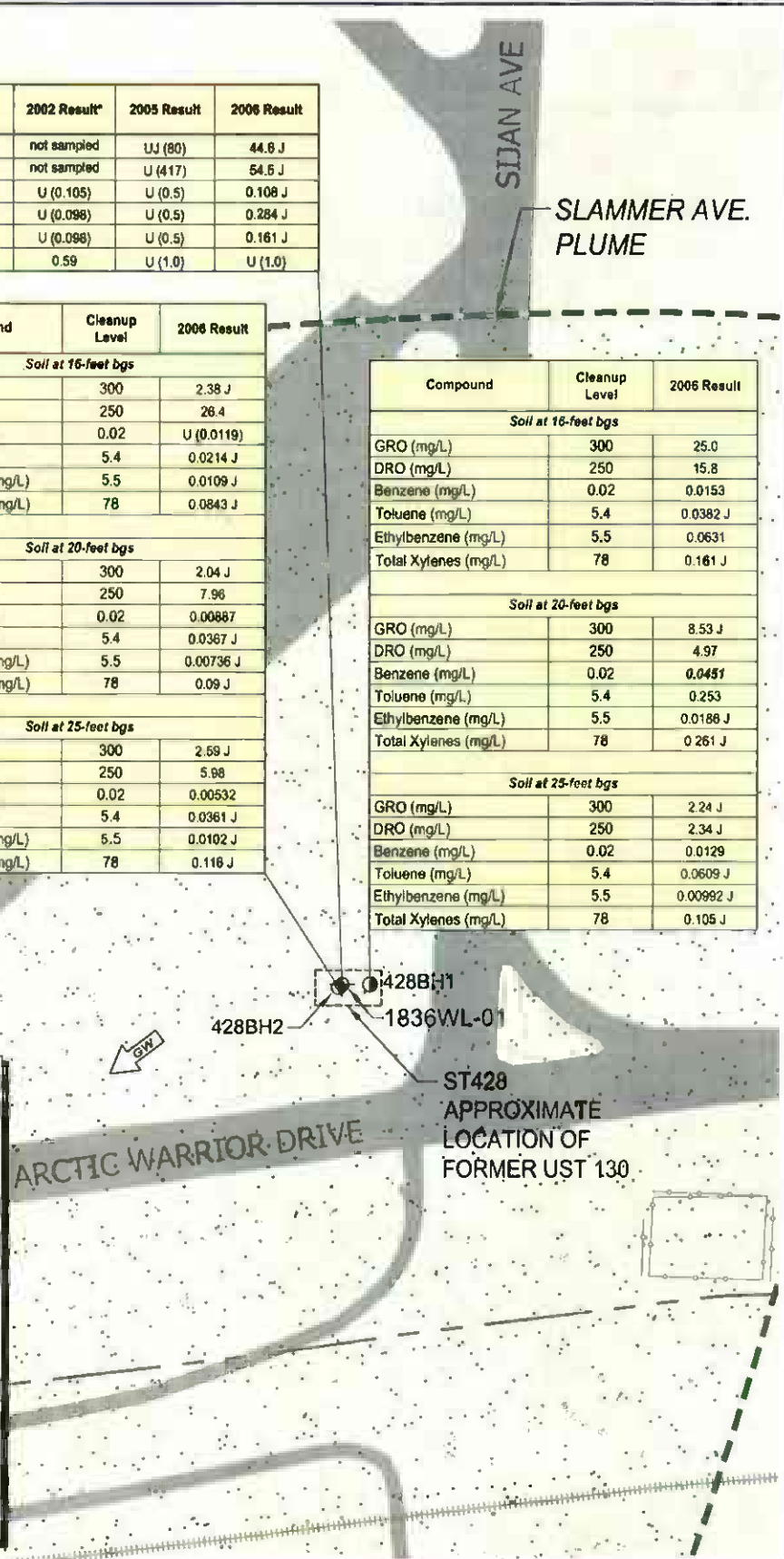
- MONITORING WELL
- BORING LOCATION WHERE SOIL SAMPLES WERE COLLECTED
- RESTORATION GROUNDWATER PLUME - SOLVENTS
- GENERAL GROUNDWATER FLOW DIRECTION

\* Data from Elmendorf Restoration Program, ERPIMS database

**Bold and Italicized** results exceed cleanup level.

For explanation of data flags, see notes below Table 14-1.


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UNITED STATES AIR FORCE  
**ST428 SITE MAP**  
ELMENDORF AIR FORCE BASE  
ALASKA



**FIGURE 14-1**

Groundwater monitoring well 1836WL-01 was sampled using the approved procedures provided in the 2006 Final Work Plan (USAF, 2006c). This sample was analyzed by an analytical laboratory for GRO, DRO, and BTEX compounds. No constituents were detected above cleanup levels in the sample. Results of the sample are summarized in Table 14-1.

**Table 14-1 ST428 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well
		1836WL-01
Gasoline Range Organics by AK101 (µg/L)	1,300	44.6 J
Diesel Range Organics by AK102 (µg/L)	1,500	54.5 J
<b>Aromatic Hydrocarbons by SW8021B</b>		
Benzene (µg/L)	5	0.108 J
Toluene (µg/L)	100	0.284 J
Ethylbenzene (µg/L)	700	0.161 J
Total Xylenes (µg/L)	10,000	U (1.0)

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.

ST428 met the criteria as a site nearing cleanup in 2006 according to the formula in Figure 2-1. In order to determine if soil contaminants have naturally attenuated to below cleanup levels, two soil borings were advanced in the area with the highest soil contamination found during previous soil sampling events. Three soil samples were collected from each of the two borings at 16 feet bgs, 20 feet bgs, and 25 feet bgs. Figure 14-1 shows the location of each soil boring.

The sample collected from the first boring at 20 feet bgs had a result for benzene that exceeded the cleanup level. The benzene concentration of 0.0451 mg/kg exceeded the cleanup level of 0.02 mg/kg. All other results were below cleanup levels. Results of the samples are summarized in Table 14-2.

**14.3 ST428 CONCLUSIONS AND RECOMMENDATIONS**

In 2005 and 2006, groundwater at monitoring well 1836WL-01, located in the center of the former UST area of ST428, did not have concentrations of GRO, DRO, or BTEX compounds above cleanup levels. Soil sampling in 2006 confirmed that benzene concentrations at ST428 still exceeded the cleanup level in soil at one location.

Annual groundwater sampling at well 1836WL-01 for benzene should continue. In 2007, a soil sample should be collected near soil boring 428BH1 at 20 feet bgs, the only location where benzene was found to still exceed cleanup levels in 2006. If benzene concentrations are found to be below cleanup levels at this location and in the groundwater in 2007, this site should be considered for closure.



**Table 14-2 ST428 Soil Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Location					
		428BH1 at 16-ft. bgs	428BH1 at 20-ft. bgs	428BH1 at 25-ft. bgs	428BH2 at 16-ft. bgs	428BH2 at 20-ft. bgs	428BH2 at 25-ft. bgs
GRO by AK101 (mg/kg)	300	25.0	8.53 J	2.24 J	2.38 J	2.04 J	2.59 J
DRO by AK102 (mg/kg)	250	15.8	4.97	2.34 J	26.4	7.96	5.98
<b>Aromatic Hydrocarbons by SW8021B</b>							
Benzene (mg/kg)	0.02	0.0153	<b>0.0451</b>	0.0129	U (0.0119)	0.00887	0.00532
Toluene (mg/kg)	5.4	0.0382 J	0.253	0.0609 J	0.0214 J	0.0367 J	0.0361 J
Ethylbenzene (mg/kg)	5.5	0.0631	0.0186 J	0.00992 J	0.0109 J	0.00736 J	0.0102 J
Total Xylenes (mg/kg)	78	0.161 J	0.261 J	0.105 J	0.0843 J	0.09 J	0.116 J

**Notes:**

<sup>1</sup> Cleanup levels are from the 18 AAC 75.341 Tables B1 and B2. Method 2, under 40-inch zone criteria, the most stringent of the three criteria except for arsenic and chromium which use the maximum background levels. The maximum background levels are from studies conducted on Elmendorf AFB published in 1993.

**Bold** value exceeds the cleanup level.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

mg/kg = milligrams per kilogram.



## 15.0 ST507

Elmendorf AFB site ST507 is located northwest of Building 15380 (formerly Building 42-525), the Air Freight Terminal building on Airlifter Drive (Figure 15-1). This site is located on the north side of the East/West Runway. Two regulated USTs are associated with site ST507, a regulated 1,500-gallon UST used to store diesel fuel and is still in use today; and a regulated 1,000-gallon UST used to store unleaded MOGAS for use in support vehicles and equipment. An associated dispenser was located along the west side of the building, approximately 120 feet southeast of the USTs.

The 1,000-gallon MOGAS UST and associated piping and dispenser were removed in 1994. Subsurface investigation of the tank location in 1996 and 1997 indicated that a release had occurred (USAF, 2004I).

## 15.1 SUMMARY OF PREVIOUS INVESTIGATIONS

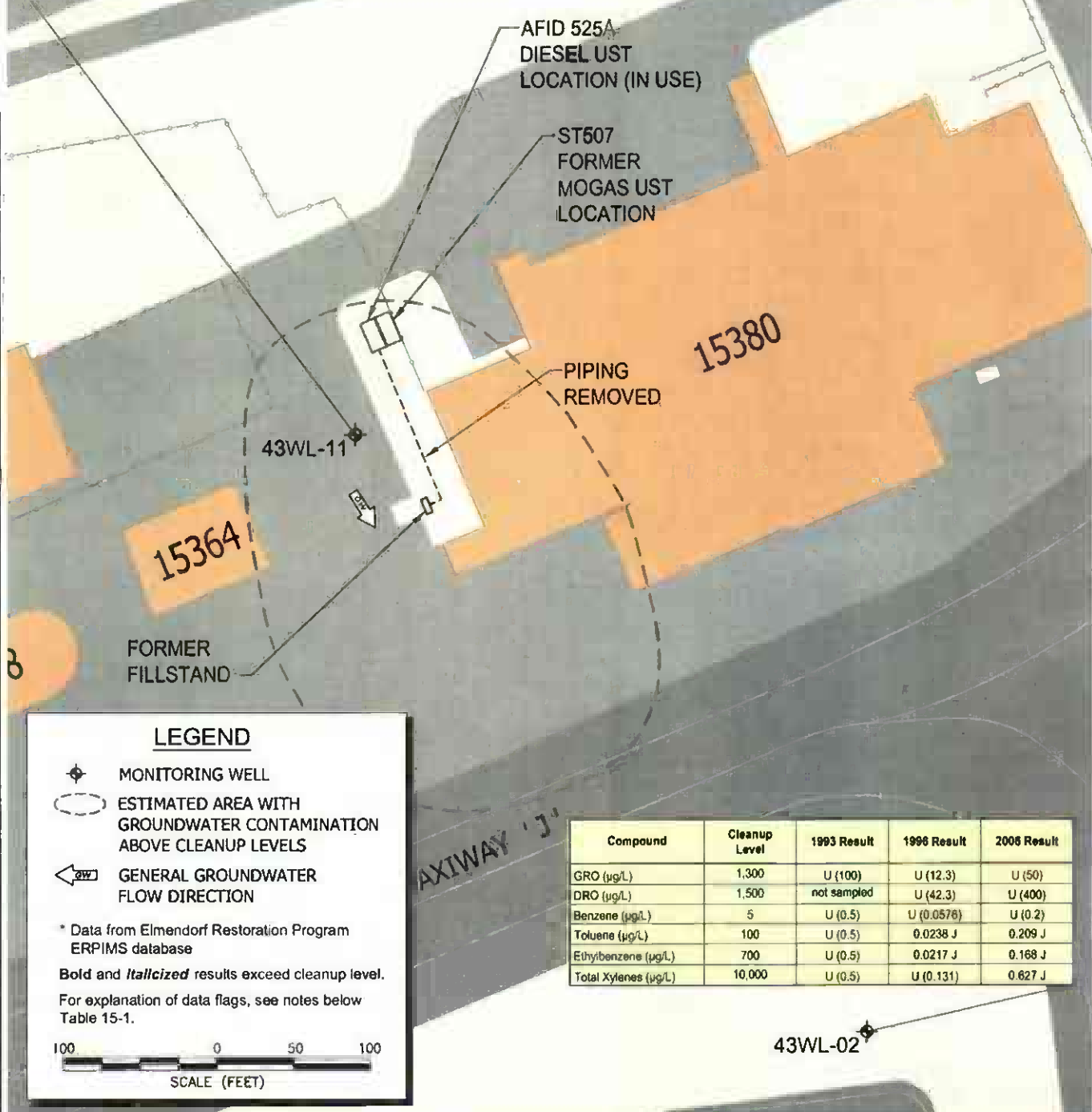
1994 UST Removal: During tank removal in 1994, two soil samples were collected from the UST excavation at a depth of 10 feet bgs and one sample was collected from the midpoint of the dispenser island at 2.5 feet bgs. Samples were analyzed for GRO, DRO, and BTEX compounds. The maximum contaminant concentrations were detected beneath the north end of the former UST and were 1,050 mg/kg GRO, 75 mg/kg DRO, 0.06 mg/kg benzene, 33.5 mg/kg toluene, 40.5 mg/kg ethylbenzene, and 304 mg/kg total xylenes. All other results were below cleanup levels. After removal of the UST, the excavation was backfilled with clean fill material.

SERA V: During the SERA Phase V investigation conducted in 1996, five borings were advanced to the groundwater table. A split spoon sampler was used to collect soil from the ground surface to the water table, which was encountered at approximately 18 feet bgs. Two samples were collected from each boring and analyzed for GRO, DRO, RRO, and BTEX compounds. Elevated contaminant concentrations were detected in 4 of the 5 borings at depths between 15 and 19 feet bgs (smear zone). Maximum detected soil contaminant concentrations were 5,130 mg/kg GRO, 7,780 mg/kg DRO, 3.49 mg/kg benzene, 51.5 mg/kg toluene, 35.6 mg/kg ethylbenzene, and 157.9 mg/kg total xylenes. Field screening indicated that contamination was not present from 0 to 15 feet bgs in these borings and contaminant concentrations in two samples collected from 10 to 12 feet bgs were below cleanup levels.

SERA VI: During the SERA Phase VI investigation conducted in 1997, a passive soil gas survey was conducted and soil borings were advanced to the groundwater table to delineate soil contamination. The results of the soil gas survey indicated that elevated levels of contamination were present south of the UST area and near former Hardstand A-6. Three borings were advanced south/southwest of Building 15380. One was drilled in the former Hardstand A-6 area and the other two borings were advanced south of the building, adjacent to Taxiway J. Two to three samples were collected from each boring and analyzed for GRO, DRO, RRO, and BTEX compounds. In the area of former Hardstand A-6, GRO, toluene, and ethylbenzene were detected in the smear zone above cleanup levels and benzene was detected in the vadose zone above the cleanup level. Near Taxiway J, GRO, DRO, and toluene were detected in the smear zone above cleanup levels.



Compound	Cleanup Level	2000 Fall Result*	2001 Summer Result*	2001 Fall Result*	2002 Result*	2003 Result*	2004 Result*	2005 Result	2006 Result
GRO (µg/L)	1,300	<b>28,000</b>	<b>22,000</b>	<b>17,000</b>	<b>21,000</b>	<b>13,000</b>	<b>16,900</b>	<b>19,700</b>	<b>19,800 R</b>
DRO (µg/L)	1,500	<b>8,200</b>	<b>8,800</b>	<b>50,000</b>	<b>18,000</b>	<b>990,000</b>	not sampled	<b>19,000</b>	<b>8,280</b>
Benzene (µg/L)	5	<b>200</b>	<b>280 J</b>	<b>210</b>	<b>210</b>	<b>270</b>	<b>250</b>	<b>158</b>	<b>138 R</b>
Toluene (µg/L)	100	<b>2,300</b>	<b>1,500</b>	<b>1,600</b>	<b>1,000</b>	<b>1,100</b>	<b>1,200</b>	<b>1,170</b>	<b>1,100 R</b>
Ethylbenzene (µg/L)	700	<b>1,300</b>	<b>920</b>	<b>760</b>	<b>710</b>	<b>450</b>	<b>870</b>	<b>523</b>	<b>546 R</b>
Total Xylenes (µg/L)	10,000	<b>3,800</b>	<b>2,700</b>	<b>2,400</b>	<b>2,200</b>	<b>3,100</b>	<b>3,500</b>	<b>3,350</b>	<b>2940 R</b>



**LEGEND**

- MONITORING WELL
- ESTIMATED AREA WITH GROUNDWATER CONTAMINATION ABOVE CLEANUP LEVELS
- GENERAL GROUNDWATER FLOW DIRECTION

\* Data from Elmendorf Restoration Program ERPIMS database

**Bold and *italicized* results exceed cleanup level.**

For explanation of data flags, see notes below Table 15-1.

SCALE (FEET)

Compound	Cleanup Level	1993 Result	1996 Result	2006 Result
GRO (µg/L)	1,300	U (100)	U (12.3)	U (50)
DRO (µg/L)	1,500	not sampled	U (42.3)	U (400)
Benzene (µg/L)	5	U (0.5)	U (0.0576)	U (0.2)
Toluene (µg/L)	100	U (0.5)	0.0238 J	0.209 J
Ethylbenzene (µg/L)	700	U (0.5)	0.0217 J	0.168 J
Total Xylenes (µg/L)	10,000	U (0.5)	U (0.131)	0.627 J

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UNITED STATES AIR FORCE

**ST507 SITE MAP**

ELMENDORF AIR FORCE BASE  
ALASKA



**FIGURE 15-1**

SERA VIII: During the SERA VIII investigation conducted in 1999, one soil boring was advanced and completed as a monitoring well (subsequently abandoned). This boring was drilled in the northern portion of the former UST excavation where elevated levels of hydrocarbons were detected during the UST removal. The maximum contaminant concentrations detected in soil were 7,100 mg/kg GRO and 8,000 mg/kg DRO, collected at 17 feet bgs. GRO, DRO, and BTEX compound concentrations in this sample, collected at 17 feet bgs (smear zone), exceeded the cleanup levels. PAH constituents in this sample were not detected or were below their respective cleanup levels. Contamination was not detected above cleanup levels in the sample collected at 10 feet bgs. The groundwater sample collected during the 1999 SERA VIII site investigation contained contaminant concentrations of 2,100 µg/L GRO, 3,200 µg/L DRO, 79 µg/L benzene, and 740 µg/L ethylbenzene. These analytes exceed their respective cleanup levels. No PAH compounds exceeded groundwater cleanup levels and product was not detected in the well in 1999 (USAF, 2004l).

Compliance Monitoring: In 2006, well 43WL-11 was sampled for DRO, GRO, and BTEX compounds. GRO (19,700 µg/L), DRO (19,000 µg/L), benzene (158 µg/L) and toluene (1,170 µg/L) were detected above cleanup levels. All other constituents were detected at concentrations below cleanup levels (USAF, 2006a).

## 15.2 ST507 2006 FIELD ACTIVITIES AND RESULTS

The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling in-source well 43WL-01 and downgradient well 43WL-02 to monitor ST507. Because ST507 originated from diesel and MOGAS USTs, the contaminants of concern include GRO, DRO, BTEX compounds, and PAHs. PAHs were sampled for during previous sampling events, but were not found above cleanup levels. According to the Analytical Decision Tree (Figure 2-2), PAHs can removed as contaminants of concern.

Groundwater monitoring well 43WL-11 and 43WL-02 were sampled using the approved procedures provided in the 2006 *Final Work Plan* (USAF, 2006c). A field duplicate sample was also collected from well 43WL-11. The samples were analyzed by an analytical laboratory for GRO, DRO, and BTEX compounds.

The sample collected from the in-source well 43WL-11 was reported with GRO, DRO, benzene, and toluene concentrations above cleanup levels. The results for GRO and BTEX compounds were all rejected during data validation, however, due to deficiencies in meeting laboratory QC criteria. The data validation report is provided in Appendix C. No constituents were detected above cleanup levels in the downgradient well 43WL-02. Results of the samples are summarized in Table 15-1.



**Table 15-1 ST507 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well		
		43WL-11	43WL-11 FD	43WL-02
Gasoline Range Organics by AK101 (µg/L)	1,300	19,800 R	19,600 R	U (50)
Diesel Range Organics by AK102 (µg/L)	1,500	8,280	8,600	U (400)
<b>Aromatic Hydrocarbons by SW8021B</b>				
Benzene (µg/L)	5	138 R	138 R	U (0.2)
Toluene (µg/L)	100	1,100 R	1,100 R	0.209 J
Ethylbenzene (µg/L)	700	546 R	549 R	0.168 J
Total Xylenes (µg/L)	10,000	2,940 R	2,960 R	0.627 J

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

FD = Field duplicate.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

R = The data are unusable due to deficiencies in meeting QC criteria and may not be used for decision making.

µg/L = micrograms per liter.

### 15.3 ST507 CONCLUSIONS AND RECOMMENDATIONS

Soil contamination remained above cleanup levels in the smear zone at ST507 in 1999. In 2005 contaminant concentrations were found to exceed the cleanup levels in groundwater from well 43WL-11. The contamination has not migrated to well 43WL-02, located about 500 feet downgradient.

Monitoring well 43WL-11 is known to contain free product on the water table. Free product should be measured at this well annually. As long as free product is present, this well should not be sampled for contaminants. Once free product is no longer present, Well 43WL-11 should again be monitored for DRO, GRO, and BTEX compounds annually. The downgradient well 43WL-02 should continue to be monitored for DRO, GRO, and BTEX compounds annually until contaminant concentrations in the in-source well 43WL-11 are less than two times the cleanup level.



## 16.0 ST509

Elmendorf AFB site ST509 is located between the North/South Runway and 28<sup>th</sup> Street, on the eastern side of Hardstand A-22 (Figure 16-1). ST509 is the former location of a leaking jet fuel pipeline discovered in 1996 (USAF, 2004m).

### 16.1 SUMMARY OF PREVIOUS INVESTIGATIONS

SERA V: Four soil borings were advanced to groundwater (approximately 46 feet bgs) and one boring was advanced to 20 feet bgs during the SERA V investigation conducted in 1996. Two to three analytical soil samples were collected from each boring and analyzed for GRO, DRO, RRO, and BTEX compounds. Elevated contaminant concentrations exceeding cleanup levels were found in all analytical samples except two west of the leak. The maximum detected contaminant concentrations were GRO (1,470 mg/kg), DRO (8,000 mg/kg), benzene (2.36 mg/kg), toluene (19.3 mg/kg), ethylbenzene (11.8 mg/kg), and total xylenes (51.1 mg/kg) detected in the smear zone. Contamination was encountered in the vadose zone, but maximum concentrations were in the smear zone (USAF, 2004m). There were no monitoring wells installed during the investigation.

### 16.2 ST509 2006 FIELD ACTIVITIES AND RESULTS

The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling one new in-source monitoring well and one new downgradient monitoring well at ST509. Because ST509 originated from a jet fuel pipeline leak, the contaminants of concern include GRO, DRO, BTEX compounds, and PAHs.

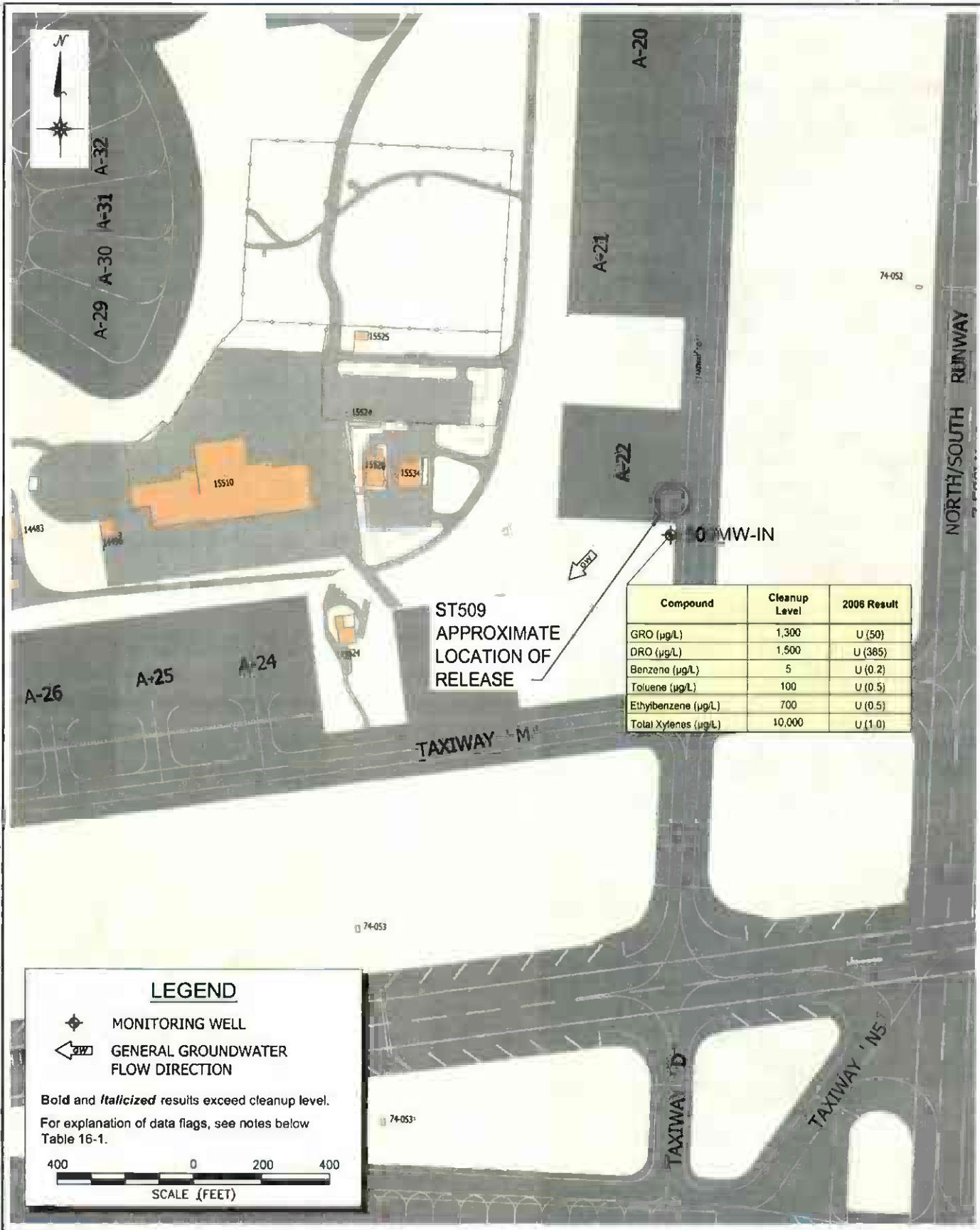
A new in-source monitoring well, 509MW-IN, was installed as close to location of the pipeline leak as possible, in the location shown on Figure 16-1. The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.

Groundwater monitoring well 509MW-IN was sampled using the approved procedures provided in the 2006 *Final Work Plan* (USAF, 2006c). A field sample and a field duplicate sample were collected. The samples were analyzed by an analytical laboratory for GRO, DRO, BTEX compounds, and PAHs. No contaminants were detected above MDLs in the samples. The sample results are summarized in Table 16-1.

According to the Compliance Program Decision Tree (Figure 2-1), a downgradient well will only be installed if groundwater contaminant concentrations are greater than two times the cleanup level in the in-source well; therefore, no new downgradient well was installed at ST509 in 2006.



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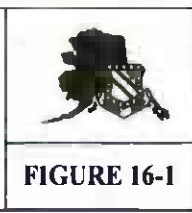
- ◆ MONITORING WELL
- ← GW GENERAL GROUNDWATER FLOW DIRECTION

**Bold and *Italicized* results exceed cleanup level.**  
For explanation of data flags, see notes below Table 16-1.

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UNITED STATES AIR FORCE  
**ST509 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



**Table 16-1 ST509 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well	
		509MW-IN	509MW-IN FD
Gasoline Range Organics by AK101 (µg/L)	1,300	U (50)	U (50)
Diesel Range Organics by AK102 (µg/L)	1,500	U (385)	U (385)
<b>Aromatic Hydrocarbons by SW8021B</b>			
Benzene (µg/L)	5	U (0.2)	U (0.2)
Toluene (µg/L)	100	U (0.5)	U (0.5)
Ethylbenzene (µg/L)	700	U (0.5)	U (0.5)
Total Xylenes (µg/L)	10,000	U (1.0)	U (1.0)
<b>Polynuclear Aromatic Hydrocarbons by SW8270C SIM</b>			
Acenaphthene (µg/L)	2,200	U (0.0943)	U (0.0943)
Anthracene (µg/L)	11,000	U (0.0943)	U (0.0943)
Benzo-a-anthracene (µg/L)	1	U (0.0943)	U (0.0943)
Benzo-a-pyrene (µg/L)	0.2	U (0.0943)	U (0.0943)
Benzo-b-fluoranthene (µg/L)	1	U (0.0943)	U (0.0943)
Benzo-k-fluoranthene (µg/L)	10	U (0.0943)	U (0.0943)
Chrysene (µg/L)	100	U (0.0943)	U (0.0943)
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.0943)	U (0.0943)
Fluorene (µg/L)	1,460	U (0.0943)	U (0.0943)
Ideno-123-cd-pyrene (µg/L)	1	U (0.0943)	U (0.0943)
Naphthalene (µg/L)	700	U (0.0943)	U (0.0943)
Pyrene (µg/L)	1,100	U (0.0943)	U (0.0943)

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

µg/L = micrograms per liter.

### 16.3 ST509 CONCLUSIONS AND RECOMMENDATIONS

Soil contamination was present above cleanup levels in the vadoze and smear zones at ST509 in 1997. In 2006, groundwater at monitoring well 509MW-IN did not have detectable concentrations of contaminants.

Monitoring well 509MW-IN should continue to be sampled annually for GRO, DRO, and BTEX compounds. According to the Analytical Decision Tree (Figure 2-2), PAHs can be removed from annual monitoring requirements.

Soil samples should be collected from ST509 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



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## 17.0 ST510

Elmendorf AFB site ST510 is located west of Building 13373, Pumphouse #9, on 28th Street (Figure 17-1). ST510 is the former location of a regulated 2,000-gallon steel UST that stored JP-4. The UST was removed in 1996 (USAF, 2004n).

### 17.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1996 UST Removal: Six soil samples were collected from the excavation when the UST was removed in 1996. The samples were analyzed for GRO, DRO, and BTEX compounds. GRO (900 mg/kg) and DRO (6,300 mg/kg) exceeded the cleanup levels in two samples collected near the fill pipe. Benzene (up to 0.28 mg/kg) exceeded the cleanup level in two samples, and the lower reporting limits (RLs) exceeded cleanup levels in two other samples. All other results were below cleanup levels. This investigation indicated that a release had occurred.

SERA V: Five soil borings were installed during the SERA Phase V investigation in 1997. Two analytical soil samples were collected from each boring and analyzed for GRO, DRO, RRO, and BTEX compounds, and one sample was analyzed for semi-volatile organic compounds (SVOCs). GRO (up to 1,190 mg/kg), DRO (up to 1,810 mg/kg), benzene (up to 1.27 mg/kg), toluene (up to 10.7 mg/kg), and ethylbenzene (up to 16.8 mg/kg) exceeded cleanup levels in the boring installed adjacent to the former fill pipe at both 15 feet and 20 feet bgs. Benzene also exceeded the cleanup level in samples collected from 20 to 22.5 feet bgs at three of the four perimeter borings, including the upgradient boring. All other results were below cleanup levels (USAF, 2004n).

Compliance Monitoring: During the 2005 Compliance Monitoring, groundwater monitoring well SP7/10-01 was sampled for GRO, DRO and BTEX compounds. GRO was detected at 93.2 µg/L in the sample, below the cleanup level. DRO and BTEX compounds were not detected in the sample above MDLs (USAF, 2006a).

### 17.2 ST510 2006 FIELD ACTIVITIES AND RESULTS

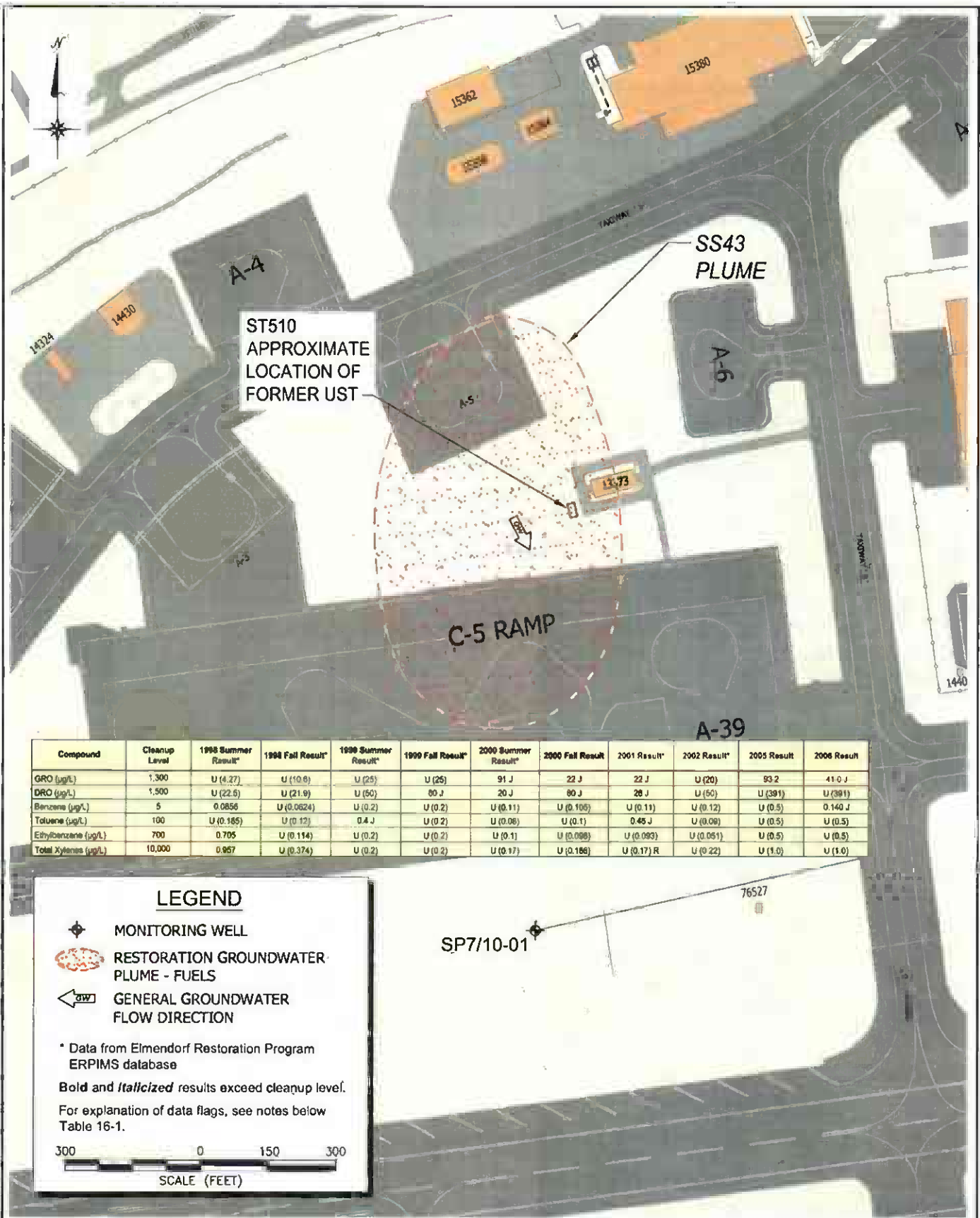
The 2006 *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling monitoring well SP7/10-01 to monitor ST510. Because ST510 originated from a jet fuel UST, the contaminants of concern include GRO, DRO, BTEX compounds, and PAHs. No PAHs were detected in previous soil samples analyzed for SVOCs (which includes PAHs). PAHs can be eliminated as contaminants of concern for annual monitoring at ST510.

