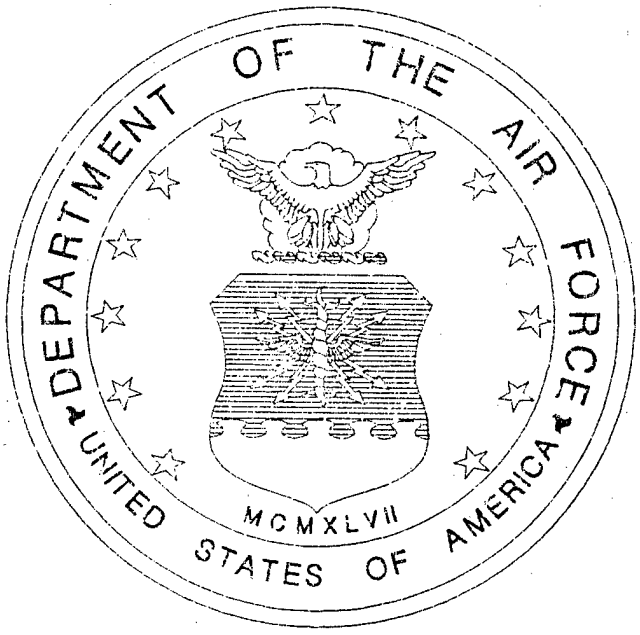
DRAFT

1997 Sitewide Monitoring Program Report



Eielson Air Force Base, Alaska

February 1998

DRAFT

1997 Sitewide Monitoring Program Report

Eielson Air Force Base, Alaska

Prepared for:

Eielson Air Force Base, Alaska

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February 1998 **12796.33.4020**

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This report has been prepared for the United States Air Force by EA Engineering, Science, and Technology to aid in the implementation of periodic environmental monitoring under the Air Force Installation Restoration Program (IRP). The limited objectives of this report and the ongoing nature of the IRP, along with the evolving knowledge of site conditions and chemical effects on the environment and health, must be considered when evaluating this report, since subsequent facts may become known which may make this report premature or inaccurate.

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EXECUTIVE SUMMARY

Sampling, analysis, and field testing to determine environmental conditions were conducted at Eielson Air Force Base (Eielson AFB) during the 1997 field season as part of the annual Sitewide Monitoring Program (SWMP). The SWMP covers long-term environmental monitoring and restoration of sites at Eielson AFB under the Federal Facilities Agreement (FFA) and other environmental regulations. Environmental samples were collected during the 1997 field season from sites under investigation. The samples were analyzed for selected chemical constituents based on location-specific rationale developed previously, during the Remedial Investigation/Feasibility Study (RI/FS), the Source Evaluation Report (SER) phases, and the 1994, 1995, and 1996 SWMP. The 1997 scope of work was based largely on 1996 SWMP results and consisted of sampling and analyses of groundwater and aquatic biota at several locations on Eielson AFB.

One task added during the 1997 SWMP was field screening of selected monitor wells using groundwater parameters such as pH, conductivity, temperature, Ohmicron immunoassay test kits for Total benzene, toluene, ethylbenzene, and xylenes (BTEX), and Dräger Liquid Extraction (DLE) test kits for perchloroethylene (PCE) and trichloroethylene (TCE) field analyses. Field screening was implemented to reduce the number of laboratory analyses on an annual basis, while still monitoring and recording groundwater quality as required by regulations. Sites sampled as part of the 1997 SWMP are:

- North Boundary Wells (downgradient of all known sources of environmental impact)
- Source areas where the result of the RI/FS or SER process was a Record of Decision (ROD) of "no further action with continued groundwater monitoring"
- Some source areas where remedial action is under way, including operable units 1 and 2 (OU1 and OU2) hydrocarbon remediation by bioventing and NAPL removal
- Some former underground storage tank (UST) sites being addressed under the Alaska UST program
- Some sites being managed as part of the Sitewide OU, including Garrison Slough

Eielson AFB source areas were grouped into OUs 1–6. The RODs for OUs 1–6 and the Sitewide ROD have been signed. Remedial design/remedial action is in progress at OUs 1–5. The ROD for OU6 specified continued groundwater monitoring under the SWMP.

This report presents the 1997 SWMP results with historical records for each site, including a summary of the conceptual model of contaminant occurrence and prior analytical results. Results of previous studies of basewide groundwater chemistry and physical properties are also presented.

This report will be reviewed for scoping of future SWMP efforts. Additional areas may be included or excluded in the program for monitoring as needed. Future SWMP data results will be presented in this report format.

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LIST OF ACRONYMS AND ABBREVIATIONS

AAC	Alaska Administrative Code
ACS	American Chemical Society
ADEC	State of Alaska Department of Environmental Conservation
AFB	Air Force Base
AFCEE	(U.S.) Air Force Center for Environmental Excellence
AGRA	AGRA Earth and Environmental, Inc.
ARAR	Applicable or Relevant and Appropriate Requirement
AST	above ground storage tank
ASTM	American Society for Testing and Materials
BEAR	Basewide Environmental Analysis and Restoration
BEHP	bis (2-ethylhexyl) phthalate
bgs	below ground surface
BRA	Baseline Risk Assessment
BTEX	benzene, toluene, ethylbenzene, and xylenes
BX	base exchange
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeters
CO_2	carbon dioxide
COC	chain of custody
COCs	Contaminants of Concern
CQAO	Corporate Quality Assurance Officer
CQAP	Corporate Quality Assurance Program
CRREL	(U.S. Army) Cold Regions Research and Engineering Laboratory
D	laboratory duplicate
DCDFM	Dichlorodifluoromethane
DCE	1,2-dichloroethene
DI	deionized
DNAPL	dense non-aqueous phase liquid
DO	dissolved oxygen
DRO	diesel-range organics
DTW	depth to water
EA	EA Engineering, Science, and Technology
EOD	explosive ordnance disposal
EPA	(U.S.) Environmental Protection Agency
FFA	Federal Facilities Agreement
FSP	Field Sampling Plan
FNSB	Fairbanks North Star Borough
ft	feet
g	grams
gal	gallons
GIS	geographic information system
GPS	global positioning system
GRO	gasoline-range organics
HC	hydrocarbons

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

HLA	Harding Lawson Associates
HSP	Health and Safety Plan
IDL	instrument detection limit
IDW	investigative derived waste
IRP	Installation Restoration Program
IT	International Technology Corporation
LCS	laboratory control sample
LEL	lower explosive limit
LF	landfill
LIMS	Laboratory Information Management System
LNAPL	light non-aqueous phase liquid
LPM	Laboratory Project Manager
LQAC	Laboratory Quality Assurance Coordinator
LUST	leaking underground storage tank
km	kilometers
MCL	maximum contaminant level
MDL	method detection limit
MW	monitor well
MWTS	mobile water treatment system
NAPL	non-aqueous phase liquid
μg/kg	micrograms per kilogram
μg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
min	minutes
mm	millimeters
MOGAS	motor gasoline
MS	matrix spike
MSD	matrix spike duplicate
NCR	Nonconformance Report
NFA	no further action
NIST	National Institute of Standards and Technology
O_2	oxygen
OB/OD	open burning/open detonation
OU	Operable Unit
PAHs	polynuclear aromatic hydrocarbons
PARCC	precision, accuracy, representativeness, completeness, and comparability
PCBs	polychlorinated biphenyls
PCE	perchloroethylene, or tetrachloroethane
PE	Performance Evaluation
PM	Project Manager
PNL	(Battelle) Pacific Northwest Laboratory
POL	petroleum, oil, and lubricants
PP	product probe

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

ppb	parts per billion
ppm	parts per million
PQL	practical quantitation limit
PRM	Program Manager
PSA	Pine & Swallow Associates, Inc.
PVC	polyvinyl chloride
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
RAO	remedial action objective
RAWP	Remedial Action Workplan
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
RL	reporting limit
ROD	Record of Decision
RPD	Relative Percent Difference
RPM	Remedial Project Manager
SAP	Sampling and Analysis Plan
SER	Source Evaluation Report
SM	Site Manager
SOP	Standard Operating Procedure
sq km	square kilometers
SSHO	Site Safety and Health Officer
STR	Senior Technical Reviewers
SVE	soil vapor extraction
SVOC	semivolatile organic compound
SWMP	Sitewide Monitoring Program
TAP	Trans-Alaska Pipeline
TCA	trichloroethane
TCE	trichloroethene
TOC	top of casing
TPH	Total Petroleum Hydrocarbons
UCL	Upper Confidence Limit
UEL	upper explosive limit
UNH	University of New Hampshire
USAF	United States Air Force
UST	underground storage tank
UWRL	Utah Water Research Laboratory
VOC	volatile organic compound

1. INTRODUCTION

In November 1989, Eielson Air Force Base (Eielson AFB), near Fairbanks, Alaska, was listed on the National Priorities List of federal Superfund sites by the U.S. Environmental Protection Agency (EPA). The Federal Facilities Agreement (FFA) for Eielson AFB was signed in May 1991 by the United States Air Force (USAF), EPA, and State of Alaska Department of Environmental Conservation (ADEC). The FFA identified 64 potential sources of contamination. Sixty of these sources have been addressed in either a Remedial Investigation/Feasibility Study (RI/FS) under an Operable Unit (OU), or through the Source Evaluation Report (SER) process. Record of Decision (ROD) documents for OU1, OU2 (and some SER sites), and OU6 were signed in 1994. A ROD for OUs 3,4,5 (including some SER sites) was signed in 1995. Amendments to the OU2 and OU3,4,5 RODs were completed in 1997. The final ROD under the FFA, the Sitewide ROD, was also signed in 1997.

The Sitewide Monitoring Program (SWMP) was established in 1992 to provide and record information about groundwater and surface water quality to support ongoing RI/FS work and establish a framework for continued monitoring during environmental restoration activities. Field work, including environmental sampling and collection of groundwater elevation data, has been performed every year since 1992. The data from 1992 through 1994 was presented in the Sitewide RI report (USAF 1995a) and is also summarized in this report.

SWMP results are reviewed annually to assist in decision making for sites in the program. Sites may be added or dropped from the program upon review. Historical results from previous phases of the Installation Restoration Program (IRP) work are summarized in this report. Some source-area-specific information was compiled from RI/FS and SER reports and output from the BEAR system. Area-wide studies of physical and chemical hydrogeology were completed for the Sitewide RI report (USAF 1995a) to establish groundwater flow directions and aquifer properties, groundwater-surface water interactions, and baseline environmental chemistry for groundwater and surface water.

Chapter 1 of this report identifies the 1997 SWMP objectives at Eielson AFB and provides background information. The site specific work performed, results, and rationale for selecting sampling locations, parameters, and methods are described in Chapter 2.

1.1 1997 SITEWIDE MONITORING OBJECTIVES

The overall objective of the SWMP is to develop a record of environmental conditions over time at Eielson AFB. Source areas identified for investigation under the FFA may be selected for remediation, limited action, or no further action (NFA). The status of remedial decisions at source areas is shown in Table 1-1. Monitoring is ongoing at many source areas; active remediation is ongoing at OU1 and OU2 source areas and at Garrison Slough. The record will be used for periodic review of remedial progress and the status of NFA sites. Review of remedial progress for each OU will occur five years after respective ROD signatures.

TABLE 1-1 Source Area Status Summary

Source Area or Site	Grouping	Description	Decision Document	Remedy
ST20	OU1	E-7, E-9 Complexes (Refueling Loop)	OU1 ROD	Bioventing, NAPL Recovery
ST20	OU1	E-8 Complex (Refueling Loop)	OU1 ROD	NFA, Monitoring
ST48	OU1	Power Plant Area	OU1 ROD	Bioventing, NAPL Recovery
ST49	OU1	Alert Hangar	OU1 ROD	NFA; Monitoring
SS50	OU1	Blair Lakes Vehicle Maintenance	OU1 ROD	NAPL Recovery
SS51	OU1	Blair Lakes Ditch	OU1 ROD	NAPL Recovery
SS52	OU1	Blair Lakes Diesel Spill	OU1 ROD	NAPL Recovery
SS53	OU1	Blair Lakes Fuel Spill	OU1 ROD	NFA
DP54	OU1	Blair Lakes Drum Disposal	OU1 ROD	NFA
DP44	OU3	Battery Shop Leach Field Building	OU 3,4,5 ROD	Monitoring; Institutional Controls
WP45	OU3	Photo Lab, Building 1163	OU 3,4,5 ROD	Monitoring; Institutional Controls
ST56	OU3	Engineer Hill Fuel Spill Area	OU 3,4,5 ROD	Wellhead treatment as appropriate; Monitoring; Institutional Controls
SS57	OU3	Fire Station Parking Lot	OU 3,4,5 ROD	Monitoring; Institutional Controls
SS61	OU3	Vehicle Maintenance, Building 3213	OU 3,4,5 ROD	Monitoring; Institutional Controls
DP25	OU4	E-8 Fuel Tank Sludge Burial Pit	OU 3,4,5 ROD	Monitoring; Institutional Controls
ST27	OU4	E11 Fuel Tank Storage Area	OU 3,4,5 ROD	NFA
WP32	OU4 (SER)	Sewage Treatment Plant Spill	OU 3,4,5 ROD	NFA
WP33	OU4	Treated Effluent Infiltration Pond	OU 3,4,5 ROD	NFA
SS35	OU4	Asphalt Mixing Area	OU 3,4,5 ROD	Monitoring; Institutional Controls
SS36	OU4	Drum Storage Site	OU 3,4,5 ROD	NFA
SS37	OU4	Drum Storage, Asphalt Mixing Area	OU 3,4,5 ROD	NFA
SS39	OU4	Asphalt Lake	OU 3,4,5 ROD	NFA
DP55	OU4 (SER)	Birch Lakes Burial Site	OU 3,4,5 ROD	NFA
ST58	OU4	Old QM Service Station	OU 3,4,5 ROD	Bioventing; Institutional Controls; Monitoring
SS63	OU4	Asphalt Lake Spill Site	OU 3,4,5 ROD	NFA
SS64	OU4	Trans Maintenance Spill Site	OU 3,4,5 ROD	NFA
LF01	OU5 (SER)	Original Base Landfill	OU 3,4,5 ROD	NFA; Monitoring
LF02	OU5	Old Base Landfill	OU 3,4,5 ROD	NFA; Monitoring
LF03	OU5	Current Base Landfill (inactive)	OU 3,4,5 ROD	Monitoring; Institutional Controls
LF04	OU5	Old Army Landfill and EOD Area	OU 3,4,5 ROD	NFA; Monitoring
LF06	OU5	Old Landfill	OU 3,4,5 ROD	NFA under FFA; Monitoring under Sitewide
FT09	OU5	Fire Training Area	OU 3,4,5 ROD	Grouped with LF03
WP38	OU6	Ski Lodge Well Contamination	OU 6 ROD	Monitoring; Institutional Controls

Notes:

NFA — No further action.

ROD — Record of Decision.

SER — Source Evaluation Report.

TABLE 1-1 Source Area Status Summary (continued)

Source Area or Site	Grouping	Description	Decision Document	Remedy
WP34	none	Sewage Sludge Drying Beds	IRP/State (no document)	Not carried to SER Phase 2
LF43	none	Asbestos Landfill	IRP/State	Closed under SER Phase 1
SS46	none	KC 135 Crash Site, Gate 2	IRP/State	Closed under SER Phase 1
ST59	none	Dining Hall	IRP/State	Closed under SER Phase 1
SS01	Chena Res.	Building 500	IRP/State	Investigation required
ST10	OU2	E-2 POL Storage	OU2 ROD	Bioventing; NAPL Recovery
ST11	OU2	Fuel Saturated Area	OU2 ROD	NFA; Monitoring
ST13	OU2	E-4 Fuel Saturated Area	OU2 ROD	Bioventing; NAPL Recovery
SS14	OU2	E-2 RR JP4 Fuel Spill Area	OU2 ROD	Bioventing; NAPL Recovery
ST18	OU2	Oil Boiler Fuel Saturated Area	OU2 ROD	NFA; Monitoring
ST19	OU2	JP4 Fuel Line Spill	OU2 ROD	NFA; Monitoring
DP26	OU2	Fuel Tank Sludge Burial Area	OU2 ROD	Bioventing; NAPL Recovery
LF05	OU2 (SER)	Old Army Landfill	OU2 ROD	NFA; Monitoring
LF07	OU2 (SER)	Test Landfill	OU2 ROD	NFA
FT08	OU2 (SER)	Fire Training Area, Past	OU2 ROD	NFA
SS12	OU2 (SER)	JP4 Fuel Spill, Building 2354	OU2 ROD	NFA
ST15	OU2 (SER)	Multi product Fuel Line	OU2 ROD	NFA
ST16	OU2 (SER)	MOGAS Fuel Line Spill	OU2 ROD	NFA
ST17	OU2 (SER)	Carol Pipeline Spill	OU2 ROD	NFA
SD21	OU2 (SER)	Road Oiling - Quarry Road	OU2 ROD	NFA
SD22	OU2 (SER)	Road Oiling - Industrial Road	OU2 ROD	NFA
SD23	OU2 (SER)	Road Oiling - Manchu Road	OU2 ROD	NFA
SD24	OU2 (SER)	Road Oiling - Gravel Haul Road	OU2 ROD	NFA
DP28	OU2 (SER)	Fly Ash Disposal Site	OU2 ROD	NFA
DP29	OU2 (SER)	Drum Burial Site	OU2 ROD	NFA
SS30	OU2 (SER)	PCB Storage Facility	OU2 ROD	NFA
SS31	OU2 (SER)	PCB Storage Facility	OU2 ROD	NFA; Monitoring
DP40	OU2 (SER)	Power Plant Sludge Pit	OU2 ROD	NFA
SS41	OU2 (SER)	Auto Hobby Shop, Past	OU2 ROD	NFA
SS42	OU2 (SER)	Misc. Storage & Disposal Facility	OU2 ROD	NFA
SS47	OU2 (SER)	Commissary Parking Lot Fuel Spill	OU2 ROD	NFA
WP66	OU2 (SER)	New Auto Hobby Shop	OU2 ROD	NFA
SS62	OU2 (SER)	Garrison Slough (General)	OU2 ROD	NFA
SS67	Sitewide	Garrison Slough (PCB Contamination)	Sitewide ROD	Removal Action; Monitoring

Notes:

NFA No further action.

ROD Record of Decision.

SER Source Evaluation Report.

Table 1-2 summarizes 1997 SWMP sampling activities, and the rationale is discussed in site-specific portions of Chapter 2. General objectives of the 1997 SWMP were:

- Filling of data gaps in the monitor well inventory and locating well coordinates using Global Positioning Station (GPS) units.

- Inputting data into the Well Inventory Spreadsheet and using well coordinates to complete the Basewide Monitor Well Location Map(s).

- Collecting groundwater elevations across the base to record the downgradient direction and inferred flow patterns in the alluvial aquifer relative to prior results; monitor wells were inventoried and maintained as appropriate.

- Modifying the SWMP groundwater monitoring procedures to reduce the number of samples requiring laboratory analyses annually, while still measuring groundwater quality at each monitored source area. These objectives were met by implementing the following procedures:

    - Continued annual collection of groundwater samples for laboratory analyses for source areas undergoing active remediation.

    - Development and implementation a schedule for periodic groundwater sample collection for source areas requiring long term monitoring. Collection of samples for laboratory analyses was reduced to a frequency of once per two years, once per three years, or once per five years, based on site specific conditions and/or source area locations in relation to potential sensitive receptors.

    - Implementation of field screening using Ohmicron immunoassay and Dräger Liquid Extraction (DLE) field test kits. These test kits were used for wells located at Active Monitoring Sites and the North Boundary Wells. Contaminants of concern (COCs) that could be field tested using these kits included total BTEX, perchloroethylene (PCE), and trichloroethylene (TCE).

    - Continued annual collection of groundwater parameters from wells proposed for monitoring under the 1997 SWMP. The parameters measured included dissolved oxygen (DO), pH, eH, conductivity, turbidity, and temperature. During the 1994, 1995, and 1996 SWMP monitoring events, groundwater parameters were collected and recorded to determine when an adequate volume of groundwater had been purged from each well. This data was combined with 1997 parameter data to create a groundwater quality record at each site requiring groundwater monitoring, and was used to monitor substantial changes in groundwater quality which might indicate contaminant migration. Groundwater parameters were collected for all Category 1, 2, and 4 wells (Table 1-2) monitored under the 1997 SWMP.

TABLE 1-2: SITE BY SITE 1997 SWMP SAMPLING ACTIVITIES CATEGORY 1 SITES -- OLD LANDFILLS

Subcategory A: (Landfills which are considered to have the highest risk due to location and/or contaminant concentrations).

SITE/SOURCE AREA	WELLS MONITORED	*COCs	1997 SWMP SAMPLING ACTIVITY/OTHER COMMENTS
LF03/FT09	03M01, 03M04, 03M08, 03M09, 03M10, 03M11, 03M12, 03M13, 09M02	BTEX, TCE, DCE, vinyl chloride, pesticides	1997 monitoring included measuring groundwater parameters for specified wells. Well 03M09 was sampled for PCBs and pesticides (EPA method 8080).
LF04	04M04, 04M07	POL, Solvents, Phenols, Metals	1997 monitoring included measuring groundwater parameters for specified wells.

Subcategory B: (Landfills which are considered to have lower risk due to location and/or contaminant concentrations).

SITE/SOURCE AREA	WELLS MONITORED	*COCs	1997 SWMP SAMPLING ACTIVITY/OTHER COMMENTS
LF01	01MW03, 01MW04	VOCs, Metals	1997 monitoring included measuring groundwater parameters for specified wells.
LF02	02M01, 02MW08 (W-8)	VOCs, Metals	1997 monitoring included measuring groundwater parameters for specified wells.
LF05	05M01	VOCs, Metals	1997 monitoring included measuring groundwater parameters for specified wells.
LF06	06M02, 06M04	VOCs	1997 monitoring included measuring groundwater parameters for specified wells.

*As listed in 1996 SWMP Report

TABLE 1-2: SITE BY SITE 1997 SWMP SAMPLING ACTIVITIES CATEGORY 2 (Active Remediation) SITES

Active Remediation - Sites impacted with substances above regulatory concern that are currently undergoing active remediation and monitoring.

SITE/SOURCE AREA	WELLS MONITORED	*COCs	1997 SWMP SAMPLING ACTIVITY/OTHER COMMENTS
ST10/SS14	10-1, 10-3, 10-8, 10MW12, 14-2, W-1	BTEX	**Analyzed 10-1, 10-3, 10MW12, 14-2, and W-1 for 8020 and 8270 (2-methylnapthalene, napthalene). **Analyzed 10-8 for 8020, AK101, and AK102.
ST13/DP26	13MW07, 26-1, 26-12, 26-15	BTEX, Lead	**Analyzed 13MW07, 26-12, and 26-15 for 8020, 8270 (2-methylnapthalene, napthalene). **Analyzed 26-1 for 8020, 7421, 6010 (dissolved lead), 8270 (2-methylnapthalene, naphthalene).
ST20 (E-7)	20M09, 20M11, 53M04	BTEX	**Analyzed selected wells for 8020, 8270 (acetophenone).
ST20 (E-9)	20M07, 20M08, 20M23	BTEX	**Analyzed selected wells for 8010 (chlorobenzene), 8020.
ST48	48M01, 48M04, 48M05, 48M06, 53M03	BTEX	**Analyzed selected wells for 8010 (trans-1,2-dichloroethylene), 8020.
SS50/52	50M01, 50M06, 50M07	BTEX	**Analyzed selected wells for 8020. 50M01 was frozen and not sampled. 50M05 was destroyed, well 50M07 was sampled in its place.

*Modified from 1996 SWMP Report.

**8010 - Volatile Organics, Halocarbons; 8020 - Volatile Organics, Aromatics; 8270 - Semi-Volatile Organics; 6010 - total and dissolved metals; 7421 - Lead; AK101 - Gasoline Range Organics; AK102 - Diesel Range Organics

TABLE 1-2: SITE BY SITE 1997 SWMP SAMPLING ACTIVITIES CATEGORY 2 (Active Monitoring) SITES

Active Monitoring - Sites impacted with substances above regulatory concern that are currently undergoing monitoring only.

SITE/SOURCE AREA	WELLS MONITORED	*COCs	1997 SWMP SAMPLING ACTIVITY/OTHER COMMENTS
Building 2375 UST Site	MW-3, MW-6	BTEX, GRO, DRO	**Analyzed selected wells for 602, AK101, AK102.
ST11	11-3	BTEX	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX immunoassay kit.
ST18	18-3	BTEX Chlorinated Solvents	**Analyzed selected well for 8010, 8020
ST19	19-1, 19MW06	BTEX	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX immunoassay kit.
ST20 (E-8)	20M15	BTEX	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX immunoassay kit.
DP25	25M04, 25M06, 25-2, 53M01	BTEX, Lead	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX immunoassay kit.
ST27	B-8, B-11, B-19	BTEX Lead	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX immunoassay kit.

*Modified from 1996 SWMP Report.

**602 - Volatile Organics; 8010 - Volatile Organics, Halocarbons; 8020 - Volatile Organics, Aromatics; AK101 - Gasoline Range Organics; AK102 - Diesel Range Organics.

TABLE 1-2: SITE BY SITE 1997 SWMP SAMPLING ACTIVITIES CATEGORY 2 (Active Monitoring) SITES

Active Monitoring - Sites impacted with substances above regulatory concern that are currently undergoing monitoring only.

SITE/SOURCE AREA	WELLS MONITORED	*COCs	1997 SWMP SAMPLING ACTIVITY/OTHER COMMENTS
SS31	W-4	Halogenated hydrocarbons	Specified well was not sampled as it could not be located in the field.
SS35	35M02, 35M05, 35M08 Fish, aquatic invertebrates, aquatic plants.	BTEX, VOCs, Pesticides	Specified wells analyzed for 8080 (PCBs and pesticides). Aquatic biota (invertebrates and vegetation) analyzed for 8080 (PCBs and pesticides).
WP38	8621, 38M01, 38M02, 38M06, 38M18	BTEX, Lead	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX immunoassay kit.
DP44 UIC Well: Bldg 1133, 1134, 1140	44M04, 44M05, 44M08, 44MW11I	BTEX, Chlorinated Solvents	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX and chlorinated solvent immunoassay kits.
WP45/ST57 UIC Well: Bldg 1183	45M01, 45M03, 45MW08	BTEX, Chlorinated Solvents	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX and chlorinated solvent immunoassay kits.
ST49 UIC Well: Bldg 1300	49M05, 49M06	BTEX, Chlorinated Solvents	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX and chlorinated solvent immunoassay kits.

*Modified from 1996 SWMP Report.

TABLE 1-2: SITE BY SITE 1997 SWMP SAMPLING ACTIVITIES CATEGORY 2 (Active Monitoring) SITES

Active Monitoring - Sites impacted with substances above regulatory concern that are currently undergoing monitoring only.

SITE/SOURCE AREA	WELLS MONITORED	*COCs	1997 SWMP SAMPLING ACTIVITY/OTHER COMMENTS
ST56	septic system, well head	BTEX, Chlorinated Solvents	**Analyzed septic system and well head for 8010 and 8020.
ST58	58MW10	BTEX, Lead	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX immunoassay kit.
SS61/64	61MW02	BTEX, Chlorinated Solvents	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX and chlorinated solvent immunoassay kits.
Garrison Slough	Sediment, Soil, Fish	PCBs	**Analyzed sediment, soil, and fish for 8080.

*Modified from 1996 SWMP Report.

**8010 - Volatile Organics, Halocarbons; 8020 - Volatile Organics, Aromatics; 8080 - PCBs / pesticides.

TABLE 1-2: SITE BY SITE 1997 SWMP SAMPLING ACTIVITIES
CATEGORY 4 SITES - NORTH BOUNDARY WELLS

SITE/SOURCE AREA	WELLS MONITORED	*COCs	1997 SWMP SAMPLING ACTIVITY/OTHER COMMENTS
NORTH BOUNDARY WELLS	51MB1, 51MB3, 51MB4, 51MB5, 08M01	VOCs, SVOCs	1997 monitoring included measuring groundwater parameters and field screening groundwater quality using BTEX and chlorinated solvent immunoassay kits. **Analyzed specified wells for 8010, 8020

*Modified from 1996 SWMP Report.

**8010 - Volatile Organics, Halocarbons; 8020 - Volatile Organics, Aromatics.

1.2 EIELSON AFB SITE SETTING

Eielson AFB is an active military installation. Eielson AFB provides housing for resident military personnel and their dependents, and employment and services for civilians from the surrounding area. The developed portion of Eielson AFB is located on the level floodplain of the Tanana River, approximately 40 kilometers (km) southeast of Fairbanks, Alaska. The eastern portion of the base is an area of steeper slopes located in the Yukon-Tanana uplands. Figure 1-1 illustrates Eielson AFB in relation to Fairbanks and other surrounding features, and Figure 1-2 depicts Eielson AFB and the majority of the base source areas.

Background environmental information for the base, including ecology, physical and chemical hydrogeology, and history of the source areas, has been studied during the RI/FS process and results presented in previous reports. The most comprehensive presentation of this information is included in the Sitewide RI Report (USAF 1995a). The following information is quoted or summarized from previous documents.

1.2.1 Demographics and Land Use

Eielson AFB is within the Fairbanks North Star Borough (FNSB), a county-scale local government. Fairbanks is the urban center of FNSB. College, North Pole, and Moose Creek are suburban/rural areas within FNSB. North Pole is approximately 11 km northwest of the base (population 5,000), and Moose Creek is approximately 4.8 km north of the base (population 510). The Trans-Alaska Pipeline (TAP) transects the middle of the base for a distance of approximately 8 km (Figures 1-1 and 1-2).

Land surrounding the base is primarily used for military training associated with Fort Wainwright, an active Army installation located northwest of Eielson AFB. Land north and east of the base is owned by the U.S. Army. Northwest of Eielson AFB is Moose Creek and the Chena River Flood Control Project, which is owned by the State of Alaska. The base owns land west to Piledriver Slough. Land located between Piledriver Slough and the Tanana River is privately held. Twenty-Three Mile Slough is a subdivision of residences located southwest of the base. Land west of the Tanana River is owned by the U.S. Army.

Approximately 5,500 people live on Eielson AFB. Military housing is located in the central portion of the base, east of Industrial Drive. Eielson AFB includes an elementary school, a junior high school, and a high school administered by the FNSB School District. Some children who live off-base also attend these schools. Some base property is used for recreational purposes, including playing fields, gardening, berry picking, fishing, recreational vehicle camping in the summer months, seasonal hunting and trapping, and skiing in winter months.

Groundwater is used for drinking water at Eielson AFB and nearby communities. Water from base supply wells is treated to remove iron and sulfate. Groundwater is also the principal supply for industrial, domestic, agricultural, and fire-fighting uses.

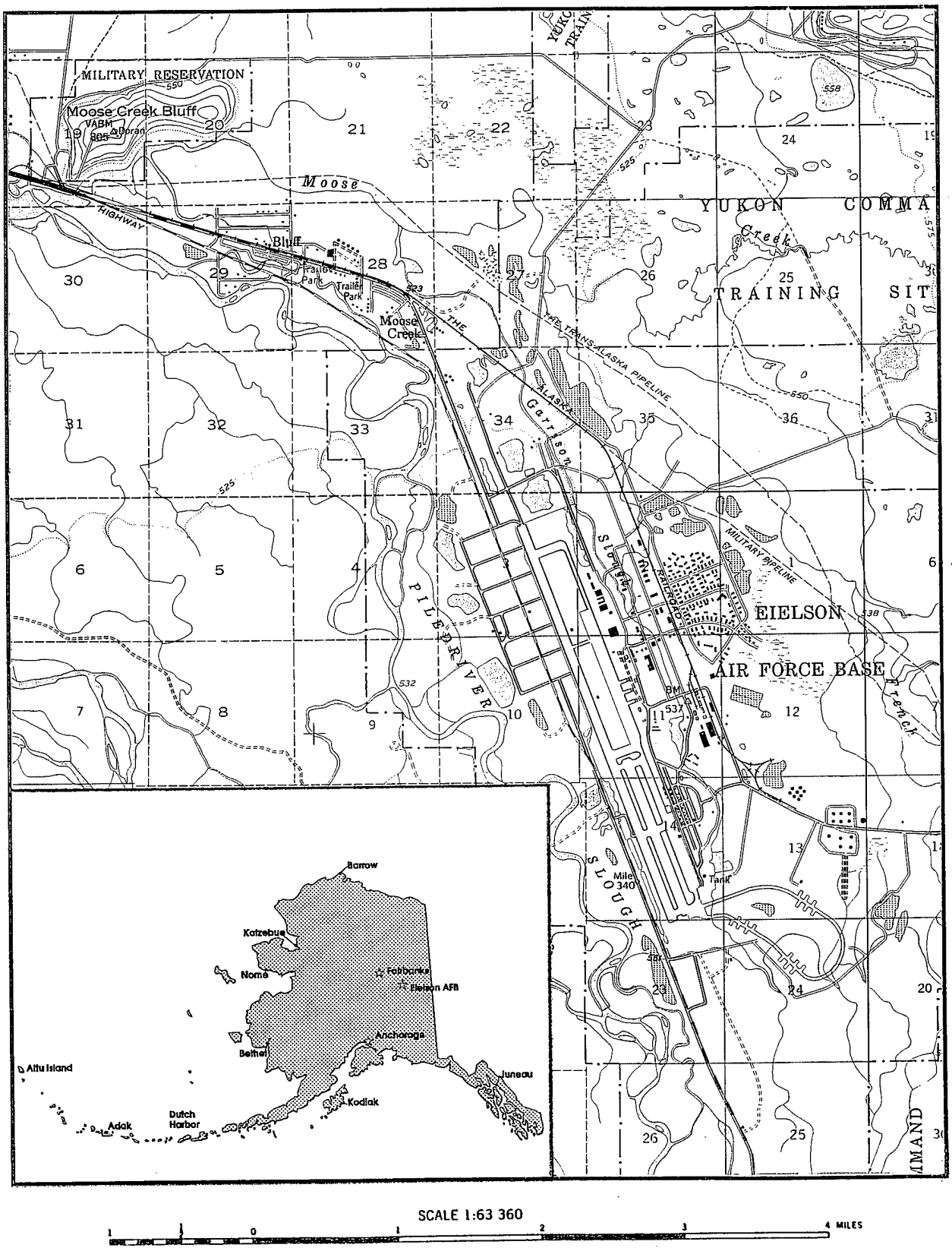

Figure 1-1: Eielson Air Force Base Location

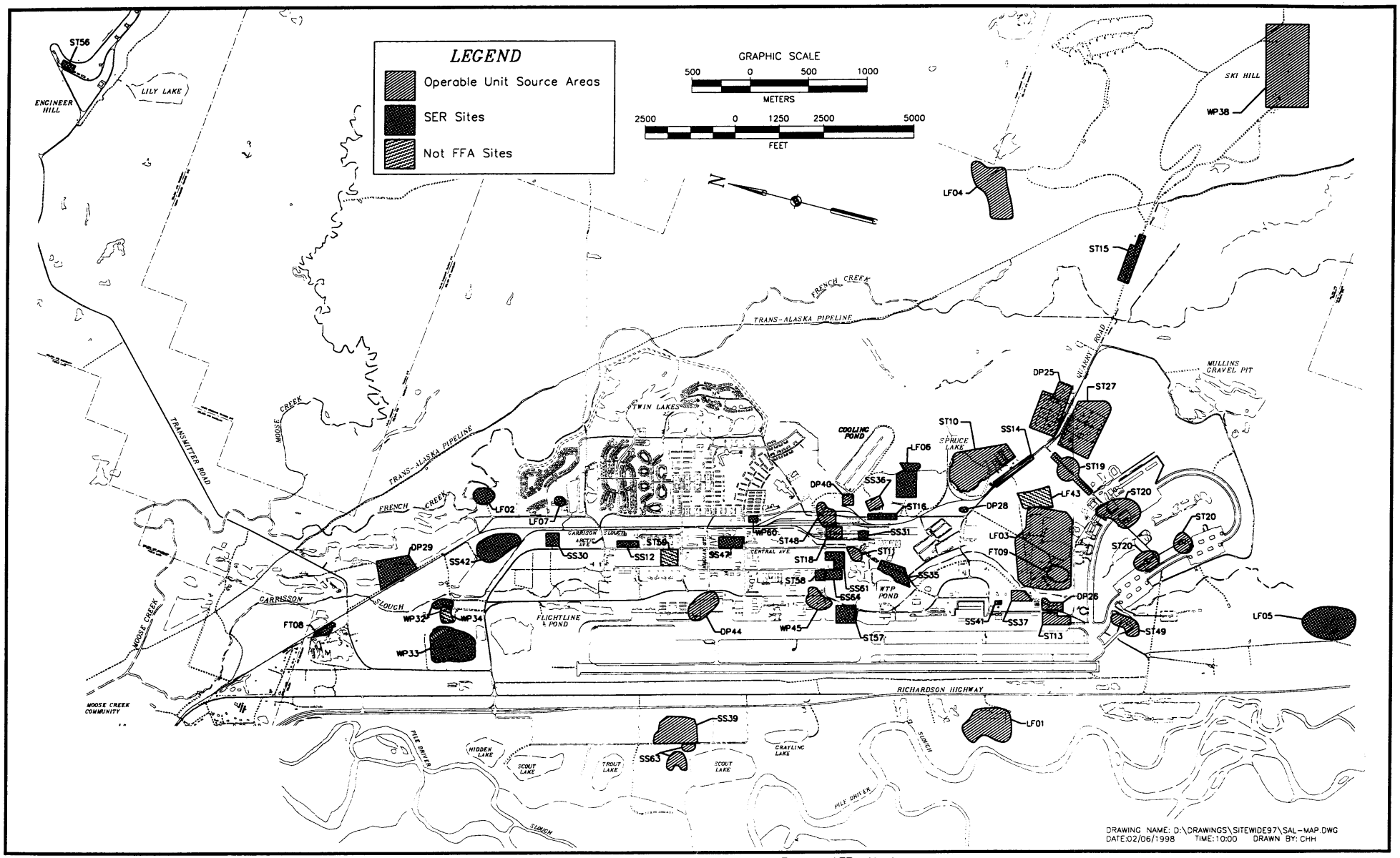

Figure 1-2. Source Area Locations, Eielson AFB, Alaska

In addition to the main base water supply wells and power plant cooling wells located near the base power plant, seven small-capacity wells serve remote base areas and 12 fire wells exist. Forty-one private wells are located within five kilometers of the base, mostly north-northwest of the base in or near the community of Moose Creek (HLA 1991).

Demographic information was used to construct current and future hypothetical risk scenarios evaluated in the Baseline Risk Assessment (BRA) for each OU. The BRA for OUs 1–6 estimated risk for the hypothetical future residential scenario, and the BRA for the Sitewide OU estimated risk for a recreational use scenario that included recreational fishing in Garrison Slough, and human consumption of fish caught from Garrison Slough.

1.2.2 Ecological Resources

An analysis of biological systems and species present at Eielson AFB is presented in the Sitewide Biological Risk Assessment Report (USAF 1995b). Eielson AFB consists of a mosaic of 13 habitat types; the major terrestrial and aquatic communities are summarized below.

Terrestrial Communities

Eight major terrestrial wildlife habitats covering approximately 65 sq km occur at Eielson AFB: black spruce forest, white spruce forest, mature birch forest, young birch forest, balsam poplar forest, willow shrub, old burn, and grassland/mown habitat. The primary wildlife species found in these habitats include black bear, marten, moose, red squirrel, grouse, raptors, snowshoe hare, beaver, and voles.

Aquatic Communities

Aquatic habitat types at Eielson AFB include low-gradient streams, ponds, lakes, and marshes covering approximately 45 sq km. Species assemblages vary according to physical and chemical characteristics of surface water. Seventeen species of fish are found on Eielson AFB, including northern pike, rainbow trout, and grayling. Chum salmon (*Oncorhynchus keta*) were observed spawning in French Creek near Quarry Road in August and September 1994. Waterfowl also frequent surface water bodies at Eielson AFB.

Threatened and Endangered Species

No threatened or endangered plant or animal species live on Eielson AFB. However, the American peregrine falcon (federal listed endangered species) breeds within 80 km of the base. Bald eagles and golden eagles (protected under the Bald and Golden Eagle Protection Act) are occasionally sighted on Eielson AFB.

1.2.3 Geology

The geology of Eielson AFB is known from published geological maps of the surrounding regions. Bedrock units consisting of Precambrian and Paleozoic-age pelitic schists, micaceous quartzites, and subordinate phyllite and marble crop out in the hills northeast of the base. These units have been locally intruded by a series of Cretaceous to lower Tertiary granodioritic to quartz monzanitic intrusions. Precious metal deposits related to these intrusions are present near Eielson AFB and elsewhere in the Fairbanks region. The headwaters of both French Creek and Moose Creek are underlain by Tertiary granodiorite of the Eielson pluton (Weber et al. 1978).

During the Quaternary period, alluvial fans built up along the southern margin of the Tanana River Valley by rapid uplift of the Alaska Range and glacial advances and retreats. Aggradation of the river plain built up a thick, layered sequence of unconsolidated silts, sands, and gravels. Unconsolidated sediments are approximately 200 to 300 feet thick beneath Eielson AFB. Glacial outwash plains at the base of the Alaska Range provided wind-blown silts that were transported northward and deposited as loess mantles along the crystalline uplands. Silt has also accumulated at lower elevations with plant debris in organic muck deposits.

Numerous small faults are mapped in the pre-Tertiary metamorphic units. Larger regional faults border the major petrologic units within the bedrock and probably extend under the Tanana floodplain deposits (Beikman 1980). In 1937, a magnitude 7.3 earthquake occurred with an epicenter at Salcha Bluff, about 21 km southeast of Eielson AFB (Pewe 1982).

1.2.4 Hydrogeology

The developed portion of Eielson AFB is located on the Tanana River floodplain, which is underlain by unconsolidated fluvial and glaciofluvial deposits approximately 200–300 feet thick. These sediments are composed primarily of sand and gravel with cobbles up to 20 cm in diameter. The silt and clay content is variable, but generally less than 10 percent. The floodplain sediments overlie crystalline bedrock associated with the Birch Creek Schist Formation (Figure 1-3).

Surface water bodies near Eielson AFB include rivers, creeks, sloughs, lakes, ponds, and wetlands. Surface drainage at Eielson AFB is generally north-northwest, parallel to the Tanana River. Several small sloughs or creeks pass through the base and discharge into the Tanana River. Moose Creek is the main receiving stream for small local drainages around the base. Both French Creek, along the eastern edge of the base, and Piledriver Slough, along the western edge, discharge into Moose Creek just above its confluence with the Tanana River. Garrison Slough also discharges into Moose Creek.

Garrison Slough passes directly through the developed portion of the base and consists primarily of engineered drainage channels. Portions of Garrison Slough are enclosed in culverts near the refueling loop (source area ST20). Prior to 1979, effluent from the base sewage treatment plant was discharged into Garrison Slough.

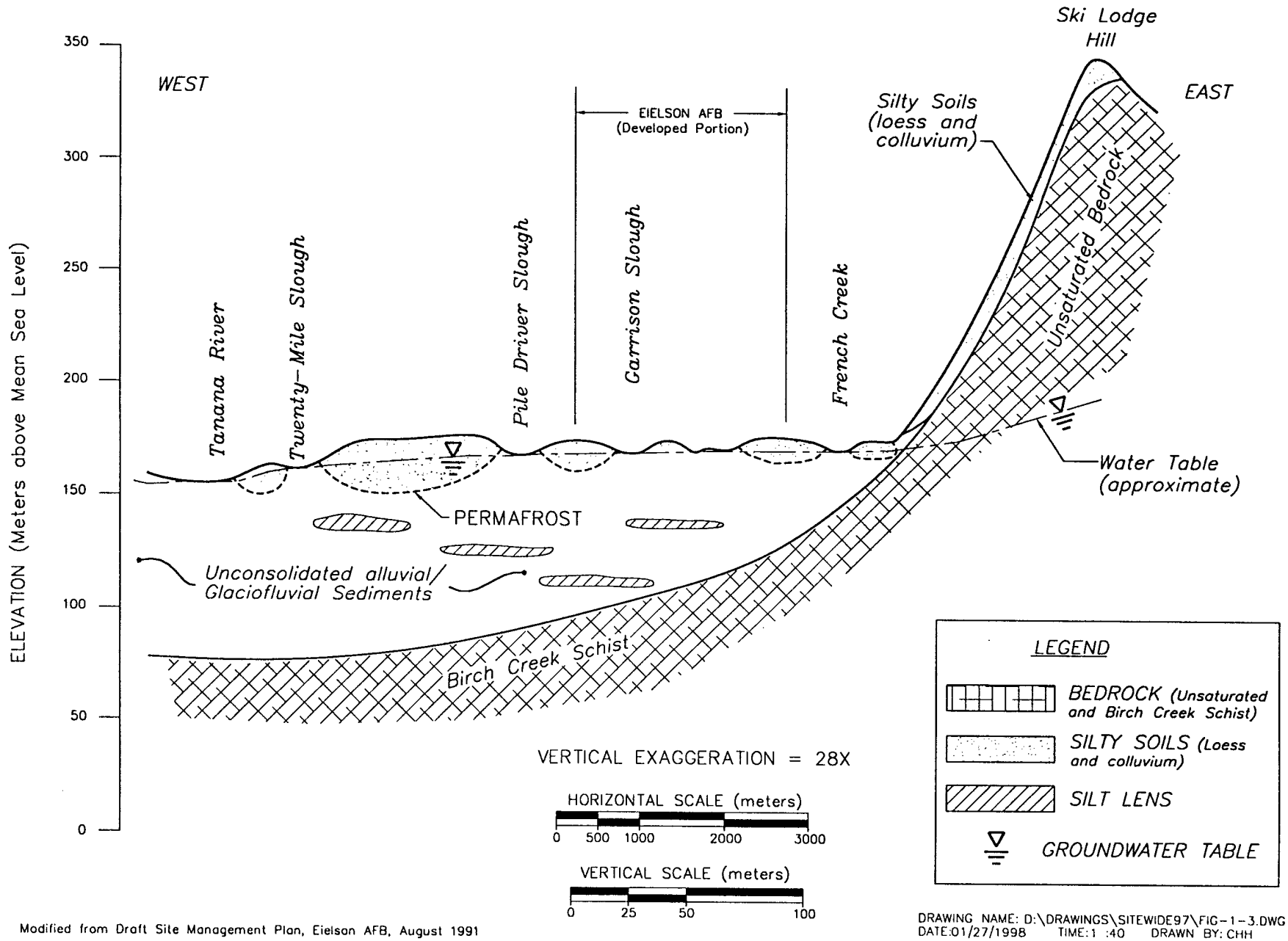

Figure 1–3. Generalized Hydrogeologic Cross Section (from PNL 1995 SWRI)

Physical Hydrogeology

Results of previous studies to characterize physical properties of the aquifers at Eielson AFB are presented in the Sitewide RI (USAF 1995a). Some general hydrogeologic information is useful for a conceptual understanding of groundwater flow in the aquifers and site-specific estimation of contaminant transport at the source areas:

- Groundwater on the developed part of the base occurs at depths of 6–10 feet below ground surface (bgs) in a water table aquifer composed of layered sand and gravel (alluvial) sediments associated with Tanana River floodplain aquifer. Downgradient flow directions are generally north-northwest at a gradient of 0.001–0.002, parallel with the downstream flow of the Tanana River. A group of wells was selected for periodic gauging and calculation of groundwater elevation as part of the SWMP. Local variations in flow directions occur on Eielson AFB near surface water bodies, near Power Plant pumping supply wells, and near melting piles of stored snow that create a source of recharge water during breakup.

- Information on vertical gradients was collected from several sets of well pairs or clusters. Gauging data suggests a downward gradient may exist in the upper part of the alluvial aquifer in areas where information was collected. The vertical gradient measurements were made at LF03 (wells 03M05, 03M06, and 03M07), ST10 (wells 10-8 and 10MW8I), and at DP26 (wells 26-2 and 26-2I). Most base monitor wells are completed in the upper 10 to 15 feet of the water table aquifer. Mid-level wells were completed approximately 15–24 feet below the top of the aquifer (LF03, ST48, ST10, DP26, and DP44). Deep wells were completed approximately 80–100 feet below the top of the aquifer (LF03 and ST48).

- Groundwater in the upland portion of the base occurs at depths of approximately 50–300 feet in a fractured bedrock aquifer. Downgradient flowpaths and extent of contaminants are not well constrained in this aquifer. Bedrock aquifers in the Fairbanks vicinity generally have low hydraulic conductivities, and may contain metal concentrations (including iron, manganese, arsenic) exceeding drinking water quality standards. The conceptual model of the bedrock aquifer hydrogeology is groundwater flow and contaminant transport is controlled largely by heterogeneities in the bedrock, such as fractures or relatively permeable lenses or layers. Only two source areas (WP38 and ST56) are located within the bedrock aquifer. These source areas have not been completely investigated due to the difficulty of installing monitor wells and because a more complete understanding of contaminant extent would not change remedial decisions. Selected remedies for these sources include natural attenuation with continued groundwater monitoring.

- Groundwater elevations in the alluvial aquifer are subject to regular seasonal fluctuations, with the highest elevations occurring during snowpack melting during

April or May, and the lowest elevations in late fall. A slow rise in water levels is normal during winter. The magnitude of fluctuations varies from year to year in the range of 1.5 to 2.0 feet.

- Surface water elevation measurements in Garrison Slough (relative to groundwater elevations) indicate the slough receives water from the aquifer along most of its length. One exception is a one kilometer length of the slough located immediately downstream of the treatment plant overflow pond, where the slough loses water to the aquifer. Excess water from the water supply wells is discharged into the pond behind the water treatment plant.

- Water budget trends have been studied at other watersheds near Ester Dome in the Fairbanks area (Geick and Kane 1986). These aquifers are located above the level of the Tanana River floodplain aquifer, but general water budget cycle information is useful to develop a water budget conceptual model for sites at Eielson AFB.

  - Winter (October to April) is a period of net loss of stored groundwater. No groundwater recharge is possible due to frozen surface water in the form of snow and ice. Extensive seasonal frost may develop in the unsaturated portion of the aquifer.

  - During spring, water from melting snow provides recharge to the aquifer, contributes to stored soil moisture, or runs off as surface water. Surface water runoff dominates the water balance loss during the snowmelt period.

  - During summer and fall net water loss from the aquifer occurs because evapotranspiration is greater than input from precipitation. Brief rain showers during the summer are generally not substantial enough to provide recharge to the aquifer. Precipitation events in fall can be heavy enough to overcome the declining evapotranspiration to provide groundwater recharge, but the recharge is small relative to the spring snowmelt events (Geick and Kane 1986).

- Hydraulic properties of the sand and gravel aquifer have been investigated by pump testing and slug testing conducted by Harding Lawson Associates (HLA) in 1988-89 (near SS36 and ST20 E-7), and by International Technology Corporation (IT) in 1995 at ST13/DP26 (IT 1995a). The U.S. Army Cold Regions Research and Engineering Laboratory (CRREL) conducted pump testing in the area of ST48 in 1995. IT considered the results of the earlier testing in the design and interpretation of their 1995 testing. The IT results indicate that the hydraulic conductivity of the upper 50 feet of the aquifer is 380 ft/day, a value that is typical of clean sands and gravels. Using the mean hydraulic gradient of 0.002, IT calculated groundwater seepage velocity for the ST13/DP26 area at 3 ft/day.

Groundwater Chemistry

- The nature and extent of groundwater contamination at each source area was characterized in an RI or SER report. Contaminants identified in base groundwater are primarily petroleum, oil, and lubricant (POL) products and solvents. Source-area-specific sampling and analysis rationale and a summary of the historical results for each source area included in the SWMP are presented in Chapter 2.

- The North Boundary Wells are located hydraulically downgradient (north-northwest) of the developed portion of the base. Groundwater from these five wells has been sampled periodically since 1988, and analyzed for a broad range of contaminant compounds to monitor the quality of groundwater leaving the base. Analytical results are presented in Chapter 2.

- Background groundwater quality at Eielson AFB has been characterized through collection and analysis of samples from 16 wells located in contamination-free areas in the alluvial aquifer of the lowland (developed) portion of the base. Background groundwater quality in the bedrock aquifer was not investigated. Results were reported in the Sitewide RI. No organic compounds were detected in the background groundwater samples. However, analysis for diesel range organics (DRO) was not done on any of these samples. The samples were analyzed both for total metals and dissolved metals. Background metal concentrations in groundwater are summarized in Table 1-3. Average iron and manganese concentrations in groundwater typically exceed the secondary maximum contaminant levels (MCLs) for drinking water, and arsenic was measured at greater than the primary MCL of 50 micrograms per liter (μg/L) in one sample. Background metal concentrations do not appear to exhibit seasonal variation. Table 1-3 illustrates total metal concentrations were generally higher in 1994 than in prior rounds. Battelle Pacific Northwest Laboratory (PNL) reported in the 1994 SWMP report that laboratory preparation for the 1994 samples included a digestion before analysis; prior samples were not digested before analysis.

  PNL calculated mean and 95 percent Upper Confidence Limit (UCL) values for the total metals results using all the analytical rounds. The total metals mean and UCL values were recalculated using the 1994 totals because laboratory preparation and analysis for those samples is comparable to the most recent total metals results. Site-specific tables are presented in Chapter 2 for sites requiring metal analysis in 1996. For ease of comparison, the mean and 95 percent UCL background concentrations for each metal, total and dissolved, are presented in each table.

- In 1995, Utah Water Research Laboratory (UWRL) studied natural attenuation of volatile organic compound (VOC) groundwater contaminants in the alluvial aquifer at WP45/SS57 and ST13/DP26. The study indicated contaminant plumes at these source areas have stabilized, or are decreasing in lateral extent.

TABLE 1-3
AVERAGE METALS CONCENTRATIONS IN BACKGROUND GROUNDWATER SAMPLES (adapted from PNL SWGWMPR)

	Concentration (µg/L)			
Metal	June 1992	June 1993	August 1993	September 1994
Total				
Aluminum	NA	142	129	7538
Arsenic	8.9	8.7	9.7	25
Barium	107	107	108	269
Calcium	49000	47813	49750	58625
Chromium	<20	<5.42	<5.42	20
Copper	<20	<2.65	<2.65	75
Iron	2374	2420	2218	16938
Lead	<5	<1	<0.6	21
Magnesium	10588	10006	9938	17375
Manganese	1457	1545	1604	3875
Nickel	<30	<17.9	<17.9	31
Potassium	3175	3125	3213	5650
Sodium	4619	3675	3844	8363
Vanadium	<30	<3.84	<3.84	24
Zinc	<10	<3.44	<3.44	63
Dissolved				
Aluminum	NA	<32.5	<32.5	43
Arsenic	NA	6.9	8.8	8.3
Barium	100	100	106	101
Calcium	48494	47563	49688	51750
Chromium	<20	<5.42	<5.42	<1.0
Copper	<20	<2.65	<2.65	2.4
Iron	1694	1790	1825	1736
Lead	NA	<1	<0.6	<1.0
Magnesium	10319	9988	9869	10450
Manganese	1409	1542	1577	1789
Nickel	<30	<17.9	<17.9	2.3
Potassium	3175	2829	3150	3400
Sodium	4438	3619	3838	4563
Vanadium	<30	<3.84	<3.84	<1.0
Zinc	<10	<3.44	<3.44	5.6

Surface Water Chemistry

Surface water samples were collected from all major surface water bodies at the base and analyzed for contaminants during the Sitewide RI. Analytical results were presented in the Sitewide RI. The sampling and analysis objective was to provide information about any surface water contamination that might pose a risk to human health or ecological receptors.

This study indicated Garrison Slough is the surface water body most affected by base activities. VOCs, including benzene, ethylbenzene, 1,2-dichloroethene (DCE), and trichloroethene (TCE), were detected in water samples from Garrison Slough. The maximum concentration detected was 1.8 μg/L of benzene, which is below the EPA drinking water MCL of 5 micrograms per liter (μg/L). The VOCs may be entering slough waters from adjacent source areas.

The pesticides 4,4'-DDD and 4,4'-DDE were detected in Garrison Slough water samples. The maximum concentration detected was 0.052 μg/L of 4-4'-DDD in 1993. ARAR MCLs and EPA drinking water MCLs were not identified for these compounds. No pesticides were detected in the surface water samples collected by PNL in 1994.

Sediment Chemistry

Sediment samples were collected for analyses from selected base water bodies during the Sitewide RI. The sampling and analysis objective was to provide information about the extent and nature of any sediment contamination that might pose a risk to human health or ecological receptors. Results indicate Garrison Slough sediments contain pesticides and polychlorinated biphenyls (PCBs). Analytical results for Garrison Slough are presented in the Sitewide RI report (USAF 1995a). Sediment samples were collected for laboratory analyses from Garrison Slough and SS35 during 1996. These findings are summarized in Chapter 2.

2. 1997 SITEWIDE MONITORING PROGRAM RATIONALE AND WORK

The 1997 field season work involved gauging and sampling groundwater from selected wells at Eielson AFB, and collection and analysis of soil, sediment, and aquatic organism samples as necessary. Groundwater samples were collected from source areas undergoing active remediation, the North Boundary Wells, and other selected sites undergoing active monitoring; field screening of groundwater quality was conducted in selected sites undergoing active monitoring, and the North Boundary Wells (Exposure 1, Appendix A). Sediment and fish samples were collected for laboratory analyses from the lower portion of Garrison Slough, and aquatic plants and organisms were collected for laboratory analyses from the pond associated with SS35 (Exposures 2 and 3, Appendix A). Groundwater parameters were measured and recorded at all sampled monitor wells during the 1997 SWMP. All analytical samples were analyzed at an off-site laboratory. Rationale for sample collection and parameter collection were based on a site-by-site historical review and previous results for each source area. Sampling activities for the 1997 SWMP are summarized in Table 1-2.

The regulatory decision status of each source area is shown in Table 1-1. The source areas are arranged in numerical order in this section for ease of reference. Site maps and data summary tables for each source area considered under the Sitewide program are included in this section. Site settings and results are discussed below. All information in this section was obtained from previous reports written for Eielson AFB and from field work performed in 1997. The most recent source of information for each of the source areas is referenced in this section.

Each source area section contains a narrative, figures, and site-specific tables summarizing analytical data. Abbreviated titles for reference documents are listed in the tables for particular data sources. A list of these references with abbreviated titles and corresponding formal titles is included as Appendix B.

2.1 GROUNDWATER GAUGING, SURVEYING, AND WELL INVENTORY

Water table elevation results for prior gauging rounds were calculated by subtracting the measured depth to water from the surveyed top-of-casing data available in existing hard-copy reports from Eielson AFB. This information is presented in Appendix C. Figures 2-1 and 2-2 are groundwater gradient maps for April 1997 (Spring breakup) and October 1997 (Winter). These maps demonstrate the regional (base-wide) down gradient direction remains north-northwest, even with seasonal climatic changes. This data is consistent with information gathered during previous gauging events.

In 1996, a comprehensive well inventory was initiated to gather pertinent information regarding well conditions and whether they were suitable for continued monitoring (Exposure 4, Appendix A). A substantial number of wells and other monitor points (product probes and microwells) were installed at the FFA source areas since at least 1988. The 1996 well inventory

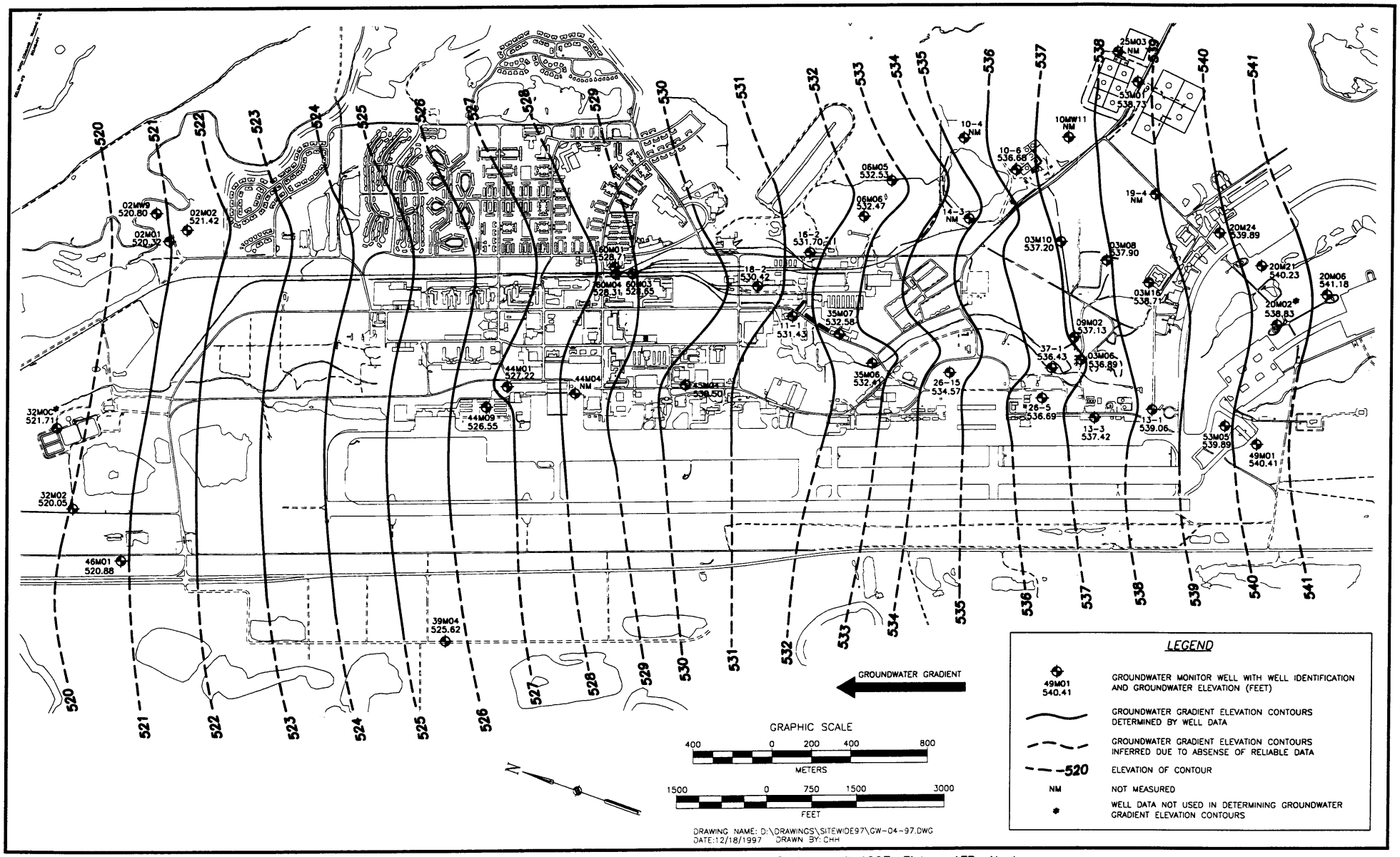

Figure 2–1. Groundwater Gradient Elevations During April 1997, Eielson AFB, Alaska

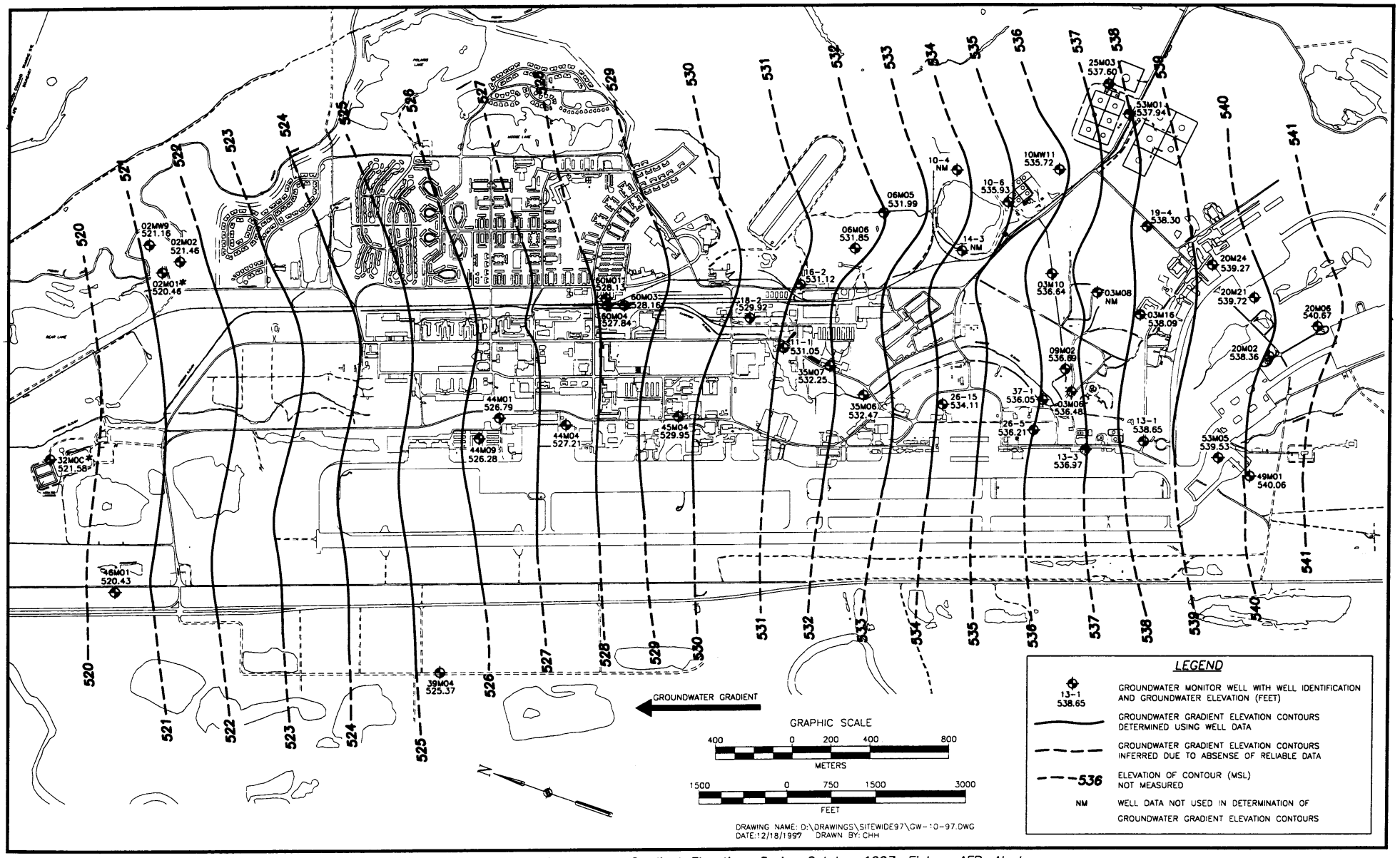

Figure 2–2. Groundwater Gradient Elevations During October 1997, Eielson AFB, Alaska

data were incorporated into a spreadsheet which summarizes field and records review data. Information in the spreadsheet includes well location, construction information, and notation of damage or unusual field observations. A corresponding map showing well/point locations and notebook containing available well logs was also completed in 1997. The data were organized in a site/source area-specific manner.

More than 900 entries (monitor wells, product probes, recovery wells and microwells) were incorporated into the well inventory spreadsheet. Sources of information included data review of prior documents including RI/FS and SER reports, the existing Well Inventory Notebook, and 1996 and 1997 field data. Some data gaps currently exist due to missing historical and field data. These data gaps will continue to be filled if (and when) the appropriate data are located. GPS units were employed to determine well coordinates (Exposure 5, Appendix A). The intent of the well inventory is to provide a consolidation of well data which can be used as a reference to decide which wells at each source area are appropriate for sample collection, and to serve as a record of well abandonment or destruction as wells are decommissioned in the future.

2.2 1997 WELL DECOMMISSIONING ACTIVITIES

Well decommissioning activities took place at several source areas during the 1997 field season. The method used was a modification of the American Society for Testing and Materials (ASTM) Standards for decommissioning wells. The general procedure included pulling the well casing and then plugging the borehole with bentonite chips (Exposures 6 and 7, Appendix A). In some cases, if the well casing could not be successfully removed, it was cut below surface grade and the well was plugged with bentonite chips.

On 11 August 1997, wells 49M02, 49RW01, and product probes 49PP103 and 49PP104 were decommissioned along the north side of Building 1300 (ST49). The wells and probes were decommissioned by casing removal and filling the borehole with bentonite. The removals were due to construction activities associated with Building 1300.

Recovery wells, former air injection points, and other miscellaneous monitoring/recovery probes which were not deemed useable were decommissioned at ST20 (E-7) on 22 September 1997. Records research indicated many of these structures did not have a formal name. These wells and probes were decommissioned by removing the casing and filling the borehole with bentonite chips. Recovery wells (RC1, RC2, and RC3), constructed of galvanized steel culvert placed vertically into the ground, were decommissioned by excavating soil from around the structures to a depth of approximately three to five feet bgs. The culverts were cut below grade at depths of two to four ft. The remaining was filled with clean fill to the approximate top of the water table. The remaining portion of the culvert was then filled with bentonite chips that were thoroughly hydrated, and the excavation was backfilled and compacted with the native material excavated from around the recovery well. The casing of monitor well "MW" was sheared off 4 ft below grade during decommissioning. The well was filled with bentonite chips and hydrated.

On 24-26 September 1997, 31 monitoring wells were decommissioned from source areas LF02, LF03/FT09, LF04, LF05, LF06, SS35, ST11, ST15, ST16, ST17, ST19, ST20 (E-8 & E-9), ST48, ST49, WP32, and WP38. Wells were decommissioned by removing the casing and filling the boreholes with bentonite. Wells were selected for decommissioning based upon the well condition and/or the well location in relation to the source area.

2.3 MOBILE WATER TREATMENT SYSTEM (MWTS) OPERATION

The MWTS was operated during the 1997 field season to treat CERCLA derived water generated during groundwater purging, and petroleum storage tank sump pump-out (Exposure 8, Appendix A). Most water was impacted with hydrocarbons; the exception being purge water which possibly contained small quantities of other substances such as chlorinated solvents or metals which was saved for the last batch treatment during the 1997 field season. Approximately 20,900 gallons of water were treated in 1997.

Influent (untreated) water was stored in one of two 5,000 gallon above ground tanks until a sufficient batch of water was accumulated for treatment. The second 5,000 gallon tank served as backup capacity during transfer of larger quantities of water awaiting treatment. Treatment included water transfer from the influent tank into the treatment trailer. Inside the trailer, the water passed through an oil/water separator that removed any non aqueous phase liquid (NAPL), and was then filtered through two 2,200 pound activated carbon vessels (plumbed in series). The activated carbon vessels are designed to remove dissolved phase hydrocarbons.

Following treatment, the water was transferred to effluent storage tanks for eventual discharge into Eielson's sanitary sewer system, pending satisfactory laboratory analyses. Sampling protocol for each batch of water treated included one influent sample, one effluent sample, and one effluent sample duplicate. These samples were submitted for laboratory analyses. A water sample was also collected from the outflow of each activated carbon vessel. The two water samples were then field analyzed using an Ohmicron total BTEX immunoassay test kit. Results were used to determine hydrocarbon breakthrough during each treatment run. Water was transferred from the effluent tanks to a RV sanitary dump station via 500 gallon tanks when laboratory results indicated the water had been sufficiently treated.

Other activities associated with MWTS operation included coordination for winter storage in Fairbanks; characterization, removal, and disposal of spent activated carbon in both filter vessels; replacement of carbon; and calibration of the trailer's lower explosive limit/oxygen (LEL/O_2) meter (Exposures 9 and 10, Appendix A).

2.4 MANAGEMENT OF CERCLA DERIVED WASTE/DRUM DISPOSAL

During the 1996 field season, approximately 400 drums of non-hazardous CERCLA derived waste was identified, characterized, transported, and disposed of during the 1996 field season. This waste consisted primarily of drummed soil cuttings generated during prior monitor well

installations, water generated during monitor well purging, and drums of spent activated carbon. Any waste which could not be identified or was determined hazardous was transported to Eielson's Hazardous Materials Facility for proper characterization and offsite treatment/disposal.

The empty drums resulting from the waste disposal effort were staged at LF03. During the 1997 field season, most of the drums were transported for offsite disposal (plastic drums) or for recycling (steel drums) at the North Star Borough Landfill (Exposure 11, Appendix A). The following activities were associated with disposal/recycling of the drums:

- Closed-top drums were deheaded (Exposure 12, Appendix A) . The lids and rings of open top drums were removed. These steps were taken to ensure the drums contained no residual soil or water.

- If the drum contained residual soil or groundwater, the material was removed from the drum and consolidated into drums dedicated for either liquids or solids. Residual liquids, consisting of hydrocarbon impacted water, were transported to the MWTS and treated during the "last run" batch treatment of water. Residual soil was consolidated into two drums, sampled for laboratory analyses, and was transported to the Hazardous Materials facility for disposal.

- Markings on the outside of each drum (and drum lid) were covered with spray paint. In some cases, several coatings of paint were necessary to adequately cover drums markings.

- The drums were transported to the North Star Borough Landfill where poly drums were disposed of in the landfill, and steel drums were crushed and compacted into bails for recycling (Exposure 13, Appendix A).

2.5 FIELD METHOD QA/QC

QA/QC Field duplicates and equipment blanks were collected in accordance with the 1997 SWMP Workplan Addendum (USAF, 1997b). Deionized (DI) or distilled water was poured over dedicated purge and sampling equipment before it was installed in a well when equipment blanks were collected from wells set up for "low flow" purging. Store-bought distilled water was used for equipment decontamination and equipment blanks analyzed for benzene, toluene, ethyl benzene, and xylenes (BTEX), VOCs by 8010, gasoline-range organics (GRO), and diesel-range organics (DRO). DI water was provided by the analytical laboratory for trip blanks and equipment blanks requiring additional analyses.

During the 1997 field season, periodic QC problems were encountered which resulted in questionable field test data associated with use of the Ohmicron total BTEX immunoassay and DLE test kits. In many cases, the reported values from these test kits were inconsistent with historical analytical data obtained during previous monitoring events. Specific examples included:

- North Boundary Wells - during the initial 1997 North Boundary Well sampling event, the total BTEX immunoassay kit displayed total BTEX concentrations of 20 ppb, 50 ppb, and 30 ppb in wells 51MB1, 51MB3, and 08M01, respectively. These wells have consistently displayed low to non detectable BTEX concentrations since groundwater monitoring for these wells was implemented in 1992. The North Boundary Wells were sampled a second time, resulting in immunoassay total BTEX concentrations of 20 ppb, and 40 ppb for wells 51MB3 and 08M01, respectively. The North Boundary Wells were sampled a third time for both laboratory analyses and field testing using the total BTEX immunoassay kit. BTEX concentrations were below detection limits for the laboratory samples, as well as for the samples tested with the total BTEX immunoassay kit.

- WP38 - Monitor wells 8621 and 38M01 have consistently displayed significant concentrations of BTEX compounds during previous sampling events. Total BTEX immunoassay test results indicated wells 8621 and 38M01 contained total BTEX concentrations below detection limits. Hydrocarbon odors were noted by field staff during collection of water samples from these wells.

- DP44 - Monitor wells 44M04 has displayed significantly elevated TCE concentrations during previous sampling events. Field testing results, using the DLE test kit, indicated TCE concentrations below detection limits (10ppb) during the 1997 sampling event.

The following table provides a representative comparison between previous laboratory results for selected monitor wells, and results obtained for these wells using the field test kits.

Well	Total BTEX Immunoassay Results Range (ppb)	Laboratory Results Range (µg/L)
51MB1	0.0nd - 20	<0.202 - 1.1
51MB3	nd - 50	<0.202 - <5.0
08M01	nd-40	<0.202 - 5.2
38M01	0.02nd	400 - 4,476
8621	nd	352
Well	**DLE Test Kit Range for TCE (ppb)**	**Laboratory Results Range for TCE (µg/L)**
44M04	nd	48 - 2,500
45M01	40.32	330 - 440
45MW08	99.12	2,000 - 7,200

2.6 LABORATORY METHOD QA/QC

Laboratory Quality Assurance/Quality Control (QA/QC) procedures used for this project are detailed in Section 3 (QAPP) of the SWMP Workplan (USAF 1996e). Laboratory quality control is evaluated in the narrative section of each laboratory report which contains observations made during sample analysis, summarizes the results of quality control measurements, and addresses the impact on data usability based on project data quality objectives. Samples and analytes for which data usability may have been impacted are noted in the site-specific tables. All direct sample data including results for samples, field blanks and duplicates, and laboratory spikes, duplicates, blanks, and control samples along with data qualifiers will be reported in electronic format. Sitewide QC problems which may impact data usability are discussed below:

- *Laboratory Contamination:*

  The analytical laboratory experienced intermittent problems with bis(2-ethyl)phthalate cross contamination for samples analyzed using EPA method 8270. This compound was not a target volatile analyte for any of the sites sampled under the 1997 SWMP, and therefore should not effect analytical data usability.

  In January 1998, the analytical laboratory also reported levels of 4,4'-DDT and 4,4'-DDD in a method blank which exceeded QC limits, suggesting laboratory cross contamination. This problem was associated with samples SS35-97- INVERTS, and SS35-97-PLANTS. These two samples were analyzed using EPA method 8080. The two compounds in question are target analytes at the site. Based on the relatively low concentrations of these compounds in the method blank, when compared to concentrations of these analytes detected in 1996 SS35 samples, data usability should not be effected.

- *Analyte Recovery Rates:*

  The analytical laboratory experienced intermittent problems with recovery rates of target analytes in laboratory control samples analyzed using EPA method 8010, EPA method 8270, EPA method 8080, and method AK102. In most cases the target analytes in question were not contaminants of concern at the sampled sites, and therefore should not effect data usability. Data usability which could have been effected by recovery rates include the following:

  -Sample 26-1 displayed a surrogate recovery of terphenyl-d14 which was below QC limits and could have negatively biased some base/neutral target analytes in the sample. Based on this data, the actual concentrations for target analytes 2-methylnapthalene and naphthalene may be higher than the concentrations reported by the laboratory.

  -High recoveries of DRO were reported for the laboratory control sample (LCS) and LCS duplicate associated with sample 10-8. Based on this data, the actual concentration of

DRO in water sample 10-8 may be lower than the concentration reported by the laboratory.

-Sample GS-NS-97-2 displayed a low recovery of surrogate decachlorobiphenyl which could be indicative of a negative bias for the sample results. Based on this data, the actual PCB concentration in sample GS-NS-97-2 may be higher than the concentration reported by the laboratory.

-Samples MC-PC-97-1 and GS-FS-DS-97-05MSD displayed surrogate recoveries that exceeded QC limits, suggesting the data may be positively biased. Based on this data, the actual concentrations of PCBs in these samples my be lower than those reported by the laboratory.

- *Other QC issues:*

The chromatographic patterns for samples 2375-MW6 and 2375-MW6DUP were not indicative of petroleum product when analyzed using method AK102. Based on this data, the actual DRO concentrations for these samples may differ from the concentrations reported by the laboratory. The irregular chromatographic patterns for these samples may be related to background interference as was previously determined for the North Boundary wells in 1996.

The chromatographic pattern for sample 2375-MW3 was indicative of petroleum product lighter than diesel (JP4 or gasoline) when analyzed using method AK102. Based on this data, the actual DRO concentrations for this sample may differ from the concentration reported by the laboratory. The chromatographic pattern for this sample suggests interference from gasoline released at the site.

2.7 SITE-SPECIFIC DISCUSSIONS

Source areas SS36 - Drum Storage Area, SS39/SS63 - Asphalt Lake/Asphalt Lake Spill Site, SS47 - Commissary Parking Lot Fuel Spill, and DP55 - Birch Lake Recreational Area were previously monitored under the SWMP, but were not monitored as part of the 1996 or 1997 SWMP. Cumulative analytical data for these source areas is presented in the 1995 SWMP Report (USAF, 1996d). Source areas ST16, Building 1146 UST site, and Building 1307 UST site were not monitored under the 1997 SWMP. Cumulative analytical data for these sites is presented in the 1996 SWMP Report (USAF, 1997a). The following sections describe site specific information for sites included under the 1997 SWMP.

North Boundary Wells

North Boundary Wells

COCs, RAOs, and ARARs

Contaminants of concern at the north boundary wells include VOCs and SVOCs. The north boundary wells are monitored for a variety of compounds to ensure that impacted groundwater is not leaving the base. No RAOs or ARARs have been established for these wells.

Site Setting

The five 'north boundary wells' are located near the northern boundary of Eielson, down-gradient from the source areas on EAFB and up-gradient from the community of Moose Creek. The wells are completed in the alluvial aquifer. This area of the base is heavily vegetated, with numerous ponds, and shallow groundwater (less than 5 feet). These wells are sampled to determine whether any contaminants of concern (COCs) have migrated as far as the north base boundary.

Previous Activities

Samples collected during the 1994 SWMP were analyzed for metals, VOCs, and DRO. Three organic compounds were detected at low concentrations in the PNL sample from well 08M01 in August 1994: chloromethane (1.0 µg/L), 1,1,1-trichloroethane (2.5 µg/L), and toluene (5.2 µg/L). A second sample was collected from this well by PNL in September 1994 to verify the presence of these compounds; however, they were not detected in the confirmation sample.

Samples collected during the 1995 SWMP were analyzed for metals, VOCs, GRO, DRO, semivolatile organic compounds (SVOCs), and pesticides. DRO was present just above the 100 µg/L detection limit in samples from 51MB1, 51MB3, 51MB5, and 08M01. The chromatograms were not indicative of diesel fuel. Toluene was detected in 51MB1 at a concentration of 1.1 µg/L. Xylenes were detected in 51MB4 at a concentration of 1.1 µg/L. Bis (2-ethylhexyl) phthalate (BEHP), a common sampling and laboratory contaminant derived from plastics, was also measured just above the 10 µg/L detection limit in all North Boundary Well samples.

Samples collected during the 1996 SWMP were analyzed for BTEX, PAH, GRO, DRO, halogenated VOCs, pesticides, PCBs, semi-volatile compounds, and metals. No COCs were detected in concentrations above EPA drinking water MCLs or the 1994 background UCL. DRO was detected in the five wells in concentrations ranging from 170 µg/L to 340 µg/L. The laboratory report, narrative section, notes that the DRO chromatograms are indicative of carbon compounds other than diesel.

Recent publications regarding the presence of naturally occurring organic compounds detected in environmental samples (Dworian 1996) prompted the collection of test samples to determine the validity of DRO results as a COC migration indicator. Test samples consisted of solid organic materials common in the vicinity of the north boundary wells. These materials were immersed in

sealed one gallon containers of distilled water for approximately two weeks. Water samples were then collected from each container and submitted for DRO analysis. The samples and results are summarized below:

Sample	Result	Material Description
NBEXP1	9,000 µg/L	Peat moss, lichen, birch leaves
NBEXP2	490 µg/L	Tundra moss, ferns, a few birch leaves
NBEXP3	60,000 µg/L	Spruce needles, spruce cones
NBEXP4	15,000 µg/L	Birch leaves
NBEXP5	3,800 µg/L	Grasses
NBEXP6	5,500 µg/L	Alder leaves and mulch
NBEXP7	920 µg/L	Submerged tundra moss, peat, and leaves

All these materials in contact with distilled water produced DRO results far greater than those obtained from the north boundary well samples. The chromatographic patterns of some of the samples are similar to known petroleum products. These results bring into question the use of DRO analysis to definitively identify petroleum compounds. These results indicate the DRO detected in the north boundary wells may be derived from natural organic materials.

1997 Results

Under the 1997 SWMP Workplan (USAF, 1997b), the north boundary wells (51MB1, 51MB3, 51MB4, 51MB5, and 08M01) were to be monitored using immunoassay testing. Results of the 12 September 1997 field screening event indicated elevated total BTEX in monitor wells 51MB1, 51MB3, and 08M01(20, 50, and 30 ppb, respectively). All other wells were below detection levels (<20 ppb). These results prompted resampling of the north boundary wells for confirmation.

On 24 September 1997, field screening of monitor wells 51MB3 and 08M01 resulted in total BTEX concentrations of 20 and 40 ppb, respectively. All other north boundary wells were below the immunoassay test kit detection limit. TCE and PCE concentrations were below the DLE test kit detection limit of 10 ppb.

Due to continued detection of total BTEX, a third sampling event occurred on 2 October 1997. For comparison purposes, all north boundary wells were sampled for both total BTEX

immunoassay and laboratory analyses. The immunoassay test kit and laboratory analytical data displayed BTEX concentrations below detection limits in all wells sampled.

Cumulative analytical and immunoassay data indicate groundwater conditions have not changed significantly since groundwater monitoring was initiated at the north boundary wells. Analytical and immunoassay results indicate all north boundary wells remain at or below detection levels for total BTEX, TCE, and PCE compounds.

References for North Boundary Wells:

1994 Sitewide Groundwater Monitoring Program Report, PNL, January 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Groundwater Monitoring Program Workplan, USAF, 1996
Dworian, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for North Boundary Wells:

List of Tables for North Boundary Wells:

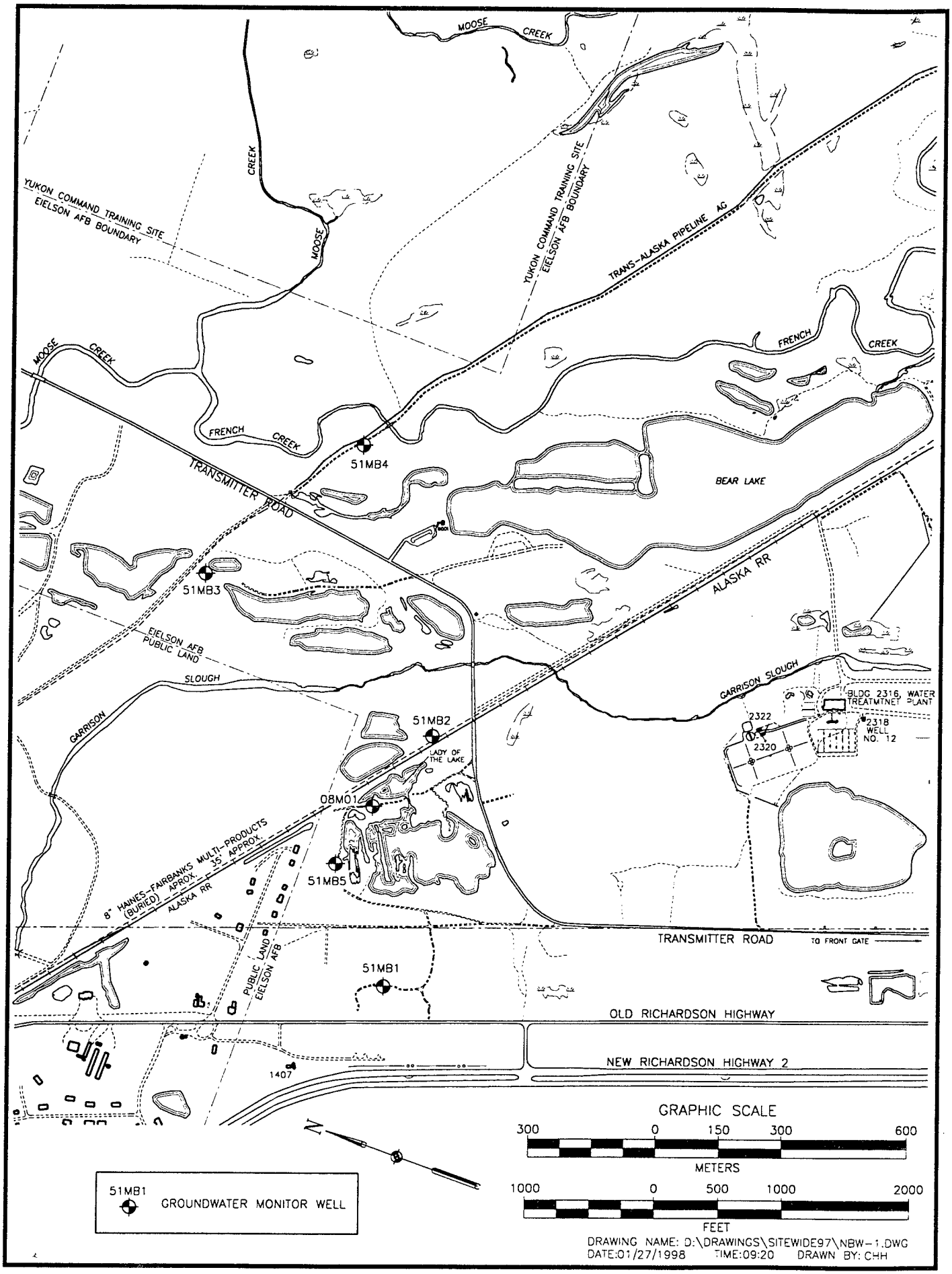

Figure NWB-1. North Boundary Monitor Wells, Eielson AFB, Alaska

TABLE NBW-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, NORTH BOUNDARY WELLS, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
51MB1	8/25/92	<2.0	<2.0	<2.0	<5.0	--	--	1,4	a	PNL 1995 SWRI
51MB1	8/19/93	<0.105	<0.056	<0.046	<0.202	--	<100	1,4,10	a	PNL 1993 SWGMPR
51MB1	8/2/94	<1.0	<1.0	<1.0	<1.0	--	<250	1,4,10	a	PNL 1994 SWGMPR
51MB1	9/6/95	<1.0	1.1	<1.0	<1.0	<50	140	1-6	a,b	USAF 1995 SWMPR
51MB1	8/1/96	<1.0	<1.0	<1.0	<1.0	<100	170	1,4-6,9,10,13	d	USAF 1996 SWMPR
51MB1	10/2/97	<1.0	<1.0	<1.0	<1.0	--	--	1,4	a	USAF 1997 SWMPR
51MB3	8/26/92	<2.0	<2.0	<2.0	<5.0	--	--	1,4	a	PNL 1995 SWRI
51MB3	8/19/93	<0.105	<0.056	<0.046	<0.202	--	<100	1,4,10	a	PNL 1993 SWGMPR
51MB3	8/2/94	<1.0	<1.0	<1.0	<1.0	--	<250	1,4,10	a	PNL 1994 SWGMPR
51MB3	9/5/95	<1.0	<1.0	<1.0	<1.0	<50	120	1-6	a,b	USAF 1995 SWMPR
51MB3	8/1/96	<1.0	<1.0	<1.0	<1.0	<100	170	1,4-6,9,10,13	d	USAF 1996 SWMPR
51MB3	10/2/97	<1.0	<1.0	<1.0	<1.0	--	--	1,4	a	USAF 1997 SWMPR
51MB4	8/28/92	<2.0	<2.0	<2.0	<5.0	--	--	1,4	a	PNL 1995 SWRI
51MB4	8/23/93	<0.105	<0.056	<0.046	<0.202	--	<100	1,4,10	a	PNL 1993 SWGMPR
51MB4	8/2/94	<1.0	<1.0	<1.0	<1.0	--	<250	1,4,10	a	PNL 1994 SWGMPR
51MB4	9/5/95	<1.0	<1.0	<1.0	1.1	<50	<100	1-6	a,b	USAF 1995 SWMPR
51MB4	8/1/96	<1.0	1.0	<1.0	1.2	<100	180	1,4-6,9,10,13	e	USAF 1996 SWMPR
51MB4	10/2/97	<1.0	<1.0	<1.0	<1.0	--	--	1,4	a	USAF 1997 SWMPR
51MB5	8/25/92	<2.0	<2.0	<2.0	<5.0	--	--	1,4	a	PNL 1995 SWRI
51MB5	8/19/93	<0.105	<0.056	<0.046	<0.202	--	<100	1,4,10	a	PNL 1993 SWGMPR
51MB5	8/2/94	<1.0	<1.0	<1.0	<1.0	--	<250	1,4,10	a	PNL 1994 SWGMPR
51MB5	9/5/95	<1.0	<1.0	<1.0	<1.0	<50	130	1-6	a,b	USAF 1995 SWMPR
51MB5	8/1/96	<1.0	<1.0	<1.0	<1.0	<100	170	1,4-6,9,10,13	d	USAF 1996 SWMPR
51MB5	10/2/97	<1.0	<1.0	<1.0	<1.0	--	--	1,4	a	USAF 1997 SWMPR
08M01	8/25/92	<2.0	<2.0	<2.0	<5.0	--	--	1,4	a	PNL 1995 SWRI
08M01	8/19/93	<0.105	<0.056	<0.046	<0.202	--	<100	1,4,10	a	PNL 1993 SWGMPR

TABLE NBW-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Analytical Methods	Notes	Reference
08M01	8/2/94	<1.0	5.2	<1.0	<1.0	--	<250	1,4,10	a,c	PNL 1994 SWGMPR
08M01	9/94	<1.0	<1.0	<1.0	<1.0	--	--	1,4	a	PNL 1994 SWGMPR
08M01	9/8/95	<1.0	<1.0	<1.0	<1.0	<50	170	1-6	a,b	USAF 1995 SWMPR
08M01	8/1/96	<1.0	<1.0	<1.0	<1.0	<100	340	1,4-6,9,10,13	d	USAF 1996 SWMPR
08M01	10/2/97	<1.0	<1.0	<1.0	<1.0	--	--	1,4	a	USAF 1997 SWMPR

Notes:
a. No compounds other than those listed or noted were detected above the reporting limits.
b. Bis(2-ethylhexyl)phthalate, a common laboratory contaminant, was detected in all noted samples at <35 µg/L. Detection limit is 10 µg/L.
c. Other compounds detected: chloromethane - 1.0 µg/L, 1,1,1-trichloroethane - 2.5 µg/L.
d. Other compounds detected: benzoic acid -3.0 ug/L
e. Other compounds detected: fluorene - 2.6 ug/L

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421
12. 6020
13. 8310

TABLE NBW-2 CONCENTRATIONS (µg/L) OF METALS IN GROUNDWATER SAMPLES, NORTH BOUNDARY WELLS, EIELSON AFB, ALASKA

Well No.	f/u	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Sodium	Vanadium	Zinc	Notes	Reference
DISSOLVED																			
51MB1	f	1993	--	--	--	--	--	--	--	1.4	--	--	--	--	--	--	--		PNL 1993 SWGMPR
51MB1	f	8/2/94	19	<3.0	56	45,100	2.8	1.9	<13	<1.0	9,380	1,440	4.1	<4,340	17,300	1.0	6.2		PNL 1994 SWGMPR
51MB1	f	9/6/95	69.9	1.1	34.5	38,300	<5	<4	248	<1.0	8,080	928	<9	8,370	15,600	<4	6.1		USAF 1995 SWMPR
51MB3	f	1993	--	--	--	--	--	--	--	1.1	--	--	--	--	--	--	--		PNL 1993 SWGMPR
51MB3	f	8/2/94	8.5	5.5	89	42,400	2.5	1.2	1,130	<1.0	9,000	2,410	2.6	<3,260	5,800	1.1	2.3		PNL 1994 SWGMPR
51MB3	f	9/5/95	75	10.7	91.6	39,500	<5	<4	1,740	<1.0	8,130	1,910	<9	8,470	5,260	<4	7.8		USAF 1995 SWMPR
51MB4	f	1993	--	--	--	--	--	--	--	1.7	--	--	--	--	--	--	--		PNL 1993 SWGMPR
51MB4	f	8/2/94	26	9	91	40,300	3.8	1.8	532	<1.0	9,380	1,430	5.5	<2,750	4,850	1.8	3.4		PNL 1994 SWGMPR
51MB4	f	9/5/95	91.1	11.2	92.9	41,600	<5	<4	1,680	<1.0	9,430	1,190	<9	9,840	4,800	<4	10.2		USAF 1995 SWMPR
51MB5	f	1993	--	--	--	--	--	--	--	<0.6	--	--	--	--	--	--	--		PNL 1993 SWGMPR
51MB5	f	8/2/94	14	8.2	495	39,600	2.4	1.0	245	<1.0	10,300	10,700	7.9	6,210	25,900	1.8	4.4		PNL 1994 SWGMPR
51MB5	f	9/5/95	67	11.1	519	34,400	<5	<4.0	391	<1.0	8,960	7,680	<9	9,500	24,200	<4	<6		USAF 1995 SWMPR
08M01	f	1993	--	--	--	--	--	--	--	<0.6	--	--	--	--	--	--	--		PNL 1993 SWGMPR
08M01	f	8/2/94	21	12	269	48,600	4.5	1.0	1,720	<1.0	11,400	6,890	5.4	5,360	25,000	2.1	3.6		PNL 1994 SWGMPR
08M01	f	9/6/95	64.4	27.8	270	41,500	<5	<4.0	6,750	<1.0	9,660	5,530	<9	10,100	20,800	<4	<6		USAF 1995 SWMPR
Background Concentrations																			
BGM	f	9/94	43	8.3	101	51,750	<1.0	2.4	1,736	<1.0	10,450	1,789	2.3	3,400	4,563	<1.0	5.6		PNL 1994 SWMP
BGMX	f	9/94	140	23	160	61,000	<1.0	4	9,900	<1.0	12,000	4,100	5	4,500	6,500	1	19		PNL 1994 SWMP
BGUCL	f	9/94	74	14.5	129	57,600	<1.0	3.1	3,980	<1.0	11,400	2,720	3.2	3,800	5,340	1	10		PNL 1994 SWMP
TOTAL																			
51MB1	u	8/25/92	--	<5	60	49,000	<20	<20	<30	<5	9,700	1,100	<30	4,200	15,000	<30	<10		PNL 1992 SWGMPR
51MB1	u	8/19/93	--	3	58	--	--	--	84	<0.6	--	1,300	--	--	--	--	--		PNL 1993 SWGMPR
51MB1	u	8/2/94	419	<3.0	56	48,400	1.4	6.2	569	<1.0	10,100	1,300	5.1	5,080	18,100	1.4	<9.0		PNL 1994 SWGMPR
51MB1	u	9/6/95	57.8	1.7	31.9	38,800	<5.0	4.1	374	<1.0	8,060	977	23.1	4,080	16,300	<4.0	13.2		USAF 1995 SWMPR
51MB1	u	8/1/96	<25.0	3.4	29.6	47,400	<6.0	<6.0	152	<1.0	9,570	556	<15.0	4,420	18,100	<8.0	<12.0		USAF 1996 SWMPR

TABLE NBW-2 (continued)

Well No.	f/u	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Sodium	Vanadium	Zinc	Notes	Reference
51MB3	u	8/26/92	--	13	120	49,000	<20	<20	4,300	<5	9,500	1,600	<30	3,800	5,100	<30	<10		PNL 1992 SWGMPR
51MB3	u	8/19/93	--	15	100	--	--	--	2,700	<0.6	--	1,700	--	--	--	--	--		PNL 1993 SWGMPR
51MB3	u	8/2/94	9,130	34	276	57,700	17	54	22,100	16	17,400	3,120	30	5,780	10,700	29	72		PNL 1994 SWGMPR
51MB3	u	9/5/95	3,350	15.4	129	40,200	13.6	13.9	8,130	7.3	9,380	2,010	<9.0	4,180	5,150	5.8	26.8		USAF 1995 SWMPR
51MB3	u	8/1/96	142	12.7	89.6	45,400	<6.0	<6.0	3,960	<1.0	9,950	2,250	<15.0	2,690	4,890	<8.0	<12.0		USAF 1996 SWMPR
51MB4	u	8/28/92	--	31	160	46,000	31	<20	15,000	7.6	13,000	1,200	32	3,700	5,600	<30	<43		PNL 1992 SWGMPR
51MB4	u	8/25/93	--	19	100	--	--	--	5,900	2	--	1,000	--	--	--	--	--		PNL 1993 SWGMPR
51MB4	u	8/2/94	10,100	37	351	60,200	18	109	20,600	22	21,200	3,060	42	5,630	9,560	31	91		PNL 1994 SWGMPR
51MB4	u	9/5/95	3,810	19.4	147	44,800	8.1	12.8	8,480	3.7	11,500	1,660	<9	3,470	5,110	9	31.3		USAF 1995 SWMPR
51MB4	u	8/1/96	1,400	22.3	128	48,100	<6.0	<6.0	6,040	<1.0	11,400	1,220	<15.0	3,330	5,250	<8.0	<12.0		USAF 1996 SWMPR
51MB5	u	8/25/92	--	11	260	47,000	<20	<20	1,100	<5	12,000	11,000	<30	5,900	26,000	<30	<10		PNL 1992 SWGMPR
51MB5	u	8/19/93	--	--	--	--	--	--	--	<0.6	--	--	--	--	--	--	--		PNL 1993 SWGMPR
51MB5	u	8/2/94	4,640	19	498	41,000	11	26	8,720	7.3	12,300	8,930	22	6,420	27,300	16	74		PNL 1994 SWGMPR
51MB5	u	9/5/95	2,000	18.7	631	37,300	16	17.5	4,900	4.6	10,400	7,790	38.3	6,280	25,600	16.6	21.3		USAF 1995 SWMPR
51MB5	u	8/1/96	122	18	629	37,400	<6.0	<6.0	2,220	<1.0	9,060	7,890	<15.0	6,270	25,600	<8.0	<12.0		USAF 1996 SWMPR
08M01	u	8/26/92	--	27	290	55,000	<20	<20	7,400	<5	13,000	6,300	<30	5,400	24,000	<30	<10		PNL 1992 SWGMPR
08M01	u	8/19/93	--	--	--	--	--	--	--	<0.6	--	--	--	--	--	--	--		PNL 1993 SWGMPR
08M01	u	1994	526	31	337	56,300	2.5	8.2	9,190	2.3	12,900	7,350	9.5	6,730	29,500	5.7	27		PNL 1994 SWGMPR
08M01	u	9/6/95	111	28.3	255	38,400	18.1	<3.0	6,550	<1.0	8,940	4,790	22.4	5,750	18,800	9.4	<11		USAF 1995 SWMPR
08M01	u	8/1/96	<25.0	26.8	315	49,100	<6.0	<6.0	9,280	<1.0	10,700	6,010	<15.0	5,980	25,800	<8.0	<12.0		USAF 1996 SWMPR
Background Concentrations																			
BGM	u	9/94	7,538	25	269	58,625	20	75	16,938	21	17,375	3,875	31	5,650	8,363	24	63		PNL 1994 SWMP
BGMX	u	9/94	18,000	63	420	66,000	46	140	33,000	48	26,000	6,500	77	7,900	9,800	52	120		PNL 1994 SWMP
BGUCL	u	9/94	11,500	37	342	64,900	30.4	105	23,800	32.6	20,800	4,980	48.8	6,500	9,260	36	88.8		PNL 1994 SWMP

Notes:

f. Field filtered.

u. Total (unfiltered).

BGM Mean concentration of samples collected from background wells in 1994.

BGMX Maximum concentration of samples collected from background wells in 1994.

BGUCL 95% Upper confidence limits of samples collected from background wells in 1994.

TABLE NBW-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, NORTH BOUNDARY WELLS, EIELSON AFB, ALASKA

		Parameters							Immunoassay Results				
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2] (ppb)	Notes	Reference
51MB1	9/6/95	4.1	--	12	--	140	7.32	--	--	--	--		USAF 1995 SWMPR
51MB1	8/1/96	2.28	--	9.7	5	309	6.59	-11	--	--	--		USAF 1996 SWMPR
51MB1	9/12/97	8.2	72	9.1	12	357	8.85	38	20	--	--		USAF 1997 SWMPR
51MB1	9/22/97	2.85	26	9.5	<5	316	7.16	-116	0.01nd	nd	nd		USAF 1997 SWMPR
51MB1	10/2/97	0.82	7	6.8	4	324	7.38	-48	0.00nd	--	--		USAF 1997 SWMPR
51MB3	9/5/95	3.7	--	11	--	125	7.4	--	--	--	--		USAF 1995 SWMPR
51MB3	8/1/96	0.61	--	6.6	15	266	6.87	59	--	--	--		USAF 1996 SWMPR
51MB3	9/12/97	6.62	61	11.6	0	283	8.04	-22	50	--	--		USAF 1997 SWMPR
51MB3	9/24/97	2.61	25	12.3	17	248	7.58	-7	20	nd	nd		USAF 1997 SWMPR
51MB3	10/2/97	1.49	14	11.0	13	262	7.75	26	nd	--	--		USAF 1997 SWMPR
51MB4	9/5/95	5.1	--	7	--	230	7.1	--	--	--	--		USAF 1995 SWMPR
51MB4	8/1/96	0.91	--	4.5	31	278	6.9	32	--	--	--		USAF 1996 SWMPR
51MB4	9/12/97	9.01	72	5.4	7	282	7.83	7	0.00nd	--	--		USAF 1997 SWMPR
51MB4	9/24/97	2.99	26	6.9	12	244	7.60	8	0.01nd	nd	nd		USAF 1997 SWMPR
51MB4	10/2/97	2.3	19	4.4	24	250	7.74	26	nd	--	--		USAF 1997 SWMPR
51MB5	9/5/95	5.4	--	14	--	110	7.3	--	--	--	--		USAF 1995 SWMPR
51MB5	8/1/96	0.55	--	10.8	10	326	6.83	98	--	--	--		USAF 1996 SWMPR
51MB5	9/12/97	6.3	55	8.8	0	447	8.30	-41	0.01nd	--	--		USAF 1997 SWMPR
51MB5	9/24/97	2.14	20	10.2	9	380	7.15	67	0.01nd	nd	nd		USAF 1997 SWMPR
51MB5	10/2/97	0.56	4.6	6.8	30	394	7.43	-14	nd	--	--		USAF 1997 SWMPR

TABLE NBW-3 (continued)

Well No.	Date Sampled	Parameters							Immunoassay Results			Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2] (ppb)		
08M01	8/31/95	4	--	11	--	175	7.6	--	--	--	--		USAF 1995 SWMPR
08M01	9/8/95	3.2	--	11	--	340	7	--	--	--	--		USAF 1995 SWMPR
08M01	9/12/95	4	--	9	--	330	7.4	--	--	--	--		USAF 1995 SWMPR
08M01	8/1/96	4.39	--	10.2	6	410	6.84	-6	--	--	--		USAF 1996 SWMPR
08M01	9/12/97	7.24	64	9.4	-3	486	8.02	-59	30	--	--		USAF 1997 SWMPR
08M01	9/24/97	1.88	17	9.2	4	400	7.49	-2	40	nd	nd		USAF 1997 SWMPR
08M01	10/2/97	3.29	29	7.7	9	436	7.58	-39	nd	--	--		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Dräger Liquid Extraction (DLE) field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.
The lower detection limit is 10 ppb on the Dräger Liquid Extraction (DLE) field test kit.

Garrison Slough

Garrison Slough

COCs, and Remediation Goals

Contaminants of concern at Garrison Slough include PCBs in the form of Arochlor 1260. The following table lists remediation goals established to address PCB impact associated with Garrison Slough.

Medium	COC	RAO
Fish	PCBs (Arochlor 1260)	0.69 µg/Kg (wet weight)
Sediment	PCBs (Arochlor 1260)	>10 mg/Kg
Soils	PCBs (Arochlor 1260)	>10 mg/Kg

Site Setting

Garrison Slough passes directly through the developed portion of Eielson AFB base and consists primarily of engineered drainage channels approximately 10-50 ft. wide. Discharge of effluent from the base sewage treatment plant into Garrison Slough ended in 1979. Garrison Slough runs near a number of potential source areas, and receives most of the surface water runoff from the developed part of the base. The water surface in the study area is approximately 8 to 10 ft. below surrounding grade and the water is approximately 2 to 4 ft. deep. The water generally has a visibly moving current downstream from the water treatment plant pond where excess well water is discharged. Upstream from the water treatment plant pond, the slough contains shallow stagnant water or is dry during low precipitation, but can fill with surface drainage water after storm events. Drainage from Garrison Slough flows into Moose Creek, which drains into Piledriver Slough, before entering the Tanana River a few miles northwest of the base.

Previous Activities

Prior Garrison Slough sediment and surface water samples were analyzed for VOCs, pesticides, and PCBs during the Sitewide OU RI/FS. Arctic grayling, trout, and pike are inhabitants of the slough, and recreational fishing is possible. Because of these aquatic inhabitants, samples of invertebrates, aquatic vegetation, and fish tissue from grayling and pike were also collected from Garrison Slough and analyzed for PCBs, pesticides, and polynuclear aromatic hydrocarbons (PAHs). The results of the Sitewide RI/FS indicated PCBs were present in soil, sediments, and fish in a section of Garrison Slough within the boundaries of EAFB. The PCBs apparently originated from past spills to surface soil at an unpaved drainage channel that empties into Garrison Slough approximately 900 ft. upstream of the Arctic Avenue/Manchu bridge. The PCBs in fish tissue present a human health risk to people who might catch and consume the fish. The Natural Resources office at the base has issued advisories against eating or keeping fish caught from Garrison Slough.

During the 1996 and 1997 field seasons, PCB impacted soil and sediment were removed from Garrison Slough to fulfill requirements presented in the Sitewide Record of Decision (ROD) for Eielson AFB. Approximately 477 cubic yards of sediment containing an estimated 22.1 kg of PCB mass plus approximately 140 cubic yards of PCB contaminated soil were removed and disposed of during the Garrison Slough pilot study.

The fish population in Garrison Slough was also placed under a monitoring program to fulfill the requirements of the Sitewide ROD. Prior fish monitoring events were conducted in 1993, 1994, and 1996. Monitoring of fish will continue under the Sitewide program until fish PCB concentrations are confirmed to be at levels that do not pose unacceptable risks to human health.

Wire mesh fish barriers were constructed in 1996 to prevent the migration of fish into and from the PCB impacted area (Exposure 14, Appendix A). The barriers are currently in place and will be maintained under the Sitewide program in accordance with the Sitewide ROD. In addition, the base Natural Resources Office has issued advisories against eating or keeping fish caught from Garrison Slough. Base restrictions on fishing in Garrison Slough and the consumption of fish from Garrison Slough will continue until fish tissue PCB concentrations are reduced to acceptable levels.

1997 Results

During the 1997 field season, 17 fish specimens were collected from five stations established along Garrison slough. The stations where fish were collected included Moose Creek/Osage Road, Moose Creek-Pete's Crossing, Garrison Slough/New Station (as shown on Figure GS-1, this is a new station established in 1997 along an unnamed dirt road upstream from Pete's Crossing), Fish Barriers, Arctic Avenue/Manchu Road Station. Stations where fish could not be collected included Upper Garrison Slough, Middle Garrison Slough, Lower Garrison Slough, Flight Line Pond, Flight Line Creek Station, Wastewater Treatment Plant, and Moose Creek/Garrison Slough Confluence. The lack of success in collecting fish specimens at most of these stations is attributed to unfavorable habitat for supporting large fish populations.

The maximum PCB concentration, 1,200 µg/Kg, was detected in a rainbow trout collected immediately upstream from the fish barriers. PCB concentrations in fish collected from the sediment removal area ranged from 450 to 67 µg/Kg. The lowest on-base PCB concentration (39 µg/Kg) was detected in a Pike specimen collected from the upstream side of the fish barriers. Fish collected from the sediment removal area displayed an overall decrease in PCB concentrations when compared to fish caught from the same area during the 1996 field season.

PCB concentrations in fish collected at off-base stations ranged from 1,100 µg/Kg (rainbow trout collected at Pete's Crossing) to <14 µg/Kg (multiple fish specimens collected from the Moose Creek/Osage Road Station and the Garrison Slough/New Station). With the exception of the Pete's Crossing rainbow trout, all off-base specimens collected in 1997 generally displayed PCB concentrations in the same order of magnitude as specimens collected during previous years.

References for Garrison Slough:

1995 Sitewide Remedial Investigation Report,USAF, August 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Record of Decision, 1996-1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997
1996-1997 Garrison Slough Pilot Study Report, 1997

List of Figures for Garrison Slough:

List of Tables for Garrison Slough:

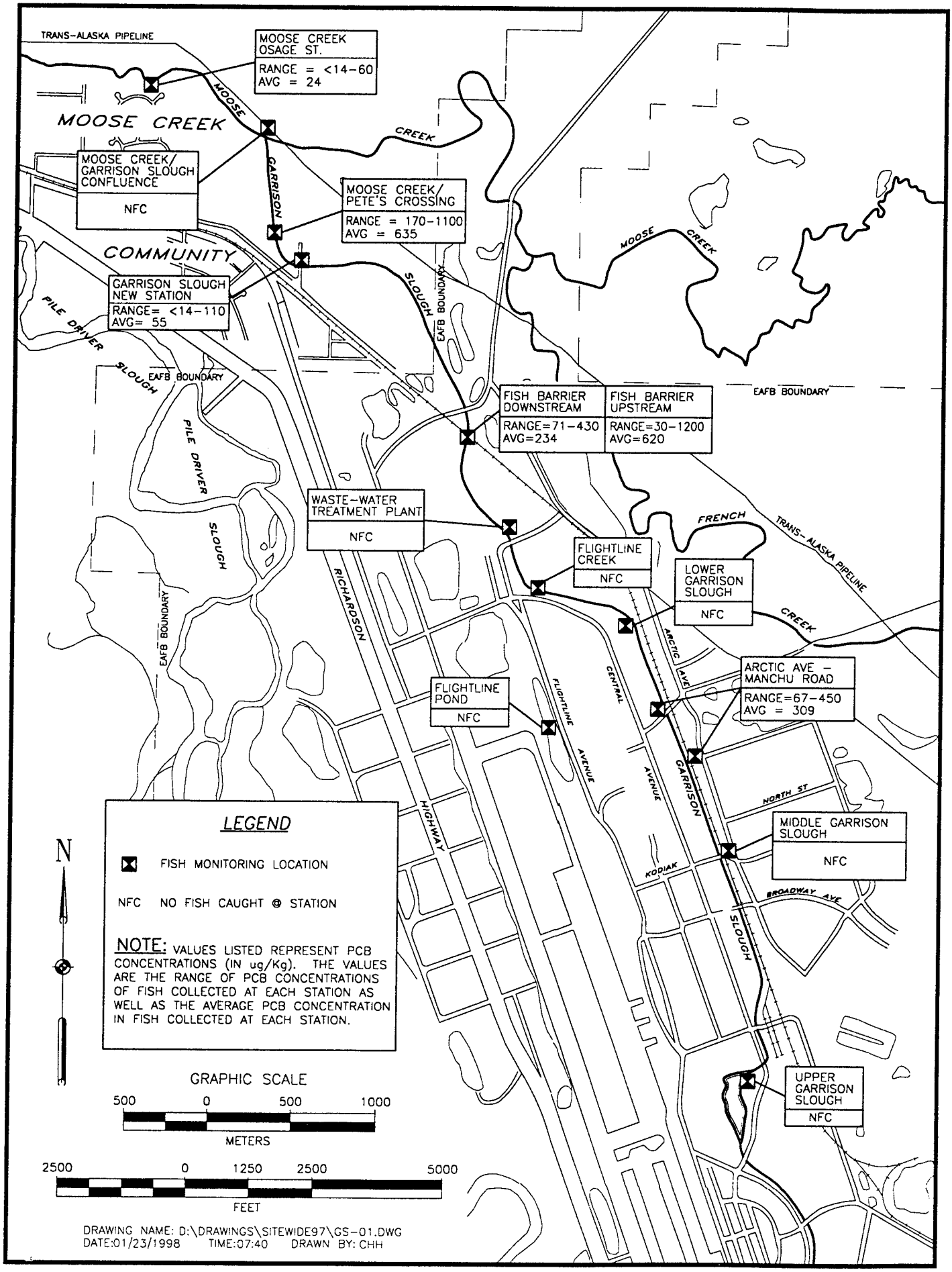

Figure GS-1. 1997 Garrison Slough Fish Monitoring Locations, Eielson AFB, Alaska

TABLE GS-1 PCB CONCENTRATIONS IN FISH SPECIMENS COLLECTED FROM 1993 THRU 1997, EIELSON AFB, ALASKA

(outlined data was collected as part of the 1997 SWMP)

Station Location	Sample #	Date	Fish Mass (gm)	Species	PCB Result (µg/kg)	Comment
Upper Garrison Slough (SS 35)	B07DE8	9/93	not reported	Pike	649	Fillet plus Organs
	Fish 1	1994	not reported	Pike	104	Skin-on fillet
	Fish 1 DUP	1994	not reported	Pike	119	Skin-on fillet
	Fish 2	1994	not reported	Pike	< 20	Skin-on fillet
	Fish 3	1994	not reported	Pike	< 20	Skin-on fillet
	Fish 4	1994	not reported	Pike	71.4	Skin-on fillet
	Fish 4 DUP	1994	not reported	Pike	109	Skin-on fillet
	Fish 4 SPLIT	1994	not reported	Pike	126	Skin-on fillet
	No Fish Caught	8/6/96				fished 0.5 hrs elec.shckng 1 hour hook and line
	No Fish Caught At Station During 1997 Field Season					
Middle Garrison Slough (SS-47)	B07DB4	9/93	not reported	Grayling	10.6	Fillet plus Organs
	Fish 1	1994	not reported	Grayling	< 20	Skin-on fillet
	Fish 2	1994	not reported	Grayling	21.8	Skin-on fillet
	Fish 3	1994	not reported	Grayling	30.2	Skin-on fillet
	Fish 3 DUP	1994	not reported	Grayling	39.8	Skin-on fillet
	Fish 4	1994	not reported	Grayling	32.8	Skin-on fillet
	MGS-08	8/5/96	490	Grayling	2300	Skin-on fillet
	MGS-09	8/5/96	228	Grayling	29	Skin-on fillet
	MGS-10	8/5/96	224	Grayling	540	Skin-on fillet
	MGS-11	8/5/96	134	Grayling	86	Skin-on fillet
	No Fish Caught At Station During 1997 Field Season					
Arctic Ave./ Manchu Rd. (sediment removal area)	AA-MR-01A	8/4/96	570	Grayling	7100	Field duplicates: 01A&B
	AA-MR-01B	8/4/96	570	Grayling	2300	Skin-on fillet
	AA-MR-02	8/4/96	444	Grayling	12000	Skin-on fillet
	AA-MR-03	8/4/96	476	Grayling	2600	Skin-on fillet
	AA-MR-04	8/4/96	440	Grayling	6300	Skin-on fillet
	AA-MR-05	8/4/96	230	Grayling	7600	Skin-on fillet
	AA-MR-06	8/4/96	186	Grayling	670	Skin-on fillet

TABLE GS-1 (continued)

(outlined data was collected as part of the 1997 SWMP)

Station Location	Sample #	Date	Fish Mass (gm)	Species	PCB Result (µg/kg)	Comment
Arctic Ave./ Manchu Rd. (sediment removal area) continued	AA-MR-97-01	9/4/97	349	Grayling	430	Skin-on fillet
	AA-MR-97-01DUP	9/4/97	349	Grayling	450	Skin-on fillet
	AA-MR-97-02	9/4/97	602	Grayling	290	Skin-on fillet
	AA-MR-97-03	9/4/97	250	Pike	67	Skin-on fillet
Lower Garrison Slough	B07DB3	9/93	not reported	Grayling	995	Fillet plus Organs
	Fish 1	1994	not reported	Grayling	1180	Skin-on fillet
	Fish 2	1994	not reported	Grayling	3000	Skin-on fillet
	Fish 3	1994	not reported	Grayling	2240	Skin-on fillet
	Fish 4	1994	not reported	Grayling	1500	Skin-on fillet
	Fish 4 DUP	1994	not reported	Grayling	2090	Skin-on fillet
	LGS-07	8/5/96	488	Grayling	1900	Skin-on fillet
	No Fish Caught At Station During 1997 Field Season					
Flightline Pond (DP 44)	B07DG1	9/93	not reported	Pike	207	Fillet plus Organs
	No Fish Caught At Station During 1997 Field Season					
Flight Line Creek Station	No Fish Caught in 15 min. shocking	8/7/96				Above large intact beaver dam (now destroyed)
	No Fish Caught At Station During 1997 Field Season					
Wastewater Treatment Plant	STP-12A	8/6/96	612	Grayling	940	Field Duplicates; 2 Longnose sucker not kept
	STP-12B	8/6/96	612	Grayling	240	
	No Fish Caught At Station During 1997 Field Season					
Railroad crossing (Fish Barriers)	No Fish Caught in 2.5 hours sport tackle	8/7/96				
	GS-FS-DS-97-01	9/4/97	430	Grayling	200	Skin-on fillet
	GS-FS-DS-97-02	9/4/97	610	Grayling	71	Skin-on fillet
	GS-FS-US-97-03	9/4/97	585	Pike	39	Skin-on fillet
	GS-FS-US-97-04	9/17/97	610	Rainbow Tr.	1200	Skin-on fillet
	GS-FS-DS-97-05	9/2/97	580	Grayling	430	Skin-on fillet

TABLE GS-1 (continued)

(outlined data was collected as part of the 1997 SWMP)

Station Location	Sample #	Date	Fish Mass (gm)	Species	PCB Result (µg/kg)	Comment
Garrison Slough/ New Station	GS-NS-97-01	9/3/97	200	Rainbow Tr.	110	Skin-on fillet
	GS-NS-97-02	9/17/97	70	Rainbow Tr.	<14	Skin-on fillet
Moose Creek - Petes Crossing (off-base)	MC-PC-19	8/8/96	238	Rainbow Tr.	79	23 Fish Caught in One
	MC-PC-19	8/8/96	126	Rainbow Tr.	59	Shocking Run;
	MC-PC-19	8/8/96	142	Rainbow Tr.	140	Good Habitat
	MC-PC-19	8/8/96	52	Grayling	49	all 96 samples are
	MC-PC-19	8/8/96	44	Grayling	100	Skin-on fillet
	MC-PC-19	8/8/96	61	Grayling	120	Skin-on fillet
	MC-PC-19	8/8/96	212	Burbot	57	Skin-on fillet
	MC-PC-97-01	9/2/97	259	Rainbow Tr.	1100	Skin-on fillet
	MC-PC-97-02	9/4/97	120	Rainbow Tr.	170	Skin-on fillet
Moose Creek/ Garrison Slough Confluence (off-base)	Fish 1	1994	not reported	Grayling	216	Skin-on fillet
	Fish 1 Duplicate	1994	not reported	Grayling	247	Skin-on fillet
	Fish 2	1994	not reported	Grayling	< 20	Skin-on fillet
	Fish 3	1994	not reported	Grayling	< 20	Skin-on fillet
	Fish 4	1994	not reported	Grayling	20.6	Skin-on fillet
	Fish 4 duplicate	1994	not reported	Grayling	23.6	Skin-on fillet
	MC-GS-31	8/8/96	290	Grayling	40	Sport tackle for 3 hrs.;
	MC-GS-32	8/8/96	290	Whitefish	170	good habitat
	MC-GS-33	8/8/96	236	Grayling	36	Skin-on fillet
	MC-GS-34A	8/8/96	392	Grayling	730	field duplicates: 34A &
	MC-GS-34B	8/8/96	392	Grayling	170	34B
	MC-GS-35	8/8/96	230	Grayling	< 14	all 96 samples are
	MC-GS-36	8/8/96	140	Whitefish	81	Skin-on fillet
	MC-GS-37	8/8/96	245	Grayling	45	Skin-on fillet
	MC-GS-38	8/8/96	200	Rainbow Tr.	22	Skin-on fillet
	MC-GS-39	8/8/96	140	Rainbow Tr.	< 14	Skin-on fillet
	No Fish Caught At Station During 1997 Field Season					
Moose Creek - Osage St. (off-base)	MC-05-15	8/8/96	112	Grayling	< 15	Sport tackle for 3 hours
	MC-05-16	8/8/96	129	Grayling	50	good habitat
	MC-05-17	8/8/96	232	Grayling	25	all 96 samples are
	MC-05-18	8/8/96	94	Grayling	82	Skin-on fillet
	MC-OS-97-01	9/3/97	129	Grayling	<14	Skin-on fillet
	MC-OS-97-02	9/3/97	95	Rainbow Tr.	<14	Skin-on fillet
	MC-OS-97-03	9/3/97	219	Grayling	60	Skin-on fillet
	MS-OS-97-03DUP	9/3/97	219	Grayling	59	Skin-on fillet
	MC-OS-97-04	9/3/97	160	Grayling	<14	Skin-on fillet
	MC-OS-97-05	9/3/97	145	Grayling	22	Skin-on fillet

UST Areas

The UST area at Building 2375 was included under the 1997 SWMP. This site is subject to ADEC UST regulations. UST areas at Building 1146 and Building 1307 were recommended for site closure during a 10 April 1997 teleconference with Eielson AFB, AFCEE, EPA, and ADEC. These sites were not sampled under the 1997 SWMP.