Groundwater monitoring well SP7/10-01 was sampled using the approved procedures provided in the 2006 *Final Work Plan* (USAF, 2006c). This sample was analyzed by an analytical laboratory for GRO, DRO, and BTEX compounds.

GRO and benzene were detected at concentrations below the cleanup level. DRO, toluene, ethylbenzene, and xylenes were not detected in the sample above MDLs. Results of the sample are summarized in Table 17-1.



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Compound	Cleanup Level	1998 Summer Result*	1998 Fall Result*	1999 Summer Result*	1999 Fall Result*	2000 Summer Result*	2000 Fall Result*	2001 Result*	2002 Result*	2005 Result	2006 Result
GRO (µg/L)	1,300	U (4.27)	U (10.9)	U (25)	U (26)	91 J	22 J	22 J	U (20)	93.2	41.0 J
DRO (µg/L)	1,500	U (22.6)	U (21.9)	U (50)	80 J	20 J	80 J	28 J	U (50)	U (391)	U (391)
Benzene (µg/L)	5	0.0856	U (0.0624)	U (0.2)	U (0.2)	U (0.11)	U (0.106)	U (0.11)	U (0.12)	U (0.5)	0.140 J
Toluene (µg/L)	100	U (0.185)	U (0.12)	0.4 J	U (0.2)	U (0.08)	U (0.1)	0.45 J	U (0.09)	U (0.5)	U (0.5)
Ethylbenzene (µg/L)	700	0.705	U (0.114)	U (0.2)	U (0.2)	U (0.1)	U (0.098)	U (0.093)	U (0.051)	U (0.5)	U (0.5)
Total Xylenes (µg/L)	10,000	0.957	U (0.374)	U (0.2)	U (0.2)	U (0.17)	U (0.166)	U (0.17) R	U (0.22)	U (1.0)	U (1.0)

**LEGEND**

- MONITORING WELL
- RESTORATION GROUNDWATER PLUME - FUELS
- GENERAL GROUNDWATER FLOW DIRECTION

\* Data from Elmendorf Restoration Program ERPIMS database

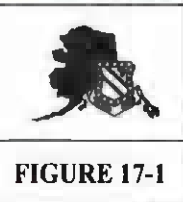
**Bold and *Italicized* results exceed cleanup level.**

For explanation of data flags, see notes below Table 16-1.

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UNITED STATES AIR FORCE  
**ST510 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



**Table 17-1 ST510 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well
		SP7/10-01
Gasoline Range Organics by AK101 (µg/L)	1,300	41.0 J
Diesel Range Organics by AK102 (µg/L)	1,500	U (385)
<b>Aromatic Hydrocarbons by SW8021B</b>		
Benzene (µg/L)	5	0.140 J
Toluene (µg/L)	100	U (0.5)
Ethylbenzene (µg/L)	700	U (0.5)
Total Xylenes (µg/L)	10,000	U (1.0)

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

µg/L = micrograms per liter

**17.3 ST510 CONCLUSIONS AND RECOMMENDATIONS**

Vadose zone soil contamination was present above cleanup levels at ST510 in 1997. Monitoring well SP7/10-01, located approximately 800 feet downgradient of ST510, had detectable concentrations of GRO in 2005 and 2006. The detected concentrations did not exceed the cleanup level, however.

This site is located within the boundaries of the SS43 Plume, which is monitored by the Elmendorf Restoration Program. In order to avoid redundancies, management of this site needs to be resolved between the Elmendorf Compliance and Restoration programs. Until that occurs, monitoring well SP7/10-01 should continue to be sampled annually for DRO, GRO, and BTEX compounds.



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## 18.0 ST516

Elmendorf AFB site ST516 is located southwest of Building 5374. This site is between 2<sup>nd</sup> Street and Arctic Warrior Drive in the south central portion of the Base (Figure 18-1). ST516 is the former location of a 1,300-gallon steel UST that received overflow from an OWS associated with an equipment decontamination pad. The UST, OWS, and associated piping were removed in 1996. (USAF, 2004o).

### 18.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1996 UST Removal: Four soil samples were collected from the bottom of the excavation when the UST, OWS, and associated piping were removed in 1996. The samples were analyzed for GRO, DRO, RRO, BTEX compounds, HVOCs, PCBs, arsenic, lead, cadmium, and chromium. GRO (540 mg/kg) and DRO (12,000 mg/kg) exceeded the cleanup levels. TCE (0.033 mg/kg) exceeded the cleanup level in one sample. Contamination was detected at approximately 5 feet bgs. All other organic contaminants were below cleanup levels and metals concentrations were within the normal background range for soils on Elmendorf AFB or were below cleanup levels (USAF, 2004o). This investigation indicated that a release had occurred.

SERA V: Five soil borings were installed during the SERA Phase V investigation in 1997. Two soil samples collected from each boring were analyzed for GRO, DRO, RRO and BTEX compounds. Select samples also were analyzed for SVOCs, nitrate/nitrite, total phosphorous, and total organic carbon. GRO (1,030 mg/kg), DRO (5,720 mg/kg), benzene (1.54 mg/kg), toluene (20.9 mg/kg), and ethylbenzene (11.5 mg/kg) exceeded cleanup levels at 35 feet bgs adjacent to the former OWS location. DRO (7,230 mg/kg) and benzene (0.0236 mg/kg) also exceeded cleanup levels at 10 feet bgs at this location. Based on field screening results, soil appeared to be contaminated from 2 feet bgs to the water table (approximately 37 feet bgs). All other results were below cleanup levels. One groundwater monitoring well (MW-516-01) was installed downgradient of the former tank location. Groundwater samples were analyzed for GRO, DRO, RRO, and BTEX compounds. DRO (1,590 µg/L) and benzene (7.21 µg/L) exceeded the cleanup levels. GRO was detected at the cleanup level (1,300 µg/L). All other results were below cleanup levels (USAF, 2004o). Well MW-516-01 was removed during excavation activities in 2001.

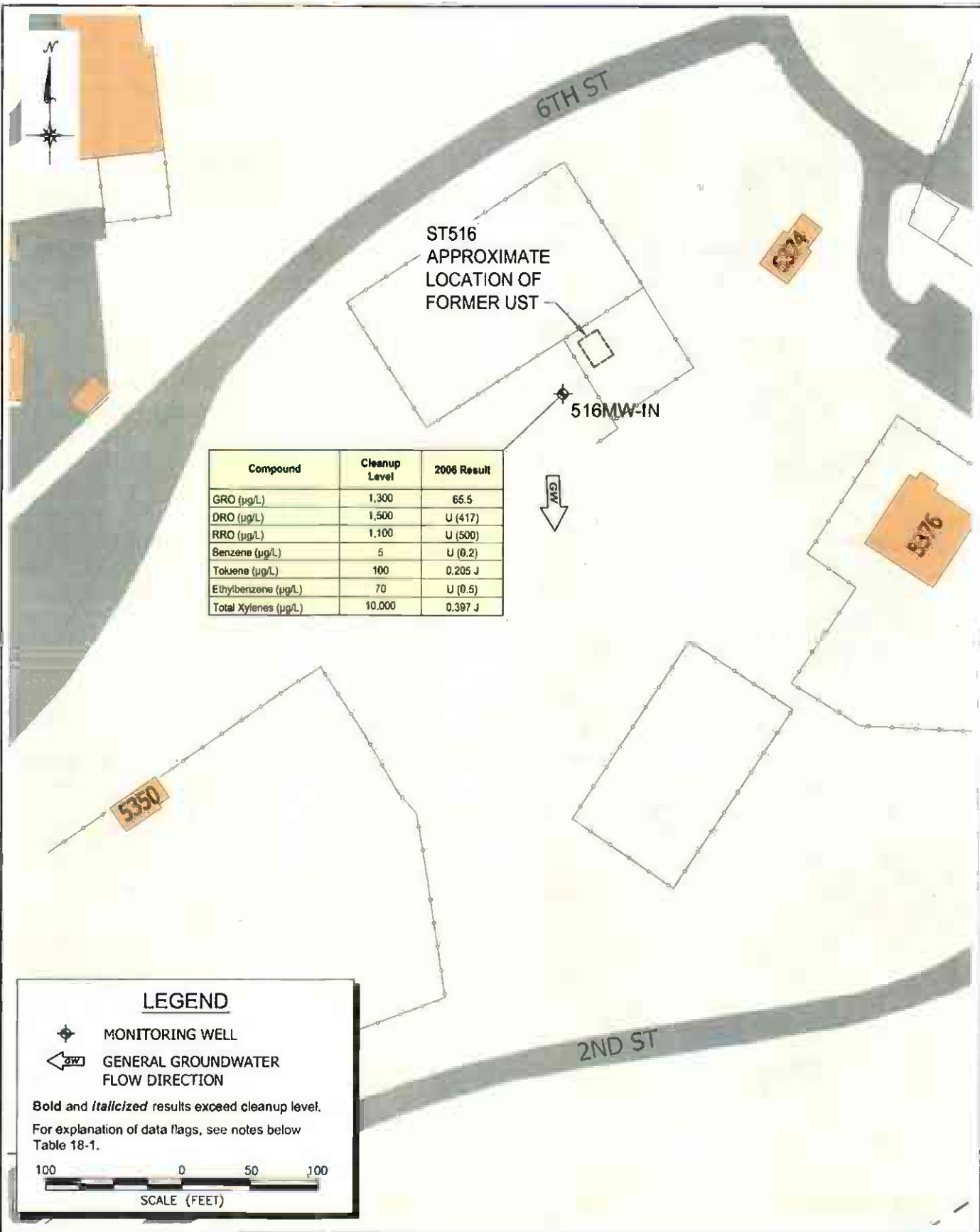
### 18.2 ST516 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source well and a new downgradient well at ST516. Because ST516 originated from a used oil UST, the contaminants of concern include GRO, DRO, RRO, BTEX compounds, VOCs, metals, and PAHs.

A new in-source monitoring well, 516MW-IN, was installed about 30 feet downgradient of the former UST and OWS location. The exact location of the former tanks was in a secured area and an underground water line ran through the area as well. The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.



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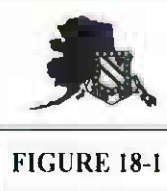
- MONITORING WELL
- GENERAL GROUNDWATER FLOW DIRECTION

**Bold and Italicized** results exceed cleanup level.  
For explanation of data flags, see notes below Table 18-1.

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UNITED STATES AIR FORCE  
**ST516 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



Groundwater monitoring well 516MW-IN was sampled using the approved procedures provided in the 2006 *Final Work Plan* (USAF, 2006c). This sample was analyzed by an analytical laboratory for GRO, DRO, RRO, BTEX compounds, metals, PAHs, and VOCs. None of these contaminants were reported above cleanup levels in the sample. Results of the sample are summarized Table 18-1.

According to the Compliance Program Decision Tree (Figure 2-1), no downgradient well was to be installed if there were no contaminants in the in-source well with concentrations greater than two times the cleanup level. No downgradient well was installed at this site in 2006.

### 18.3 ST516 CONCLUSIONS AND RECOMMENDATIONS

In 1997, GRO and DRO concentrations above cleanup levels remained in the vadose zone soil at ST516. In 2006, groundwater in monitoring well 516MW-IN did not have concentrations of contaminants above cleanup levels.

Groundwater should continue to be monitored annually for GRO, DRO, RRO, BTEX compounds, metals and VOCs from well 516MW-IN. Soil samples should be collected from ST516 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



**Table 18-1 ST516 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well
		516MW-IN
Gasoline Range Organics by AK101 (µg/L)	1,300	65.5
Diesel Range Organics by AK102 (µg/L)	1,500	U (417)
Residual Range Organics by AK103 (µg/L)	1,100	U (500)
<b>Aromatic Hydrocarbons by SW8021B</b>		
Benzene (µg/L)	5	U (0.2)
Toluene (µg/L)	100	0.205 J
Ethylbenzene (µg/L)	700	U (0.5)
Total Xylenes (µg/L)	10,000	0.397 J
<b>Metals by SW6020</b>		
Arsenic (µg/L)	50	0.310 J
Barium (µg/L)	2,000	34.8
Cadmium (µg/L)	5	U (1.0)
Chromium (µg/L)	100	0.680 J
Lead (µg/L)	15	U (1.0)
Nickel (µg/L)	100	3.39
Vanadium (µg/L)	260	0.340 J
<b>Polynuclear Aromatic Hydrocarbons by SW8270C SIM</b>		
Acenaphthene (µg/L)	2,200	U (0.102)
Anthracene (µg/L)	11,000	U (0.102)
Benzo-a-anthracene (µg/L)	1	U (0.102)
Benzo-a-pyrene (µg/L)	0.2	U (0.102)
Benzo-b-fluoranthene (µg/L)	1	U (0.102)
Benzo-k-fluoranthene (µg/L)	10	U (0.102)
Chrysene (µg/L)	100	U (0.102)
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.102)
Fluorene (µg/L)	1,460	U (0.102)
Ideno-123-cd-pyrene (µg/L)	1	U (0.102)
Naphthalene (µg/L)	700	U (0.102)
Pyrene (µg/L)	1,100	U (0.102)
<b>Volatile Organic Compounds by SW8260B Above Cleanup Levels<sup>2</sup></b>		
None		

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

<sup>2</sup> Because there are more than 60 reported VOCs in the analytical data package, only those that exceed cleanup levels are provided in this table. No VOCs were reported above cleanup levels so none are listed.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.



## 19.0 ST522

Elmendorf AFB site ST522 is located east of Hangar 11, Building 16430 on Airlifter Drive (Figure 19-1). ST522 is the former location of an unregulated 20,000-gallon steel UST used to store heating oil for Hangar 11. The UST was removed in August 1996. (USAF, 2004p).

### 19.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1996 UST Excavation: The UST was removed in August 1996. Although the tank and associated piping appeared to be in good condition, evidence of leakage (i.e., stained soil, hydrocarbon odors) was present in the soil surrounding the southern portion of the tank.

Two samples were collected from the base of the tank excavation, at approximately 14 feet bgs, and one sample was collected from each of the four sidewalls. Samples were analyzed for GRO, DRO, and BTEX compounds. DRO (3,200 to 4,600 mg/kg) exceeded the cleanup level in three samples. Benzene was not detected above the laboratory RL, which ranged from 0.007 to 0.13 mg/kg. All other results were below cleanup levels.

SERA IV: Five soil borings were installed during the SERA Phase V investigation in 1997. Two soil samples were collected from each boring and analyzed for GRO, DRO, RRO, and BTEX compounds. Select samples also were analyzed for SVOCs, including PAHs. GRO (654 mg/kg), DRO (4,580 mg/kg), and toluene (9.19 mg/kg) exceeded cleanup levels in the sample collected at 12.5 feet bgs near the vent pipe. All other results were below cleanup levels (USAF, 2004p). There were no monitoring wells installed during the investigation.

2001 Contaminated Soil Removal: In 2001, 171 tons of contaminated soil was excavated from ST522. The excavation was limited on the west sidewall due to sloping required to protect the foundation of Building 16430. Four confirmation samples were collected from the bottom of the excavation (16 to 18 feet bgs) and analyzed for GRO, DRO, and BTEX compounds. DRO exceeded the cleanup level in one sample and its duplicate (434 and 661 mg/kg, respectively) collected from the bottom of the excavation at 16 feet bgs. All other results were below cleanup levels (USAF, 2004p).

### 19.2 ST522 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source well and a new downgradient well at ST522. Because ST522 originated from a heating oil UST, the contaminants of concern include DRO, BTEX compounds, and PAHs. GRO was found above cleanup levels in soil during previous investigations and were included as a contaminant of concern. PAHs were sampled for in previous soil sampling and were not detected above cleanup levels. PAHs were removed as contaminants of concern for annual sampling.

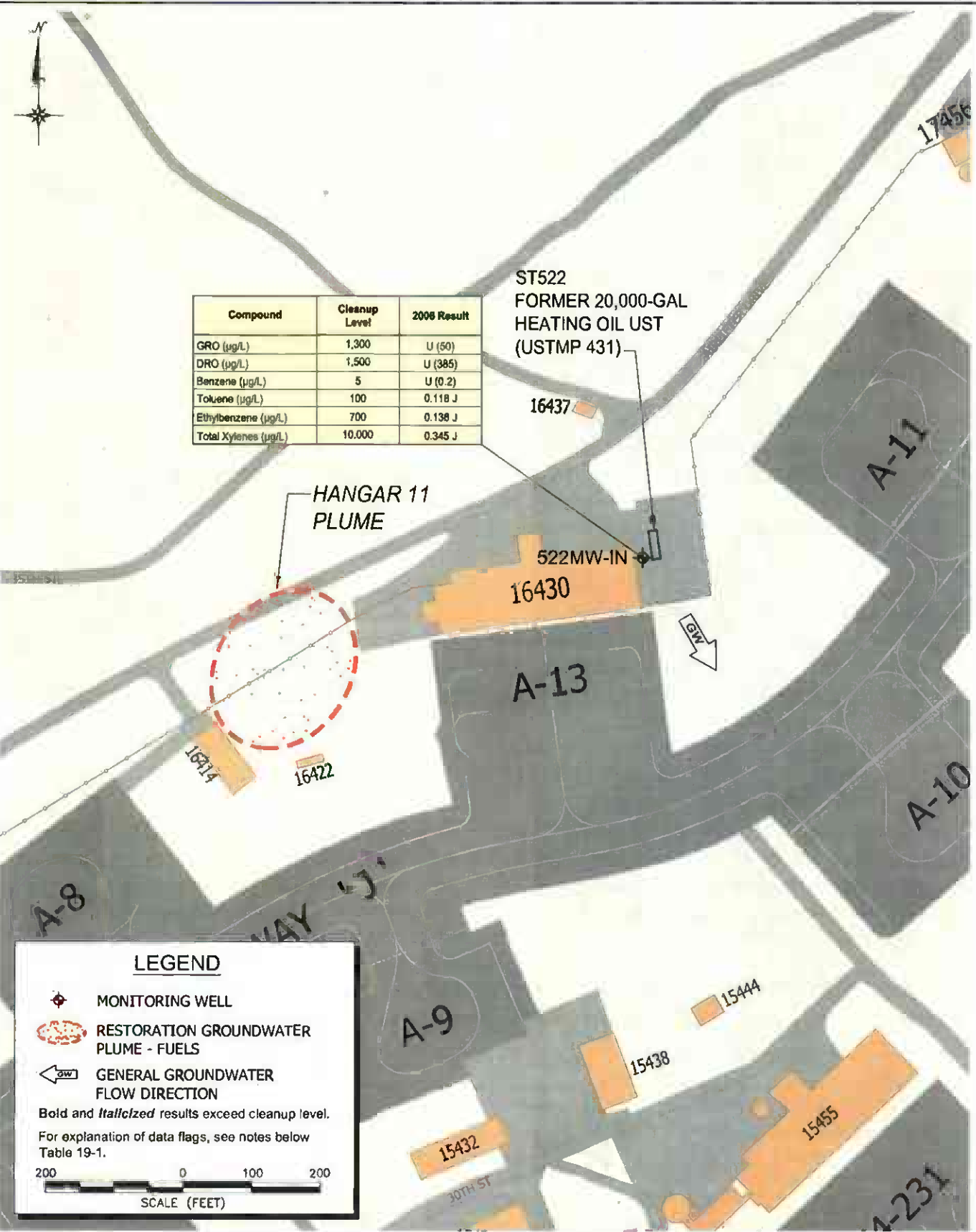




Compound	Cleanup Level	2006 Result
GRO (µg/L)	1,300	U (50)
DRO (µg/L)	1,500	U (385)
Benzene (µg/L)	5	U (0.2)
Toluene (µg/L)	100	0.118 J
Ethylbenzene (µg/L)	700	0.138 J
Total Xylenes (µg/L)	10,000	0.345 J

ST522  
FORMER 20,000-GAL  
HEATING OIL UST  
(USTMP 431)

HANGAR 11  
PLUME



**LEGEND**

-  MONITORING WELL
-  RESTORATION GROUNDWATER PLUME - FUELS
-  GENERAL GROUNDWATER FLOW DIRECTION

**Bold and *Italicized* results exceed cleanup level.**  
For explanation of data flags, see notes below Table 19-1.



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UNITED STATES AIR FORCE  
**ST522 SITE MAP**  
ELMENDORF AIR FORCE BASE  
ALASKA



FIGURE 19-1

A new in-source monitoring well, 522MW-IN, was installed as close as possible to the location known to previously contain the highest concentration of soil contaminants (DRO 434 and 661 mg/kg in 2001). The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.

Groundwater monitoring well 522MW-IN was sampled using the approved procedures provided in the 2006 Final Work Plan (USAF, 2006c). The sample was analyzed by an analytical laboratory for GRO, DRO, and BTEX compounds. No constituents were detected above cleanup levels in the sample. Results of the sample are summarized in Table 19-1.

**Table 19-1 ST522 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well
		522MW-IN
Gasoline Range Organics by AK101 (µg/L)	1,300	U (50)
Diesel Range Organics by AK102 (µg/L)	1,500	U (385)
Aromatic Hydrocarbons by SW8021B		
Benzene (µg/L)	5	U (0.2)
Toluene (µg/L)	100	0.118 J
Ethylbenzene (µg/L)	700	0.136 J
Total Xylenes (µg/L)	10,000	0.345 J

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.

According to the Compliance Program Decision Tree (Figure 2-1), no downgradient well was to be installed if no contaminants with concentrations greater than two times the cleanup level were detected in the in-source well. No downgradient well was installed at this site in 2006.

### 19.3 ST522 CONCLUSIONS AND RECOMMENDATIONS

Subsurface soil contamination was present above the cleanup level at ST522 in 2001. In 2006, groundwater in the in-source monitoring well 522MW-IN did not have contaminant concentrations above cleanup levels.

Groundwater should continue to be monitored annually for GRO, DRO, and BTEX compounds from well 522MW-IN. Soil samples should be collected from ST522 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



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## 20.0 ST523

Elmendorf AFB site ST523 is located south of former Building 24-301, a National Oceanic and Atmospheric Administration (NOAA) warehouse that was demolished in 1995. ST523 is the former location of a regulated 1,000-gallon carbon steel UST which held gasoline and diesel for Building 24-301. The regulated 1,000-gallon UST was removed in May 1996 (USAF, 2004q).

### 20.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1996 UST Removal: Two soil samples were collected from the bottom of the excavation when the 1,000-gallon UST was removed in 1996 (8 feet bgs) and analyzed for GRO, DRO, BTEX and lead. GRO (1,470 mg/kg), DRO (4,980 mg/kg), benzene (0.423 mg/kg), toluene (7.63 mg/kg), and ethylbenzene (12.5 mg/kg) exceeded their cleanup levels. Xylene and lead results were below cleanup levels. This investigation indicated that a release had occurred.

SERA V: Five soil borings were advanced in the former UST area during the SERA Phase V investigation in 1997. Two or three soil samples were collected from each boring and analyzed for GRO, DRO, RRO and BTEX. The sample with the highest DRO concentration was also analyzed for SVOCs. Contamination was detected in the soil boring located within the footprint of the UST. Benzene (0.117 mg/kg) exceeded the cleanup level in all three samples collected from this boring. DRO (917 mg/kg) exceeded the cleanup level in samples collected at 17.5 feet and 32 feet bgs from this boring. All other results were below cleanup levels (USAF, 2004q). There were no groundwater monitoring wells installed during the investigation.

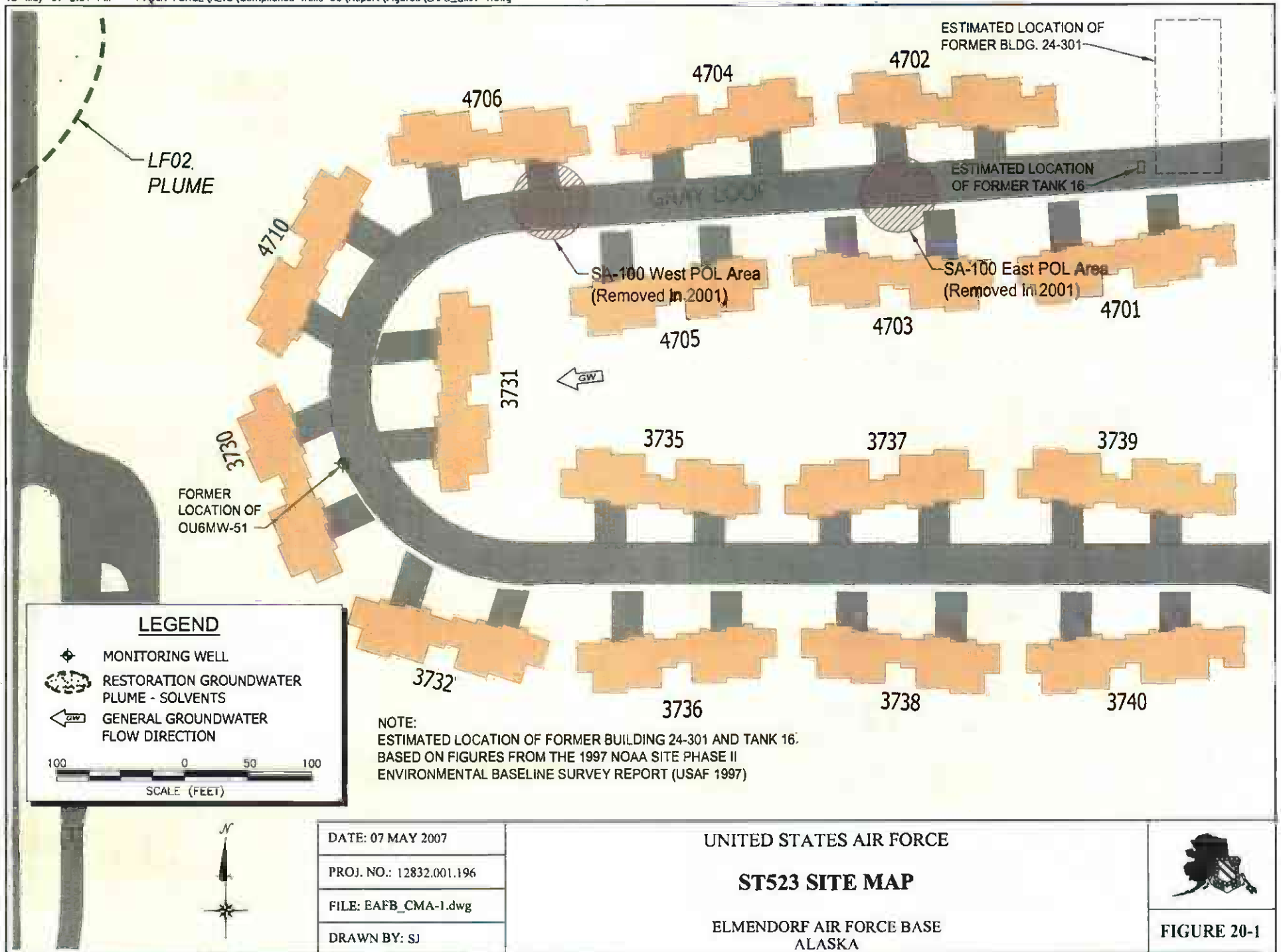
### 20.2 ST523 2006 FIELD ACTIVITIES AND RESULTS

During the meeting between 3 CES/CEVQ and ADEC on 15 September 2006, it was agreed that sampling of this site would be biannual, as documented in the meeting minutes (USAF, 2006). No field activities were performed at ST523 during 2006.

### 20.3 ST523 CONCLUSIONS AND RECOMMENDATIONS

In 1997, subsurface soil contamination remained above cleanup levels at ST523. No groundwater monitoring wells exist that would be useful to monitor this site. Determination of the exact location of the former UST is estimated due to insufficient documentation during the previous investigations and the placement of the new PSF housing over the site. Its location is estimated on Figure 20-1 by extrapolating its location from a figure in the *1997 NOAA Site Phase II Environmental Baseline Survey Final Report* (USAF, 1997). The location of the former tank was estimated by calculating the distance and bearing from former wells shown on the NOAA report figure 2-2 with known survey locations to the tank location shown on the figure. Estimating its location in this manner places it under Gray Street, within the new PSF housing area. The estimated location also places the former tank about 150 feet east of the SA-100 East POL area; an area where approximately 80 to 85 cubic yards of fuel-contaminated soil was removed as part of the SA-100 Removal actions.





The SA-100 Removal Actions were a time-critical CERCLA response to buried debris and contaminated soil discovered during construction of the PSF project at Elmendorf AFB in 2001. The East and West POL areas shown on Figure 20-1 were discovered when construction crews for the PSF housing uncovered a seam of wetted soil approximately eight feet below grade with a strong volatile compound odor. The excavation of contaminated soil from these areas was completed on 20 August 2001. Confirmation soil samples were collected and analyzed for DRO, RRO, and PAHs. All the confirmation sample results for both areas were below cleanup levels (USAF, 2002).

Depending on the accuracy of the previous figures and methods used to estimate the locations of both the former UST at ST523 and the SA-100 POL areas, The SA-100 East POL area may or may not have been the remaining contaminated soil at ST523. No other explanation for the uncovered contaminated soil at SA-100 was suggested. However, because the two have been estimated to be 150 feet apart, additional investigation should be done to confirm whether or not contaminated soil and/or groundwater is still present. Soil samples should be collected in 2008 as close to the location of the former UST depicted on Figure 20-1 (outside of the road and utility corridors) and a groundwater well placed close to the site or just downgradient of the site. If no contamination is found, ST523 should be considered for closure.



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## 21.0 ST526

Elmendorf AFB site ST526 is located west of Building 7508, the Burger King Restaurant, between Arctic Warrior Drive and Sharp Avenue (Figure 21-1). ST526 is the former location of two regulated 380-gallon USTs found to contain oily sludge. The two USTs and associated piping were removed in 1996 (USAF, 2004r).

### 21.1 SUMMARY OF PREVIOUS INVESTIGATIONS

Site Assessment: In 1994, a site assessment was performed to evaluate the presence of petroleum contamination and to determine whether corrective action should take place. A geophysical survey was performed that confirmed the location of the USTs. Four soil borings were drilled to 13.5 feet bgs and one sample was collected from each boring at 8 to 9.5 feet bgs and analyzed for GRO, BTEX compounds, and lead. All results were below cleanup levels (USAF, 2004r). There were no monitoring wells installed during this investigation.

1996 UST Removal: When the two USTs and associated piping were removed in 1996 they were found in poor condition and contained an oily sludge that was observed leaking from the fittings on the tanks. Three soil samples were collected from the excavation at 5 to 7 feet bgs and analyzed for GRO, DRO, RRO, BTEX compounds, HVOCs, PCBs, arsenic, cadmium, chromium, and lead. Maximum concentrations of GRO (486 mg/kg), DRO (6,800 mg/kg), RRO (24,600 mg/kg), benzene (2.45 mg/kg), toluene (20.1 mg/kg), ethylbenzene (10 mg/kg), and lead (1,320 mg/kg) exceeded their cleanup levels. The excavation was continued to 15 feet bgs and two samples were collected and analyzed for the same compounds. DRO (1,580 mg/kg) exceeded the cleanup levels in one sample. All other results were below cleanup levels. This investigation confirmed that a release had occurred.

SERA V: Six soil borings were installed to groundwater during the SERA Phase V investigation in 1997. Two or three samples were collected from five of the six borings. The samples were analyzed for GRO, DRO, RRO, and BTEX compounds and one boring was analyzed for SVOCs. DRO (1,330 mg/kg) was detected exceeding cleanup levels in one sample from 12 feet bgs in the boring located in the middle of the former USTs. There were no monitoring wells installed during the investigation (USAF, 2004r).




Compliance Monitoring: During the 2005 Compliance Monitoring, groundwater from the downgradient well SP4/11-03 was sampled for GRO, DRO, RRO, BTEX compounds, and PAHs. No contaminants were detected in the sample above MDLs (USAF, 2006a).

### 21.2 ST526 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source well and sampling downgradient well SP4/11-03 at ST526. Because ST522 originated from a UST containing oily sludge, the contaminants of concern include GRO, DRO, RRO, BTEX compounds, PAHs, metals, and VOCs.



### LEGEND

-  MONITORING WELL
-  RESTORATION GROUNDWATER PLUME - SOLVENTS
-  GENERAL GROUNDWATER FLOW DIRECTION

**Bold and Italicized** results exceed cleanup level.  
For explanation of data flags, see notes below  
Table 21-1.



SLAMMER AVE.  
PLUME

ST526  
APPROXIMATE  
LOCATION OF  
FORMER USTs

7508

526MW-IN

Compound	Cleanup Level	2005 Result	2006 Result
GRO (µg/L)	1,300	UJ (80)	38.9 J
DRO (µg/L)	1,500	U (455)	77.1 J
RRO (µg/L)	1,100	U (545)	U (482)
Benzene (µg/L)	5	U (0.5)	UJ (0.2)
Toluene (µg/L)	100	U (0.5)	0.183 J
Ethylbenzene (µg/L)	70	U (0.5)	U (0.5)
Total Xylenes (µg/L)	10,000	U (1.0)	U (1.0)
Trichloroethene (µg/L)	5	not sampled	0.280

Compound	Cleanup Level	2006 Result
<b>Groundwater</b>		
GRO (µg/L)	1,300	103
DRO (µg/L)	1,500	U (400)
RRO (µg/L)	1,100	U (480)
Benzene (µg/L)	5	0.428
Toluene (µg/L)	100	0.429 J
Ethylbenzene (µg/L)	700	0.151 J
Total Xylenes (µg/L)	10,000	0.638 J
Trichloroethene (µg/L)	5	<b>18.4</b>
<b>Soil at 10-foot bgs</b>		
GRO (mg/L)	300	U (2.0)
DRO (mg/L)	250	2.30 J
RRO (mg/L)	11000	3.56 J
Benzene (mg/L)	0.02	U (0.00798)
Toluene (mg/L)	5.4	0.00209 J
Ethylbenzene (mg/L)	5.5	0.00305 J
Total Xylenes (mg/L)	78	0.00551 J
Trichloroethene (mg/Kg)	0.027	U (0.0395)
<b>Soil at 12-foot bgs</b>		
GRO (mg/L)	300	U (2.48)
DRO (mg/L)	250	U (4.22)
RRO (mg/L)	11000	2.94 J
Benzene (mg/L)	0.02	U (0.00982)
Toluene (mg/L)	5.4	0.00255 J
Ethylbenzene (mg/L)	5.5	0.00255 J
Total Xylenes (mg/L)	78	U (0.0491)
Trichloroethene (mg/Kg)	0.027	U (0.0487)
<b>Soil at 16-foot bgs</b>		
GRO (mg/L)	300	U (2.76)
DRO (mg/L)	250	5.65
RRO (mg/L)	11000	6.84 J
Benzene (mg/L)	0.02	U (0.0110)
Toluene (mg/L)	5.4	0.00273 J
Ethylbenzene (mg/L)	5.5	0.00262 J
Total Xylenes (mg/L)	78	U (0.0551)
Trichloroethene (mg/Kg)	0.027	U (0.0547)

SP4/11-03

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UNITED STATES AIR FORCE  
**ST526 SITE MAP**  
ELMENDORF AIR FORCE BASE  
ALASKA



FIGURE 21-1

A new in-source monitoring well, 526MW-IN, was installed at the location known to previously contain the highest concentration of soil contaminants (DRO 1,330 mg/kg in 1997). A completion diagram of this well is provided in Appendix B.

Groundwater monitoring wells 526MW-IN and SP4/11-03 were sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). A field duplicate sample was also collected from well SP4/11-03. The samples were analyzed by an analytical laboratory for GRO, DRO, RRO, BTEX compounds, metals, and VOCs. The in-source well 526MW-IN was also sampled for PAHs. TCE was detected in the in-source monitoring well 526MW-IN at concentrations exceeding the cleanup level. No other contaminants were detected in samples from either well above cleanup levels. Results of the samples are summarized in Table 21-1.

ST526 soil met the criteria as nearing cleanup in 2006 according to the formula in Figure 2-1. Three soil samples were collected from the pilot hole for the new in-source monitoring well 526MW-IN at depths known to previously contain the highest concentrations of soil contaminants (10, 12, and 16 feet bgs). The samples were analyzed by an analytical laboratory for GRO, DRO, RRO, BTEX compounds, metals, PAHs, and VOCs by the same methods as the groundwater samples. No contaminants were detected above cleanup levels in any of the samples. Results of the samples are summarized in Table 21-2.