UST 2375

COCs, RAOs, ARARS

The COCs at the site are BTEX, GRO, and DRO. No RAOs or ARARs have been established for the site. BTEX MCLs (ADEC 18AAC 80.070) are as follows:

Compound	MCL (µg/L)
Benzene	5
Toluene	1,000
Ethylbenzene	700
Xylenes	10,000

Site Setting

UST 2375 is located near the northwest corner of Central and Wabash Avenues, near the base exchange (BX) service station.

Previous Activities

Monitor wells MW1, MW3, MW4, MW6, MW8, and product probe DP-1 were sampled in 1995. Low to non-detectable concentrations of GRO and BTEX were obtained from all wells except MW3, which contained benzene and total BTEX concentrations of 190 µg/L and 5,320 µg/L, respectively. GRO concentration in MW3 was 9,200 µg/L. DRO ranged from 110 µg/L to 2,000 µg/L with highest concentration occurring in MW3.

Monitor wells MW1, MW3, MW4, MW6, MW8, and product probe DP-1 were sampled twice during the 1996 field season in accordance with ADEC UST regulations. Benzene concentrations ranged from below detection limits (MW4, MW-6, and MW8) to 160 µg/L (MW-3) during the 23 September 1996 sampling event. Benzene concentrations were above MCLs in wells MW-1 and MW-3 during both 1996 sampling events. MW-3 also displayed the highest toluene, ethylbenzene, and xylene concentrations during the 1996 sampling events at 820 µg/L (23 September 1996), 540 µg/L (23 September 1996), and 3,010 µg/L (5 August 1996), respectively. These concentrations were below MCLs. Maximum GRO and DRO concentrations

were also detected in MW-3 at 18,000 µg/L (23 September 1996), and 1,900 µg/L (5 August 1996), respectively.

1997 Results

Monitor wells MW-3 and MW-6 were sampled during the 1997 field season for VOCs, GRO, and DRO. Monitor well MW-3 displayed concentrations of benzene, toluene, and ethylbenzene of 71, 270, and 390 µg/L, respectively. The benzene concentration exceeds the ADEC MCL of 5 µg/L. GRO was detected in MW-3 (9,000 µg/L), while DRO was detected in both MW-3 and MW-6 (1,900 and 180 µg/L, respectively). The GRO chromatographic pattern in MW-3 is indicative of gasoline. The DRO chromatographic pattern in MW-6 was not indicative of a petroleum product; while the DRO chromatographic pattern for MW-3 was indicative of petroleum product lighter than diesel fuel such as gasoline or JP4. No MCLs have been identified for GRO and DRO.

Cumulative analytical data indicates hydrocarbon impacted groundwater is associated with a previously reported hydrocarbon release at Building 2375. Monitor well MW3, located immediately downgradient of the former UST area, has consistently displayed elevated hydrocarbon concentrations since 1995. MW-6, located down and across gradient from the former UST area, has consistently displayed non-detectable BTEX concentrations since monitoring began in 1995, indicating impacted groundwater is not migrating in this direction from the former UST location.

References for UST 2375:

1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Groundwater Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Groundwater Program Workplan Addendum, USAF, 1997

List of Figures for UST 2375:

Figure B2375-1	Building 2375 Site Plan Showing Locations of Groundwater Monitor Wells, Eielson AFB, Alaska.

List of Tables for UST 2375:

Table B2375-1	Concentrations ($\mu g/L$) of Organic Compounds in Groundwater Samples, Building 2375, UST at Building 2375, Eielson AFB, Alaska.
Table B2375-2	Groundwater Parameter and Immunoassay Field Test Results, Building 2375, UST at Building 2375, Eielson AFB, Alaska.

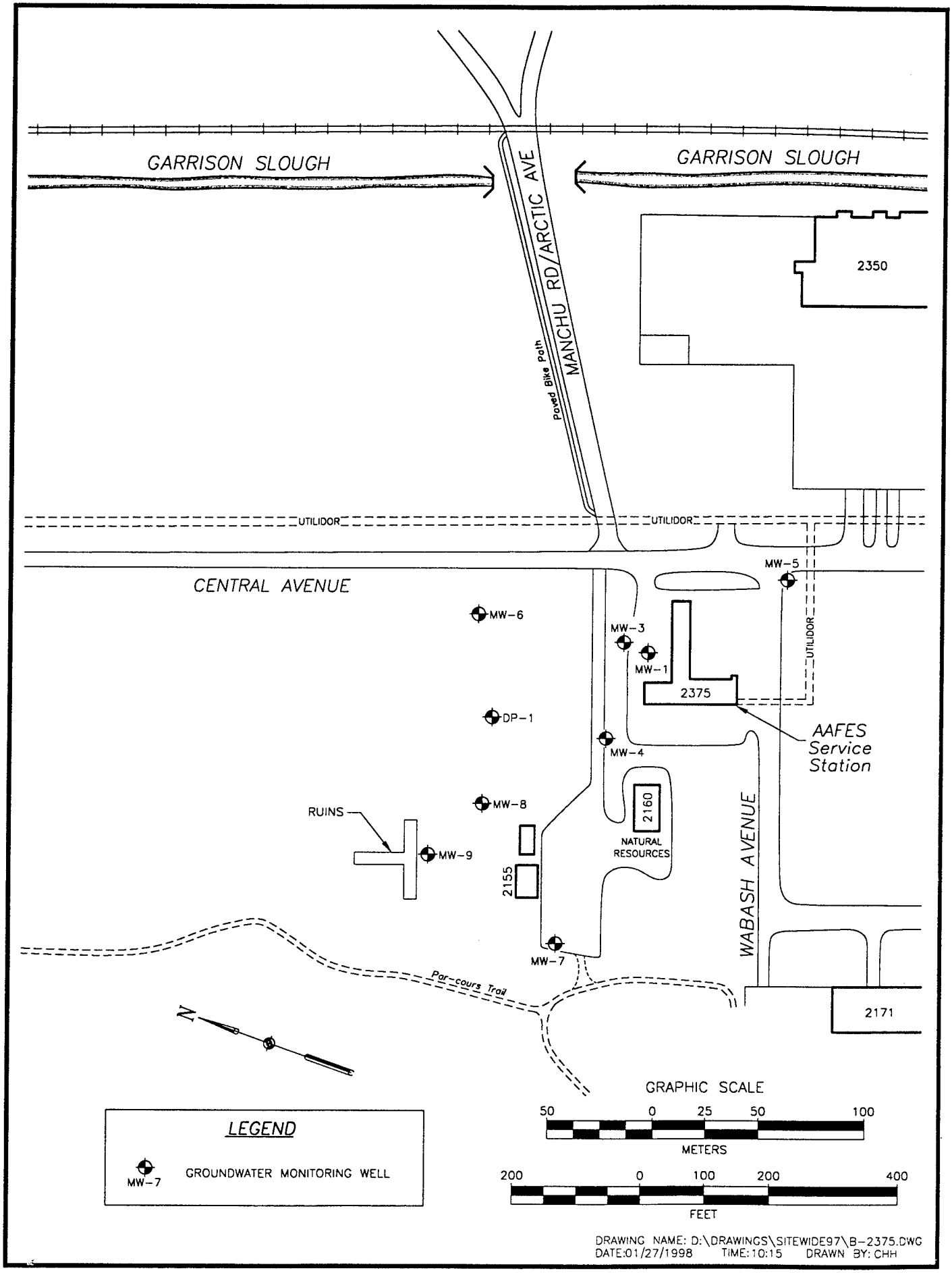

Figure B2375-1. Building 2375 Site Plan Showing Locations of Groundwater Monitor Wells, Eielson AFB, Alaska

TABLE B2375-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, BUILDING 2375, UST AT BUILDING 2375, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
MW1	10/2/95	<1.0	<1.0	<1.0	<1.0	<50	120	1-3		USAF 1995 SWMPR
MW1	8/5/96	12	6.3	<1.0	2.5	<100	110	1,9,10		USAF 1996 SWMPR
MW1	9/24/96	17	<1.0	<1.0	1.1	<100	<100	1,9,10		USAF 1996 SWMPR
MW3	10/2/95	190	860	630	3,640	9,200	2,000	1-3		USAF 1995 SWMPR
MW3	8/5/96	120	640	480	3,010	15,000	1,900	1,9,10		USAF 1996 SWMPR
MW3	9/23/96	160	820	540	2,990	18,000	1,600	1,9,10		USAF 1996 SWMPR
MW3	9/2/97	71	270	390	--	9,000	1,900	9,10,11	a	USAF 1997 SWMPR
MW4	9/29/95	<1.0	<1.0	<1.0	<1.0	56	140	1-3		USAF 1995 SWMPR
MW4	8/5/96	<1.0	<1.0	<1.0	<1.0	<100	140	1,9,10		USAF 1996 SWMPR
MW4	9/23/96	<1.0	<1.0	<1.0	<1.0	<100	<100	1,9,10		USAF 1996 SWMPR
MW6	9/29/95	<1.0	<1.0	<1.0	<1.0	55	110	1-3		USAF 1995 SWMPR
MW6	8/5/96	<1.0	<1.0	<1.0	<1.0	<100	210	1,9,10		USAF 1996 SWMPR
MW6	9/23/96	<1.0	<1.0	<1.0	<1.0	<100	<100	1,9,10		USAF 1996 SWMPR
MW6	9/2/97	<1.0	<1.0	<1.0	--	<100	180	9,10,11	b	USAF 1997 SWMPR
MW8	9/28/95	<1.0	<1.0	<1.0	<1.0	<50	120	1-3		USAF 1995 SWMPR
MW8	8/5/96	<1.0	<1.0	<1.0	<1.0	<100	200	1,9,10		USAF 1996 SWMPR
MW8	9/23/96	<1.0	<1.0	<1.0	<1.0	<100	<100	1,9,10		USAF 1996 SWMPR
DP-1	9/29/95	<1.0	1.2	<1.0	<1.0	100	880	1-3		USAF 1995 SWMPR
DP-1	8/6/96	1.6	<1.0	<1.0	<1.0	<100	270	1,9,10		USAF 1996 SWMPR
DP-1	9/19/96	1.5	<1.0	<1.0	<1.0	<100	<100	1,9,10		USAF 1996 SWMPR

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 602

Notes:

a. GRO chromotographic pattern indicative of gasoline; DRO chromotographic pattern indicative of petroleum product which is lighter than diessel fuel, such as gasoline or JP-4.

b. DRO chromotographic pattern is not indicative of a petroleum product.

TABLE B2375-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, BUILDING 2375, UST AT BUILDING 2375, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1]		
MW1	10/29/95	1.4	--	8	--	300	7.24	--	--		USAF 1995 SWMPR
MW3	10/02/95	1.6	--	10	--	800	7.05	--	--		USAF 1995 SWMPR
MW3	08/05/96	0.7	--	8.8	27	658	6.69	63	--		USAF 1996 SWMPR
MW3	09/23/96	0.12	--	8.42	46	361	6.86	-9	--		USAF 1996 SWMPR
MW3	09/02/97	0.39	3.7	11.8	46	1056	7.38	-55	--		USAF 1997 SWMPR
MW4	09/29/95	4.1	--	9	--	310	6.92	--	--		USAF 1995 SWMPR
MW6	09/29/95	3.1	--	9	--	410	6.79	--	--		USAF 1995 SWMPR
MW6	08/05/96	1.04	--	7.9	112	468	6.77	38	--		USAF 1996 SWMPR
MW6	09/23/96	0.184	--	6.84	78	247	6.79	67	--		USAF 1996 SWMPR
MW6	09/02/97	0.86	9.6	9.1	78	391	8.15	-1	--		USAF 1997 SWMPR
MW8	09/28/95	2.9	--	9	--	350	6.8	--	--		USAF 1995 SWMPR
DP-1	09/29/95	2	--	9	--	270	7.2	--	--		USAF 1995 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

LF01 Original Base Landfill and Drum Storage Area

COCs, RAOs, and ARARs

Contaminants of concern at Landfill 01 (LF01) include VOCs and metals. The following table lists ARAR MCLs established to address groundwater quality at LF01 and other OU 3,4,5 source areas. RAOs have not been established for LF01 and other OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level. 2 - Secondary MCL.

Site Setting

LF01 is located between the Richardson Highway and Piledriver Slough. LF01 includes an abandoned landfill and drum disposal area. The landfill was used throughout the 1950s and received domestic and base operations waste, including garbage, lumber, metal, construction debris, and empty cans. Waste oil, solvents, and paint residues were also reportedly deposited in the landfill. The landfill was covered with a cap in 1960, but some refuse is still visible.

There is no historical record of use of the drum storage area. In 1992, approximately 2,500 open, rusting drums were removed from the area and disposed of in the Borough landfill. Several drums found to contain liquids were removed in accordance with appropriate laws and regulations by base HazMat (hazardous material) personnel.

Previous Activities

The limited field investigation of this area included drilling two groundwater monitor wells (one at the landfill and one at the drum storage area), digging seven soil pits down to groundwater at the drum storage area, sampling surface soils in a drainage that leads from the landfill to Piledriver

Slough, and monitoring three existing wells near the landfill. Soil and groundwater samples were collected and analyzed for VOCs, SVOCs, pesticides, herbicides, and metals. Other than metals, no other compounds were detected in soil and groundwater samples. Metal concentrations did not exceed background levels determined during the Source Evaluation Report (SER) investigation. Analyses of soil, groundwater, surface water, and sediment showed no contamination that posed an unacceptable risk to human health or the environment.

Groundwater contamination was not identified at LF01 during the SER investigation. One groundwater sample was collected in 1994 to monitor water quality down-gradient of the landfill. This sample was analyzed for metals. Some metals have been detected above the background 95 percent UCLs. The LF01 source area was recommended for no further action in the OUs 3,4,5 ROD. No samples were collected at LF01 under the 1995 SWMP.

Monitor wells 01MW03 and 01MW04 were sampled during the 1996 field season for VOCs and metals. No VOCs were detected in either 01MW03 or 01MW04. Total lead and total silver concentrations were below ARAR MCLs established for groundwater quality at OU 3,4,5 source areas. Other metals detected in 1996 were within the 95% UCL established for background metals.

1997 Results

During the 1997 field season, groundwater parameters were measured in monitor wells 01MW03 and 01MW04. An overall trend of groundwater quality can not be determined solely on groundwater parameter data.

References for LF01:

1994 Source Evaluation Report, Phase 2, PNL, October 1994
1995 OU 3,4,5 Record of Decision, USAF, September 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for LF01:

List of Tables for LF01:

List of Tables for LF01 (continued):

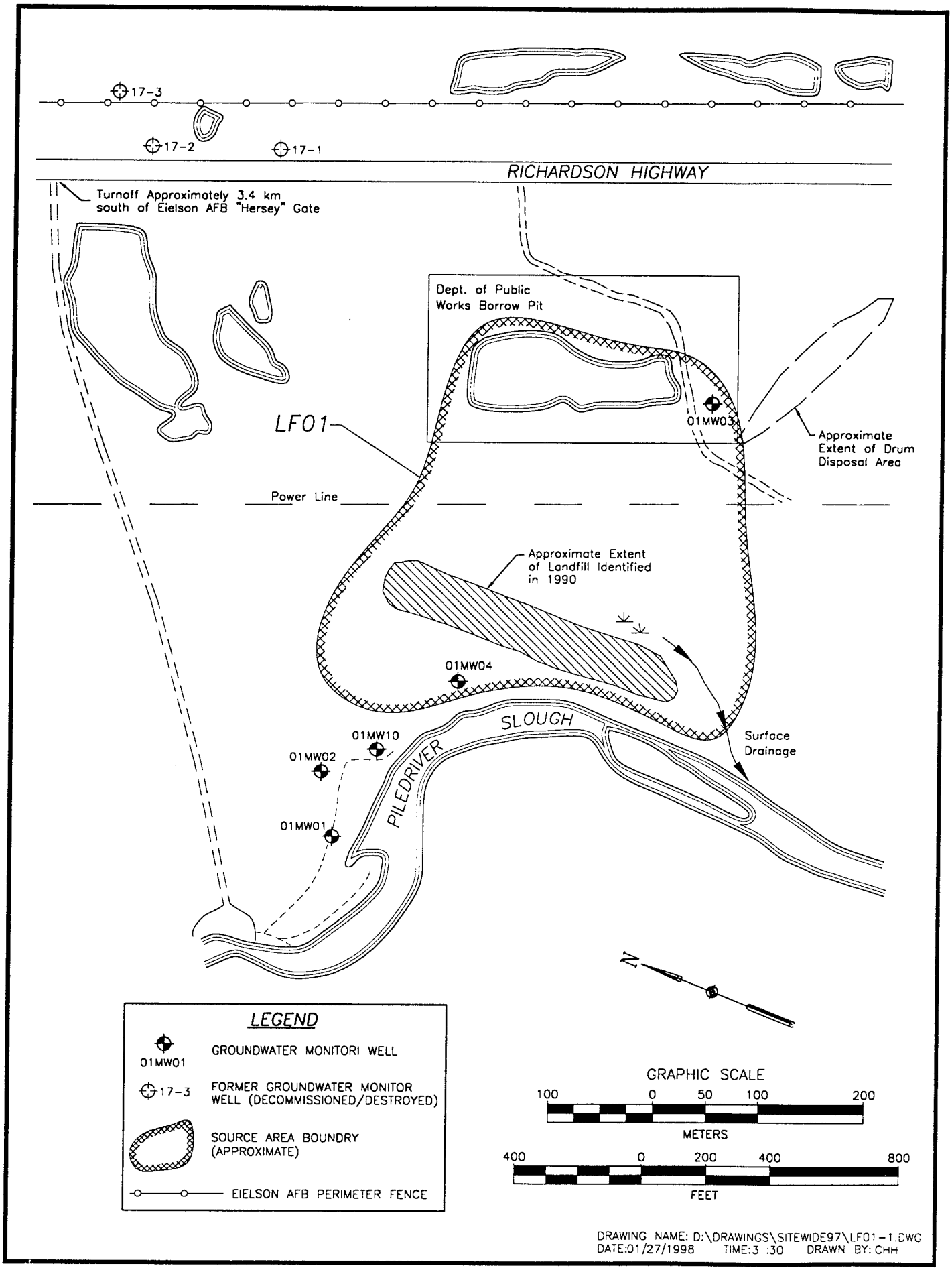

Figure LF01-1. LF01 Original Base Landfill and Drum Storage Area, Eielson AFB, Alaska

TABLE LF01-1 LF01 ORIGINAL BASE LANDFILL AND DRUM STORAGE AREA GROUNDWATER ANALYTICAL RESULTS (REVISED FROM PNL 1994 SER PHASE 2)

LF01 Ground Water Sample Data From Previous Investigations											
		Det.	01M01		01M02	01MW10				Conc.	Location
Parameter Analyzed	Units	Limit	1988	1988-Dup.	1988	1984	1986	1987	1988	Range	of Max.
Oil and Grease	µg/L	500				2,000				2,000	01MW10
PCBs	µg/L	0.5				ND					
Pesticides	µg/L	0.002-0.02									
Phenols	µg/L	10				ND					
TDS	µg/L	1000	196,000	222,000	188,000	--	180,000	Unknown	204,000	180,000-222,000	01M01
TOC	µg/L	1000				1,000				1,000	01MW10
TOX	µg/L	10				89				89	01MW10
pH (field)						6.85				6.85	01MW10
Spec. Cond. @ 25°C	µmhos/cm					211				211	01MW10
Petroleum Hydrocarbons			ND				ND	Unknown			
Purgeable Halocarbons											
Chlorobenzene	µg/L	0.34	ND	0.371	ND		ND		ND	0.371	01M01
Chloromethane	µg/L	0.4	ND	ND	0.566		ND		2.06	0.566-2.06	01MW10
1,2-Dichloroethane	µg/L	0.2	ND	ND	ND		ND		0.387	0.387	01MW10
Trichlorfluoromethane	µg/L	0.44	ND	ND	ND		3.0		ND	3.0	01MW10
Purgeable Aromatics											
Benzene	µg/L	0.15	ND	0.23	ND		ND		ND	0.23	01M01
Toluene	µg/L	0.25	ND	0.35	ND		ND		ND	0.35	01M01
Semi-VOC			ND	ND	ND				ND		
Arsenic											
Arsenic, total	µg/L	1.8	8.9	16.9	11.7				3.1	3.1-16.9	01M01
Arsenic, dissolved	µg/L	1.8	5.0	6.0	ND				ND	5.0-6.0	01M01
Lead											
Lead, total	µg/L	1.4	23.8	64.7	53.0	20	ND		6.2	6.2-64.7	01M01
Lead, dissolved	µg/L	1.4	6.0	ND	ND				ND	6.0	01M01
Mercury											
Mercury, total	µg/L	0.2	ND	ND	0.6				ND	0.6	01M02
Mercury, dissolved	µg/L	0.2	ND	ND	ND				ND		
ICP Metals Scan											
Aluminum, total	µg/L	30	17,900	59,600	102,000				4,960	4,960-102,000	01M02
Arsenic, total	µg/L	40	8.9	16.9	11.7				3.1	3.1-16.9	01M01
Barium, total	µg/L	1.8	377	914	1,240				127	127-1,240	01M02
Barium, dissolved	µg/L	1.8	100	200	100				90	90-200	01M01
Cadmium, total	µg/L	3.0	ND	ND	3.8				ND	3.8	01M02
Calcium, total	µg/L	1.3	60,800	76,100	83,000				51,400	51,400-83,000	01M02
Calcium, dissolved	µg/L	1.3	52,200	54,200	44,300				48,000	44,300-54,200	01M01
Chromium, total	µg/L	6.0	28.1	120	198				ND	28.1-198	01M02
Cobalt, total	µg/L	6.0	19.1	62.9	83.4				8.2	8.2-83.4	01M02
Copper, total	µg/L	3.0	84.0	325	322				17.2	17.2-325	01M01
Iron, total	µg/L	20	23,400	92,300	164,000				7,360	7,360-164,000	01M02
Iron, dissolved	µg/L	20	40	40	40				30	30-40	01M01/02
Lead, total	µg/L	30	ND	100	100				ND	100	01M01/02
Magnesium, total	µg/L	44	16,100	33,800	50,000				11,300	11,300-50,000	01M02
Magnesium, dissolved	µg/L	44	9,880	10,300	8,180				9,100	8,180-10,300	01M01
Magnanese, total	µg/L	1.4	1,240	2,360	3,180				435	435-3,180	01M02
Magnanese, dissolved	µg/L	1.4	800	900	40				10	10-900	01M01
Nickel, total	µg/L	20	37.4	117	197				ND	37.4-197	01M02
Potassium, total	µg/L	408	6,400	12,800	15,800				3,950	3,950-15,800	01M02
Potassium, dissolved	µg/L	408	2,520	2,670	2,310				2,480	2,310-2,670	01M01
Sodium, total	µg/L	82	7,190	11,500	14,700				4,720	4,720-14,700	01M02
Sodium, dissolved	µg/L	82	4,220	4,380	4,000				4,020	4,000-4,380	01M01
Vanadium, total	µg/L	10	42.2	169	288				ND	42.2-288	01M02
Zinc, total	µg/L	2.0	72.1	270	418				30.8	30.8-418	01M02
Zinc, dissolved	µg/L	2.0	40	40	40				40	40	01M01/02/W10
Common Anions											
Chloride	µg/L	200	1,849	1,259	1,167				1,198	1,167-1,849	01M01
Sulfate	µg/L	500	32,420	30,900	33,150				31,420	30,900-33,150	01M02
Nitrogen			ND	ND	ND				ND		

No Entry Parameter not analyzed for. -- Parameter in suite of analyses for well, but not analyzed.
ND Parameter not detected. Unknown Reference unavailable at this time.

TABLE LF01-2 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF01, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
01M03	8/93	not analyzed - broken container								PNL 1994 SER PHASE 2
01M03	8/20/96	<1.0	<1.0	<1.0	<1.0	--	--	7	a	USAF 1996 SWMPR
01M04	8/93	<0.105	<0.056	<0.046	<.202	--	--	1,4	a	PNL 1994 SER PHASE 2
01M04	8/20/96	<1.0	<1.0	<1.0	<1.0	--	--	7	a	USAF 1996 SWMPR

Notes:

a. No compounds other than those listed were detected above reporting limits.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE LF01-3 CONCENTRATIONS (µg/L) OF METALS IN GROUNDWATER SAMPLES, LF01, EIELSON AFB, ALASKA

Well No.	f/u	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
DISSOLVED																										
01M01	f	6/93	<32.5	<69.4	<1.0	110	1.0	<4.70	49,000	12	<4.05	3.0	72	<1.0	8,900	160	<17.9	3,100	--	<2.87	3,700	--	<3.84	<3.44		PNL 1993 SWGMPR
01M01	f	8/93	<32.5	<69.4	<2.0	84	<0.814	<4.70	49,000	<5.42	5.2	2.7	<16	<0.6	8,500	55	<17.9	2,800	--	<2.87	4,000	--	<3.84	4.6		PNL 1993 SWGMPR
01M01	f	9/94	22	<1.0	<1.0	65	<1.0	<1.0	59,000	<1.0	<1.0	3.0	<18	<1.0	10,000	2.0	1.0	2,900	--	<1.0	4,600	--	<1.0	3.0		PNL 1994 SWGMPR
01M02	f	6/93	<32.5	<69.4	<1.0	43	<0.814	<4.70	44,000	<5.42	<4.05	<2.65	<21	<1.0	8,200	3.1	<17.9	1,600	--	<2.87	3,800	--	<3.84	<3.44		PNL 1993 SWGMPR
01M02	f	8/93	<32.5	<69.4	2.0	47	1.1	<4.70	44,000	<5.42	4.5	<2.65	<14	<1.4	7,500	2.2	<17.9	3,400	--	<2.87	3,800	--	<3.84	3.9		PNL 1993 SWGMPR
01M02	f	1994	140	--	1.0	57	--	--	49,000	<1.0	<1.0	4.0	120	<1.0	8,800	9.0	1.0	3,600	--	<1.0	6,500	--	<1.0	12		PNL 1994 SWGMPR
01M04	f	8/94	<57	<1.0	3.0	100	<1.0	<1.0	59,000	<1.0	1.5	<1.0	1,800	1.0	12,000	360	2.1	3,000	--	<1.0	4,100	--	<1.0	4.5		PNL 1994 SWGMPR
Background Concentrations																										
BGM	f	9/94	43	--	8.3	101	<1.0	<1.0	51,750	<1.0	1.3	2.4	1,736	<1.0	10,450	1,789	2.3	3,400	--	<1.0	4,563	--	<1.0	5.6		PNL 1994 SWGMPR
BGMX	f	9/94	140	--	23	160	<1.0	<1.0	61,000	<1.0	3.0	4.0	9,900	<1.0	12,000	4,100	5.0	4,500	--	<1.0	6,500	--	1.0	19		PNL 1994 SWGMPR
BGUC	f	9/94	74	--	14.5	129	<1.0	<1.0	57,600	<1.0	<3	3.1	3,980	<1.0	11,400	2,720	3.2	3,800	--	<1.0	5,340	--	1.0	10		PNL 1994 SWGMPR
TOTAL																										
01M01	u	6/93	120	<69.4	2.0	110	<0.814	<4.70	49,000	<5.42	<4.05	<2.65	260	<1.0	9,100	190	<17.9	3,000	--	<2.87	3,900	--	<3.84	<3.44		PNL 1993 SWGMPR
01M01	u	8/93	680	<69.4	2.0	96	<0.814	<4.70	50,000	9.7	4.4	3.1	1,500	<1.9	8,900	300	<17.9	3,100	--	<2.87	4,100	--	<3.84	5.8		PNL 1993 SWGMPR
01M01	u	9/94	15,000	2.0	24	420	<1.0	3.0	64,000	43	29	140	33,000	47	23,000	6,500	77	7,400	--	<1.0	9,700	--	50	120		PNL 1994 SWGMPR
01M02	u	6/93	560	<69.4	2.0	55	<0.814	<4.70	45,000	<5.42	<4.05	<2.65	840	<1.0	8,500	53	<17.9	1,500	--	<2.87	3,900	--	<3.84	<3.44		PNL 1993 SWGMPR
01M02	u	8/93	160	<69.4	<2.0	49	<0.814	<4.70	43,000	<5.42	<4.05	<2.65	250	<0.92	7,400	20	<17.9	3,300	--	<2.87	3,700	--	4.8	<3.44		PNL 1993 SWGMPR
01M02	u	9/94	18,000	2.0	25	410	<1.0	1.0	64,000	46	31	130	33,000	48	26,000	4,800	69	7,900	--	<1.0	9,800	--	52	120		PNL 1994 SWGMPR
01M03	u	8/93	5,900	--	3.6	160	--	--	54,000	11	--	11	8,000	4.9	12,000	1,200	<17.9	5,200	--	--	5,200	--	17	32		PNL 1994 SER PHASE 2
01M03	u	8/20/96	629	<2.0	<2.0	44.9	<1.0	<1.0	46,000	<6.0	<11.0	<6.0	1,090	1.4	9,140	746	<15.0	3,420	4.5	<4.0	3,730	<1.0	<8.0	<12.0		USAF 1996 SWMPR
01M04	u	8/93	2,300	--	3.9	120	--	--	51,000	7.5	--	5.9	5,700	4.1	1,100	600	<17.9	4,600	--	--	4,500	--	12	16		PNL 1994 SER PHASE 2
01M04	u	8/94	20,000	1.8	13.0	310	<1.0	1.9	61,000	22	1.6	130	35,000	50	19,000	660	39	6,000	--	<1.0	8,200	--	40	120		PNL 1994 SWGMPR
01M04	u	8/20/96	262	<2.0	<2.0	53.7	<1.0	<1.0	48,500	<6.0	<11.0	6.6	1,570	1.2	9,410	97.5	<15.0	2,850	<2.0	<4.0	4,060	<1.0	<8.0	<12.0		USAF 1996 SWMPR
Background Concentrations																										
BGM	u	9/94	7,538	<1.0	25	269	<1.0	<1.0	58,625	20	13.75	75	16,938	21	17,375	3,875	31	5,650	--	<1.0	8,363	--	24	63		PNL 1994 SWMP
BGMX	u	9/94	18,000	2.0	63	420	<1.0	<1.0	66,000	46	31	140	33,000	48	26,000	6,500	77	7,900	--	<1.0	9,800	--	52	120		PNL 1994 SWMP
BGUC	u	9/94	11,500	<2.0	37	342	<1.0	<1.0	64,900	30.4	20.8	105	23,800	32.6	20,800	4,980	48.8	6,500	--	<1.0	9,260	--	36	88.8		PNL 1994 SWMP

Notes:
- f. Field filtered.
- u. Total (unfiltered).

TABLE LF01-4 GROUNDWATER PARAMETERS AND IMMUNOASSAY FIELD TEST RESULTS, LF01, EIELSON AFB, ALASKA

		Parameters							Immunoassay Results				
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2] (ppb)	Notes	Reference
01M03	08/20/96	2.96	–	7.1	27	227	6.98	188	–	–	–		USAF 1996 SWMPR
01M03	08/20/97	3.16	26.2	6.7	<5	318	6.79	162	–	–	–		USAF 1997 SWMPR
01M04	08/20/96	0.83	–	1.2	11	231	7.13	169	–	–	–		USAF 1996 SWMPR
01M04	08/20/97	2.54	18.5	2.0	<5	316	6.22	192	–	–	–		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Dräger Liquid Extraction (DLE) field test kit.

LF02 Old Base Landfill

COCs, RAOs, and ARARs

Contaminants of concern at Landfill 02 (LF02) include VOCs and metals. The following table lists ARAR MCLs established to address groundwater quality at LF02 and other OU 3,4,5 source areas. RAOs have not been established for OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

LF02 is an abandoned 6-acre landfill located about 250 feet northwest of the intersection of Manchu Road and Gravel Haul Road. The site is located on the banks of French Creek, a tributary of Moose Creek. LF02 is about 400 feet east of Bear Lake. LF02 boundaries were estimated using results of a surface electromagnetic survey. The minimum distance from the site to French Creek is approximately 20 feet. LF02 was used as the primary base landfill from 1960 to 1967 and received domestic and base operations waste.

Previous Activities

Previous site investigations and analyses of soil, surface water, sediments, and groundwater showed no contamination that poses an unacceptable risk to human health or the environment. No samples were collected at LF02 under the 1995 SWMP.

Monitor wells 02M01, 02M02, 02MW9, and 02M0B were sampled during the 1996 field season. Monitor well 02M02 displayed a toluene concentration of 73 µg/L, while monitor wells 02M01,

02MW9, and 02M0B displayed low (≤0.8 µg/L) to non detectable BTEX compounds. All BTEX compounds detected in 1996 were below the ARAR MCLs established for groundwater quality at LF02 and other OU 3,4,5 source areas. Low levels of methylene chloride were detected in 02M01 and 02M02. Well 02M01 also displayed low concentrations of c-1,2-DCE and t-1,2-DCE. These concentrations were below applicable ARAR MCLs and EPA drinking water MCLs.

Monitor wells 02M01, 02MW9, and 02M0B displayed total arsenic concentrations which ranged from 54 µg/L to 153 µg/L. These concentrations are above EPA drinking water MCL of 50 µg/L and the 95% background UCL of 37 µg/L. No other metals of concern were noted above the 95% UCL established for background metals.

1997 Results

During the 1997 field season, groundwater parameters were measured in monitor wells 02M01 and 02MW08. Groundwater parameters in 02M01 are generally consistent with 1996 groundwater parameters. Previous parameter data are not available for 02MW08. A trend of groundwater quality can not be determined based solely on current groundwater parameter data.

On 24 September 1997, monitor wells 02M0B and 02M0C were decommissioned by removal of the well casing and filling the borehole with bentonite. Monitor well 02M0B was selected for decommissioning due to its up- and side-gradient location to the source area. Monitor well 02M0C was decommissioned due to its poor condition.

References for LF02:

1995 OU 3,4,5 Record of Decision, USAF, September 1995
1995 OU 3,4,5 Remedial Investigation Report, PNL, May 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for LF02:

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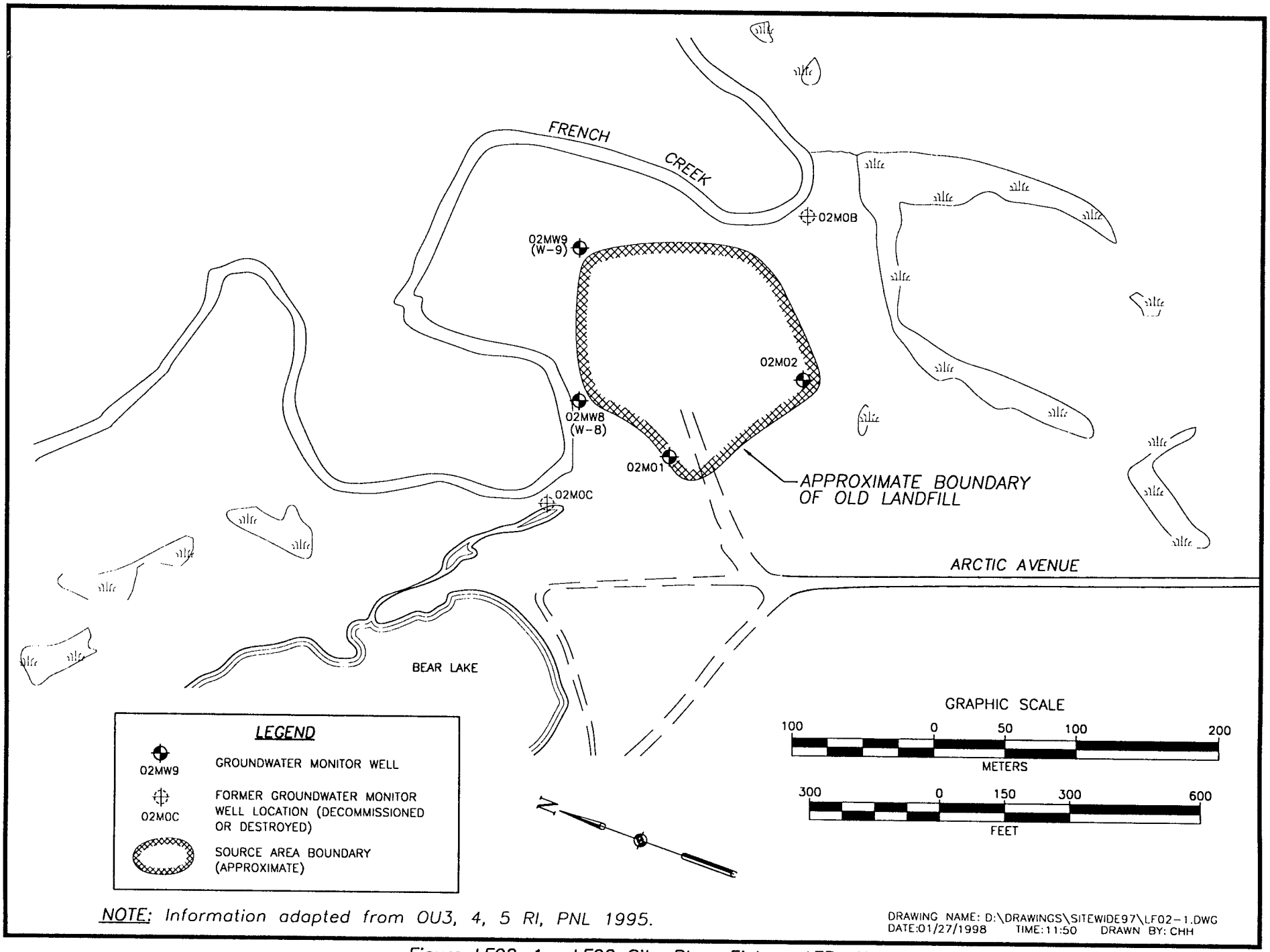

Figure LF02-1. LF02 Site Plan, Eielson AFB, Alaska

TABLE LF02-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF02, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
02M01	5/93	0.13	<0.056	0.048	<0.202	--	--	1		PNL 1995 OU 3,4,5 RI
02M01	8/93	0.11	<0.056	0.066	<0.202	--	--	1		PNL 1995 OU 3,4,5 RI
02M01	6/16/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU 3,4,5 RI
02M01	8/18/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU 3,4,5 RI
02M01	8/22/96	<1.0	0.8	0.2	1.0	--	--	7		USAF 1996 SWMPR
02M02	5/93	<0.105	1.0	0.049	0.24	--	--	1		PNL 1995 OU 3,4,5 RI
02M02	8/93	<0.105	<0.056	<0.046	<0.202	--	--	1		PNL 1995 OU 3,4,5 RI
02M02	6/16/94	<1.0	46	<1.0	<1.0	--	--	1		PNL 1995 OU 3,4,5 RI
02M02	8/3/94	<1.0	2.2	<1.0	<1.0	--	--	1		PNL 1995 OU 3,4,5 RI
02M02	8/22/96	<1.0	73	<1.0	<1.0	--	--	7		USAF 1996 SWMPR
02MW9	5/93	0.16	0.14	0.13	<0.202	--	--	1		PNL 1995 OU 3,4,5 RI
02MW9	8/93	<0.105	<0.056	<0.046	<0.202	--	--	1		PNL 1995 OU 3,4,5 RI
02MW9	6/16/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU 3,4,5 RI
02MW9	8/3/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU 3,4,5 RI
02MW9	8/22/96	<1.0	0.3	0.3	0.2	--	--	7		USAF 1996 SWMPR
02M0B	5/93	<0.105	<0.056	<0.046	<0.202	--	--	1		PNL 1995 OU 3,4,5 RI
02M0B	8/93	<0.105	<0.056	<0.046	<0.202	--	--	1		PNL 1995 OU 3,4,5 RI
02M0B	6/16/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU 3,4,5 RI
02M0B	8/3/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU 3,4,5 RI
02M0B	8/28/96	<1.0	<1.0	<1.0	0.3	--	--	7		USAF 1996 SWMPR

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE LF02-2 CONCENTRATIONS (µg/L) OF NON-BTEX VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF02, EIELSON AFB, ALASKA

Well No.	Date Sampled	Methylene Chloride	c-1,2-DCE	t-1,2-DCE	TCE	PCE	1,2,4-TMB	Naphthalene	Analytical Methods	Notes	Reference
02M01	5/93	0.12	7.6	1.9	6.5	0.078	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M01	8/93	0.11	4.3	1.4	4.5	0.074	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M01	6/16/94	<1.0	--	<1.0	<0.50	<0.50	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M01	8/18/94	1.7	--	1.4	<0.50	<0.50	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M01	8/22/96	0.6	7.0	1.0	<1.0	<1.0	0.4	0.2	7	a	USAF 1996 SWMPR
02M02	5/93	<0.056	<0.127	<0.149	<0.065	<0.049	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M02	8/93	0.085	<0.127	<0.149	<0.065	<0.049	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M02	6/16/94	<1.0	--	<1.0	<0.50	<0.50	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M02	8/3/94	<1.0	--	<1.0	<0.50	<0.50	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M02	8/22/96	0.9	<1.0	<1.0	<1.0	<1.0	0.3	<1.0	7	a	USAF 1996 SWMPR
02MW9	5/93	0.094	<0.127	0.17	<0.065	0.10	--	--	4	a	PNL 1995 OU 3,4,5 RI
02MW9	8/93	0.084	<0.127	<0.149	<0.065	<0.049	--	--	4	a	PNL 1995 OU 3,4,5 RI
02MW9	6/16/94	<1.0	--	<1.0	<0.50	<0.50	--	--	4	a	PNL 1995 OU 3,4,5 RI
02MW9	8/3/94	<1.0	--	<1.0	<0.50	<0.50	--	--	4	a	PNL 1995 OU 3,4,5 RI
02MW9	8/22/96	0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7	a	USAF 1996 SWMPR
02M0B	5/93	0.069	<0.127	<0.149	<0.065	<0.049	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M0B	8/93	<0.056	<0.127	<0.149	<0.065	<0.049	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M0B	6/16/94	<1.0	--	<1.0	<0.50	<0.50	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M0B	8/3/94	<1.0	--	<1.0	<0.50	<0.50	--	--	4	a	PNL 1995 OU 3,4,5 RI
02M0B	8/28/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7	a	USAF 1996 SWMPR

Notes:

a. No non-BTEX volatile organic compounds other than those listed or noted were detected above method reporting limits.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

DCE Dichloroethene.
TCE Trichloroethylene.
PCE Perchloroethene (tetrachloroethene).

TABLE LF02-3 CONCENTRATIONS (µ/L) OF METALS IN GROUNDWATER SAMPLES, LF02, EIELSON AFB, ALASKA

Well No.	f/u	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
DISSOLVED																										
02M01	f	6/15/94	--	--	11.5	199	<1.0	<1.0	--	<1.0	--	--	1,750	1.7	17,300	--	3.4	8.33	<3.0	<1.0	18,800	--	--	--		PNL 1995 OU 3,4,5 RI
02M01	f	8/4/94	23.9	<1.0	21.4	392	<2.0	<1.0	43,900	3.4	<1.0	<1.0	5,640	<1.0	16,500	1,020	1.2	8,830	--	<1.0	17,800	--	2.4	4.9		PNL 1995 OU 3,4,5 RI
02M02	f	6/15/94	--	25.1	--	38.3	<1.0	<1.0	--	<1.0	--	--	22,600	1.0	32,400	--	8.1	15,500	<3.0	<1.0	23,600	--	--	--		PNL 1995 OU 3,4,5 RI
02M02	f	8/4/94	8.8	71.4	<1.0	37.7	<1.0	<1.0	--	4.2	2.1	<1.0	18,000	<1.0	17,400	1,670	10.0	1,640	--	<1.0	12,500	--	3.7	3.9		PNL 1995 OU 3,4,5 RI
02MW9	f	6/15/94	--	--	11.7	86.1	<1.0	<1.0	--	1.0	--	--	3,570	<1.0	9,130	--	4.1	2,780	<3.0	<1.0	4,250	--	--	--		PNL 1995 OU 3,4,5 RI
02MW9	f	8/4/94	14.3	<1.0	24.0	98.4	<2.0	<1.0	29,700	2.3	<1.0	<1.0	8,300	<1.0	7,440	1,170	1.9	2,680	--	<1.0	4,110	--	3.3	6.7		PNL 1995 OU 3,4,5 RI
02M0B	f	6/15/94	Sample damaged in transit.																							
02M0B	f	8/4/94	27.1	<1.0	24.8	42.2	<2.0	<1.0	36,100	2.3	<1.0	3.2	4,650	<1.0	9,190	1,030	2.1	2,750	--	<1.0	3,980	--	2.8	4.7		PNL 1995 OU 3,4,5 RI
Background Concentrations																										
BGM	f	9/94	43	--	8.3	101	<1.0	<1.0	51,750	<1.0	1.3	2.4	1,736	<1.0	10,450	1,789	2.3	3,400	--	<1.0	4,563	--	<1.0	5.6		PNL 1994 SWMP
BGMX	f	9/94	140	--	23	160	<1.0	<1.0	61,000	<1.0	3.0	4.0	9,900	<1.0	12,000	4,100	5.0	4,500	--	<1.0	6,500	--	1.0	19		PNL 1994 SWMP
BGUCL	f	9/94	74	--	14.5	129	<1.0	<1.0	57,600	<1.0	<3.0	3.1	3,980	<1.0	11,400	2,720	3.2	3,800	--	<1.0	5,340	--	1.0	10		PNL 1994 SWMP
TOTAL																										
02M01	u	5/93	21,000	<69.4	81	510	<0.814	<4.7	79,000	32	<4.05	61	49,000	18	32,000	1,400	32	11,000	--	<2.87	25,000	--	48	100		PNL 1995 OU 3,4,5 RI
02M01	u	8/93	2,900	<69.4	43	270	<0.814	4.8	58,000	9.3	<4.05	9.7	18,000	4.3	22,000	890	<17.9	9,300	--	<2.87	22,000	--	12	20		PNL 1995 OU 3,4,5 RI
02M01	u	6/15/94	--	--	35.3	266	<1.0	<1.0	--	7.6	--	--	18,400	8.6	21,900	--	12.4	9,930	<3.0	<1.0	24,500	--	--	--		PNL 1995 OU 3,4,5 RI
02M01	u	8/4/94	6,660	<1.0	54.8	392	<2.0	<1.0	55,200	13.8	8.3	55.9	24,600	18.3	23,200	1,260	19.7	11,400	--	<1.0	22,400	--	24.0	82.8		PNL 1995 OU 3,4,5 RI
02M01	u	8/22/96	81	<2.0	54.2	209	<1.0	<1.0	47,500	<6.0	<11.0	<6.0	13,900	<1.0	15,900	1,230	<15.0	6,690	4.7	<4.0	13,400	<1.0	<8.0	<12.0		USAF 1996 SWMPR
02M02	u	5/93	1,000	<69.4	63	57	<0.814	<4.7	51,000	<5.42	<4.05	<2.65	20,000	2.3	18,000	830	<17.9	7,300	--	<2.87	10,000	--	<3.84	21		PNL 1995 OU 3,4,5 RI
02M02	u	8/93	350	<69.4	61	35	<0.814	4.9	34,000	<5.42	<4.05	<2.65	9,900	2.5	7,700	740	<17.9	2,700	--	<2.87	4,200	--	<3.84	9.3		PNL 1995 OU 3,4,5 RI
02M02	u	6/15/94	--	--	43.9	101	<1.0	<1.0	--	2.1	--	--	31,200	2.7	32,500	--	11.9	15,800	<3.0	<1.0	26,800	--	--	--		PNL 1995 OU 3,4,5 RI
02M02	u	8/4/94	2530	<1.0	72.6	83.2	<2.0	<1.0	56,400	7.4	5.9	31.7	20,700	6.1	16,800	1,430	22.9	7,100	--	<1.0	14,300	--	11.0	77.6		PNL 1995 OU 3,4,5 RI
02M02	u	8/22/96	<25.0	<2.0	38.2	100	<1.0	<1.0	59,600	<6.0	<11.0	<6.0	14,700	<1.0	14,100	1,760	<15.0	4,640	3.3	<4.0	9,720	<1.0	<8.0	<12.0		USAF 1996 SWMPR
02MW9	u	5/93	4,500	<69.4	62	270	<0.814	<4.7	54,000	<5.42	<4.05	<2.65	27,000	6.2	14,000	1,300	<17.9	5,000	--	<2.87	5,800	--	<3.84	37		PNL 1995 OU 3,4,5 RI
02MW9	u	8/93	1,900	<69.4	83	240	<0.814	<4.7	50,000	8.0	<4.05	6.5	22,000	1.5	12,000	1,300	<17.9	4,700	--	<2.87	5,700	--	8.8	18		PNL 1995 OU 3,4,5 RI
02MW9	u	6/15/94	--	--	56.9	205	<1.0	<1.0	--	8.4	--	--	24,100	8.5	13,200	--	12.9	11,000	<3.0	<1.0	8,580	--	--	--		PNL 1995 OU 3,4,5 RI
02MW9	u	8/4/94	3,220	19.8	58.1	171	<2.0	<1.0	34,500	11	4.0	26.2	20,500	8.0	10,800	1,230	12.9	3,730	--	<1.0	8,390	--	14.5	76		PNL 1995 OU 3,4,5 RI
02MW9	u	8/22/96	1,310	<2.0	153	294	<1.0	<1.0	35,900	<6.0	<11.0	<6.0	44,900	2.5	9,030	1,150	<15.0	1,960	2.5	<4.0	4,540	<1.0	10.4	16.6		USAF 1996 SWMPR
02M0B	u	5/93	5,100	<69.4	140	220	<0.814	<4.7	32,000	<5.42	<4.05	<2.65	36,000	8.2	8,200	1,500	<17.9	2,000	--	<2.87	4,000	--	<3.84	28		PNL 1995 OU 3,4,5 RI
02M0B	u	8/93	640	<69.4	53	110	<0.814	5.0	46,000	<5.42	<4.05	4.4	19,000	1.2	8,600	1,300	<17.9	2,600	--	<2.87	4,300	--	8.7	9.8		PNL 1995 OU 3,4,5 RI
02M0B	u	6/15/94	--	--	64.7	111	<1.0	<1.0	--	3.3	--	--	21,400	3.5	9,190	--	6.9	1,950	<3.0	<1.0	6,100	--	--	--		PNL 1995 OU 3,4,5 RI
02M0B	u	8/4/94	8,570	<1.0	295	308	<2.0	<1.0	52,000	19.9	9.1	40.1	60,600	13.9	17,200	1,460	25.8	4,480	--	<1.0	9,670	--	35.2	126		PNL 1995 OU 3,4,5 RI
02M0B	u	8/28/96	834	<2.0	76	122	<1.0	<1.0	43,200	<6.0	<11.0	<6.0	21,700	1.6	8,640	1,370	<15.0	2,070	3.7	<4.0	4,230	<1.0	<8.0	<12.0		USAF 1996 SWMPR

TABLE LF02-3 (continued)

Well No.	f/u	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
Background Concentrations																										
BGM	u	9/94	7,538	<1.0	25	269	<1.0	<1.0	58,625	20	13.75	75	16,938	21	17,375	3,875	31	5,650	--	<1.0	8,363	--	24	63		PNL 1994 SWMP
BGMX	u	9/94	18,000	2.0	63	420	<1.0	<1.0	66,000	46	31	140	33,000	48	26,000	6,500	77	7,900	--	<1.0	9,800	--	52	120		PNL 1994 SWMP
BGUCL	u	9/94	11,500	<2.0	37	342	<1.0	<1.0	64,900	30.4	20.8	105	23,800	32.6	20,800	4,980	48.8	6,500	--	<1.0	9,260	--	36	88.8		PNL 1994 SWMP

Notes:

f. Field filtered.

u. Total (unfiltered).

BGM Mean concentration of samples collected from background wells in 1994.

BGMX Maximum concentration of samples collected from background wells in 1994.

BGUCL 95% Upper confidence limits of samples collected from background wells in 1994.

TABLE LF02-4 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, LF02, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results			Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2](ppb)		
02M01	08/22/96	0.08	--	3	141	371	6.78	--	--	--	--		USAF 1996 SWMPR
02M01	08/20/97	4.03	31	3.9	<5	438	6.85	40	--	--	--		USAF 1997 SWMPR
02M02	08/22/96	4.27	--	5.7	7	426	6.55	--	--	--	--		USAF 1996 SWMPR
02M0B	08/28/96	0.38	--	1.6	182	250	6.79	--	--	--	--		USAF 1996 SWMPR
02MW08	08/20/97	4.75	37.5	4.6	<5	508	6.43	138	--	--	--		USAF 1997 SWMPR
02MW9	08/22/96	3.45	--	5.8	764	222	6.81	--	--	--	--		USAF 1996 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Dräger Liquid Extraction (DLE) field test kit.

LF03/FT09 Inactive Base Landfill/Fire Training Area

COCs, RAOs, and ARARs

Contaminants of concern at Landfill 03/Fire Training area 09 (LF03/FT09) are BTEX, TCE, DCE, vinyl chloride, and pesticides. The following table lists ARARs established to address groundwater quality at LF03/FT09 and other OU 3,4,5 source areas. RAOs have not been established for OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

LF03/FT09 occupies approximately 100 acres of the base near the south end of the runway and north of the refueling loop. LF03 was used as the main base landfill from 1967 to 1987, and FT09 was a fire training area from 1955 to 1989. LF03 is located west of the ADEC permitted asbestos landfill.

During landfill operations, waste materials were reportedly dumped into standing water in landfill excavations that extended below the groundwater surface. The landfill received base refuse, including household garbage, construction debris, and empty cans and drums from the flightline industrial shops. LF03 also reportedly received waste oils, solvents, paint residues, and thinners. The majority of the landfill received wastes before 1980. After 1980, long trenches in the northern end of the landfill area were excavated to receive waste.

FT09 was used for fire training exercises from 1955 to 1989. Fuel, waste oils, and solvents were burned in the fire training area.

The present land surface over the buried debris is approximately level with the natural grade at the base. The waste is covered with ash from the EAFB power plant, and a layer of soil. Some of the landfill surface area is currently used as a land farm to store, segregate, and treat fuel impacted soil encountered during construction operations and from leaking underground storage tank sites at the base. Piles of clean soil, asphalt debris, and digested sludge from the Eielson AFB wastewater treatment plant have also been stored at LF03 since 1992.

The ROD for OUs 3,4,5 indicates that the preferred alternative for the area of LF03/FT09 is to install a cover on the landfill as required under Resource Conservation and Recovery Act (RCRA) Subtitle C. The Remedial Design (RD) process for OUs 3,4,5 was completed in 1996. During the summer of 1996 the cover materials for LF03 were inspected and augmented in one corner where refuse was exposed. This work satisfied the required remedial action per ROD for LF03/09.

Various activities were conducted during the 1996-1997 field seasons which could potentially affect groundwater monitoring results for several years. These include:

- Garrison Slough: Two pits were dug approximately 50 feet south of monitor well 03M09. These pits were used for disposition of PCB impacted sediment recovered from Garrison Slough.
- Landfarm Pilot Study: A land farming pilot study was conducted to assess the feasibility of remediation of petroleum impacted soils.
- Sludge Compost: Four sludge piles were constructed at LF03 in 1993 for composting. The piles were disassembled during the 1996 field season.
- Asphalt Pad: An asphalt pad was constructed in the southwest portion of the landfill during the 1996 field season.
- Asbestos Landfill: Materials were transported to the asbestos landfill.
- Drum Storage/Removal: Drums of CERCLA derived waste were staged at LF03 prior to 1995. The contents of the drums were characterized and disposed of in 1996, and the empty drums were removed during the 1997 field season for disposal at the North Star Borough Landfill.

Previous Activities

Seven wells at LF03/FT09 were sampled (03M01, 03M08, 03M13, and EAMW01-EAMW04) under the 1995 SWMP to monitor groundwater contaminants downgradient from the landfill for contaminants. The analyses for 03M01, 03M08 and 03M13 (VOCs, GRO, DRO, SVOCs, pesticides, and metals) were chosen to identify contaminants that might be present in the landfill, and included the list of landfill monitoring analyses shown in 40 CFR 258 (EPA Criteria for Solid Waste Landfills).

Low concentrations of petroleum-related and other organic compounds were detected in wells 03M01 and 03M13 while relatively higher levels were detected in samples from 03M08.

Monitor wells 03M01, 03M04, 03M05, 03M06, 03M07, 03M08, 03M10, 03M11, 03M12, 03M13, and 09M02 were sampled during the 1996 field season for VOCs, SVOCs, pesticides and metals. Monitor well 03M09 was sampled for PCBs and pesticides only.

Analytical results for 1996 indicated benzene concentrations exceeded OU 3,4,5 ARAR MCLs in monitor wells 03M08 (8 µg/L), 03M13 (42 µg/L), and 09M02 (13 µg/L). A TCE concentration of 63 µg/L was also detected in 03M08, exceeding the OU 3,4,5 ARAR MCL of 5 µg/L. All other VOCs were non detectable or detected in low concentrations below OU 3,4,5 ARAR MCLs and other applicable EPA drinking water MCLs.

Bis (2-ethylhexyl) phthalate was detected in monitor wells 03M04, 03M06, and 03M07 in concentrations ranging from 10 µg/L to 97 µg/L, exceeding the EPA drinking water MCL of 6 µg/L. Other semivolatiles detected included phenol (03M01 - 3.0 µg/L), naphthalene (03M01 - 1.5 µg/L; 03M08 - 22.0 µg/L), diethyl phthalate (03M08 - 17.0 µg/L), and benzoic acid (03M01 - 5.0 µg/L; 03M13 - 3.0 µg/L;). Applicable ARAR MCLs and EPA drinking water MCLs were not identified for these compounds.

1997 Results

During the 1997 field season groundwater parameters were measured in monitor wells 03M01, 03M04, 03M08, 03M09, 03M10, 03M11, 03M12, 03M13, and 09M02. Monitor well 03M09 was also sampled for PCBs and pesticides. No PCBs or pesticides were detected in 03M09.

The 1997 parameter data are generally consistent with previous data. No overall trends, based solely upon parameter data, are apparent at this time. PCB and pesticide analytical data in 03M09 continue to remain at below detection limits.

Monitor well EAMW1 was decommissioned on 26 September 1997 by removal of the well casing and filling the borehole with bentonite. The well was decommissioned due to its location upgradient of LF03.