According to the Compliance Program Decision Tree (Figure 2-1), samples from a second soil boring would only be collected if groundwater results and soil results from the first boring were below cleanup levels for all constituents. Because the groundwater sample collected from the in-source well had TCE concentrations exceeding the cleanup level, no soil samples from a second boring were collected.

### 21.3 ST526 CONCLUSIONS AND RECOMMENDATIONS

In 1996, ST526 had DRO soil contamination above the cleanup levels; which was thought to be limited to the vadose zone within the vicinity of the former USTs. Six soil borings were installed to groundwater during the SERA Phase V investigation in 1997. Two or three samples were collected from five of the six borings. The samples were analyzed for GRO, DRO, RRO, and BTEX compounds and one boring was analyzed for SVOCs. DRO (1,330 mg/kg) was detected exceeding cleanup levels in one sample at 12 feet bgs in the boring located in the middle of the former USTs. In 2006, a groundwater monitoring well was installed at this location and three soil samples were collected from the pilot hole (collected at 10, 12 and 16 feet bgs). No contaminants were found above cleanup levels in the soil samples. Soil remediation should be considered complete at this site. Site ST526 falls within the downgradient portion of the Slammer Avenue Plume monitored by the 3 CES/CEVR under the Elmendorf Restoration Program. The TCE detected in well 526MW-IN is likely related to the Slammer Avenue Plume, and not the former USTs at this site. The *SERA Phase V Summary Report* supports this conclusion (USAF, 1999).

A groundwater sample should be collected from well 526MW-IN and analyzed for GRO, DRO, RRO, BTEX compounds, metals, and VOCs again in 2007. If cleanup levels are not exceeded for any contaminant except TCE again, remediation of ST526 should be considered complete.



**Table 21-1 ST526 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well		
		526MW-IN	SP4/11-03	SP4/11-03 FD
Gasoline Range Organics by AK101 (µg/L)	1,300	103	36.9 J	41.1 J
Diesel Range Organics by AK102 (µg/L)	1,500	U (400)	77.1 J	50.1 J
Residual Range Organics by AK103 (µg/L)	1,100	U (480)	U (462)	U (462)
<b>Aromatic Hydrocarbons by SW8021B</b>				
Benzene (µg/L)	5	0.428	UJ (0.2)	0.200 J
Toluene (µg/L)	100	0.429 J	0.183 J	0.256 J
Ethylbenzene (µg/L)	700	0.151 J	U (0.5)	0.184 J
Total Xylenes (µg/L)	10,000	0.636 J	U (1.0)	0.395 J
<b>Metals by SW6020</b>				
Arsenic (µg/L)	50	0.240 J	0.270 J	0.280 J
Barium (µg/L)	2,000	19.9	23.8	23.3
Cadmium (µg/L)	5	0.180 J	U (1)	U (1)
Chromium (µg/L)	100	0.760 J	0.330 J	0.250 J
Lead (µg/L)	15	0.470 J	0.0400 J	0.0500 J
Nickel (µg/L)	100	6.89	2.11	1.98
Vanadium (µg/L)	260	0.400 J	0.990 J	0.810 J
<b>Polynuclear Aromatic Hydrocarbons by SW8270C SIM</b>				
Acenaphthene (µg/L)	2,200	U (0.0971)	--	--
Anthracene (µg/L)	11,000	U (0.0971)	--	--
Benzo-a-anthracene (µg/L)	1	U (0.0971)	--	--
Benzo-a-pyrene (µg/L)	0.2	U (0.0971)	--	--
Benzo-b-fluoranthene (µg/L)	1	U (0.0971)	--	--
Benzo-k-fluoranthene (µg/L)	10	U (0.0971)	--	--
Chrysene (µg/L)	100	U (0.0971)	--	--
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.0971)	--	--
Fluorene (µg/L)	1,460	U (0.0971)	--	--
Ideno-123-cd-pyrene (µg/L)	1	U (0.0971)	--	--
Naphthalene (µg/L)	700	U (0.0971)	--	--
Pyrene (µg/L)	11,00	U (0.0971)	--	--
<b>Volatile Organic Compounds by SW8260B Above Cleanup Levels<sup>2</sup></b>				
Trichloroethene (µg/L)	5	19.4	0.280	0.280

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C. <sup>2</sup> Because there are more than 60 reported VOCs in the analytical data package, only those that exceed cleanup levels are provided in this table.

<sup>2</sup> Because there are more than 60 reported VOCs in the analytical data package, only those that exceed cleanup levels are provided in this table. **Bold value exceeds cleanup level.**

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

UJ = The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

µg/L = micrograms per liter.



Table 21-2 ST526 Soil Analytical Sample Results

Compound	Cleanup Level <sup>1</sup>	Location			
		526MW-IN at 10-ft. bgs	526MW-IN at 12 ft. bgs	526MW-IN at 16-ft. bgs	526MW-IN at 16-ft. bgs FD
Gasoline Range Organics by AK101 (mg/kg)	300	U (2.0)	U (2.46)	U (2.76)	0.530 J
Diesel Range Organics by AK102 (mg/kg)	250	2.30 J	U (4.22)	5.65	U (4.16)
Residual Range Organics by AK103 (mg/kg)	11,000	3.56 J	2.94 J	6.84 J	3.92 J
<b>Aromatic Hydrocarbons by SW8021B</b>					
Benzene (mg/kg)	0.02	U (0.00798)	U (0.00982)	U (0.0110)	U (0.00989)
Toluene (mg/kg)	5.4	0.00209 J	0.00255 J	0.00273 J	0.00467 J
Ethylbenzene (mg/kg)	5.5	0.00305 J	0.00255 J	0.00262 J	0.00260 J
Total Xylenes (mg/kg)	78	0.00551 J	U (0.0491)	U (0.0551)	U (0.0494)
<b>Metals by SW6020</b>					
Arsenic (mg/kg)	16.2	4.79	5.78	5.38	4.50
Barium (mg/kg)	1,100	47.7	55.0	43.6	54.2
Cadmium (mg/kg)	5	0.165 J	0.147 J	0.177 J	0.135 J
Chromium (mg/kg)	76.1	31.0	31.4	30.1	26.2
Lead (mg/kg)	400	5.18	5.05	4.58	4.60
Nickel (mg/kg)	87	32.3	36.1	30.3	28.2
Vanadium (mg/kg)	710	63.0	60.2	62.6	57.5
<b>Polynuclear Aromatic Hydrocarbons (PAHs) by SW8270C SIM</b>					
Acenaphthene (mg/kg)	210	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Anthracene (mg/kg)	4,300	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Benzo-a-anthracene (mg/kg)	6	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Benzo-a-pyrene (mg/kg)	1	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Benzo-b-fluoranthene (mg/kg)	11	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Benzo-k-fluoranthene (mg/kg)	110	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Chrysene (mg/kg)	620	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Dibenzo-a,h-anthracene (mg/kg)	1	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Fluorene (mg/kg)	270	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Ideno-123-cd-pyrene (mg/kg)	11	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Naphthalene (mg/kg)	21	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
Pyrene (mg/kg)	1,500	U (0.0105)	U (0.0106)	U (0.0104)	U (0.0105)
<b>Volatile Organic Compounds (VOCs) by SW8260B Above Cleanup Levels<sup>2</sup></b>					
None					

Notes:

<sup>1</sup> Cleanup levels are from the 18 AAC 75.341 Tables B1 and B2. Method 2, under 40-inch zone criteria, the most stringent of the three criteria except for arsenic and chromium which use the maximum background levels. The maximum background levels are from studies conducted on Elmendorf AFB published in 1993.

<sup>2</sup> Because there are more than 60 reported VOCs in the analytical data package, only those that exceed cleanup levels are provided in this table. No VOCs were detected above cleanup levels so none are listed.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

mg/kg = milligrams per kilogram.



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## 22.0 ST529

Elmendorf AFB site ST529 is located northwest of former Building 21-878. The building was located at the corner of 9<sup>th</sup> Street and Finletter Avenue and originally housed mechanical equipment for steam generation. It was later converted to a car wash and then demolished sometime prior to 1996. ST529 is the former location of two unregulated 57,000-gallon steel USTs which stored diesel fuel for Building 21-878 (Figure 22-1). The USTs and associated piping were removed in 1996 (USAF, 2004s).

### 22.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1996 UST Removal: Stained soil and hydrocarbon odors were present in the excavation from 2 feet to 10 feet bgs when the USTs and associated piping were removed in 1996. Free flowing liquid was found at 14.5 feet bgs at the north end of one tank. Fourteen samples were collected from the excavation and analyzed for DRO and BTEX compounds. DRO results (maximum 12,700 mg/kg) exceeded the cleanup level in the three samples located in the north central portion of the excavation at 13.5 feet bgs (USAF, 2004s). This investigation indicated that a release had occurred.

SERA V: Six soil borings were installed during the SERA Phase V investigation in 1997. Two soil samples were collected from each boring and analyzed for GRO, DRO, RRO, and BTEX compounds; six samples were analyzed for SVOCs. DRO exceeded the cleanup level in the two borings installed in the north central portion of the former UST area and one boring installed northwest of the former UST area. The maximum DRO concentration (15,400 mg/kg) was detected at 15 feet bgs, and the DRO concentration in this boring at 25 feet bgs was 2,450 mg/kg (USAF, 2004s). There were no monitoring wells installed during this investigation.

### 22.2 ST529 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling in-source well 48WL-03 and downgradient well OU5MW-34 at ST529. Well 48WL-03 was not found to exist anymore (had been abandoned) and a new in-source well was installed in its place. Because ST529 originated from a diesel fuel UST, the contaminants of concern include DRO, BTEX compounds, and PAHs. During the SERA V investigation in 1997, BTEX compounds and SVOCs (which include PAHs) were not detected above cleanup levels in soil and these constituents were therefore eliminated as contaminants of concern.

A new in-source monitoring well, 529MW-IN, was installed as close as possible to the location known to previously contain the highest concentration of soil contaminants. The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.

Groundwater monitoring wells 529MW-IN and OU5MW-34 were sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). These samples were analyzed by an analytical laboratory for DRO. DRO was detected in the in-source well, 529MW-IN, above the DRO cleanup level. Results of the samples are summarized in Table 22-1.









ST529  
APPROXIMATE  
LOCATION OF  
FORMER USTs

FAIRCHILD AVE.  
PLUME

Compound	Cleanup Level	2006 Result
DRO (µg/L)	1,500	4,570

Compound	Cleanup Level	2005 Result	2006 Result
DRO (µg/L)	1,500	U (400)	U (385)

### LEGEND

-  MONITORING WELL
-  ESTIMATED AREA WITH GROUNDWATER CONTAMINATION ABOVE CLEANUP LEVELS
-  RESTORATION GROUNDWATER PLUME - SOLVENTS
-  GENERAL GROUNDWATER FLOW DIRECTION

**Bold and *Italicized* results exceed cleanup level.**  
For explanation of data flags, see notes below Table 22-1.



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UNITED STATES AIR FORCE

## ST529 SITE MAP

ELMENDORF AIR FORCE BASE  
ALASKA



FIGURE 22-1

**Table 22-1 ST529 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well	
		529MW-IN	OU6MW-34
Diesel Range Organics by AK102 (µg/L)	1,500	<b>4,570</b>	U (385)

Notes:

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

**Bold** values exceed cleanup level.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

µg/L = micrograms per liter

**22.3 ST529 CONCLUSIONS AND RECOMMENDATIONS**

Soil at ST529 contained concentrations of DRO above cleanup levels in 1997. In 2006, groundwater in the in-source monitoring well 529MW-IN had concentrations of DRO above the cleanup level.

Annual sampling for DRO should continue at monitoring wells 529MW-IN and OU5MW-34. Once groundwater contaminant concentrations are below cleanup levels, soil samples should be collected to determine if all vadose zone soil has been remediated. Once all groundwater and vadose zone soil contaminant concentrations are below cleanup levels, this site should be considered for closure.



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## 23.0 ST532

Elmendorf AFB site ST532 is located on the southwest corner of Building 12759 (former Building 34-620), within the Defense Reutilization and Marketing Office (DRMO) complex (Figure 23-1). ST532 is the former location of an unregulated 1,500-gallon single-walled UST used to store heating oil for Building 12759. The 1,500-gallon single-walled UST and associated piping were removed in July 1996 (USAF, 2004t).

### 23.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1996 UST Removal: Petroleum-contaminated soil was observed and a strong hydrocarbon odor was present near the vent pipe on the east side of the excavation when the UST and associated piping were removed in 1996. Two soil samples were collected from the UST excavation and analyzed for DRO. DRO in excess of cleanup levels was detected in both samples (1,200 and 7,900 mg/kg) (USAF, 2004t). This investigation indicated that a release had occurred.

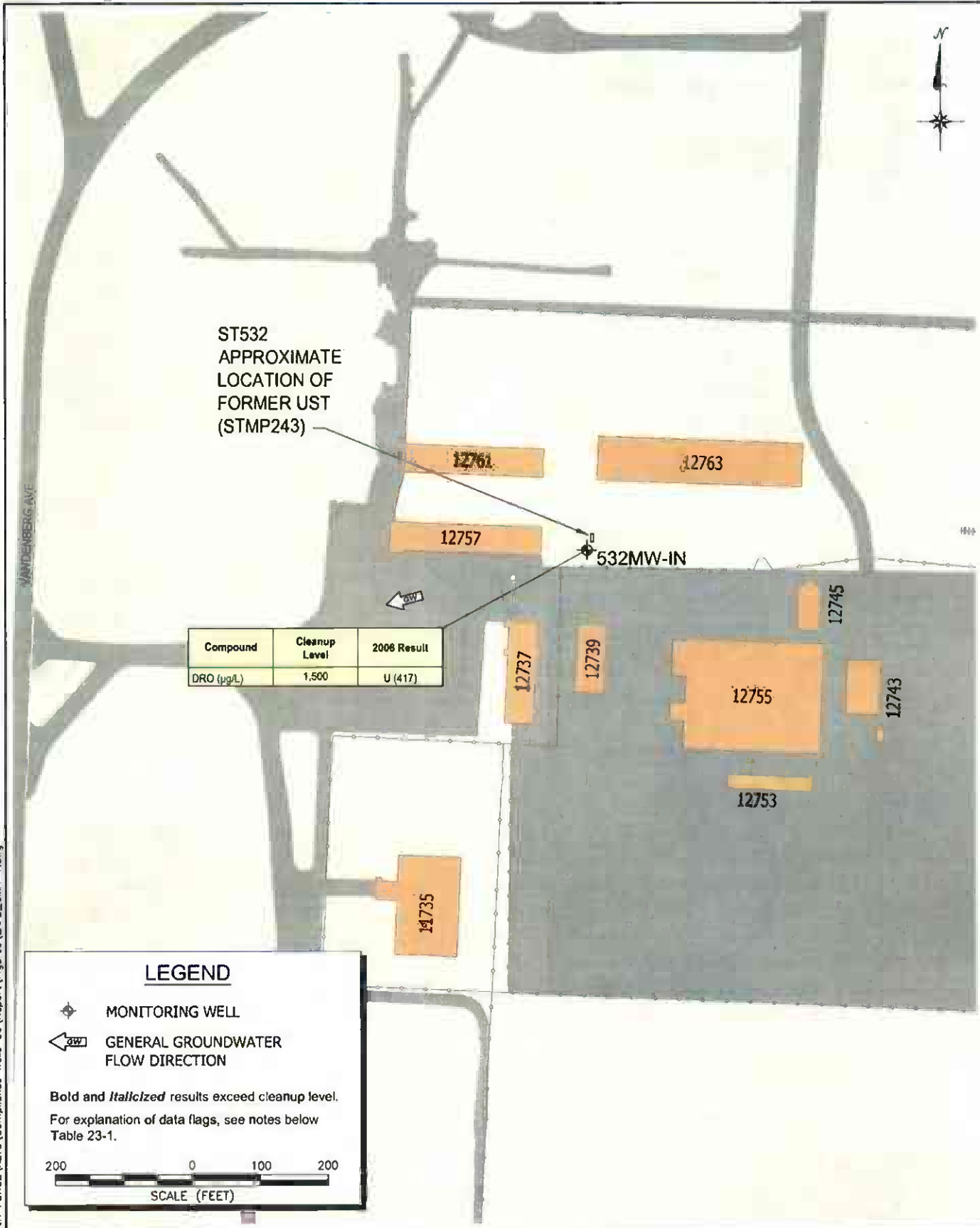
SERA V: Four soil borings were installed during the SERA Phase V investigation in 1997. One or two samples were collected from each boring and analyzed for GRO, DRO, RRO, and BTEX compounds. The sample with the highest DRO concentration was also analyzed for SVOCs. DRO (2,630 mg/kg) exceeded the cleanup level in one sample at 2.5 feet bgs. All other results were below cleanup levels. Groundwater (at approximately 45.5 feet bgs) in the central boring appeared to have a hydrocarbon sheen and odor and was completed as a monitoring well (this well no longer exists). The groundwater sample was analyzed for GRO, DRO, RRO, and BTEX compounds. DRO (2,180 µg/L) was detected above the groundwater cleanup level. Other constituents either were not detected or were not found above cleanup levels (USAF, 2004t).

SERA IX: Two soil borings were installed to groundwater during the SERA Phase IX investigation in 2001. One boring was advanced in the center of the former UST location where the maximum DRO concentrations were detected during previous investigations. Three samples were collected from each boring and analyzed for GRO, DRO, and RRO. Five of the six samples were analyzed for BTEX compounds and three of the six samples were analyzed for PAHs. DRO exceeded the cleanup level in the smear zone samples collected from both borings and in the sample collected at 30 feet bgs in one boring (640 to 7,000 mg/kg). All other constituents in these samples either were not detected or were not found above cleanup levels (USAF, 2004t).

### 23.2 ST532 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source well and a new downgradient well at ST532. Because ST532 originated from a heating oil UST, the contaminants of concern include DRO, BTEX compounds, and PAHs. Previous soil sampling eliminated BTEX compounds and PAHs as contaminants of concern, however.





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UNITED STATES AIR FORCE  
**ST532 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



A new in-source monitoring well, 532MW-IN, was installed as close as possible to the location known to previously contain the highest concentration of soil and groundwater contaminants. A completion diagram of this well is provided in Appendix B.

Groundwater monitoring well 532MW-IN was sampled using the approved procedures provided in the 2006 Final Work Plan (USAF, 2006c). The sample was analyzed by an analytical laboratory for DRO. DRO was not detected above MDLs in the sample. A summary of the result is provided in Table 23-1.

Table 23-1 ST532 Groundwater Analytical Sample Results

Compound	Cleanup Level <sup>1</sup>	Well
		532MW-IN
Diesel Range Organics by AK102 (µg/L)	1,500	U (417)

Notes:

<sup>1</sup> Cleanup level from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

µg/L = micrograms per liter

According to the Compliance Program Decision Tree (Figure 2-1), no downgradient well was to be installed if there were no contaminants in the in-source well with concentrations greater than two times the cleanup level. No downgradient well was installed at this site in 2006.

### 23.3 ST532 CONCLUSIONS AND RECOMMENDATIONS

In 2001, ST532 vadose and smear zone soil contained DRO contamination above cleanup levels. In 2006, groundwater from the in-source monitoring well 532MW-IN did not have detectable concentrations of DRO.

Annual sampling for DRO in well 532MW-IN should continue. Soil samples should be collected from ST532 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



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## 24.0 ST538

Elmendorf AFB site ST538 is located in a field south of the Jet Engine Shop, Building 8549, on Sijan Avenue (Figure 24-1). ST538 is the former location of six regulated 25,000-gallon USTs that stored deicing fluid and were formerly used to store MOGAS. The western fuel unloading dock and six USTs were removed in 1997 (USAF, 2004u).

### 24.1 SUMMARY OF PREVIOUS INVESTIGATIONS

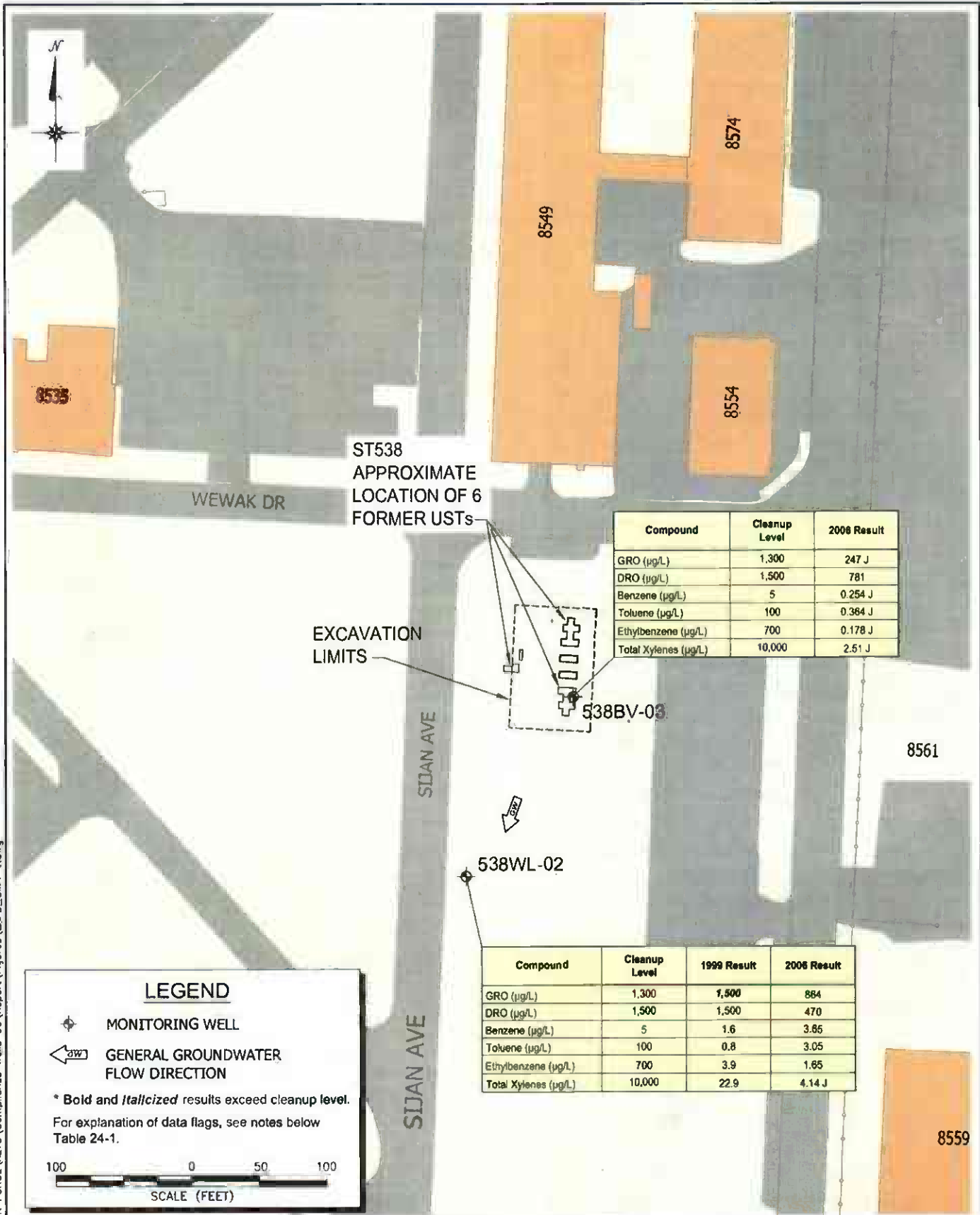
1997 UST Removal: Four of the six USTs had obvious signs of leaks when they were removed in 1997. Twenty soil samples were collected from the excavation and analyzed for GRO, DRO, BTEX compounds, and lead. Maximum concentrations of GRO (2,050 mg/kg), DRO (685 mg/kg), benzene (6.48 mg/kg), toluene (62.2 mg/kg), ethylbenzene (31.5 mg/kg), and total xylenes (238 mg/kg) exceeded cleanup levels. Forty-two soil samples were collected from five stockpiles of excavated soil and analyzed for GRO, DRO, BTEX compounds, and lead. Lead was the only analyte that did not exceed cleanup levels (USAF, 2004u). This investigation indicated that a release had occurred.

SERA V: Fifteen perimeter soil borings were installed during the SERA Phase V investigation in 1997. Two soil samples per boring were collected from 14 borings at approximately 20 and 28 feet bgs and three soil samples were collected from one boring at 7.5 feet, 20 feet, and 30 feet bgs. Samples were analyzed for GRO, DRO, RRO, and BTEX compounds. GRO (632 to 743 mg/kg), DRO (312 to 684 mg/kg), and ethylbenzene (6.3 mg/kg) were detected in the boring located near the eastern fuel unloading dock. Benzene concentrations (maximum 0.0807 mg/kg) exceeded the cleanup level in 10 samples and three duplicate samples. All other analytical results were below cleanup levels (USAF, 2004u). There were no monitoring wells installed during the investigation.

SERA VI: Four soil borings were advanced to groundwater during the SERA Phase VI investigation in 1998. Two soil samples were collected from each boring in the 20 to 30 feet bgs interval and analyzed for GRO, DRO, RRO, BTEX compounds, and PAHs. One sample was analyzed for VOCs. GRO (520 mg/kg) and DRO (340 mg/kg) exceeded the cleanup level in the smear zone (28 to 30 feet bgs) and benzene exceeded the cleanup level in the 20- to 22-foot bgs interval and the 28- to 30-foot bgs interval (up to 0.28 mg/kg) (USAF, 2004u). There were no monitoring wells installed during this investigation.

SERA VIII: Six soil borings were advanced to groundwater as part of the SERA Phase VIII investigation in 1999. Two to three analytical soil samples were collected from each boring and analyzed for DRO, GRO, and BTEX compounds. Select samples were analyzed for VOCs and PAHs. GRO (4,100 mg/kg), DRO (1,500 mg/kg), benzene (0.2 mg/kg), ethylbenzene (10 mg/kg), total xylenes (98 mg/kg), and TCE (0.1 mg/kg) were detected in excess of cleanup levels from the in-source boring. Perimeter borings contained elevated GRO, DRO, and/or benzene near the smear zone (25 to 30 feet bgs).





ST538  
APPROXIMATE  
LOCATION OF 6  
FORMER USTs

EXCAVATION  
LIMITS

Compound	Cleanup Level	2006 Result
GRO (µg/L)	1,300	247 J
DRO (µg/L)	1,500	781
Benzene (µg/L)	5	0.254 J
Toluene (µg/L)	100	0.364 J
Ethylbenzene (µg/L)	700	0.178 J
Total Xylenes (µg/L)	10,000	2.51 J

Compound	Cleanup Level	1999 Result	2006 Result
GRO (µg/L)	1,300	<b>1,500</b>	884
DRO (µg/L)	1,500	<b>1,500</b>	470
Benzene (µg/L)	5	<b>1.6</b>	3.85
Toluene (µg/L)	100	<b>0.8</b>	3.05
Ethylbenzene (µg/L)	700	<b>3.9</b>	1.65
Total Xylenes (µg/L)	10,000	<b>22.9</b>	4.14 J

**LEGEND**

- MONITORING WELL
- GENERAL GROUNDWATER FLOW DIRECTION


\* **Bold and Italicized** results exceed cleanup level.  
For explanation of data flags, see notes below Table 24-1.

100      0      50      100  
SCALE (FEET)

15-May-07 3:27 PM P:\AIR FORCE\AETC\Compliance Wells 06\Report\Figures\EAFB\_CMA-1.dwg

DATE: 09 MAY 2007  
 PROJ. NO.: 12832.001.196  
 FILE: EAFB\_CMA-1.dwg  
 DRAWN BY: SJ

UNITED STATES AIR FORCE  
**ST538 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



**FIGURE 24-1**

Groundwater samples were collected from one existing well (61WL-02), located upgradient of the site, and the five new monitoring wells (538-WL01 through 538-WL05) and analyzed for GRO, DRO, BTEX compounds, and VOCs. Select samples were analyzed for PAHs. Downgradient wells had GRO (up to 2,600 µg/L) above the cleanup level. One well also had DRO and benzene concentrations (1,900 and 7.1 µg/L) above cleanup levels and two of the upgradient wells contained TCE (6.6 and 7.3 µg/L) above the cleanup level. All other results were below cleanup levels (USAF, 2004u).

## 24.2 ST538 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling in-source well 538BV-03 and downgradient well 538WL-02. Because ST538 originated from USTs that contained deicing fluid and MOGAS, the contaminants of concern include GRO, BTEX compounds, VOCs, and PAHs. Previous soil sampling events did not find PAHs above cleanup levels; therefore, according to the Analytical Decision Tree (Figure 2-2), PAHs can be removed from annual sampling. DRO was also found to exceed the cleanup levels in soil and groundwater at ST538 and is included as a contaminant of concern.

Groundwater monitoring wells 538BV-03 and 538WL-02 were sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). These samples were analyzed by an analytical laboratory for GRO, DRO, BTEX compounds, and VOCs. No constituents were detected above cleanup levels in either sample. Results of the samples are summarized in Table 24-1.

**Table 24-1 ST538 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well	
		538BV-03	538WL-02
Gasoline Range Organics by AK101 (µg/L)	1,300	247 J	864
Diesel Range Organics by AK102 (µg/L)	1,500	781	470
<b>Aromatic Hydrocarbons by SW8021B</b>			
Benzene (µg/L)	5	0.254 J	3.65
Toluene (µg/L)	100	0.364 J	3.05
Ethylbenzene (µg/L)	700	0.178 J	1.65
Total Xylenes (µg/L)	10,000	2.51 J	4.14 J
<b>Volatile Organic Compounds (VOCs) by SW8260B Above Cleanup levels<sup>2</sup></b>			
None			

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

<sup>2</sup> Because there are more than 60 reported VOCs in the analytical data package, only those that exceed cleanup levels are provided in this table. No VOCs were detected above cleanup levels so none are listed.

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.



### 24.3 ST538 CONCLUSIONS AND RECOMMENDATIONS

In 1999, soil at ST538 had GRO, DRO, BTEX compounds, and TCE concentrations above cleanup levels. In 2006, each of these contaminants was detected in groundwater at monitoring wells 538BV-03 and 538WL-02, at concentrations below cleanup levels.

Monitoring well 538WL-02, although slightly downgradient of the former USTs, has higher concentrations of contaminants in groundwater than well 538BV-03. The soil samples collected during the SERA investigations from the 538WL-02 pilot hole had higher concentrations of contaminants than those collected from the 538BV-03 pilot hole. Because well 538WL-02 has higher concentrations of contaminants than well 538BV-03, it would better serve as the in-source well to monitor ST538. Groundwater samples should continue to be collected annually from well 538WL-02. An additional downgradient well is not needed to be sampled at this time because contaminant concentrations do not exceed cleanup levels.

Soil samples should be collected from ST538 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



## 25.0 ST703

Elmendorf AFB site ST703 is located in the northern portion of the Base adjacent to former Building 26282, the Green Lake Cabin. ST703 is the former location of an unregulated 1,000-gallon steel UST used to store heating oil (Figure 25-1). The UST and associated piping were removed in July 1997 (USAF, 2004v).

### 25.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1997 UST Removal: Five soil samples were collected from the excavation when the UST and associated piping were removed in 1997. The samples were analyzed for DRO and BTEX compounds. Maximum DRO (9,150 mg/kg) and benzene (0.159 mg/kg) results from the excavation exceeded the cleanup levels. A sample from the stockpiled soil contained 6,730 mg/kg DRO and 0.0863 mg/kg benzene. This investigation indicated that a release had occurred. There were no monitoring wells installed during tank removal.

SERA VII: Seven soil borings were drilled from 6 to 12 feet bgs during the SERA Phase VII investigation in 1998. Two of the borings were completed as downgradient monitoring wells (703WL-01 and 703WL-02). A clay and silt layer encountered between 2 and 6 feet bgs may serve as a confining layer. One to three soil samples were collected from each boring and analyzed for GRO, DRO, and BTEX compounds. Select samples were analyzed for PAHs. DRO results ranged from 285 to 11,100 mg/kg in four samples from 4 and 6 feet bgs, and tended to decrease with depth, suggesting the clay/silt layer may be restricting vertical migration. Benzene results ranged from 0.0401 to 0.258 mg/kg in three samples with the highest result from approximately 10.5 feet bgs. Elevated GRO and DRO were not detected at this depth. Naphthalene (21.6 J mg/kg) was detected exceeding the cleanup level in the sample containing the highest DRO result, but this result was an estimate. The lower RL for benzo(a)pyrene and dibenzo(a,h)anthracene (1.8 mg/kg) exceeded the cleanup level (1 mg/kg) in one sample. All other results were below cleanup levels. Groundwater samples were collected from the two new monitoring wells and analyzed for DRO, BTEX compounds, GRO, and PAHs. All results were below groundwater cleanup levels (USAF, 2004v).

2001 Removal Actions: In 2001, approximately 249 tons of contaminated soil was excavated from site ST703. Excavation to the south (towards the lake) was limited by a wood utilidor surrounded by clay encountered at 6 feet bgs. The utilidor and clay apparently limited the migration of contamination towards the lake. Six confirmation soil samples were collected from the bottom of the excavation and analyzed for DRO, BTEX compounds, and GRO. DRO (369, 378, and 6,080 mg/kg) exceeded cleanup levels at three locations. Further excavation was completed at the location of the highest DRO result. An additional soil sample was collected and analyzed; however, DRO still exceeded cleanup levels (4,850 mg/kg) (USAF, 2004v).

Compliance Monitoring: During the 2005 Compliance Monitoring, groundwater monitoring well 703WL-02 was sampled for DRO and BTEX compounds. No constituents were detected above MDL (USAF, 2006a).





ST703  
APPROXIMATE  
LOCATION OF  
FORMER UST

Compound	Cleanup Level	2006 Result
DRO (µg/L)	1,500	U (417)
Benzene (µg/L)	5	0.136 J
Toluene (µg/L)	100	0.190 J
Ethylbenzene (µg/L)	700	U (0.5)
Total Xylenes (µg/L)	10,000	0.389 J

BMW-IN

703WL-02

26278

Compound	Cleanup Level	1996 Result	2005 Result	2006 Result
DRO (µg/L)	1,500	U (110)	U (413)	70.4 J
Benzene (µg/L)	5	U (1)	U (0.5)	U (0.2)
Toluene (µg/L)	100	U (1)	U (0.5)	U (0.5)
Ethylbenzene (µg/L)	700	U (1)	U (0.5)	0.255 J
Total Xylenes (µg/L)	10,000	U (1)	U (1.0)	0.847 J

GREEN  
LAKE

**LEGEND**



MONITORING WELL



GENERAL GROUNDWATER  
FLOW DIRECTION

**Bold and *italicized* results exceed cleanup level.**

For explanation of data flags, see notes below  
Table 25-1.

100 0 50 100

SCALE (FEET)

15-May-07 3:36 PM P:\AR FORCE\AETC\Compliance Wells 06\Report\Figures\EAFB\_CMA-1.dwg

DATE: 09 MAY 2007

PROJ. NO.: 12832.001.196

FILE: EAFB\_CMA-1.dwg

DRAWN BY: SJ

UNITED STATES AIR FORCE

**ST703 SITE MAP**

ELMENDORF AIR FORCE BASE  
ALASKA



FIGURE 25-1

## 25.2 ST703 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source well and sampling downgradient well 703WL-02. Because ST703 originated from a heating oil UST, the contaminants of concern include DRO, BTEX compounds, and PAHs.

A new in-source monitoring well, 703MW-IN, was installed at the former UST location. Direct-push technology was used and Geoprobe® prepacked well screens were installed. The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.

Groundwater monitoring wells 703MW-IN and 703WL-02 were sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). The samples were analyzed by an analytical laboratory for DRO and BTEX compounds. The sample collected from the in-source well 703MW-IN was also sampled for PAHs. No constituents were detected above the cleanup levels. Results of the samples are summarized in Table 25-1.

**Table 25-1 ST703 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well	
		703MW-IN	703WL-02
Diesel Range Organics by AK102 (µg/L)	1,500	U (417)	70.4 J
<b>Aromatic Hydrocarbons by SW8021B</b>			
Benzene (µg/L)	5	0.136 J	U (0.2)
Toluene (µg/L)	100	0.190 J	U (0.5)
Ethylbenzene (µg/L)	700	U (0.5)	0.255 J
Total Xylenes (µg/L)	10,000	0.389 J	0.847 J
<b>Polynuclear Aromatic Hydrocarbons (PAHs) by SW8270C SIM</b>			
Acenaphthene (µg/L)	2,200	U (0.116)	--
Anthracene (µg/L)	11,000	U (0.116)	--
Benzo-a-anthracene (µg/L)	1	U (0.116)	--
Benzo-a-pyrene (µg/L)	0.2	U (0.116)	--
Benzo-b-fluoranthene (µg/L)	1	U (0.116)	--
Benzo-k-fluoranthene (µg/L)	10	U (0.116)	--
Chrysene (µg/L)	100	U (0.116)	--
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.116)	--
Fluorene (µg/L)	1,460	U (0.116)	--
Ideno-123-cd-pyrene (µg/L)	1	U (0.116)	--
Naphthalene (µg/L)	700	U (0.116)	--
Pyrene (µg/L)	1,100	U (0.116)	--

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.



### 25.3 ST703 CONCLUSIONS AND RECOMMENDATIONS

In 2001, vadose zone soil at ST703 contained DRO concentrations above cleanup levels. In 2006, groundwater from monitoring wells 703MW-IN and 703WL-02 did not have concentrations of DRO or BTEX compounds above cleanup levels. PAHs were not detected in the sample collected from the in-source well 703MW-IN.

Annual sampling for DRO should continue at the in-source well 703MW-IN. According to the Compliance Program Decision Tree, Figure 2-1, The downgradient well does not require annual sampling at this time.

Soil samples should be collected from ST703 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



## 26.0 SS704

Elmendorf AFB site SS704 is located between Taxiway 'M' and Taxiway 'J' near Hardstands 39 to 42 (Figure 26-1). This site is just north of the East/West Runway and is the location of a JP-8 pipeline leak.

In July 1997, a contractor accidentally bored a 3-inch-diameter hole into a 6-inch-diameter fuel supply pipeline at Hardstand 39. The pipeline, located approximately 6 feet bgs, was not pressurized at that time. When the line was pressurized on 17 July, JP-8 was forced up through the ground and broke through the asphalt apron at grade. The fuel that was released to the surface flowed over the asphalt apron and collected in a grassy low spot (referred to as the "ponding area") located approximately 600 feet west of the release point. Records indicate 13,655 gallons of JP-8 were released during the incident; approximately 7,700 gallons were recovered on the night of the release (USAF, 2004w).

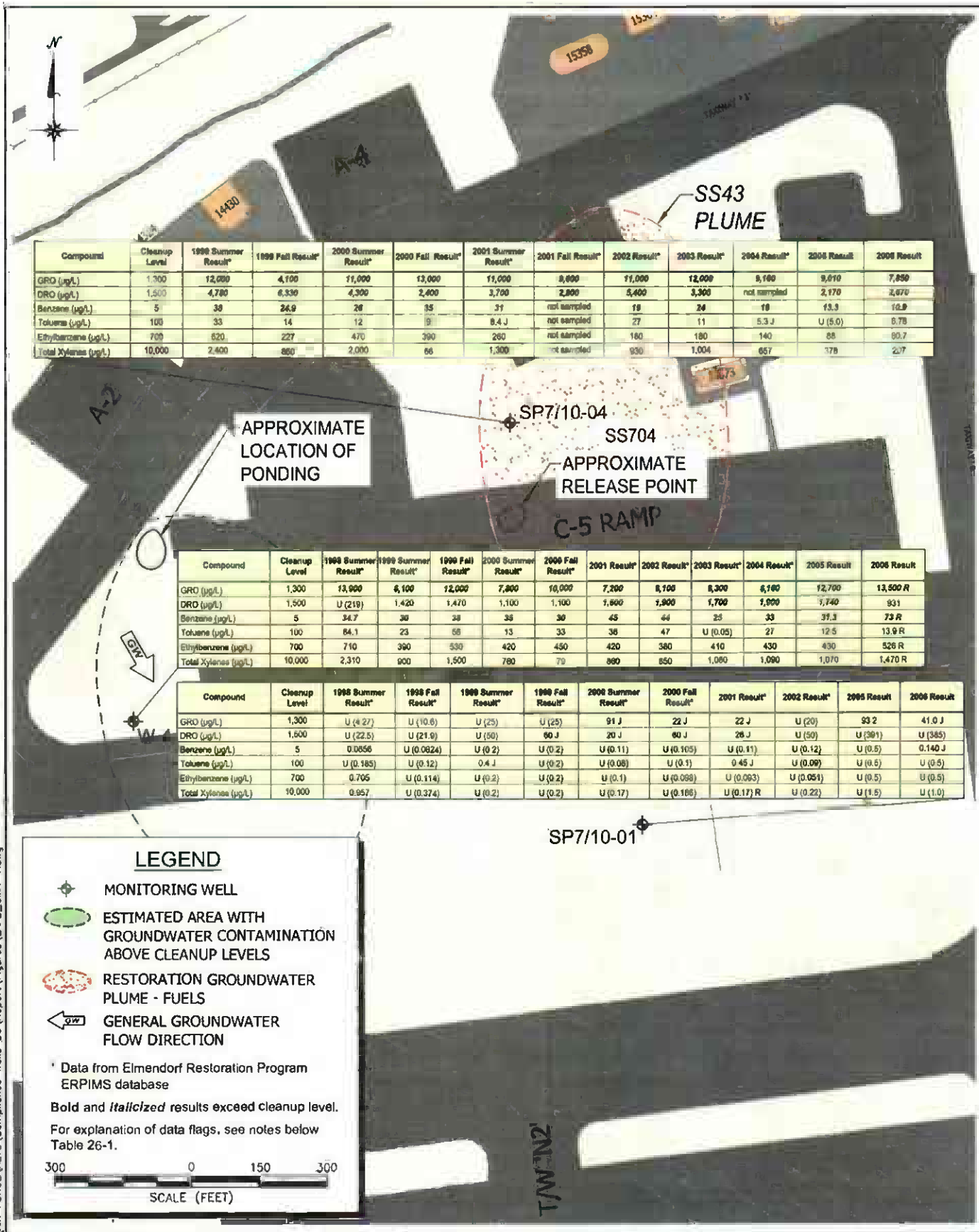
### 26.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1997 Removal Actions: In 1997, approximately 1,500 cy of soil were excavated from the ponding area. During excavation activities, groundwater was encountered at 18 feet bgs. Initially, approximately 1,000 gallons of water and 170 gallons of fuel were pumped from this excavation. A fuel skimmer was later deployed and recovered approximately 80 gallons of fuel. Additionally, approximately 45 cy of soil were removed from the release point. Soil beneath the release point was excavated to approximately 12 feet bgs; groundwater was not encountered. Soil at the bottom of the release point excavation reportedly was impacted by petroleum hydrocarbons; however, no confirmation samples were collected at the time.

SERA VII: In 1998, nine soil borings were installed during the SERA Phase VII investigation. Soil samples were collected approximately every 5 feet from each boring for lithologic logging and field screening. A clay layer was encountered at 13.5 feet bgs at the ponding area and 22 feet bgs at the release area. This clay layer appears to act as a confining unit. One to three soil samples were collected from each boring and analyzed for GRO, DRO, and BTEX compounds. Three samples also were analyzed for PAHs. Maximum contaminant levels were 4,810 mg/kg GRO, 6,640 mg/kg DRO, 7.83 mg/kg benzene, 16.8 mg/kg toluene, 35 mg/kg ethylbenzene, and 148.1 mg/kg xylenes. These contaminant levels exceeded their cleanup levels.

SERA VIII: During the 1998 SERA Phase VIII investigation, groundwater samples were collected from two monitoring wells and sampled for GRO, DRO, and BTEX compounds. Maximum contaminant concentrations were 15,000 µg/L GRO, 34,500 µg/L DRO, and 91.6 µg/L benzene. These levels exceeded the groundwater cleanup levels. One well also had a thin (approximately 1/8 inch) layer of free product on the water surface. All other results were below cleanup levels (USAF, 2004w).





Compound	Cleanup Level	1998 Summer Result*	1998 Fall Result*	2000 Summer Result*	2000 Fall Result*	2001 Summer Result*	2001 Fall Result*	2002 Result*	2003 Result*	2004 Result*	2005 Result	2006 Result
GRD (µg/L)	1,300	12,000	4,100	11,000	13,000	11,000	8,800	11,000	12,000	5,100	9,610	7,890
DRO (µg/L)	1,500	4,780	6,330	4,300	2,400	3,700	2,800	5,400	3,300	not sampled	2,170	2,470
Benzene (µg/L)	5	38	24.9	28	35	31	not sampled	18	24	18	13.3	16.9
Toluene (µg/L)	100	33	14	12	9	8.4 J	not sampled	27	11	5.3 J	U (5.0)	0.78
Ethylbenzene (µg/L)	700	620	227	470	390	260	not sampled	180	180	140	88	80.7
Total Xylenes (µg/L)	10,000	2,400	860	2,000	66	1,300	not sampled	930	1,004	657	178	2.7

Compound	Cleanup Level	1998 Summer Result*	1998 Summer Result*	1998 Fall Result*	2000 Summer Result*	2000 Fall Result*	2001 Result*	2002 Result*	2003 Result*	2004 Result*	2005 Result	2006 Result
GRD (µg/L)	1,300	13,900	6,100	12,000	7,800	10,000	7,300	8,100	8,300	6,100	12,700	13,500 R
DRO (µg/L)	1,500	U (219)	1,420	1,470	1,100	1,100	1,800	1,900	1,700	1,900	1,740	931
Benzene (µg/L)	5	34.7	30	38	38	30	45	44	25	33	31.3	73 R
Toluene (µg/L)	100	84.1	23	66	13	33	36	47	U (0.05)	27	12.5	13.9 R
Ethylbenzene (µg/L)	700	710	390	530	420	450	420	380	410	430	430	526 R
Total Xylenes (µg/L)	10,000	2,310	800	1,500	780	70	890	850	1,080	1,080	1,070	1,470 R

Compound	Cleanup Level	1998 Summer Result*	1998 Fall Result*	1999 Summer Result*	1999 Fall Result*	2000 Summer Result*	2000 Fall Result*	2001 Result*	2002 Result*	2003 Result	2004 Result	2005 Result	2006 Result
GRD (µg/L)	1,300	U (4.27)	U (10.6)	U (25)	U (25)	91 J	22 J	22 J	U (20)	93.2	41.0 J		
DRO (µg/L)	1,500	U (22.5)	U (21.9)	U (50)	60 J	20 J	26 J	26 J	U (50)	U (301)	U (385)		
Benzene (µg/L)	5	0.0856	U (0.0824)	U (0.2)	U (0.2)	U (0.11)	U (0.105)	U (0.11)	U (0.12)	U (0.5)	0.140 J		
Toluene (µg/L)	100	U (0.185)	U (0.12)	0.4 J	U (0.2)	U (0.08)	U (0.1)	0.45 J	U (0.09)	U (0.5)	U (0.5)		
Ethylbenzene (µg/L)	700	0.705	U (0.114)	U (0.2)	U (0.2)	U (0.1)	U (0.098)	U (0.093)	U (0.051)	U (0.5)	U (0.5)		
Total Xylenes (µg/L)	10,000	0.957	U (0.374)	U (0.2)	U (0.2)	U (0.17)	U (0.186)	U (0.17) R	U (0.22)	U (1.5)	U (1.0)		

**LEGEND**

- MONITORING WELL
- ESTIMATED AREA WITH GROUNDWATER CONTAMINATION ABOVE CLEANUP LEVELS
- RESTORATION GROUNDWATER PLUME - FUELS
- GENERAL GROUNDWATER FLOW DIRECTION

\* Data from Elmendorf Restoration Program ERPIMS database

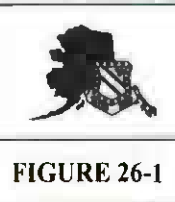
**Bold and *italicized* results exceed cleanup level.**

For explanation of data flags, see notes below Table 26-1.

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SCALE (FEET)

DATE: 06 APR 2007  
 PROJ. NO.: 12832.001.196  
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 DRAWN BY: SJ

UNITED STATES AIR FORCE  
**SS704 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



**Compliance Monitoring:** During the 2005 Compliance Monitoring, groundwater monitoring wells SP7/10-01, SP7/10-04, and W-4 were sampled. Samples from each well were analyzed for GRO, DRO, and BTEX compounds. The analytical results confirmed that concentrations of contaminants remained above cleanup levels in two of the wells used to monitor SS704. GRO concentrations were reported as high as 12,700 µg/L. DRO concentrations were reported as high as 2,170 µg/L. Benzene concentrations were reported as high as 31.35 µg/L. Toluene, ethylbenzene, and xylene concentrations were detected above their MDLs, but did not exceed cleanup levels. No contaminants were above cleanup levels in the downgradient well SP7/10-01 (USAF, 2006a).

## 26.2 SS704 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling wells SP7/10-04, W-4, and SP7/10-01 to monitor SS704. Because SS704 originated from a jet fuel pipeline leak, the contaminants of concern include GRO, DRO, BTEX compounds, and PAHs. During the 1998 SERA Phase VII investigation, PAHs were sampled for in soil and not detected above cleanup levels; PAHs were therefore removed as contaminants of concern for annual groundwater monitoring.

Groundwater monitoring wells SP7/10-01, SP7/10-04, and W-4 were sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). Samples from each well were analyzed for GRO, DRO, and BTEX compounds.

The analytical results confirm that concentrations of contaminants remain above cleanup levels in two of the wells used to monitor SS704: SP7/10-4 and W-4. The results for GRO and BTEX compounds in Well W-4 were rejected during data validation, however, due to deficiencies in meeting laboratory QC criteria. The data validation report is provided in Appendix C. No contaminants were detected above cleanup levels in the downgradient well SP7/10-01.

**Table 26-1 SS704 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well		
		SP7/10-4	SP7/10-01	W-4
Gasoline Range Organics by AK101 (µg/L)	1,300	<b>7,850</b>	41.0 J	<b>13,500 R</b>
Diesel Range Organics by AK102 (µg/L)	1,500	<b>2,670</b>	U (385)	981
<b>Aromatic Hydrocarbons by SW8021B</b>				
Benzene (µg/L)	5	<b>10.9</b>	0.140 J	<b>73.0 R</b>
Toluene (µg/L)	100	6.78	U (0.5)	13.9 R
Ethylbenzene (µg/L)	700	60.7	U (0.5)	526 R
Total Xylenes (µg/L)	10,000	207	U (1.0)	1,470 R

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

**Bold** values exceed cleanup level.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

R = The data are unusable due to deficiencies in meeting QC criteria and may not be used for decision making.

µg/L = micrograms per liter.



### 26.3 SS704 CONCLUSIONS AND RECOMMENDATIONS

In 1999, contaminant concentrations in the soil and groundwater exceeded the cleanup level for GRO, DRO, and BTEX compounds at SS704. In 2006, concentrations of contaminants in groundwater were found to still exceed the cleanup levels in samples collected from two of the three wells used to monitor this site.

This site is located in the vicinity of the SS43 Plume, which is monitored by the Elmendorf Restoration Program. In order to avoid redundancies, management of this site needs to be resolved between the Elmendorf Compliance and Restoration programs. Until that occurs, annual monitoring for GRO, DRO, and BTEX compounds from wells SP7/10-01, SP7/10-04, and W-4 should continue.



## 27.0 ST805/806

ST805/ST806 is located east of the former Battery Shops, Building 32-129, which was previously demolished. This site is located southwest of the intersection of Fighter Drive and Johnson Avenue, in the central portion of the Base (Figure 27-1). Two unregulated 100-gallon, single-wall USTs were located at this site. These tanks reportedly stored heating oil for the former Battery Shops (USAF, 2004x).

### 27.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1998 UST Removal: During tank removal in 1998, three analytical soil samples were collected from the excavation and analyzed for BTEX compounds and DRO. DRO was detected at 330 to 4,000 mg/kg, which exceeded the cleanup level (250 mg/kg). BTEX compounds were not detected; the laboratory RL for benzene ranged from 0.054 to 0.055 mg/kg. There were no monitoring wells installed during the tank removal.

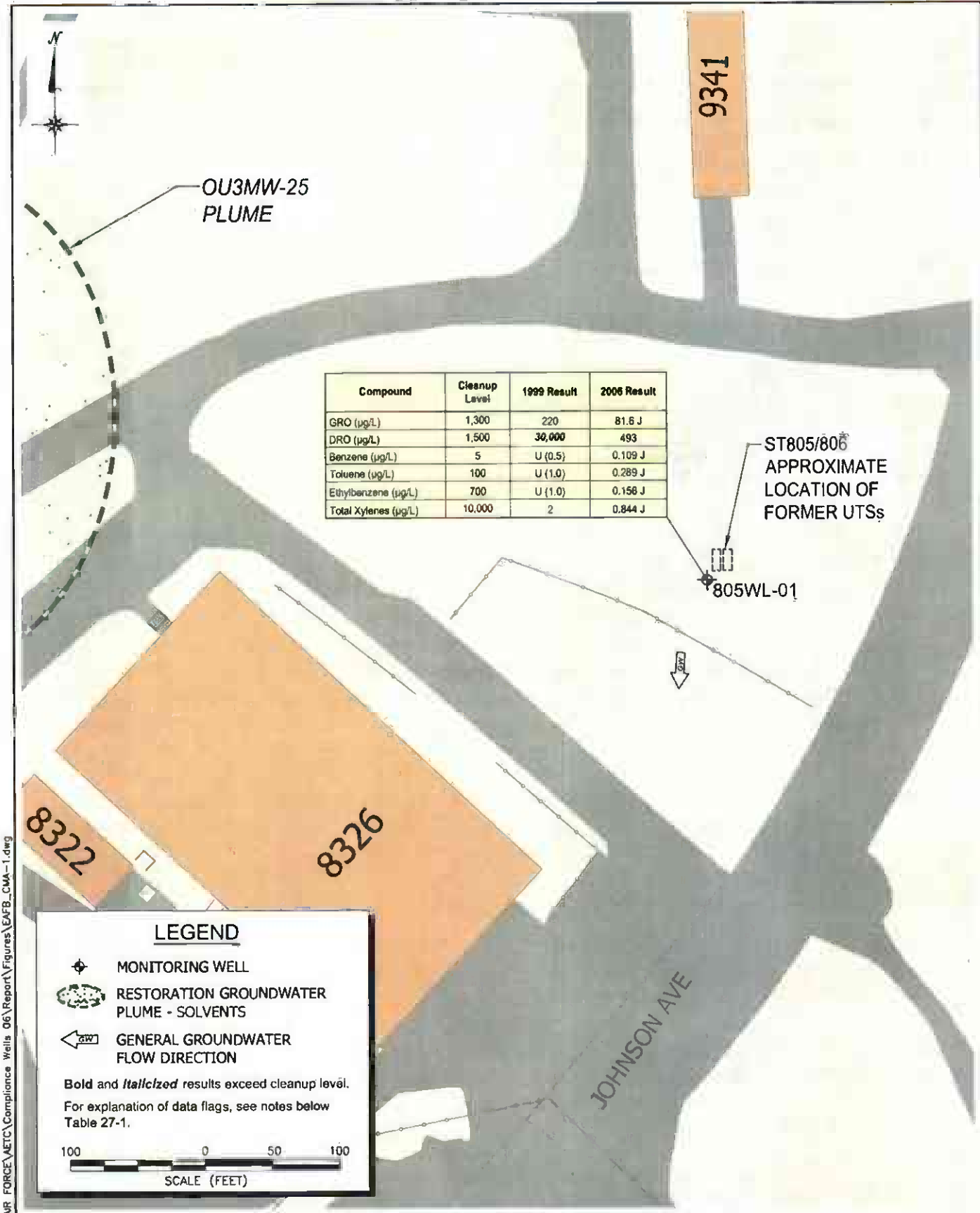
SERA VIII: Four soil borings were advanced during the SERA Phase VIII investigation conducted in October 1999. One boring installed in the UST excavation area was completed as a groundwater monitoring well (805-WL01). Soil samples were collected at least every 5 feet for lithologic logging and field screening. Between one and three analytical soil samples were collected from each boring and analyzed for BTEX compounds, DRO, GRO, and PAHs. DRO (1,400 to 12,000 mg/kg) exceeded the cleanup level in two samples. GRO (480 mg/kg) exceeded the cleanup level of 300 mg/kg in the sample collected from the excavation area at 13 feet bgs. Benzene was not detected; the laboratory RL for benzene was 0.05 mg/kg and the MDL was 0.02 mg/kg in all samples except one. In this sample, the laboratory RL was 5 mg/kg and the MDL was 0.02 mg/kg. All other results were below cleanup levels. One groundwater sample was collected in 1999 and analyzed for BTEX compounds, DRO, GRO, and PAHs. Only DRO exceeded the groundwater cleanup level of 1,500 µg/L; the DRO concentration detected was 30,000 µg/L (USAF, 2004x).

### 27.2 ST805/806 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source well and a new downgradient well at ST805/806. An available in-source well, 805WL-01, was discovered prior to field activities however, and was sampled in place of installing a new in-source well. Because ST805/806 originated from a UST containing heating oil, the contaminants of concern include DRO, BTEX compounds, and PAHs. During the SERA Phase VIII investigation in 1999, GRO was detected above cleanup levels in soil samples and PAHs were not. Therefore, GRO is included as a contaminant of concern for annual monitoring and PAHs are not.

Groundwater well 805WL-01 was sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). Samples from the well were submitted to an analytical laboratory for GRO, DRO, and BTEX compounds. No contaminants were detected above cleanup levels in the sample. Results of the sample are summarized in Table 27-1.





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UNITED STATES AIR FORCE

**ST805/806 SITE MAP**

ELMENDORF AIR FORCE BASE  
ALASKA



**Table 27-1 ST805/806 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well
		805WL-01
Gasoline Range Organics by AK101 (µg/L)	1,300	81.6 J
Diesel Range Organics by AK102 (µg/L)	1,500	493
<b>Aromatic Hydrocarbons by SW8021B</b>		
Benzene (µg/L)	5	0.109 J
Toluene (µg/L)	100	0.289 J
Ethylbenzene (µg/L)	700	0.156 J
Total Xylenes (µg/L)	10,000	0.844 J

**Notes:**

<sup>1</sup> Cleanup levels from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

J = The analyte was positively detected. The reported concentration is an estimate because it was detected below the reporting limit (RL) or because of a quality control (QC) exceedance.

µg/L = micrograms per liter.

According to the Compliance Program Decision Tree (Figure 2-1), no downgradient well was to be installed if there were no contaminants in the in-source well with concentrations greater than two times the cleanup level. No downgradient well was installed at this site in 2006.

**27.3 ST805/806 CONCLUSIONS AND RECOMMENDATIONS**

In 1999, DRO concentrations in soil and groundwater at ST805/806 exceeded cleanup levels. In 2006, groundwater samples from the in-source monitoring well 805WL-01 had detectable concentrations of GRO, DRO, and BTEX compounds, but at concentrations below their respective cleanup levels.

Annual groundwater sampling for GRO, DRO, and BTEX compounds should continue at well 805WL-01. Soil samples should be collected from ST805/806 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



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## 28.0 ST904

Elmendorf AFB site ST904 is located adjacent to former Building 41-635, the former navigational aide/tactical air navigation site (Figure 28-1). The site is located on 39<sup>th</sup> Street, north of the west ramp tank farm in the vicinity of Four Million-Gallon Hill. An unregulated 750-gallon steel UST was used to store heating oil for former Building 41-635. The UST and all associated piping were removed from the site in 1998 (USAF, 2004y).

### 28.1 SUMMARY OF PREVIOUS INVESTIGATIONS

1998 UST Removal: When the 750-gallon steel UST was removed in 1998, it was half full of water with some heating oil. The UST appeared to be in good condition however, with no visible holes, blistering, or excessive rust. During the UST removal, one soil sample was collected from the north end of the UST excavation at 6 feet bgs. The DRO concentration in the soil sample was 2,500 mg/kg and BTEX compounds were not detected. One sample was collected from the excavated soil stockpile; DRO was detected at 400 mg/kg and BTEX compounds were not detected. This investigation indicated that a release had occurred. After removal of the UST, the excavation was backfilled with clean fill. No monitoring wells were installed during the tank excavation.

SERA IX: During the 2001 SERA Phase IX investigation, in order to determine if a soil stockpile at the site was associated with the UST removal and to obtain current data about the stockpile for eventual disposition, one composite sample was collected from the soil stockpile and analyzed for DRO, RRO, GRO, and PAHs. DRO, RRO, and PAHs were detected below cleanup levels and GRO and BTEX compounds were not detected. No monitoring wells were installed during the investigation (USAF, 2004y).

### 28.2 ST904 2006 FIELD ACTIVITIES

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended sampling wells 59-WL-26 and 59-WL-05 to monitor site ST904. Because the UST at this site was located atop a groundwater divide, both wells are considered to be downgradient. Because ST904 originated from a UST storing heating oil, the contaminants of concern include DRO, BTEX compounds, and PAHs. BTEX compounds were sampled for but not detected in confirmation soil samples following the 1998 UST removal. BTEX compounds were therefore removed as contaminants of concern for annual monitoring.

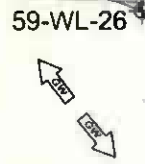
Groundwater monitoring wells 59-WL-26 and 59-WL-05 were sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). Samples from each well were analyzed for DRO and PAHs. DRO was detected in one of the two samples at concentrations below the cleanup level. No PAHs were detected above MDLs in either sample. Results of the samples are summarized in Table 28-1.



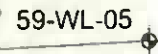


ST904  
APPROXIMATE  
LOCATION OF  
FORMER UST  
(750-GAL)

Compound	Cleanup Level	1995 Result*	2006 Result
DRO (µg/L)	1,500	250 J	49.8 J



Compound	Cleanup Level	1995 Result*	2006 Result
DRO (µg/L)	1,500	U (100)	U (385)



13194 13196

59WL-31 PLUME



**LEGEND**

- MONITORING WELL
- RESTORATION GROUNDWATER PLUME - FUELS
- GENERAL GROUNDWATER FLOW DIRECTION

\* Data from Elmendorf Restoration Program ERPIMS database

**Bold and *Italicized* results exceed cleanup level.**

For explanation of data flags, see notes below Table 28-1.

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UNITED STATES AIR FORCE

**ST904 SITE MAP**

ELMENDORF AIR FORCE BASE  
ALASKA



FIGURE 28-1

**Table 28-1 ST904 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well	
		59WL-26	59WL-05
Diesel Range Organics by AK102 (µg/L)	1,500	49.6 J	U (385)
<b>Polynuclear Aromatic Hydrocarbons (PAHs) by SW8270C SIM</b>			
Acenaphthene (µg/L)	2,200	U (0.0962)	U (0.0952)
Anthracene (µg/L)	11,000	U (0.0962)	U (0.0952)
Benzo-a-anthracene (µg/L)	1	U (0.0962)	U (0.0952)
Benzo-a-pyrene (µg/L)	0.2	U (0.0962)	U (0.0952)
Benzo-b-fluoranthene (µg/L)	1	U (0.0962)	U (0.0952)
Benzo-k-fluoranthene (µg/L)	10	U (0.0962)	U (0.0952)
Chrysene (µg/L)	100	U (0.0962)	U (0.0952)
Dibenzo-a,h-anthracene (µg/L)	0.1	U (0.0962)	U (0.0952)
Fluorene (µg/L)	1,460	U (0.0962)	U (0.0952)
Ideno-123-cd-pyrene (µg/L)	1	U (0.0962)	U (0.0952)
Naphthalene (µg/L)	700	U (0.0962)	U (0.0952)
Pyrene (µg/L)	1,100	U (0.0962)	U (0.0952)

**Notes:**

<sup>1</sup> Cleanup level from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

µg/L = micrograms per liter

### 28.3 ST904 CONCLUSIONS AND RECOMMENDATIONS

Following the 1998 UST removal, one confirmation soil sample was collected from the north end of the UST excavation at 6 feet bgs. The DRO concentration in the sample exceeded the soil cleanup level (2,500 mg/kg). In 2006, DRO concentrations in wells 59WL-26 and 59WL-05 did not exceed the groundwater cleanup level. PAHs were not detected in either well.

Annual groundwater sampling for DRO should continue at wells 59WL-26 and 59WL-05. Soil samples should be collected from ST904 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure



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## 29.0 BUILDING 16716

Elmendorf AFB site Building 16716 is located on the east side of Building 16716, Hangar 15, on Talley Avenue, on the north side of the East/West Runway (Figure 29-1). It consists of one former unregulated 20,000-gallon steel UST used to store diesel fuel. The UST was located just outside the boiler room on the east side of the building. The UST appeared to be in good condition when it was removed in June 2003. There was no evidence of leaks; however, stained soil was observed around the fill pipe. Further subsurface investigation in 2003 indicated that a release had occurred (USAF, 2004z).

### 29.1 SUMMARY OF PREVIOUS INVESTIGATIONS

**2003 UST Removal:** Following removal of the 20,000-gallon steel UST in June 2003, contaminated soil was excavated to the maximum extent practical. A total of 225 tons of contaminated soil was removed. Excavation continued until field screening indicated that contamination remained only in the west end of the excavation, where the fill port was located. Additional soil could not be excavated from this location due to proximity to the building; additional excavation may have compromised the building foundation. The excavation was 57 feet by 30 feet by 17 feet deep.

Nine confirmation samples were collected from the excavation and analyzed for GRO, DRO, RRO, BTEX compounds, and PAHs. Four samples from the west end of the excavation had DRO concentrations ranging from 1,730 mg/kg to 6,050 mg/kg, exceeding the cleanup level of 250 mg/kg. All other results were below cleanup levels (USAF, 2004z).

**Compliance Monitoring:** During 2005, downgradient groundwater monitoring well IS6-01 was sampled for DRO. DRO was not detected in the sample (USAF, 2006a).

### 29.2 BUILDING 16716 2006 FIELD ACTIVITIES AND RESULTS

The *Draft Conceptual Site Model Reviews* (USAF, 2006b) recommended installing and sampling a new in-source well and sampling downgradient well IS6-01 to monitor this site. Because this site originated from a diesel fuel UST, the contaminants of concern include DRO, BTEX compounds, and PAHs. BTEX compounds and PAHs were sampled for during the 2003 UST removal confirmation sampling and were not detected above cleanup levels. BTEX compounds and PAHs were therefore removed as contaminants of concern for annual sampling according to the Analytical Decision Tree (Figure 2-2).

A new in-source monitoring well, 16716MW-IN, was installed in the area where concentrations of DRO above cleanup levels remained in the soil following the UST and contaminated soil removal in 2003. The procedures for well installation are described in Section 3.1. A completion diagram of this well is provided in Appendix B.

Groundwater monitoring wells 16716MW-IN and IS6-01 were sampled using the approved procedures provided in the *2006 Final Work Plan* (USAF, 2006c). The samples were analyzed by an analytical laboratory for DRO. DRO was not detected in either sample. The result of the sample analysis is provided in Table 29-1.









Compound	Cleanup Level	2006 Result
DRO (µg/L)	1,500	U (417)

Compound	Cleanup Level	2005 Result	2006 Result
DRO (µg/L)	1,500	U (400)	U (385)

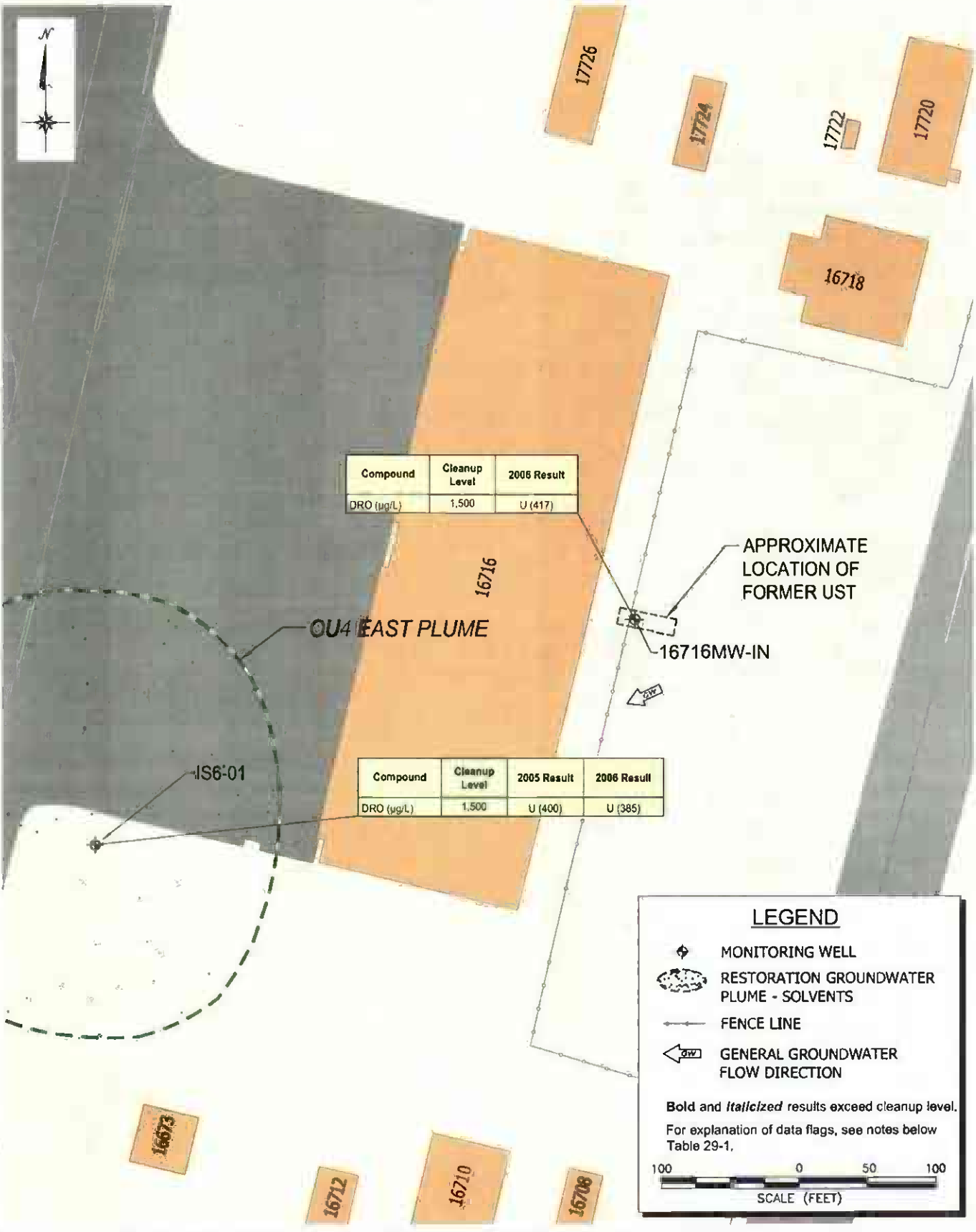
**LEGEND**

-  MONITORING WELL
-  RESTORATION GROUNDWATER PLUME - SOLVENTS
-  FENCE LINE
-  GENERAL GROUNDWATER FLOW DIRECTION

**Bold and italicized results exceed cleanup level.**  
 For explanation of data flags, see notes below Table 29-1.

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UNITED STATES AIR FORCE  
**BUILDING 16716 SITE MAP**  
 ELMENDORF AIR FORCE BASE  
 ALASKA



**FIGURE 29-1**

**Table 29-1 Building 16716 Groundwater Analytical Sample Results**

Compound	Cleanup Level <sup>1</sup>	Well	
		16716MW-IN	IS6-01
Diesel Range Organics by AK102 (µg/L)	1,500	U (417)	U (385)

**Notes:**

<sup>1</sup> Cleanup level from 18 AAC 75.345 Table C.