References for LF03:

1995 OU 3,4,5 Remedial Investigation Report, PNL, May 1995
1995 OU 3,4,5 Record of Decision, USAF, September 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 OU 2,3,4,5 Proposed ROD Amendments, USAF, May 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for LF03:

List of Tables for LF03:

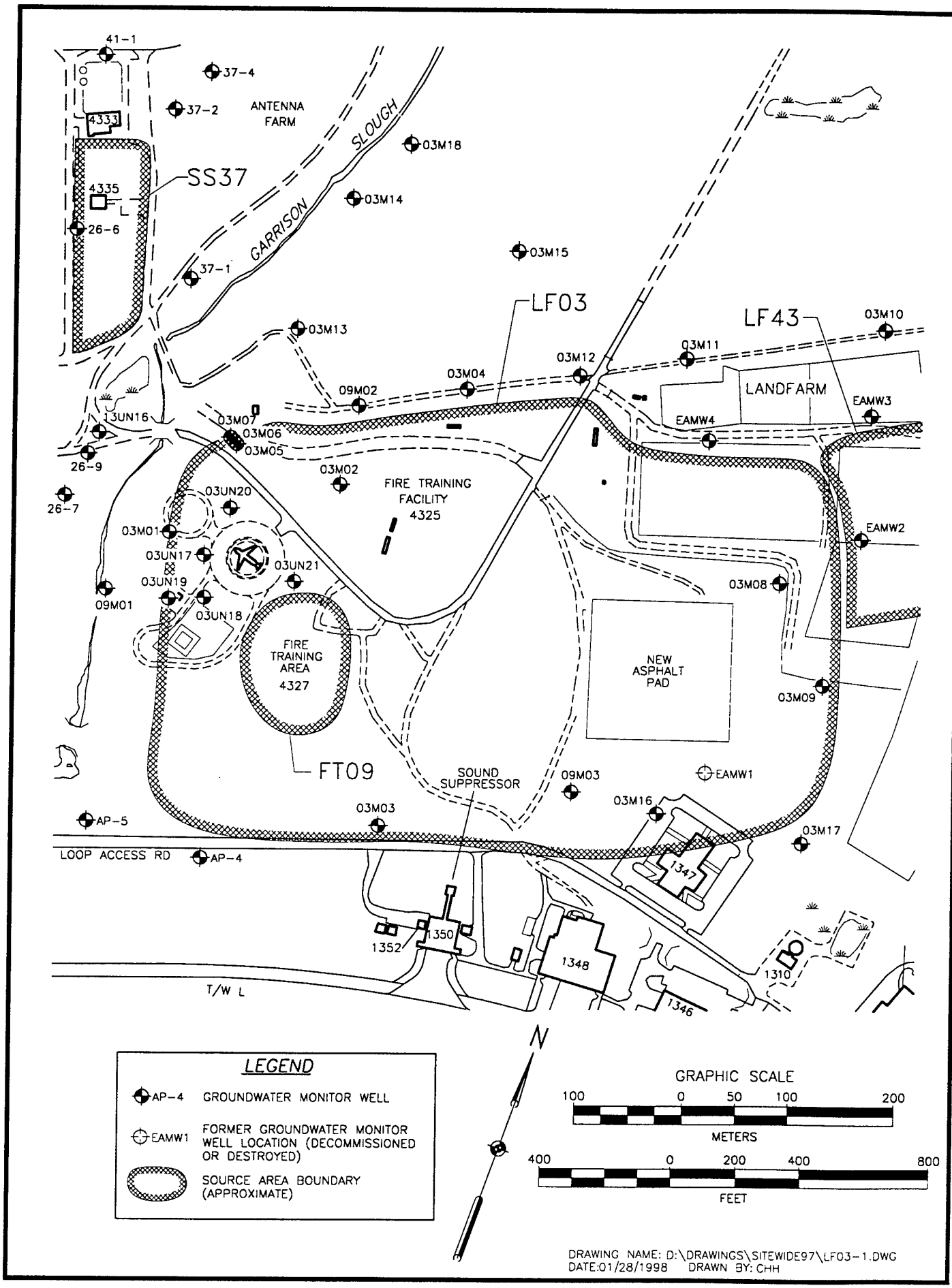

Figure LF03/FT09-1. LF03/FT09 Vicinity Map Showing Locations of Groundwater Monitor Wells, Eielson AFB, Alaska

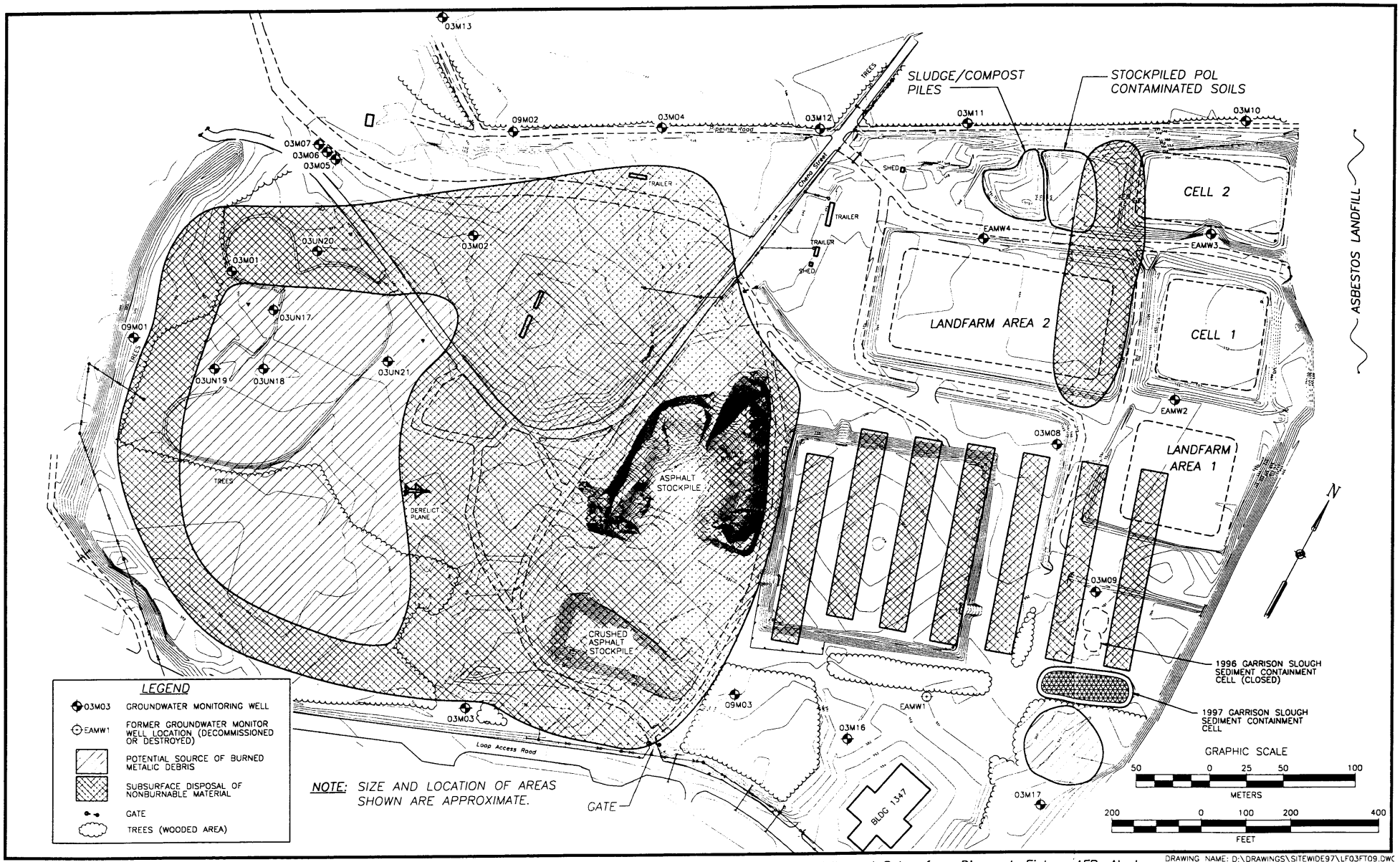

Figure LF03/FT09–2. LF03/FT09 Site Plan Showing Locations of Groundwater Monitor Wells and Subsurface Disposal, Eielson AFB, Alaska

DRAWING NAME: D:\DRAWINGS\SITEWIDE97\LF03FT09.DWG
DATE:01/27/1998 TIME:15:20 DRAWN BY: CHH

TABLE LF03/FT09-1 CONCENTRATIONS (µg/L) OF BTEX COMPOUNDS, TPH GRO, AND TPH DRO IN GROUNDWATER SAMPLES, LF03/FT09, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
03M01	1988	0.95	0.76	3.74	19.3	--	--	1		PNL 1995 OU3,4,5 RI
03M01	1989	0.84	1.43	5.64	18.4	--	--	1		PNL 1995 OU3,4,5 RI
03M01	6/92	<2	<2	<2	7	--	--	1		PNL 1995 OU3,4,5 RI
03M01	8/21/92	<2.0	<2.0	<2.0	5.5	--	--	1		PNL 1995 OU3,4,5 RI
03M01	8/5/94	1.7	<1.0	1.5	5.9	--	--	1		PNL 1995 OU3,4,5 RI
03M01	9/27/95	<1.0	1.4	<1.0	2.4	<50	1,000	1-3		USAF 1995 OU1,3,4,5 RDWP
03M01	8/7/96	<1.0	<1.0	0.4	1.8	--	--	7		USAF 1996 SWMPR
03M02	1988	11.5	81.8	24.8	72.1	--	--	1		PNL 1995 OU3,4,5 RI
03M02	1989	3.92	1.75	0.79	3.51	--	--	1		PNL 1995 OU3,4,5 RI
03M02	8/5/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M03	1988	0.71	<0.25	<0.46	<0.85	--	--	1		PNL 1995 OU3,4,5 RI
03M03	1989	<0.2	<0.30	<0.5	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M03	8/5/94	<1.0	2.5	1.7	1.6	--	--	1		PNL 1995 OU3,4,5 RI
03M04	1988	6.53	<0.25	<0.46	<0.85	--	--	1		PNL 1995 OU3,4,5 RI
03M04	1989	4.00	<0.30	1.11	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M04	8/7/96	2.0	<1.0	<1.0	<1.0	--	--	7		USAF 1996 SWMPR
03M05	1988	0.40	<0.25	<0.46	<0.85	--	--	1		PNL 1995 OU3,4,5 RI
03M05	1989	0.25	<0.30	<0.5	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M05	6/12/92	6.6	<2	<2	<5	--	--	1		PNL 1995 OU3,4,5 RI
03M05	8/21/92	5.9	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
03M05	8/8/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M05	8/14/96	0.3	<1.0	<1.0	<1.0	--	--	7		USAF 1996 SWMPR

TABLE LF03/FT09-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
03M06	1988	<0.15	<0.25	<0.46	<0.85	--	--	1		PNL 1995 OU3,4,5 RI
03M06	1989	<0.2	<0.30	<0.5	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M06	6/12/92	<2	<2	<2	<5	--	--	1		PNL 1995 OU3,4,5 RI
03M06	8/21/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
03M06	8/8/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M06	8/14/96	<1.0	<1.0	<1.0	<1.0	--	--	7		USAF 1996 SWMPR
03M07	1988	<0.15	<0.25	<0.46	<0.85	--	--	1		PNL 1995 OU3,4,5 RI
03M07	1989	<0.2	<0.30	<0.5	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M07	6/12/92	<2	<2	<2	<5	--	--	1		PNL 1995 OU3,4,5 RI
03M07	8/21/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
03M07	8/8/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M07	8/14/96	<1.0	<1.0	<1.0	<1.0	--	--	7		USAF 1996 SMWPR
03M08	1989	--	--	--	--	--	--	1		PNL 1995 OU3,4,5 RI
03M08	8/9/94	20	460	38	91	--	--	1		PNL 1995 OU3,4,5 RI
03M08	10/4/95	14	430	27	77	17,000	47,000	1-3		USAF 1995 OU1,3,4,5 RDWP
03M08	8/7/96	8	350	28	66	--	--	7		USAF 1996 SWMPR
03M09	1989	0.9	6.79	5.04	10.1	--	--	1		PNL 1995 OU3,4,5 RI
03M09	8/9/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M10	1989	0.24	<0.30	<0.5	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M10	8/9/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M10	8/13/96	<1.0	<1.0	<1.0	<1.0	--	--	7		USAF 1996 SWMPR
03M11	1989	0.42	5.66	3.50	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M11	8/9/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M11	8/13/96	0.6	<1.0	<1.0	<1.0	--	--	7		USAF 1996 SWMPR
03M12	8/9/94	<1	<1	<1	<1	--	--	1		PNL 1995 OU3,4,5 RI
03M12	8/7/96	<1.0	<1.0	<1.0	<1.0	--	--	7		USAF 1996 SWMPR

TABLE LF03/FT09-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
03M13	1989	45.9	<0.30	<0.5	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M13	6/12/92	24	<2	<2	<5	--	--	1		PNL 1995 OU3,4,5 RI
03M13	8/21/92	35	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
03M13	8/10/94	1.8	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M13	10/4/95	<1.0	<1.0	<1.0	<1.0	230	130	1-3		USAF 1995 OU1,3,4,5 RDWP
03M13	8/7/96	42.0	<1.0	<1.0	<1.0	--	--	7		USAF 1996 SWMPR
03M14	1989	8.87	<0.30	<0.5	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M14	8/10/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M15	1989	<1.0	<1.0	<1.0	<1.0	--	--	1		HLA 1992 LF03/FT09 RI/FS
03M15	8/10/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M16	1989	<1.0	<1.0	<1.0	<1.0	--	--	1		HLA 1992 LF03/FT09 RI/FS
03M16	8/10/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M17	1989	<1.0	<1.0	<1.0	<1.0	--	--	1		HLA 1992 LF03/FT09 RI/FS
03M17	8/10/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
03M18	1989	6.15	<0.30	<0.5	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
03M18	8/10/94	2.4	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
09M01	8/12/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
09M02	1988	20.0	<0.25	<0.46	<0.85	--	--	1		PNL 1995 OU3,4,5 RI
09M02	1989	14.3	<0.30	<0.5	<0.40	--	--	1		PNL 1995 OU3,4,5 RI
09M02	8/11/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
09M02	8/7/96	13.0	<1.0	<1.0	<1.0	--	--	7		USAF 1996 SWMPR
09M03	8/12/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
EAMW01	10/12/95	<1.0	<1.0	<1.0	<1.0	<50	160	1-3		USAF 1995 OU1,3,4,5 RDWP

TABLE LF03/FT09-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Analytical Methods	Notes	Reference
EAMW02	10/12/95	<1.0	<1.0	<1.0	<1.0	<50	800	1-3		USAF 1995 OU1,3,4,5 RDWP
EAMW03	10/10/95	<1.0	<1.0	<1.0	<1.0	<50	<100	1-3		USAF 1995 OU1,3,4,5 RDWP
EAMW04	10/10/95	1.8	<1.0	<1.0	<1.0	<50	230	1-3		USAF 1995 OU1,3,4,5 RDWP

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421.
12. 6020.
13. 8310.

TABLE LF03/FT09-2 CONCENTRATIONS (µg/L) OF NON-BTEX VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF03/FT09, EIELSON AFB, ALASKA

Well No.	Date Sampled	Acetone	2-Butanone	4-Methyl-2-pentanone	2-Hexanone	DCDFM	Chloro-methane	Vinyl Chloride	Chloro-ethane	TCFM	Methylene Chloride	c-1,2-DCE	t-1,2-DCE	Total 1,2-DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	PCE	1,3-DCB	1,4-DCB	1,2-DCB	PCB	Analytical Methods	Notes	Reference
03M01	1988	--	--	--	--	--	--	2.08	--	--	--	--	--	<0.38	--	--	--	<0.52	--	--	--	--	--	4		PNL 1995 OU3,4,5 RI
03M01	1989	--	--	--	--	5.16	2.53	5.31	2.38	--	<1.40	--	--	--	0.547	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M01	6/92	--	--	--	--	--	--	9.5	--	--	<5.0	4.3	<1.0	4.3	1.6	<0.5	<0.5	<1.0	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M01	8/21/92	--	--	--	--	--	--	4.5	--	--	<5.0	3.4	<1.0	3.4	<1.0	<0.5	<0.5	<1.0	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M01	8/5/94	--	--	--	--	5.8	<1.0	1.3	<1.0	--	<1.0	--	<1.0	--	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	<2.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M01	9/27/95	12	<10	<10	<10	15	6.9	5.1	<1.0	<1.0	<1.0	<5.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	4,7	b	USAF 1995 SWMPR
03M01	8/7/96	--	--	--	--	<1.0	<1.0	<1.0	1.0	<1.0	<1.0	2.0	<1.0	2.0	0.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a	USAF 1996 SWMPR
03M02	1988	--	--	--	--	--	--	<0.2	--	--	--	--	--	<0.38	--	--	--	2.50	--	--	--	--	--	4		PNL 1995 OU3,4,5 RI
03M02	1989	--	--	--	--	<0.600	8.16	0.800	<0.770	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.0	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M02	8/5/94	--	--	--	--	2.2	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M03	1989	--	--	--	--	<0.600	10.4	<0.200	<0.770	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.0	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M03	8/5/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M04	1988	--	--	--	--	--	--	<0.2	--	--	--	--	--	0.400	--	--	--	1.98	--	--	--	--	--	4		PNL 1995 OU3,4,5 RI
03M04	1989	--	--	--	--	<0.600	3.71	0.28	<0.770	--	<1.40	--	--	--	<0.400	--	--	2.25	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M04	8/7/96	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	10.0	0.4	10.4	<1.0	<1.0	<1.0	0.9	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a,c	USAF 1996 SWMPR
03M05	1988	--	--	--	--	--	--	0.975	--	--	--	--	--	0.440	--	--	--	<0.52	--	--	--	--	--	4		PNL 1995 OU3,4,5 RI
03M05	1989	--	--	--	--	1.28	<0.400	1.77	<0.770	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M05	6/92	--	--	--	--	--	--	2.5	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<1.0	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M05	8/21/92	--	--	--	--	--	--	2.2	--	--	<5.0	1.6	<1.0	1.6	<1.0	<0.5	<0.5	<1.0	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M05	8/8/94	--	--	--	--	1.2	<1.0	0.74	<1.0	--	<1.0	--	<1.0	<1.0	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M05	8/14/96	--	--	--	--	<1.0	<1.0	0.6	<1.0	<1.0	<1.0	1.0	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a	USAF 1996 SWMPR
03M06	1988	--	--	--	--	--	--	0.873	--	--	--	--	--	<0.38	--	--	--	<0.52	--	--	--	--	--	4		PNL 1995 OU3,4,5 RI
03M06	1989	--	--	--	--	1.41	<0.400	2.56	<0.770	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M06	6/92	--	--	--	--	--	--	<2.0	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<1.0	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M06	8/21/92	--	--	--	--	--	--	2.3	--	--	<5.0	1.2	<1.0	1.2	<1.0	<0.5	<0.5	<1.0	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M06	8/8/94	--	--	--	--	<1.0	<1.0	0.84	<1.0	--	1.0	--	<1.0	<1.0	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M06	8/14/96	--	--	--	--	<1.0	<1.0	0.5	<1.0	<1.0	<1.0	0.5	<1.0	0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a	USAF 1996 SWPMR
03M07	1988	--	--	--	--	--	--	<0.2	--	--	--	--	--	<0.38	--	--	--	<0.52	--	--	--	--	--	4		PNL 1995 OU3,4,5 RI
03M07	1989	--	--	--	--	<0.600	<0.400	<0.200	<0.770	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M07	6/92	--	--	--	--	--	--	<2.0	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<1.0	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M07	8/24/92	--	--	--	--	--	--	<2.0	--	--	<5.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.5	<1.0	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M07	8/8/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	<1.0	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M07	8/14/96	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a	USAF 1996 SWMPR
03M08	1989	--	--	--	--	<0.600	<0.400	<0.200	13.0	--	19.1	--	--	--	<0.400	--	--	8.55	--	--	5.12	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M08	8/9/94	--	--	--	--	650	<10	17	<10	--	250	--	<10	<10	33	<5.0	<10	150	53	<10	82	25	--	4	a	PNL 1995 OU3,4,5 RI
03M08	10/4/95	1,100	1,400	120	620	24	13	<1.0	49	2.9	67	45	<1.0	--	13	1.4	<1.0	40	14	2.3	31	14	--	4,7	a	USAF 1995 SWMPR
03M08	8/6/96	--	--	--	--	39	<1.0	0.8	<1.0	<1.0	17	31	0.3	31.3	11	<1.0	<1.0	63	31	5.0	39	27	<1.0	6,7	a,d	USAF 1996 SWMPR
03M09	1989	--	--	--	--	<0.600	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M09	8/9/94	--	--	--	--	2.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	<1.0	<0.5	<1	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M09	10/24/96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	6		USAF 1996 SWMPR
03M09	9/8/97	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	<1.0	6	a	USAF 1997 SWMPR

TABLE LF03/FT09-2 (continued)

Well No.	Date Sampled	Acetone	2-Butanone	4-Methyl-2-pentanone	2-Hexanone	DCDFM	Chloro-methane	Vinyl Chloride	Chloro-ethane	TCFM	Methylene Chloride	c-1,2-DCE	t-1,2-DCE	Total 1,2-DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	PCE	1,3-DCB	1,4-DCB	1,2-DCB	PCB	Analytical Methods	Notes	Reference
03M10	1989	--	--	--	--	<0.600	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M10	8/9/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	<1.0	<0.5	1.5	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M10	8/13/96	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	0.4	<1.0	0.4	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a	USAF 1996 SWMPR
03M11	1989	--	--	--	--	<0.600	<0.400	<0.200	2.00	--	0.81	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M11	8/9/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M11	8/13/96	--	--	--	--	<1.0	<1.0	<1.0	1.0	<1.0	<1.0	2.0	<1.0	2.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a	USAF 1996 SWMPR
03M12	1989	--	--	--	--	12.4	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M12	8/9/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	--	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M12	8/7/96	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	1.0	<1.0	<1.0	<1.0	0.4	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a	USAF 1996 SWMPR
03M13	1989	--	--	--	--	<0.600	<0.400	0.569	--	--	<1.40	--	--	--	<0.400	--	--	1.09	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M13	6/92	--	--	--	--	--	--	<2.0	--	--	<5.0	2.9	<1.0	2.9	<1.0	<0.5	<0.5	<1.0	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M13	8/21/92	--	--	--	--	--	--	<2.0	--	--	--	4.1	<1.0	4.1	<1.0	<0.5	<0.5	1.1	<0.5	--	<2.0	--	--	4	a	PNL 1995 OU3,4,5 RI
03M13	8/10/94	--	--	--	--	<1.0	<1.0	0.54	<1.0	--	<1.0	--	<1.0	<1.0	<1.0	<0.5	<1.0	0.82	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M13	10/4/95	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	--	4,7	a	USAF 1995 SWMPR
03M13	8/7/96	--	--	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	<1.0	3.0	<1.0	<1.0	<1.0	0.7	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a	USAF 1996 SWMPR
03M14	1989	--	--	--	--	<0.600	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	1.51	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M14	8/9/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	--	<0.5	<1.0	1.3	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M15	1989	--	--	--	--	<0.600	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	3.58	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M15	8/9/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	--	<0.5	<1.0	2.2	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M16	1989	--	--	--	--	<0.600	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M16	8/9/94	--	--	--	--	--	--	<0.5	<1.0	--	--	--	--	--	--	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M17	1989	--	--	--	--	<0.600	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M17	8/9/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	--	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
03M18	1989	--	--	--	--	<0.600	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	1.80	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
03M18	8/9/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	--	<0.5	<1.0	1.4	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
09M01	1989	--	--	--	--	<0.600	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
09M01	8/12/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	--	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
09M02	1988	--	--	--	--	--	--	0.953	--	--	--	--	--	0.490	--	--	--	0.607	--	--	--	--	--	4		PNL 1995 OU3,4,5 RI
09M02	1989	--	--	--	--	<0.600	0.407	0.571	--	--	<1.40	--	--	--	<0.400	--	--	0.828	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
09M02	8/11/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	<1.0	<0.5	<1.0	0.64	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI
09M02	8/7/96	--	--	--	--	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.0	<1.0	3.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	6,7	a,c	USAF 1996 SWMPR
09M03	1989	--	--	--	--	3.38	<0.400	<0.200	--	--	<1.40	--	--	--	<0.400	--	--	<0.600	--	--	<1.00	--	--	4		HLA 1992 LF03/FT09 RI/FS
09M03	8/12/94	--	--	--	--	<1.0	<1.0	<0.5	<1.0	--	<1.0	--	<1.0	--	<1.0	<0.5	<1.0	<0.5	<0.5	<1.0	<1.0	<1.0	--	4	a	PNL 1995 OU3,4,5 RI

Notes: a. No compounds other than those listed or noted were detected above method reporting limits.

TABLE LF03/FT09-2 (continued)

Well No.	Date Sampled	Acetone	2-Butanone	4-Methyl-2-pentanone	2-Hexanone	DCDFM	Chloro-methane	Vinyl Chloride	Chloro-ethane	TCFM	Methylene Chloride	c-1,2-DCE	t-1,2-DCE	Total 1,2-DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	PCE	1,3-DCB	1,4-DCB	1,2-DCB	PCB	Analytical Methods	Notes	Reference

b. Chloromethane and vinyl chloride data reported are EPA Method 8010 results. Both compounds were reported at <5 µg/L using EPA Method 8260.

c. Other compounds detected: isopropylbenzene between 0.4 mg/L to 0.8 mg/L.

d. Other compounds detected: Chlorobenzene - 2.0 mg/L, Isopropylbenzene - 1.0 mg/L, n-propylbenzene - 0.6 mg/L, 1,3,5-trimethylbenzene - 6.0 mg/L, tert-Butylbenzene 2.0 mg/L, 1,2,4-trimethylbenzene - 18.0 mg/L and p-isopropyltoluene - 8.0 mg/L.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

DCDFM	Dichlorodifluoromethane.
TCFM	Trichlorofluoromethane.
DCE	Dichloroethene.
DCA	Dichloroethane.
TCA	Trichloroethane.
TCE	Trichloroethene.
PCE	Perchloroethene (tetrachloroethene).
DCB	Dichlorobenzene.
PCB	Polychlorinated Biphenyl

TABLE LF03/FT09-3 CONCENTRATIONS (µg/L) OF SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF03/FT09, EIELSON AFB, ALASKA

Well No.	Date Sampled	Phenol	4-Methyl-phenol	Benzoic Acid	Naph-thalene	Diethyl phthalate	Pentachloro-phenol	bis (2-Ethylhexyl) phthalate	Analytical Methods	Notes	Reference
03M01	1989	--	--	--	3.61	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M01	8/5/94	<10	<10	<50	<10	<10	<50	3.5	5,6		PNL 1995 OU3,4,5 RI
03M01	9/27/95	4.0	<10	4.0	<10	<10	<50	9.0	5,6	a	USAF 1995 SWMPR
03M01	8/7/96	3.0	<10	5.0	1.5	<10	<50	<10	5-7,13	a,e,f	USAF 1996 SWMPR
03M02	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M02	8/5/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M03	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M03	8/5/94	<10	<10	<50	<10	<10	<50	78	5,6		PNL 1995 OU3,4,5 RI
03M04	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M04	8/7/96	<10	<10	<50	<1.0	<10	<10	97	5-7,13	a,f	USAF 1996 SWMPR
03M05	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M05	8/8/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M05	8/14/96	<10	<10	<50	<1.0	<10	<50	<10	5-7,13	a,f	USAF 1996 SWMPR
03M06	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M06	8/8/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M06	8/14/96	<10	<10	<50	<1.0	<10	<50	6.0	5-7,13	a	USAF 1996 SWMPR
03M07	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M07	8/8/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M07	8/14/96	<10	<10	<50	<1.0	<10	<50	10	5-7,13	a	USAF 1996 SWMPR
03M08	1989	--	--	--	0.551	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M08	8/9/94	250	6,200	<1,000	<200	<200	<1,000	<200	5,6		PNL 1995 OU3,4,5 RI
03M08	10/4/95	<10	4,400	6,400	15.0	120.0	20.0	<10	5,6	a,b,c	USAF 1995 SWMPR
03M08	8/7/96	<10	<10	<50	22.0	17.0	<50	<10	5-7,13	a,c,d	USAF 1996 SWMPR
03M09	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS

TABLE LF03/FT09-3 (continued)

Well No.	Date Sampled	Phenol	4-Methyl-phenol	Benzoic Acid	Naph-thalene	Diethyl phthalate	Pentachloro-phenol	bis (2-Ethylhexyl) phthalate	Analytical Methods	Notes	Reference
03M10	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M10	8/9/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M10	8/13/96	<10	<10	<50	<1.0	<10	<50	<10	5-7,13	a	USAF 1996 SWMPR
03M11	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M11	8/9/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M11	8/13/96	<10	<10	<50	<1.0	<10	<50	<10	5-7,13	a	USAF 1996 SWMPR
03M12	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M12	8/9/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M12	8/7/96	<10	<10	<50	<1.0	<10	<50	<10	5-7,13	a	USAF 1996 SWMPR
03M13	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M13	8/10/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M13	10/4/95	<10	<10	<50	<10	<10	<50	10.0	5,6	a	USAF 1995 SWMPR
03M13	8/7/96	<10	<10	3.0	<1.0	<10	<50	<10	5-7,13	a	USAF 1996 SWMPR
03M14	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M14	8/10/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M15	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M15	8/10/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M16	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M16	8/10/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M17	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M17	8/10/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
03M18	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
03M18	8/10/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
09M01	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS

TABLE LF03/FT09-3 (continued)

Well No.	Date Sampled	Phenol	4-Methyl-phenol	Benzoic Acid	Naph-thalene	Diethyl phthalate	Pentachloro-phenol	bis (2-Ethylhexyl) phthalate	Analytical Methods	Notes	Reference
09M01	8/12/94	<10	<10	<50	<10	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI
09M02	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
09M02	8/11/94	<10	<10	<50	<10	1.1	<50	<10	5,6		PNL 1995 OU3,4,5 RI
09M02	8/7/96	<10	<10	<50	<1.0	<10	<50	<10	5-7,13	a	USAF 1996 SWMPR
09M03	1989	--	--	--	<0.470	--	--	--	13		HLA 1992 LF03/FT09 RI/FS
09M03	8/12/94	<10	<10	<50	1.3	<10	<50	<10	5,6		PNL 1995 OU3,4,5 RI

Notes:
a. No semivolatile compounds other than those listed were detected above reporting limits.
b. Other compounds detected: alpha-BHC - 0.057 µg/L.
c. Because of matrix interferences encountered when analyzing the sample from 03M08, the semivolatile results may exhibit a negative bias.
d. Other compounds detected: alpha-BHC - 0.10 µg/L, beta-BHC - 0.70 µg/L, Heptachlor Epoxide - 0.19 µg/L, Acenaphthylene - 4.5 µg/L and Fluorene - 0.19 µg/L.
e. Other compounds detected: Acenaphthylene - 1.1 µg/L.
f. Some semivolatile results may exhibit a slight negative bias.

Analytical Methods:

1. 8020.
2. ADEC 8015M
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. EPA 7421.
12. EPA 6020.
13. EPA 8310.

TABLE LF03/FT09-4 CONCENTRATIONS (µg/L) OF METALS IN GROUNDWATER SAMPLES, LF03/FT09, EIELSON AFB, ALASKA

Well No.	f/u	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
DISSOLVED																										
03M01	f	6/93	<32.5	<69.4	3.0	860	<0.814	<4.70	120,000	<5.42	<4.05	<2.65	31,000	<1.0	78,000	900	<17.9	17,000	--	4.3	63,000	--	<3.84	<3.44		PNL 1993 SWGMPR
03M01	f	8/93	250	<69.4	2.3	1,100	0.82	<4.70	110,000	<5.42	<4.05	<2.65	28,000	--	83,000	820	<17.9	17,000	--	<2.87	70,000	--	4.4	5.0		PNL 1993 SWGMPR
03M01	f	8/5/94	39.9	<1.0	10.5	772	<2.0	<1.0	92,600	11.6	<1.0	<1.0	29,300	<1.0	49,900	913	5.0	12,000	--	<1.0	55,900	--	4.1	4.9		PNL 1995 OUs3,4,5 RI
03M01	f	10/6/95	148	--	4.9	396	--	--	46,500	<5.0	--	<4.0	2,960	1.2	19,900	361	<9.0	20,300	--	--	86,500	--	<4.0	<6.0		USAF 1995 SWMPR
03M02	f	8/5/94	18.6	<1.0	25.3	251	<2.0	<1.0	57,500	<1.0	<1.0	<1.0	9,510	<1.0	15,400	1,170	2.6	4,200	--	<1.0	7,710	--	1.5	4.1		PNL 1995 OUs3,4,5 RI
03M03	f	8/5/94	41.6	<1.0	5.3	143	<2.0	<1.0	46,000	2.0	<1.0	<1.0	25,500	<1.0	10,400	1,010	3.3	2,710	--	<1.0	3,650	--	1.6	5.9		PNL 1995 OUs3,4,5 RI
03M05	f	6/12/92	--	<200	--	180	<3.0	<10	51,000	<20	<20	<20	4,800	--	13,000	810	<30	3,600	--	<20	6,000	--	<30	--		PNL 1995 OUs3,4,5 RI
03M05	f	8/8/94	17.8	<1.0	22.3	179	<1.0	<1.0	42,600	<1.0	<1.0	<1.0	7,450	1.3	11,500	658	1.9	3,750	--	<1.0	5,330	--	<1.0	8.5		PNL 1995 OUs3,4,5 RI
03M06	f	6/12/92	--	<200	--	150	<3.0	<10	50,000	<20	<20	<20	6,000	--	12,000	730	<30	3,500	--	<20	5,400	--	<30	--		PNL 1995 OUs3,4,5 RI
03M06	f	8/8/94	12.5	<1.0	14.3	132	<1.0	<1.0	42,600	<1.0	<1.0	<1.0	4,250	<1.0	10,900	594	1.0	3,870	--	<1.0	4,550	--	<1.0	6.3		PNL 1995 OUs3,4,5 RI
03M07	f	6/12/92	--	<200	--	120	<3.0	<10	40,000	<20	<20	<20	370	--	8,700	310	<30	2,400	--	<20	6,100	--	<30	--		PNL 1995 OUs3,4,5 RI
03M07	f	8/8/94	16	<1.0	4.5	128	<1.0	<1.0	35,200	<1.0	<1.0	<1.0	2,050	<1.0	8,200	295	<1.0	2,660	--	<1.0	3,580	--	<1.0	5.5		PNL 1995 OUs3,4,5 RI
03M08	f	8/9/94	211	1.6	3.5	406	<2.0	<1.0	638,000	26	2.1	172	568,000	18.6	52,700	8,290	30.6	48,500	--	<1.0	98,800	--	4.7	172		PNL 1995 OUs3,4,5 RI
03M08	f	10/4/95	458	--	5.7	309	--	--	456,000	9.1	--	<40	474,000	1.3	48,100	6,020	16.9	50,200	--	--	72,400	--	<4.0	32.2		USAF 1995 SWMPR
03M09	f	8/9/94	10.3	<1.0	25.2	188	<1.0	<1.0	55,200	<1.0	1.4	<1.0	7,690	1.5	12,900	3,410	3.8	5,600	--	<1.0	6,570	--	<1.0	3.6		PNL 1995 OUs3,4,5 RI
03M10	f	8/9/94	15.6	<1.0	24.3	145	<1.0	<1.0	68,800	<1.0	<1.0	<1.0	5,620	4.2	13,600	2,790	2.9	5,200	--	<1.0	7,740	--	<1.0	3.8		PNL 1995 OUs3,4,5 RI
03M11	f	8/9/94	11.2	<1.0	16	318	<2.0	<1.0	85,100	1.8	2.6	7.1	4,550	<1.0	19,000	4,680	4.8	7,770	--	<1.0	16,700	--	<1.0	7.1		PNL 1995 OUs3,4,5 RI
03M12	f	8/9/94	404	4.8	362	182	1.6	3.8	46,000	92	18	12	1,930	10.6	10,400	1,890	9.3	4,330	--	<1.0	4,730	--	20.9	8.3		PNL 1995 OUs3,4,5 RI
03M13	f	8/10/94	32.8	<1.0	6.7	166	<1.0	<1.0	69,300	<1.0	1.1	<1.0	--	<1.0	18,800	1,440	1.9	4,430	--	<1.0	8,320	--	<1.0	2.8		PNL 1995 OUs3,4,5 RI
03M13	f	10/4/95	87.3	--	13.3	157	--	--	67,000	6.0	--	<4.0	8,070	1.1	21,700	1,070	12.2	20,500	--	--	8,270	--	<4.0	<6.0		USAF 1995 SWMPR
03M14	f	8/10/94	56	<1.0	18.6	178	<1.0	<1.0	66,700	<1.0	<1.0	<1.0	--	<1.0	14,500	2,920	2.5	4,060	--	<1.0	8,140	--	<1.0	3.4		PNL 1995 OUs3,4,5 RI
03M15	f	8/10/94	<31	<1.0	4.5	106	<1.0	<1.0	67,500	<1.0	1.5	1.7	--	1.2	13,200	1,280	3.2	3,710	--	<1.0	5,630	--	<1.0	<2.0		PNL 1995 OUs3,4,5 RI
03M16	f	8/10/94	<31	<1.0	5.3	89.5	<1.0	<1.0	51,400	<1.0	1.8	1.1	--	<1.0	10,400	1,630	2.0	2,760	--	<1.0	3,820	--	<1.0	<2.0		PNL 1995 OUs3,4,5 RI
03M17	f	8/10/94	<31	1.8	69.1	132	1.2	2.9	56,100	8.6	3.6	4.8	--	3.4	11,300	2,800	2.4	2,760	--	<1.0	3,900	--	3.8	5.5		PNL 1995 OUs3,4,5 RI
03M18	f	8/10/94	37.5	<1.0	17.6	180	<1.0	<1.0	63,100	<1.0	1.5	<1.0	--	<1.0	13,400	2,210	2.9	3,740	--	<1.0	6,910	--	<1.0	<2.0		PNL 1995 OUs3,4,5 RI
09M01	f	8/12/94	40.2	<1.0	<3.0	156	<1.0	<1.0	53,400	<1.0	2.0	2.8	--	<1.0	11,500	2,040	5.2	2,800	--	<1.0	3,770	--	<1.0	2.1		PNL 1995 OUs3,4,5 RI
09M02	f	8/11/94	<31	<1.0	5.3	347	<1.0	<1.0	76,600	<1.0	1.2	1.7	--	<1.0	22,400	2,470	4.1	6,560	--	<1.0	15,100	--	<1.0	<2.0		PNL 1995 OUs3,4,5 RI
09M03	f	8/12/94	51.3	<1.0	14.9	140	<1.0	<1.0	55,400	<1.0	<1.0	<1.0	--	2.2	11,000	2,200	3.4	3,570	--	<1.0	4,610	--	<1.0	2.8		PNL 1995 OUs3,4,5 RI

Well No.	f/u	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
Background Concentrations																										
BGM	f	9/94	43	--	8.3	101	<1.0	<1.0	51,750	<1.0	1.3	2.4	1,736	<1.0	10,450	1,789	2.3	3,400	--	<1.0	4,563	--	<1.0	5.6		PNL 1994 SWMP
BGMX	f	9/94	140	--	23	160	<1.0	<1.0	61,000	<1.0	3.0	4.0	9,900	<1.0	12,000	4,100	5.0	4,500	--	<1.0	6,500	--	1.0	19		PNL 1994 SWMP
BGUCL	f	9/94	74	--	14.5	129	<1.0	<1.0	57,600	<1.0	<3.0	3.1	3,980	<1.0	11,400	2,720	3.2	3,800	--	<1.0	5,340	--	1.0	10		PNL 1994 SWMP
TOTAL																										
03M01	u	1988	--	--	64.6	15,300	--	--	--	1,890	--	5,440	1,180,000	1,130	--	16,900	18,400	--	--	--	--	--	2,430	18,400		PNL 1995 OUs3,4,5 RI
03M01	u	8/21/92	--	<200	--	1,100	<3.0	<10	120,000	<20	<20	<20	32,000	--	--	920	<30	17,000	--	<20	72,000	--	<30	110		PNL 1995 OUs3,4,5 RI
03M01	u	6/93	340	<69.4	3.0	970	<0.814	<4.70	120,000	<5.42	<4.05	<2.65	38,000	2.0	76,000	900	<17.9	16,000	--	4.3	61,000	--	<3.84	44		PNL 1993 SWGMPR
03M01	u	8/93	5,800	<69.4	32	1,200	1.1	<4.70	120,000	9.2	<4.05	9.7	46,000	--	75,000	890	20	18,000	--	<2.87	68,000	--	14	170		PNL 1993 SWGMPR
03M01	u	8/5/94	7,380	3.5	32.8	1,070	<2.0	<1.0	100,000	16.2	6.7	34	50,600	35.7	53,700	1,070	23.5	13,900	--	<1.0	60,400	--	27.2	390		PNL 1995 OUs3,4,5 RI
03M01	u	10/6/95	1,080	--	6.7	424	--	--	48,500	<5.0	--	<4.0	4,960	2.4	19,900	382	<9.0	20,600	--	--	83,100	--	<4.0	<6.0		USAF 1995 SWMPR
03M01	u	8/7/96	138	3.4	2.9	672	<1.0	<1.0	82,400	<6.0	<11.0	<6.0	18,700	1.4	47,900	548	<15.0	13,700	7.0	<4.0	63,600	<1.0	<8.0	<12.0		USAF 1996 SWMPR
03M02	u	8/5/94	9,440	<1.0	80.6	503	<2.0	11.7	72,000	28.7	15.6	89.6	29,300	61.9	23,800	1,510	41.2	5,060	--	<1.0	10,900	--	33.9	1,030		PNL 1995 OUs3,4,5 RI
03M03	u	8/5/94	4,960	<1.0	12	249	<2.0	<1.0	53,200	14.1	6.5	56.2	9,510	16.2	14,500	1,210	19.5	2,770	--	<1.0	6,360	--	20.2	63.6		PNL 1995 OUs3,4,5 RI
03M04	u	8/7/96	<25.0	2.0	26.9	186	<1.0	<1.0	56,300	<6.0	<11.0	<6.0	9,930	<1.0	13,200	2,520	<15.0	4,870	<2.0	<4.0	6,750	<1.0	<8.0	<12.0		USAF 1996 SWMPR
03M05	u	8/8/94	4,900	1.0	45.4	311	<1.0	<1.0	53,100	16.5	9.8	64.2	25,500	19	16,100	962	28.1	5,390	--	1.0	10,100	--	18.1	98.8		PNL 1995 OUs3,4,5 RI
03M05	u	8/14/96	2,450	<2.0	33.3	246	<1.0	<1.0	52,700	<6.0	<11.0	8.7	17,800	5.9	14,700	925	<15.0	4,300	<73	<4.0	7,100	<1.0	<8.0	15.1		USAF 1996 SWMPR
03M06	u	8/8/94	2,490	1.0	22.1	192	<1.0	<1.0	47,600	9.1	3.3	50.4	14,500	14.6	12,600	735	14.6	4,160	--	1.0	8,380	--	10.6	43.1		PNL 1995 OUs3,4,5 RI
03M06	u	8/14/96	488	<2.0	12.7	133	<1.0	<1.0	45,000	<6.0	<11.0	<6.0	8,300	2.5	11,400	641	<15.0	3,460	<73	<4.0	4,900	<1.0	<8.0	<12.0		USAF 1996 SWMPR
03M07	u	8/8/94	120	1.0	5.1	131	<1.0	<1.0	35,900	1.5	<1.0	11.9	2,830	1.4	7,820	332	4.3	2,500	--	1.0	6,650	--	<1.0	29.8		PNL 1995 OUs3,4,5 RI
03M07	u	8/14/96	<25.0	<2.0	3.9	129	<1.0	<1.0	39,500	<6.0	<11.0	<6.0	2,830	<1.0	8,560	336	<15.0	2,480	<73	<4.0	4,370	<1.0	<8.0	<12.0		USAF 1996 SWMPR
03M08	u	8/9/94	333	1.5	5.4	375	<1.0	1.9	584,000	20.7	2.3	20.2	545,000	11	49,900	7,420	27.2	46,600	--	1.0	91,500	--	4.9	249		PNL 1995 OUs3,4,5 RI
03M08	u	10/4/95	748	--	<5.0	371	--	--	538,000	9.1	--	<40.0	543,000	23.8	55,800	7,080	15.9	57,000	--	--	80,600	--	<4.0	250		USAF 1995 SWMPR
03M08	u	8/7/96	<25.0	2.5	2.3	388	<1.0	<1.0	514,000	<6.0	<11.0	<300	492,000	4.2	48,600	5,460	<15.0	33,800	15	<4.0	66,300	<1.0	<8.0	168		USAF 1996 SWMPR
03M09	u	8/9/94	173	1.0	45	208	<1.0	<1.0	56,800	2.2	3.3	15.3	15,400	1.9	12,600	3,810	10	5,860	--	1.0	9,860	--	3.4	17.7		PNL 1995 OUs3,4,5 RI
03M10	u	8/9/94	136	1.0	34.6	169	<1.0	<1.0	70,300	2.1	1.1	14.6	10,400	1.5	13,400	3,280	7.7	5,440	--	1.0	11,000	--	2.1	20		PNL 1995 OUs3,4,5 RI
03M10	u	8/13/96	<25.0	<2.0	19	158	<1.0	<1.0	83,800	<6.0	<11.0	<6.0	8,460	11.8	14,900	3,040	<15.0	6,110	<73	<4.0	8,690	<1.0	<8.0	<12.0		USAF 1996 SWMPR
03M11	u	8/9/94	2,120	1.0	46.7	400	<1.0	<1.0	74,400	5.9	7.8	39.5	20,600	10.2	18,200	4,760	18	9,020	--	1.0	17,000	--	12.8	49.6		PNL 1995 OUs3,4,5 RI
03M11	u	8/13/96	<25.0	<2.0	36.9	310	<1.0	<1.0	73,000	<6.0	<11.0	<6.0	14,400	<1.0	17,500	4,300	<15.0	8,120	<73	<4.0	13,800	<1.0	<8.0	<12.0		USAF 1996 SWMPR
03M12	u	8/9/94	11,000	1.8	70.5	340	<1.0	1.1	55,100	24.2	22.8	136	30,800	40.5	18,000	2,480	53.2	6,520	--	1.0	10,100	--	43	131		PNL 1995 OUs3,4,5 RI
03M12	u	8/7/96	<25.0	2.0	9.6	161	<1.0	<1.0	50,400	<6.0	<11.0	<6.0	4,950	<1.0	11,600	2,280	<15.0	4,340	<2.0	<4.0	5,710	<1.0	<8.0	<12.0		USAF 1996 SWMPR
03M13	u	8/10/94	376	<1.0	11	189	<1.0	<1.0	68,100	1.2	1.6	5.7	--	1.3	18,600	1,500	4.9	5,100	--	<1.0	10,400	--	1.4	20.4		PNL 1995 OUs3,4,5 RI
03M13	u	10/4/95	86.5	--	13.2	163	--	--	72,800	<5.0	--	<4.0	9,650	1.5	23,600	840	9.7	23,400	--	--	7,570	--	<4.0	11.4		USAF 1995 SWMPR
03M13	u	8/7/96	<25	<2.0	9.4	153	<1.0	<1.0	57,200	<6.0	<11.0	<6.0	11,500	<1.0	15,600	1,270	<15.0	4,340	<2.0	<4.0	8,290	<1.0	<8.0	<12.0		USAF 1996 SWMPR
03M14	u	8/10/94	2,140	<1.0	28.2	218	<1.0	<1.0	66,200	2.9	2.3	24.5	--	5.6	14,900	3,030	8.2	4,970	--	<1.0	10,300	--	5.4	28.3		PNL 1995 OUs3,4,5 RI

TABLE LF03/FT09-4 (continued)

Well No.	f/u	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
03M15	u	8/10/94	20,700	<1.0	16.4	323	<1.0	1.1	74,700	22.3	18	98.6	--	21.8	21,900	3,490	40	6,270	--	<1.0	9,310	--	30.3	71.4		PNL 1995 OUs3,4,5 RI
03M16	u	8/10/94	21,100	<1.0	100	389	<1.0	<1.0	61,400	18.8	15.5	83.7	--	38	19,900	3,380	32.5	5,900	--	<1.0	7,360	--	28.9	92.2		PNL 1995 OUs3,4,5 RI
03M17	u	8/10/94	7,710	<1.0	11.4	269	<1.0	<1.0	57,500	10.1	6.4	48.3	--	14.3	14,200	3,260	15.4	4,470	--	<1.0	6,670	--	14.9	50.8		PNL 1995 OUs3,4,5 RI
03M18	u	8/10/94	37,800	<1.0	38	632	<1.0	2.5	91,100	31.8	26	252	--	50.5	31,500	2,980	56.5	8,510	--	1.4	12,800	--	49.4	126		PNL 1995 OUs3,4,5 RI
09M01	u	8/12/94	895	<1.0	5.5	208	<1.0	<1.0	50,800	2.3	3.6	18.6	--	2.4	11,200	2,860	8.8	3,330	--	<1.0	5,790	--	3.7	26.1		PNL 1995 OUs3,4,5 RI
09M02	u	8/11/94	2,410	<1.0	25.3	473	<1.0	2.0	72,600	4.7	3.2	27.4	--	8.8	22,000	2,580	14.3	7,150	--	<1.0	16,800	--	7.9	37		PNL 1995 OUs3,4,5 RI
09M02	u	8/7/96	<25.0	<2.0	17.2	360	<1.0	<1.0	59,700	<6.0	<11.0	<6.0	17,700	<1.0	19,300	1,900	<15.0	6,050	5.0	<4.0	12,100	<1.0	<8.0	<12.0		USAF 1996 SWMPR
09M03	u	8/12/94	2,550	<1.0	16.4	176	<1.0	<1.0	56,100	4.3	2.4	25.2	--	6.6	11,900	2,390	8.3	4,860	--	<1.0	7,180	--	7.7	32.7		PNL 1995 OUs3,4,5 RI
Background Concentrations																										
BGM	u	9/94	7,538	<1.0	25	269	<1.0	<1.0	58,625	20	13.75	75	16,938	21	17,375	3,875	31	5,650	--	<1.0	8,363	--	24	63		PNL 1994 SWMP
BGMX	u	9/94	18,000	2.0	63	420	<1.0	<1.0	66,000	46	31	140	33,000	48	26,000	6,500	77	7,900	--	<1.0	9,800	--	52	120		PNL 1994 SWMP
BGUCL	u	9/94	11,500	<2.0	37	342	<1.0	<1.0	64,900	30.4	20.8	105	23,800	32.6	20,800	4,980	48.8	6,500	--	<1.0	9,260	--	36	88.8		PNL 1994 SWMP

Notes:

-- Analysis not performed in sample.

f. Field filtered.

u. Total (unfiltered).

BGM Mean concentration of samples collected from background wells in 1994.

BGMX Maximum concentration of samples collected from background wells in 1994.

BGUCL 95% Upper confidence limits of samples collected from background wells in 1994.

TABLE LF03/FT09-5 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, LF03/FT09, EIELSON AFB, ALASKA

		Parameters							Immunoassay Results				
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)	TCE [2] (ppb)	PCE[2] (ppb)	Notes	Reference
03M01	09/27/95	1.1	--	10	--	500	7.25	--	--	--	--		USAF 1995 SWMPR
03M01	08/07/96	0.65	--	6.3	5	763	6.66	-85	--	--	--		USAF 1996 SWMPR
03M01	08/21/97	1.7	13.8	6.0	351	728	7.79	-75	--	--	--		USAF 1997 SWMPR
03M04	08/07/96	2.9	--	6.3	<5	350	7.56	--	--	--	--		USAF 1996 SWMPR
03M04	08/21/97	0.62	4.8	4.2	12	446	7.81	-59	--	--	--		USAF 1997 SWMPR
03M05	08/08/96	0.18	--	4.1	1	333	6.78	-6	--	--	--		USAF 1996 SWMPR
03M05	08/14/96	0.13	--	4.0	8	328	6.84	11	--	--	--		USAF 1996 SWMPR
03M06	08/08/96	0.18	--	4	0	280	6.88	-34	--	--	--		USAF 1996 SWMPR
03M06	08/14/96	0.1	--	4.2	0	280	7.01	16	--	--	--		USAF 1996 SWMPR
03M07	08/08/96	0.25	--	3.5	0	224	6.96	48	--	--	--		USAF 1996 SWMPR
03M07	08/14/96	0.08	--	3.1	0	224	7.14	-34	--	--	--		USAF 1996 SWMPR
03M08	10/04/95	1.4	--	8	--	2700	6.48	--	--	--	--		USAF 1995 SWMPR
03M08	08/07/96	0.6	--	7.9	6	3080	6.27	-48	--	--	--		USAF 1996 SWMPR
03M08	08/22/97	1.6	14	9.1	11	3220	6.83	-58	--	--	--		USAF 1997 SWMPR
03M09	09/08/97	0.74	6.0	5.3	0	417	8.0	-4	--	--	--		USAF 1997 SWMPR
03M10	08/08/96	0.79	--	5.2	9	467	6.67	121	--	--	--		USAF 1996 SWMPR
03M10	08/13/96	3.72	--	9.2	303	437	6.83	--	--	--	--		USAF 1996 SWMPR
03M10	08/21/97	1.32	11.1	7.1	29	522	7.52	-45	--	--	--		USAF 1997 SWMPR
03M11	08/08/96	0.64	--	8	6	485	6	-7	--	--	--		USAF 1996 SWMPR
03M11	08/13/96	2.16	--	9.2	47	446	6.82	--	--	--	--		USAF 1996 SWMPR
03M11	08/21/97	0.66	5.9	9.5	40	508	7.54	-43	--	--	--		USAF 1997 SWMPR

TABLE LF03/FT09-5 (continued)

Well No.	Date Sampled	Parameters							Immunoassay Results			Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)	TCE [2] (ppb)	PCE[2] (ppb)		
03M12	08/07/96	12.53	--	8.6	150	321	7.49	--	--	--	--		USAF 1996 SWMPR
03M12	08/21/97	1.3	11.1	7.0	6	416	8.56	-86	--	--	--		USAF 1997 SWMPR
03M13	10/04/95	2.7	--	7.0	--	370	7.26	--	--	--	--		USAF 1995 SWMPR
03M13	08/07/96	1.12	--	4.0	<5	373	6.8	--	--	--	--		USAF 1996 SWMPR
03M13	08/19/97	1.87	14.4	3.9	<5	412	6.54	28	--	--	--		USAF 1997 SWMPR
09M02	08/07/96	2.78	--	8.0	100	417	6.61	--	--	--	--		USAF 1996 SWMPR
09M02	08/19/97	-0.27	-2.1	6.4	<5	470	6.63	17	--	--	--		USAF 1997 SWMPR
EAMW01	10/12/95	1.8	--	6.0	--	330	7.13	--	--	--	--		USAF 1995 SWMPR
EAMW02	10/12/95	2.3	--	6	--	330	9.11	--	--	--	--		USAF 1995 SWMPR
EAMW03	10/10/95	2	--	7	--	800	6.84	--	--	--	--		USAF 1995 SWMPR
EAMW04	10/10/95	1.6	--	8	--	220	6.76	--	--	--	--		USAF 1995 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Drager Liquid Extraction (DLE) field test kit.

LF04 Old Army Landfill and Explosive Ordnance Disposal (EOD) Area

COCs, RAOs, and ARARs

Contaminants of concern at Landfill 04 (LF04) include metals, POL, solvents, and phenols. The following table lists ARAR MCLs established to address groundwater quality at LF04. RAOs have not been established for LF04 and other OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

LF04 is located approximately 1.5 miles east-northeast of the south end of the Eielson AFB runway. LF04 is an old Army landfill where general refuse was disposed. The landfill reportedly received small quantities of waste oil and spent solvents, and may have received small amounts of munitions and spent cartridges. The Army originally used the area to store munitions in bunkers. Access to the area is currently restricted because of its potential use as an emergency explosive ordinance disposal (EOD) and EOD training area. There are two disposal pads used for active shot holes and a munitions incinerator (burning kettle) at LF04. The ROD for OUs 3,4,5 indicates the landfill will be regulated under RCRA 3008a. LF04 was recommended for no further action in the OUs 3, 4, 5 ROD.

Previous Activities

During the 1994 SWMP, four wells at LF04 were sampled to verify the absence of organic contaminants and to monitor metals concentrations. DRO was detected at concentrations ranging from 380 micrograms per liter (µg/L) to 1,300 µg/L in all of the samples (Table LF04-1). The

analyses quantified chromatogram peaks for compounds with 10 to 24 carbons; however, the peaks did not match the diesel pattern, and the origin of the hydrocarbons is not known. GRO was detected at a concentration of 1,900 µg/L in the sample collected from well 04M07. The chromatogram peaks do not match the gasoline pattern, but appear to be toluene. Toluene was detected in the sample collected from this well at a concentration of 290 µg/L (Table LF04-1). The compound 3,4-methylphenol was detected in all samples at estimated concentrations of 1 µg/L to 42 µg/L. 2-methylphenol was also detected in the sample from 04M07 at 10 µg/L. Metals concentrations at LF04 (with the exception of arsenic, iron, and barium in several samples) were generally within the range of the 1994 background values for the lowland area.

LF04 was not monitored under the 1995 SWMP.

Monitor wells 04M01, 04M02, 04M03, 04M04, and 04M07 were sampled under the 1996 SWMP to identify contaminants that might be present in the landfill, based on 40 CFR 258 (EPA Criteria for Solid Waste Landfills) Appendix 1 and historic use of the landfill. Monitor well 04M05 was dry and was not sampled. Damage to 04M02, 04M03, and 04M07 caused by frost jacking damage was observed. Lift caused by frost jacking ranged from <0.1 foot in 04M07 to approximately 1.0 to 1.5 feet in 04M02.

Toluene was detected in 04M07 at a concentration of 230 µg/L, which is below the OU 3,4,5 ARAR MCL of 1,000 µg/L. Other BTEX compounds were detected in low concentrations (below ARAR MCLs), or were below detection limits. Total arsenic concentrations ranged from 52.9 µg/L (04M04) to 126 µg/L (04M02), which is above the drinking water MCL of 50 µg/L and the background 95% UCL of 37 µg/L. No other metals of concern were noted above drinking water MCLs.

3/4-methylphenol was detected in all monitor wells sampled in 1996 at concentrations ranging from 5 µg/L to 280 µg/L. 2-methylphenol was detected in 04M07 at 7.0 µg/L. Concentrations of benzoic acid, ranging from 11 µg/L to 36 µg/L, were detected in 04M01, 04M03, 04M04, and 04M07. Phenol was detected in 04M03 and 04M04 in concentrations of 2 µg/L and 40 µg/L, respectively. EPA drinking water MCLs were not identified for these compounds.

1997 Results

During the 1997 field season, groundwater parameters were measured in monitor wells 04M04 and 04M07. Groundwater parameters at 04M07 are generally consistent with previous groundwater parameters; while turbidity and conductivity data in 04M04 are higher than corresponding 1996 data. An overall trend of groundwater quality can not be determined based solely on current groundwater parameter data.

Monitor well 04M05 was decommissioned on 25 September 1997 by removing the well casing from the ground and filling the borehole with bentonite. The well was selected for decommissioning due to its poor condition.

References for LF04:

1994 Sitewide Groundwater Monitoring Program Report, PNL, January 1995
1995 OU 3,4,5 Record of Decision, USAF, September 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for LF04:

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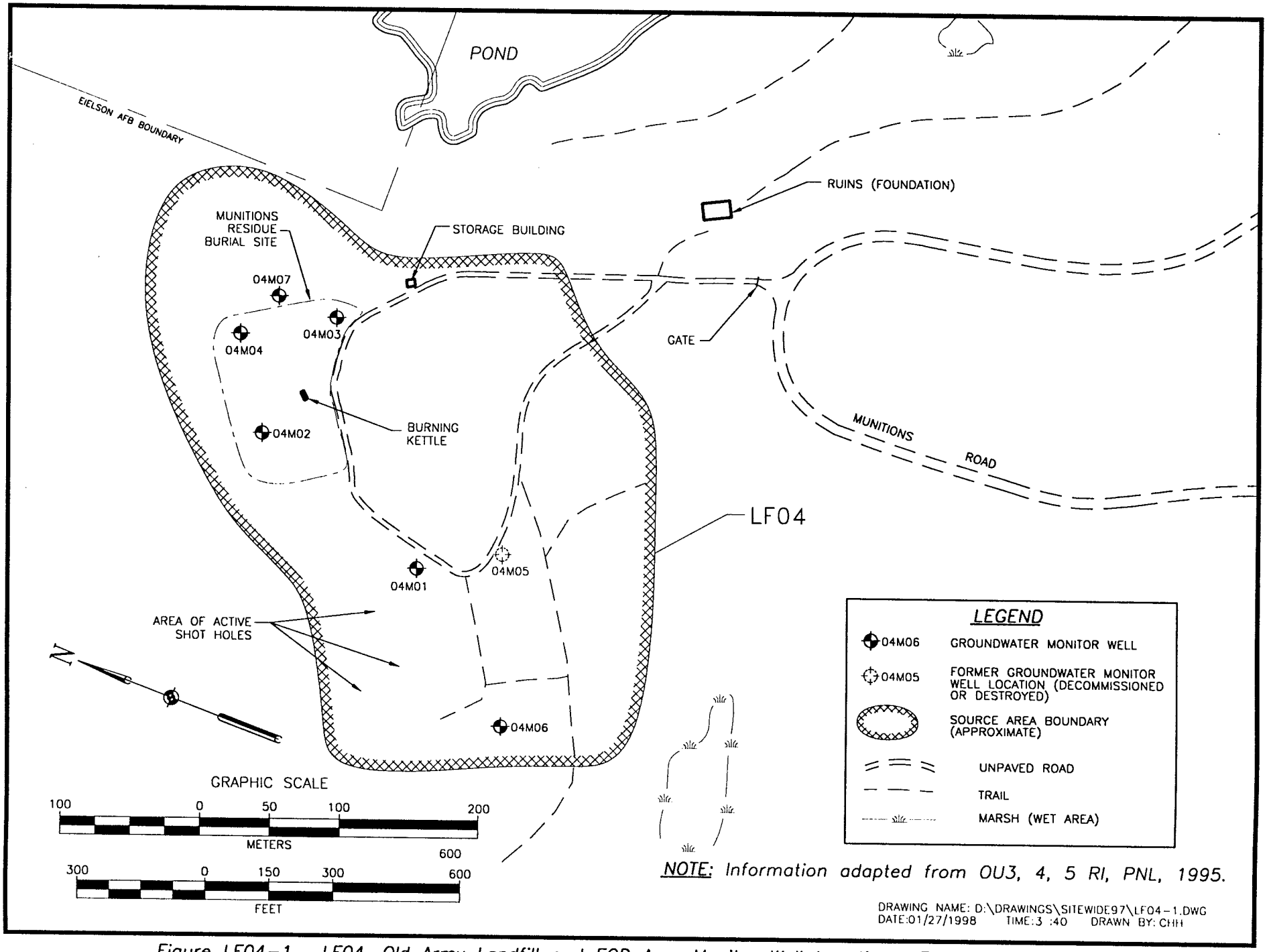


Figure LF04-1. LF04, Old Army Landfill and EOD Area Monitor Well Locations, Eielson AFB, Alaska

TABLE LF04-1 CONCENTRATIONS (µg/L) OF VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF04, OLD ARMY LANDFILL AND EOD AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
04M01	8/15/96	<1.0	<1.0	<1.0	<1.0	--	--	6	a	USAF 1996 SWMPR
04M02	8/18/94	<1	<1	<1	<1	<250	380	1,4,9,10	a	PNL 1994 SWGMPR
04M02	8/15/96	<1.0	1.0	<1.0	<1.0	--	--	6	a	USAF 1996 SWMPR
04M03	8/4/94	<1	<1	<1	<1	<250	550	1,4,9,10	a	PNL 1994 SWGMPR
04M03	8/15/96	<1.0	<1.0	<1.0	<1.0	--	--	6	a	USAF 1996 SWMPR
04M04	8/4/94	<1	<1	<1	<1	<250	1,300	1,4,9,10	a	PNL 1994 SWGMPR
04M04	8/15/96	<1.0	0.5	<1.0	<1.0	--	--	6	a	USAF 1996 SWMPR
04M05	8/15/96	Not sampled due to dry well.								
04M07	8/4/94	<10	290	<10	<10	1,900	660	1,4,9,10	a	PNL 1994 SWGMPR
04M07	8/15/96	<1.0	230	<1.0	<1.0	--	--	6	a	USAF 1996 SWMPR

Notes: a. No compounds other than those listed were detected above the reporting limits.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101
10. AK102
11. 8310

TABLE LF04-2 CONCENTRATIONS (µg/L) OF METALS IN GROUNDWATER SAMPLES, LF04, OLD ARMY LANDFILL AND EOD AREA, EIELSON AFB, ALASKA

Well No.	f/u	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
DISSOLVED																										
04M02	f	6/12/92	--	<200	--	350	<3.0	<10	140,000	<20	<20	<20	68,000	--	84,000	1,800	40	9,000	--	<20	50,000	--	<30	<10		PNL 1995 OU3,4,5 RI
Background Concentrations																										
BGM	f	9/94	43	--	8.3	101	<1.0	<1.0	51,750	<1.0	1.3	2.4	1,736	<1.0	10,450	1,789	2.3	3,400	--	<1.0	4,563	--	<1.0	5.6		PNL 1994 SWMP
BGMX	f	9/94	140	--	23	160	<1.0	<1.0	61,000	<1.0	3.0	4.0	9,900	<1.0	12,000	4,100	5.0	4,500	--	<1.0	6,500	--	1.0	19		PNL 1994 SWMP
BGUCL	f	9/94	74	--	14.5	129	<1.0	<1.0	57,600	<1.0	<3.0	3.1	3,980	<1.0	11,400	2,720	3.2	3,800	--	<1.0	5,340	--	1.0	10		PNL 1994 SWMP
TOTAL																										
04M01	u	8/15/96	<25.0	5.1	163	201	<1.0	<1.0	263,000	21.3	<11.0	<6.0	38,600	<1.0	292,000	923	<15.0	12,700	5.0	<4.0	290,000	<1.0	53.3	17.5		USAF 1996 SWMPR
04M02	u	1988	--	--	107	2,540	--	--	--	306	--	651	341,000	113	--	8,800	389	--	--	--	--	--	--	789		PNL 1995 OU3,4,5 RI
04M02	u	6/12/92	--	<200	120	1,400	<3.0	<10	220,000	97	78	130	180,000	25	110,000	4,400	190	14,000	--	<20	58,000	--	190	240		PNL 1995 OU3,4,5 RI
04M02	u	8/24/92	--	<200	--	1,900	4.8	<10	240,000	200	120	260	270,000	--	--	5,500	330	16,000	--	<20	67,000	--	--	510		PNL 1995 OU3,4,5 RI
04M02	u	4/13/93	--	<200	--	2,300	5.0	<10	250,000	280	140	390	310,000	--	170,000	5,900	360	19,000	--	<20	54,000	--	480	640		PNL 1995 OU3,4,5 RI
04M02	u	8/94	1,800	<1.0	78	790	<2.0	<1.0	230,000	14	29	9.5	140,000	28	100,000	4,600	70	8,500	--	<1.0	65,000	--	61	30		PNL 1994 SWGMPR
04M02	u	10/9/95	--	--	110	1,840	--	--	--	268	--	--	--	74.6	--	--	--	--	--	--	--	--	--	--		USAF 1995 SWMPR
04M02	u	8/15/96	442	<2.0	126	358	<1.0	<1.0	109,000	<6.0	<11	<6.0	78,400	1.9	64,400	1,250	29.2	8,030	3.6	<4.0	38,600	<1.0	<8.0	28.9		USAF 1996 SWMPR
04M03	u	8/94	72	<1.0	200	600	<2.0	<1.0	150,000	9.4	51	4.6	200,000	1.4	53,000	3,800	53	4,800	--	<1.0	22,000	--	12	34		PNL 1994 SWGMPR
04M03	u	10/9/95	--	--	155	608	--	--	--	5.8	--	--	--	1.3	--	--	--	--	--	--	--	--	--	--		USAF 1995 SWMPR
04M03	u	8/15/96	<25.0	<2.0	94	681	<1.0	<1.0	106,000	<6.0	35.2	<6.0	122,000	3.0	36,800	2,630	27.8	6,430	<2.0	<4.0	21,100	<1.0	<8.0	29.6		USAF 1996 SWMPR
04M04	u	8/94	370	<1.0	81	270	<2.0	<1.0	180,000	15	19	11	90,000	<1.0	87,000	1,700	53	4,600	--	<1.0	24,000	--	23	37		PNL 1994 SWGMPR
04M04	u	10/9/95	--	--	44.7	280	--	--	--	5.0	--	--	--	5.0	--	--	--	--	--	--	--	--	--	--		USAF 1995 SWMPR
04M04	u	8/15/96	<25.0	<2.0	52.9	344	<1.0	<1.0	164,000	<6.0	<11.0	<6.0	89,900	1.6	73,000	2,170	29.4	4,220	<2.0	<4.0	21,500	<1.0	<8.0	25.9		USAF 1996 SWMPR
04M07	u	9/14/92	--	<200	--	380	<3.0	<10	89,000	30	<20	40	65,000	--	--	1,500	40	5,100	--	<20	14,000	--	--	80		PNL 1995 OU3,4,5 RI
04M07	u	4/13/93	--	<200	--	470	<3.0	<10	84,000	60	<20	30	93,000	--	39,000	2,300	80	6,100	--	<20	17,000	--	60	90		PNL 1995 OU3,4,5 RI
04M07	u	8/94	6,200	<1.0	51	380	<2.0	<1.0	90,000	26	16	46	65,000	15	39,000	1,600	54	4,400	--	<1.0	14,000	--	39	98		PNL 1994 SWGMPR
04M07	u	8/15/96	56.2	<2.0	55.0	187	<1.0	<1.0	81,600	<6.0	<11.0	<6.0	50,900	1.0	29,500	1,040	<15	3,140	<2.0	<4.0	8,810	<1.0	<8.0	20.3		USAF 1996 SWMPR
Background Concentrations																										
BGM	u	9/94	7,538	<1.0	25	269	<1.0	<1.0	58,625	20	13.75	75	16,938	21	17,375	3,875	31	5,650	--	<1.0	8,363	--	24	63		PNL 1994 SWMP
BGMX	u	9/94	18,000	2.0	63	420	<1.0	<1.0	66,000	46	31	140	33,000	48	26,000	6,500	77	7,900	--	<1.0	9,800	--	52	120		PNL 1994 SWMP
BGUCL	u	9/94	11,500	<2.0	37	342	<1.0	<1.0	64,900	30.4	20.8	105	23,800	32.6	20,800	4,980	48.8	6,500	--	<1.0	9,260	--	36	88.8		PNL 1994 SWMP

Notes:

f. Field filtered.

u. Total (unfiltered).