U = The analyte was not detected above the method detection limit (MDL). The value in parenthesis is the reporting limit (RL).

µg/L = micrograms per liter.

**29.3 BUILDING 16716 CONCLUSIONS AND RECOMMENDATIONS**

Following the removal of the UST in 2003, remaining DRO concentrations in soil were found to exceed the cleanup level. Groundwater samples collected from the in-source monitoring well 16716MW-IN and downgradient monitoring well IS6-01 did not have detectable concentrations of DRO in 2006.

Annual groundwater sampling for DRO in well 16716MW-IN should continue. Annual sampling of the downgradient well IS6-01 is not necessary because contamination is restricted to soil and is not present in the groundwater at this time. Soil samples should be collected from this site in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure



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**30.0 SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS**

Table 30-1 contains a summary of the conclusions and recommendations for each site discussed in this report.



**Table 30-1 Summary of Conclusions and Recommendations**

Site	Summary of Conclusions			Summary of Recommendations
	Remaining Groundwater Contamination above Cleanup Levels	Remaining Vadose Zone Soil Contamination Above Cleanup Levels	Comments	
ST401		X	Soil determination based on soil sampling from 1996 SERA IV Investigation.	Continue annual sampling of the in-source and downgradient wells. Collect soil samples in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.
ST402	X	X	Soil determination based on soil sampling from 1996 SERA IV Investigation.	Continue annual sampling of the in-source well. Once groundwater contaminant concentrations are below cleanup levels, soil samples should be collected to determine if all vadose zone soil has been remediated. Once all groundwater and vadose zone soil contaminant concentrations are below cleanup levels, this site should be considered for closure.
ST403	X	X	Soil determination based on soil sampling from 1996 SERA IV Investigation.	Continue annual sampling of the in-source and downgradient wells. Once groundwater contaminant concentrations are below cleanup levels, soil samples should be collected to determine if all vadose zone soil has been remediated. Once all groundwater and vadose zone soil contaminant concentrations are below cleanup levels, this site should be considered for closure.
ST407	Unknown	X	Construction activities in area did not allow installation of in-source well in 2006.	Vadose zone soil samples should be collected as soon as possible (pending construction activities) to determine if DRO concentrations in soil continue to exceed the cleanup level. In addition, an in-source monitoring well should be installed and sampled. If DRO concentrations are more than two times the cleanup level in the in-source well, a new downgradient well should also be installed. If both vadose zone soil and groundwater concentrations are below cleanup levels, this site should be considered for closure.
ST409			Soil determination based on soil sampling following the 2002 contaminated soil removal; remaining contaminated soil was limited to the smear zone.	Sample well 409WL-06 in 2007; if no contaminants are detected above cleanup levels, this site should be considered for closure.



**Table 30-1 Summary of Conclusions and Recommendations (Continued)**

Site	Summary of Conclusions			Summary of Recommendations
	Remaining Groundwater Contamination above Cleanup Levels	Remaining Vadose Zone Soil Contamination Above Cleanup Levels	Comments	
ST410		X	Soil determination based on soil sampling from 1996 & 1997 SERA IV Investigation.	Continue annual sampling of the in-source well. Soil samples should be collected from ST410 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.
ST422	X	X	Soil determination based on soil sampling from 1996 SERA IV Investigation.	Continue annual sampling of the in-source and downgradient wells. Once groundwater contaminant concentrations are below cleanup levels, soil samples should be collected to determine if all vadose zone soil has been remediated. Once all groundwater and vadose zone soil contaminant concentrations are below cleanup levels, this site should be considered for closure.
ST424			Soil determination based on soil sampling following the 2001 contaminated soil removal; contaminated soil found in smear zone only.	Sample the in-source well in 2007; if all contaminant concentrations are below cleanup levels again, this site should be considered for closure.
ST426			Soil determination based on soil sampling from SERA IV – SERA VII Investigations in 1997 and 1998.	In-source well 44-785WL-01 should be sampled again in 2007 for DRO. If concentrations of DRO are below cleanup levels again in 2007, this site should be considered for closure. DRO has not been detected in monitoring well 44-785WL-02 for two consecutive years and continued sampling is not necessary.
ST427			Soil determination based on soil sampling from 1996 SERA IV Investigation; contaminated soil limited to the smear zone.	Sample the in-source well in 2007; if concentrations of DRO are below cleanup levels again in 2007, this site should be considered for closure.
ST428		X	Soil determination based on soil samples collected in 2006.	Annual groundwater sampling at well 1836WL-01 for benzene should continue. In 2007, a soil sample should be collected at the only location where benzene was found to still exceed cleanup levels in 2006. If benzene concentrations are found below cleanup levels at this location and in the groundwater in 2007, this site should be considered for closure.



Table 30-1 Summary of Conclusions and Recommendations (Continued)

Site	Summary of Conclusions			Summary of Recommendations
	Remaining Groundwater Contamination above Cleanup Levels	Remaining Vadose Zone Soil Contamination Above Cleanup Levels	Comments	
ST507			Soil determination based on soil sampling from 1999 SERA VIII Investigation; contaminated soil limited to the smear zone.	Monitoring well 43WL-11 is known to contain free product on the water table. Free product should be measured at this well annually. As long as free product is present, this well should not be sampled for contaminants. Once free product is no longer present, Well 43WL-11 should again continue to be monitored annually. The downgradient well 43WL-02 should continue to be monitored annually until contaminant concentrations in the in-source well 43WL-11 are less than two times the cleanup level.
ST509		X	Soil determination based on soil sampling from 1996 SERA V Investigation.	Continue annual sampling of the in-source well. Soil samples should be collected from ST509 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.
ST510		X	Soil determination based on soil sampling from 1997 SERA V Investigation.	This site is located within the boundaries of the SS43 Plume, which is monitored by the Elmendorf Restoration Program. In order to avoid redundancies, management of this site needs to be resolved between the Elmendorf Compliance and Restoration programs. Until that occurs, monitoring well SP7/10-01 should continue to be sampled annually for DRO, GRO, and BTEX compounds.
ST516		X	Soil determination based on soil sampling from 1997 SERA V Investigation.	Continue annual sampling of the in-source well. Soil samples should be collected from ST516 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.
ST522		X	Soil determination based on soil samples collected following the 2001 contaminated soil removal.	Continue annual sampling of the in-source well. Soil samples should be collected from ST522 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



Table 30-1 Summary of Conclusions and Recommendations (Continued)

Site	Summary of Conclusions			Summary of Recommendations
	Remaining Groundwater Contamination above Cleanup Levels	Remaining Vadose Zone Soil Contamination Above Cleanup Levels	Comments	
ST523	Unknown	Unknown	DRO and benzene concentrations in vadose zone soil exceeded cleanup levels when last sampled in 1997. The contamination may have been removed during the SA-100 removal Actions, however.	Additional investigation should be done to confirm whether or not contaminated soil and/or groundwater is still present. Soil samples should be collected in 2008 as close to the location of the former UST depicted on Figure 20-1 (outside of the road and utility corridors) and a groundwater well placed close to the site or just downgradient of the site. If no contamination is found, ST523 should be considered for closure.
ST526	X		Remaining groundwater contamination likely related to the Slammer Avenue Plume and not the former USTs at ST526. Soil determination based on soil samples collected in 2006.	Collect groundwater samples from the in-source well again in 2007; if cleanup levels are not exceeded for any contaminant except TCE, remediation of ST526 should be considered complete.
ST529	X	X	Soil determination based on soil sampling from the 1997 SERA V Investigation.	Continue annual sampling of the in-source and downgradient wells. Once groundwater contaminant concentrations are below cleanup levels, soil samples should be collected to determine if all vadose zone soil has been remediated.
ST532		X	Soil determination based on soil sampling from the 2001 SERA IX Investigation.	Continue annual sampling of the in-source well. Soil samples should be collected from ST532 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.
ST538		X	Soil determination based on soil sampling from the 1999 SERA VIII Investigation.	Continue annual sampling of well 538WL-02. Soil samples should be collected from ST538 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



Table 30-1 Summary of Conclusions and Recommendations (Continued)

Site	Summary of Conclusions			Summary of Recommendations
	Remaining Groundwater Contamination above Cleanup Levels	Remaining Vadose Zone Soil Contamination Above Cleanup Levels	Comments	
ST703		X	Soil determination based on soil samples collected following the 2001 contaminated soil removal.	Continue annual sampling of the in-source well. Soil samples should be collected from ST703 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.
SS704	X	X	Soil determination based on soil sampling from the 1998 SERA VIII Investigation.	This site is located in the vicinity of the SS43 Plume, which is monitored by the Elmendorf Restoration Program. In order to avoid redundancies, management of this site needs to be resolved between the Elmendorf Compliance and Restoration programs. Until that occurs, annual sampling of wells SP7/10-01, SP7/10-04, and W-4 should continue.
ST805/806		X	Soil determination based on soil sampling from the 1999 SERA VIII Investigation.	Continue annual sampling of the in-source well. Soil samples should be collected from ST805/806 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.
ST904		X	Soil determination based on soil samples collected following the 1999 UST removal.	Continue annual sampling of wells 59WL-26 and 59WL-05. Soil samples should be collected from ST904 in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.
Building 16716		X	Soil determination based on soil samples collected following the 2003 UST removal.	Continue annual sampling of the in-source well. Soil samples should be collected from this site in 2008 to determine if contaminant concentrations have been remediated to below cleanup levels. If soil contaminant concentrations are below cleanup levels, and groundwater contaminant concentrations are below cleanup levels again in 2007, this site should be considered for closure.



### 31.0 REFERENCES

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# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 401WL-02  
 Site Name(s): ST401 Sample ID: 401WL-02-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Rich Vicente  
 Date/Time: 10/2/2006 12:05 Weather: Overcast, 45 F, no rain

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>9:40</u>	<u>34.17</u>	<u>31.63</u>	<u>2.54</u>	<u>0.41</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.500

Begin Purge: 11:50

Total Volume Purged (gallons): 6.5

End Purge: 12:03

Well Volumes Purged: 3

## Sample Screening

### Field Measurements

Time:	11:52	11:56	11:58	12:00	12:03	
Volume (gallons):	1.5	3.0	4.0	5.0	6.5	
Temperature (celsius):	9.03	8.95	8.98	8.97	8.94	
Conductivity (mS/cm):	0.464	0.463	0.463	0.464	0.463	
Dissolved Oxygen (mg/L):	5.28	5.29	5.26	5.25	5.29	
pH:	6.97	6.86	6.83	6.81	6.81	
ORP (mV):	62.50	66.40	67.50	68.7	69.7	
Turbidity (NTU):	653.00	261.00	180.00	121.0	94.2	

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Richard M. [Signature]



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST401  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/2/2006 9:45

Well ID: 401WL-03  
 Sample ID: 401WL-03-GW-2006-0  
 Sampler: Rich Vicente  
 Weather: Overcast, 45 F, no rain

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
9:40	43.93	33.76	10.17	1.66

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.545

Begin Purge: 10:20

End Purge: 10:31

Total Volume Purged (gallons): 6

Well Volumes Purged: 3

## Sample Screening

### Field Measurements

Time:	10:22	10:28	10:31			
Volume (gallons):	2.0	4.0	6.0			
Temperature (celsius):	8.88	8.62	8.71			
Conductivity (mS/cm):	0.614	0.616	0.616			
Dissolved Oxygen (mg/L):	0.24	0.22	0.24			
pH:	6.91	6.94	6.94			
ORP (mV):	-193.40	-212.60	-218.10			
Turbidity (NTU):	238.00	68.00	14.30			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Richard M. V. 1/3



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST 401  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/2/2006 10:16

Well ID: SP2/6-05  
 Sample ID: SP2/6-05-GW-2006-0  
 Sampler: Lance Larsen  
 Weather: Cloudy, cool

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>9:42</u>	<u>49.10</u>	<u>31.26</u>	<u>17.84</u>	<u>2.91</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.600

Begin Purge: 9:59

End Purge: 10:14

Total Volume Purged (gallons): 9

Well Volumes Purged: 3.1

## Sample Screening

### Field Measurements

Time:	10:04	10:09	10:14			
Volume (gallons):	3	6	9			
Temperature (celsius):	7.60	7.97	7.93			
Conductivity (mS/cm):	0.413	0.412	0.409			
Dissolved Oxygen (mg/L):	3.50	2.84	2.49			
pH:	7.01	7.00	6.98			
ORP (mV):	129.00	110.90	80.60			
Turbidity (NTU):	34.80	26.30	8.27			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 402WL-02  
 Site Name(s): ST402 Sample ID: 402WL-02-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Rich Vicente  
 Date/Time: 10/2/2006 13:33 Weather: Cloudy, 45 F, light rain

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>12:58</u>	<u>21.80</u>	<u>14.68</u>	<u>7.12</u>	<u>1.16</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.304

Begin Purge: 13:05

Total Volume Purged (gallons): 8.5

End Purge: 13:33

Well Volumes Purged: 5

## Sample Screening

### Field Measurements

Time:	13:08	13:14	13:20	13:29	13:33	
Volume (gallons):	1.3	3.0	5.5	7	8.5	
Temperature (celsius):	9.25	9.30	9.28	9.33	9.36	
Conductivity (mS/cm):	0.672	0.669	0.668	0.678	0.678	
Dissolved Oxygen (mg/L):	1.24	0.56	0.31	0.17	0.26	
pH:	6.37	6.36	6.33	6.33	6.36	
ORP (mV):	-182.90	-190.70	-191.60	-182.9	-190.8	
Turbidity (NTU):	>1000	>1000	245.00	38.70	18.4	

## Sample Collection Screening

QA/QC Type: **Field Sample - Collected MS/MSD**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Richard M. [Signature]



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 403MW-IN  
 Site Name(s): ST 403 Sample ID: 403MW-IN-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Laura Wilson/Eric Van Dongan  
 Date/Time: 10/20/2006 at 1:16:00 PM Weather: 45 F Calm, partly cloudy

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>11:26</u>	<u>43.61</u>	<u>34.30</u>	<u>9.31</u>	<u>0.21</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.013

Begin Purge: 11:26

Total Volume Purged (gallons): 1.3

End Purge: 13:02

Well Volumes Purged: 6

## Sample Screening

### Field Measurements

Time:	11:50	12:09	12:18	12:36	12:45	13:02
Volume (gallons):	0.2	0.4	0.6	0.8	1.1	1.3
Temperature (celsius):	8.22	8.17	8.15	8.19	8.48	8.23
Conductivity (mS/cm):	0.361	0.380	0.390	0.393	0.397	0.395
Dissolved Oxygen (mg/L):	1.47	0.88	2.03	1.57	1.99	2.21
pH:	6.76	6.81	6.83	6.88	6.86	6.88
ORP (mV):	-146.00	-181.10	-162.80	-178.7	-178.9	-163
Turbidity (NTU):	>1000	237.00	65.00	32.0	18	12

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: OU5KM-03  
 Site Name(s): ST403 Sample ID: OU5KM-03-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Lance Larsen  
 Date/Time: 10/2/2006 15:20 Weather: Rain 40 F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>14:55</u>	<u>54.75</u>	<u>34.40</u>	<u>20.35</u>	<u>3.32</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.588

Begin Purge: 15:00

Total Volume Purged (gallons): 10

End Purge: 15:17

Well Volumes Purged: 3.0

## Sample Screening

### Field Measurements

Time:	15:05	15:11	15:17			
Volume (gallons):	3.3	6	10			
Temperature (celsius):	7.51	7.75	7.75			
Conductivity (mS/cm):	0.485	0.459	0.458			
Dissolved Oxygen (mg/L):	0.96	0.48	0.34			
pH:	6.88	6.87	6.87			
ORP (mV):	49.30	38.40	33.90			
Turbidity (NTU):	9.55	12.40	10.20			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 409WL-06  
 Site Name(s): ST 409 Sample ID: 409WL-06-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Laura Wilson/Henry Hill  
 Date/Time: 10/16/2006 at 10:59:00 AM Weather: 35 F cloudy, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:39</u>	<u>31.30</u>	<u>25.82</u>	<u>5.48</u>	<u>0.89</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.074

Begin Purge: 16:26

End Purge: 17:20

Total Volume Purged (gallons): 4

Well Volumes Purged: 4.5

## Sample Screening

### Field Measurements

Time:	10:40	10:45	10:55	10:59		
Volume (gallons):	1	2	3	4		
Temperature (celsius):	5.61	5.98	6.02	6.05		
Conductivity (mS/cm):	0.290	0.299	0.301	0.303		
Dissolved Oxygen (mg/L):	8.20	7.38	7.06	6.79		
pH:	6.21	6.21	6.21	6.21		
ORP (mV):	107.2	110.2	111.8	115.3		
Turbidity (NTU):	536	95	31	9		

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST 410  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/19/2006 at 11:27 am

Well ID: 410MW-IN  
 Sample ID: 410W-IN-GW-2006-0  
 Sampler: Laura Wilson/Nathan Visser  
 Weather: 37 F Damp, cloudy, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:15</u>	<u>31.33</u>	<u>24.14</u>	<u>7.19</u>	<u>0.17</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.012

Begin Purge: 10:15

End Purge: 11:25

Total Volume Purged (gallons): 0.9

Well Volumes Purged: 5.1

## Sample Screening

### Field Measurements

Time:	10:10	10:25	10:46	11:01	11:25	
Volume (gallons):	0.17	0.34	0.51	0.68	0.85	
Temperature (celsius):	7.31	7.22	7.03	7.19	7.19	
Conductivity (mS/cm):	0.351	0.348	0.341	0.342	0.342	
Dissolved Oxygen (mg/L):	3.15	2.76	2.03	6.67	2.50	
pH:	6.55	6.42	6.47	6.46	6.49	
ORP (mV):	25.4	28.20	44.40	50.50	57.5	
Turbidity (NTU):	10	14	4	5	3	

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 422MW-IN  
 Site Name(s): ST 422 Sample ID: 422W-IN-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Laura Wilson/Nathan Visser  
 Date/Time: 10/24/2006 at 13:10 pm Weather: 33 F overcast 10mph wind

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:20</u>	<u>22.99</u>	<u>14.64</u>	<u>8.35</u>	<u>0.19</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.013

Begin Purge: 10:20

End Purge: 11:51

Total Volume Purged (gallons): 1.2

Well Volumes Purged: 6.2

## Sample Screening

### Field Measurements

Time:	10:44	10:57	11:10	11:24	11:38	11:51
Volume (gallons):	0.2	0.4	0.6	0.8	1.0	1.2
Temperature (celsius):	3.50	3.43	3.68	3.44	3.65	3.35
Conductivity (mS/cm):	1.024	0.784	0.696	0.639	0.606	0.577
Dissolved Oxygen (mg/L):	2.01	3.33	4.98	6.86	6.87	8.10
pH:	6.94	6.94	6.93	6.94	6.95	6.99
ORP (mV):	-157.40	-130.90	-118.10	-108.7	-110.6	-108.3
Turbidity (NTU):	>1000	424.00	179.00	77.0	47.6	32.5

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST422  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/3/2006 13:00

Well ID: 59WL-35  
 Sample ID: 59WL-35-GW-2006-0  
 Sampler: Jamie Grund/Steve Johnson  
 Weather: Overcast 45 F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>12:40</u>	<u>39.00</u>	<u>30.70</u>	<u>8.30</u>	<u>1.35</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.286

Begin Purge: 12:45

End Purge: 12:59

Total Volume Purged (gallons): 4

Well Volumes Purged: 3.0

## Sample Screening

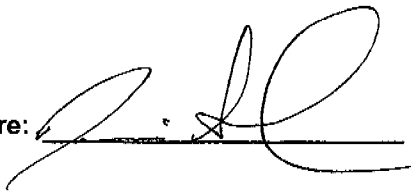
### Field Measurements

Time:	12:51	12:55	12:57	12:59		
Volume (gallons):	<1	2.0	3.0	4.0		
Temperature (celsius):	5.73	5.62	5.98	6.10		
Conductivity (mS/cm):	0.448	0.444	0.444	0.446		
Dissolved Oxygen (mg/L):	7.670	6.950	6.920	6.85		
pH:	7.31	7.29	7.29	7.29		
ORP (mV):	8.60	15.30	17.10	18.3		
Turbidity (NTU):	135.00	14.40		12.3		

Sample Collection Screening 13:00

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: 



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST 424  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/23/2006 at 15:30

Well ID: 424MW-IN  
 Sample ID: 424W-IN-GW-2006-0  
 Sampler: Laura Wilson/Henry Hill  
 Weather: 40 F clear, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>14:12</u>	<u>23.79</u>	<u>15.81</u>	<u>7.98</u>	<u>0.18</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.014

Begin Purge: 14:12

End Purge: 15:15

Total Volume Purged (gallons): 0.9

Well Volumes Purged: 4.9

## Sample Screening

### Field Measurements

Time:	14:36	14:43	14:56	15:05	15:15	
Volume (gallons):	0.2	0.4	0.5	0.7	0.9	
Temperature (celsius):	6.49	6.28	6.23	6.62	6.65	
Conductivity (mS/cm):	0.416	0.419	0.420	0.423	0.424	
Dissolved Oxygen (mg/L):	1.96	4.71	6.31	6.16	5.52	
pH:	6.74	6.76	6.76	6.73	6.62	
ORP (mV):	-119.70	-120.10	-118.10	-118.6	-113.4	
Turbidity (NTU):	>1000	137.00	45.10	23.4	9.72	

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 44785WL-01  
 Site Name(s): ST 426 Sample ID: 44785WL-01-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Lance Larsen  
 Date/Time: 10/3/2006 10:48 Weather: Overcast 45 F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:30</u>	<u>14.88</u>	<u>6.18</u>	<u>8.70</u>	<u>1.42</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.188

Begin Purge: 10:32

End Purge: 10:40

Total Volume Purged (gallons): 1.5

Well Volumes Purged: 1.06

## Sample Screening

### Field Measurements

Time:	10:32	10:40				
Volume (gallons):	0.0	1.5	No more purging possible			
Temperature (celsius):	10.07	9.82	not recharging			
Conductivity (mS/cm):	0.263	0.294				
Dissolved Oxygen (mg/L):	2.400	9.210				
pH:	6.71	6.71				
ORP (mV):	-97.60	-131.40				
Turbidity (NTU):	12.60	5.91				

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 44785WL-02  
 Site Name(s): ST426 Sample ID: 44785WL-02-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Lance Larsen  
 Date/Time: 10/3/2006 11:24 Weather: Light rain 45 F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:55</u>	<u>19.76</u>	<u>6.50</u>	<u>13.26</u>	<u>2.16</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.125

Begin Purge: 10:57

End Purge: 11:21

Total Volume Purged (gallons): 3

Well Volumes Purged: 1.4

## Sample Screening

### Field Measurements

Time:	11:00	11:03	11:13	11:21		
Volume (gallons):	0.0	1.0	2.0	3.0		
Temperature (celsius):	8.32	8.44	8.86	9.08		
Conductivity (mS/cm):	0.096	0.096	0.092	0.097		
Dissolved Oxygen (mg/L):	7.780	7.140	7.210	6.7		
pH:	5.74	5.69	5.54	5.63		
ORP (mV):	82.70	105.70	133.20	138.2		
Turbidity (NTU):	329.00	116.00	143.00	460.0		

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: Well very slow to recharge,  
shut down for 5 minutes each between the 2nd and 4th purge cycles.

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 427MW-IN  
 Site Name(s): ST 427 Sample ID: 427MW-IN-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Laura Wilson/Nathan Visser  
 Date/Time: 10/19/2006 at 16:47 Weather: 37 F damp, cloudy, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>13:25</u>	<u>31.74</u>	<u>25.66</u>	<u>6.08</u>	<u>0.14</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.004

Begin Purge: 13:25

Total Volume Purged (gallons): 0.7

End Purge: 16:34

Well Volumes Purged: 5

## Sample Screening

### Field Measurements

Time:	14:40	15:31	15:50	16:11	16:34	
Volume (gallons):	0.1	0.3	0.4	0.6	0.7	
Temperature (celsius):	9.17	8.60	7.79	7.68	7.63	
Conductivity (mS/cm):	0.314	0.305	0.298	0.296	0.296	
Dissolved Oxygen (mg/L):	4.35	4.47	5.73	5.34	5.02	
pH:	6.35	6.71	6.69	6.69	6.67	
ORP (mV):	-13.0	-6.1	-6.6	10.0	11.4	
Turbidity (NTU):	>999	55	7	5	2	

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: *Laura Wilson*



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST428  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/2/2006 14:30

Well ID: 1836WL-01  
 Sample ID: 1836WL-01-GW-2006-0  
 Sampler: Lance Larsen  
 Weather: Rain 40 F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>14:15</u>	<u>39.36</u>	<u>33.34</u>	<u>6.02</u>	<u>0.98</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.429

Begin Purge: 14:20

End Purge: 14:27

Total Volume Purged (gallons): 3

Well Volumes Purged: 3

## Sample Screening

### Field Measurements

Time:	14:22	14:24	14:27			
Volume (gallons):	1.0	2.0	3.0			
Temperature (celsius):	5.99	6.18	6.35			
Conductivity (mS/cm):	0.251	0.254	0.255			
Dissolved Oxygen (mg/L):	3.99	3.19	2.90			
pH:	6.62	6.58	6.56			
ORP (mV):	31.20	39.20	43.70			
Turbidity (NTU):	233.00	135.00	69.10			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring

Well ID: 43WL-11

Site Name(s): ST 507

Sample ID: 43WL-11-GW-2006-0

Project Number: 12832.001.196.0003.04

Sampler: Jamie Grund/Steve Johnson

Date/Time: 10/3/2006 15:30

Weather: Overcast 40+ F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>15:14</u>	<u>21.00</u>	<u>15.50</u>	<u>5.50</u>	<u>0.90</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.273

Begin Purge: 15:15

Total Volume Purged (gallons): 3

End Purge: 15:26

Well Volumes Purged: 3.3

## Sample Screening

### Field Measurements

Time:	15:20	15:23	15:26			
Volume (gallons):	1.0	2.0	3.0			
Temperature (celsius):	8.50	8.17	8.20			
Conductivity (mS/cm):	0.644	0.772	0.763			
Dissolved Oxygen (mg/L):	2.29	0.35	0.27			
pH:	6.47	6.29	6.28			
ORP (mV):	-48.60	-76.10	-82.70			
Turbidity (NTU):	22.70	8.81	5.97			

## Sample Collection Screening

QA/QC Type: **Field Sample & Duplicate Sample Collected**

Comments: \_\_\_\_\_

Sampler Signature: 



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST507  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/16/2006 at 14:15

Well ID: 43WL-02  
 Sample ID: 43WL-02-GW-2006-0  
 Sampler: Laura Wilson/Henry Hill  
 Weather: 35 F cloudy, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>12:40</u>	<u>25.14</u>	<u>18.96</u>	<u>6.18</u>	<u>1.01</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.238

Begin Purge: 13:48

End Purge: 14:09

Total Volume Purged (gallons): 5

Well Volumes Purged: 5

## Sample Screening

### Field Measurements

Time:	13:56	14:01	14:03	14:06	14:09	
Volume (gallons):	<1	2.0	3.0	4.0	5.0	
Temperature (celsius):	6.70	7.17	7.25	7.32	7.36	
Conductivity (mS/cm):	0.080	0.080	0.080	0.080	0.082	
Dissolved Oxygen (mg/L):	11.0	7.040	5.590	6.35	6.40	
pH:	6.32	6.07	6.05	6.03	6.02	
ORP (mV):	55.80	102.0	112.9	119.9	122	
Turbidity (NTU):	242	47	32	17	12	

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST 509  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/23/2006 at 14:45

Well ID: 509MW-IN  
 Sample ID: 509MW-IN-GW-2006-0  
 Sampler: Jamie Grund/Randy Mileur  
 Weather: \_\_\_\_\_

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>13:14</u>	<u>43.50</u>	<u>34.30</u>	<u>9.20</u>	<u>0.21</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.036

Begin Purge: 14:17

End Purge: 14:45

Total Volume Purged (gallons): 1.0

Well Volumes Purged: 4.7

## Sample Screening

### Field Measurements

Time:	14:22	14:27	14:34	14:40	14:45	
Volume (gallons):	0.2	0.4	0.6	0.8	1.0	
Temperature (celsius):	5.74	5.73	5.70	5.71	5.75	
Conductivity (mS/cm):	0.469	0.469	0.469	0.469	0.469	
Dissolved Oxygen (mg/L):	4.02	3.83	3.59	3.59	3.72	
pH:	7.24	7.24	7.25	7.23	7.23	
ORP (mV):	2.70	8.10	4.30	6.60	11.70	
Turbidity (NTU):	19	16.1	14.2	12.4	12.4	

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: 



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: SP7/10-01  
 Site Name(s): ST510 & SS704 Sample ID: SP7/10-01-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Jamie Grund/Steve Johnson  
 Date/Time: 10/3/2006 14:49 Weather: Overcast 45 F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>14:17</u>	<u>34.80</u>	<u>11.70</u>	<u>23.10</u>	<u>3.77</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.429

Begin Purge: 14:20

Total Volume Purged (gallons): 12

End Purge: 14:48

Well Volumes Purged: 3.2

## Sample Screening

### Field Measurements

Time:	14:24	14:29	14:35	14:44	14:48	
Volume (gallons):	<1	3.0	6.0	9.0	12.0	
Temperature (celsius):	7.23	7.42	7.50	7.50	7.49	
Conductivity (mS/cm):	0.646	0.653	0.651	0.648	0.647	
Dissolved Oxygen (mg/L):	1.050	0.180	0.120	0.09	0.10	
pH:	6.82	6.71	6.73	6.75	6.75	
ORP (mV):	-77.90	-102.90	-114.40	-120.4	-122	
Turbidity (NTU):	11.70	3.70	1.37	0.8	0.72	

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: \_\_\_\_\_



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST 516  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/23/2006 at 12:30

Well ID: 516MW-IN  
 Sample ID: 516MW-IN-GW-2006-0  
 Sampler: Laura Wilson/Henry Hill  
 Weather: 40 F clear, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>11:56</u>	<u>41.74</u>	<u>34.40</u>	<u>7.34</u>	<u>0.17</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.017

Begin Purge: 11:56

End Purge: 12:26

Total Volume Purged (gallons): 0.51

Well Volumes Purged: 3.0

## Sample Screening

### Field Measurements

Time:	11:56	12:13	12:26			
Volume (gallons):	0.17	0.34	0.51			
Temperature (celsius):	6.28	6.81	6.60			
Conductivity (mS/cm):	0.351	0.357	0.358			
Dissolved Oxygen (mg/L):	6.98	3.43	4.30			
pH:	6.88	6.71	6.69			
ORP (mV):	-4.1	-4.6	-4.3			
Turbidity (NTU):	1.54	0.96	0.83			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 522MW-IN  
 Site Name(s): ST 522 Sample ID: 522MW-IN-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Jamie Grund/Randy Mileur  
 Date/Time: 10/23/2006 12:30 Weather: 36 F clear skies

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:15</u>	<u>33.40</u>	<u>25.30</u>	<u>8.10</u>	<u>0.19</u>

Water Level Measurement Method: **Electronic Probe** (23.85 oz)

Well Evacuation Method: **Air Bladder pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.050

Begin Purge: 12:01

Total Volume Purged (gallons): 1.2

End Purge: 12:25

Well Volumes Purged: 6

## Sample Screening

### Field Measurements

Time:	12:06	12:11	12:16	12:20	12:25	
Volume (gallons):	0.2	0.4	0.7	0.9	1.2	
Temperature (celsius):	6.18	6.22	6.20	6.16	6.18	
Conductivity (mS/cm):	0.703	0.703	0.700	0.703	0.701	
Dissolved Oxygen (mg/L):	1.42	1.48	1.70	1.90	1.70	
pH:	6.80	6.85	6.88	6.84	6.87	
ORP (mV):	-60.00	-58.40	-54.20	-56.8	-45.1	
Turbidity (NTU):	29.30	25.60	24.00	19.6	21.5	

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature:



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST 526  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/24/2006 at 15:39

Well ID: 526MW-IN  
 Sample ID: 526W-IN-GW-2006-0  
 Sampler: Laura Wilson/Nathan Visser  
 Weather: 35 F overcast, 5mph wind

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>14:43</u>	<u>43.04</u>	<u>35.82</u>	<u>7.22</u>	<u>0.17</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.011

Begin Purge: 14:43

End Purge: 15:30

Total Volume Purged (gallons): 0.5

Well Volumes Purged: 3.0

## Sample Screening

### Field Measurements

Time:	14:58	15:15	15:30			
Volume (gallons):	0.2	0.3	0.5			
Temperature (celsius):	4.60	5.22	5.01			
Conductivity (mS/cm):	0.258	0.257	0.253			
Dissolved Oxygen (mg/L):	3.44	2.94	6.01			
pH:	6.80	6.79	6.84			
ORP (mV):	-5.0	-4.3	-3.4			
Turbidity (NTU):	214.00	24.60	4.24			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST 526  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/2/2006 15:40

Well ID: SP4/11-03  
 Sample ID: SP4/11-03-GW-2006-0  
 Sampler: Rich Vicente  
 Weather: Cloudy/Rainy 45 F, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>15:10</u>	<u>54.25</u>	<u>36.42</u>	<u>17.83</u>	<u>2.91</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.588

Begin Purge: 15:21

End Purge: 15:38

Total Volume Purged (gallons): 10

Well Volumes Purged: 3.4

## Sample Screening

### Field Measurements

Time:	15:23	15:30	15:38			
Volume (gallons):	3	6.5	10			
Temperature (celsius):	7.80	7.86	7.87			
Conductivity (mS/cm):	0.467	0.468	0.469			
Dissolved Oxygen (mg/L):	0.24	0.20	0.24			
pH:	7.00	6.97	6.97			
ORP (mV):	33.00	37.00	40.50			
Turbidity (NTU):	23.90	5.72	3.29			

## Sample Collection Screening:

QA/QC Type: **Field Sample & Field Duplicate**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Richard M. Vicente



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 529MW-IN  
 Site Name(s): ST 529 Sample ID: 529MW-IN-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Laura Wilson/Nathan Visser  
 Date/Time: 10/25/2006 at 11:56 Weather: 31 F partly cloudy, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>9:56</u>	<u>37.12</u>	<u>27.16</u>	<u>9.96</u>	<u>0.23</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.016

Begin Purge: 9:56

Total Volume Purged (gallons): 1.4

End Purge: 11:21

Well Volumes Purged: 6.1

## Sample Screening

### Field Measurements

Time:	10:10	10:28	10:48	10:59	11:11	11:21
Volume (gallons):	0.2	0.5	0.7	0.9	1.1	1.4
Temperature (celsius):	4.11	5.08	5.53	6.16	6.25	6.57
Conductivity (mS/cm):	0.363	0.378	0.384	0.397	0.295	0.399
Dissolved Oxygen (mg/L):	4.17	1.89	1.27	1.94	1.99	2.19
pH:	6.19	6.26	6.28	6.38	6.45	6.39
ORP (mV):	-4.0	-9.6	-13.4	-23.5	-24.9	-20.2
Turbidity (NTU):	>1000	371	106	55.8	27.2	22.6

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST529  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/4/2006 10:45

Well ID: OU5MW-34  
 Sample ID: OU5MW-34-GW-2006-0  
 Sampler: Lance Larsen  
 Weather: Cloudy, cool

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:20</u>	<u>57.95</u>	<u>29.45</u>	<u>28.50</u>	<u>4.65</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.690

Begin Purge: 10:23

End Purge: 10:43

Total Volume Purged (gallons): 13.8

Well Volumes Purged: 3.0

## Sample Screening

### Field Measurements

Time:	10:29	10:36	10:43			
Volume (gallons):	4.6	9.2	13.8			
Temperature (celsius):	7.59	7.63	7.60			
Conductivity (mS/cm):	0.449	0.450	0.449			
Dissolved Oxygen (mg/L):	1.57	1.44	1.54			
pH:	6.49	6.53	6.56			
ORP (mV):	176.30	138.00	119.80			
Turbidity (NTU):	535.00	205.00	71.30			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST 532  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/23/2006 at 17:22

Well ID: 532MW-IN  
 Sample ID: 532MW-IN-GW-2006-0  
 Sampler: Laura Wilson/Henry Hill  
 Weather: 40 F clear, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
16:26	56.25	47.20	9.05	0.21

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.011

Begin Purge: 16:26

End Purge: 17:20

Total Volume Purged (gallons): 0.6

Well Volumes Purged: 3

## Sample Screening

### Field Measurements

Time:	16:54	17:03	17:20			
Volume (gallons):	0.2	0.4	0.6			
Temperature (celsius):	7.43	7.12	6.81			
Conductivity (mS/cm):	0.394	0.387	0.379			
Dissolved Oxygen (mg/L):	8.77	7.97	8.20			
pH:	6.85	6.81	6.77			
ORP (mV):	38.5	45.2	55.3			
Turbidity (NTU):	4.94	1.62	0.91			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 538BV-03  
 Site Name(s): ST538 Sample ID: 538BV-03-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Lance Larsen  
 Date/Time: 10/2/2006 12:05 Weather: Cloudy, cool

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>11:40</u>	<u>36.65</u>	<u>30.69</u>	<u>5.96</u>	<u>0.97</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.250

Begin Purge: 11:46

Total Volume Purged (gallons): 4.5

End Purge: 12:04

Well Volumes Purged: 4.6

## Sample Screening

### Field Measurements

Time:	11:53	11:59	12:04			
Volume (gallons):	1.5	3.0	4.5			
Temperature (celsius):	7.68	8.00	7.39			
Conductivity (mS/cm):	0.281	0.283	0.280			
Dissolved Oxygen (mg/L):	1.24	1.19	1.30			
pH:	6.79	6.76	6.75			
ORP (mV):	13.70	13.30	21.80			
Turbidity (NTU):	>1000	>1000	>1000			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST538  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/2/2006 12:55

Well ID: 538WL-02  
 Sample ID: 538WL-02-GW-2006-0  
 Sampler: Lance Larsen  
 Weather: Rain 40 F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>12:40</u>	<u>37.24</u>	<u>32.53</u>	<u>4.71</u>	<u>0.77</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.643

Begin Purge: 12:46

End Purge: 12:53

Total Volume Purged (gallons): 4.5

Well Volumes Purged: 5.9

## Sample Screening

### Field Measurements

Time:	12:49	12:51	12:53			
Volume (gallons):	1.5	3.0	4.5			
Temperature (celsius):	6.29	6.44	6.53			
Conductivity (mS/cm):	0.301	0.301	0.302			
Dissolved Oxygen (mg/L):	10.00	3.25	1.95			
pH:	6.65	6.67	6.67			
ORP (mV):	-186.90	-198.10	-202.60			
Turbidity (NTU):	9.59	4.12	1.45			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 703MW-IN  
 Site Name(s): ST703 Sample ID: 703MW-IN-GW-2006-0  
 Project Number: 12832.001.196 Sampler: Lance Larsen  
 Date/Time: 10/24/2005 15:10 Weather: Cloudy & Cold, 20° F Lt. snow

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:15</u>	<u>14.30</u>	<u>3.65</u>	<u>10.65</u>	<u>0.24</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Bladder Vacuum pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.007

Begin Purge: 1250

End Purge: 1500

Total Volume Purged (gallons): 0.9

Well Volumes Purged: 3.67

## Sample Screening

### Field Measurements

Time:	1320	1400	1500		
Volume (gallons):	0.4	0.65	0.9		
Temperature (celsius):	4.54	4.53	4.54		
Conductivity (mS/cm):	0.286	0.285	0.286		
Dissolved Oxygen (mg/L):	6.14	6.10	6.04		
pH:	8.52	8.52	8.52		
ORP (mV):					
Turbidity (NTU):	40.4	37.0	13.7		

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: Very little re-charge at this well

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 703WL-02  
 Site Name(s): ST703 Sample ID: 703WL-02-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Jamie Grund/Steve Johnson  
 Date/Time: 10/4/2006 10:43 Weather: Cloudy, cool

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:08</u>	<u>16.15</u>	<u>5.80</u>	<u>10.35</u>	<u>1.69</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.240

Begin Purge: 10:15

Total Volume Purged (gallons): 6

End Purge: 10:40

Well Volumes Purged: 3.6

## Sample Screening

### Field Measurements

Time:	10:15	10:22	10:28	10:40		
Volume (gallons):	<1	2.0	4.0	6.0		
Temperature (celsius):	8.93	10.08	10.38	10.03		
Conductivity (mS/cm):	0.385	0.348	0.365	0.329		
Dissolved Oxygen (mg/L):	1.00	0.13	0.13	0.18		
pH:	6.89	6.62	6.57	6.79		
ORP (mV):	206.90	194.50	32.60	31.4		
Turbidity (NTU):	112.00	16.10	12.30	10.9		

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: Seemed clogged on third  
purge cycle

Sampler Signature: 



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: SP7/10-04  
 Site Name(s): SS704 Sample ID: SP7/10-04-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Jamie Grund/Steve Johnson  
 Date/Time: 10/3/2006 11:58 Weather: Overcast 45 F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>11:35</u>	<u>28.50</u>	<u>16.40</u>	<u>12.10</u>	<u>1.97</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.437

Begin Purge: 11:40

Total Volume Purged (gallons): 7

End Purge: 11:56

Well Volumes Purged: 3.5

## Sample Screening

### Field Measurements

Time:	11:44	11:47	11:51	11:56		
Volume (gallons):	<1	2.0	4.0	7.0		
Temperature (celsius):	7.77	8.28	8.54	8.62		
Conductivity (mS/cm):	0.544	0.532	0.524	0.514		
Dissolved Oxygen (mg/L):	1.130	0.400	0.210	0.16		
pH:	6.68	6.65	6.61	6.60		
ORP (mV):	-80.10	-86.80	-88.20	-86.6		
Turbidity (NTU):	14.80	4.53	4.40	2.5		

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: \_\_\_\_\_



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): SS704  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/3/2006 11:16

Well ID: W-4  
 Sample ID: W-4-GW-2006-0  
 Sampler: Jamie Grund/Steve Johnson  
 Weather: Overcast 45 F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>10:41</u>	<u>29.20</u>	<u>10.30</u>	<u>18.90</u>	<u>3.08</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.429

Begin Purge: 10:54

Total Volume Purged (gallons): 9

End Purge: 11:15

Well Volumes Purged: 3

## Sample Screening

### Field Measurements

Time:	10:54	11:00	11:08	11:15		
Volume (gallons):	<1	3.0	6.0	9.0		
Temperature (celsius):	6.42	6.82	6.86	6.88		
Conductivity (mS/cm):	0.659	0.658	0.657	0.656		
Dissolved Oxygen (mg/L):	0.500	0.150	0.120	0.1		
pH:	6.27	6.39	6.42	6.43		
ORP (mV):	-67.50	-84.00	-95.10	-98.6		
Turbidity (NTU):	>1000	>1000	83.00	16.7		

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: Slight odor

Sampler Signature:



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 59WL-26  
 Site Name(s): ST904 Sample ID: 59WL-26-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Lance Larsen  
 Date/Time: 10/3/2006 12:23 Weather: Overcast 40+ F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>11:50</u>	<u>31.91</u>	<u>9.59</u>	<u>22.32</u>	<u>3.64</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.652

Begin Purge: 11:58

Total Volume Purged (gallons): 15

End Purge: 12:21

Well Volumes Purged: 4.1

## Sample Screening

### Field Measurements

Time:	12:05	12:12	12:21			
Volume (gallons):	5.0	10.0	15.0			
Temperature (celsius):	6.56	6.69	6.76			
Conductivity (mS/cm):	0.139	0.132	0.136			
Dissolved Oxygen (mg/L):	1.11	0.57	0.65			
pH:	5.61	5.62	5.66			
ORP (mV):	130.10	136.80	138.2			
Turbidity (NTU):	19.70	15.10	10.2			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 59WL-05  
 Site Name(s): ST904 Sample ID: 59WL-05-GW-2006-0  
 Project Number: 12832.001.196.0003.04 Sampler: Jamie Grund/Steve Johnson  
 Date/Time: 10/4/2006 12:00 Weather: Cloudy, cool

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>11:22</u>	<u>78.50</u>	<u>70.50</u>	<u>8.00</u>	<u>1.30</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.550

Begin Purge: 11:35

Total Volume Purged (gallons): 11.0

End Purge: 11:55

Well Volumes Purged: 8.4

## Sample Screening

### Field Measurements

Time:	11:36	11:40	11:43	11:46	11:51	11:55
Volume (gallons):	1.0	2.0	3.0	5.0	8.0	11.0
Temperature (celsius):	5.98	6.00	6.54	6.64	6.64	6.67
Conductivity (mS/cm):	0.630	0.634	0.636	0.639	0.64	0.639
Dissolved Oxygen (mg/L):	6.20	4.52	4.23	4.10	3.98	3.86
pH:	7.13	7.10	7.11	7.11	7.14	7.11
ORP (mV):	-38.00	-12.00	-3.90	18.2	26.6	29
Turbidity (NTU):	>1000	>1000	>1000	982.0	278	88.5

Sample Collection Screening 12:00

QA/QC Type: **Field Sample**

Comments: May be lower water table

Sampler Signature: 



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): ST805/806  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/2/2006 17:05

Well ID: 805WL-01  
 Sample ID: 805WL-01-GW-2006-0  
 Sampler: Rich Vicente  
 Weather: Cloudy, 45 F, intermittent light rain

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>16:50</u>	<u>17.90</u>	<u>11.20</u>	<u>6.70</u>	<u>1.09</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Grundfos**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.375

Begin Purge: 16:56

End Purge: 17:04

Total Volume Purged (gallons): 3

Well Volumes Purged: 3

## Sample Screening

### Field Measurements

Time:	15:58	17:00	17:04			
Volume (gallons):	1.0	2.0	3.0			
Temperature (celsius):	9.98	10.11	10.16			
Conductivity (mS/cm):	0.555	0.585	0.601			
Dissolved Oxygen (mg/L):	1.80	1.90	1.45			
pH:	6.80	6.72	6.70			
ORP (mV):	-138.50	-156.90	-165.30			
Turbidity (NTU):	36.80	13.10	3.07			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Richard M. [Signature]



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring Well ID: 16716MW-IN  
 Site Name(s): Building 16716 Sample ID: 16716MW-IN-GW-2006-0  
 Project Number: 12832.001.196 Sampler: Lance Larsen  
 Date/Time: 10/24/2005 17:28 Weather: Cloudy & Cold, 20° F

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
<u>15:30</u>	<u>57.90</u>	<u>48.85</u>	<u>9.05</u>	<u>0.21</u>

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Bladder Vacuum pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.023

Begin Purge: 1652

End Purge: 1720

Total Volume Purged (gallons): 0.63

Well Volumes Purged: 3.03

## Sample Screening

### Field Measurements

Time:	17:01	17:07	17:20		
Volume (gallons):	0.21	0.42	0.63		
Temperature (celsius):	5.73	5.83	5.72		
Conductivity (mS/cm):	0.485	0.482	0.481		
Dissolved Oxygen (mg/L):	2.46	2.82	2.72		
pH:	7.02	7.03	7.03		
ORP (mV):					
Turbidity (NTU):	37.9	Turbidity meter not working			

## Sample Collection Screening

QA/QC Type: **Field Sample**

Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Lance Larsen



# Groundwater Sampling Record

## Sample Details

Project Name: Compliance Monitoring  
 Site Name(s): Building 16716  
 Project Number: 12832.001.196.0003.04  
 Date/Time: 10/16/2006 at 12:42

Well ID: IS6-01  
 Sample ID: IS6-01-GW-2006-0  
 Sampler: Laura Wilson/Henry Hill  
 Weather: 35 F cloudy, calm

## Water Level Measurements and Purge Data

Time	Depth of Well (ft below TOC)	Depth to Water (ft below TOC)	Water in Well (ft)	Gallons per Well Volume (0.75" dia. = 0.023, 2" dia. = 0.163 gal/ft)
12:05	68.10	48.00	20.10	3.28

Water Level Measurement Method: **Electronic Probe**

Well Evacuation Method: **Air Bladder Pump**

Purge Water Disposal: **Emerald Alaska**

Decon Procedure: **Alconox wash and double rinse**

Sample Type: **Groundwater**

Purge Rate (gpm): 0.371

Begin Purge: 12:05

End Purge: 12:40

Total Volume Purged (gallons): 13

Well Volumes Purged: 4.0

## Sample Screening

### Field Measurements

Time:	12:16	12:24	12:32	12:40		
Volume (gallons):	3	7	10	13		
Temperature (celsius):	7.11	7.48	7.26	7.39		
Conductivity (mS/cm):	0.367	0.354	0.340	0.335		
Dissolved Oxygen (mg/L):	3.23	3.39	3.79	3.93		
pH:	6.83	6.86	6.89	6.90		
ORP (mV):	-21.3	2.7	3.8	31.8		
Turbidity (NTU):	190	58	21	5		

## Sample Collection Screening

QA/QC Type: **Field Sample**

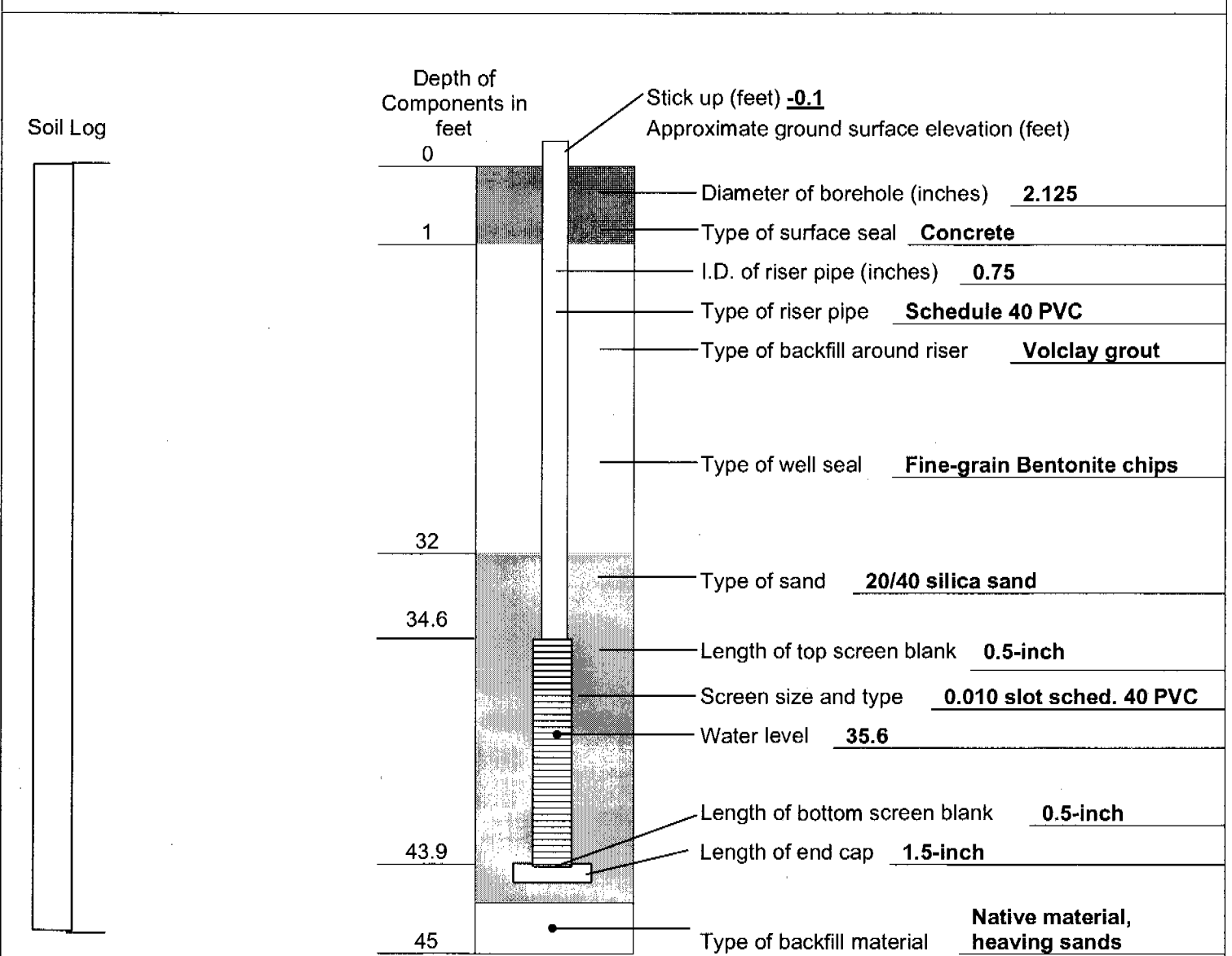
Comments: \_\_\_\_\_  
\_\_\_\_\_

Sampler Signature: Laura Wilson



# MONITORING WELL INSTALLATION REPORT

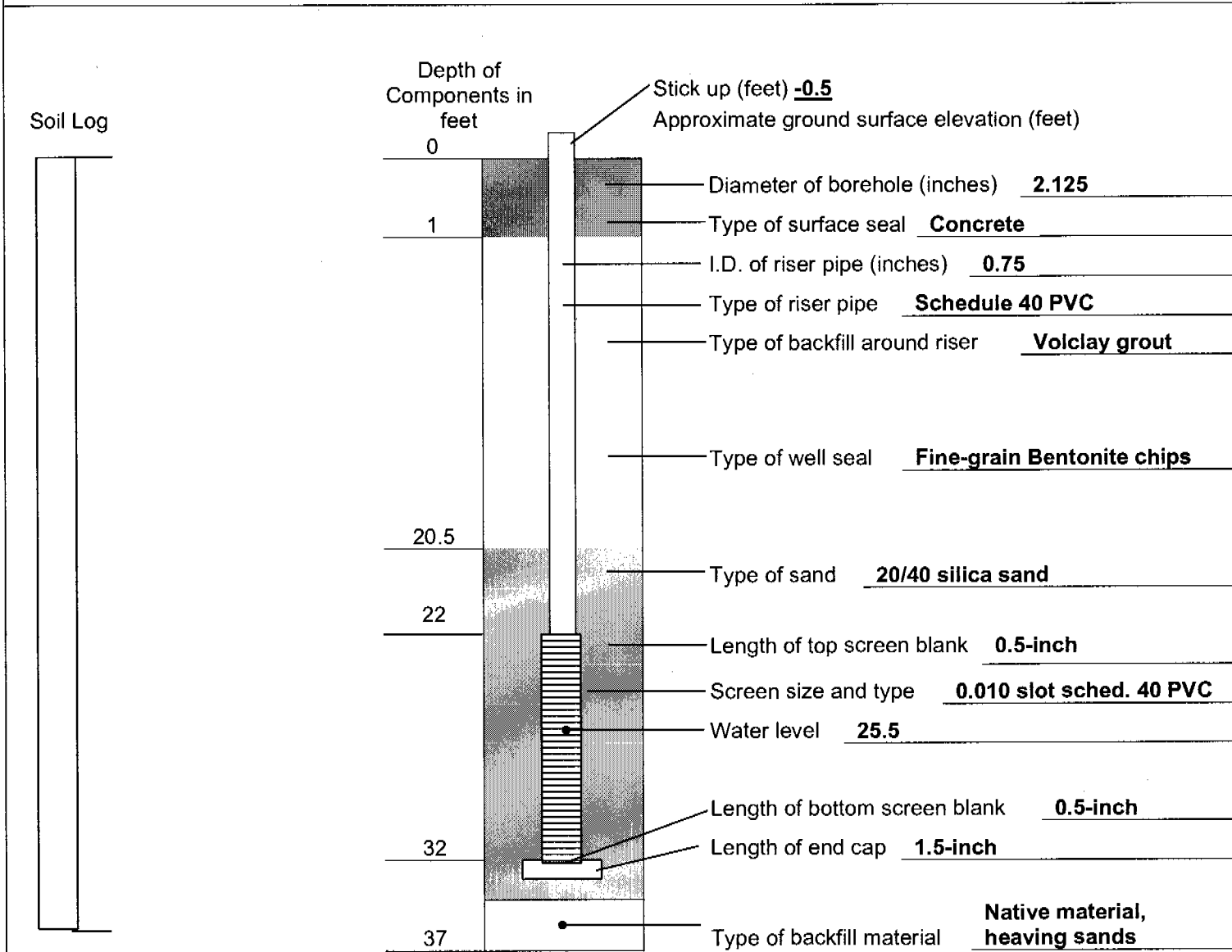
Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>403MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Lance Larsen</u>
Date/Time: <u>18 October 2006 14:00</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6792107.689 Easting: 347942.374 Elevation: 46.671 (UTM Zone 6 (Meters))</u>	



Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

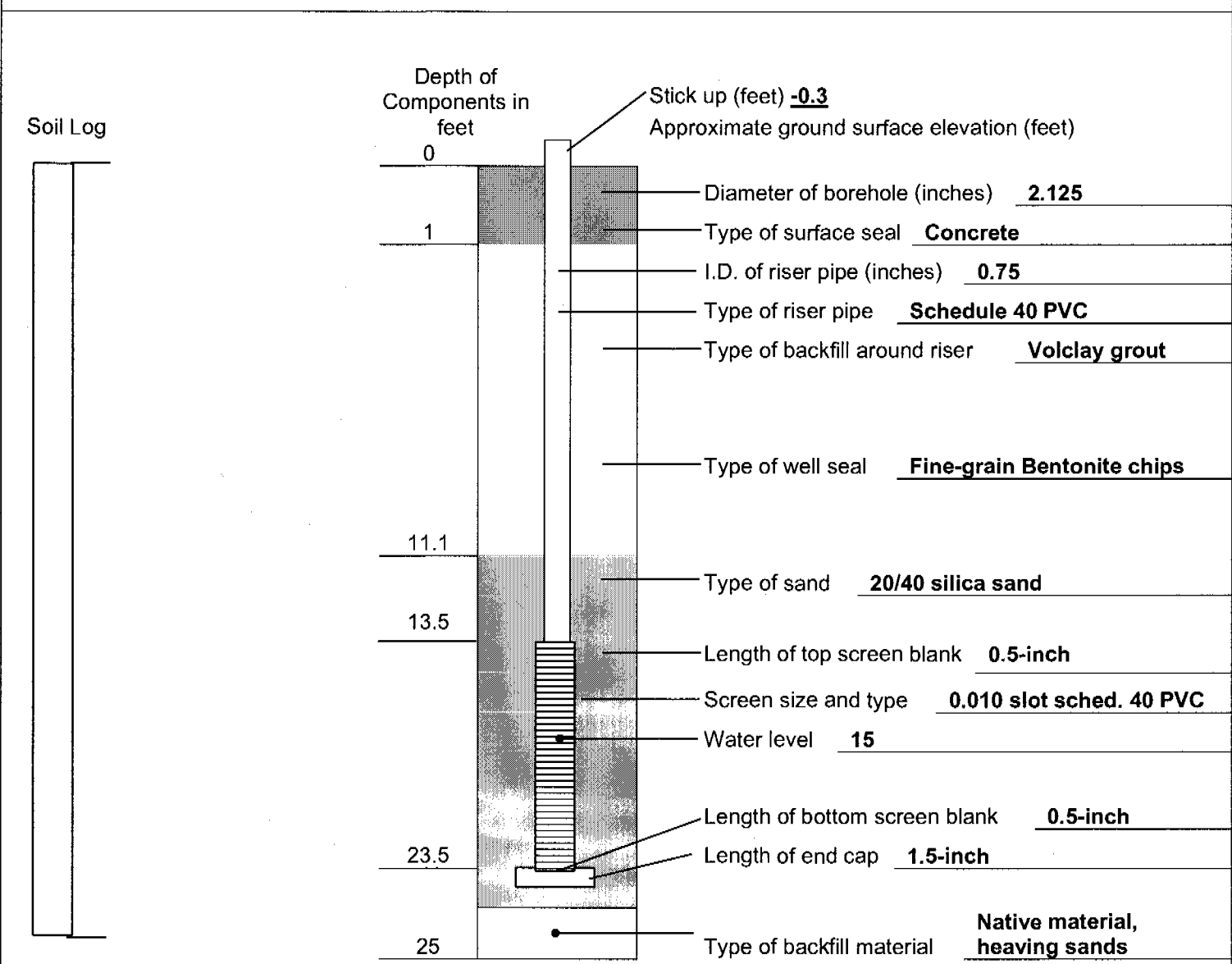
Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>410MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Lance Larsen</u>
Date/Time: <u>17 October 2006 09:35</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6793149.615 Easting: 349857.389 Elevation: 56.533 (UTM Zone 6 (Meters))</u>	



Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>422MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Lance Larsen</u>
Date/Time: <u>17 October 2006 16:30</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6794266.664 Easting: 347675.000 Elevation: 63.574 (UTM Zone 6 (Meters))</u>	

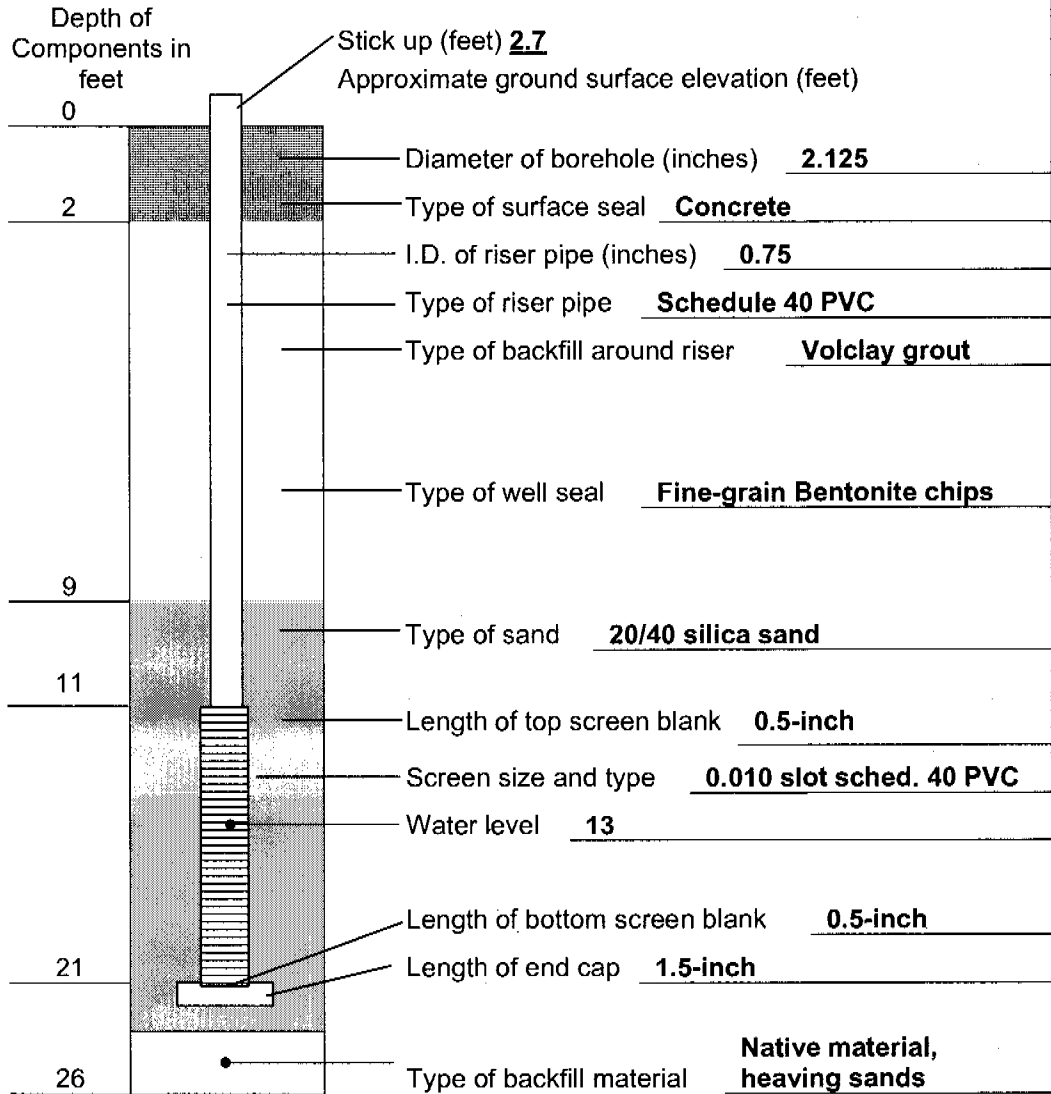
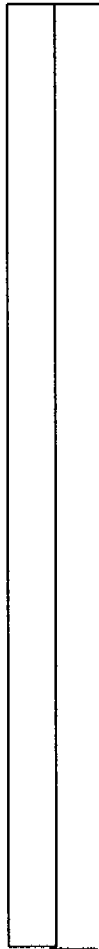


Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: Elmendorf Compliance Program Well No.: 424MW-IN  
 Project No.: 12832.001.196.0002.04 Observer: Lance Larsen  
 Date/Time: 17 October 2006 13:20 Drilling Method: Direct Push Geoprobe  
 Survey Data: Northing: 6793480.062 Easting: 348163.010 Elevation: 51.409 (UTM Zone 6 (Meters))

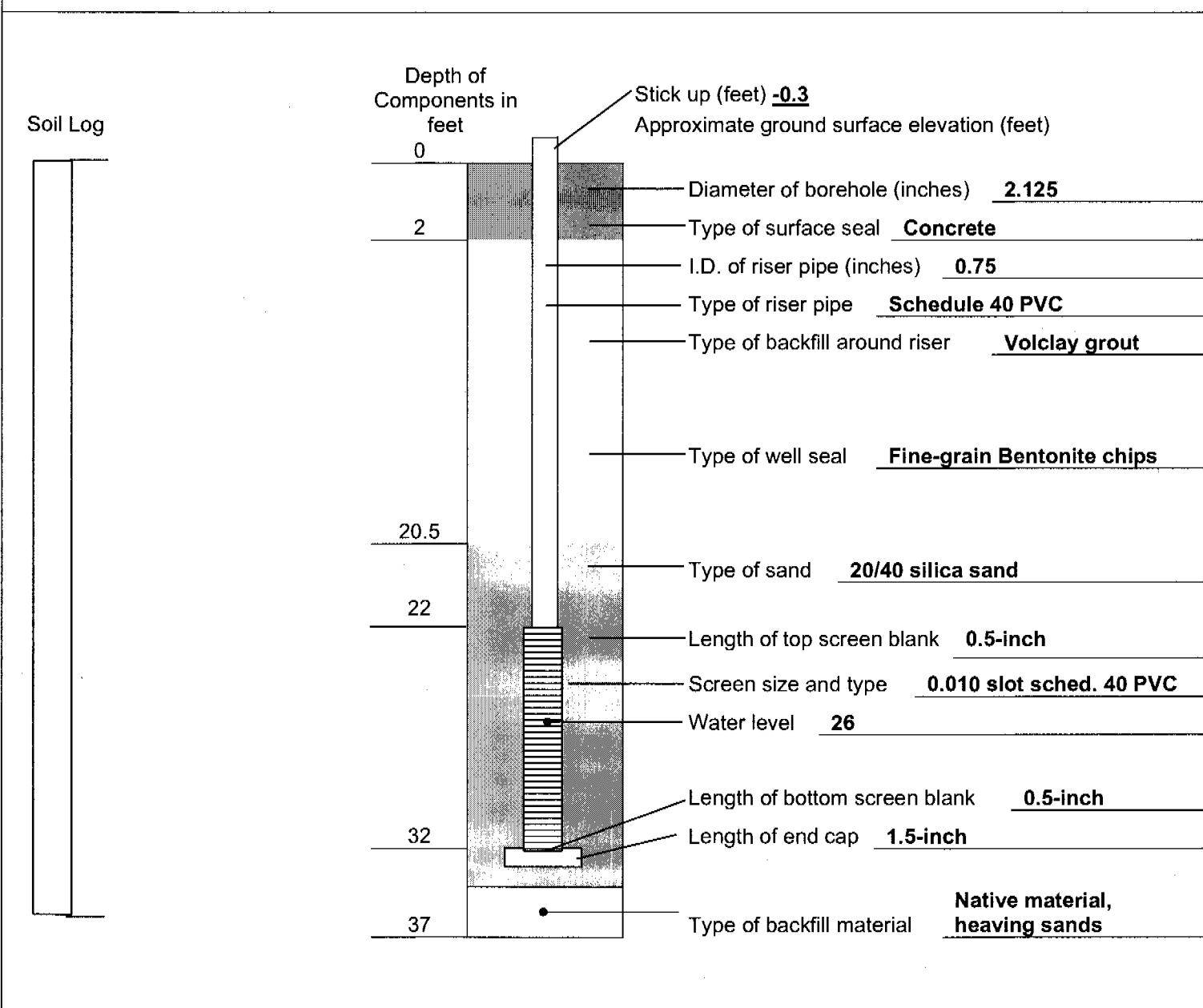
Soil Log



Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>427MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Lance Larsen</u>
Date/Time: <u>17 October 2006 12:00</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6793105.428 Easting: 349828.431 Elevation: 56.726 (UTM Zone 6 (Meters))</u>	

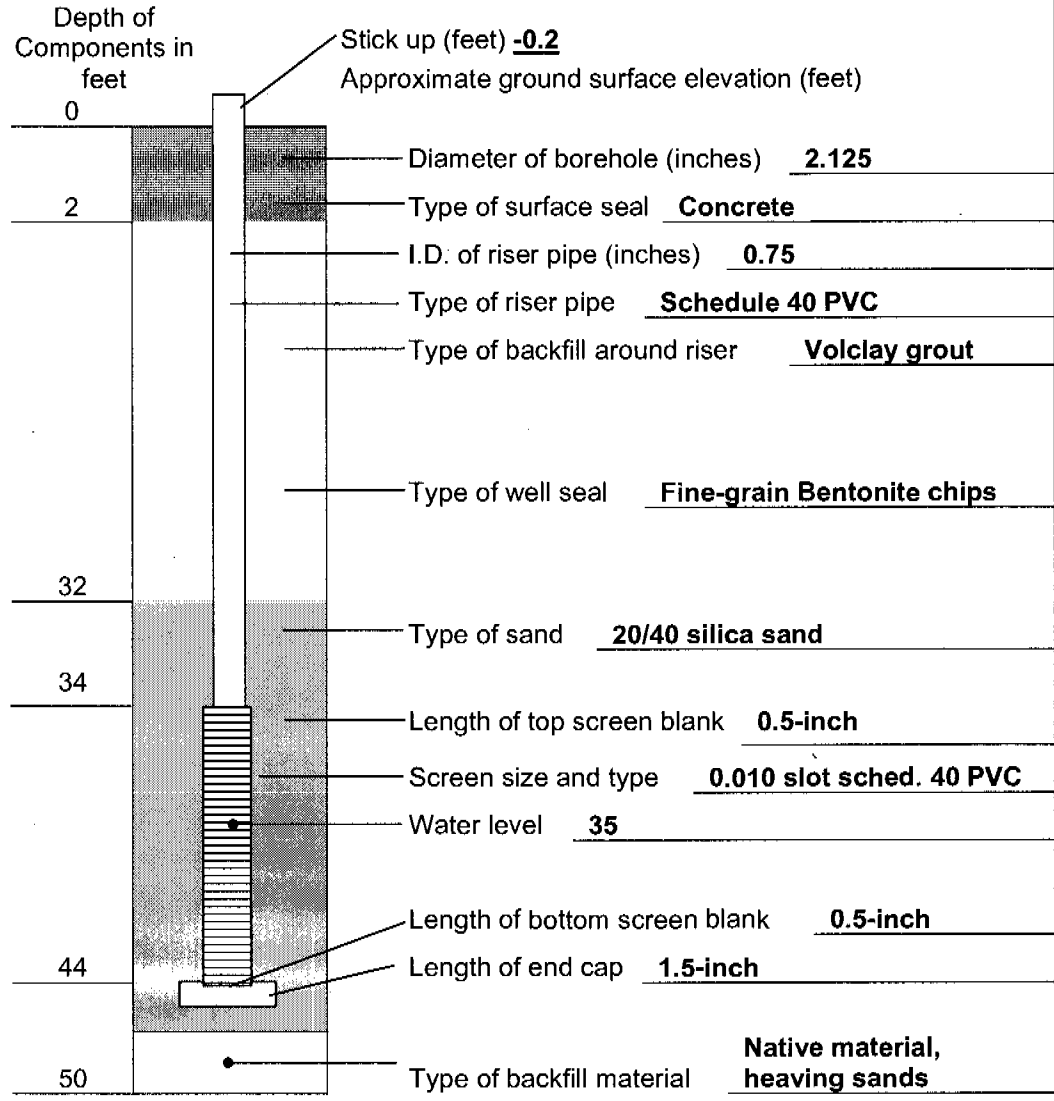


Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: Elmendorf Compliance Program Well No.: 509MW-IN  
 Project No.: 12832.001.196.0002.04 Observer: Lance Larsen  
 Date/Time: 17 October 2006 15:20 Drilling Method: Direct Push Geoprobe  
 Survey Data: Northing: 6794535.847 Easting: 349901.320 Elevation: 61.947 (UTM Zone 6 (Meters))