BGM Mean concentration of samples collected from background wells in 1994.

BGMX Maximum concentration of samples collected from background wells in 1994.

BGUCL 95% Upper confidence limits of samples collected from background wells in 1994.

TABLE LF04-3 CONCENTRATIONS (µg/L) OF SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF04, OLD ARMY LANDFILL AND EOD AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L) Phenol	2-Methyl-phenol	3/4 Methyl-phenol (total)	Benzoic Acid	Analytical Methods	Notes	Reference
04M01	8/15/96	<10	<10	5.0	11	5, 6, 11	a,c	USAF 1996 SWMPR
04M02	8/18/94	<10	<10	1.0	--	5, 6, 11	a,b	PNL 1994 SWGMPR
04M02	8/15/96	<10	<10	10	<50	5, 6, 11	a,c	USAF 1996 SWMPR
04M03	8/4/94	<10	<10	30	--	5, 6, 11	a,b	PNL 1994 SWGMPR
04M03	8/15/96	40	<10	280	36	5, 6, 11	a,c	USAF 1996 SWMPR
04M04	8/4/94	<10	<10	9.0	--	5, 6, 11	a,b	PNL 1994 SWGMPR
04M04	8/15/96	2.0	<10	28	14	5, 6, 11	a,c	USAF 1996 SWMPR
04M05	8/15/96	Not sampled due to dry well.						
04M07	8/4/94	<10	10	42	--	5, 6, 11	a,b	PNL 1994 SWGMPR
04M07	8/15/96	<10	7.0	42	12	5, 6, 11	a,c	USAF 1996 SWMPR

Notes:
a. No compounds other than those listed were detected above the reporting limits.
b. 8270 analysis was for phenols only.
c. Some semivolatile results may exhibit a slight negative bias.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 8310

TABLE LF04-4 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, LF04, OLD ARMY LANDFILL AND EOD AREA, EIELSON AFB, ALASKA

		Parameters							Immunoassay Results				
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2](ppb)	Notes	Reference
04M01	8/15/96	2.34	--	4.8	10	260	6.96	-8	--	--	--		USAF 1996 SWMPR
04M02	8/15/96	0.53	--	10.3	8	781	6.38	-0.36	--	--	--		USAF 1996 SWMPR
04M03	8/15/96	0.63	--	9.4	9	735	6.38	-48	--	--	--		USAF 1996 SWMPR
04M04	08/15/96	0.94	--	5.5	4	869	6.38	-41	--	--	--		USAF 1996 SWMPR
04M04	08/22/97	4.66	38.7	6.4	41	1582	7.14	-65	--	--	--		USAF 1997 SWMPR
04M07	08/15/96	0.8	--	3.7	22	580	6.42		--	--	--		USAF 1996 SWMPR
04M07	08/22/97	10.4	84	5.2	29	848	7.87	-89	--	--	--		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Drager Liquid Extraction (DLE) field test kit.

LF05 Old Army Landfill

COCs, RAOs, and ARARs

Contaminants of concern at Landfill 05 (LF05) include VOCs and metals. The following table lists RAOs and ARARs established to address groundwater quality at LF05 and other OU2 source areas.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L
Naphthalenes:		
2 -Methylnaphthalene	140 µg/L	---
Naphthalene	220 µg/L	---
Lead	[1]15 µg/L	[1]15 µg/L

[1] EPA Action Level

Site Setting

LF05 is located on Eielson AFB property, approximately 1.5 miles south-southeast of the south end of the base runway, 0.4 miles east of the Richardson Highway. The source area is an old Army landfill used by the Army battery station from 1956 to 1959. Information about the landfill is limited; the landfill probably received small quantities of waste oils and spent solvents, in addition to general debris and scrap materials. Previous site reconnaissance indicated that as of 1989 there were 650 to 950 drums at the site in shallow ponds. Eielson AFB removed surface materials in 1993 to minimize the potential for future unauthorized dumping.

Previous Activities

Limited contaminant investigations for soil and groundwater at the site found no contaminants that pose an unacceptable risk to human health or the environment. Chlorinated compounds and metals have previously been detected in the past in groundwater from the wells at LF05. Lead was detected at 70 µg/L in a water sample collected from well 05M01 in 1988. Lead was not detected in a water sample collected from this well in 1993 (USAF 1993a). LF05 has been recommended for no further action.

Monitor well 05M01 was sampled and analyzed for VOCs and metals during the 1996 field season. BTEX compounds were below detection limits. Methylene chloride was detected at a concentration of 1.0 µg/L. No other organic compounds were detected. No metals were detected above background 95% UCL concentrations or applicable drinking water MCLs.

1997 Results

During the 1997 field season, groundwater parameters were measured in monitor well 05M01. Parameters data at 05M01 are consistent with previous data. Based upon parameter data, groundwater quality has not changed significantly since groundwater monitoring was initiated at LF05.

Monitor well 05M03 was decommissioned on 26 September 1997 by removing the well casing out of the ground and filling the borehole with bentonite. Monitor well 05M03 was selected for decommissioning due to its upgradient location in relation to LF05.

References for LF05:

1993 Source Evaluation Report, Phase 1, PNL, October 1993
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for LF05:

List of Tables for LF05:

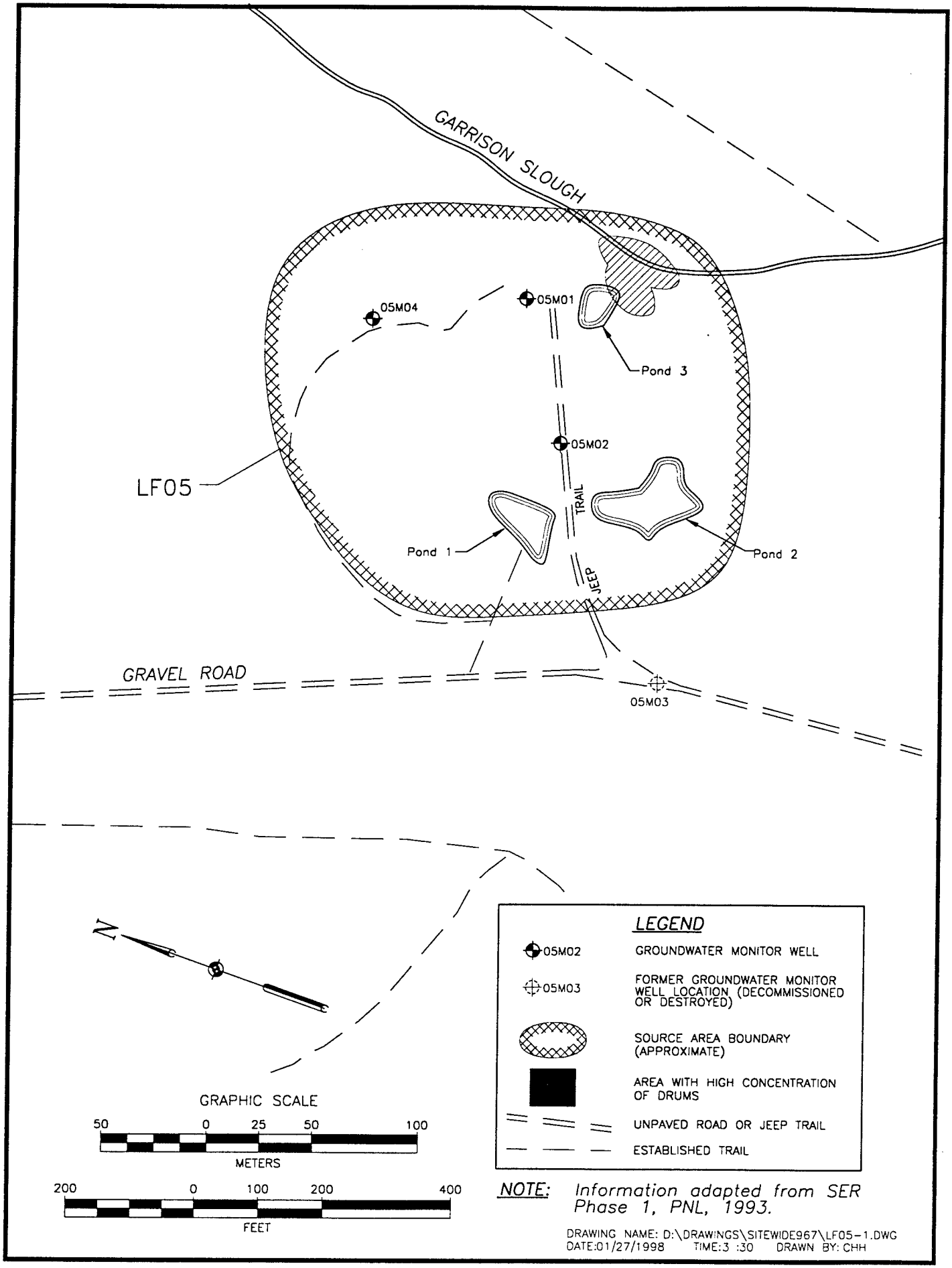


Figure LF05-1. LF05, Old Army Landfill Monitor Well Locations, Eielson AFB, Alaska

TABLE LF05-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF05, OLD ARMY LANDFILL, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Methylene Chloride	Methods	Analytical Notes	Reference
05M01	8/93	<0.105	<0.056	<0.046	<0.202	--	--	<0.056	1,4	b	PNL 1993 SWGMPR
05M01	8/22/96	<1.0	<1.0	<1.0	<1.0	--	--	1.0	7	a,b	USAF 1996 SWMPR
05M03	8/93	<0.105	<0.056	<0.046	<0.202	--	--	<0.056	1,4	b	PNL 1993 SWGMPR

Notes: a. Chloromethane (1.95 ug/L) and trichlorofluoromethane (0.765 ug/L) detected in a groundwater sample from 05M01 in 1988 (PNL1993 SER Phase 1)
b. No compounds other than those listed were detected above the reporting limits.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE LF05-2 CONCENTRATIONS (µg/L) OF METALS IN GROUNDWATER SAMPLES, LF05, OLD ARMY LANDFILL, EIELSON AFB, ALASKA

Well No.	f/u	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Notes	Reference
DISSOLVED																		
05M01	f	1988	--	--	4.0	100	--	--	--	--	--	--	--	--	--	--		PNL 1993 SER Phase 1 Final
05M01	f	8/8/94	<57	<1.0	6.9	96	<1.0	<1.0	54,000	<1.0	2.2	<1.5	950	1.1	10,000	2,500		PNL 1994 SWGMPR
05M01	f	9/29/95	149	--	1.0	211	--	--	113,000	6.5	--	<4.0	809	<1.0	16,900	2,850		USAF 1995 SWMPR
05M02	f	1988	--	--	10	200	--	--	--	--	--	--	--	--	--	--		PNL 1993 SER Phase 1 Final
05M03	f	1988	--	--	4.0	200	--	--	--	--	--	--	--	--	--	--		PNL 1993 SER Phase 1 Final
05M03	f	6/93	<32.5	<69.4	2.0	110	<0.814	<4.70	65,000	<5.42	<4.05	<2.65	950	<1.0	14,000	2,300		PNL 1993 SWGMPR
05M03	f	8/93	<32.5	<69.4	2.7	110	<0.814	<4.70	62,000	<5.42	4.5	<2.65	1,100	<0.6	12,000	2,000		PNL 1993 SWGMPR
05M03	f	9/29/94	20	4.0	3.0	83	<1.0	<1.0	61,000	<1.0	1.0	<3.0	610	<1.0	12,000	1,700		PNL 1994 SWGMPR
Background Concentrations																		
BGM	f	9/94	43	--	8.3	101	<1.0	<1.0	51,750	<1.0	1.3	2.4	1,736	<1.0	10,450	1,789		PNL 1994 SWMP
BGMX	f	9/94	140	--	23	160	<1.0	<1.0	61,000	<1.0	3.0	4.0	9,900	<1.0	12,000	4,100		PNL 1994 SWMP
BGUCL	f	9/94	74	--	14.5	129	<1.0	<1.0	57,600	<1.0	<3.0	3.1	3,980	<1.0	11,400	2,720		PNL 1994 SWMP
TOTAL																		
05M01	u	1988	1.4	--	8.4	1,030	--	--	--	139		--	--	70	--	--		PNL 1993 SER Phase 1 Final
05M01	u	8/24/93	140	<69.4	4.4	110	1.91	<4.70	59,000	<5.42	<4.05	<2.65	970	<0.88	11,000	2,800		PNL 1993 SWGMPR
05M01	u	8/94	96	<1.0	7.3	100	<1.0	<1.0	53,000	1.2	1.5	2.6	1,200	1.4	9,800	2,500		PNL 1994 SWGMPR
05M01	u	9/29/95	251	--	5.4	221	--	--	113,000	<5.0	--	<4.0	1,660	1.1	16,900	3,260		USAF 1995 SWMPR
05M01	u	8/22/96	<25.0	<2.0	6.8	111	<1.0	<1.0	57,300	<6.0	<11.0	<6.0	1,150	<1.0	8,960	1,720		USAF 1996 SWMPR
05M02	u	1988	--	--	16.4	363	--	--	--	24.6	--	--	--	--	--	--		PNL 1993 SER Phase 1 Final
05M03	u	1988	--	--	8.9	488	--	--	--	35.8	--	--	--	13.7	--	--		PNL 1993 SER Phase 1 Final
05M03	u	6/93	150	<69.4	3.0	110	<1.1	<4.70	65,000	<5.42	4.3	<2.65	1,300	<1	14,000	2,300		PNL 1993 SWGMPR
05M03	u	8/93	40	<69.4	2.0	110	<0.814	<4.70	63,000	<5.42	<4.05	3.0	1,100	<0.6	12,000	2,000		PNL 1993 SWGMPR
05M03	u	9/29/94	3,600	<1.0	8.0	160	<1.0	<1.0	66,000	8.0	5.0	29	7,900	7.0	15,000	2,400		PNL 1994 SWGMPR
Background Concentrations																		
BGM	u	9/94	7,538	<1.0	25	269	<1.0	<1.0	58,625	20	13.75	75	16,938	21	17,375	3,875		PNL 1994 SWMP
BGMX	u	9/94	18,000	2.0	63	420	<1.0	<1.0	66,000	46	31	140	33,000	48	26,000	6,500		PNL 1994 SWMP
BGUCL	u	9/94	11,500	<2.0	37	342	<1.0	<1.0	64,900	30.4	20.8	105	23,800	32.6	20,800	4,980		PNL 1994 SWMP

TABLE LF05-2 (continued)

Well No.	f/u	Date Sampled	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
DISSOLVED												
05M01	f	1988	--	--	--	--	--	--	--	60		PNL 1993 SER Phase 1 Final
05M01	f	8/8/94	3.9	3,300	--	<1.0	3,200	--	1.2	2.4		PNL 1994 SWGMPR
05M01	f	9/29/95	15.7	15,600	--	--	4,880	--	<4.0	<6.0		USAF 1995 SWMPR
05M02	f	1988	--	--	--	--	--	--	--	50		PNL 1993 SER Phase 1 Final
05M03	f	1988	--	--	--	--	--	--	--	40		PNL 1993 SER Phase 1 Final
05M03	f	6/93	<17.9	2,100	--	<2.87	3,300	--	<3.84	<3.44		PNL 1993 SWGMPR
05M03	f	8/93	<17.9	2,100	--	<2.87	3,900	--	<3.84	<5.0		PNL 1993 SWGMPR
05M03	f	9/29/94	5	3,100	--	<1.0	3,600	--	<1.0	3.0		PNL 1994 SWGMPR
Background Concentrations												
BGM	f	9/94	2.3	3,400	--	<1.0	4,563	--	<1.0	5.6		PNL 1994 SWMP
BGMX	f	9/94	5.0	4,500	--	<1.0	6,500	--	1.0	19		PNL 1994 SWMP
BGUCL	f	9/94	3.2	3,800	--	<1.0	5,340	--	1.0	10		PNL 1994 SWMP
TOTAL												
05M01	u	1988	122	--	--	--	--	--	190	304		PNL 1993 SER Phase 1 Final
05M01	u	8/24/93	<17.9	4,700	--	<2.87	3,800	--	<3.84	<3.44		PNL 1993 SWGMPR
05M01	u	8/94	4.1	3,800	--	<1.0	5,600	--	<1.0	22		PNL 1994 SWGMPR
05M01	u	9/29/95	17.5	15,400	--	--	4,930	--	4.1	<6.0		USAF 1995 SWMPR
05M01	u	8/22/96	<15.0	3,700	2.0	<4.0	3,160	<1.0	<8.0	<12.0		USAF 1996 SWMPR
05M02	u	1988	28.7	--	--	--	--	--	35.9	90.8		PNL 1993 SER Phase 1 Final
05M03	u	1988	43.1	--	--	--	--	--	44.1	81.6		PNL 1993 SER Phase 1 Final
05M03	u	6/93	<17.9	3,100	--	<2.87	3,300	--	4.6	<3.44		PNL 1993 SWGMPR
05M03	u	8/93	<17.9	3,100	--	<2.87	4,000	--	<4.2	<3.7		PNL 1993 SWGMPR
05M03	u	9/29/94	12	4,400	--	<1.0	7,000	--	10	32		PNL 1994 SWGMPR

TABLE LF05-2 (continued)

Well No.	f/u	Date Sampled	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
Background Concentrations												
BGM	u	9/94	31	5,650	--	<1.0	8,363	--	24	63		PNL 1994 SWMP
BGMX	u	9/94	77	7,900	--	<1.0	9,800	--	52	120		PNL 1994 SWMP
BGUCL	u	9/94	48.8	6,500	--	<1.0	9,260	--	36	88.8		PNL 1994 SWMP

Notes:

f.	Field filtered.
u.	Total (unfiltered).
BGM	Mean concentration of samples collected from background wells in 1994.
BGMX	Maximum concentration of samples collected from background wells in 1994.
BGUCL	95% Upper confidence limits of samples collected from background wells in 1994.

TABLE LF05-3 CONCENTRATIONS (µg/L) OF NON-BTEX VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF05, EIELSON AFB, ALASKA

Well No.	Date Sampled	DCDFM	Chloro-methane	Vinyl Chloride	Chloro-ethane	TCFM	Methylene Chloride	c-1,2-DCE	t-1,2-DCE	Total 1,2 DCE	1,1-DCA	1,2-DCA	1,1,1-TCA	TCE	PCE	1,3-DCB	1,4-DCB	1,2-DCB	Analytical Methods	Notes	Reference
05M01	8/22/96	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	7	a	USAF 1996 SWMPR

Notes: a. No compounds other than those listed or noted were detected above method reporting limits.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

DCDFM Dichlorodifluoromethane.
TCFM Trichlorofluoromethane.
DCE Dichloroethene.
DCA Dichloroethane.
TCA Trichloroethane.
TCE Trichloroethene.
PCE Perchloroethene (tetrachloroethene).
DCB Dichlorobenzene.

TABLE LF05-4 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, LF05, OLD ARMY LANDFILL , EIELSON AFB, ALASKA

		Parameters							Immunoassay Results		
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	Notes	Reference
05M01	09/29/95	3.6	--	10	--	440	6.67	--	--		USAF 1995 SWMPR
05M01	08/22/96	1.28	--	11.4	1	282	6.75	--	--		USAF 1996 SWMPR
05M01	08/20/97	1.15	11	13.1	<5	358	7.44	53	--		USAF 1997 SWMPR
05M01	08/21/97	1.7	16.7	13.3	27	366	7.17	85	--	a	USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

a. Parameters duplicate

LF06 Old Landfill

COCs, RAOs, and ARARs

Contaminants of concern at Landfill 06 (LF06) include VOCs. The following table lists ARARs established to address groundwater quality at LF06. RAOs have not been established for LF06 and other OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

LF06 is located near the central power plant just south of the power plant cooling pond on the eastern side of the main developed portion of the base. The landfill is approximately 0.2 miles north of Spruce Lake. From 1959 to 1963, LF06 was used as a secondary landfill.

Previous Activities

Previous site investigations and analyses of soil and groundwater samples showed no contamination that poses an unacceptable risk to human health or the environment. LF06 was recommended for no further action in the OUs 3,4,5 ROD. No samples were collected under the 1995 SWMP.

Monitor wells 06M02 and 06M04 were sampled for VOCs and metals during the 1996 field season. No VOCs were detected during the 1996 sampling event. No metal concentrations were detected which exceeded the background 95% UCL or applicable drinking water MCLs.

1997 Results

During the 1997 field season, groundwater parameters were measured in monitor wells 06M02 and 06M04. Although groundwater parameters are consistent with previous parameter measurements, a trend of groundwater quality can not be determined based on limited groundwater parameter data.

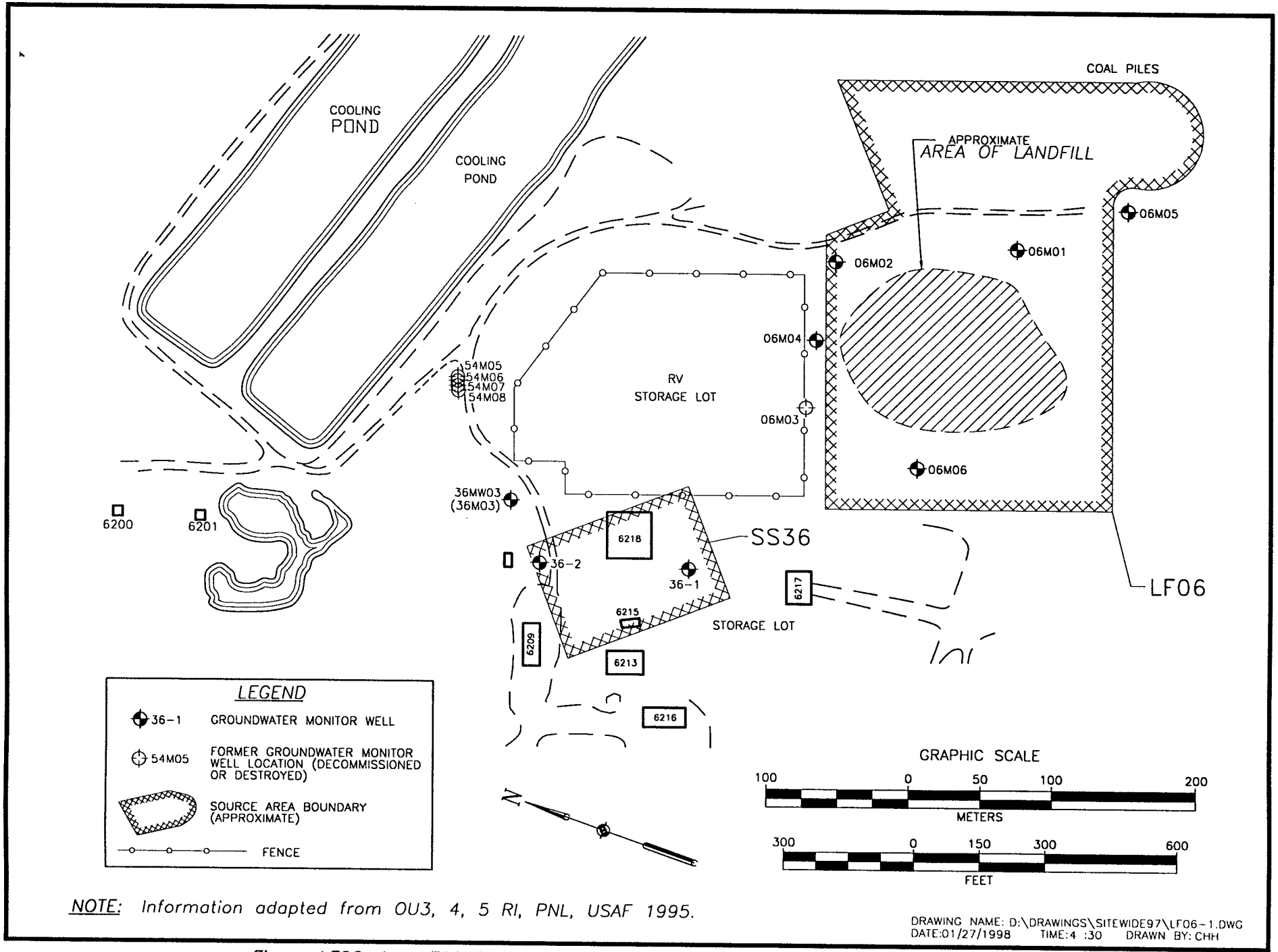
On 24 September 1997, monitor wells 06M03, 54M05, 54M06, 54M07, and 54M08 were decommissioned by pulling the well casing and filling the remaining borehole with bentonite. Monitor well 06M03 was decommissioned due to its poor condition. Wells 54M05 thru 54M08 were decommissioned because they were no longer deemed necessary for groundwater monitoring purposes.

References for LF06:

1995 OU 3,4,5 Remedial Investigation Report, PNL, May 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for LF06:

List of Tables for LF06:



NOTE: Information adapted from OU3, 4, 5 RI, PNL, USAF 1995.

DRAWING NAME: D:\DRAWINGS\SITEWIDE97\LF06-1.DWG
DATE:01/27/1998 TIME:4 :30 DRAWN BY: CHH

Figure LF06-1. LF06 Site Plan Showing Monitor Well Locations, Eielson AFB, Alaska

TABLE LF06-1 SUMMARY OF CONTAMINANTS ANALYZED FOR AND DETECTED IN GROUNDWATER (µg/L) (FROM PNL 1995 OU 3,4, 5 RI)

Monitoring Well	Constituent	1988 [a]	1990 [b]	1993 [b]
06M01	Benzene	0.18	ND	
	1,2-dichloroethane	0.206	ND	
	Dichlorodifluoromethane	2.17	0.650 (0.228)[c]	
	Lead, total	61.1	NA	
	Lead, dissolved	1.0	NA	
	Arsenic, total	29.0	NA	
	Arsenic, dissolved	20.0	NA	
	Nickel, total	97.7	NA	
	Vanadium, total	121.0	NA	
	Zinc, total	225.0	NA	
	Zinc, dissolved	40.0	NA	
	Chromium, total	96.7	NA	
	Cadmium	5.3		
06M02	Benzene	0.26	ND	
	Dichlorodifluoromethane	2.36	1.83	
	Lead	13.0	NA	
	Arsenic, total	78.7	NA	
	Arsenic, dissolved	50.0	NA	
	Nickel, total	33.5	NA	
	Vanadium, total	23.2	NA	
	Zinc, total	43.0	NA	
	Zinc, dissolved	30.0	NA	
	Chromium, total	19.0	NA	
06M03	Lead	33.5	NA	
	Arsenic, total	40.8	NA	
	Arsenic, dissolved	20.0	NA	
	Nickel, total	48.8	NA	
	Vanadium, total	64.6	NA	
	Zinc, total	121.0	NA	
	Zinc, dissolved	50.0	NA	
	Chromium, total	49.8	NA	
06M04	Dichlorodifluoromethane		1.04	
06M05	Dichlorodifluoromethane		3.38	
	Toluene		0.35	
	Methylene chloride		2.11	
06M06	No volatile organic compounds detected			

(a) HLA 1989.
(b) HLA 1990.
(c) Duplicate
NA = not analyzed.
ND = not detected.

TABLE LF06-2 VOLATILE ORGANIC COMPOUNDS ANALYZED FOR AND DETECTED IN GROUNDWATER (µg/L) IN AUGUST 1994 USING METHOD 8010/8020
(FROM PNL 1995 OU 3,4,5 RI)

Constituent	CAS #	06M02		06M04		06M05	06M06		CRQL	MDL
		LT	Result	LT	Result	Result	LT	Result		
Dichlorodifluoromethane	75-71-8	<	1.0	<	1.0	1.0	<	1.0	1.0	0.3
Chloromethane	74-87-3	<	1.0	<	1.0	1.0	<	1.0	1.0	0.4
Vinyl Chloride	75-01-4	<	0.5	<	0.5	0.5	<	0.5	0.5	0.3
Bromomethane	74-83-9	<	2.0	<	2.0	2.0	<	2.0	2.0	0.5
Chloroethane	75-00-3	<	1.0	<	1.0	1.0	<	1.0	1.0	0.4
Trichlorofluoromethane	75-69-4	<	1.0	<	1.0	1.0	<	1.0	1.0	0.3
1,1-Dichloroethene	75-35-4	<	0.5	<	0.5	0.5	<	0.5	0.5	0.2
Methylene Chloride	75-09-2	<	1.0	<	1.0	1.0	<	1.0	1.0	0.3
trans-1,2-Dichloroethene	156-60-5	<	1.0	<	1.0	1.0	<	1.0	1.0	0.3
1,1-Dichloroethane	75-34-3	<	1.0	<	1.0	1.0	<	1.0	1.0	0.3
Chloroform	67-66-3	<	1.0	<	1.0	1.0	<	1.0	1.0	0.2
1,1,1-Trichloroethane	71-55-6	<	1.0	<	1.0	1.0	<	1.0	1.0	0.3
Carbon Tetrachloride	56-23-5	<	0.5	<	0.5	0.5	<	0.5	0.5	0.2
1,2-Dichloroethane	107-06-2	<	0.5	<	0.5	0.5	<	0.5	0.5	0.3
Trichloroethane (TCE)	79-01-6	<	0.5	<	0.5	0.5	<	0.5	0.5	0.2
1,2-Dichloropropane	78-87-5	<	0.5	<	0.5	0.5	<	0.5	0.5	0.2
Bromodichloromethane	75-27-4	<	1.0	<	1.0	1.0	<	1.0	1.0	0.3
2-Chloroethylvinyl ether	110-75-8	<	2.0	<	2.0	2.0	<	2.0	2.0	0.5
cis-1,3-Dichloropropene	10061-01-5	<	0.5	<	0.5	0.5	<	0.5	0.5	0.4
trans-1,3-Dichloropropene	10061-02-6	<	0.5	<	0.5	0.5	<	0.5	0.5	0.3
1,1,2-Trichloroethane	79-00-5	<	0.5	<	0.5	0.5	<	0.5	0.5	0.3
Tetrachloroethane (PCE)	127-18-4	<	0.5	<	0.5	0.5	<	0.5	0.5	0.3
Dibromochloromethane	124-48-1	<	1.0	<	1.0	1.0	<	1.0	1.0	0.4
Chlorobenzene	108-90-7	<	0.5	<	0.5	0.5	<	0.5	0.5	0.2
Bromoform	75-25-2	<	1.0	<	1.0	1.0	<	1.0	1.0	0.5
1,1,2,2-Tetrachloroethane	79-34-5	<	1.0	<	1.0	1.0	<	1.0	1.0	0.2
1,3-Dichlorobenzene	541-73-1	<	1.0	<	1.0	1.0	<	1.0	1.0	0.1
1,4-Dichlorobenzene	106-46-7	<	1.0	<	1.0	1.0	<	1.0	1.0	0.2
1,2-Dichlorobenzene	95-50-1	<	1.0	<	1.0	1.0	<	1.0	1.0	0.2
Benzene	71-43-2	<	1.0	<	1.0	1.0	<	1.0	1.0	0.3
Toluene	108-88-3	<	1.0	<	1.0	1.0	<	1.0	1.0	0.2
Chlorobenzene	108-90-7	<	1.0	<	1.0	1.0	<	1.0	1.0	0.2
Ethylbenzene	100-41-4	<	1.0	<	1.0	1.0		2.0	1.0	0.3
m,p-Xylene	MPXYLENES	<	1.0	<	1.0	1.0	<	1.0	1.0	0.4
o-Xylene	95-47-6	<	1.0	<	1.0	1.0	<	1.0	1.0	0.5
1,3-Dichlorobenzene	541-73-1	<	1.0	<	1.0	1.0	<	1.0	1.0	0.2
1,4-Dichlorobenzene	106-46-7	<	1.0	<	1.0	1.0	<	1.0	1.0	0.2
1,2-Dichlorobenzene	95-50-1	<	1.0	<	1.0	1.0	<	1.0	1.0	0.2

MDL = method detection limit.
CRQL = contract required quantification unit.

TABLE LF06-3 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, LF06, OLD LANDFILL, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	Total GRO	Total DRO	Analytical Methods	Notes	Reference
06M02	8/15/96	<1.0	<1.0	<1.0	<1.0	--	--	7	a	USAF 1996 SWMPR
06M04	8/93	<0.105	<0.056	<0.046	<0.202	--	--	1,4	a	PNL 1993 SWGMPR
06M04	8/15/96	<1.0	<1.0	<1.0	<1.0	--	--	7	a	USAF 1996 SWMPR
06M05	8/93	<0.105	<0.056	<0.046	<0.202	--	--	1,4	a	PNL 1993 SWGMPR

Notes: a. No compounds other than those listed were detected above the reporting limits.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE LF06-4 CONCENTRATIONS (µg/L) OF METALS IN GROUNDWATER SAMPLES, LF06, OLD LANDFILL, EIELSON AFB, ALASKA

Well No.	f/u	Date Sampled	Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium	Chromium	Cobalt	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
DISOLVED																										
Background Concentrations																										
BGM	f	9/94	43	--	8.3	101	<1.0	<1.0	51,750	<1.0	1.3	2.4	1,736	<1.0	10,450	1,789	2.3	3,400	--	<1.0	4,563	--	<1.0	5.6		PNL 1994 SWMP
BGMX	f	9/94	140	--	23	160	<1.0	<1.0	61,000	<1.0	3.0	4.0	9,900	<1.0	12,000	4,100	5.0	4,500	--	<1.0	6,500	--	1.0	19		PNL 1994 SWMP
BGUCL	f	9/94	74	--	14.5	129	<1.0	<1.0	57,600	<1.0	<3.0	3.1	3,980	<1.0	11,400	2,720	3.2	3,800	--	<1.0	5,340	--	1.0	10		PNL 1994 SWMP
TOTAL																										
06M02	u	8/15/96	<25.0	<2.0	19.7	137	<1.0	<1.0	50,100	<6.0	<11.0	<6.0	5,750	<1.0	9,690	1,130	<15.0	2,950	<2.0	<4.0	5,390	<1.0	<8.0	12.0	a	USAF 1996 SWMPR
06M04	u	8/93	58	<69.4	3.5	150	1.9	<4.70	55,000	<5.42	<4.05	4.0	160	<1.4	12,000	1,600	<17.9	3,600	--	<2.87	5,300	--	4.1	<3.44	a	PNL 1993 SWGMPR
06M04	u	8/15/96	<25.0	<2.0	10.4	155	<1.0	<1.0	52,300	<6.0	<11.0	<6.0	951	<1.0	10,900	1,850	<15.0	3,490	<2.0	<4.0	6,810	<1.0	<8.0	18.9	a	USAF 1996 SWMPR
06M05	u	8/93	120	<69.4	12	120	0.87	<4.70	52,000	<5.42	4.4	<2.65	3,900	4.0	8,800	1,400	<17.9	3,200	--	<2.87	4,500	--	<3.84	<3.44	a	PNL 1993 SWGMPR
Background Concentrations																										
BGM	u	9/94	7,538	<1.0	25	269	<1.0	<1.0	58,625	20	13.75	75	16,938	21	17,375	3,875	31	5,650	--	<1.0	8,363	--	24	63		PNL 1994 SWMP
BGMX	u	9/94	18,000	2.0	63	420	<1.0	<1.0	66,000	46	31	140	33,000	48	26,000	6,500	77	7,900	--	<1.0	9,800	--	52	120		PNL 1994 SWMP
BGUCL	u	9/94	11,500	<2.0	37	342	<1.0	<1.0	64,900	30.4	20.8	105	23,800	32.6	20,800	4,980	48.8	6,500	--	<1.0	9,260	--	36	88.8		PNL 1994 SWMP

Notes:

a. No other compounds other than those listed were detected above the reporting limits.

f. Field filtered.

u. Total (unfiltered).

BGM Mean concentration of samples collected from background wells in 1994.

BGMX Maximum concentration of samples collected from background wells in 1994.

BGUCL 95% Upper confidence limits of samples collected from background wells in 1994.

TABLE LF06-5 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, LF06, OLD LANDFILL, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)		
06M02	8/15/96	0.63	--	5.1	8	253	7.08	70	--		USAF 1996 SWMPR
06M02	8/20/97	2.2	17.8	5.8	<5	420	7.06	48	--		USAF 1997 SWMPR
06M04	8/15/96	2.56	--	10.2	1	252	7.3	59	--		USAF 1996 SWMPR
06M04	8/20/97	2.36	21.4	10.4	<5	356	7.33	70	--		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

FT09: see LF03/FT09 Inactive Base Landfill/Fire Training Area

ST10/SS14 E-2 POL Storage Area/E-2 Railroad JP4 Spill

COCs, RAOs, AND ARARs

BTEX compounds are COCs for ST10/SS14. DRO and GRO have also been detected during previous sampling events. The following table lists RAOs and ARARs established to address groundwater quality at ST10/SS14 and other OU2 source areas.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L
Naphthalenes: 2 -Methylnaphthalene Naphthalene	 140 µg/L 220 µg/L	
Lead	[1]15 µg/L	[1]15 µg/L

[1] EPA Action Level

Site Setting

ST10/SS14 includes the bulk fuel storage facility, Spruce Lake, and the railroad area, located in the southeast portion of the developed base area. The combined source areas include areas of NAPL and dissolved fuel compounds released from the tanks and associated piping.

A bioventing system was constructed at ST10/SS14 during the 1995 field season. The system was constructed to include air injection below the water table. The system was upgraded in 1996 to include soil vapor extraction (SVE) in the vicinity of Building 6225. This upgrade occurred in response to reports of hydrocarbon vapors inside the building.

Previous Activities

Wells in source area ST10 were not sampled in the 1994 SWMP. Selected wells were sampled during the 1994 field season, and the results were reported in the IT Field Activities report (IT 1995b).

Some wells at this source area are completed with screened intervals below the top of the alluvial water surface. These wells include 10MW12, 10-6, and 10MW08I. Monitor well 10MW12 was

installed during the 1994 field season. The screened interval of well 10MW12 is located between 25 and 40 feet bgs. Benzene was measured at concentrations of 9.0 and 9.2 µg/L in a field sample and a field duplicate. Benzene, toluene, ethylbenzene, and xylene (BTEX) compounds were detected in groundwater samples in the area associated with the NAPL plume.

Two wells (10-1 and 10MW12) were sampled for fuel contaminants under the 1995 SWMP. Samples from 10-1, immediately downgradient of the tank farm, continued to show BTEX concentrations. BTEX was not detected in well 10MW12, downgradient of Spruce Lake and the farthest downgradient well of the source area.

Monitor wells 10-1, 10-3, 10-4, 10-6, 10-8, 10MW08I, 10MW09, 10MW12, 14-2, and W-1 were sampled under the 1996 SWMP. Benzene concentrations ranged from below detection limits (multiple wells) to 110 µg/L in W-1. Wells displaying benzene concentrations above RAOs and ARAR MCLs included 10-1, 10MW12, 14-2, and W-1. No other compounds were detected above site specific RAOs or ARAR MCLs.

Well 10-4 was decommissioned on 27 September 1996. The well was decommissioned by removing well casing and filling the borehole with bentonite pellets. The close proximity of the well to construction activities prompted well removal.

1997 Results

Monitor wells 10-1, 10-3, 10MW12, 14-2, and W-1 were sampled during the 1997 field season for VOCs and semi-VOCs. Monitor well 10-8 was also sampled for BTEX, GRO, and DRO. Benzene concentrations ranged from below detection limits (10-8) to 460 µg/L (14-2). Wells displaying benzene concentrations above site specific RAOs and ARAR MCLs included 10-3 (150 µg/L), 14-2 (460 µg/L), and W-1 (71 µg/L). No other compounds were detected above site specific RAOs or ARAR MCLs. DRO was detected at 10-8 at a concentration of 310 µg/L; however, the chromatographic pattern for this sample does not appear to be indicative of a petroleum product. This irregular chromatographic pattern is possibly due to background interference as was previously determined for the north boundary wells.

Several SVOCs were detected in ST10/SS14 groundwater samples. Monitor well 10-3 displayed 2,500 µg/L of bis (2-ethylhexyl) phthalate, exceeding the EPA MCL of 6 µg/L. Additional semi-volatile compounds detected included phenol (14-2, W-1), 2-methylphenol (W-1), 4-methylphenol (14-2), and benzoic acid (14-2). No EPA drinking water MCLs were identified for these compounds. These SVOCs were previously detected in similar concentrations during the 1993 OU2 RI.

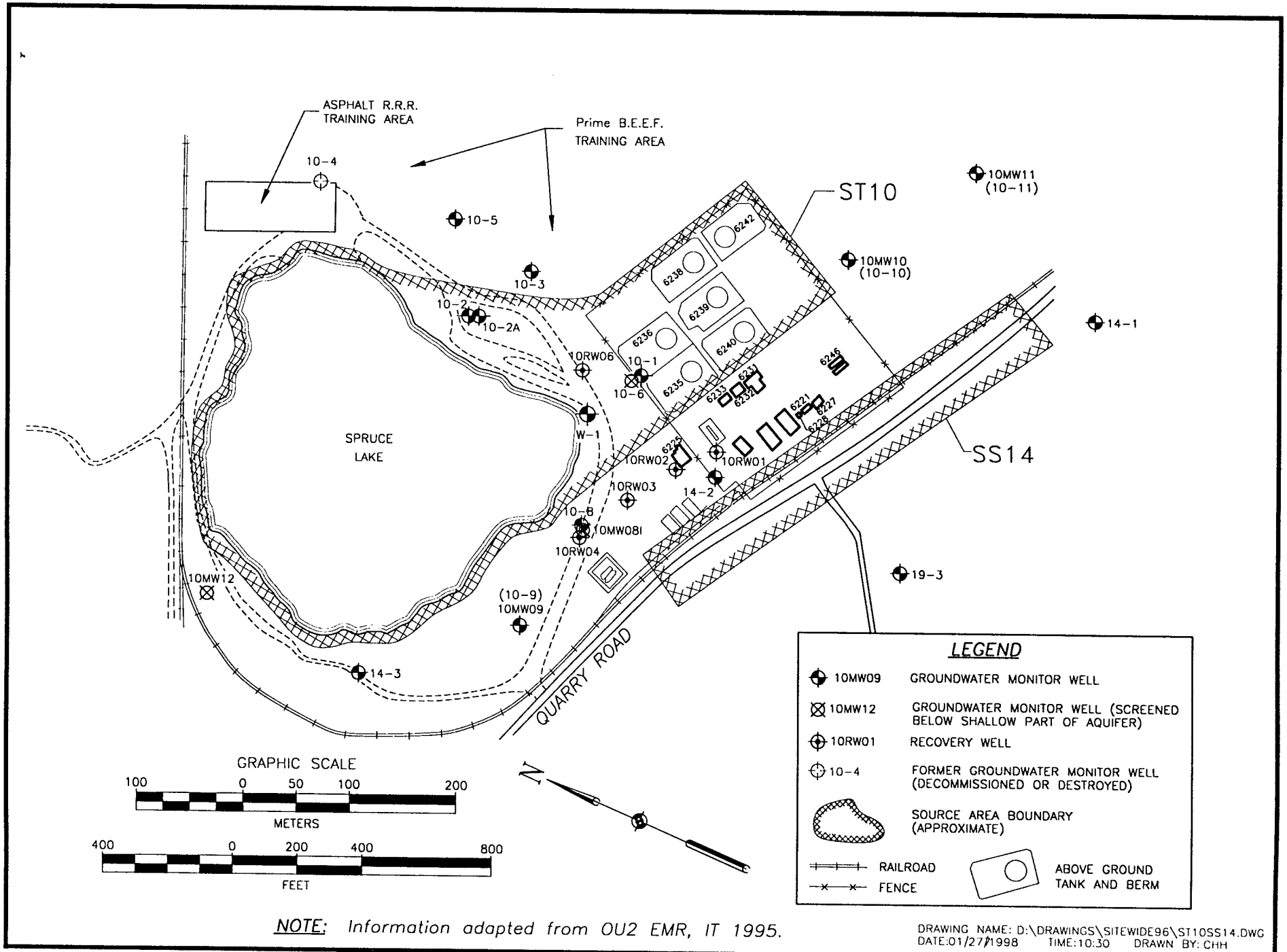
Cumulative analytical data indicates continued overall decreases of BTEX compounds in 10-1 and 10-8. BTEX concentrations in monitor wells 10-3, 14-2, 10MW12, and W-1 remained at approximately the same order of magnitude since groundwater monitoring was initiated. Due to the variability of BTEX concentrations, a groundwater quality trend can not be presently determined.

References for ST10/SS14:

1993 OU2 Remedial Investigation Report, PNL, October 1993
1994 OU2 Environmental Monitoring Field Activities Report, IT, February 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST10/SS14:

List of Tables for ST10/SS14:



NOTE: Information adapted from OU2 EMR, IT 1995.

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DATE:01/27/1998 TIME:10:30 DRAWN BY: CHH

Figure ST10/SS14-1. ST10/SS14, E-2 POL Storage Area/E-2 Railroad JP4 Fuel Spill, Eielson AFB, Alaska

TABLE ST10/SS14-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST10/SS14, E-2 POL STORAGE/RAILROAD AND JP4 FUEL SPILL, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)								Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	2- Methylnapthalene	Naphthalene			
10-1	9/91	1,300	9,500	290	2,800	--	--	--	--	5,6,8	a,b	PNL 1993 OU2 RI
10-1	9/27/95	120	900	<50	490	3,700	5,700	--	--	1-3		USAF 1995 SWMPR
10-1	8/28/96	29	57	4.1	35	--	--	--	--	1		USAF 1996 SWMPR
10-1	9/10/97	1	9	<1.0	7	--	--	<10	<10	1,5	i	USAF 1997 SWMPR
10-2A	9/91	5.0	2.0	7.0	130	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
10-3	9/91	30	5.0	24	220	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
10-3	8/28/96	<1.0	<1.0	<1.0	4.1	--	--	--	--	1		USAF 1996 SWMPR
10-3	9/10/97	150	4	1	9	--	--	<10	<10	1,5	f	USAF 1997 SWMPR
10-4	9/91	<5.0	<5.0	<5.0	<5.0	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
10-4	8/28/96	<1.0	<1.0	<1.0	<1.0	--	--	--	--	1		USAF 1996 SWMPR
10-5	9/91	1.0	3.0	<5.0	<5.0	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
10-6	9/91	<5.0	<5.0	<5.0	<5.0	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
10-6	9/9/96	<1.0	1.2	<1.0	<1.0	--	--	--	--	1		USAF 1996 SWMPR
10-8	9/91	430	2,700	110	750	--	--	--	--	5,6,8	a,c	PNL 1993 OU2 RI
10-8	8/28/96	<1.0	<1.0	<1.0	<1.0	--	--	--	--	1		USAF 1996 SWMPR
10-8	10/1/97	<1.0	<1.0	<1.0	<1.0	<100	310	--	--	1,9,10	h	USAF 1997 SWMPR
10MW8I	9/91	2.0	<5.0	<5.0	<5.0	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
10MW8I	9/9/96	<1.0	<1.0	<1.0	<1.0	--	--	--	--	1		USAF 1996 SWMPR
10MW9	9/91	<5.0	<5.0	<5.0	<5.0	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
10MW9	8/28/96	<1.0	<1.0	<1.0	<1.0	--	--	--	--	1		USAF 1996 SWMPR
10MW10	9/91	<5.0	<5.0	<5.0	<5.0	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
10MW11	9/91	<5.0	<5.0	<5.0	<5.0	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI

TABLE ST10/SS14-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	2- Methylnapthalene	Naphthalene	Analytical Methods	Notes	Reference
10MW12	10/10/94	9.0	<2.0	<2.0	<2.0	--	--	--	--	1		IT 1994 EMR
10MW12	2/1/95	10.6	0.33	<0.2	<0.4	--	--	--	--	1,4	d	PNL 1995 SWRI
10MW12	10/11/95	<1.0	<1.0	<1.0	<1.0	<50	150	--	--	1-3		USAF 1995 SWMPR
10MW12	9/9/96	6.3	<1.0	<1.0	<1.0	--	--	--	--	1		USAF 1996 SWMPR
10MW12	9/15/97	3.0	<1.0	<1.0	<1.0	--	--	<10	<10	1,5		USAF 1997 SWMPR
14-2	9/91	800	1,200	150	700	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
14-2	8/28/96	83	330	160	540	--	--	--	--	1		USAF 1996 SWMPR
14-2	9/10/97	460	490	110	410	--	--	27	44	1,5	g,i	USAF 1997 SWMPR
14-3	9/91	<5.0	<5.0	<5.0	<5.0	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
W-1	9/91	200	2.0	<5.0	3.0	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
W-1	8/28/96	110	3.0	<1.0	10.2	--	--	--	--	1		USAF 1996 SWMPR
W-1	9/10/97	71	16	<1.0	24	--	--	<10	<10	1,5	e,i	USAF 1997 SWMPR

Notes:
a. For additional compounds detected, see reference.
b. Additional compounds detected: 2-butanone - 12 µg/L.
c. Additional compounds detected: 2-butanone - 20 µg/L.
d. Additional compounds detected: cis-1,2-DCE - 0.30 µg/L.
e. Additional compounds detected: phenol - 4 µg/L.
f. Additional compounds detected: bis (2-ethylhexyl) phthalate - 2500 µg/L.
g. Additional compounds detected: phenol - 3 µg/L, 2-methylphenol - 4 µg/L, 4-methylphenol -2 µg/L, benzoic acid - 12 µg/L
h. Chromatographic pattern of DRO analysis does not appear to be indicative of a petroleum product.
i. Bis (2-ethylhexyl) phthalate was detected below reporting limits, suspected to be the result of laboratory contamination (also detected in the method blank).

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

I Intermediate depth well.

TABLE ST10/SS14-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST10/SS14, E-2 POL STORAGE AREA/E-2 RAILROAD JP4 FUEL SPILL, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)		
10-1	9/27/95	2.7	--	12	--	230	7.15	--	--		USAF 1995 SWMPR
10-1	8/28/96	0.184	--	9.37	62	180	7.16	-20	--		USAF 1996 SWMPR
10-1	9/10/97	0.73	6.9	11.4	33	270	7.39	43	--		USAF 1997 SWMPR
10-1	10/1/97	9.81	87	9.3	72	238	7.55	40	--		USAF 1997 SWMPR
10-3	8/28/96	0.187	--	7.26	14.9	160	7.06	-86	--		USAF 1996 SWMPR
10-3	9/10/97	1.41	12	7.9	605	264	7.32	70	--		USAF 1997 SWMPR
10-3	10/2/97	0.61	5.2	7.5	110	246	7.66	-90	--		USAF 1997 SWMPR
10-4	8/28/96	0.283	--	5.13	78	148	7.29	-47	--		USAF 1996 SWMPR
10-6	9/9/96	0.026	--	4.52	0.6	182	6.85	-110	--		USAF 1996 SWMPR
10-8	8/28/96	0.168	--	6.51	33.5	150	7.17	-35	--		USAF 1996 SWMPR
10-8	10/1/97	0.1	1.0	5.1	18	232	7.43	0	--		USAF 1997 SWMPR
10MW8I	9/9/96	0.008	--	1.74	0	213	7.52	-110	--		USAF 1996 SWMPR
10MW9	8/28/96	0.103	--	5.66	2.6	179	7.06	-51	--		USAF 1996 SWMPR
10MW12	9/11/95	2.6	--	11	--	240	6.93	--	--		USAF 1995 SWMPR
10MW12	9/9/96	0.021		11.44	6.6	206	7.4	-167.8			
10MW12	9/9/96	--	2.1	11.44	6.6	206	7.4	-167.8	--		USAF 1996 SWMPR
10MW12	9/15/97	6.02	58	12.5	31	262	8.06	-5	--		USAF 1997 SWMPR
14-2	8/28/96	0.184	--	8.87	8	188	7.04	11.5	--		USAF 1996 SWMPR
14-2	9/10/97	1.75	15	9.2	0	353	7.85	-67	--		USAF 1997 SWMPR

TABLE ST 10/ST14-2 (continued)

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)		
14-2	10/1/97	0.13	1.1	8.3	6	306	7.43	-78	--		USAF 1997 SWMPR
W-1	8/28/96	0.059	--	3.46	1	157	7.18	-82	--		USAF 1996 SWMPR
W-1	9/10/97	LO	--	3.0	0	291	7.66	-13	--		USAF 1997 SWMPR
W-1	10/1/97	0.20	1.5	3.1	2	264	6.44	-12	--		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Dräger Liquid Extraction (DLE) field test kit.

ST11 Fuel Saturated Area

COCs, RAOs, and ARARs

BTEX compounds are COCs for ST11. DRO was also detected in well 11-3 in the 1995 sampling event. The following table lists RAOs and ARARs established to address groundwater quality at ST11 and other OU2 source areas.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L
Naphthalenes: 2 -Methylnaphthalene Naphthalene	 140 µg/L 220 µg/L	
Lead	[1]15 µg/L	[1]15 µg/L

[1] EPA Action Level

Site Setting

ST11 is now a dog-training facility adjacent to Garrison Slough. The area was once the base bakery, where diesel-fueled ovens were fed by an underground pipeline. Leaks believed to be from the pipeline resulted in a fuel layer on the groundwater and in Garrison Slough. In the late 1970s, the pipeline was removed and the residual fuel was removed from the top of the water. It is reported in the OU2 RI that trenches equipped with oil/water separators were used to remove floating fuel from 1977 to 1980. The Sitewide RI reports the surface water in Garrison Slough is at a higher elevation than the groundwater elevations at ST11, indicating the slough loses water to the aquifer in this area.

Previous Activities

Low concentrations of BTEX compounds have been detected during previous sampling rounds. BTEX compounds were not detected in the samples collected from ST11 (Well 11-3) in 1994 or 1995 under the SWMP.

Monitor wells 11-1 thru 11-7 were sampled for BTEX compounds during the 1996 field season. Xylenes were detected in monitor wells 11-1, 11-3 and 11-5, at concentrations of 1.1 µg/L, 1.2 µg/L, and 1.5 µg/L, respectively. No other BTEX compounds were detected. Analytical results

for wells sampled in 1996 indicate BTEX compounds were below RAOs and ARAR MCLs established for ST11.

1997 Results

Groundwater quality was monitored at ST11 using groundwater parameters and total BTEX immunoassay testing. The total BTEX concentration in 11-3 was below the detection limit (<20 ppb) of the immunoassay test kit. Total BTEX concentrations are consistent with previous analytical data.

Cumulative immunoassay and analytical data indicates subsurface conditions have not changed significantly since groundwater monitoring was initiated at ST11 in 1991. Immunoassay and analytical data for monitor well 11-3 have consistently displayed low to non detectable BTEX concentrations.

On 24 and 26 September 1997, monitor wells 11-4, 11-6, and 11-7 were decommissioned by removing the well casings and filling the boreholes with bentonite. These wells were decommissioned due to their location in relation to the source area.

References for ST11:

1994 Sitewide Groundwater Monitoring Program Report, PNL, January 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

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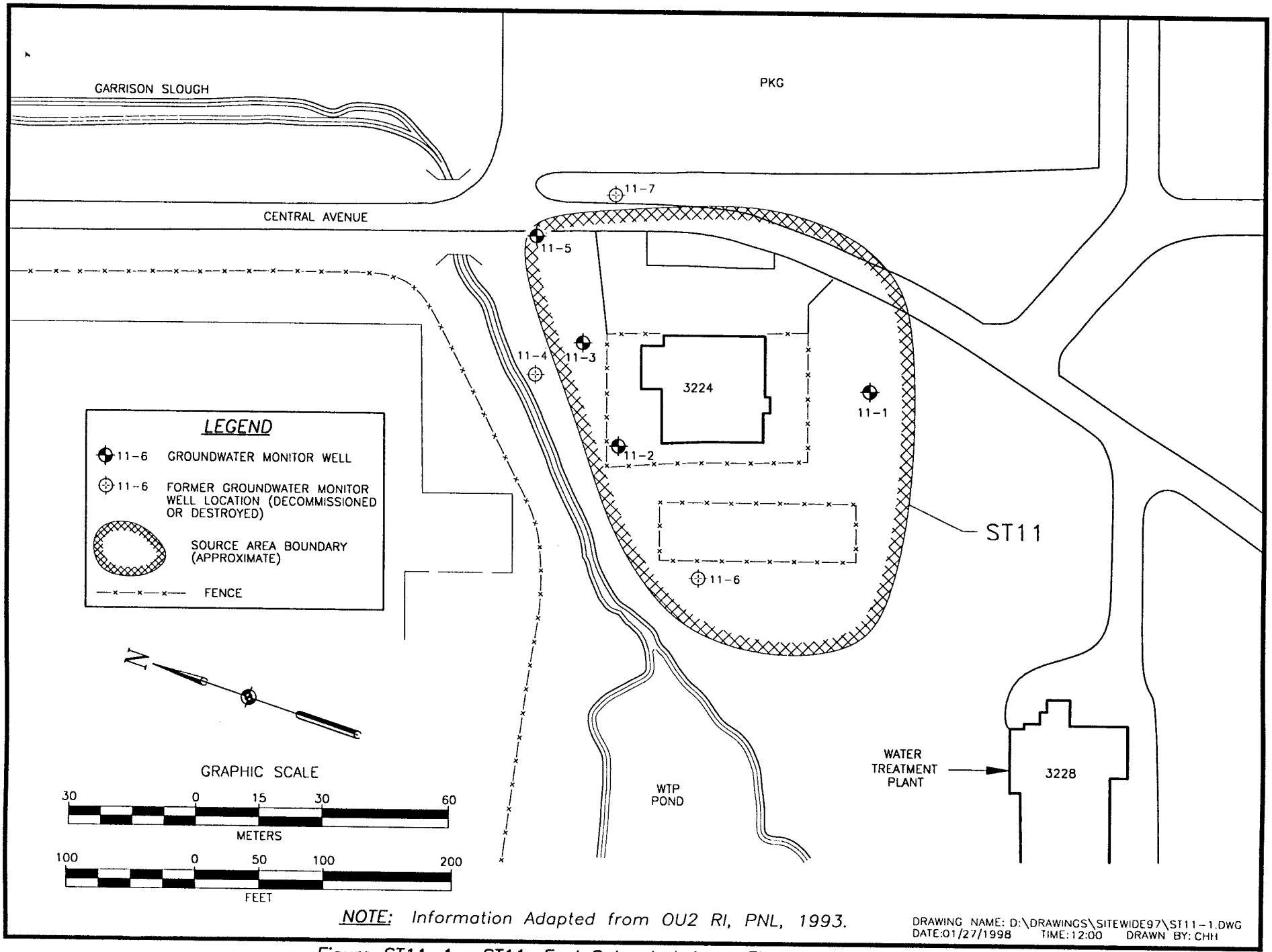

Figure ST11-1. ST11, Fuel Saturated Area, Eielson AFB, Alaska

TABLE ST11-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST11, FUEL-SATURATED AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzen	Toluene	Ethylbenzene	Xylenes	TPH GR	TPH DRO			
11-1	9/91	<5.0	<5.0	<5.0	<5.0	--	--	5,6,8	a	PNL 1993 OU2 RI
11-1	8/12/96	<1.0	<1.0	<1.0	1.1	--	--	1		USAF 1996 SWMPR
11-2	9/91	<5.0	<5.0	<5.0	<5.0	--	--	5,6,8	a	PNL 1993 OU2 RI
11-2	8/12/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
11-3	9/91	1.0	<5.0	<5.0	<5.0	--	--	5,6,8	a	PNL 1993 OU2 RI
11-3	8/24/93	<0.105	0.26	0.22	1.8	--	--	1,4	a	PNL 1993 SWGMPR
11-3	8/5/94	<1.0	<1.0	<1.0	<1.0	--	--	1,4	a	PNL 1994 SWGMPR
11-3	9/13/95	<1.0	<1.0	<1.0	<1.0	<50	130	1-3		USAF 1995 SWMPR
11-3	8/14/96	<1.0	<1.0	<1.0	1.2	--	--	1		USAF 1996 SWMPR
11-4	9/91	<5.0	<5.0	<5.0	<5.0	--	--	5,6,8	a	PNL 1993 OU2 RI
11-4	8/12/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
11-5	9/91	<5.0	<5.0	<5.0	<5.0	--	--	5,6,8	a	PNL 1993 OU2 RI
11-5	8/12/96	<1.0	<1.0	<1.0	1.5	--	--	1		USAF 1996 SWMPR
11-6	9/91	<5.0	<5.0	<5.0	<5.0	--	--	5,6,8	a	PNL 1993 OU2 RI
11-6	8/12/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
11-7	9/91	<5.0	<5.0	<5.0	<5.0	--	--	5,6,8	a	PNL 1993 OU2 RI
11-7	8/12/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR

Notes: a. For additional compounds detected, see reference.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE ST11-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST11, FUEL SATURATED AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)		
11-1	8/12/96	4.56	--	9	2	388	6.43	--	--		USAF 1996 SWMPR
11-2	8/12/96	2.07	--	10.2	27	290	6.62	--	--		USAF 1996 SWMPR
11-3	9/13/95	3.1	--	15	--	260	6.6	--	--		USAF 1995 SWMPR
11-3	8/14/96	2.31	--	10.3	9	316	6.55	-21	--		USAF 1996 SWMPR
11-3	8/27/97	2.32	21	10.8	0	382	6.80	26	nd		USAF 1997 SWMPR
11-4	8/12/96	0.78	--	7.9	302	255	6.57	--	--		USAF 1996 SWMPR
11-5	8/12/96	2.55	--	9.9	31	256	6.66	--	--		USAF 1996 SWMPR
11-6	8/12/96	2.21	--	9.5	55	253	6.74	--	--		USAF 1996 SWMPR
11-7	08/12/96	1.84	--	7.6	65	255	6.86	--	--		USAF 1996 SWMPR

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.

ST13/DP26 E-4 Diesel Fuel Spill/E-10 Fuel Tank Sludge Burial Pit

COCs, RAOs, and ARARs

BTEX compounds and lead are COCs for ST13/DP26. GRO and DRO have also been detected in previous sampling events. The following table lists RAOs and ARARs established to address groundwater quality at ST13/DP26 and other OU2 source areas.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L
Naphthalenes: 2 -Methylnaphthalene Naphthalene	 140 µg/L 220 µg/L	
Lead	[1]15 µg/L	[1]15 µg/L

[1] EPA Action Level

Site Setting

ST13 is a diesel spill site near the fuel outlets along the southeast end of the main taxiway. The facility was upgraded in 1994, which included the excavation and removal of ten 25,000-gallon USTs, and upgrading the associated fuel hydrant system. DP26 is located directly east of ST13, and has been used for fuel storage and dispensing since the base was established. Spills and leaks from fueling equipment resulted in NAPL and dissolved fuel compounds in groundwater. In 1988, a large above ground storage tank (AST), Tank 300, was replaced. POL impacted soils within the containment berm were excavated to the water table and replaced with clean fill material. These combined source areas in the southwest portion of the developed area of the base include areas of NAPL and dissolved fuel compounds.

Remedial design and field work to implement a bioventing remediation system were conducted during the 1995 field season. A natural attenuation study by UWRL personnel was also completed during the 1995 field season. The results of the study indicated the plume is shrinking in size. A lead treatability study was conducted by IT Corporation in 1995. The study concluded the sources of lead were leaded fuel leaked during the 1950s and 1960s from USTs, associated dispensing equipment, and buried fuel tank sludge. The mobility of lead which is transported with fuel along the vadose zone and water table is very low. Organic lead is naturally attenuating in groundwater at ST13/DP26, and the lead plume has not migrated significantly since monitoring for lead in groundwater was initiated at ST13/DP26.

Previous Activities

Previous analytical results indicate BTEX compounds were present in groundwater samples associated with the NAPL plume. Well 26-6 was sampled during the 1994 SWMP for VOCs with none detected. Well 26-6 is located on the lateral edge of the benzene plume emanating from DP26.

Seven new wells (13MW06–13MW08, 26MW20–26MW23) were installed by IT in 1995. Wells 26-8 and 26-8a were abandoned by IT because they were constructed with long screened intervals, creating a potential conduit for contamination. Three wells (26-1, 26-12, and 26-19) were sampled for BTEX, GRO, DRO, and lead under the 1995 SWMP. Wells 26-10 and 26-14 were not sampled. 26-10 was either damaged, buried, or decommissioned as a result of base construction activities. 26-14 is located in a parking lot and was subjected to surface water infiltration. 26-19 and 26-12 were chosen as substitute wells based on proximity to the wells originally proposed for sampling.

Monitor wells 13MW07, 26-1, 26-12, 26-15, 26-16, and 26MW20 were sampled during the 1996 field season for VOCs and lead. EDB (1,2-Dibromoethane) was added to the analyte list because it had historically been used as an additive in leaded gasoline. Monitor well 26MW17 could not be located and is believed to be destroyed.

BTEX compounds were detected in monitor wells 13MW07, 26-1, 26-12, and 26MW20. Benzene concentrations ranged from below detection limits in monitor well 26-15 to 610 µg/L in monitor well 13MW07. Wells displaying benzene concentrations above RAOs and ARAR MCLs included 13MW07, 26-1, 26-12 and 26MW20. Wells displaying toluene concentrations above the RAO and ARAR MCL included 13MW07 and 26-1. Monitor well 26-1 also displayed an ethylbenzene concentration which exceeded the RAO and ARAR MCL. Lead was detected in 13MW07, 26-1, 26-15, and 26MW20 at concentrations ranging from 2.3 to 216 µg/L. Analytical data indicated monitor well 26-1 contained a lead concentration above the applicable RAO and ARAR action levels of 15 µg/L. EDB was detected in 13MW07 at a concentration of 39 µg/L, which exceeds the EPA drinking water MCL of 0.05 µg/L.

1997 Results

Monitor wells 13MW07, 26-1, 26-12, and 26-15 were sampled for VOCs and SVOCs. Monitor well 26-1 was also sampled for total and dissolved lead. BTEX compounds were detected in 13MW07, 26-1, and 26-12. Benzene concentrations ranged from below detection limits (26-15) to 560 µg/L (13MW07). Wells displaying benzene concentrations above site specific RAOs and ARARs included 13MW07 (560 µg/L), 26-1 (240 µg/L), and 26-12 (18 µg/L). Toluene concentrations above the site specific RAO and ARAR were observed at 13MW07 and 26-1 (1600 and 2600 µg/L, respectively). Monitor well 26-1 also displayed an ethylbenzene concentration (1,200 µg/L) exceeding the site specific RAO and ARAR MCL. Lead concentrations (dissolved and total) in 26-1 exceed the ARAR action level of 15 µg/L. Lead

concentrations in 26-1 also exceed the 1994 background UCLs of <1 µg/L (dissolved lead) and 32.6 µg/L (total lead). No other compounds were detected above RAOs or ARAR MCLs.

Several SVOCs were detected in ST10/SS14 groundwater samples. Monitor well 26-1 displayed concentrations of pentachlorophenol (39 µg/L) and bis (2-ethylhexyl) phthalate (11 µg/L) which exceed EPA MCLs of 1 and 6 µg/L, 2,4-dimethylphenol (13MW07. 26-1), benzoic acid (13MW07), acetophenone (13MW07 respectively. Other SVOCs detected included, 26-1), 2-methylphenol (26-1), 4-methylphenol (26-1), 2,4-dimethylphenol (26-1), and diethylphthalate (26-1). No MCLs have been identified for these compounds. The bis (2-ethylhexyl) phthalate detected in the samples may be the result of laboratory contamination. Some of these SVOCs were previosuly detected in similar concentrations during the 1993 OU2 RI.

Cumulative groundwater analytical data indicates an overall decrease of BTEX compounds in monitor well 26-12, while BTEX compounds have remained at approximately the same order of magnitude for monitor wells 13MW07, 26-1, and 26-15. Continued low to non detectable BTEX compounds in 26-15, and the overall decrease of BTEX compounds in monitor well 26-12, suggest the hydrocarbon plume has stabilized, and may be shrinking in lateral extent.

References for ST13/DP26:

1994 Sitewide Groundwater Monitoring Program Report, PNL, January 1995
1994 OU2 Environmental Monitoring Field Activities Report, IT, February 1995
1995 ST13/DP26 Treatability Study Report, IT, September 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST13/DP26:

List of Tables for ST13/DP26:

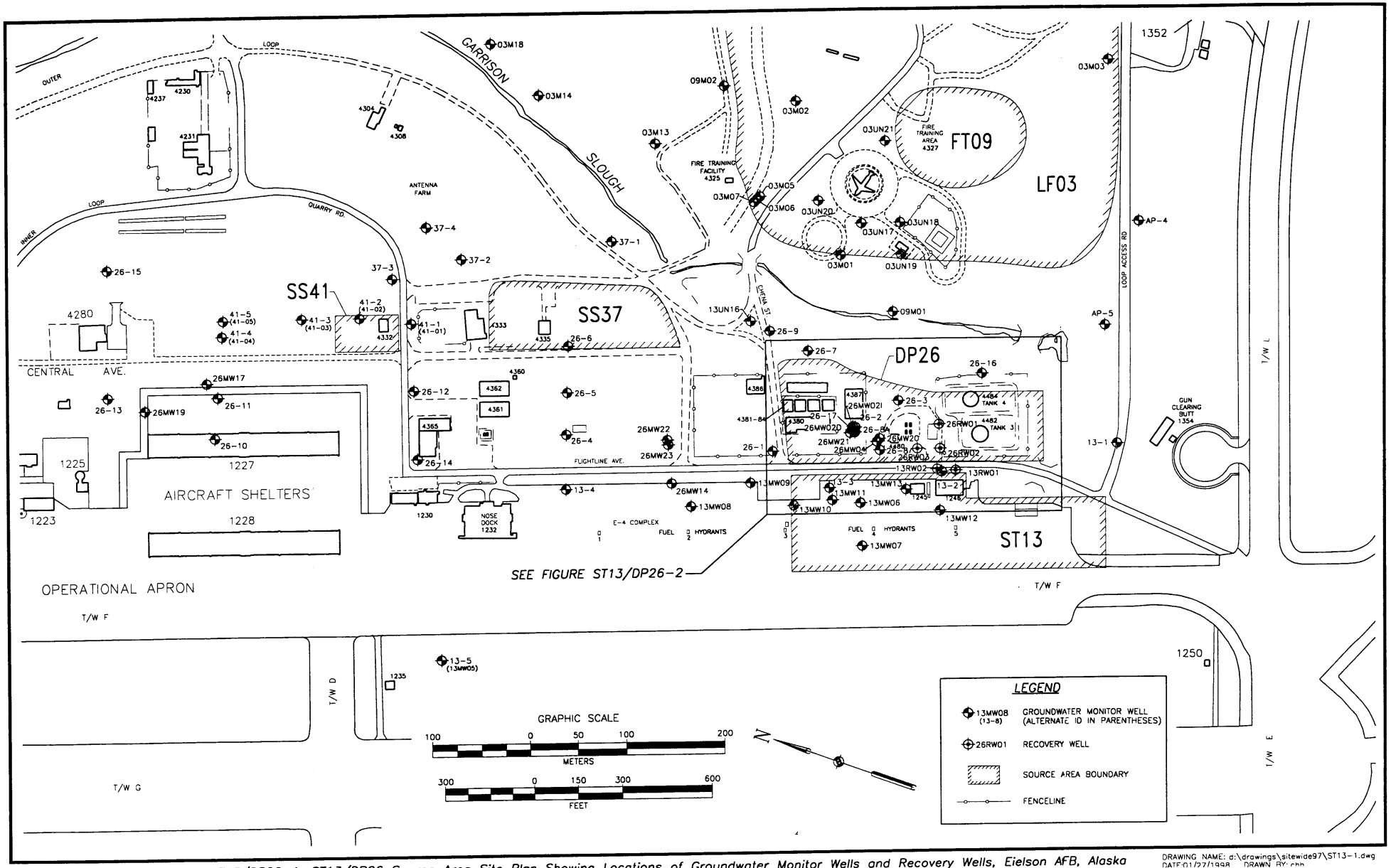

Figure ST13/DP26-1. ST13/DP26 Source Area Site Plan Showing Locations of Groundwater Monitor Wells and Recovery Wells, Eielson AFB, Alaska

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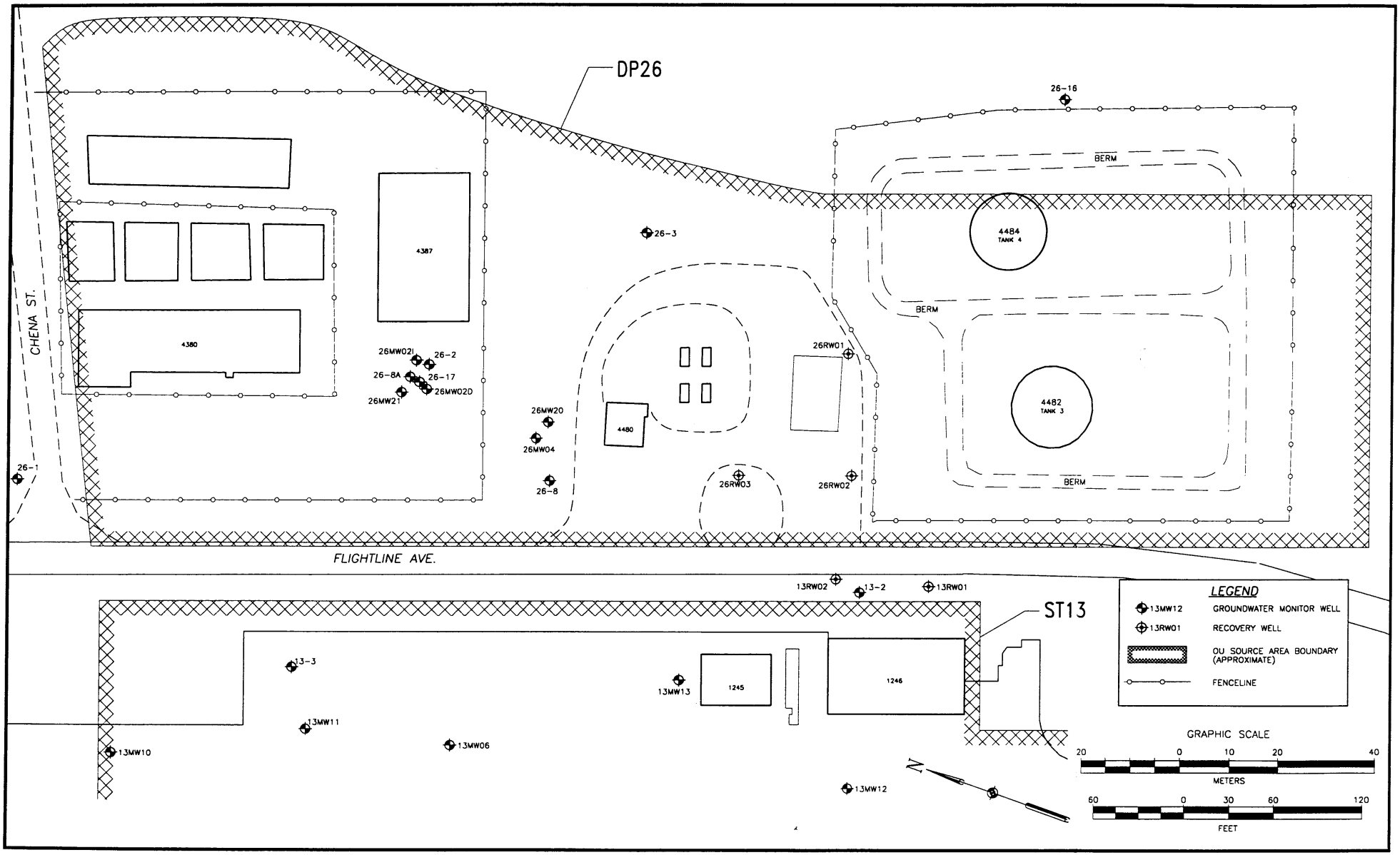

Figure ST13/DP26-2. ST13/DP26 Detail Showing Monitor Well Locations, Eielson AFB, Alaska

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TABLE ST13/DP26-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS AND LEAD IN GROUNDWATER SAMPLES, ST13/DP26, E-10 DIESEL FUEL SPILL/FUEL TANK SLUDGE BURIAL PIT, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	2-Methyl napthalene	Napthalene	Dissolved Lead	Total Lead	Analytical Methods	Notes	Reference
13-1	9/91	1.0	<5.0	<5.0	<5.0	--	--	--	--	--	3.3	5,6,8,11	a	PNL 1993 OU2 RI
13-2	9/91	68	720	320	2,100	--	--	--	--	--	41.4	5,6,8,11	a	PNL 1993 OU2 RI
13-3	9/91	58	31	34	160	--	--	--	--	--	1.9	5,6,8,11	a	PNL 1993 OU2 RI
13-3	7/95	--	--	--	--	--	--	--	--	<3.0	3.6	11		IT 1995 TS ITIR
13-4	9/91	170	6.0	26	49	--	--	--	--	--	6.3	5,6,8,11	a	PNL 1993 OU2 RI
13-4	7/95	--	--	--	--	--	--	--	--	<3.0	<3.0	11		IT 1995 TS ITIR
13MW5	10/91	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--	<3.0	5,6,8,11	a	PNL 1993 OU2 RI
13MW06	7/95	87	240	110	790	6,200	560	--	--	<3.0	5.1	1,9-11		IT 1995 TS ITIR
13MW07	7/95	380	680	330	1,500	13,000	910	--	--	<3.0	9.4	1,9-11		IT 1995 TS ITIR
13MW07	8/28/96	610	1600	630	4,200	--	--	--	--	--	5.5	1,4,11	e,f	EA 1996 SWMPR
13MW07	9/10/97	560	1600	680	4,000	--	--	19	14	--	--	1,5	g,j	EA 1997 SWMPR
13MW08	7/95	33	<5.0	5.3	34	490	<500	--	--	<3.0	<3.0	1,9-11		IT 1995 TS ITIR
26-1	9/91	510	3,000	1,100	6,300	--	--	--	--	--	334	5,6,8,11	a	PNL 1993 OU2 RI
26-1	8/21/93	780	7,000	1,200	9,800	--	--	--	--	99	420	1,4,11		PNL 1993 SWGMPR
26-1	7/95	360	2,700	950	6,400	11,000	4,500	--	--	85	150	1,9-11		IT 1995 TS ITIR
26-1	10/10/95	450	3,200	1,200	8,300	24,000	5,100	--	--	--	--	1-3		EA 1995 SWMPR
26-1	8/28/96	360	3,300	1,200	9,500	--	--	--	--	--	216	1,4,11	e	EA 1996 SWMPR
26-1	9/11/97	240	2,600	1,200	7,200	--	--	17	46	41.3	90.9	1,5,11,12	h	EA 1997 SWMPR
26-2	9/91	140	150	40	230	--	--	--	--	--	1.3	5,6,8,11	a	PNL 1993 OU2 RI
26-2	8/20/92	37	37	8.1	53	--	--	--	--	--	--	5,6,8		PNL 1993 OU2 RI

TABLE ST13/DP26-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	2-Methyl napthalene	Napthalene	Dissolved Lead	Total Lead	Analytical Methods	Notes	Reference
26MW02I	10/91	53	<5.0	11	11	--	--	--	--	--	4.0	5,6,8,11	a,d	PNL 1993 OU2 RI
26MW02I	8/20/92	14	<2.0	<2.0	<5.0	--	--	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
26MW02I	7/95	<5.0	<5.0	<5.0	<5.0	<250	<500	--	--	<3.0	<3.0	1,9-11		IT 1995 TS ITIR
26MW02D	9/14/92	<2.0	<2.0	<2.0	<5.0	--	--	--	--	--	--	5,6,8	a,d	PNL 1993 OU2 RI
26MW02D	7/95	<5.0	<5.0	<5.0	<5.0	<250	<500	--	--	<3.0	<3.0	1,9-11		IT 1995 TS ITIR
26-3	9/91	75	<5.0	1.0	5.0	--	--	--	--	--	1.4	5,6,8,11	a	PNL 1993 OU2 RI
26-3	7/95	--	--	--	--	--	--	--	--	<3.0	<3.0	11		IT 1995 TS ITIR
26-4	9/91	220	31	15	120	--	--	--	--	--	<1.0	5,6,8,11	a	PNL 1993 OU2 RI
26-5	9/91	92	7.0	7.0	70	--	--	--	--	--	<1.0	5,6,8,11	a	PNL 1993 OU2 RI
26-6	9/91	2.0	<5.0	<5.0	1.0	--	--	--	--	--	<1.0	5,6,8,11	a	PNL 1993 OU2 RI
26-6	8/21/93	0.39	<0.16	<0.046	<0.202	--	--	--	--	--	--	1,4	a	PNL 1993 SWGMPR
26-6	8/2/94	<1.0	<1.0	<1.0	<1.0	--	--	--	--	--	--	1,4	a	PNL 1994 SWGMPR
26-7	9/91	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--	<1.0	5,6,8,11	a	PNL 1993 OU2 RI
26-7	7/95	<5.0	<5.0	<5.0	<5.0	<250	<500	--	--	<3.0	<3.0	1,9-11		IT 1995 TS ITIR
26-8	9/91	1,400	4,200	610	5,400	--	--	--	--	--	795	5,6,8,11	a	PNL 1993 OU2 RI
26-8	8/21/93	2,700	8,500	990	9,100	--	--	--	--	55	690	1,4, 11	a,c	PNL 1993 SWGMPR
26-8	7/95	3,100	8,200	830	9,800	31,000	250,000	--	--	490	5,100	1,9-11		IT 1995 TS ITIR
26-8A	9/91	280	520	220	2,300	--	--	--	--	--	71.5	5,6,8,11	a,c	PNL 1993 OU2 RI
26-10	9/91	16	<5.0	<5.0	<5.0	--	--	--	--	--	1.8	5,6,8,11	a	PNL 1993 OU2 RI
26-10	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI
26-10	8/17/92	<2.0	<2.0	<2.0	<5.0	--	--	--	--	--	--	5,6,8	a	PNL 1993 OU2 RI

TABLE ST13/DP26-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	2-Methyl napthalene	Napthalene	Dissolved Lead	Total Lead	Analytical Methods	Notes	Reference
26-11	9/91	59	<5.0	<5.0	<5.0	–	–	–	–	–	2.4	5,6,8,11	a	PNL 1993 OU2 RI
26-11	6/11/92	41	<2.0	<2.0	<5.0	–	–	–	–	–	–	5,6,8	a,b	PNL 1993 OU2 RI
26-11	8/17/92	11	<2.0	<2.0	<5.0	–	–	–	–	–	–	5,6,8	a	PNL 1993 OU2 RI
26-12	9/91	140	2.0	<5.0	<5.0	–	–	–	–	–	3.0	5,6,8,11	a	PNL 1993 OU2 RI
26-12	10/3/95	44	100	12	33.6	610	260	–	–	–	–	1-3		EA 1995 SWMPR
26-12	8/28/96	32	4.0	4.0	39	–	–	–	–	–	<1.0	1,4,11		EA 1996 SWMPR
26-12	9/10/97	18	<1.0	<1.0	<1.0	–	–	<10	<10	–	–	1,5	j	EA 1997 SWMPR
26-13	9/91	<5.0	<5.0	<5.0	<5.0	–	–	–	–	–	3.2	5,6,8,11	a	PNL 1993 OU2 RI
26-13	6/11/92	<2.0	<2.0	<2.0	<5.0	–	–	–	–	–	–	5,6,8,11	a	PNL 1993 OU2 RI
26-13	8/17/92	<2.0	<2.0	<2.0	<5.0	–	–	–	–	–	–	5,6,8	a	PNL 1993 OU2 RI
26-13	8/21/93	0.17	<0.13	0.14	0.56	–	–	–	–	–	–	1,4	a	PNL 1993 SWGMPR
26-14	9/91	110	<5.0	10	7.0	–	–	–	–	–	<1.0	5,6,8,11	a	PNL 1993 OU2 RI
26-15	9/91	<5.0	<5.0	<5.0	<5.0	–	–	–	–	–	1.4	5,6,8,11	a	PNL 1993 OU2 RI
26-15	8/28/96	<1.0	1.1	1.0	11.1	–	–	–	–	–	2.3	1,4,11	e	EA 1996 SWMPR
26-15	9/11/97	<1.0	<1.0	<1.0	<1.0	–	–	<10	<10	–	–	1,5	i	EA 1997 SWMPR
26-16	7/95	–	–	–	–	–	–	–	–	<3.0	<3.0	11		IT 1995 TS ITR
26-16	8/29/96	<1.0	<1.0	<1.0	<1.0	–	–	–	–	–	<1.0	1,4,11	e	EA 1996 SWMPR
26-19	1994	<0.2	0.38	<0.2	<0.4	–	–	–	–	–	–	1,4	a	PNL 1995 SWRI
26-19	10/11/95	<1.0	<1.0	<1.0	<1.0	<50	280	–	–	–	–	1-3		EA 1995 SWMPR
26MW20	8/28/96	110	530	170	1,860	–	–	–	–	–	6.6	1,4,11		EA 1996 SWMPR

TABLE ST13/DP26-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	2-Methyl napthalene	Napthalene	Dissolved Lead	Total Lead	Analytical Methods	Notes	Reference
26MW21	7/95	8.5	<5.0	1.9	6.3	360	<500	--	--	<3.0	<3.0	1,9-11	d	IT 1995 TS ITIR
26MW22	7/95	32	<5.0	<5.0	<5.0	230	<500	--	--	<3.0	<3.0	1,9-11		IT 1995 TS ITIR
26MW23	7/95	300	<5.0	34	640	3,000	540	--	--	<3.0	<3.0	1,9-11	d	IT 1995 TS ITIR

Notes: Background mean concentrations for lead: dissolved, <1.0 µg/L; total, 21 µg/L.
Background maximum concentrations for lead: dissolved, <1.0 µg/L; total, 48 µg/L.
Background 95 percent UCL concentrations for lead: dissolved, <1.0 µg/L; total, 33 µg/L.

a. For additional compounds detected, see reference.
b. Additional compounds detected: chloroform - 1.4 µg/L, cis-DCE - 1.1 µg/L.
c. Well abandoned in 1995.
d. Not screened in shallow part of aquifer.
e. Additional compounds detected: methylene chloride - between 1.4 and 1.8 µg/L, suspected to be the result of laboratory contamination (also detected in laboratory method blank at 1.3 mg/L).
f. Additional compounds detected: 1,2 Dibromoethane - 39 µg/L.
g. Additional compounds detected: 2,4-dimethylphenol -2 µg/L, benzoic acid - 17 µg/L, acetophenone - 9 µg/L.
h. Additional compounds detected: 2-methylphenol -19 µg/L, 4-methylphenol - 19 µg/L, 2,4-dimethylphenol - 79 µg/L, diethylphthalate -3 µg/L, pentachlorophenol - 39 µg/L, bis (2-ethylhexyl)phthalate - 11 µg/L (laboratory contamination suspected), acetophenone - 24 µg/L.
i. Additional compound detected: bis (2-ethylhexyl) phthalate - 3 µg/L, suspected to be the result of laboratory contamination (also detected in laboratory method blank).
j. Bis (2-ethylhexyl) phthalate was detected below reporting limits, suspected to be the result of laboratory contamination (also detected in the method blank).

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421.
12. 6010

I Intermediate depth well.
D Deep well.

TABLE ST13/DP26-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST13/DP26, E-10 DIESEL FUEL SPILL/FUEL TANK SLUDGE BURIAL PIT, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)		
13MW07	08/28/96	0.14	--	8.2	0	268	6.84	--	--		EA 1996 SWMPR
13MW07	09/10/97	0.86	7.7	9.2	0	306	7.35	89	--		EA 1997 SWMPR
13MW07	10/01/97	0	0	7	6	286	7.14	-58	--		EA 1997 SWMPR
26-1	10/10/95	2.9	--	8	--	430	6.73	--	--		EA 1995 SWMPR
26-1	08/28/96	1.21	--	9.7	0	255	6.71	--	--		EA 1996 SWMPR
26-1	09/11/97	6.4	57	9.7	2	313	8.08	-31	--		EA 1997 SWMPR
26-1	09/18/97	1.77	16.4	10.3	0	297	7.14	4	--		EA 1997 SWMPR
26-12	10/03/95	1.7	--	8	--	240	7.25	--	--		EA 1995 SWMPR
26-12	08/28/96	1.53	--	4.7	14	264	6.97	--	--		EA 1996 SWMPR
26-12	09/10/97	0.81	7.2	8.7	70	303	7.40	112	--		EA 1997 SWMPR
26-12	10/01/97	2.20	20	7.3	44	270	6.97	57	--		EA 1997 SWMPR
26-15	08/28/96	0.16	--	5.2	0	252	6.9	--	--		EA 1996 SWMPR
26-15	09/11/97	10.01	84	7.5	0	310	8.89	62	--		EA 1997 SWMPR
26-16	08/29/96	--	20.7%	5.45	13.3	226	6.86	135	--		EA 1996 SWMPR
26-19 (26MW19)	10/11/95	3.1	--	5	--	205	6.79	--	--		EA 1995 SWMPR
26MW20	08/28/96	0	--	6.0	0	261	6.77	--	--		EA 1996 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

SS14 E-2 Railroad JP4 Spill: see ST10

ST18 Oil Boiler Fuel Spill

COCs, RAOs, and ARARs

BTEX compounds and chlorinated solvents are COCs for ST18. The following table lists RAOs and ARARs established to address groundwater quality at ST18 and other OU2 source areas.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L
Naphthalenes:		
2 -Methylnaphthalene	140 µg/L	--
Naphthalene	220 µg/L	--
Lead	[1]15 µg/L	[1]15 µg/L

[1] EPA Action Level

Site Setting

ST18 consists of three buildings in an industrial part of the base, southwest of the base power plant. The buildings house several emergency generators fueled by two 25,000-gallon USTs, located between Building 3405 and Building 3411. Petroleum products were detected during an excavation project in the mid-1970s. The source is believed to be the USTs. The tanks failed a tightness test in August 1993 and were removed on 30 August - 02 September, 1994. 850 cubic yards (yd^3) of hydrocarbon impacted soil were also removed. The UST excavation was backfilled with clean soil and compacted.

Low concentrations of chlorinated solvents have been detected in wells at the site. The source of contamination is suspected to be a former dry well at building 3423, approximately 500 feet south of ST18. The dry well may have been used to dispose of solvents.

As required by the OU2 ROD, a dry well and cesspool were removed on 17-18 September, 1996. The dry well and cesspool were used to dispose of liquid waste generated from buildings in the ST18 area. All pipes leading to the dry well and cesspool were removed or plugged with grout.

Previous Activities

Monitor wells 18-1, 18-2, 18-3, 18-5, 18MW05I, 18-6, 18-7, and 18-8 have been periodically sampled since 1991. Monitor wells 18-3, 18-5, and 18-6 were also sampled in 1986. Low levels of BTEX compounds have been detected in 18-3 since 1991. TCE has been detected in 18-1, 18-2, 18-3, 18-5, 18MW05I, 18-7, and 18-8, with concentrations ranging from 1.0 µg/L (multiple wells) to 2.7 µg/L in 18-3. GRO and DRO compounds have been detected in 18-3, 18-5 and 18-6 (DRO only), with the highest concentration (280 µg/L and 15,000 µg/L, respectively) occurring in 18-3.

Monitor wells 18-3, 18-5, and 18MW05I were sampled during the 1996 field season for BTEX compounds and TCE. Ethylbenzene, total xylenes, and TCE were detected in monitor well 18-3 at concentrations of 1.0 µg/L, 4.0 µg/L, and 1.1 µg/L, respectively. No BTEX compounds or TCE were detected in monitor wells 18-5 or 18MW05I. Analytical results for wells sampled in 1996 indicate BTEX compounds were below RAOs and ARAR MCLs established for ST18. The TCE detected in monitor well 18-3 was below the EPA drinking water MCL of 5 µg/L.

1997 Results

Monitor well 18-3 was sampled for VOCs during the 1997 field season. Benzene was detected at 1.0 µg/L, which is below the RAO and ARAR MCL of 5 µg/L. Chloromethane was also detected at 1 µg/L. No MCLs were identified for chloromethane.

Cumulative analytical data indicates subsurface conditions have not changed significantly since groundwater monitoring was initiated at ST18. Groundwater analytical data has consistently displayed low to non detectable BTEX and TCE concentrations at monitor well 18-3.

References for ST18:

1994 Sitewide Groundwater Monitoring Program Report, PNL, January 1995
1994 OU2 Environmental Monitoring Field Activities Report, IT, February 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST18:

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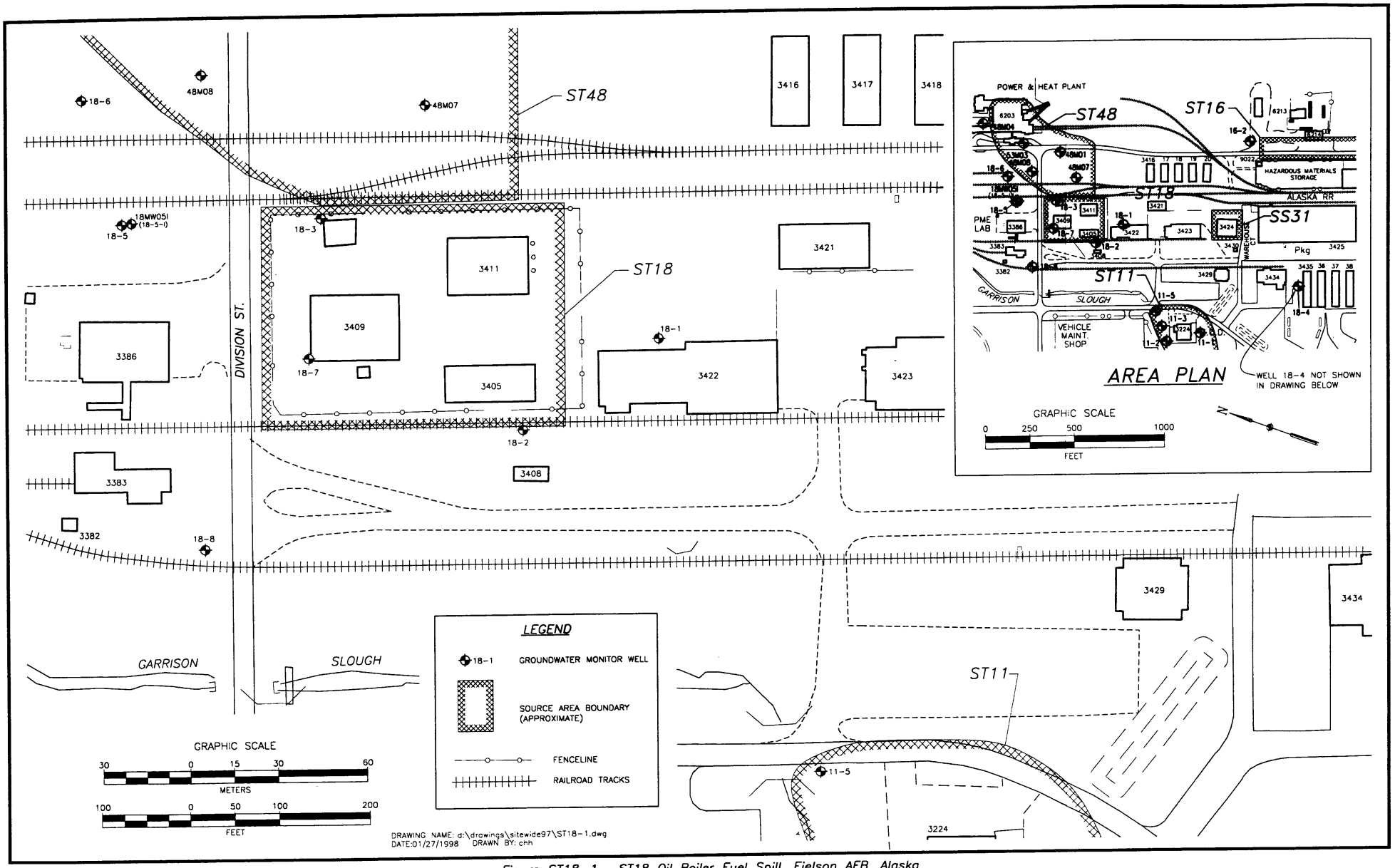


Figure ST18-1. ST18 Oil Boiler Fuel Spill, Eielson AFB, Alaska

TABLE ST18-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST18, OIL BOILER FUEL SPILL, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)							Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	TCE			
18-1	9/91	<5.0	<5.0	<5.0	<5.0	--	--	1.0	5,6,8	a	PNL 1993 OU2 RI
18-2	9/91	<5.0	<5.0	<5.0	<5.0	--	--	1.0	5,6,8	a	PNL 1993 OU2 RI
18-3	1986	<5.0	<5.0	<5.0	<5.0	--	--	--			BEAR
18-3	1986	<5.0	<5.0	<5.0	<5.0	--	--	--			BEAR
18-3	1986	<5.0	<5.0	<5.0	<5.0	--	--	--			BEAR
18-3	9/15/91	<5.0	<5.0	3.0	8.0	--	--	2.0	5,6,8	a	PNL 1993 OU2 RI
18-3	8/21/93	<0.105	1.2	9.1	61	--	--	0.9	1,4	a	PNL 1993 SWGMPR
18-3	7/27/94	<1.0	<1.0	<1.0	2.7	130	15,000	1.9	1-4	b,c	USAF 1995 OU1 RD
18-3	8/8/94	<1.0	<1.0	<1.0	<1.0	--	--	1.4	1,4	a	PNL 1994 SWGMPR
18-3	9/7/94	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	8	a	IT 1994 EMR
18-3	10/4/94	<1.0	<1.0	<1.0	<1.0	71	--	<1.0	1,2,4	b,c	USAF 1995 OU1 RD
18-3	3/16/95	1.6	1.6	1.6	4.0	280	990	2.7	1-4	b,c	USAF 1995 OU1 RD
18-3	9/18/95	1.2	<1.0	<1.0	1.3	<50	2,800	--	1-3		USAF 1995 SWMPR
18-3	8/12/96	<1.0	<1.0	1.0	4.0	--	--	1.1	1,4	b	USAF 1996 SWMPR
18-3	9/8/97	1.0	<1.0	<1.0	<1.0	--	--	<1.0	1,4	d	USAF 1997 SWMPR
18-5	1986	<5.0	<5.0	<5.0	<5.0	--	--	--			BEAR
18-5	1986	<5.0	<5.0	<5.0	<5.0	--	--	--			BEAR
18-5	1986	<5.0	<5.0	<5.0	<5.0	--	--	--			BEAR
18-5	9/15/91	<5.0	<5.0	<5.0	<5.0	--	--	2.0	5,6,8	a	PNL 1993 OU2 RI
18-5	7/22/94	<1.0	<1.0	<1.0	<1.0	150	120	1.1	1-4	b	USAF 1995 OU1 RD
18-5	10/4/94	<1.0	<1.0	<1.0	<1.0	<50	1,900	<1.0	1-4	b	USAF 1995 OU1 RD
18-5	8/12/96	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	1,4	b	USAF 1996 SWMPR
18MW05	10/91	<5.0	<5.0	<5.0	<5.0	--	--	2.0	5,6,8	a	PNL 1993 OU2 RI
18MW05	9/9/94	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	8	a	IT 1994 EMR
18MW05	8/20/96	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	1,4	b	USAF 1996 SWMPR

TABLE ST18-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST18, OIL BOILER FUEL SPILL, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	TCE	Analytical Methods	Notes	Reference
18-6	1986	<5.0	<5.0	<5.0	<5.0	--	--	--			BEAR
18-6	1986	<5.0	<5.0	<5.0	<5.0	--	--	--			BEAR
18-6	9/15/91	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	5,6,8	a	PNL 1993 OU2 RI
18-6	5/18/93	<2.0	--	--	--	--	--	<1.0			PNL 1994 OU1 RI
18-6	7/26/94	<1.0	<1.0	<1.0	<1.0	<50	<100	<1.0	1-4	b	USAF 1995 OU1 RD
18-6	10/4/94	<1.0	<1.0	<1.0	<1.0	<50	600	<1.0	1-4	b	USAF 1995 OU1 RD
18-7	9/91	<5.0	<5.0	<5.0	<5.0	--	--	1.0	5,6,8	a	PNL 1993 OU2 RI
18-7	9/7/94	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	8	a	IT 1994 EMR
18-8	9/91	<5.0	<5.0	<5.0	<5.0	--	--	1.0	5,6,8	a	PNL 1993 OU2 RI

Notes:
a. For additional compounds detected, see reference.
b. No compounds other than those listed were detected above the reporting limits.
c. Sampled without purging.
d. Additional compounds detected: chloromethane - 1 mg/L.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

I Intermediate depth well.
TCE Trichloroethene.

TABLE ST18-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS,ST18, OIL BOILER FUEL SPILL, EIELSON AFB, ALASKA

		Parameters							Immunoassay Results				
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)	TCE [2] (ppb)	PCE[2] (ppb)	Notes	Reference
18-3	09/18/95	2.4	--	12	--	320	6.74	--	--	--	--		USAF 1995 SWMPR
18-3	08/12/96	1.85	--	11.7	10	329	6.54	--	--	--	--		USAF 1996 SWMPR
18-3	09/08/97	2.35	24	15.2	71	368	7.59	4	--	--	--		USAF 1997 SWMPR
18-5	08/12/96	1.39	--	9.7	160	317	6.84	--	--	--	--		USAF 1996 SWMPR
8MW05	08/20/96	0.08	--	4.3	1	252	7.22	80	--	--	--		USAF 1996 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Drager Liquid Extraction (DLE) field test kit.

ST19 JP4 Fuel Line Spill Area

COCs, RAOs, and ARARs

BTEX compounds are COCs for ST19. The following table lists RAOs and ARAR MCLs established to address groundwater quality at ST19 and other OU2 source areas.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L
Naphthalenes:		
2 -Methylnaphthalene	140 µg/L	--
Naphthalene	220 µg/L	--
Lead	[1]15 µg/L	[1]15 µg/L

[1] EPA Action Level

Site Setting

ST19 is located along buried fuel pipelines in an undeveloped part of the base along Cargain Road. A fuel spill occurred in the 1950s when a snowplow broke a pipeline valve. The OU2 ROD selected remedy for this area is groundwater monitoring.

After the RI/FS was completed, a second fuel spill occurred in August 1994, when a part of the fuel pipeline failed. NAPL recovery efforts occurred during the 1994 field season, and more than 14,700 gallons of fuel were recovered from a manhole along the pipeline as of December 1994 (CRREL 1995a). The Environmental Compliance section of the base Civil Engineering Squadron (354 CES/CEVC) continues to provide oversight of the fuel recovery efforts. Continuous NAPL recovery was discontinued in September of 1995. According to 354 CES/CEVC personnel, NAPL recovery is performed sporadically (every 2 to 3 weeks), recovering approximately 10 to 20 gallons each time (Fowler, October 1996).

Previous Activities

BTEX compounds were not detected in samples collected from ST19 (monitor well 19MW06) during the 1994 SWMP.

IT installed one monitor well in 1994 (19MW07) and abandoned well 19-2A because it was broken off at 3 feet bgs. The IT report indicates the screened interval of well 19-2A was across the water table, and the screened interval of well 19MW07 is located between 24 and 39 feet bgs. This well is not suitable for monitoring the hydrocarbon plume. Four wells were sampled by IT in 1994. The results indicate that fuel compounds are present in groundwater at the source area.

During September 1994, University of New Hampshire (UNH) personnel installed numerous microwells and collected NAPL thickness measurements and groundwater samples from the new wells. NAPL and dissolved fuel compounds are present in the aquifer south of the location of the ST19 monitor wells.

During the 1995 SWMP, monitor wells 19MW06 and 19MW07 were sampled. BTEX was not detected at concentrations greater than method detection limits. DRO was detected in 19MW07 at a concentration of 260 µg/L. In October 1995, microwells 19PS1, 19PS4, 19PS5, 19PS8, 19PS11, 19PS12, 19PS13, 19PS15, 19PS21, 19PS27, 19PS30, and 19PS31 were sampled. BTEX, TPH GRO, and TPH DRO compounds were detected in all microwells, with the exception of 19PS27. Benzene concentrations ranged from 0.37 µg/L (19PS11) to 2,160 µg/L (19PS4), with the highest total BTEX concentration (20,070 µg/L) occurring in 19PS4. TPH GRO concentrations ranged from 59.8 µg/L (19PS11) to 61,500 µg/L (19PS8). TPH DRO concentrations ranged from 320 µg/L (19PS13) to 318,000 µg/L (19PS8).

During the 1996 field season, monitor wells 19-1, 19-4, 19MW06, 19MW07 and microwells 19PS8, 19PS14, 19PS17, 19PS23, 19PS27, 19PS28, 19PS30-B, and 19PS31 were sampled for BTEX, GRO, and DRO compounds. Microwell 19PS8 displayed the highest toluene, ethylbenzene, and xylene concentrations at values of 8,600 µg/L, 7,600 µg/L, and 28,500 µg/L, respectively. Microwell 19PS31 displayed the highest benzene concentration at 2,200 µg/L. These two microwells, and microwell 19PS30-B were the only sample points displaying BTEX compounds above RAOs and ARAR MCLs. DRO concentrations ranged from <100 µg/L (multiple points) to 130,000 µg/L (19PS8). GRO concentrations ranged from <500 µg/L (multiple points) to 52,000,000 µg/L (19PS8). A drinking water MCL was not identified for either DRO or GRO.

1997 Results

During the 1997 field season, total BTEX immunoassay testing was used to monitor wells 19-1 and 19MW06. Monitor well 19-1 displayed a total BTEX concentration of 140 ppb. 19MW06 results were below the detection limit of 20 ppb. Immunoassay results at 19MW06 are consistent with previous analytical data. Total BTEX results at 19-1 are higher than previous analytical data. The elevated total BTEX result at 19-1 may be attributed to interference of gasoline and diesel products with the immunoassay test method. GRO and DRO have been previously detected in 19-1.

Cumulative analytical and immunoassay results indicate 19MW06 has consistently displayed non detectable BTEX concentrations since groundwater monitoring was initiated. Due to the variability of data for monitor well 19-1, a groundwater trend cannot be determined for this well.

On 25 September 1997, monitor well 19MW07 was decommissioned by removing the well casing from the ground and filling the borehole with bentonite. The well was decommissioned due to its poor condition and it being improperly screened for long term groundwater monitoring.

References for ST19:

1994 OU2 Record of Decision, USAF, September 1994
1994 OU2 Environmental Monitoring Field Activities Report, IT, February 1995
1995 Report on Microwell Investigations of USTs and the Cargain Road Spill, CRREL, 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1997 Sitewide Groundwater Monitoring Report, USAF, 1997

List of Figures for ST19:

List of Tables for ST19:

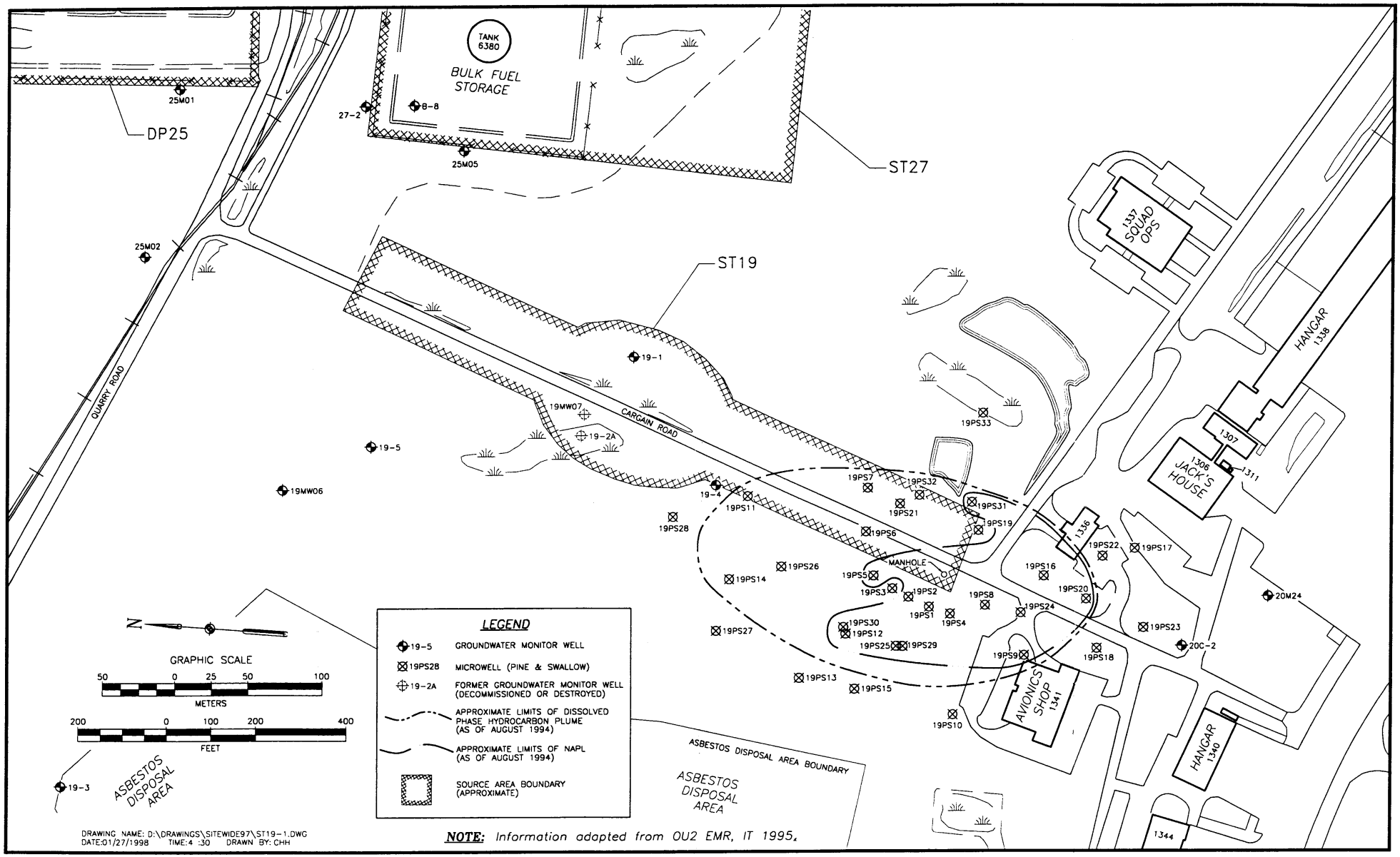


Figure ST19-1. ST19, JP4 Fuel Line Spill Area, Eielson AFB, Alaska

TABLE ST19-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST19, JP4 FUEL LINE SPILL AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
19-1	9/91	6.0	4.0	42	130	–	–	5,6,8	a	PNL 1993 OU2 RI
19-1	9/7/94	9.5	59	8.1	4.3	–	–	8	a	IT 1994 EMR
19-1	9/11/96	<1.0	<1.0	1.5	5.1	430	840	1,9,10		USAF 1996 SWMPR
19-2A	1986	71	1,500	–	1,100	–	–	–		PNL 1993 OU2 RI
19-2A	1987	–	3,600	240	2,500	–	–	–		PNL 1993 OU2 RI
19-2A	1988	35	6,800	140	3,200	–	–	–		PNL 1993 OU2 RI
19-2A	1988	–	4,100	86	2,800	–	–	–		PNL 1993 OU2 RI
19-2A	9/91	20	1,500	390	2,300	–	–	5,6,8	a,c	PNL 1993 OU2 RI
19-2A	6/11/92	11	1,900	610	4,000	–	–	1,4	a,d	PNL 1993 OU2 RI; PNL 1995 SWRI
19-3	9/91	<5.0	5.0	<5.0	1.0	–	–	5,6,8	a	PNL 1993 OU2 RI
19-4	9/91	3.0	<5.0	<5.0	<5.0	–	–	5,6,8	a	PNL 1993 OU2 RI
19-4	9/8/94	<5.0	<5.0	<5.0	<5.0	–	–	8	b	IT 1994 EMR
19-4	9/11/96	<1.0	<1.0	<1.0	<1.0	<100	<500	1,9,10		USAF 1996 SWMPR
19MW06	10/91	<5.0	<5.0	<5.0	<5.0	–	–	5,6,8	a	PNL 1993 OU2 RI
19MW06	1992	<5.0	<5.0	<5.0	<5.0	–	–			PNL 1995 SWRI
19MW06	8/24/93	<0.105	<0.056	<0.046	<0.202	–	–	1,4	b	PNL 1993 SWGMPR
19MW06	8/2/94	<1.0	<1.0	<1.0	<1.0	–	–	1,4	b	PNL 1994 SWGMPR
19MW06	9/7/94	<1.0	<1.0	<1.0	<1.0	–	–	8	a	IT 1994 EMR
19MW06	9/14/95	<1.0	<1.0	<1.0	<1.0	<100	<100	1-3		USAF 1995 SWMPR
19MW06	9/11/96	<1.0	<1.0	<1.0	<1.0	<100	<500	1,9,10		USAF 1996 SWMPR
19MW07	9/1/94	1.04	<0.30	0.28	<0.4	–	–	1,4		PNL 1994 SWGMPR
19MW07	9/10/94	2.7	<5.0	2.3	3.1	–	–	8	a	IT 1994 EMR
19MW07	10/11/95	<1.0	<1.0	<1.0	<1.0	<50	260	1-3		USAF 1995 SWMPR
19MW07	9/11/96	<1.0	<1.0	<1.0	<1.0	<100	<500	1,9,10		USAF 1996 SWMPR

TABLE 19-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
19PS1	9/5/94	140	410	270	950	18,000	23,000	–	e	CRREL 1995
19PS1	10/23/95	37	593	379	1,680	5,750	106,000	1,9,10		NTL 11/16/95 RPT.
19PS3	9/5/94	420	3,200	470	1,280	18,000	39,000	–	e	CRREL 1995
19PS4	10/23/95	2,160	13,900	1,040	2,970	24,100	128,000	1,9,10		NTL 11/16/95 RPT.
19PS5	10/23/95	929	9,450	578	2,310	16,700	31,100	1,9,10		NTL 11/16/95 RPT.
19PS6	9/5/94	140	460	290	480	16,000	17,000	–	e	CRREL 1995
19PS7	9/5/94	5.8	<2.0	<3.0	<3.0	<120	<700	–	e	CREEL 1995
19PS8	10/23/95	200	7,870	570	2,760	61,500	318,000	1,9,10		NTL 11/16/95 RPT.
19PS8	9/12/96	600	8,600	7,600	28,500	130,000	52,000,000	1,9,10		USAF 1996 SWMPR
19PS9	9/6/94	210	1,300	300	1,110	26,000	18,000	–	e	CRREL 1995
19PS10	9/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CREEL 1995
19PS11	9/6/94	<2.0	<2.0	<3.0	4.7	310	<700	–	e	CRREL 1995
19PS11	10/23/95	0.37	1.21	0.39	2.34	59.8	1,180	1,9,10		NTL 11/16/95 RPT.
19PS12	10/23/95	25	2100	204	1720	5220	35,200	1,9,10		NTL 11/16/95 RPT.
19PS13	9/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995
19PS13	10/23/95	3.15	<0.30	0.20	<0.40	108	320	1,9,10		NTL 11/16/95 RPT.
19PS14	9/6/94	18	<2.0	<3.0	<3.0	160	1,200	–	e	CRREL 1995
19PS14	9/16/96	<1.0	<1.0	<1.0	<1.0	260	1,900	1,9,10		USAF 1996 SWMPR

TABLE 19-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
19PS15	9/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995
19PS15	10/23/95	7.4	0.82	1.13	0.45	260	1,900	1,9,10		NTL 11/16/95 RPT.
19PS17	9/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995
19PS17	9/24/96	<1.0	<1.0	<1.0	<1.0	<100	120	1,9,10		USAF 1996 SWMPR
19PS18	9/7/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995
19PS19	9/7/94	300	640	350	440	12,000	46,000	–	e	CRREL 1995
19PS20	9/7/94	190	280	250	289	23,000	22,000	–	e	CRREL 1995
19PS21	9/7/94	12	9	26	214	2,800	1,200	–	e	CRREL 1995
19PS21	10/23/95	0.44	1.08	28.2	444	868	3,430	1,9,10		NTL 11/16/95 RPT.
19PS22	9/7/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995
19PS23	9/7/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995
19PS23	9/12/96	<1.0	<1.0	<1.0	<1.0	<100	<500	1,9,10		USAF 1996 SWMPR
19PS24	9/7/94	400	1,200	420	750	>31,000	98,000	–	e	CRREL 1995
19PS25	9/7/94	180	820	370	860	21,000	24,000	–	e	CRREL 1995
19PS26-A	9/7/94	43.0	4.2	43	11	1,200	1,500	–	e	CRREL 1995
19PS26-B	9/7/94	4.2	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995
19PS27	9/8/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995
19PS27	10/26/95	<0.20	<0.30	<0.20	<0.40	<10	<250	1,9,10		NTL 11/16/95 RPT.
19PS27	9/16/96	<1.0	<1.0	<1.0	<1.0	<100	200	1,9,10		USAF 1996 SWMPR

TABLE 19-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Analytical Methods	Notes	Reference
19PS28	9/8/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995
19PS28	9/16/96	<1.0	<1.0	<1.0	1.4	<100	310	1,9,10		USAF 1996 SWMPR
19PS29-A	9/8/94	43	140	140	161	6,600	2,800	–	e	CRREL 1995
19PS29-B	9/8/94	3.5	8.8	13	13	630	<700	–	e	CRREL 1995
19PS30-A	9/8/94	8.8	110	120	147	5,200	3,800	–	e	CRREL 1995
19PS30-B	9/8/94	11.0	14	13	21	710	<700	–	e	CRREL 1995
19PS30-B	10/23/95	25.8	<0.3	0.39	1.27	202	1,020	1,9,10	e	NTL 11/16/95 RPT.
19PS30-B	9/12/96	6.6	<1.0	<1.0	<1.0	<100	570	1,9,10	e	USAF 1996 SWMPR
19PS31	9/8/94	480	2,000	450	1,020	20,000	11,000	–	e	CRREL 1995
19PS31	10/23/95	1,960	10,400	650	2,330	40,900	58,700	1,9,10		NTL 11/16/95 RPT.
19PS31	9/23/96	2,200	5,000	450	2,480	24,000	15,000	1,9,10		USAF 1996 SWMPR
19PS32	9/8/94	110	200	76	277	9,400	7,600	–	e	CRREL 1995
19PS33	9/14/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	e	CRREL 1995

Notes:
a. For additional compounds detected, see reference.
b. No compounds other than those listed were detected above the reporting limits.
c. Other compounds detected: 2-butanone - 48 µg/L.
d. Reported as 19-02 in PNL 1993 OU2 RI, 19-02A in PNL 1995 SWRI.
e. Field gas chromatograph was used for sample analysis.

-A, -B, extentions represent different screened interval depths in the well.

19PS26	-A (2.30 - 12.14 ft bgs); -B (21.98 - 31.83 ft bgs).
19PS29 & 19PS30	-A (11.16 - 21.00 ft bgs); -B (21.00 - 30.84 ft bgs).

Analytical Methods:

1. 8020.	3. ADEC 8100M.	5. 8270.	7. 8260.	9. AK101.
2. ADEC 8015M.	4. 8010.	6. 8080.	8. 8240.	10. AK102.

TABLE 19-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST19, JP4 FUEL LINE SPILL AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)		
19-1	09/11/96	--	6.6	3.45	168.7	232	7.32	-94.3	--		USAF 1996 SWMPR
19-1	08/25/97	0.86	6.8	4.5	61	394	7.40	75	140		USAF 1997 SWMPR
19-4	09/11/96	--	33.1	3.83	120.8	199	7.49	-70.7	--		USAF 1996 SWMPR
19MW06	9/14/95	7.1	--	10	--	60	6.5	--	--		USAF 1995 SWMPR
19MW06	9/11/96	--	38.9	5.77	84	70	7.10	18	--		USAF 1996 SWMPR
19MW06	9/19/97	3.27	28	6.9	18	86	7.42	122	nd		USAF 1997 SWMPR
19MW07	10/11/95	2.0	--	5	--	220	6.9	--	--		USAF 1995 SWMPR
19MW07	09/11/96	--	2.0	2.89	1.8	224	7.48	-145	--		USAF 1996 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.

ST20 Refueling Loop (E-7) Complex

COCs, RAOs, and ARARs

BTEX compounds are COCs for ST20 (E-7). The following table lists RAOs and ARAR MCLs established to address groundwater quality at ST20 (E-7) and other OU1 source areas.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L

Site Setting

Source area ST20 contains three refueling complexes (E-7, E-8, and E-9). Each complex consists of an asphalt pad centered along the taxiway with adjacent unpaved areas of gravel and grass. Each complex is served by a fuel pump house with three associated 50,000 gallon (190,000-liter) JP-4 USTs and one 25,000 gallon (95,000-liter) defueling UST along with fueling and defueling transfer pipes. The large area enclosed by the taxiway loop north of the complex contains surface water ponds. Garrison Slough is approximately 1000 feet (300 meters) southwest of the complex.

The majority of aircraft refueling operations are conducted at the refueling loop, and numerous fuel spills have occurred there. The source of contamination at the E-7 complex is believed to be leaks in the subsurface JP-4 fueling and defueling transfer pipes. Contaminants typically associated with JP-4 fuel include total petroleum hydrocarbons (TPH), VOCs (BTEX), and SVOCs (naphthalenes).

NAPL was encountered in 1982 in a 20 foot (6-meter) test hole at the E-7 pump house. In July 1987, a 1-ft (30-cm) thick layer of NAPL was observed in a ditch excavated during maintenance work on an underground defueling line immediately north of the E-7 pump house.

Three static recovery wells subsequently were installed in the leak area and operated until February 1988. Approximately 885 gallons (3,350 liters) of JP4 fuel were recovered before flow to the system was restricted. Another static recovery well was installed in late 1988. This recovery well was abandoned sometime before October 1991.

Bioventing was selected as the interim remedial action for the ST20 E-7 complex. A bioventing treatability study was conducted by Battelle Columbus at the ST20 E-7 complex and ran until

December 1993. Four areas were tested for microbial degradation of fuel hydrocarbons in soil using three different methods to heat the vadose zone: ambient air was circulated in one area as a control; solar (passive) heating was installed in a second area by covering the ground surface with transparent plastic; heated groundwater (active warming) was recirculated in a third area; and heat tracing tape (surface warming) was buried in a fourth area. Significant microbial activity was observed in the control plot, even during winter months when soil temperatures drop below 32°F. Respiration rates in the passive warming test plot were observed to increase one order of magnitude during the summer months. Respiration rates in the active warming plot were higher than those measured in both the passive warming and control plots. Surface warming results indicate both respiration rates and soil temperatures were higher than the control plot and passive warming plot and were similar to those measured in the active warming plot. Surface warming may be more efficient than active warming because it avoids problems associated with high soil moisture content. Data available from this study indicate bioventing is successful in reducing contaminant concentrations. The study concludes that implementation of a soil warming technology over basic bioventing is not necessarily based on cost but on desired remediation time and funds available for operation and maintenance versus capital costs (EPA, 1995).

The basic bioventing system was expanded in 1996, modified in 1997, and is currently operating. Modifications to the bioventing system included burial of the air distribution piping, construction and installation of an airflow manifold, and installation of 13 new vapor monitoring points.

Previous Activities

Monitor wells 20M02, 20M03, 20M04, 20M09, 20M10, 20M11, 20M12, and 53M04 have been sampled since 1989. Product probes 20PP12, 20PP17, 20PP101, 20PP104 were sampled in 1995. BTEX compounds were detected at all locations, with the exception of 20M12. The highest benzene (12,000 µg/L) and total BTEX concentrations (40,900 µg/L) was detected in 20PP104. A benzene concentration of 12,000 µg/L was also detected at 53M04 in 1989. TPH GRO was detected at all locations; with the exception of 20M02, 20M05, 20M10, 20M11, and 20M12, with the highest concentration occurring in 53M04 (210,000 µg/L). TPH DRO was detected at all locations, with the highest concentration detected at 20M04 (22,000 µg/L). Analytical results for ST20 E-7 indicate that dissolved BTEX compounds are present in the groundwater in the area associated with the NAPL plume.

During the 1996 field season monitor wells 20M03, 20M04, 20M05, 20M09, 20M11 and 53M04 were sampled for BTEX compounds. Benzene concentrations ranged from below detection limits in wells 20M11 and 20M05 to 8,600 µg/L in well 53M04. Wells displaying benzene concentrations above the RAO and ARAR MCL included 20M03 (65 µg/L), 20M04 (2,400 µg/L), 20M09 (240 µg/L), and 53M04 (8,600 µg/L). Well 20M04 also displayed a toluene concentration of 2,500 µg/L, and well 53M04 displayed a toluene concentration of 12,000 µg/L, and ethylbenzene concentration of 1,000 µg/L. These toluene and ethylbenzene concentrations exceed site specific RAOs and ARAR MCLs.

1997 Results

Monitor wells 20M09, 20M11, and 53M04 were sampled for BTEX and SVOCs. BTEX compounds were detected in 20M09 and 53M04. Benzene concentrations ranged from below detection limits (20M11) to 1,800 µg/L (53M04). Monitor well 20M09 displayed a benzene concentration of 140 µg/L, exceeding the site specific RAO and ARAR MCL. Monitor well 53M04 displayed benzene (1,800 µg/L), toluene (6,900 µg/L), and ethylbenzene (890 µg/L) concentrations which exceed site specific RAOs and ARAR MCLs. No other compounds were detected above site specific RAOs or ARAR MCLs.

Several SVOCs were detected in ST20 (E-7) groundwater samples. 53M04 displayed a bis (2-ethylhexyl) phthalate concentration of 17 µg/L, which is above the EPA drinking water MCL of 6 µg/L. Other SVOCs detected included phenol (3.0 µg/L - 20M09, 37 µg/L 53M04); 2-methylphenol (160 µg/L - 53M04); 4-methylphenol (5.0 µg/L - 20M11, 82 µg/L - 53M04); 2,4-dimethylphenol (46 µg/L - 53M04); benzoic acid (30 µg/L - 53M04); naphthalene (76 µg/L - 53M04) and 2-methylnaphthalene (48 µg/L - 53M04). Applicable EPA drinking water MCLs were not identified for these compounds. These SVOCS were reported in similar concentrations in the 1994 OU1 RI.

Cumulative analytical data indicates an overall decrease of BTEX compounds in well 20M09 and 53M04. BTEX concentrations in well 20M11 have consistently remained at, or below detection limits since groundwater monitoring was initiated at the site. The reduction of BTEX compounds in 20M09 suggests the hydrocarbon plume may be stabilizing in the downgradient direction.

On 22 September 1997, 13 recovery wells, monitoring wells, and other associated probes were decommissioned. Wells were decommissioned by removing the casing and filling the borehole with bentonite. Recovery wells RC1, RC2, and RC3 were decommissioned by cutting the casing below grade (at 2, 4, and 2 ft, respectively) and filling the wells with bentonite. The casing of monitor well "MW" sheared off 4 ft below grade during decommissioning. The remaining well casing and borehole were filled with bentonite.

References for ST20 (E-7):

1994 OU1 Record of Decision, USAF, September 1994
1995 OU1 Remedial Design, USAF, November 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST20 (E-7):

List of Tables for ST20 (E-7):

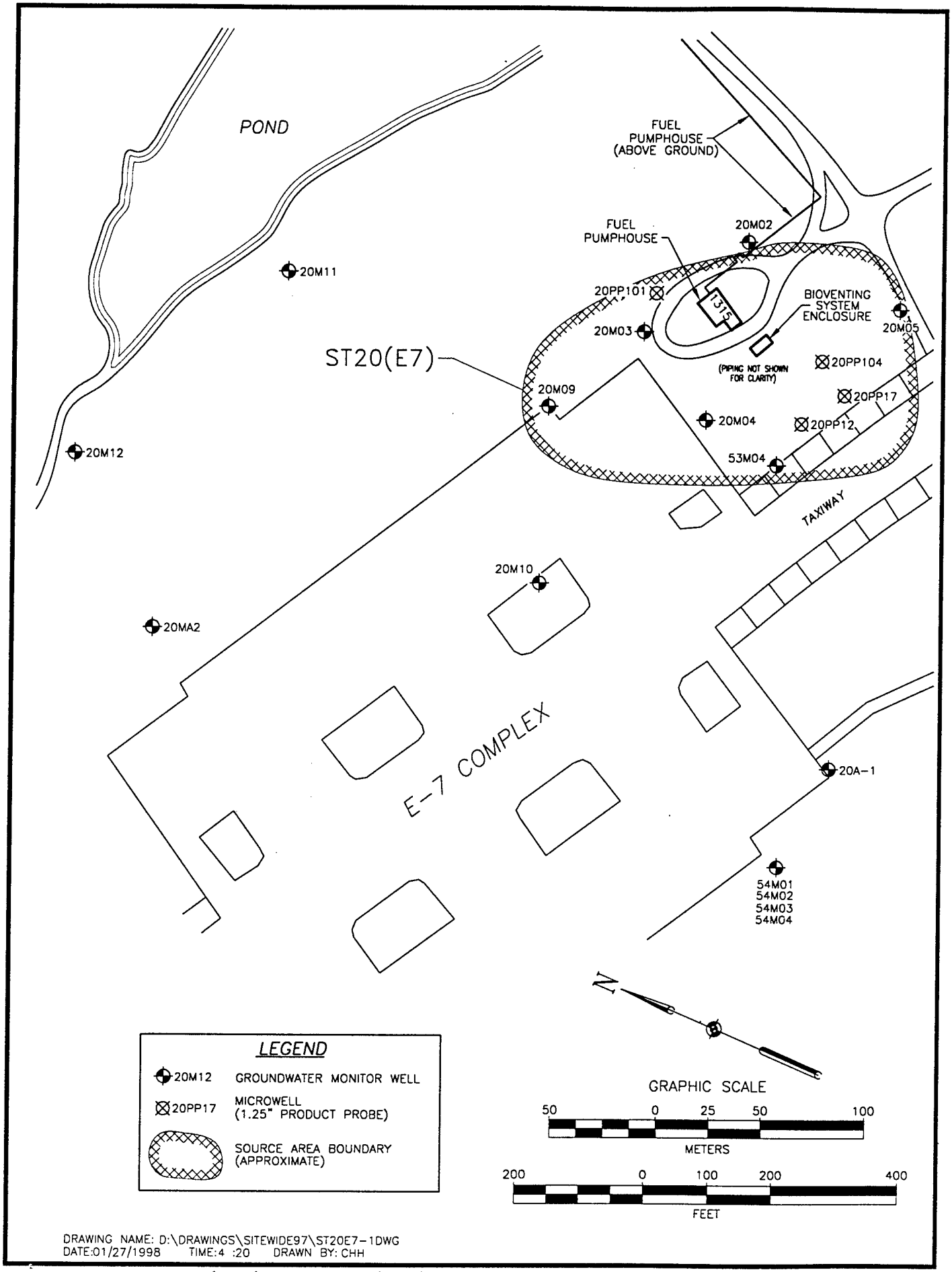


Figure ST20(E-7)-1. ST20 (E-7) Site Plan Showing Groundwater Monitor Wells and 1.25" Well Locations, Eielson AFB, Alaska

TABLE ST20(E-7)-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST20 (E-7) REFUELING LOOP, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)							Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Acetophenone			
20M02	9/5/89	<0.2	<0.3	<0.5	<0.4	–	–		1		HLA 1992 RI/FS; BEAR
20M02	1989	33	<0.25	<0.46	<0.85	–	–				BEAR
20M02	5/23/93	<2.0	–	–	–	–	–		1,4,5		PNL 1994 OU1 RI
20M02	7/12/94	<1.0	<1.0	<1.0	<1.0	<50	500		1-3		USAF 1995 OU1 RD
20M02	9/29/94	<1.0	<1.0	<1.0	<1.0	<50	<100		1-3		USAF 1995 OU1 RD
20M03	9/5/89	262	30.9	6.27	28.5	–	–		1		HLA 1992 RI/FS; BEAR
20M03	1989	1,190	348	87	290	–	–				BEAR
20M03	5/23/93	110	–	–	–	–	–		1,4,5		PNL 1994 OU1 RI
20M03	7/14/94	120	6.8	18	39.7	370	1,000		1-3		USAF 1995 OU1 RD
20M03	9/29/94	300	<1.0	23	77	930	270		1-3		EA 1995 OU1 RD
20M03	7/5/95	120	5.2	3.4	16	340	2,200		1-3	a	USAF 1995 OU1 RD
20M03	7/29/96	65	<1.0	<1.0	1.6	–	–		1		USAF 1996 SWMPR
20M04	9/6/89	7,170	13,200	1,030	3,820	–	–		1		HLA 1992 RI/FS; BEAR
20M04	1989	11,500	15,800	1,130	3,820	–	–				BEAR
20M04	5/24/93	190	–	–	–	–	–		1,4,5		PNL 1994 OU1 RI
20M04	7/14/94	5,300	810	3,700	9,400	35,000	22,000		1-3		USAF 1995 OU1 RD
20M04	9/30/94	6,000	7,700	880	3,790	26,000	1,900		1-3		USAF 1995 OU1 RD
20M04	7/10/95	2,800	3,800	480	3,200	50,000	9,900		1-3		USAF 1995 OU1 RD
20M04	7/29/96	2,400	2,500	580	1,920	–	–		1		USAF 1996 SWMPR
20M05	1989	0.32	0.83	<0.46	<0.4	–	–		1		HLA 1992 RI/FS; BEAR
20M05	1989	<0.15	0.83	<0.5	<0.85	–	–				BEAR
20M05	7/12/94	<1.0	<1.0	<1.0	<1.0	<50	1,200		1-3		USAF 1995 OU1 RD
20M05	9/29/94	<1.0	<1.0	<1.0	<1.0	<50	260		1-3		USAF 1995 OU1 RD
20M05	9/23/96	<1.0	<1.0	<1.0	1.3	–	–		1		USAF 1996 SWMPR

TABLE ST20(E-7)-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)							Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Acetophenone			
20M09	9/5/89	1,190	<0.3	19.3	<0.4	--	--		1		HLA 1992 RI/FS; BEAR
20M09	1989	1,120	<0.25	24.6	<0.85	--	--				BEAR
20M09	5/24/93	90	--	--	--	--	--		1,4,5		PNL 1994 OU1 RI
20M09	7/12/94	430	8.9	18	18.1	900	750		1-3		USAF 1995 OU1 RD
20M09	9/30/94	430	3.3	1.6	6.3	1,100	240		1-3		USAF 1995 OU1 RD
20M09	7/10/95	370	<1.0	2.4	9.1	1,000	710		1-3	a	USAF 1995 OU1 RD
20M09	9/23/96	240	<1.0	<1.0	1.1	--	--		1		USAF 1996 SWMPR
20M09	8/28/97	140	<1.0	<1.0	<1.0	--	--	<10	1,5	b	USAF 1997 SWMPR
20M10	9/1/89	2.65	<0.3	<0.5	<0.4	--	--				BEAR
20M10	1989	4.72	<0.25	<0.46	<0.85	--	--				BEAR
20M10	7/13/94	<1.0	<1.0	<1.0	<1.0	<50	130		1-3		USAF 1995 OU1 RD
20M10	9/29/94	<1.0	<1.0	<1.0	<1.0	<50	120		1-3		USAF 1995 OU1 RD
20M11	9/14/89	1.3	1.67	<0.5	1.21	--	--		1		HLA 1992 RI/FS; BEAR
20M11	5/23/93	<2.0	--	--	--	--	--		1,4,5		PNL 1994 OU1 RI
20M11	7/13/94	<1.0	<1.0	<1.0	<1.0	<50	940		1-3		USAF 1995 OU1 RD
20M11	9/29/94	<1.0	<1.0	<1.0	1.1	<50	1,200		1-3		USAF 1995 OU1 RD
20M11	3/9/95	1.3	1.4	<1.0	3.5	<100	2,400		1-3		USAF 1995 OU1 RD
20M11	7/5/95	<1.0	<1.0	<1.0	<1.0	<50	2,300		1-3	a	USAF 1995 OU1 RD
20M11	9/23/96	<1.0	2.0	<1.0	1.3	--	--		1		USAF 1996 SWMPR
20M11	8/28/97	<1.0	<1.0	<1.0	<1.0	--	--	<10	1,5	c	USAF 1997 SWMPR
20M12	9/13/89	<0.2	<0.3	<0.5	<0.4	--	--		1		HLA 1992 RI/FS; BEAR
20M12	5/23/93	<2.0	--	--	--	--	--		1,4,5		PNL 1994 OU1 RI
20M12	7/13/94	<1.0	<1.0	<1.0	<1.0	<50	460		1-3		USAF 1995 OU1 RD
20M12	9/29/94	<1.0	<1.0	<1.0	<1.0	<50	<100		1-3		USAF 1995 OU1 RD
53M04	9/6/89	6,980	15,900	1,120	3,350	--	--		1		HLA 1992 RI/FS; BEAR
53M04	1989	12,000	19,700	1,050	3,830	--	--				BEAR
53M04	5/24/93	<2.0	--	--	--	--	--		1,4,5		PNL 1994 OU1 RI
53M04	7/15/94	4,400	720	2,400	11,820	210,000	20,000		1-3		USAF 1995 OU1 RD
53M04	9/29/94	2,100	6,000	460	1,690	53,000	5,000		1-3		USAF 1995 OU1 RD
53M04	7/10/95	4,200	10,000	520	3,300	79,000	9,600		1-3		USAF 1995 OU1 RD

TABLE ST20(E-7)-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Acetophenone	Analytical Methods	Notes	Reference
53M04	9/23/96	8,600	12,000	1,000	3,710	--	--		1		USAF 1996 SWMPR
53M04	8/28/97	1,800	6,900	890	3,440	--	--	<10	1,5	d	USAF 1997 SWMPR
20PP12	7/31/95	2,400	8,700	1,100	4,200	27,000	6,800		1-3		USAF 1995 OU1 RD
20PP17	7/25/95	11,000	22,000	1,500	5,700	41,000	8,600		1-3		USAF 1995 OU1 RD
20PP101	7/25/95	150	58	110	700	4,300	12,000		1-3		USAF 1995 OU1 RD
20PP104	7/31/95	12,000	22,000	1,800	5,100	92,000	7,900		1-3		USAF 1995 OU1 RD

Notes:
a. TPH DRO chromatogram is dominated by large peak not characteristic of diesel.
b. Other compounds detected: phenol - 3 µg/L, bis (2-ethylhexyl) phthalate - 2 µg/L
c. Other compounds detected: 4-methylphenol - 5 µg/L.
d. Other compounds detected: phenol - 37 µg/L, 2-methylphenol - 160 µg/L, 4-methylphenol - 82 µg/L, 2,4-dimethylphenol - 46 µg/L, benzoic acid - 30 µg/L, naphthalene - 76 µg/L, 2-methylnaphthalene - 48 µg/L, bis (2-ethylhexyl) phthalate - 17 µg/L.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE ST20(E-7)-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST20(E-7) REFUELING LOOP, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)		
20M03	07/29/96	1.96	--	7.6	27	242	6.8	28	–		USAF 1996 SWMPR
20M04	07/29/96	0.4	--	7.1	11	379	6.81	-28	–		USAF 1996 SWMPR
20M05	09/23/96	0.12	--	3.2	687	339	6.8	-46.4	–		USAF 1996 SWMPR
20M09	09/23/96	0.19	--	5.6	2097	379	6.85	-75.7	–		USAF 1996 SWMPR
20M09	08/28/97	0.52	4.1	4.8	0	386	7.13	36	–		USAF 1997 SWMPR
20M11	09/23/96	0.24	--	7.7	180	1468	6.12	-37.5	–		USAF 1996 SWMPR
20M11	08/28/97	0.54	5.0	10.8	410	1992	6.74	-31	–		USAF 1997 SWMPR
53M04	09/23/96	0.11	--	4.9	99	645	6.42	83.9	–		USAF 1996 SWMPR
53M04	08/28/97	0.51	4.1	5.0	0	488	6.85	-15	–		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

ST20 Refueling Loop (E-8) Complex

COCs, RAOs, and ARARs

BTEX compounds are COCs for ST20 (E-8). DRO and GRO have also been detected during previous sampling events. The following table lists RAOs and ARAR MCLs established to address groundwater quality at ST20 (E-8) and other OU1 source areas.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L

Site Setting

Source area ST20 contains three refueling complexes (E-7, E-8, and E-9). Each complex consists of an asphalt pad centered along the taxiway with adjacent unpaved areas of gravel and grass. Each complex is served by a fuel pump house with three associated 50,000 gallon (190,000-liter) JP-4 USTs and one 25,000 gallon (95,000-liter) defueling UST along with fueling and defueling transfer pipes. The large area enclosed by the taxiway loop, north of the complex, contains surface water ponds. Garrison Slough is approximately 1000 feet (300 meters) southwest of the complex.

The source of contamination at the E-8 Complex is believed to be surface spills of JP-4 jet fuel resulting from storage tank overfill. No interim remedial action has been conducted at the E-8 facility.

Previous Activities

Monitor wells 20M06, 20M13, 20M14, 20M15, 20M16 have been periodically sampled since 1989. Product probes 20PP48, 20PP52, 20PP79, 20PP80, and 20PP801 were sampled in 1995. Benzene concentrations ranged from <1.0 µg/L (multiple locations) to 570 µg/L (20M06), with the highest total BTEX concentration (9,600 µg/L) detected in 20PP79. TPH GRO was detected in 20M06, 20M16, 20PP48, 20PP52, 20PP79, 20PP80 and 20PP801, with the highest concentration (10,000 µg/L) detected at 20PP79. TPH DRO was detected at all locations, with the highest concentration (4,000 µg/L) detected at 20M06.

Monitor wells 20M06, 20M15, 20M16, and product probes 20PP48, 20PP79 and 20PP801 were sampled for BTEX compounds during the 1996 field season. BTEX compounds were detected in

20M06, 20PP79, and 20PP801, with benzene concentrations ranging from below detection limits (multiple points) to 46 µg/L in product probe 20PP79. Product probe 20PP79 displayed benzene and toluene concentrations which exceeded site specific RAOs and ARAR MCLs. No other wells or product probes displayed BTEX compounds above RAOs or ARAR MCLs.

1997 Results

During the 1997 field season, total BTEX immunoassay testing was used to monitor well 20M15. The total BTEX concentration was below the detection level (<20 ppb) of the total BTEX immunoassay kit. The immunoassay results are consistent with previous analytical data. Cumulative immunoassay and analytical data at 20M15 have consistently displayed non-detectable BTEX concentrations.

On 26 September 1997, monitor well 20M18 was decommissioned by removal of the well casing and filling the borehole with bentonite. The well was decommissioned due to its location in relationship to the source area.

References for ST20 (E-8):

1994 OU1 Record of Decision, USAF, September 1994
1995 OU1 Remedial Design, USAF, November 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Groundwater Program Workplan Addendum, 1997

List of Figures for ST20 (E-8):

List of Tables for ST20 (E-8):

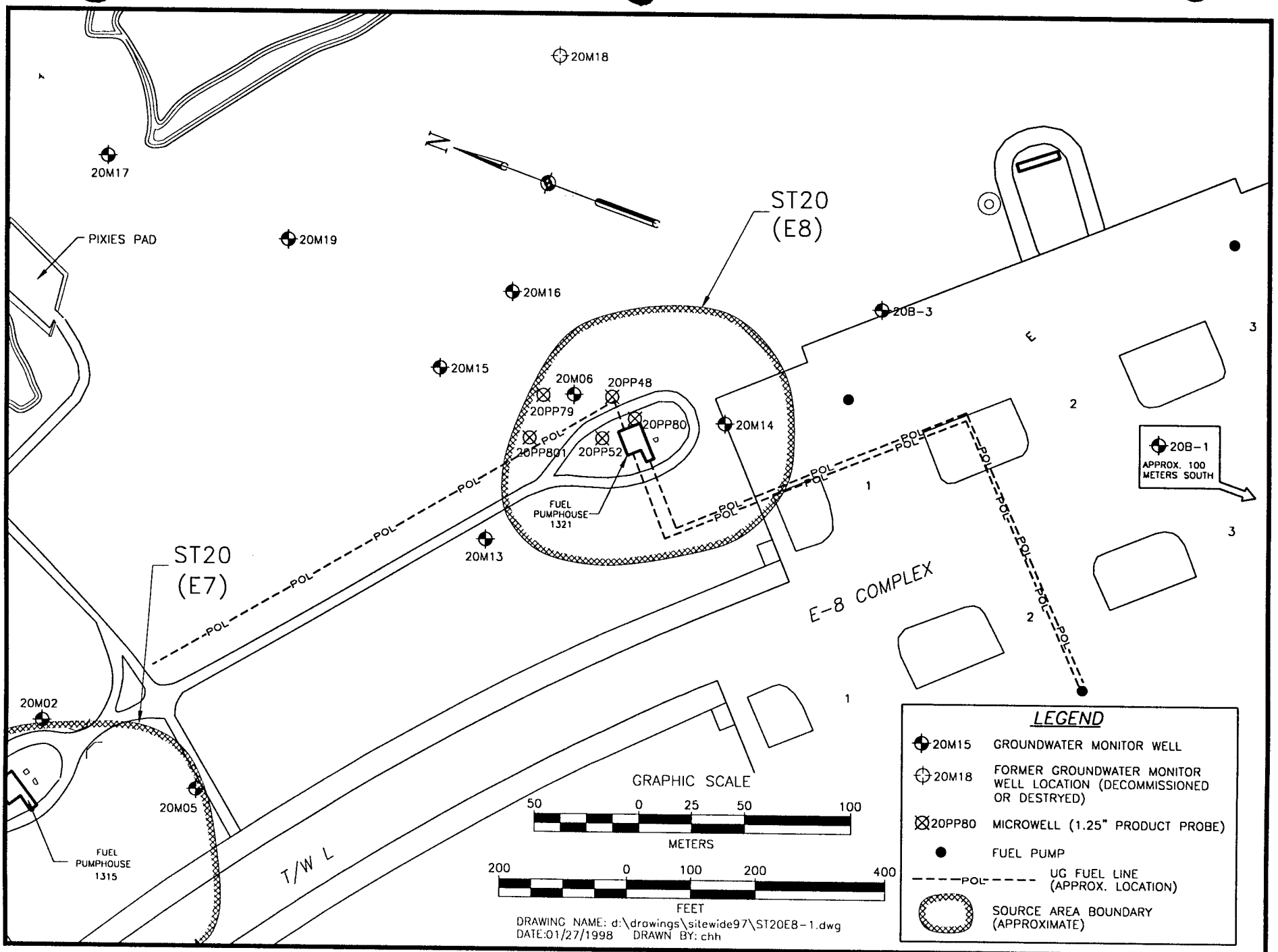


Figure ST20(E8)-1. ST20 (E-8) Site Plan Showing Locations of Groundwater Monitor Wells and 1.25" Well Points. Eielson AFB. Alaska

TABLE ST20(E-8)-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST20 (E-8) REFUELING LOOP, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
20M06	9/6/89	62.3	3,040	431	1,550	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M06	1989	481	939	87	236	--	--			BEAR
20M06	5/20/93	570	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M06	7/11/94	19	16	6.2	66	3,500	2,100	1-3		USAF 1995 OU1 RD
20M06	9/28/94	77	250	27	63	870	240	1-3		USAF 1995 OU1 RD
20M06	3/9/95	1.5	1.9	<1.0	<1.0	380	200	1-3	c	USAF 1995 OU1 RD
20M06	7/6/95	1.6	72	24	45	3,400	4,000	1-3	b	USAF 1995 OU1 RD
20M06	7/30/96	<1.0	<1.0	<1.0	1.1	--	--	1		USAF 1996 SWMPR
20M13	9/12/89	<0.2	<0.3	<0.5	<0.4	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M13	5/24/93	<2.0	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M13	7/11/94	<1.0	<1.0	<1.0	<1.0	<50	110	1-3		USAF 1995 OU1 RD
20M13	9/28/94	<1.0	<1.0	<1.0	<1.0	<50	100	1-3		USAF 1995 OU1 RD
20M14	9/13/89	0.45	0.87	<0.5	<0.4	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M14	5/25/93	<2.0	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M14	7/12/94	<1.0	<1.0	<1.0	<1.0	<50	380	1-3		USAF 1995 OU1 RD
20M14	9/29/94	<1.0	6.1	<1.0	<1.0	<50	230	1-3		USAF 1995 OU1 RD
20M15	9/14/89	<0.2	<0.3	<0.5	<0.4	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M15	5/25/93	<2.0	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M15	7/11/94	<1.0	<1.0	<1.0	<1.0	<50	150	1-3		USAF 1995 OU1 RD
20M15	9/28/94	<1.0	<1.0	<1.0	<1.0	<50	130	1-3		USAF 1995 OU1 RD
20M15	3/9/95	<1.0	<1.0	<1.0	<1.0	<100	<100	1-3		USAF 1995 OU1 RD
20M15	7/30/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
20M16	9/14/89	<0.2	<0.3	<0.5	<0.4	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M16	7/11/94	<1.0	<1.0	<1.0	<1.0	67	<100	1-3		USAF 1995 OU1 RD
20M16	9/28/94	<1.0	<1.0	<1.0	<1.0	110	180	1-3		USAF 1995 OU1 RD
20M16	3/9/95	1.3	1.1	<1.0	1.5	<100	150	1-3		USAF 1995 OU1 RD
20M16	7/6/95	<1.0	<1.0	<1.0	<1.0	54	420	1-3	b	USAF 1995 OU1 RD
20M16	7/30/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR

TABLE ST20 (E-8)-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Analytical Methods	Notes	Reference
20PP48	7/27/95	<1.0	<1.0	<1.0	<1.0	180	1,500	1-3		USAF 1995 OU1 RD
20PP48	8/7/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
20PP52	7/27/95	<1.0	<1.0	<1.0	<1.0	78	320	1-3		USAF 1995 OU1 RD
20PP79	7/31/95	400	5,900	1,100	2,200	10,000	1,500	1-3		USAF 1995 OU1 RD
20PP79	8/7/96	46	2,400	920	1,730	--	--	1		USAF 1996 SWMPR
20PP80	7/27/95	7.6	<1.0	1.5	1.9	180	1,100	1-3		USAF 1995 OU1 RD
20PP801	8/1/95	<1.0	<1.0	<1.0	<1.0	200	390	1-3		USAF 1995 OU1 RD
20PP801	8/7/96	2.1	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR

Notes:
a. For semivolatile compounds detected, see reference.
b. TPH DRO chromatogram is dominated by large peak not characteristic of diesel.
c. Sampled without purging

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE ST20(E-8)-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST20(E-8) REFUELING LOOP, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)		
20M06	7/30/96	2.46	--	4.5	6	270	6.53	116	--	--	USAF 1996 SWMPR
20M15	7/30/96	4.71	--	9.7	9	267	6.58	118	--	--	USAF 1996 SWMPR
20M15	8/26/97	4.20	36.8	8.7	11	376	7.26	135	nd	--	USAF 1997 SWMPR
20M15	8/26/97	2.73	23	7.8	18	374	6.97	127	--	a	USAF 1997 SWMPR
20M16	7/30/96	3.41	--	9.9	5	213	6.41	136	--	--	USAF 1996 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

a. Parameter duplicate.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.

ST20 Refueling Loop (E-9) Complex

COCs, RAOs, and ARARs

BTEX compounds are COCs for ST20 (E-9). DRO and GRO have been detected during previous sampling events. The following table lists RAOs and ARAR MCLs established to address groundwater quality at ST20 (E-9) and other OU1 source areas.

COC	RAO/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L

Site Setting

Source area ST20 contains three refueling complexes (E-7, E-8, and E-9). Each complex consists of an asphalt pad centered along the taxiway with adjacent unpaved areas of gravel and grass. Each complex is served by a fuel pump house with three associated 50,000 gallon (190,000-liter) JP-4 USTs and one 25,000 gallons (95,000-liter) defueling UST along with fueling and defueling transfer pipes. The large area enclosed by the taxiway loop, north of the complex, contains surface water ponds. Garrison Slough is approximately 1000 feet (300 meters) southwest of the complex. The majority of aircraft refueling operations are conducted at the refueling loop, and numerous fuel spills have occurred there.

Eielson AFB Liquid Fuels Department records indicate three spills at the E-9 Refueling Loop. The first leak was detected in August 1988 and repaired in June 1989. The leak was extensive; the amount of fuel lost is unknown. After the leak was repaired, a leak test was conducted on the piping. During this test, contractors noticed a second leak farther out on the tarmac where fuel was seeping up through cracks. The age of this leak is unknown. This leak was repaired in June 1989. A third leak was discovered near the refueling building in June 1992 and repaired in July 1992. It occurred in the line to the defueling tank. The amount of fuel leaked is unknown.

Four test trenches were excavated in August 1992 to test the feasibility of NAPL recovery, and one extraction trench was installed in September 1992. A single recovery well (20RW04) was installed. To date, no NAPL has been recovered from either the extraction trench or the recovery well. The NAPL is not flowing into the recovery structures. A passive skimmer placed in well 20M25 in 1989 recovered approximately 5 gallons of NAPL through April 1993. Some of the other well points and wells at the source area still contain measurable NAPL, but efforts to recover significant quantities have been unsuccessful.

A bioventing system installed in 1993, and expanded in 1996, continues to operate. The system injects air into seven PVC vadose wells and a number of well points and groundwater wells.

In addition to the ongoing interim remedial actions at the refueling loop, the U.S. Air Force conducted a tank tightness and pipeline leak detection investigation of USTs and associated transfer piping in 1993. Leaks identified during testing were either repaired or the leaking lines were taken out of service.

Previous Activities

Monitor wells 20M01, 20M07, 20M08, 20M20, 20M22, 20M23, 20M24, 20M25, and 20M26 were periodically sampled since 1989. Monitor well 20M21 was sampled during the 1993 and 1994 field seasons. Product probes and microwells 20PP58 20PP115, 20PS22V, and 20PS27V were sampled in 1995.

Monitor wells 20M01, 20M07, 20M08 and 20M23 were sampled during the 1996 field season. Benzene concentrations ranged from <1.0 µg/L (multiple locations) to 180 µg/L (20M07), with the highest total BTEX concentration occurring at 20M07 (797 µg/L). TPH GRO concentrations ranged from <50 µg/L (20M21, 20M22, and 20M26) to 25,000 µg/L (20M07). TPH DRO was detected at all locations with concentrations ranging from 110 µg/L (20M20) to 27,000 µg/L (20PP115).

1997 Results

Monitor wells 20M07, 20M08, and 20M23 were sampled for VOCs during the 1997 field season. Monitor well 20M07 displayed BTEX compounds of 63 µg/L benzene, 17 µg/L toluene, 37 µg/L ethylbenzene, and 252 µg/L xylenes. The benzene concentration is above the site specific RAO and ARAR MCL. No other compounds were detected.

Cumulative analytical data indicates an overall decrease in BTEX concentrations in 20M07 and 20M08. 20M23 has consistently displayed low to non detectable BTEX concentrations since groundwater monitoring was initiated. The reduction of BTEX compounds in 20M07 and 20M08 may indicate the hydrocarbon plume is stabilizing.

Monitor well 20M26 was decommissioned on 26 September 1997 by removing the well casing and filling the borehole with bentonite. 20M26 was decommissioned due to its poor condition, up-gradient location to the source area, and close proximity to the flightline restricted area.

References for ST20 (E-9):

1994 OU1 Record of Decision, USAF, September 1994
1995 OU1 Remedial Design, USAF, November 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST20 (E-9):

List of Tables for ST20 (E-9):

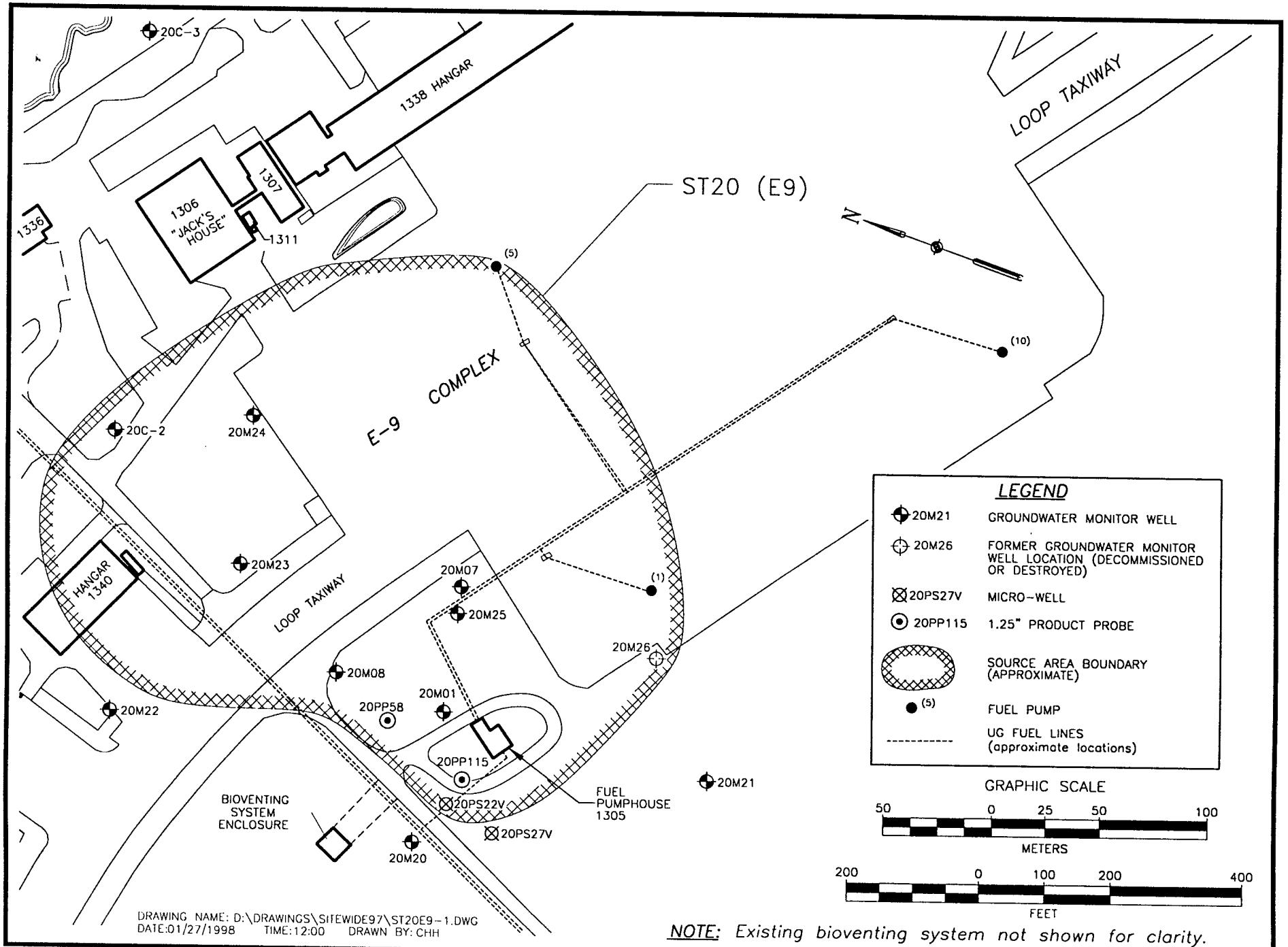


Figure ST20(E-9)-1. ST20 (E-9) Site Plan Showing Locations of Groundwater Monitor Wells, Eielson AFB, Alaska

TABLE ST20 (E-9)-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST20 (E-9) REFUELING LOOP, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)							Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Chlorobenzene			
20M01	1989	3.0	60	24	432	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M01	1989	3,060	2,010	24	2,200	--	--	--			BEAR
20M01	5/19/93	<2.0	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M01	7/15/94	37	82	390	530	8,200	3,700	--	1-3		USAF 1995 OU1 RD
20M01	9/28/94	5.1	6.9	5.0	54	630	1,100	--	1-3		USAF 1995 OU1 RD
20M01	3/10/95	<1.0	2.7	<1.0	3.7	100	<100	--	1-3		USAF 1995 OU1 RD
20M01	7/6/95	3.9	88	25	260	3,400	2,300	--	1-3	b	USAF 1995 OU1 RD
20M01	7/29/96	<1.0	<1.0	1.9	6.6	--	--	--	1		USAF 1996 SWMPR
20M07	9/12/89	4,430	6,600	387	1,590	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M07	1989	0.47	0.28	<0.46	<0.85	--	--	--			BEAR
20M07	5/20/93	660	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M07	7/19/94	750	2,300	320	1,950	25,000	14,000	--	1-3		USAF 1995 OU1 RD
20M07	9/28/94	350	230	190	550	5,100	--	--	1,2	c	USAF 1995 OU1 RD
20M07	3/16/95	280	460	210	830	9,000	6,800	--	1-3	c	USAF 1995 OU1 RD
20M07	7/10/95	220	230	120	550	3,700	9,400	--	1-3		USAF 1995 OU1 RD
20M07	7/29/96	180	70	81	466	--	--	--	1		USAF 1996 SWMPR
20M07	8/28/97	63	17	37	252	--	--	<1.0	1,4		USAF 1997 SWMPR
20M08	9/6/89	98	1.7	1.2	3.4	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M08	1989	1.33	1.16	<0.46	2.33	--	--	--			BEAR
20M08	5/20/93	440	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M08	7/18/94	140	<1.0	<1.0	<1.0	300	940	--	1-3		USAF 1995 OU1 RD
20M08	9/28/94	25	<1.0	3.4	2.1	160	160	--	1-3		USAF 1995 OU1 RD
20M08	3/10/95	39	<1.0	<1.0	2.8	<100	<100	--	1-3		USAF 1995 OU1 RD
20M08	7/6/95	72	<1.0	<1.0	1.3	260	1,300	--	1-3	c	USAF 1995 OU1 RD
20M08	7/29/96	16	<1.0	<1.0	2.8	--	--	--	1		USAF 1996 SWMPR
20M08	8/28/97	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	1,4		USAF 1997 SWMPR
20M20	9/14/89	<0.2	<0.3	<0.5	<0.4	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M20	1989	--	--	--	--	--	--	--			BEAR
20M20	5/19/93	<2.0	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M20	7/18/94	<1.0	<1.0	<1.0	<1.0	<50	500	--	1-3		USAF 1995 OU1 RD
20M20	9/27/94	<1.0	<1.0	<1.0	<1.0	<50	110	--	1-3		USAF 1995 OU1 RD

TABLE ST20(E-9)-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)							Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Chlorobenzene			
20M21	5/19/93	<2.0	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M21	7/18/94	<1.0	<1.0	<1.0	<1.0	<50	560	--	1-3		USAF 1995 OU1 RD
20M22	9/15/89	30.5	<0.3	<0.5	<0.4	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M22	1989	--	--	--	--	--	--	--			BEAR
20M22	5/25/93	<2.0	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M22	7/27/94	<1.0	<1.0	<1.0	<1.0	<50	180	--	1-3		USAF 1995 OU1 RD
20M22	9/27/94	<1.0	<1.0	<1.0	<1.0	<50	120	--	1-3		USAF 1995 OU1 RD
20M23	9/15/89	178	1.07	11.2	<0.4	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M23	1989	--	--	--	--	--	--	--			BEAR
20M23	5/20/93	2.1	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M23	7/18/94	<1.0	<1.0	<1.0	<1.0	<50	510	--	1-3		USAF 1995 OU1 RD
20M23	9/27/94	<1.0	<1.0	<1.0	<1.0	<50	180	--	1-3		USAF 1995 OU1 RD
20M23	7/29/96	<1.0	<1.0	<1.0	1.2	--	--	--	1		USAF 1996 SWMPR
20M23	8/28/97	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	1,4		USAF 1997 SWMPR
20M24	9/26/89	2.25	0.56	<0.5	<0.4	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
20M24	1989	--	--	--	--	--	--	--			BEAR
20M24	5/20/93	0.93	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M24	7/18/94	1.6	<1.0	<1.0	2.4	<50	530	--	1-3		USAF 1995 OU1 RD
20M24	9/27/94	<1.0	<1.0	<1.0	<1.0	<50	180	--	1-3		USAF 1995 OU1 RD
20M25	7/27/94	16	29	12	129	1,300	1,200	--	1-3		USAF 1995 OU1 RD
20M25	9/28/94	4.2	2.2	5.0	37.6	1,700	--	--	1,2		USAF 1995 OU1 RD
20M25	7/10/95	4.2	1.9	1.4	5.1	400	610	--	1-3		USAF 1995 OU1 RD
20M26	5/24/93	<2.0	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
20M26	7/27/94	<1.0	<1.0	<1.0	<1.0	<50	<100	--	1-3		USAF 1995 OU1 RD
20M26	9/27/94	<1.0	<1.0	<1.0	<1.0	<50	120	--	1-3		USAF 1995 OU1 RD
20M26	1996	Did not sample because well is located in restricted area.									USAF 1996 SWMPR
20PP58	7/31/95	190	48	26	530	2,000	870	--	1-3		USAF 1995 OU1 RD
20PP115	8/1/95	340	3,600	270	4,200	14,000	27,000	--	1-3		USAF 1995 OU1 RD
20PS22V	8/1/95	22	2,200	520	3,200	10,000	9,900	--	1-3		USAF 1995 OU1 RD

TABLE ST20(E-9)-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)							Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Chlorobenzene			
20PS27V	8/1/95	<1.0	<1.0	<1.0	<1.0	270	500	--	1-3		USAF 1995 OU1 RD

Notes:
a. For semivolatile compounds detected, see reference.
b. TPH DRO chromatogram is dominated by large peak not characteristic of diesel.
c. Product detected in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured into well and purged 5 gal. before sampling.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE ST20 (E-9)-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST20 (E-9) REFUELING LOOP, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)		
20M01	7/29/96	1.27	--	5.9	11	213	6.75	-25	--		USAF 1996 SWMPR
20M07	7/29/96	2.25	--	11.9	7	396	6.55	-48	--		USAF 1996 SWMPR
20M07	8/28/97	1.76	17	13.5	0	450	7.22	-51	--		USAF 1997 SWMPR
20M08	7/29/96	1.98	--	8.5	46	416	6.45	76	--		USAF 1996 SWMPR
20M08	8/28/97	1.95	17	9.3	72	514	6.83	46	--		USAF 1997 SWMPR
20M23	7/29/96	1.38	--	11.9	19	363	6.62	106	--		USAF 1996 SWMPR
20M23	8/28/97	2.38	21.2	9.4	34	392	6.95	120	--		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

DP25 E-6 Fuel Tank Sludge Burial Pit

COCs, RAOs, and ARARs

BTEX compounds and lead are COCs for DP25. DRO and GRO have also been detected during previous sampling events. The following table lists ARAR MCLs established to address groundwater quality at DP25 and other OU 3,4,5 source areas. RAOs have not been established for OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*contd.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

DP25 is located north of Quarry Road adjacent to the E-11 Fuel Storage Tank Area, ST27. This is an active fuel storage area. The tank complex was built in the 1950s. Six 1.26-million-gallon and two 210,000-gallon above-ground tanks are enclosed by a separate fence east of the main tank farm area. Sludge from periodic cleaning of fuel tanks was reportedly buried in shallow trenches between the fuel storage tanks until 1980. The sludge consisted primarily of water, rust, dirt, and fuel. No evidence of the buried sludge was found during previous investigations.

NAPL was noted in several monitor wells installed during earlier investigations. In 1987, a pipeline fuel spill of JP-4 reportedly occurred along Quarry Road adjacent to DP25. Contaminants of concern are fuel-related compounds and lead in soil and groundwater. The contamination appeared to originate from leaks in the tanks and/or fuel-distribution system. Microwells were installed at the facility in 1994. Benzene was present in several locations in the shallow groundwater. Depth to groundwater inside the bermed area was approximately 2 feet bgs.

The OU 3,4,5 ROD indicated groundwater monitoring and institutional controls would be the remedy for the fuel contamination at DP25. The ROD states bioventing would have limited effectiveness because of the shallow groundwater table and the presence of the tanks, piping, and proposed liners.

Previous Activities

Prior groundwater monitoring results indicated dissolved BTEX present in groundwater samples from wells in the tank farm area.

Monitor wells B-4, B-18, 25M04, and 53M01 were sampled during the 1996 field season for BTEX, PAHs, and lead. BTEX compounds were detected in B-4, B-18, and 53M01. Benzene concentrations ranged from below detection limits in 25M04 to 1,300 µg/L in B-18. Wells displaying benzene concentrations above the site specific ARAR MCL include B-4 (17 µg/L), B-18 (1,300 µg/L), and 53M01 (95 µg/L). Elevated toluene, ethylbenzene, and xylenes concentrations were displayed in B-4, B-18, and 53M01. B-18 displayed a toluene concentration (8,900 µg/L) which exceeded site specific ARAR MCLs. No other BTEX compounds exceeded site specific ARAR MCLs. Lead was detected in B-4 (1.4 µg/L) and B-18 (5.8 µg/L). PAH compounds were also detected in monitor wells B-4, B-18, and 53M01.

On 1 & 2 October 1996, twenty-three 1.25 inch product probes, four two inch diameter monitor wells (B-3, B-14, B-15, and B-18), one 8 inch recovery well, and three 6 inch steel casing wells were decommissioned at DP25 Casings were removed for all monitor well and product probes and the resultant holes were filled with bentonite pellets. An attempt was made to remove the recovery well casing, but the casing sheared approximately 3 ft below grade. The well was abandoned by filling the well with bentonite pellets. Steel casing for three six inch wells could not be removed. Soil was excavated from around each well and the casings were cut approximately 3 ft below grade. Two of the wells were filled with bentonite pellets; the third well (original top of casing slightly below grade) had filled with soil and gravel prior to decommissioning activities. The soil was removed from the upper six inches of the cut casing and the void was filled with bentonite pellets. A thick layer of bentonite was also placed in the bottom of the hole used to cut the casing below grade. These wells were decommissioned in preparation for liners to be installed in earthen sumps surrounding bulk storage tanks.

1997 Results

During the 1997 field season, total BTEX immunoassay testing was used to monitor wells 25M04, 25M06, 25-2, and 53M01. Monitor wells 25-2, 25M04, and 25M06 displayed total BTEX concentrations below the detection level (<20 ppb) of the immunoassay kit. Monitor well 53M01 displayed a total BTEX concentration of 1,070 ppb.

Cumulative analytical and immunoassay data in downgradient monitor wells 25M04 and 25M06 have consistently displayed non detectable BTEX concentrations. 53M01 has consistently displayed elevated BTEX concentrations since groundwater monitoring was initiated at DP25.

References for DP25:

1995 OU 3,4,5 Record of Decision, USAF, September 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 OU 3,4,5 Remedial Design, USAF, May 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for DP-25:

List of Tables for DP-25:

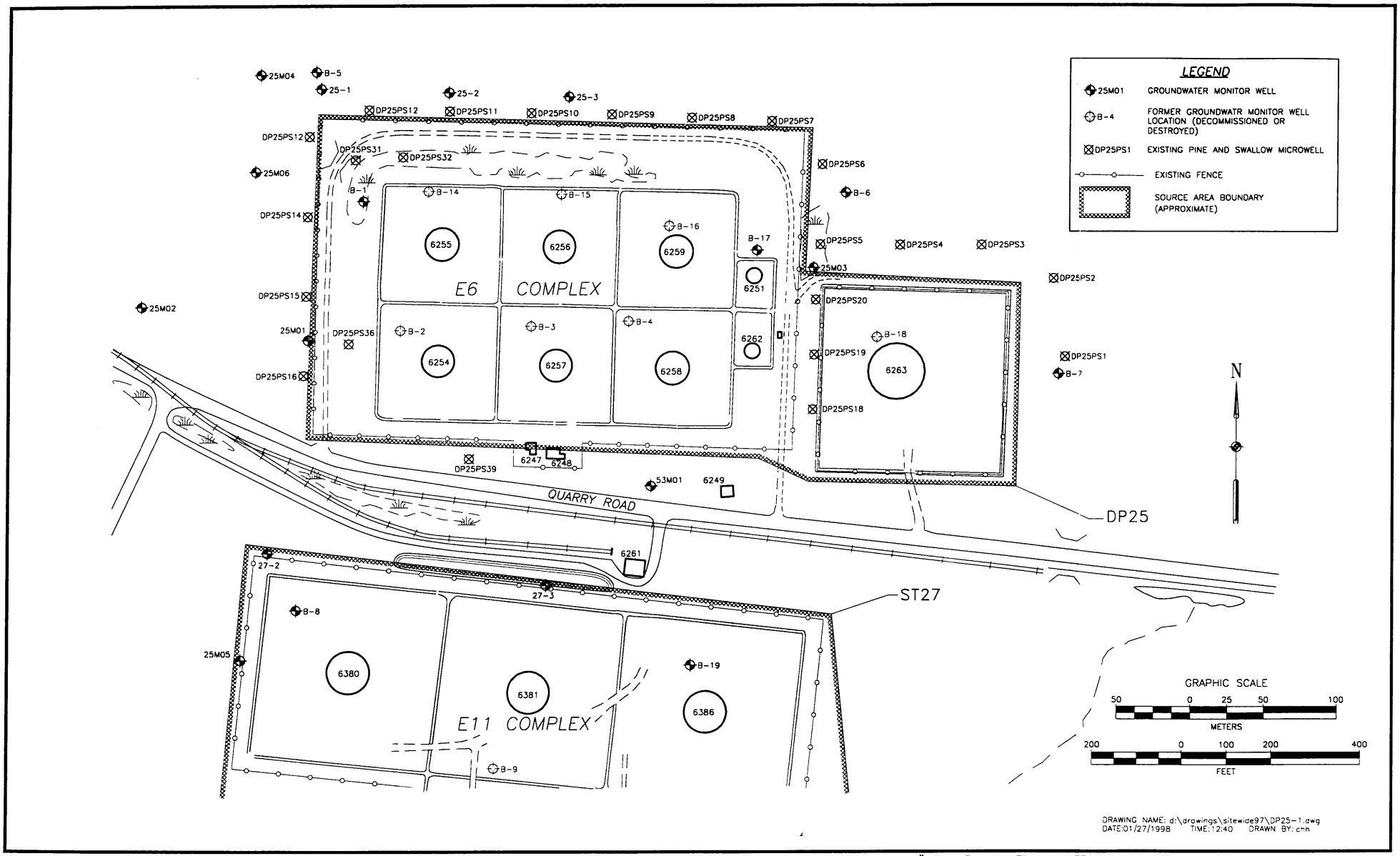


Figure DP25-1. DP25 Site Plan Showing Locations of Groundwater Monitor Wells and 1.25" Well Points, Eielson AFB, Alaska

TABLE DP25-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS AND LEAD IN GROUNDWATER SAMPLES, DP25, E-6 FUEL TANK SLUDGE BURIAL PIT, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)								Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	Dissolved Lead	Total Lead			
B-1	1988	290	--	--	--	--	--	--	--	1,4,11		PNL 1995 OU 3,4,5 RI
B-1	6/10/92	61	<2.0	22	180	--	--	--	--	1,4,11		PNL 1995 OU 3,4,5 RI
B-1	8/10/92	83	<2.0	<2.0	280	--	--	--	--	1,4,11		PNL 1995 OU 3,4,5 RI
B-1	4/6/93	150	<5.0	--	300	<2,000	1,600	--	<5	8,11	a,b	PNL 1995 OU 3,4,5 RI
B-1	9/20/94	69	28	24	135	1,700	<700	--	--			Pine & Swallow, 1994
B-2	1988	250	--	--	--	--	--	--	--			PNL 1995 OU 3,4,5 RI
B-3	1988	3.0	10	2.0	15	--	--	--	--	1,4,11		PNL 1995 OU 3,4,5 RI
B-4	1988	--	34,000	--	--	--	--	--	--	1,4,11		PNL 1995 OU 3,4,5 RI
B-4	4/6/93	<5.0	250	--	2,600	1,900	1,100	--	12	8,11	a,b	PNL 1995 OU 3,4,5 RI
B-4	9/20/94	480	710	840	1,710	19,000	7,400	--	--			Pine & Swallow, 1994
B-4	8/20/96	17	69	330.0	2,630	--	--	--	1.4	1,11		USAF 1996 SWMPR
B-5	4/7/93	<5.0	<5.0	--	<5.0	<2,000	<100	--	12	8,11	a,b	PNL 1995 OU 3,4,5 RI
B-6	4/8/93	<5.0	<5.0	--	<5.0	<2,000	<100	--	42	8,11	a,b	PNL 1995 OU 3,4,5 RI
B-7	4/8/93	<5.0	<5.0	--	<5.0	<2,000	<100	--	40	8,11	a,b	PNL 1995 OU 3,4,5 RI
B-14	1988	--	--	--	--	--	--	--	362	1,4,11		PNL 1995 OU 3,4,5 RI
B-14	4/6/93	<5.0	<5.0	--	<5.0	<2,000	<100	--	33	8,11	a,b	PNL 1995 OU 3,4,5 RI
B-14	9/20/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	--			Pine & Swallow, 1994
B-15	1988	150	1,200	--	--	--	--	--	291	1,4,11	a	PNL 1995 OU 3,4,5 RI
B-15	8/12/92	53	210	150	480	--	--	--	<5.0	1,4,11		PNL 1995 OU 3,4,5 RI
B-15	4/14/93	20	36	--	230	950	1,100	--	9.2	8,11	a,b	PNL 1995 OU 3,4,5 RI
B-15	9/20/94	31	94	150	230	4,300	2,800	--	--			Pine & Swallow, 1994
B-16	1988	46	6,800	1,000	8,600	--	--	--	5.0	1,4,11		PNL 1995 OU 3,4,5 RI

TABLE DP25-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)								Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	Dissolved Lead	Total Lead			
B-17	1988	3.0	7.0	<5.0	13	--	--	--	44.3	1,4,11		PNL 1995 OU 3,4,5 RI
B-17	4/14/93	<5.0	<5.0	--	<5.0	--	--	--	60	8,11	a	PNL 1995 OU 3,4,5 RI
B-18	1988	7,900	24,000	2,000	9,100	--	--	--	66.4	1,4,11		PNL 1995 OU 3,4,5 RI
B-18	4/14/93	1,700	8,900	1,900	3,400	--	--	--	21	8,11	a	PNL 1995 OU 3,4,5 RI
B-18	1994	2,810	11,300	1,100	--	--	--	--	--		c	CRREL, 1994
B-18	10/6/94	1,700	6,100	1,100	2,340	28,000	17,000	--	--			Pine & Swallow, 1994
B-18	8/20/96	1,300	8,900	1,000	5,200	--	--	--	5.8	1,11		USAF 1996 SWMPR
25M01	1988	<0.15	<0.25	<0.46	<0.85	--	--	<1.0	49	1,4,11		PNL 1995 OU 3,4,5 RI
25M01	8/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	<5.0	1,4,11	a	PNL 1995 OU 3,4,5 RI
25M01	4/7/93	<5.0	<5.0	--	<5.0	<2,000	<100	--	5.7	8,11	a	PNL 1995 OU 3,4,5 RI
25M02	1988	--	<0.25	<0.46	<0.85	--	--	<1.0	16	1,4,11		PNL 1995 OU 3,4,5 RI
25M02	8/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	<5.0	1,4,11	a	PNL 1995 OU 3,4,5 RI
25M02	4/7/93	<5.0	<5.0	--	<5.0	<2,000	<100	--	<5.0	8,11	a	PNL 1995 OU 3,4,5 RI
25M03	1988	3.3	<0.25	<0.46	1.11	--	--	<1.0	6.0	1,4,11		PNL 1995 OU 3,4,5 RI
25M04	1988	<0.15	<0.25	<0.46	<0.85	--	--	<1.0	55	1,4,11		PNL 1995 OU 3,4,5 RI
25M04	8/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	<5.0	1,4,11	a	PNL 1995 OU 3,4,5 RI
25M04	4/7/93	<5.0	<5.0	--	<5.0	<2,000	<100	<1.0	<5.0	8,11	a,b	PNL 1995 OU 3,4,5 RI
25M04	8/20/96	<1.0	<1.0	<1.0	<1.0	--	--	--	<1.0	1,11		USAF 1996 SWMPR
25M05	1988	<0.15	<0.25	<0.46	<0.85	--	--	--	8.0	1,4,11		PNL 1995 OU 3,4,5 RI
25M06	1988	<0.15	<0.25	<0.46	<0.85	--	--	--	46	1,4,11		PNL 1995 OU 3,4,5 RI
25M06	8/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	<5.0	1,4,11	a	PNL 1995 OU 3,4,5 RI
25M06	4/7/93	<5.0	<5.0	--	<5.0	<2,000	<100	--	<5.0	8,11	a,b	PNL 1995 OU 3,4,5 RI

TABLE DP25-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	Dissolved Lead	Total Lead	Analytical Methods	Notes	Reference
53M01	1988	985	4,680	902	2,810	--	--	<1.0	16	1,4,11		PNL 1995 OU 3,4,5 RI
53M01	4/8/93	60	170	740	730	<2,000	3,800	--	<5.0	8,11	a	PNL 1995 OU 3,4,5 RI
53M01	9/27/94	150	580	860	680	19,000	39,000	--	--			Pine & Swallow, 1994
53M01	8/20/96	95	210	150	820	--	--	--	<1.0	1,11		USAF 1996 SWMPR

Notes: a. For additional compounds detected, see reference.
b. TPH GRO and TPH DRO were analyzed by Data Chem Labs by EPA Method 8015, not ADEC GRO (8015M) and ADEC DRO (8100M).
c. Only results above the MCL for BTEX compounds were reported.