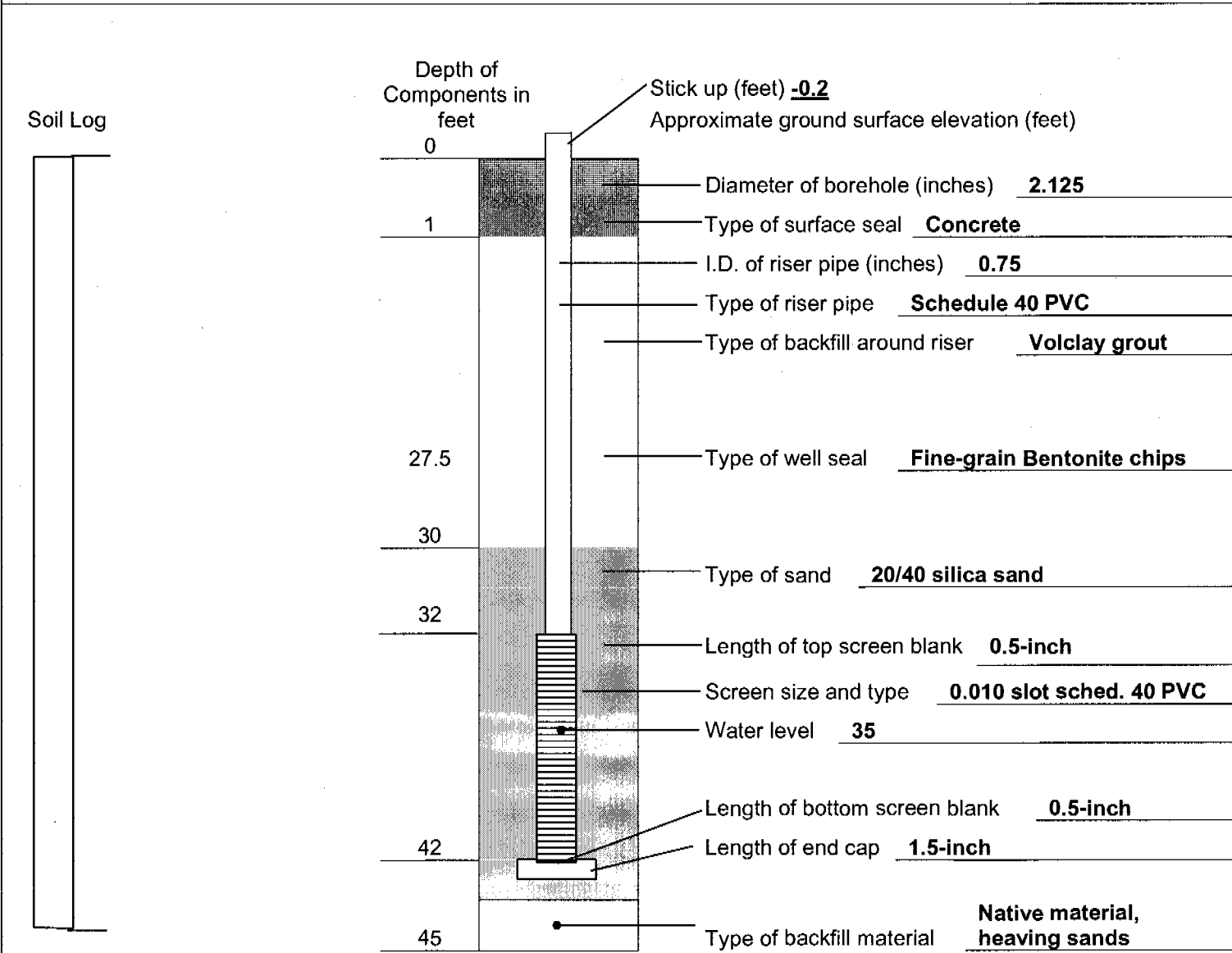
Soil Log



Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: Elmendorf Compliance Program Well No.: 516MW-IN  
 Project No.: 12832.001.196.0002.04 Observer: Russ Beck  
 Date/Time: 16 October 2006 12:00 Drilling Method: Direct Push Geoprobe  
 Survey Data: Northing: 6792343.232 Easting: 348359.465 Elevation: 48.911 (UTM Zone 6 (Meters))

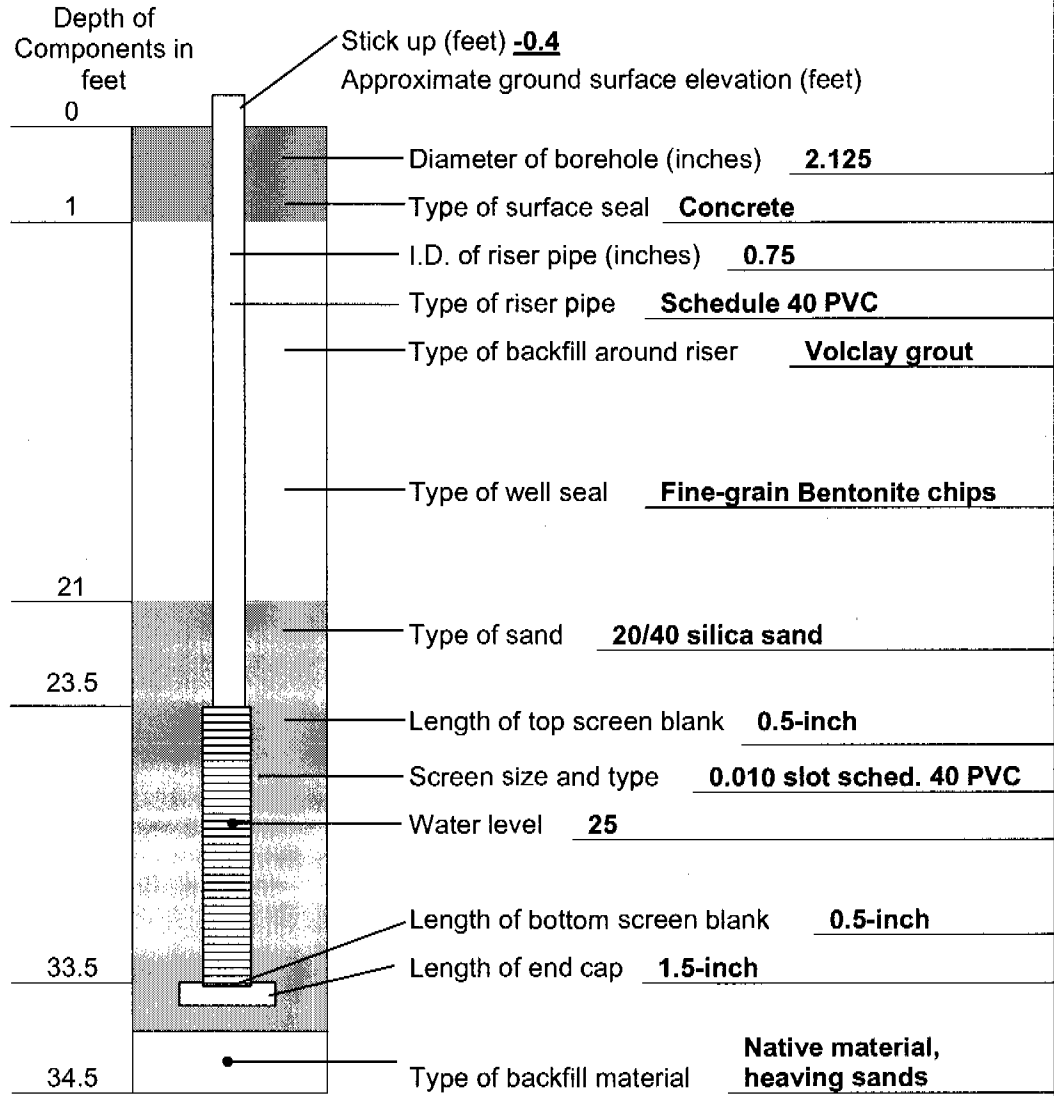
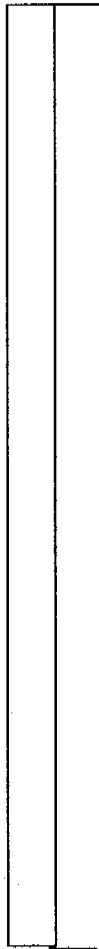


Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>522MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Russ Beck</u>
Date/Time: <u>16 October 2006 15:00</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6794958.143 Easting: 349003.868 Elevation: 58.838 (UTM Zone 6 (Meters))</u>	

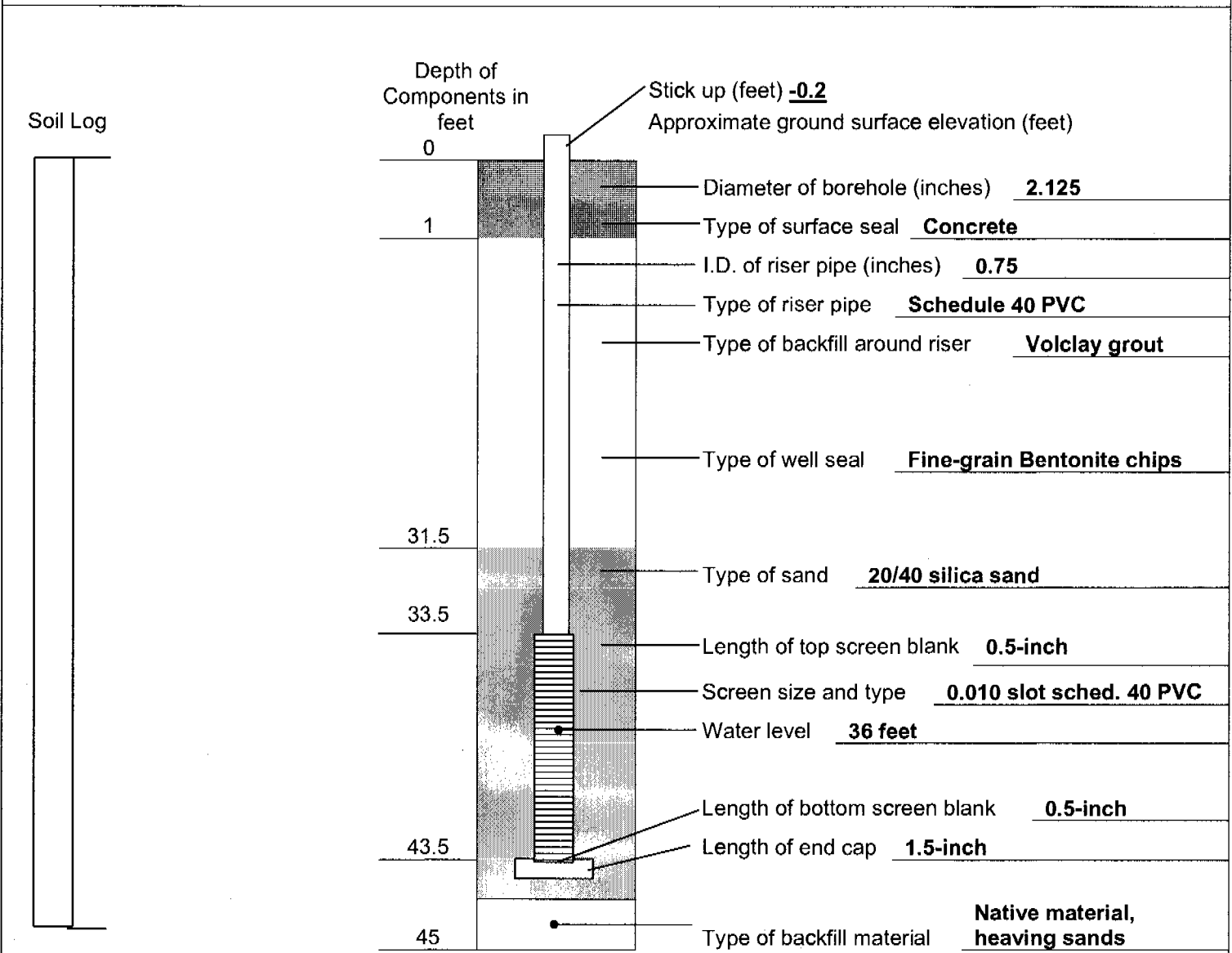
Soil Log



Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

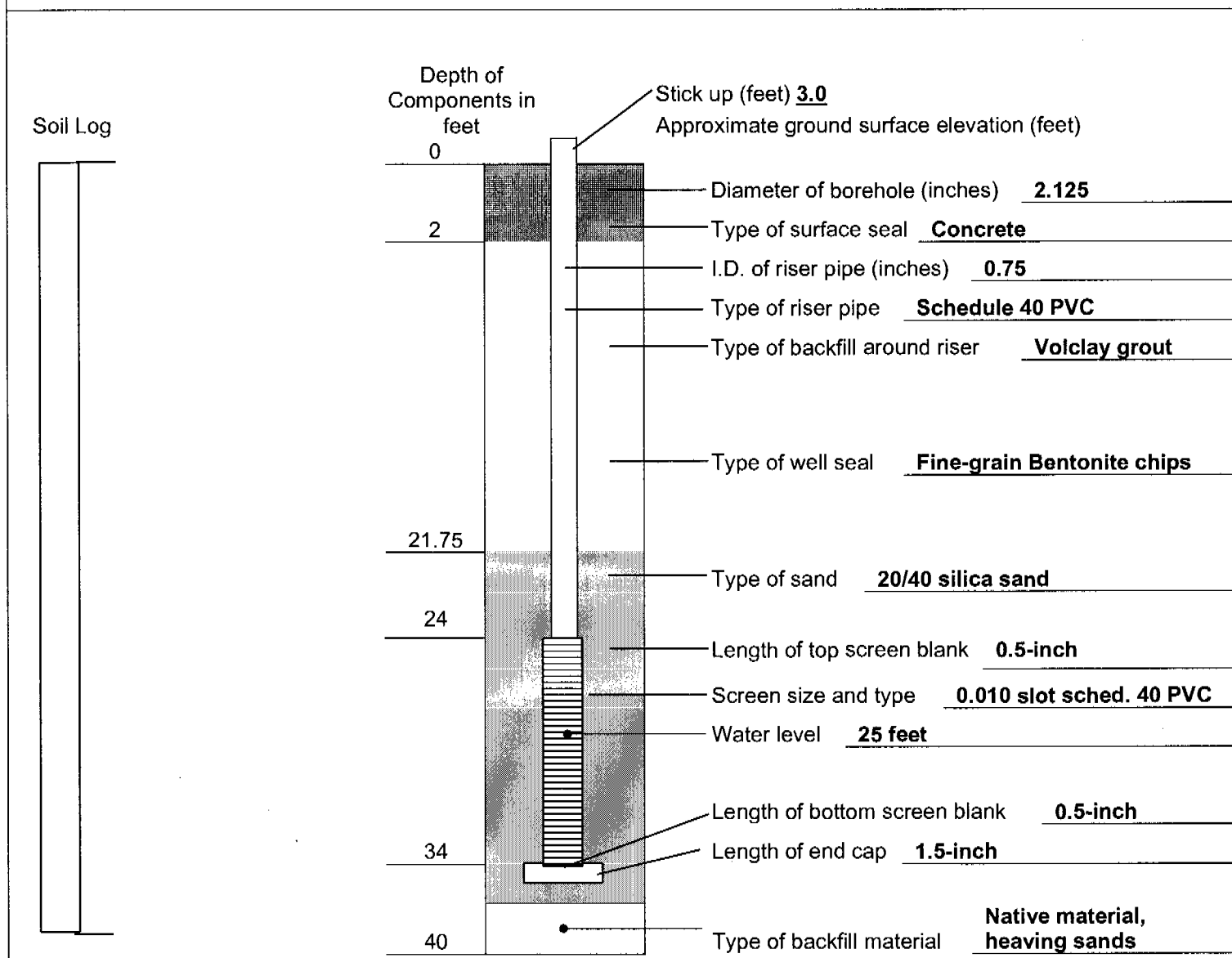
Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>526MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Lance Larsen</u>
Date/Time: <u>18 October 2006 15:40</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6792688.897 Easting: 349390.545 Elevation: 54.131 (UTM Zone 6 (Meters))</u>	



Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>529MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Lance Larsen</u>
Date/Time: <u>19 October 2006 14:00</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6792429.206 Easting: 347274.596 Elevation: 46.227 (UTM Zone 6 (Meters))</u>	

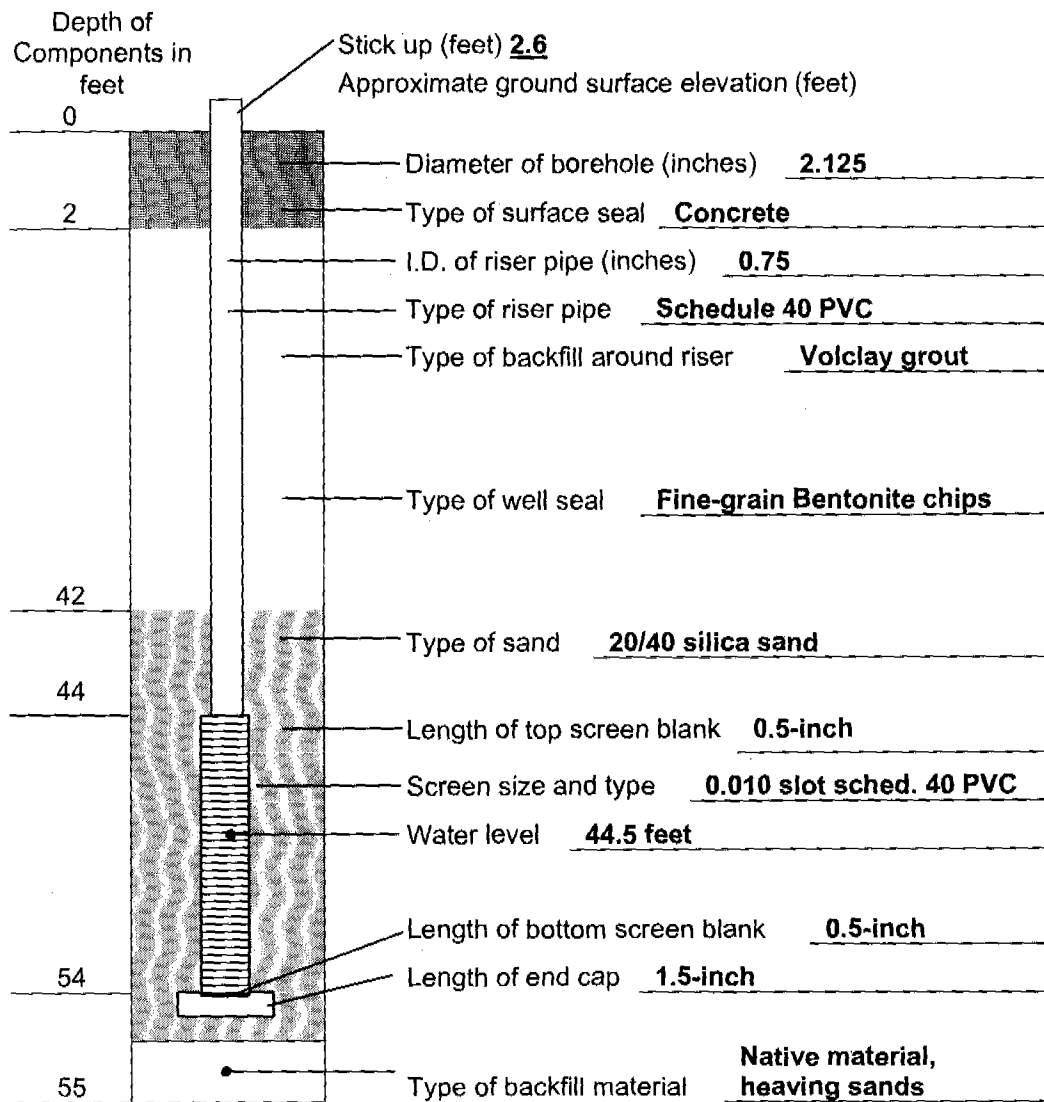
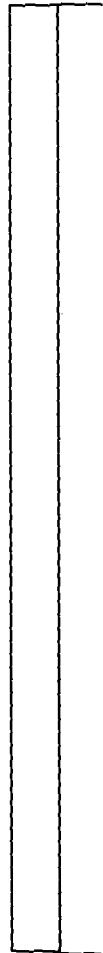


Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>532MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Lance Larsen</u>
Date/Time: <u>18 October 2006 12:00</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6793878.404 Easting: 351191.051 Elevation: 67.965 (UTM Zone 6 (Meters))</u>	

Soil Log

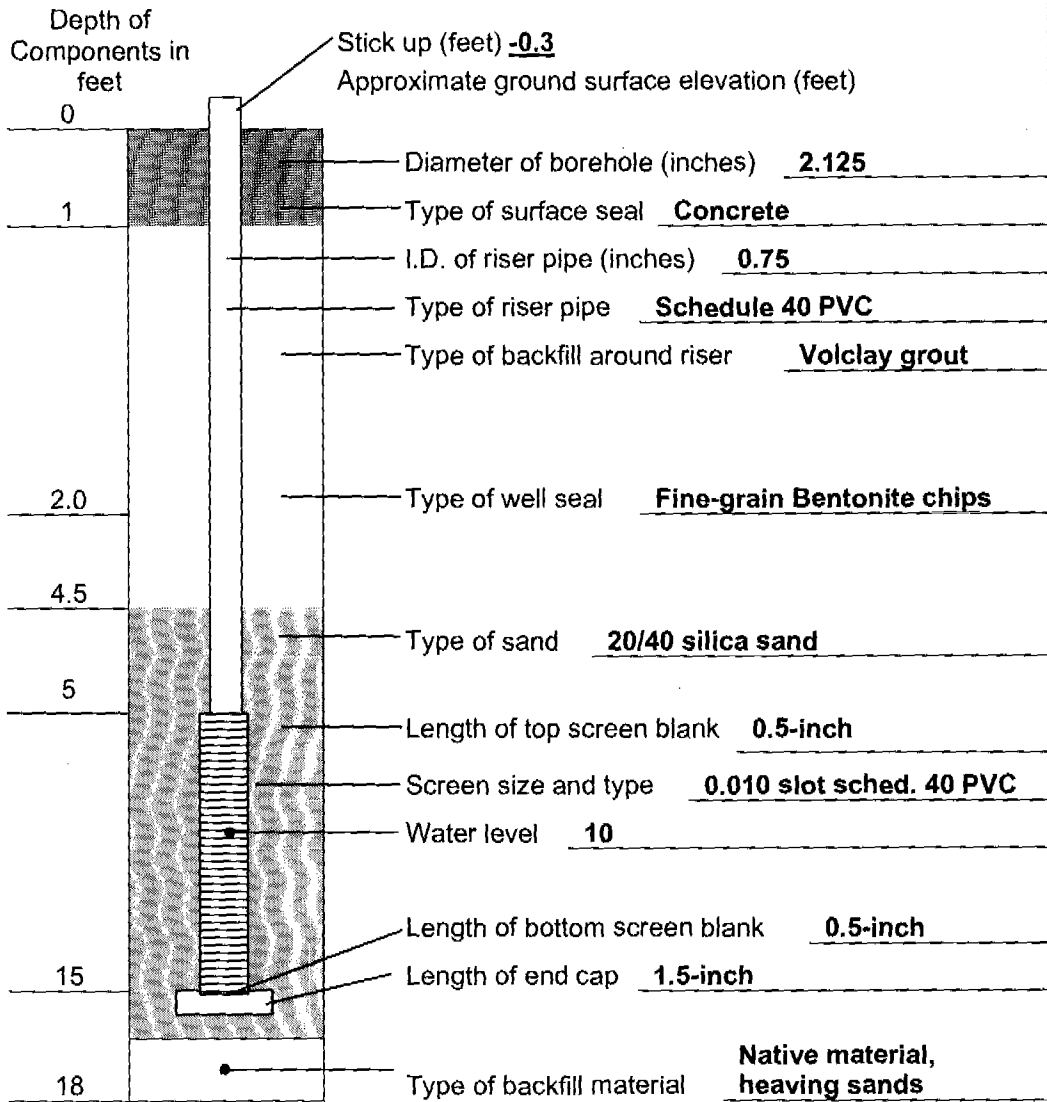


Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>703MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Russ Beck</u>
Date/Time: <u>16 October 2006 16:30</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6797352.480 Easting: 347978.409 Elevation: 34.071 (UTM Zone 6 (Meters))</u>	

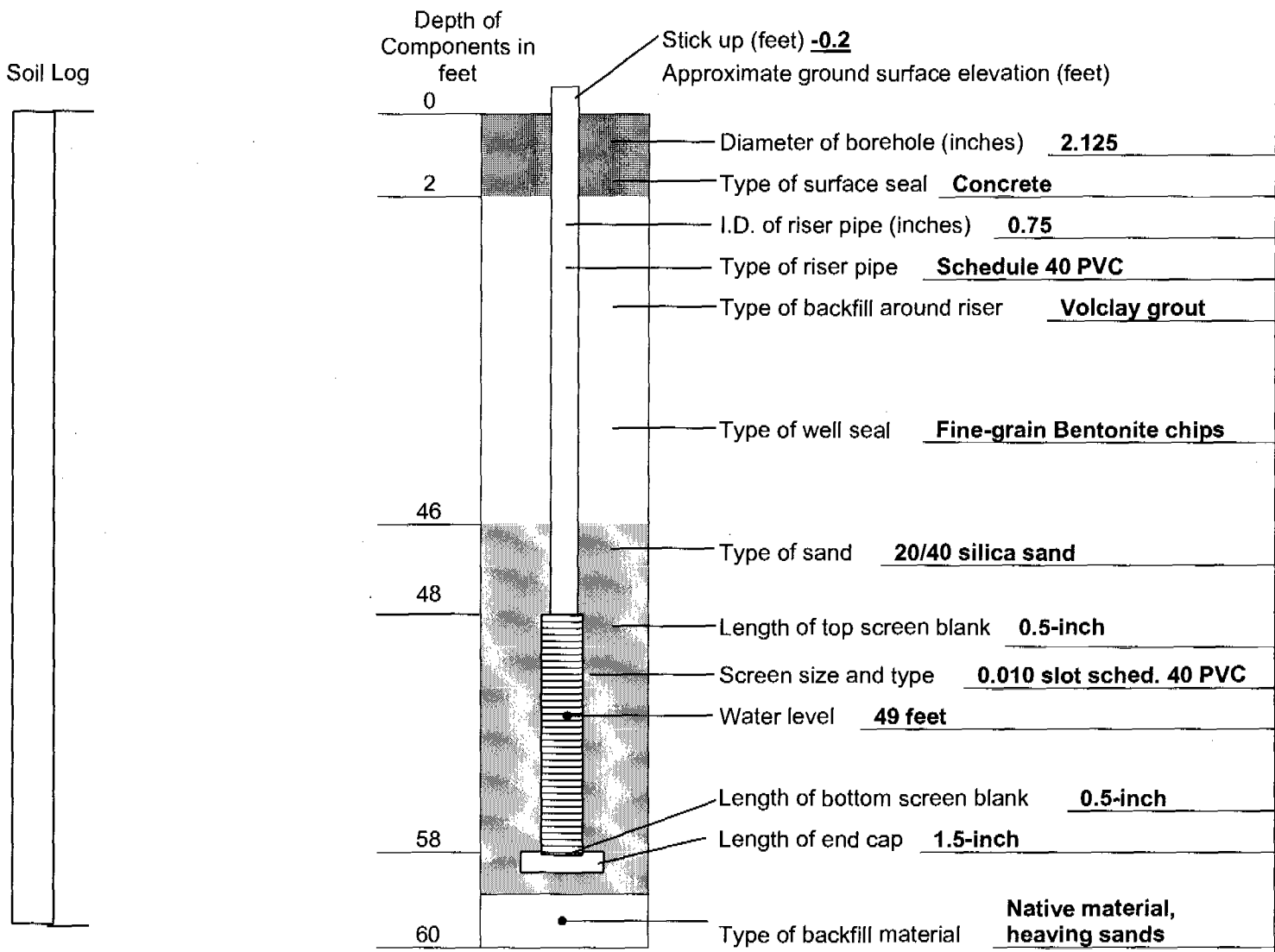
Soil Log



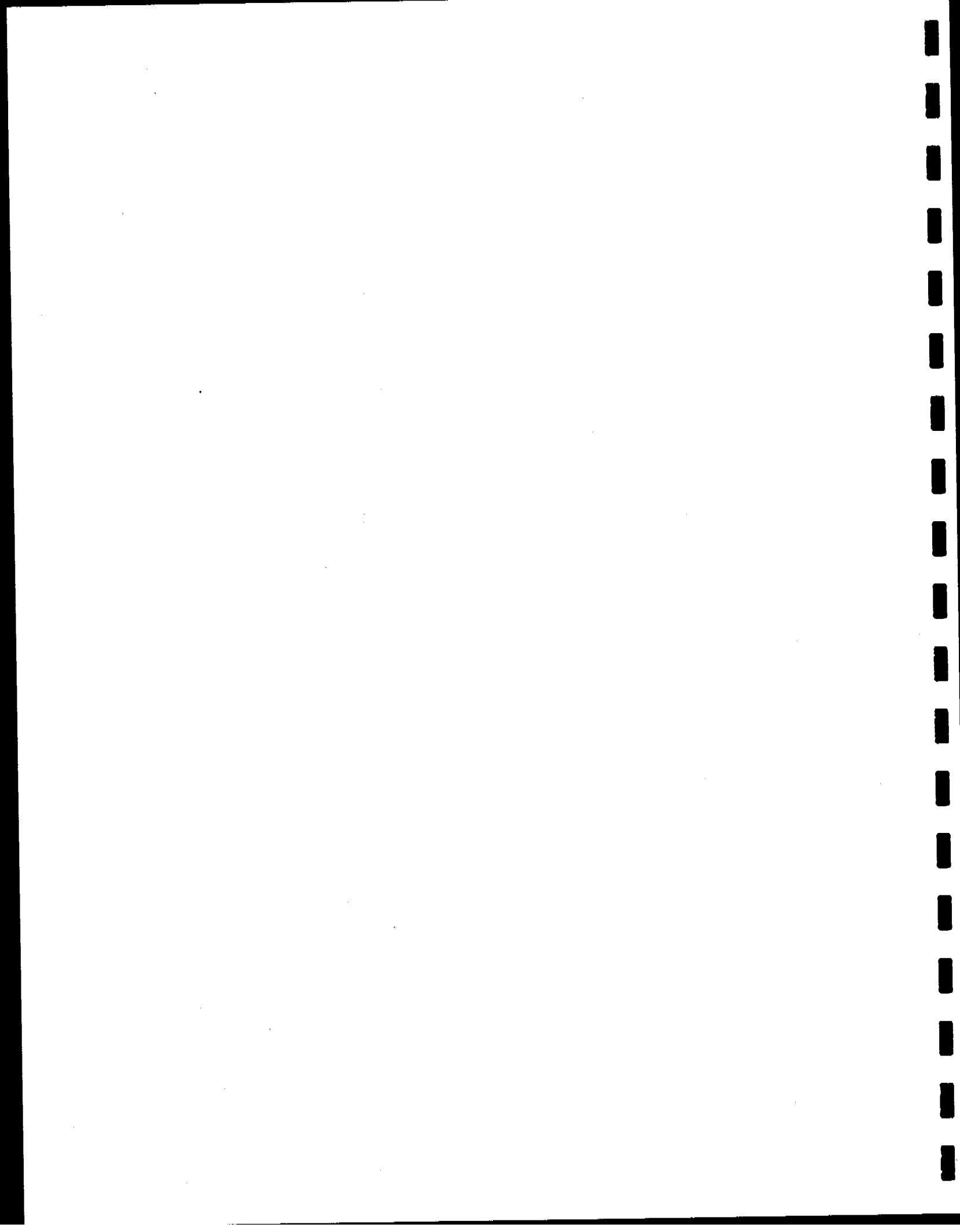
Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.

# MONITORING WELL INSTALLATION REPORT

Project Name: <u>Elmendorf Compliance Program</u>	Well No.: <u>16716MW-IN</u>
Project No.: <u>12832.001.196.0002.04</u>	Observer: <u>Lance Larsen</u>
Date/Time: <u>19 October 2006 16:00</u>	Drilling Method: <u>Direct Push Geoprobe</u>
Survey Data: <u>Northing: 6794930.577 Easting: 351019.038 Elevation: 67.513 (UTM Zone 6 (Meters))</u>	



Remarks: Pre-pack well screens consist of 10 feet of stainless steel mesh outer screens, 20/40 silica sand, Schedule 40 PVC with 0.010 slot.



## 1.0 INTRODUCTION

This Quality Assurance/Quality Control (QA/QC) Report summarizes the evaluation of analytical data associated with the collection of groundwater and soil, as well as associated quality control samples. These data have been reviewed and validated to assess ongoing monitoring activities for the Compliance Monitoring and assessment Program at Elmendorf Air Force Base (AFB), Anchorage, Alaska.

Quality acceptance criteria for this project are described in the project-specific Quality Assurance Plan (Quality Assurance Project Plan [QAPP]; United States Air Force, [USAF] 2006), developed using the *Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (United States Environmental Protection Agency [USEPA] 2004) and *Contract Laboratory Program National Functional Guidelines for Organic Data Review* (USEPA 1999). Overall, the data have met the quality control acceptance criteria specified for this project. Non-conformances of data are identified, discussed, and qualified in this report. Attachment 1 provides a complete set of laboratory analytical data reports, stored as digital files in portable document file (PDF) format, on compact disks.



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## 2.0 OBJECTIVES

This report summarizes the results of the QA/QC data associated with the analysis of ground water and soil samples for selected organic and inorganic constituents. Any potential bias resulting from the quality issue identified by the data flag (validation qualifier) is discussed in this QA/QC summary report.

### Organic Parameters

- Volatile organic compounds (VOC) by gas chromatography/mass spectrometry (GC/MS), USEPA Office of Solid Waste and Emergency Response (OSWER; SW-846) Method SW8260B.
- VOC as benzene, ethylbenzene, toluene, and total xylenes (BTEX) by gas chromatograph/photoionization detection (GC/PID), USEPA Method SW8021B.
- Total petroleum hydrocarbons as gasoline-range organic (GRO) compounds by gas chromatography/flame ionization detection (GC/FID), Alaska Department of Environmental Conservation (ADEC) Method AK101.
- Total petroleum hydrocarbons as diesel-range organic (DRO) and residual range organics (RRO) compounds by GC/FID, ADEC Method AK102 and AK103, respectively.
- Polynuclear aromatic hydrocarbons (PAH; PNA) by GC/MS Selective Ion Monitoring (SIM), USEPA Method SW8270D.

### Inorganic Parameters

- Dissolved metals by inductively-coupled plasma/mass spectrometry (ICP/MS), USEPA Method SW6020A.

Samples for this project evaluated for this review were collected between October 2 and October 26 2006. Test America (TA), Analytical Testing Corporation of Seattle, Washington and Portland, Oregon performed all analytical testing of samples collected.