Background mean concentrations for lead: dissolved, <1.0 µg/L; total, 21 µg/L.
Background maximum concentrations for lead: dissolved, <1.0 µg/L; total, 48 µg/L.
Background 95 percent UCL concentrations for lead: dissolved, <1.0 µg/L; total, 33 µg/L.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421.
12. 8310

TABLE DP25-2 CONCENTRATIONS (µg/L) OF PAH ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, DP25, E-6 FUEL TANK SLUDGE BURIAL PIT, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L) Naphthalene	Acenaphthylene	Fluorene	Phenanthrene	Fluoranthene	Pyrene	Benzo [a] - anthracene	Benzo [b] fluoranthene	Benzo [k] - fluoranthene	Benzo [a] - pyrene	Analytical Methods	Notes	Reference
B-4	8/20/96	37.0	<2.3	0.17	0.53	0.90	0.30	0.096	0.022	0.012	0.029	12		USAF 1996 SWMP
B-18	8/20/96	44	2.7	0.53	1.0	0.71	<0.27	0.120	<0.018	<0.019	<0.024	12		USAF 1996 SWMP
25M04	8/20/96	<1.8	<2.3	<0.21	<0.64	<0.21	<0.27	<0.014	<0.018	<0.019	<0.024	12		USAF 1996 SWMP
53M01	8/20/96	7.9	<2.3	0.11	<0.64	<0.21	<0.27	<0.014	<0.018	<0.019	<0.024	12		USAF 1996 SWMP

Notes:

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421.
12. 8310

TABLE DP25-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, DP25, E-6 FUEL TANK SLUDGE BURIAL PIT, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)		
B-4	8/20/96	1.64	--	11.2	36	265	6.7	--	--		USAF 1996 SWMPR
B-18	8/20/96	4.01		7.9	48	361	6.57	--	--		USAF 1996 SWMPR
25-2	8/25/97	1.48	14.0	12.2	42	318	7.64	80	0.00nd		USAF 1997 SWMPR
25M04	8/20/96	2.98	--	12	32	275	6.92	--	--		USAF 1996 SWMPR
25M04	8/25/97	0.49	4.5	10.4	3	344	7.77	-16	nd		USAF 1997 SWMPR
25M06	8/25/97	2.4	22.0	9.2	28	298	8.64	-66	nd		USAF 1997 SWMPR
53M01	8/20/96	3.12	--	11.9	4	361	6.91	--	--		USAF 1996 SWMPR
53M01	8/25/97	0.98	9.0	10.6	40	394	7.61	-39	1,070		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.

DP26: see ST13/DP26

ST27 E-11 Fuel Storage Tank Area

COCs, RAOs, and ARARs

BTEX compounds and lead are COCs for ST27. DRO and GRO has also been detected during previous sampling events. The following table lists ARARs established to address groundwater quality at ST27 and other OU 3,4,5 source areas. RAOs have not been established for OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*contd.*)	ARAR (Groundwater) - Drinking water MCL (*contd.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

ST27 is a fence-enclosed complex of five fuel tanks on the south side of Quarry Road approximately 2,000 feet southeast of Spruce Lake. The area is actively used for storage of JP8. The tank facility is being upgraded under a project begun in 1994. Before 1980, this source area was identified as a location where sludge from tank cleaning operations was buried in shallow trenches in the tank area. The RI/FS results indicate that no fuel contamination is present in groundwater. ST27 was recommended for no further action in the OUs 3,4,5 ROD.

Previous Activities

During the 1994 SWMP, groundwater samples were collected from wells B-8, B-11, and B-19 to verify the absence of fuel-related contamination and to monitor lead concentrations. DRO and GRO were not detected in the ST27 samples. Total lead concentrations ranged from 38 µg/L to 54 µg/L. In June 1992, total lead concentrations were measured at 12 µg/L to 120 µg/L in

groundwater samples. These values, however, are not directly comparable with the 1994 data because of different sample preparation procedures. The 1994 result of 54 µg/L in the groundwater sample from well B-8 exceeds the 1994 UCL total lead background value of 33 µg/L.

Analytical results for samples collected in 1995 indicated lead concentrations lower than measured in 1994, that did not exceed the UCL values. Dissolved BTEX was below method detection limits.

During the 1996 field season, monitor wells B-8, B-11, B-13, and B-19 were sampled for BTEX, lead, and PAHs. Toluene, ethylbenzene, and xylenes were detected in monitor wells B-8, B-11, and B-19; ethylbenzene and xylenes were detected in B-13. The highest concentrations of toluene, ethylbenzene, and xylenes were detected in B-19 at 16 µg/L, 7 µg/L, and 47 µg/L, respectively. No BTEX concentrations were detected above site specific ARAR MCLs. Lead concentrations ranged from <1.0 µg/L (B-11, B-13) to 3.5 µg/L (B-19). No lead concentrations exceeded the site specific ARAR MCLs. Naphthalene (1.1 µg/L - B-19), dibenzo [a,h] anthracene (0.021 µg/L - B-13), and benzo [k] fluoranthene (0.011 µg/L - B-13) were also detected. Applicable EPA drinking water MCLs were not identified for these compounds.

Monitor well B-9 was decommissioned at ST27 on 1 October 1996. The well was decommissioned by pulling the casing and filling the borehole with bentonite chips. The well was decommissioned in preparation for a liner which was to be installed in one of the earthen sumps surround a bulk fuel storage tank.

1997 Results

During the 1997 field season, total BTEX immunoassay testing was used to monitor wells B-8, B-11, and B-19. Immunoassay testing results displayed total BTEX concentrations below detection limits (<20 ppb) in all wells. Cumulative analytical and total BTEX immunoassay data at B-8, B-11, and B-19 have consistently displayed low to non detectable total BTEX concentrations since groundwater monitoring was initiated at ST27.

References for ST27:

1994 Sitewide Groundwater Monitoring Program Report, PNL, January 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Groundwater Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Groundwater Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST27:

List of Tables for ST27:

List of Tables for ST27 (continued):

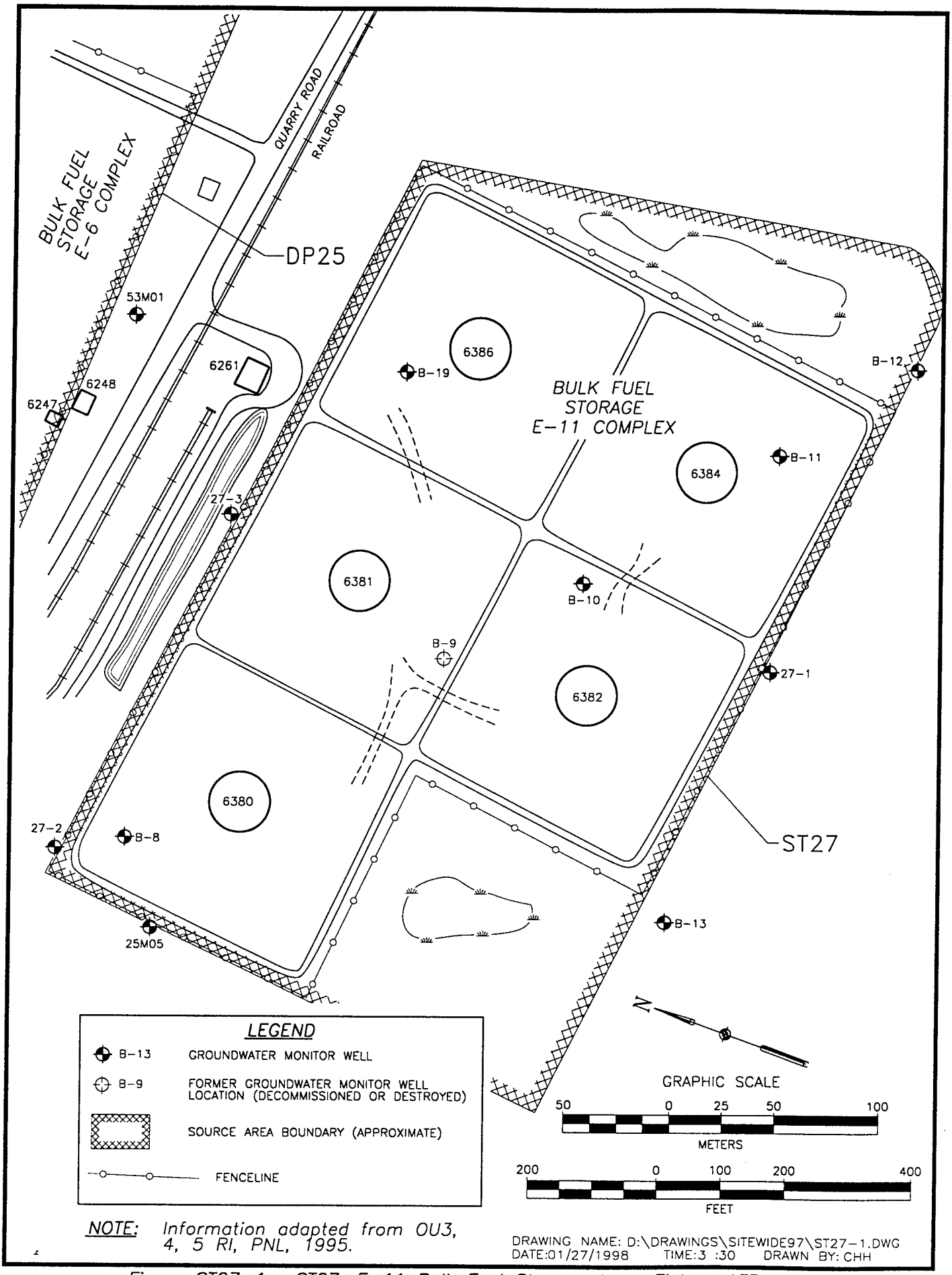


Figure ST27-1. ST27, E-11 Bulk Fuel Storage Area, Eielson AFB, Alaska

TABLE ST27-1 CONCENTRATIONS (µg/L) OF VOLATILE ORGANIC COMPOUNDS AND LEAD IN GROUNDWATER SAMPLES, ST27, E-11 FUEL STORAGE TANK AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)								Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	Dissolved Lead	Total Lead			
B-8	6/10/92	<2.0	<2.0	<2.0	<5.0	--	--	--	22	1,4,11	a	PNL 1995 OU 3,4,5 R
B-8	8/14/92	<2.0	<2.0	<2.0	<5.0	--	--	--	8.4	1,4,11	a	PNL 1995 OU 3,4,5 R
B-8	8/5/94	--	--	--	--	<250	<250	--	54	9-11		PNL 1994 SWGMPR
B-8	10/6/95	<1.0	<1.0	<1.0	<1.0	<50	150	<1.0	8.7	1-4,11	a	USAF 1995 SWMPR
B-8	8/20/96	<1.0	6.6	2.9	19.8	--	--	--	3.4	1,11	b	USAF 1996 SWMPR
B-9	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	6.8	1,4,11	a	PNL 1995 OU 3,4,5 R
B-9	8/14/92	<2.0	<2.0	<2.0	<5.0	--	--	--	<5.0	1,4,11	a	PNL 1995 OU 3,4,5 R
B-10	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	21	1,4,11	a	PNL 1995 OU 3,4,5 R
B-10	8/14/92	<2.0	<2.0	<2.0	<5.0	--	--	--	<5.0	1,4,11	a	PNL 1995 OU 3,4,5 R
B-10	4/14/93	--	--	--	--	--	--	--	22	11		PNL 1995 OU 3,4,5 R
B-11	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	12	1,4,11	a	PNL 1995 OU 3,4,5 R
B-11	8/14/92	<2.0	<2.0	<2.0	<5.0	--	--	--	<5.0	1,4,11	a	PNL 1995 OU 3,4,5 R
B-11	4/14/93	--	--	--	--	--	--	--	18	11		PNL 1995 OU 3,4,5 R
B-11	8/5/94	--	--	--	--	<250	<250	--	38	9-11		PNL 1994 SWGMPR
B-11	10/6/95	<1.0	<1.0	<1.0	<1.0	<50	110	<1.0	7.7	1-4,11	a	USAF 1995 SWMPR
B-11	8/20/96	<1.0	7.0	3.3	22.2	--	--	--	<1.0	1,11	b	USAF 1996 SWMPR
B-12	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	<5.0	1,4,11	a	PNL 1995 OU 3,4,5 R
B-12	8/21/92	--	<2.0	<2.0	<5.0	--	--	--	<5.0	1,4,11	a	PNL 1995 OU 3,4,5 R
B-13	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	120	1,4,11	a	PNL 1995 OU 3,4,5 R
B-13	4/14/93	--	--	--	--	--	--	--	<5.0	11		PNL 1995 OU 3,4,5 R
B-13	10/5/95	<1.0	<1.0	<1.0	<1.0	54	100	<1.0	3.3	1-4,11	a	USAF 1995 SWMPR
B-13	8/20/96	<1.0	<1.0	1.3	9.0	--	--	--	<1.0	1,11	b	USAF 1996 SWMPR

TABLE ST27-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	Dissolved Lead	Total Lead	Analytical Methods	Notes	Reference
B-14	1988	--	--	--	--	--	--	--	362	1,4,11		PNL 1995 OU 3,4,5 R
B-14	4/14/93	<5.0	<5.0	--	<5.0	<2,000	<100	--	33	8,11	a	PNL 1995 OU 3,4,5 R
B-19	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	--	18	1,4,11	a	PNL 1995 OU 3,4,5 R
B-19	8/14/92	<2.0	<2.0	<2.0	<5.0	--	--	--	6.6	1,4,11	a	PNL 1995 OU 3,4,5 R
B-19	4/14/93	--	--	--	--	--	--	--	23	11		PNL 1995 OU 3,4,5 R
B-19	8/5/94	--	--	--	--	<250	<250	--	40	9-11		PNL 1994 SWGMPR
B-19	10/5/95	<1.0	<1.0	<1.0	<1.0	52	120	<1.0	2.0	1-4,11	a	USAF 1995 SWMPR
B-19	8/20/96	<1.0	16.0	7.0	47.0	--	--	--	3.5	1,11	b	USAF 1996 SWMPR

Notes: a. No compounds other than those listed were detected above the reporting limits.
b. Toluene, ethylbenzene, and xylenes concentrations may be the result of field cross contamination.

Background mean concentrations for lead: dissolved, <1.0 µg/L; total, 21 µg/L.
Background maximum concentrations for lead: dissolved, <1.0 µg/L; total, 48 µg/L.
Background 95 percent UCL concentrations for lead: dissolved, <1.0 µg/L; total, 33 µg/L.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421.

TABLE ST27-2 CONCENTRATIONS (µg/L) OF PAH ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST27, E-11 FUEL STORAGE TANK AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (mg/L) Naphthalene	Dibenzo [a,h] - Anthracene	Benzo [k] - Fluoranthen	Analytical Methods	Notes	Reference
B-8	8/20/96	<1.8	<0.030	<0.019	13		USAF 1996 SWMPR
B-11	8/20/96	<1.8	<0.030	<0.019	13		USAF 1996 SWMPR
B-13	8/20/96	<1.8	0.021	0.011	13		USAF 1996 SWMPR
B-19	8/20/96	1.1	<0.030	<0.019	13		USAF 1996 SWMPR

Analytical Methods:

1. 8020.	3. ADEC 8100M	5. 8270.	7. 8260.	9. 8270.	11. 7421.	13. 8310
2. ADEC 8015M.	4. 8010	6. 8080.	8. 8240.	10. 8080.	12. 6020.	

TABLE ST27-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST27, E-11 FUEL STORAGE TANK AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)		
B-8	10/6/95	3.1	--	7	--	190	6.84	--	--		USAF 1995 SWMPR
B-8	8/20/96	0.98	--	9.2	87	206	6.9	--	--		USAF 1996 SWMPR
B-8	8/26/97	0.60	5.3	9.4	20	334	7.36	114	nd		USAF 1997 SWMPR
B-11	10/6/95	5.4	--	7	--	190	6.93	--	--		USAF 1995 SWMPR
B-11	8/20/96	0.67	--	8.5	144	209	7	--	--		USAF 1996 SWMPR
B-11	8/26/97	0.79	7	9.0	40	288	7.07	137	nd		USAF 1997 SWMPR
B-13	10/5/95	2.8	--	7	--	180	7.15	--	--		USAF 1995 SWMPR
B-13	8/20/96	6	--	12	<10	100	7.2	--	--		USAF 1996 SWMPR
B-19	10/5/95	2.6	--	7	--	210	7.04	--	--		USAF1995 SWMPR
B-19	8/20/96	3.27	--	8.8	59	314	6.95	--	--		USAF 1996 SWMPR
B-19	8/26/97	0.84	7.4	8.8	22	388	7.01	-45	nd		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.

SS31 PCB Storage Facility

COCs, RAOs, and ARARs

Halogenated hydrocarbons are COCs for SS31. The following table lists RAOs and ARAR MCLs established to address groundwater quality at OU2 source areas.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L
Naphthalenes:		
2 -Methylnaphthalene	140 µg/L	--
Naphthalene	220 µg/L	--
Lead	[1]15 µg/L	[1]15 µg/L

[1] EPA Action Level

Site Setting

SS31 is located on Warehouse Court between Central and Industrial Avenues, in the area surrounding Building 3424. The four main water supply wells are located within 0.5 mile of SS31. Water supply Wells A, B, and D are used for drinking water supply, while Well C is used to supply water for the fire protection system.

Source area SS31 was used to store undrained and empty transformer casings as well as PCB-contaminated liquids and soils from a cleanup of a PCB spill at another location. Other waste materials such as paint, paint remover, and solvents were also stored at SS31. The PCB equipment and waste material stored at SS31 were removed around 1982 for off-base disposal. Currently, no PCB materials are stored at SS31.

In September 1986, a RCRA inspection at Building 3424 identified improperly stored and labeled waste containers. By joint agreement among the USAF, EPA, and ADEC, this area was addressed as part of the CERCLA source area SS31.

There is no indication that SS31 is a source of contamination based on the fact that Building 3424 were properly curbed and diked to prevent releases. There is no evidence of spills inside or surrounding the building.

The selected remedy in the 1994 OU2 ROD was no further action. Monitor well W-4, previously located just upgradient of Building 3424, displayed elevated levels of total organic halogens, oil, grease, and lead. These contaminants are not attributed to SS31. The OU2 ROD states that monitor well W-4 will be monitored to determine the source of contamination under the Sitewide operable unit.

1997 Results

Monitoring well W-4 could not be located during the 1996 or 1997 field seasons and is believed to have been destroyed.

References for SS31:

1991 Source Evaluation Report, Battelle Environmental, December 1991
1994 OU2 Record of Decision, USAF, September 1994
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for SS31:

Figure SS31-1 SS31 Site Plan, Eielson AFB, Alaska.

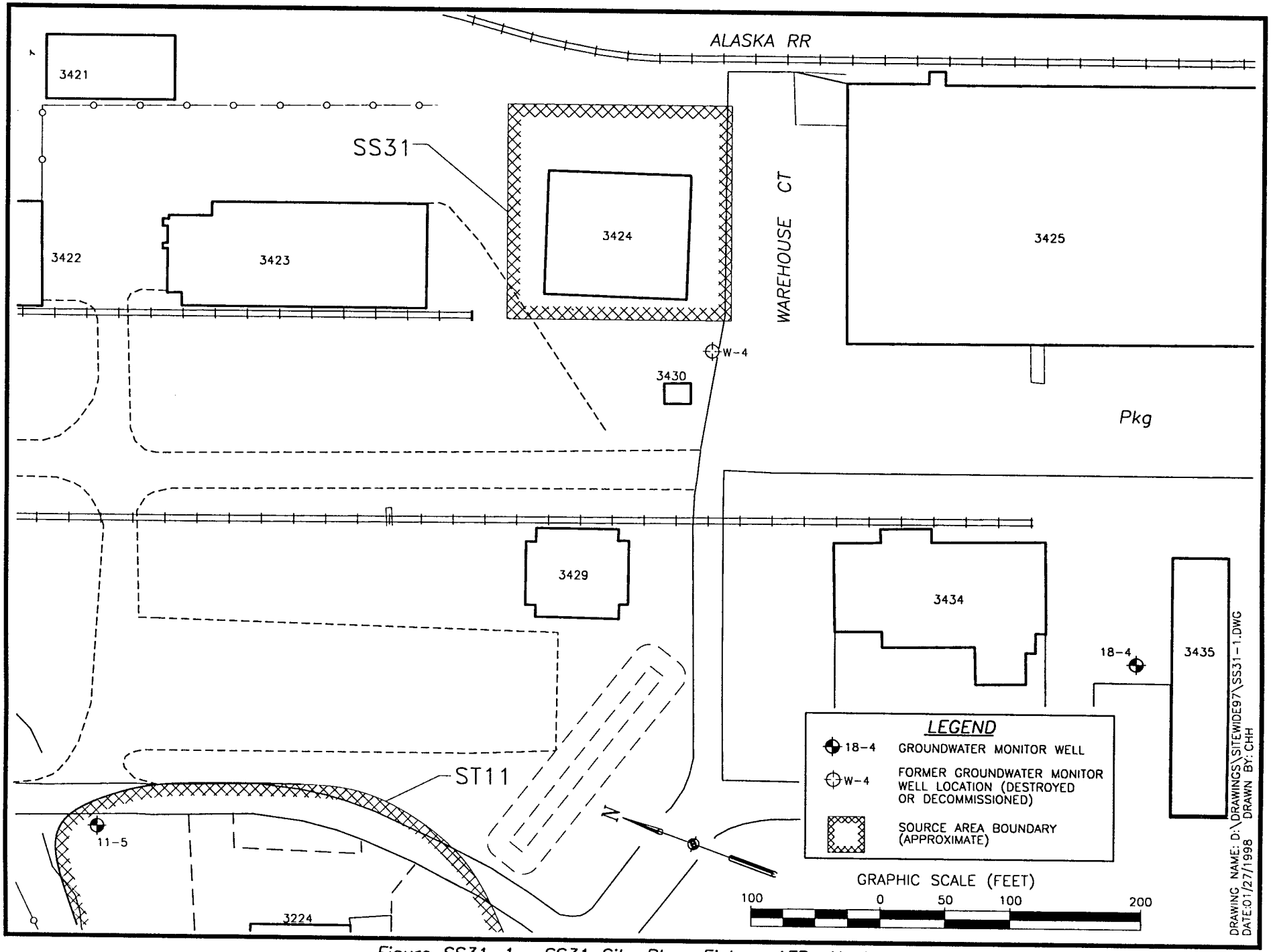


Figure SS31-1. SS31 Site Plan, Eielson AFB, Alaska

SS35 Asphalt Mixing Area

COCs, RAOs, and ARARs

BTEX compounds, VOCs, and pesticides are COCs for SS35. DRO and GRO has also been detected during previous sampling events. The following table lists ARAR MCLs established to address groundwater quality at SS35 and other OU 3,4,5 source areas. RAOs have not been established for OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

SS35 is located in the central part of the base adjacent to Central Avenue, about 0.2 miles south of the Water Treatment Plant. Historical information is incomplete regarding use of this site, however, it is documented that SS35 was used as a mixing area from the early 1950s to the late 1960s. Asphalt-cement was mixed in a tank and used for road maintenance. Waste oils and solvents were mixed with contaminated fuels and used for road oiling to control dust. About 200 empty asphalt-cement drums were reported disposed of along the banks of Garrison Slough. The area may also have been used for mixing pesticides and cleaning pesticide spraying equipment.

The selected remedy in the 1995 OU 3,4,5 ROD was preparation of a soil cap over the surface contamination to prevent direct contact by humans, animals, and surface water runoff into Garrison Slough. An amendment to the 1995 OUs 3, 4, 5 ROD is currently under review by the

EPA and ADEC. The Proposed ROD Amendment selects continued monitoring of surface water, sediment, and aquatic organisms in Garrison Slough to confirm COC concentrations remain at levels protective of human health and the environment.

Previous Activities

Surface soils were sampled in 1990 and 1992 for organochlorine pesticides. DDT was detected in these samples at the source area and in slough sediments adjacent to the source area.

During the 1996 field season, samples of surface water, sediments, and aquatic organisms were collected from the water treatment plant adjacent to SS35 to monitor the concentrations of pesticides in these media. One sample of surface water was collected directly from the pond adjacent to 35M08. Two samples of sediment were collected from the pond bottom near 35M08 and near 35M02. The sediment samples were collected using a clam gun. No fish were caught using both hook-and-line and a backpack electroshocking unit. One sample each of submerged vegetation and aquatic invertebrates were collected from the pond adjacent to the source area. No pesticides were detected in the surface water sample. The highest levels of DDT (47,000 µg/kg), DDD (72,000 µg/kg), and DDE (3,700 µg/kg) were detected in the sediment sample collected near 35M02. Low levels of the same pesticides were detected in the invertebrate sample. Only DDD was detected in the vegetation sample. Applicable ARAR MCLs and EPA drinking water MCLs were not identified for these compounds.

1997 Results

Monitor wells 35M02, 35M05, and 35M08 were sampled during the 1997 field season for pesticides and PCB compounds. No pesticide or PCB compounds were detected in these samples. Aquatic invertebrates and plants were collected from the pond adjacent to SS35 and analyzed for 4,4'-DDE, 4,4'-DDD, and 4,4'-DDT. As displayed in Table SS35-2, analytical results indicated higher concentrations of these compounds in the aquatic invertebrates, as compared to invertebrates collected during the 1996 field season. The higher concentrations is possibly due to 1997 invertebrate sample locations differing from the previous year. Analytical results for SS35 aquatic plants indicate these compounds are generally in the same order of magnitude as concentrations detected during the 1996 SWMP. Additional sampling events will be necessary before a trend can be determined for these compounds in SS35 aquatic organisms.

References for SS35:

1995 OU 3,4,5 Final Record of Decision, Final, September 1995
1996 OU 3,4,5 Remedial Design, USAF, May 1996
1996 OU 2,3,4,5 Proposed ROD Amendments, USAF, May 1996
1996 Sitewide Groundwater Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Groundwater Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for SS35:

List of Tables for SS35:

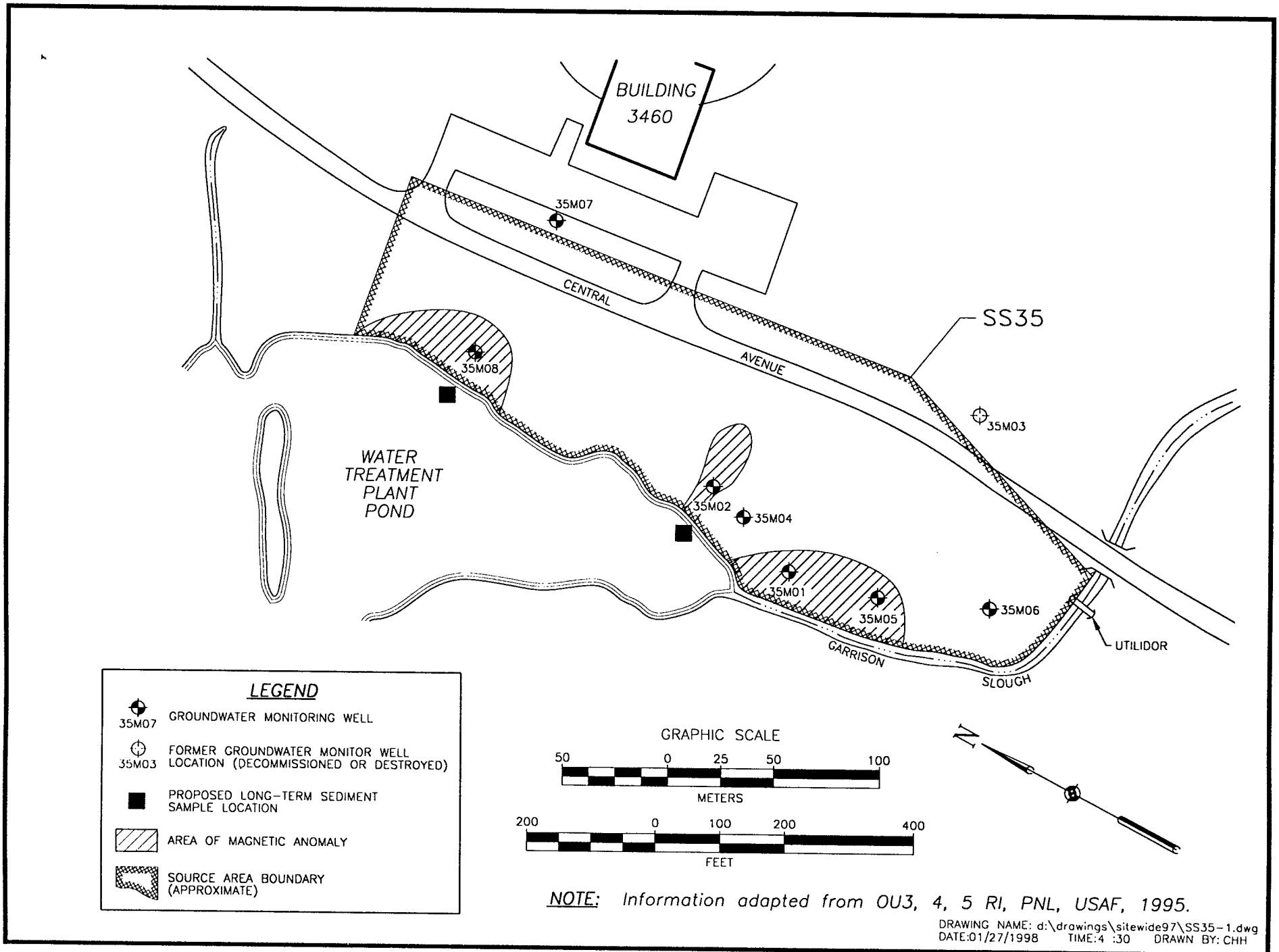


Figure SS35-1. SS35 Site Plan, Eielson AFB, Alaska

TABLE SS35-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS AND LEAD IN GROUNDWATER SAMPLES, SS35, ASPHALT MIXING AND DRUM BURIAL AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)							Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Total Lead			
35M01	8/20/92	<2.0	<2.0	<2.0	<2.0	--	--	<5.0	1,4,6,11	a	PNL 1995 OU3,4,5 RI
35M02	8/20/92	<2.0	<2.0	<2.0	<2.0	--	--	15	1,4,6,11	a	PNL 1995 OU3,4,5 RI
35M03	8/20/92	<2.0	<2.0	<2.0	<2.0	--	--	<5.0	1,4,6,11	a	PNL 1995 OU3,4,5 RI
35M04	8/20/92	<2.0	<2.0	<2.0	<2.0	--	--	6.3	1,4,6,11	a	PNL 1995 OU3,4,5 RI
35M05	8/20/92	<2.0	<2.0	<2.0	<2.0	--	--	15	1,4,6,11	a	PNL 1995 OU3,4,5 RI
35M06	8/20/92	<2.0	<2.0	<2.0	<2.0	--	--	<5.0	1,4,6,11	a	PNL 1995 OU3,4,5 RI
35M07	8/20/92	<2.0	<2.0	<2.0	<2.0	--	--	10	1,4,6,11	a	PNL 1995 OU3,4,5 RI
35M08	8/20/92	<2.0	<2.0	<2.0	<2.0	--	--	<5.0	1,4,6,11	a	PNL 1995 OU3,4,5 RI

Notes: a. No compounds other than those listed were detected above the reporting limits set forth in the reference.

Background mean concentrations for lead: dissolved, <1.0 µg/L; total, 21 µg/L.
Background maximum concentrations for lead: dissolved, <1.0 µg/L; total, 48 µg/L.
Background 95 percent UCL concentrations for lead: dissolved, <1.0 µg/L; total, 33 µg/L.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. EPA 7421.

TABLE SS35-2 CONCENTRATIONS (µg/kg) OF PESTICIDE COMPOUNDS IN VEGETATION, SURFACE WATER, INVERTEBRATE AND SEDIMENT SAMPLES, SS35, ASPHALT MIXING AND DRUM BURIAL AREA, EIELSON AFB, ALASKA

Sample ID	Date Sampled	Concentration (µg/kg) 4,4-DDE	4,4-DDD	4,4-DDT	Analytical Methods	Notes	Reference
Sediment near 35M02	10/24/96	3,700	72,000	47,000	6	a	USAF 1996 SWMPR
Sediment near 35M08	10/24/96	110	780	160	6	b	USAF 1996 SWMPR
Invertebrates SS35	10/25/96	3.4	7.8	1.6	6	b	USAF 1996 SWMPR
Invertebrates SS35	10/3/97	85	280	56	6	c	USAF 1997 SWMPR
Surface Water (µg/L) SS35	10/24/96	<0.10	<0.10	<0.10	6	b	USAF 1996 SWMPR
Vegetation	9/25/96	<3.3	3.6	<3.3	6	b	USAF 1996 SWMPR
Vegetation	10/3/97	<1.2	6.0	0.55	6	d	USAF 1997 SWMPR

Notes:

a. Other compounds detected: Heptachlor Epoxide at 26 µg/kg.
b. No other compounds reported above detection limits.
c. Other compounds detected: Endosulfan Sulfate at 23 µg/kg.
d. Other compounds detected: Dieldrin at 0.52 µg/kg.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270
6. 8080
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE SS35-3 CONCENTRATIONS (µg/L) OF PESTICIDE AND PCB COMPOUNDS IN GROUNDWATER SAMPLES, SS35, ASPHALT MIXING AND DRUM BURIAL AREA, EIELSON AFB, ALASKA

Well Number	Date Sampled	Concentration (mg/L) 4,4-DDE	4,4-DDD	4,4-DDT	PCB	Analytical Methods	Notes	Reference
35M02	9/8/97	<0.1	<0.1	<0.1	<1.0	1	a	USAF 1997 SWMPR
35M05	9/2/97	<0.1	<0.1	<0.1	<1.0	1	a	USAF 1997 SWMPR
35M08	9/2/97	<0.1	<0.1	<0.1	<1.0	1	a	USAF 1997 SWMPR

Notes:

a. No compounds other than those listed were detected.

Analytical Methods:

1. 8080.

TABLE SS35-4 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, SS35, ASPHALT MIXING AND DRUM BURIAL AREA, EIELSON AFB, ALASKA

		Parameters							Immunoassay Results				
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2] (ppb)	Notes	Reference
35M02	9/8/97	0.78	6.6	6.9	0	294	8	58	--	--	--		USAF 1997 SWMPR
35M05	9/2/97	0.79	7.1	9.5	0	357	7.45	13	--	--	--		USAF 1997 SWMPR
35M08	9/2/97	1.34	11.5	7.6	13	297	7.68	62	--	--	--		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Dräger Liquid Extraction (DLE) field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.
The lower detection limit is 10 ppb on the Dräger Liquid Extraction (DLE) field test kit.

WP38 (OU6) Ski Lodge Well Contamination

COCs, RAOs, and ARARs

BTEX compounds and lead are COCs for WP38. DRO and GRO have also been detected during previous sampling events. The following table lists RAOs and ARAR MCLs established to address groundwater quality at WP38 (OU6).

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	--	10,000 µg/L

Site Setting

OU6 is a single source area at the ski hill facility in the southeast portion of the base. Fuel storage tanks were formerly located at the top of the ski hill; the tanks were removed in 1977. Dissolved fuel compounds were present in groundwater samples collected from monitor wells on the hillside and from supply and monitor wells near the bottom of the hill. Groundwater movement in the aquifer at OU6 is difficult to characterize because of the geologically complex setting. The higher elevations of the ski hill are underlain by heavily fractured and foliated schist bedrock, and the alluvial aquifer at the base of the hill contains discontinuous permafrost.

The ROD for OU6 was signed in September 1994. The selected remedy for OU6 was to supply safe drinking water to the ski lodge facility and to use institutional controls to prevent access to the groundwater at the site. Groundwater monitoring is conducted to record concentrations of fuel compounds in the alluvial and bedrock aquifers.

Monitor wells and former water supply wells near the ski lodge are sampled as part of the SWMP. Collecting groundwater samples from the wells at OU6 is logistically difficult because the wells in the bedrock of the ski hill are very deep (greater than 150 feet). The wells in the alluvial aquifer are installed in discontinuous permafrost, which causes the water in well casings to freeze. Heat tape was installed in 38M06 which is completed in permafrost and prone to freezing. Before samples are collected, the heat tape is energized and the groundwater in the casing thawed.

A submersible pump was stuck in the well casing at 38M01 during the August 1994 sampling event. The pump was successfully removed during the 1996 field season. A stuck pump was also removed from the former water supply well 8621.

Previous Activities

During the 1994 field season, seven wells at WP38 were sampled. Benzene was detected in two samples, at 400 µg/L (38M01) and 44.5 µg/L (38SLW - the former water supply well). Benzene was detected in these wells in 1993 at concentrations of 910 µg/L and 140 µg/L, respectively.

Wells 38M02 and 38SLW were sampled during the 1995 SWMP. Results were consistent with previous data. DRO was also detected in samples from both wells.

Monitor wells 38M01, 38M02, 38M06, 38M07, and 38M18 were sampled during the 1996 field season. Former supply wells 8621 and 38SLW were also sampled. BTEX compounds were detected in 38M01, 38M07, 38M18, 38SLW, and 8621. Benzene concentrations were detected in 38M01 (490 µg/L), 38SLW (110 µg/L), and 8621 (340 µg/L) which exceed OU6 ARAR MCLs and RAOs. Low to non detectable concentrations of toluene, ethylbenzene, and xylenes were detected in 38M01, 38M07, 38M18, and 8621. Total lead was detected in concentrations above the EPA drinking water action level of 15 µg/L and the 1994 background UCL of 32.6 µg/L in 38M02 (169 µg/L) and 38M06 (155 µg/L). Arsenic was detected in concentrations above the EPA drinking water MCL of 50 µg/L and 1994 background UCL of 37.0 µg/L in 38M02 (153 µg/L), 38M06 (115 µg/L), and 38M07 (88.9 µg/L).

On 27 September 1996, wells 8626, 38M07, and 38M16 were decommissioned. Well 38M16 was decommissioned by casing removal and filling the borehole with bentonite pellets. Wells 38M07 and 8626 (a former supply well) were decommissioned by cutting the casing below surface grade and filling the wells with bentonite pellets. The three wells were not useable due to a stuck pump (8626), blockage caused by frost heaving (38M07) and frost heaving (38M16). An additional well (38M18) was also installed at WP38 during the 1996 field season.

1997 Results

During the 1997 field season, total BTEX immunoassay testing was used to monitor wells 8621, 38M01, 38M02, 38M06, and 38M18. These wells all displayed total BTEX concentrations below detection limits (<20 ppb). Immunoassay results are consistent with previous analytical data in monitor wells 38M02, 38M06, and 38M18. Total BTEX immunoassay results for monitor wells 8621 and 38M01 were significantly lower than previous analytical results. These wells will require further monitoring to verify the 1997 immunoassay results.

Monitor wells 38M03 and 38M17 were decommissioned on 25 September 1997 by removing the well casing and filling the borehole with bentonite. These wells were decommissioned due to their location in relationship to the source area.

References for WP38:

1994 OU6 Record of Decision, USAF, July 1994
1994 Sitewide Groundwater Monitoring Program Report, PNL, January 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Operable Unit 6 - Report of Activities and Findings, USAF, October 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for WP38:

List of Tables for WP38:

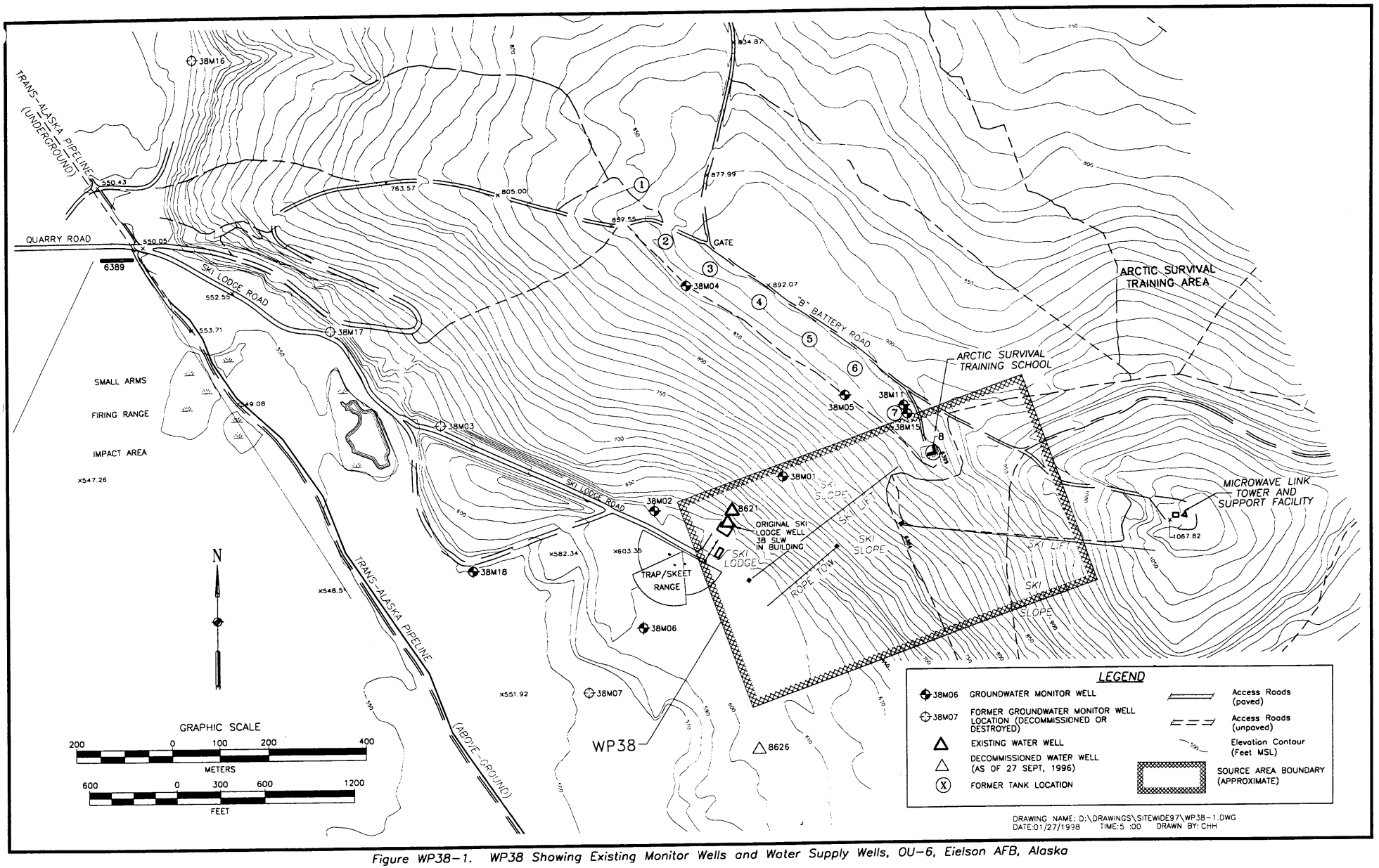


Figure WP38-1. WP38 Showing Existing Monitor Wells and Water Supply Wells, OU-6, Eielson AFB, Alaska

TABLE WP38-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, WP38, SKI LODGE WELL CONTAMINATION, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
38M01	1988	868	1,400	318	1,890	--	--	1,5	a	ES 1994 OU6 RI
38M01	1989	510	96.6	21.3	230	--	--	1,5	a	ES 1994 OU6 RI
38M01	1992	590	5.9	4.4	28	--	--		c	ES 1994 OU6 RI
38M01	7/9/93	910	27	<6.0	50	3,760	1,340	1,9,10		ES 1994 OU6 RI
38M01	8/9/94	400	<100	<100	<100	--	--	1,4		PNL 1994 SWGMPR
38M01	10/17/96	490	1.4	1.6	3.2	--	--	1	g	USAF 1996 SWMPR
38M02	1988	<0.15	0.64	<0.46	<0.85	--	--	1,5	a	ES 1994 OU6 RI
38M02	1989	<0.20	<0.30	<0.50	<0.40	--	--	1,5	a	ES 1994 OU6 RI
38M02	1992	<2.0	<2.0	<2.0	<5.0	--	--		c	ES 1994 OU6 RI
38M02	7/9/93	<0.3	<0.3	<0.3	<0.7	<60	<85	1,9,10		ES 1994 OU6 RI
38M02	8/6/94	<1.0	<1.0	<1.0	<1.0	--	--	1,4	b	PNL 1994 SWGMPR
38M02	12/29/94	<0.2	<0.3	0.22	2.48	--	--			USAF 1995 SWMWP
38M02	10/11/95	<1.0	<1.0	<1.0	<1.0	<50	160	1-3		USAF 1995 SWMPR
38M02	8/19/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
38M03	1988	<0.15	<0.25	<0.46	<0.85	--	--	1,5	a	ES 1994 OU6 RI
38M03	1989	<0.20	<0.30	<0.50	<0.40	--	--	1,5	a	ES 1994 OU6 RI
38M03	1992	<2.0	<2.0	<2.0	<5.0	--	--		c	ES 1994 OU6 RI
38M03	7/9/93	<0.3	<0.3	<0.3	<0.7	<60	<85	1,9,10		ES 1994 OU6 RI
38M03	8/6/94	<1.0	<1.0	<1.0	<1.0	--	--	1,4	b	PNL 1994 SWGMPR
38M03	12/29/94	<0.2	<0.3	<0.2	<0.4	--	--			USAF 1995 SWMWP
38M04	1988	3.77	2.15	<0.46	<0.85	--	--	1	a	ES 1994 OU6 RI
38M04	1989	<0.20	2.02	<0.50	<0.40	--	--	1	a	ES 1994 OU6 RI
38M04	1992	<2.0	<2.0	<2.0	<5.0	--	--		c	ES 1994 OU6 RI
38M04	7/10/93	<0.3	<0.3	<0.3	<0.7	<60	820	1,9,10		ES 1994 OU6 RI
38M05	1988	0.19	0.43	0.82	<0.85	--	--	1,5	a	ES 1994 OU6 RI
38M05	1989	0.43	1.1	<0.50	<0.40	--	--	1,5	a	ES 1994 OU6 RI
38M05	1992	<2.0	<2.0	<2.0	<5.0	--	--		c	ES 1994 OU6 RI
38M05	7/10/93	<0.3	<0.3	<0.3	<0.7	<60	830	1,9,10		ES 1994 OU6 RI

TABLE WP38-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Analytical Methods	Notes	Reference
38M06	1989	<0.20	<0.30	<0.50	<0.40	–	–	1,5	a	ES 1994 OU6 RI
38M06	8/10/94	<1.0	<1.0	<1.0	<1.0	–	–	1,4	b	PNL 1994 SWGMPR
38M06	10/1/96	<1.0	<1.0	<1.0	<1.0	–	–	1		USAF 1996 SWMPR
38M07	1989	<0.2	14.7	<0.5	<0.4	–	–	1,5	a	ES 1994 OU6 RI
38M07	1993	1.0	1.2	1.0	2.0	338	<20	1,9,10		ES 1994 OU6 RI
38M07	3/30/95	–	–	–	–	–	–		e	USAF 1995 SWMWP
38M07	8/22/96	<1.0	1.0	<1.0	<1.0	–	–	1,4		USAF 1996 SWMPR
38M16	7/8/93	<0.3	<0.3	<0.3	0.77	<60	940	1,9,10		ES 1994 OU6 RI
38M16	8/4/94	<1.0	<1.0	<1.0	<1.0	–	–	1,4	b	PNL 1994 SWGMPR
38M16	12/29/94	0.25	<0.3	0.38	1.54	–	–			USAF 1995 SWMWP
38M17	7/8/93	<0.3	<0.3	<0.3	<0.7	<60	<85	1,9,10		ES 1994 OU6 RI
38M17	8/6/94	<1.0	<1.0	<1.0	<1.0	–	–	1,4	b	PNL 1994 SWGMPR
38M17	12/29/94	0.21	0.72	<0.2	0.81	–	–			USAF 1995 SWMWP
38M18	9/18/96	<1.0	1.3	<1.0	<1.0	–	–	1		USAF 1996 SWMPR
38SLW	7/8/93	140	<2.0	<2.0	<4.0	<300	560	1,9,10		ES 1994 OU6 RI
38SLW	3/9/94	20	<1.0	<1.0	<1.0	–	–	1,4	d	PNL 1994 SWGMPR
38SLW	12/29/94	44.5	0.92	<0.2	0.87	–	–		f	USAF 1995 SWMWP
38SLW	1/96	45	<1.0	<1.0	<1.0	<100	220	1-3		USAF 1995 SWMPR
38SLW	9/18/96	110	<1.0	<1.0	<1.0	–	–	1		USAF 1996 SWMPR
8621	10/17/96	340	3.0	3.8	5.5	–	–	1	g	USAF 1996 SWMPR

TABLE WP38-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Analytical Methods	Notes	Reference
8626	1988	14.6	<0.25	<0.46	<0.85	--	--	1,5	a	ES 1994 OU6 RI
8626	1989	16.6	3.0	<0.50	<0.40	--	--	1,5	a	ES 1994 OU6 RI

Notes:
a. For other compounds detected, see reference.
b. No compounds other than those listed were detected above the reporting limits.
c. 1992 samples analyzed by EPA Method 503.1. 1,2-Dichloroethane (DCA) was detected at 10 µg/L in well 38M01. Additional 503.1 compounds detected were not available in the ES 1994 OU6 RI reference.
d. Additional compounds detected: 1,2-DCA - 0.65 µg/L.
e. A sample was collected by the Air Force on 30 March 1995 from 38M07. Perchloroethene was detected - 8.54 µg/L; trichloroethane (sic) was detected - 0.82 µg/L.
f. Fluorotrichloromethane was detected in a sample collected on 30 March 1995 by the Air Force from 38SLW - 0.94 µg/L.
g. Well was sampled without purge.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE WP38-2 CONCENTRATIONS (µg/L) OF METALS IN GROUNDWATER SAMPLES, WP38, SKI LODGE AREA, EIELSON AFB, ALASKA

Well No.	f/u	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Sodium	Vanadium	Zinc	Notes	Reference
DISSOLVED																			
38M01	f	1988	40	--	40	63,200	--	--	100	6.0	26,600	20	--	2,100	66,000	--	700		ES 1994 OU6 RI
38M01	f	8/10/94	120	<3.0	4.8	93,000	<1.0	<1.0	75	<1.0	32,000	59	3.9	1,100	13,000	<1.0	41		PNL 1994 SWGMPR
38M02	f	1988	<30	--	200	1,660	--	--	200	<1.4	70,500	2,700	--	4,550	26,200	--	30		ES 1994 OU6 RI
38M02	f	8/6/94	18	<3.0	100	250,000	<1.0	7.3	33	<1.0	86,000	230	12	4,800	16,000	<1.0	4.6		PNL 1994 SWGMPR
38M02	f	10/11/95	302	3.4	92.9	248,000	<5.0	12	<63	1.5	87,500	561	11.5	84,900	14,800	<4.0	9.2		USAF 1995 SWMPR
38M03	f	1988	90	--	200	30,500	--	--	60	<1.4	10,900	20	--	1,930	12,900	--	200		ES 1994 OU6 RI
38M03	f	8/6/94	<6.0	<3.0	140	26,000	<1.0	<1.0	24	<1.0	7,800	<15	<1.0	2,500	5,500	<1.0	<5.1		PNL 1994 SWGMPR
38M04	f	1988	40	--	50	22,300	--	--	50	<1.4	6,830	20	--	<408	6,820	--	300		ES 1994 OU6 RI
38M05	f	1988	<30	--	70	63,700	--	--	90	<1.4	28,900	70	--	1,580	34,100	--	500		ES 1994 OU6 RI
38M06	f	8/10/94	76	20	210	77,000	1.7	<1.0	1,200	1.4	28,000	160	5.1	1,500	7,600	<1.0	7.1		PNL 1994 SWGMPR
38M17	f	8/6/94	7.1	76	230	32,000	<1.0	<1.0	27,000	<1.0	8,000	3,900	1.2	1,900	8,200	<1.0	5.6		PNL 1994 SWGMPR
38SLW	f	8/9/94	<57	<3.0	190	34,000	<1.0	<1.0	4,200	<1.0	26,000	76	<1.0	1,700	7,200	<1.0	29		PNL 1994 SWGMPR
38SLW	f	1/5/96	<155	<1.0	83.1	43,400	<5.0	<4.0	5,000	<1.0	21,700	347	<9.0	1,780	6,400	<4.0	18.7		USAF 1995 SWMPR
8626	f	1988	<30	--	100	98,700	--	--	3,200	<1.4	40,700	2,200	--	2,620	6,710	--	400		ES 1994 OU6 RI
Background Concentrations																			
BGM	f	9/94	43	8.3	101	51,750	<1.0	2.4	1,736	<1.0	10,450	1,789	2.3	3,400	4,563	<1.0	5.6		PNL 1994 SWMP
BGMX	f	9/94	140	23	160	61,000	<1.0	4.0	9,900	<1.0	12,000	4,100	5.0	4,500	6,500	1.0	19		PNL 1994 SWMP
BGUCL	f	9/94	74	14.5	129	57,600	<1.0	3.1	3,980	<1.0	11,400	2,720	3.2	3,800	5,340	1.0	10		PNL 1994 SWMP
TOTAL																			
38M01	u	1988	39,200	--	200	82,400	25.4	50.8	41,700	92.4	43,500	807	609	4,920	76,700	44.9	1,900		ES 1994 OU6 RI
38M01	u	7/9/93	--	--	--	--	<4.0	--	--	<2.0	--	--	--	--	--	--	--		ES 1994 OU6 RI
38M01	u	8/10/94	200	<3.0	9.6	94,000	1.4	6.2	560	3.1	32,000	65	8.8	2,000	15,000	<1.0	67		PNL 1994 SWGMPR
38M01	u	10/17/96	285	2.7	<22.0	78,900	<6.0	<6.0	428	5.5	25,800	62.2	<15.0	1,940	11,900	<8.0	1,710	a	USAF 1996 SWMPR

TABLE WP38-2 (continued)

Well No.	f/u	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Sodium	Vanadium	Zinc	Notes	Reference
38M02	u	1988	8,150	--	263	189,000	23.2	34.9	13,600	17.3	82,400	3,370	<20	6,070	30,100	18.0	84.1		ES 1994 OU6 RI
38M02	u	7/9/93	--	--	--	--	<4.0	--	--	<2.0	--	--	--	--	--	--	--		ES 1994 OU6 RI
38M02	u	8/6/94	35,000	24	1,100	350,000	76	250	180,000	89	130,000	3,500	180	13,000	23,000	93	260		PNL 1994 SWGMPR
38M02	u	10/11/95	331,000	391	3,860	523,000	616	777	663,000	420	257,000	13,400	714	234,000	26,800	1,000	1,560		USAF 1995 SWMPR
38M02	u	8/19/96	231,000	153	2,420	511,000	342	494	422,000	169	220,000	11,500	461	22,200	26,800	566	995		USAF 1996 SWMPR
38M03	u	1988	892	--	204	34,400	<6.0	<3.0	665	5.2	12,600	42.6	<20	2,880	14,700	<10	154		ES 1994 OU6 RI
38M03	u	7/9/93	--	--	--	--	<4.0	--	--	<2.0	--	--	--	--	--	--	--		ES 1994 OU6 RI
38M03	u	8/6/94	24	<3.0	140	28,000	<1.0	<1.0	58	<1.0	7,800	6.3	1.1	2,100	6,000	<1.0	9.3		PNL 1994 SWGMPR
38M04	u	1988	2,180	--	83.2	29,100	<6.0	14.7	5,720	13.2	9,110	132	<20	1,610	8,190	11.2	337		ES 1994 OU6 RI
38M04	u	7/10/93	--	--	--	--	<4.0	--	--	<2.0	--	--	--	--	--	--	--		ES 1994 OU6 RI
38M05	u	1988	10,400	--	175	74,000	513	28.9	22,500	15.2	38,000	524	31.8	2,830	24,300	45	907		ES 1994 OU6 RI
38M05	u	7/10/93	--	--	--	--	<4.0	--	--	<2.0	--	--	--	--	--	--	--		ES 1994 OU6 RI
38M06	u	8/10/94	130,000	91	2,400	140,000	670	650	330,000	210	84,000	3,200	970	12,000	11,000	400	80		PNL 1994 SWGMPR
38M06	u	10/1/96	180,000	115	2,440	128,000	667	543	326,000	155	89,600	2,360	618	16,800	10,400	562	977		USAF 1996 SWMPR
38M07	u	8/22/96	25,100	88.9	433	58,100	49.5	42.7	119,000	18.7	24,300	2,850	70.6	3,330	6,750	86.3	185	b	USAF 1996 SWMPR
38M16	u	7/8/93	--	--	--	--	7.0	--	--	<2.0	--	--	--	--	--	--	--		ES 1994 OU6 RI
38M16	u	8/4/94	13,000	100	970	290,000	48	100	180,000	31	100,000	5,200	95	5,700	39,000	75	160		PNL 1994 SWGMPR
38M17	u	7/8/93	--	--	--	--	<4.0	--	--	<2.0	--	--	--	--	--	--	--		ES 1994 OU6 RI
38M17	u	8/6/94	3,300	110	440	37,000	8.8	29	49,000	7.9	9,500	4,900	13	3,000	12,000	28	62		PNL 1994 SWGMPR
38M18	u	9/18/96	12,100	<34.0	562	127,000	33.5	21.8	239,000	20.8	47,200	8,910	44.2	5,260	20,300	56.7	73.4		USAF 1996 SWMPR
38SLW	u	7/8/93	--	--	--	--	<4.0	--	--	<2.0	--	--	--	--	--	--	--		ES 1994 OU6 RI
38SLW	u	8/9/94	<57	<3.0	74	33,000	1.6	7.3	4,900	2.8	25,000	81	2.5	2,400	6,900	<1.0	22		PNL 1994 SWGMPR
38SLW	u	1/6/96	<155	1.5	85.3	46,400	<5.0	<4.0	5,560	<1.0	22,300	401	<9.0	1,750	6,510	<4.0	69.8		USAF 1995 SWMPR
38SLW	u	9/18/96	<25.0	<2.0	69.6	53,000	<6.0	<6.0	5,300	<1.0	23,600	787	<15.0	1,730	6,870	<8.0	167		USAF 1996 SWMPR
8621	u	10/17/96	35.4	<2.0	<22.0	4,880	<6.0	<6.0	3,690	4.4	15,900	54.2	<15.0	2,000	17,400	<8.0	859	a	USAF 1996 SWMPR
8626	u	1988	90.4	--	189	112,000	<6.0	10.0	5,480	1.6	35,700	2,500	<20	1,940	7,800	<10	526		ES 1994 OU6 RI

TABLE WP38-2 (continued)

Well No.	f/u	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Sodium	Vanadium	Zinc	Notes	Reference
Background Concentrations																			
BGM	u	9/94	7,538	25	269	58,625	20	75	16,938	21	17,375	3,875	31	5,650	8,363	24	63		PNL 1994 SWMP
BGMX	u	9/94	18,000	63	420	66,000	46	140	33,000	48	26,000	6,500	77	7,900	9,800	52	120		PNL 1994 SWMP
BGUCL	u	9/94	11,500	37	342	64,900	30.4	105	23,800	32.6	20,800	4,980	48.8	6,500	9,260	36	88.8		PNL 1994 SWMP

Notes:

a. Well sampled without purge.

b. Additional metals detected: Antimony - 3.1 µg/L, Cobalt - 45.7 µg/L and Selenium - 7.3 µg/L

f. Field filtered.

u. Total (unfiltered).

BGM Mean concentration of samples collected from background wells in 1994.

BGMX Maximum concentration of samples collected from background wells in 1994.

BGUCL 95% Upper confidence limits of samples collected from background wells in 1994.

TABLE WP38-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, WP38, SKI LODGE WELL CONTAMINATION, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)		
38M01	10/17/96	NO PARAMETERS TAKEN FOR THIS SAMPLE									USAF 1996 SWMPR
38M01	8/26/97	NO PARAMETERS TAKEN FOR THIS SAMPLE							0.02nd		USAF 1997 SWMPR
38M02	10/11/95	5.3	–	4	–	1100	6.8	–	–		USAF 1995 SWMPR
38M02	8/19/96	9.95	–	4.8	HI	1310	7.28	–	–		USAF 1996 SWMPR
38M02	9/19/97	4.16	33	3.5	966	1478	6.83	40	0.00nd		USAF 1997 SWMPR
38M06	10/1/96	–	3.2	1.74	1596	260	7.41	-293	–		USAF 1996 SWMPR
38M06	10/3/97	2.27	17.6	3.9	HI	462	7.73	-24	nd		USAF 1997 SWMPR
38M07	08/22/96	0.29		1.6	HI	400	6.46	30			USAF 1996 SWMPR
38M18	9/18/96	93	–	6.7	1740	765	6.22	-71.3	–		USAF 1996 SWMPR
38M18	9/18/97	1.2	10	6.5	134	1295	6.52	8	0.01nd		USAF 1997 SWMPR
38SLW	1/5/96	1.6	–	