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### 3.0 DATA QUALIFIERS

Specifications provided in the Project QAPP (USAF 2006) were followed when determining and assigning data qualifiers for the Compliance Monitoring Program samples. Data qualifiers used, listed in order of significance, are as follow:

- R** – The data are unusable due to deficiencies in meeting QC criteria and may not be used for decision making.
- J** – Estimated: The analyte was positively identified; the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
- U** – Undetected: The analyte was analyzed for, but not detected.
- UJ** – The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.

The “R” data qualifier is applied to analytical results that have failed to meet critical project quality control criteria. These results have a high degree of uncertainty and should not be used for most purposes.

The “J” data qualifier is used to indicate the sample result is an estimated quantity or that the associated analyte was positively detected but below the project-specified reporting limit.

The “U” data qualifier was used to indicate that the analyte was not detected at or above its associated method detection limit (MDL); the analyte is reported at its associated RL.

The “UJ” data qualifier was used to indicate that the analyte was not detected at or above its associated MDL; the analyte is reported at its associated, estimated RL. The RL is an estimated concentration due to analyte-specific QC exceedance.

The review focuses on criteria for the following QA/QC parameters and their overall effect on the data:

- Sample handling chain of custody (COC);
- Holding-time compliance;
- Field QA/QC (trip blanks and field duplicates);
- Initial and continuing calibration verification (ICV and CCV) check sample recoveries;
- Method RL – recovery of the low calibration standard;
- Method blank (MB) sample recovery;
- Surrogates spike recoveries;
- Internal standard performance (GC/MS only);
- GC retention time shifts (organic compounds);
- GC retention time windows (organic compounds);



- Organic constituent compound mass spectral identification;
- Appropriate application of analytical methods;
- Precision and accuracy; and
- Completeness.

### **3.1 SAMPLE HANDLING CHAIN-OF-CUSTODY (COC) AND RECEIVING**

COC forms and laboratory case narratives were reviewed to determine if any sample shipping or handling procedures might affect the integrity of the samples and the quality of the resulting data. Copies of the COCs and cooler receipts are included in Attachment 1.

Samples were packed with frozen gel packs and delivered to the Test America sample receiving station in Anchorage, Alaska where they were repacked and shipped to the Test America network laboratories in Seattle and Portland. Generally, samples were in route for 24 to 48 hours. COC forms and laboratory narratives were reviewed to determine if any sample handling procedures employed might affect the integrity of the samples and the quality of the resulting data. These include handling issues such as sample temperature upon receipt, holding time violations, and container integrity.

### **3.2 HOLDING-TIME COMPLIANCE**

All samples were extracted and/or analyzed within the recommended hold time for the analytical procedures utilized for this project, except as noted under Analytical Methods.

### **3.3 TRIP BLANKS**

Trip blanks samples were shipped with coolers containing samples for VOC (SW8021B; SW8260B; AK101) analyses to assess whether contamination may have occurred during transport. Chains of custody were reviewed to ensure that each cooler containing samples for VOC analysis included at least one trip blank sample.

### **3.4 INITIAL AND CONTINUING CALIBRATION VERIFICATION**

ICV and CCV standards are analyzed to monitor instrument performance with respect to the QAPP requirements prior to, during, and at the end of each analytical sequence. Frequency and acceptable recoveries for each analysis performed for this project are outlined in the Project QAPP (USAF 2006).

### **3.5 METHOD REPORTING LIMITS**

Method reporting limits are specified in the Project QAPP (USAF 2006), and in the project-specific QAPP for soil and water samples. Methods were evaluated and specified based on the ability of each procedure to measure below regulatory levels and at or below historical data levels at each site. RLs achieved by the laboratory met the requirements for this project unless dilution to mitigate matrix interference was required.



### **3.6 METHOD BLANKS**

Method blanks are analyzed concurrent with a batch of 20 or fewer samples for each of the analytical procedures performed for this project. These samples are prepared in the laboratory in conjunction with project samples to monitor for contamination during the laboratory analytical procedure. A measured result above the required RL would indicate a laboratory method control problem that could affect data quality. For this project, method blanks were tested at the required frequency.

### **3.7 SYSTEM MONITORING COMPOUNDS (SURROGATES)**

Surrogates are specified for organic chromatographic analytical procedures. Surrogates are compounds similar to those tested, although available hydrogen atoms have been replaced with their hydrogen isotope deuterium (deuterated) or they contain atoms like fluorine that are not typically encountered in nature. These compounds are added to each sample tested before the extraction step of the procedure; measured recoveries serve as an indicator of overall method performance for each sample. Surrogates are also added to each calibration and QC check sample. Surrogates that failed to meet recovery criteria are discussed under Analytical Methods

### **3.8 INTERNAL STANDARDS**

Internal standards are similar to surrogates, except that they are exclusively deuterated analogues of the project analytes. They are added to each sample prior to analysis but after all preparation steps have been completed. Internal standards are also added to each calibration and QC check sample. Their peak areas are compared to the mid-level calibration standard as an ongoing measure of instrument and method performance.

### **3.9 GAS CHROMATOGRAPHY RETENTION TIMES**

Retention time describes the residence time of an analyte during elution through the chromatography column. This parameter is dependent upon several factors, including the column stationary phase composition, column temperature, carrier gas flow rates, and diameter (bore) of the column. Reproducibility of any given analyte retention time is characterized in terms of a time interval or "retention time window" and is established for each instrument under operating conditions specified by the analytical method. Shifts in retention times may be indicative of system instability or excessive "loading" of the column with high levels (masses; high concentrations) of analytes. Column loading interferes with partitioning of analyte between the stationary (column) and mobile (carrier gas) phases, and may result in changes in total analyte elution time and ability of the system to separate or "resolve" individual analytes. Retention time shifts and elution of analytes within their established retention time windows were evaluated.

### **3.10 MASS SPECTRAL COMPOUND IDENTIFICATION**

When using GC techniques, individual analytes are identified based on their retention times relative to those of known analytes that have been measured under identical instrument conditions. However, this technique alone is not always sufficient to identify individual components of a mixture of analytes. Use of a mass-sensitive detector provides a means to



confirm the identity of an analyte by measuring the mass-to-charge ratio of the parent ion and any fragments formed in the mass detector. In this way, there are two independent measures available to identify an analyte – its retention time and its mass spectrum. No issues involving compound identification were observed during the project.



#### 4.0 ANALYTICAL METHODS

The following sections describe QA exceedances and resulting data qualification.

#### 4.1 VOC – USEPA METHOD SW8260B

##### 4.1.1 Matrix Spike

The chlorobenzene recovery in the matrix spike duplicate analyzed 10/10/2006 was less than method acceptance criteria due to the high level of chlorobenzene in the original sample. No data were qualified

#### 4.2 GRO/BTEX – ADEC METHOD AK101/USEPA METHOD SW8021B

##### 4.2.1 Holding Time Exceedances and Improper Sample Handling Procedures

Holding times for several samples were exceeded. Samples were initially analyzed within holding time on 10/15/2006. Results for all analytes in this initial run exceeded instrument calibration ranges. Reanalyses of these samples were performed outside of method specified holding times on 10/20/2006 (three days past hold time). Reanalysis for benzene in these samples was performed on 10/24/2006 (seven days past hold time), due to a low bias for this analyte in the CCV analyzed on 10/20/2006. In addition, benzene reanalyses performed on 10/24/2006 were performed on sample containers with significant headspace. These containers had been used for analysis four days prior (on 10/20/2006). GRO and BTEX results for the following samples have been qualified as rejected for use (R).

43WL-11-GW-2006-0 (R)	43WL-11-GW-2006-1 (R)	W-4-GW-2006-0 (R)
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Samples were collected and transported to the TA Anchorage office where they were logged in and repackaged by TA staff for transport to the Seattle and Portland laboratories. Several GRO/BTEX samples were shipped by TA Anchorage staff to the TA Portland laboratory rather than TA Seattle by mistake on 10/06/2006. The mistake was noticed and all but one sample were transported by TA Portland staff to the TA Seattle laboratory on 10/11/2006. The final misplaced sample FIELDQC-061002-3 was transported from TA Portland to TA Seattle on 10/12/2006. The cooler temperature was not recorded by TA Seattle staff upon receipt on 10/11/2006. Additionally, trip blank (TB) FIELDQC-061002-3 was received by TA Seattle at 16.6°C on 10/12/2006. All GRO and BTEX results for the following samples are qualified as estimated (J) due to the sample handling issues presented above:

1836WL-01-GW-2006-0 (J)	401WL-02-GW-2006-1 (J)	401WL-03-GW-2006-0 (J)
402WL-02-GW-2006-0 (J)	FIELDQC-061002-3 (J)	

##### 4.2.2 Laboratory Control Samples

The laboratory control sample and laboratory sample duplicate (LCS and LCSD, respectively) analyzed on 10/30/2006 were not spiked with the field surrogate  $\alpha,\alpha,\alpha$ -TFT. Recoveries for this surrogate were acceptable in all associated field samples. No data were qualified.



### 4.2.3 Matrix Spikes

The matrix spike sample (MS) analyzed on 10/30/2006 was mis-spiked with BTEX compounds leading to recoveries below laboratory control limits. Recoveries for this surrogate were acceptable in laboratory control sample. No data were qualified.

### 4.2.4 Trip Blank

Benzene and GRO were present in trip blank (TB) FIELDQC-061002-3 at concentrations greater than the MDL, but less than the method reporting limit (MRL). Positive sample results for these analytes, less than ten times the concentrations in the TB are qualified as estimates (J) in the following samples:

1836WL-01-GW-2006-0 (J)	401WL-02-GW-2006-1 (J)	401WL-03-GW-2006-0 (J)
538BV-03-GW-2006-0 (J)	805WL-01-GW-2006-0 (J)	OU5KM-03-GW-2006-0 (J)
SP2/6-05-GW-2006-0 (J)	SP4/11-03-GW-2006-0 (J)	SP4/11-03-GW-2006-1 (J)

GRO, toluene and xylenes were present in trip blank (TB) TB181006-3 at concentrations greater than the MDL, but less than the MRL. Positive sample results for these analytes, less than ten times the concentrations in the TB are qualified as estimates (J) in the following samples:

403IN-25-181006-0 (J) t,x	403IN-31-181006-0 (J) g,t,x	526-10-181006-0 (J) t,x
526-12-181006-0 (J) t	526-16-181006-0 (J) t	526-16-181006-1 (J) g,t
428BH1-16-181006-0 (J) t,x	428BH1-20-181006-0 (J) g,x	428BH1-25-181006-0 (J) g,t,x
428BH2-16-181006-0 (J) g,t,x	428BH2-20-181006-0 (J) g,t,x	428BH2-25-181006-0 (J) g,t,x

### 4.2.5 Sample Matrix Effects

Xylene results for the following samples may be elevated due to coeluting compounds:

401WL-03-GW-2006-0 (J)	538BV-03-GW-2006-1 (J)	538WL-02-GW-2006-0 (J)
805WL-01-GW-2006-0 (J)		

For samples 428BH1-16-181006-0 and 428BH1-20-181006-0, 4-BFB surrogate recoveries were greater than method acceptance criteria due to analyte coelution. No data were qualified.

## 4.3 PAH –USEPA METHOD SW8270D SIM

### 4.3.1 Method Reporting Limits

Method reporting limits for samples 43WL-11-GW-2006-0 and 43WL-11-GW-2006-1 are elevated due to sample dilution performed to minimize matrix interference caused by high target analyte concentrations.



#### 4.4 DRO –ADEC METHOD AK102

##### 4.4.1 Surrogate Recoveries

LCS and LCSD 1-chlorooctadecane surrogate recoveries exceeded method control limits (biased high). LCS and LCSD target analyte recoveries were within control limits. Samples were re-extracted outside hold time (with acceptable LCS and LCSD surrogate recoveries) for confirmation of results. Original sample results are reported without qualification.

#### 4.5 PRECISION AND ACCURACY

Precision, as relative percent difference between duplicate results (often duplicate spike analyses), is the criterion used evaluate analytical reproducibility. Accuracy, as determined by the analytical recovery from duplicate spike sample analyses, is the criterion used to evaluate agreement of actual versus expected recoveries. Precision and accuracy requirements apply when the concentration of analyte added to the MS/MSD samples is equal to or greater than the analyte found in the original sample. MS/MSD recoveries outside the accepted range generally indicate matrix interference. Generally, all project samples of a similar matrix associated with the exceedance are qualified as "M" to indicate matrix interference. Matrix interference of this type can be confirmed through use of analytical spikes (post-digestion spikes) for metals analysis and by comparison of surrogate recoveries from analysis of undiluted and diluted sample extracts for organics analysis.

Method accuracy is also measured by the analysis of a LCS. One LCS sample per analytical batch of 20 or less project samples must be analyzed. Recovery of each analyte tested within the required range is a measure of method performance. The laboratory is required to reanalyze all samples in the analytical batch if LCS failure occurs; however, sporadic marginal exceedances may be permissible. If any analyte in the LCS is outside control limits, affected data are qualified as estimated concentrations (J). If LCS recoveries are low, non-detected data are rejected (R) for use. Specific detail regarding data qualification is provided in the Project QAPP.

Precision and accuracy measurements were measured at the required frequency for this project. Precision and accuracy measurements were measured within the required limits for this project, except as discussed in Analytical Methods

#### 4.6 COMPLETENESS

The percentage of valid results is reported as completeness. Completeness is calculated after the QC data have been evaluated and the results applied to the measurement data. In addition to results identified as being outside of the QC limits established for the method, broken or spilled samples, or samples that could not be analyzed for any other reason, are included in the assessment of completeness. Only samples that are rejected are considered invalid for the calculation of completeness.



Completeness is calculated as follows:

$$\frac{T - (I + NC)}{T} \times 100\% = \text{Completeness Where:}$$

- T = Total number of expected measurements for a method and matrix;
- I = Number of invalidated results for a method and matrix; and
- NC = Number of results not collected (e.g., bottles broken, etc.) for a method and a matrix.

Completeness goals are 90% for this project. All completeness goals were met for the project.



## 5.0 REFERENCES

Alaska Department of Environmental Conservation (ADEC) *Gasoline and Diesel/Residual Range Organic Compounds*, revision 3. (1996).

USEPA. *Test Methods for Evaluating Solid Waste Physical / Chemical Methods ( SW-846), through Update III*. 1996.

USEPA. *National Functional Guidelines for Organic Data Review*, EPA 540/R-99/088, Office of Emergency and Remedial Response. October 1999.

USEPA. *National Functional Guidelines for Inorganic Data Review*, EPA 540/R-04/004, Office of Superfund Remediation and Technology Innovation. October 2004.

United States Air Force (USAF), *Work Plan, Compliance Monitoring and Assessment, Elmendorf AFB, Alaska, Final*. October 2006.



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**LABORATORY DATA  
REVIEW CHECKLIST**

**BPJ0135**

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## Laboratory Data Review Checklist

### 1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes       No

Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes       No

Comments:

Test America Seattle subcontracted DRO analyses to Test America Portland

### 2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes       No

Comments:

b. Correct analyses requested?

Yes       No

Comments:

### 3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ( $4^{\circ} \pm 2^{\circ} \text{C}$ )?

Yes       No

Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes       No

Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes       No

Comments:

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes     No

Comments:

e. Data quality or usability affected? Explain.

Comments:

4. Case Narrative

a. Present and understandable?

Yes     No

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes     No

Comments:

c. Were all corrective actions documented?

Yes     No

Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Effects on data usability or quality not determined by laboratory

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes     No

Comments:

b. All applicable holding times met?

Yes     No

Comments:

c. All soils reported on a dry weight basis?

Yes     No

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes       No

Comments:

\_\_\_\_\_

e. Data quality or usability affected? Explain.

Comments:

\_\_\_\_\_

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes       No

Comments:

\_\_\_\_\_

ii. All method blank results less than PQL?

Yes       No

Comments:

\_\_\_\_\_

iii. If above PQL, what samples are affected?

Comments:

\_\_\_\_\_

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes       No

Comments:

\_\_\_\_\_

v. Data quality or usability affected? Explain.

Comments:

\_\_\_\_\_

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

Yes       No

Comments:

\_\_\_\_\_

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes       No

Comments:

\_\_\_\_\_

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

vii. Data quality or usability affected? Explain.

Comments:

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

Yes     No

Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes     No

Comments:

See QA Summary section 4.0

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

iv. Data quality or usability affected? Explain.

Comments:

See QA Summary section 4.0

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

Yes       No

Comments:

ii. All results less than PQL?

Yes       No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Data quality or usability affected? Explain.

Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes       No

Comments:

ii. Submitted blind to lab?

Yes       No

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

Yes       No

Comments:

iv. Data quality or usability affected?

Yes       No

Comments:

f. Decontamination or Equipment Blank (if applicable)

Yes     No     Not Applicable

i. All results less than PQL?

Yes     No

Comments:

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes     No

Comments:

Completed by:

Title:

Date:

Report Name:

Report Date:

Firm:

File Number:

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**LABORATORY DATA  
REVIEW CHECKLIST**

**BPJ0136**

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## Laboratory Data Review Checklist

### 1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes       No

Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes       No

Comments:

Test America Seattle subcontracted DRO analyses to Test America Portland

### 2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes       No

Comments:

b. Correct analyses requested?

Yes       No

Comments:

### 3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ( $4^{\circ} \pm 2^{\circ} \text{C}$ )?

Yes       No

Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes       No

Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes       No

Comments:

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes     No

Comments:

e. Data quality or usability affected? Explain.

Comments:

#### 4. Case Narrative

a. Present and understandable?

Yes     No

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes     No

Comments:

c. Were all corrective actions documented?

Yes     No

Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Effects on data usability or quality not determined by laboratory

#### 5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes     No

Comments:

b. All applicable holding times met?

Yes     No

Comments:

c. All soils reported on a dry weight basis?

Yes     No

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes     No

Comments:

e. Data quality or usability affected? Explain.

Comments:

## 6. QC Samples

### a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes     No

Comments:

ii. All method blank results less than PQL?

Yes     No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

v. Data quality or usability affected? Explain.

Comments:

### b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

Yes     No

Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes     No

Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

vii. Data quality or usability affected? Explain.

Comments:

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

Yes     No

Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes     No

Comments:

See QA Summary section 4.0

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

iv. Data quality or usability affected? Explain.

Comments:

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

Yes       No

Comments:

ii. All results less than PQL?

Yes       No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Data quality or usability affected? Explain.

Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes       No

Comments:

ii. Submitted blind to lab?

Yes       No

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

Yes       No

Comments:

iv. Data quality or usability affected?

Yes       No

Comments:

f. Decontamination or Equipment Blank (if applicable)

Yes     No     Not Applicable

i. All results less than PQL?

Yes     No

Comments:

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes     No

Comments:

Completed by:

Title:

Date:

Report Name:

Report Date:

Firm:

File Number:

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**LABORATORY DATA  
REVIEW CHECKLIST**

**BPJ0137**

---



## Laboratory Data Review Checklist

### 1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes       No

Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes       No

Comments:

Test America Seattle subcontracted DRO analyses to Test America Portland

### 2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes       No

Comments:

b. Correct analyses requested?

Yes       No

Comments:

### 3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ( $4^{\circ} \pm 2^{\circ} \text{C}$ )?

Yes       No

Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes       No

Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes       No

Comments:

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes     No

Comments:

e. Data quality or usability affected? Explain.

Comments:

**4. Case Narrative**

a. Present and understandable?

Yes     No

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes     No

Comments:

c. Were all corrective actions documented?

Yes     No

Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Effects on data usability or quality not determined by laboratory

**5. Samples Results**

a. Correct analyses performed/reported as requested on COC?

Yes     No

Comments:

b. All applicable holding times met?

Yes     No

Comments:

c. All soils reported on a dry weight basis?

Yes     No

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes     No

Comments:

e. Data quality or usability affected? Explain.

Comments:

## 6. QC Samples

### a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes     No

Comments:

ii. All method blank results less than PQL?

Yes     No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

v. Data quality or usability affected? Explain.

Comments:

### b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

Yes     No

Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes     No

Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

vii. Data quality or usability affected? Explain.

Comments:

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

Yes     No

Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes     No

Comments:

See QA Summary section 4.0

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

iv. Data quality or usability affected? Explain.

Comments:

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

Yes       No

Comments:

ii. All results less than PQL?

Yes       No

Comments:

See QA Summary section 4.0

iii. If above PQL, what samples are affected?

Comments:

See QA Summary section 4.0

iv. Data quality or usability affected? Explain.

Comments:

See QA Summary section 4.0

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes       No

Comments:

ii. Submitted blind to lab?

Yes       No

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

Yes       No

Comments:

iv. Data quality or usability affected?

Yes       No

Comments:

f. Decontamination or Equipment Blank (if applicable)

Yes     No     Not Applicable

i. All results less than PQL?

Yes     No

Comments:

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes     No

Comments:

Completed by:

Title:

Date:

Report Name:

Report Date:

Firm:

File Number:

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**LABORATORY DATA  
REVIEW CHECKLIST**

**BPJ0400**

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## Laboratory Data Review Checklist

### 1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes       No

Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes       No

Comments:

Test America Seattle subcontracted DRO analyses to Test America Portland

### 2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes       No

Comments:

b. Correct analyses requested?

Yes       No

Comments:

### 3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ( $4^{\circ} \pm 2^{\circ} \text{C}$ )?

Yes       No

Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes       No

Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes       No

Comments:

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes     No    Comments:

e. Data quality or usability affected? Explain.

Comments:

**4. Case Narrative**

a. Present and understandable?

Yes     No    Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes     No    Comments:

c. Were all corrective actions documented?

Yes     No    Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Effects on data usability or quality not determined by laboratory

**5. Samples Results**

a. Correct analyses performed/reported as requested on COC?

Yes     No    Comments:

b. All applicable holding times met?

Yes     No    Comments:

c. All soils reported on a dry weight basis?

Yes     No    Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes       No

Comments:

e. Data quality or usability affected? Explain.

Comments:

## 6. QC Samples

### a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes       No

Comments:

ii. All method blank results less than PQL?

Yes       No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes       No

Comments:

v. Data quality or usability affected? Explain.

Comments:

### b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

Yes       No

Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes       No

Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes       No

Comments:

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes       No

Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes       No

Comments:

vii. Data quality or usability affected? Explain.

Comments:

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

Yes       No

Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes       No

Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes       No

Comments:

iv. Data quality or usability affected? Explain.

Comments:

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

Yes       No

Comments:

ii. All results less than PQL?

Yes       No

Comments:

See QA Summary section 4.0

iii. If above PQL, what samples are affected?

Comments:

See QA Summary section 4.0

iv. Data quality or usability affected? Explain.

Comments:

See QA Summary section 4.0

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes       No

Comments:

ii. Submitted blind to lab?

Yes       No

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

Yes       No

Comments:

iv. Data quality or usability affected?

Yes       No

Comments:

f. Decontamination or Equipment Blank (if applicable)

Yes     No     Not Applicable

i. All results less than PQL?

Yes     No

Comments:

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes     No

Comments:

Completed by:

Title:

Date:

Report Name:

Report Date:

Firm:

File Number:



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**LABORATORY DATA  
REVIEW CHECKLIST**

**BPJ0470**

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## Laboratory Data Review Checklist

### 1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes       No

Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes       No

Comments:

Test America Seattle subcontracted DRO analyses to Test America Portland

### 2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes       No

Comments:

b. Correct analyses requested?

Yes       No

Comments:

### 3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ( $4^{\circ} \pm 2^{\circ} \text{C}$ )?

Yes       No

Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes       No

Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes       No

Comments:

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes     No

Comments:

\_\_\_\_\_

c. Data quality or usability affected? Explain.

Comments:

\_\_\_\_\_

**4. Case Narrative**

a. Present and understandable?

Yes     No

Comments:

\_\_\_\_\_

b. Discrepancies, errors or QC failures identified by the lab?

Yes     No

Comments:

\_\_\_\_\_

c. Were all corrective actions documented?

Yes     No

Comments:

\_\_\_\_\_

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Effects on data usability or quality not determined by laboratory

**5. Samples Results**

a. Correct analyses performed/reported as requested on COC?

Yes     No

Comments:

\_\_\_\_\_

b. All applicable holding times met?

Yes     No

Comments:

\_\_\_\_\_

c. All soils reported on a dry weight basis?

Yes     No

Comments:

\_\_\_\_\_

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes       No

Comments:

e. Data quality or usability affected? Explain.

Comments:

## 6. QC Samples

### a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes       No

Comments:

ii. All method blank results less than PQL?

Yes       No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes       No

Comments:

v. Data quality or usability affected? Explain.

Comments:

### b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

Yes       No

Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes       No

Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes       No

Comments:

---

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes       No

Comments:

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v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

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vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes       No

Comments:

---

vii. Data quality or usability affected? Explain.

Comments:

---

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

Yes       No

Comments:

---

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes       No

Comments:

---

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes       No

Comments:

---

iv. Data quality or usability affected? Explain.

Comments:

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

Yes       No

Comments:

ii. All results less than PQL?

Yes       No

Comments:

See QA Summary section 4.0

iii. If above PQL, what samples are affected?

Comments:

See QA Summary section 4.0

iv. Data quality or usability affected? Explain.

Comments:

See QA Summary section 4.0

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes       No

Comments:

ii. Submitted blind to lab?

Yes       No

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

Yes       No

Comments:

iv. Data quality or usability affected?

Yes       No

Comments:

f. Decontamination or Equipment Blank (if applicable)

Yes     No     Not Applicable

i. All results less than PQL?

Yes     No

Comments:

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes     No

Comments:

Completed by:

Title:

Date:

Report Name:

Report Date:

Firm:

File Number:

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**LABORATORY DATA  
REVIEW CHECKLIST**

**BPJ0543**

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## Laboratory Data Review Checklist

### 1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes       No

Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes       No

Comments:

Test America Seattle subcontracted DRO analyses to Test America Portland

### 2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes       No

Comments:

b. Correct analyses requested?

Yes       No

Comments:

### 3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ( $4^{\circ} \pm 2^{\circ} \text{C}$ )?

Yes       No

Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes       No

Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes       No

Comments:

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes     No

Comments:

e. Data quality or usability affected? Explain.

Comments:

#### 4. Case Narrative

a. Present and understandable?

Yes     No

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes     No

Comments:

c. Were all corrective actions documented?

Yes     No

Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Effects on data usability or quality not determined by laboratory

#### 5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes     No

Comments:

b. All applicable holding times met?

Yes     No

Comments:

c. All soils reported on a dry weight basis?

Yes     No

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes       No

Comments:

e. Data quality or usability affected? Explain.

Comments:

## 6. QC Samples

### a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes       No

Comments:

ii. All method blank results less than PQL?

Yes       No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes       No

Comments:

v. Data quality or usability affected? Explain.

Comments:

### b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

Yes       No

Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes       No

Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes

No

Comments:

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes

No

Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes

No

Comments:

vii. Data quality or usability affected? Explain.

Comments:

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

Yes

No

Comments:

See QA Summary section 4.0

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes

No

Comments:

See QA Summary section 4.0

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes

No

Comments:

iv. Data quality or usability affected? Explain.

Comments:

See QA Summary section 4.0

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

Yes

No

Comments:

ii. All results less than PQL?

Yes

No

Comments:

See QA Summary section 4.0

iii. If above PQL, what samples are affected?

Comments:

See QA Summary section 4.0

iv. Data quality or usability affected? Explain.

Comments:

See QA Summary section 4.0

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes

No

Comments:

ii. Submitted blind to lab?

Yes

No

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

Yes

No

Comments:

iv. Data quality or usability affected?

Yes

No

Comments:

f. Decontamination or Equipment Blank (if applicable)

Yes     No     Not Applicable

i. All results less than PQL?

Yes     No

Comments:

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes     No

Comments:

Completed by:

Title:

Date:

Report Name:

Report Date:

Firm:

File Number:



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**LABORATORY DATA  
REVIEW CHECKLIST**

**BPJ0574**

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## Laboratory Data Review Checklist

### 1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes       No

Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes       No

Comments:

Test America Seattle subcontracted DRO analyses to Test America Portland

### 2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes       No

Comments:

b. Correct analyses requested?

Yes       No

Comments:

### 3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ( $4^{\circ} \pm 2^{\circ} \text{C}$ )?

Yes       No

Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes       No

Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes       No

Comments:

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes       No

Comments:

e. Data quality or usability affected? Explain.

Comments:

#### 4. Case Narrative

a. Present and understandable?

Yes       No

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes       No

Comments:

c. Were all corrective actions documented?

Yes       No

Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Effects on data usability or quality not determined by laboratory

#### 5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes       No

Comments:

b. All applicable holding times met?

Yes       No

Comments:

c. All soils reported on a dry weight basis?

Yes       No

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes     No

Comments:

e. Data quality or usability affected? Explain.

Comments:

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes     No

Comments:

ii. All method blank results less than PQL?

Yes     No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

v. Data quality or usability affected? Explain.

Comments:

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

Yes     No

Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes     No

Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

vii. Data quality or usability affected? Explain.

Comments:

c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

Yes     No

Comments:

ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes     No

Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

iv. Data quality or usability affected? Explain.

Comments:

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

Yes       No

Comments:

ii. All results less than PQL?

Yes       No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Data quality or usability affected? Explain.

Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes       No

Comments:

ii. Submitted blind to lab?

Yes       No

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

Yes       No

Comments:

iv. Data quality or usability affected?

Yes       No

Comments:

f. Decontamination or Equipment Blank (if applicable)

Yes     No     Not Applicable

i. All results less than PQL?

Yes     No

Comments:

[Empty text box for comments]

ii. If above PQL, what samples are affected?

Comments:

[Empty text box for comments]

iii. Data quality or usability affected? Explain.

Comments:

[Empty text box for comments]

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes     No

Comments:

[Empty text box for comments]

Completed by:

Title:  Date:

Report Name:  Report Date:

Firm:  File Number:

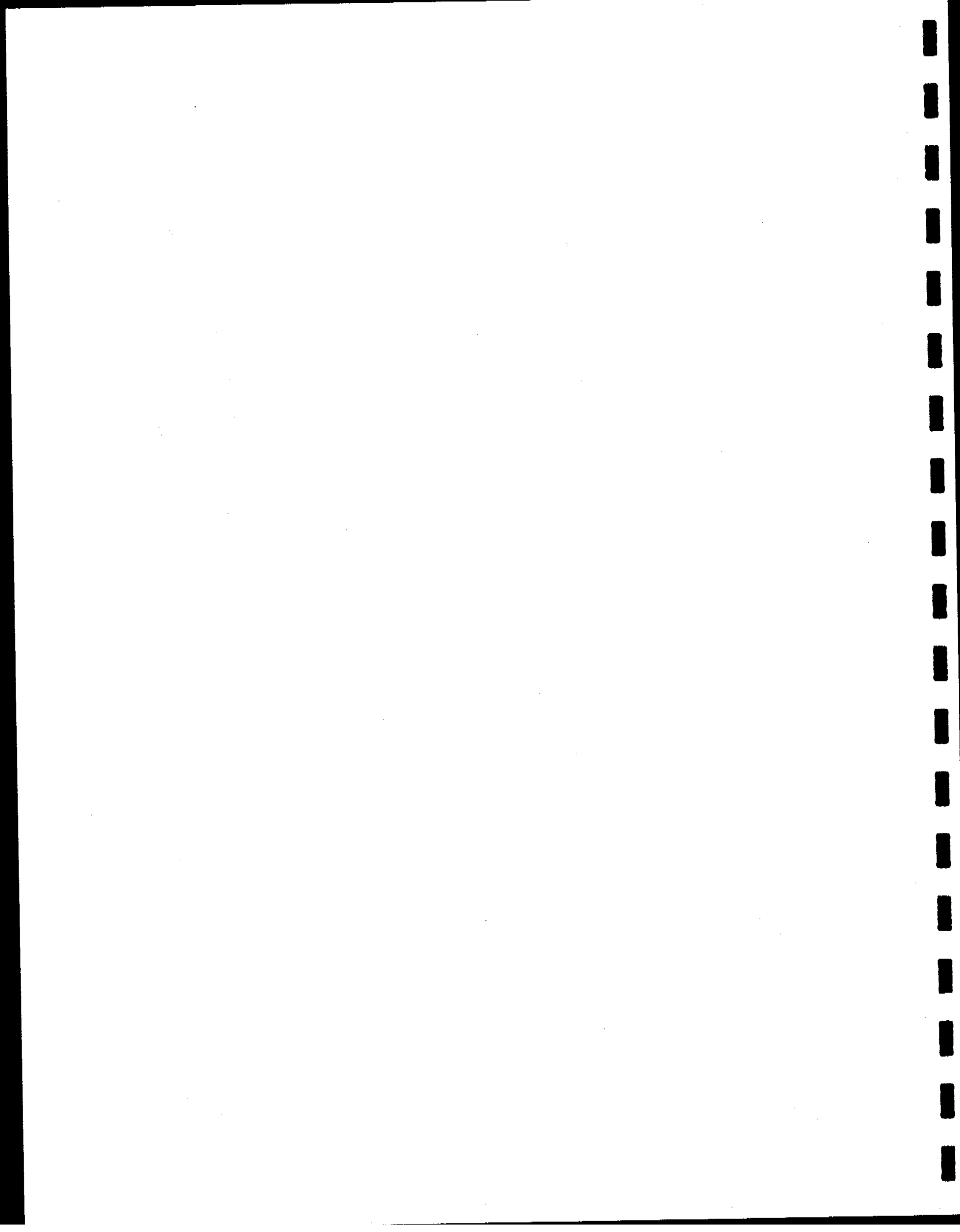


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**LABORATORY DATA  
REVIEW CHECKLIST**

**BPJ0608**

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## Laboratory Data Review Checklist

### 1. Laboratory

a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes       No

Comments:

b. If the samples were transferred to another "network" laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes       No

Comments:

Test America Seattle subcontracted DRO analyses to Test America Portland

### 2. Chain of Custody (COC)

a. COC information completed, signed, and dated (including released/received by)?

Yes       No

Comments:

b. Correct analyses requested?

Yes       No

Comments:

### 3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ( $4^{\circ} \pm 2^{\circ} \text{C}$ )?

Yes       No

Comments:

b. Sample preservation acceptable - acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes       No

Comments:

c. Sample condition documented - broken, leaking (Methanol), zero headspace (VOC vials)?

Yes       No

Comments:

See QA Summary section 4.0

d. If there were any discrepancies, were they documented? - For example, incorrect sample containers/preservation, sample temperature outside of acceptance range, insufficient or missing samples, etc.?

Yes     No

Comments:

e. Data quality or usability affected? Explain.

Comments:

#### 4. Case Narrative

a. Present and understandable?

Yes     No

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes     No

Comments:

c. Were all corrective actions documented?

Yes     No

Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

Effects on data usability or quality not determined by laboratory

#### 5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes     No

Comments:

b. All applicable holding times met?

Yes     No

Comments:

c. All soils reported on a dry weight basis?

Yes     No

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes     No

Comments:

e. Data quality or usability affected? Explain.

Comments:

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes     No

Comments:

ii. All method blank results less than PQL?

Yes     No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

v. Data quality or usability affected? Explain.

Comments:

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

Yes     No

Comments:

ii. Metals/Inorganics - One LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes     No

Comments:

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

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iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes     No

Comments:

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v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

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vi. Do the affected samples(s) have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

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vii. Data quality or usability affected? Explain.

Comments:

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c. Surrogates - Organics Only

i. Are surrogate recoveries reported for organic analyses - field, QC and laboratory samples?

Yes     No

Comments:

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ii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes     No

Comments:

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iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes     No

Comments:

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iv. Data quality or usability affected? Explain.

Comments:

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

i. One trip blank reported per matrix, analysis and cooler?

Yes       No

Comments:

ii. All results less than PQL?

Yes       No

Comments:

iii. If above PQL, what samples are affected?

Comments:

iv. Data quality or usability affected? Explain.

Comments:

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes       No

Comments:

ii. Submitted blind to lab?

Yes       No

Comments:

iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil)

Yes       No

Comments:

iv. Data quality or usability affected?

Yes       No

Comments:

f. Decontamination or Equipment Blank (if applicable)

Yes     No     Not Applicable

i. All results less than PQL?

Yes     No

Comments:

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes     No

Comments:

Completed by:

Title:

Date:

Report Name:

Report Date:

Firm:

File Number:

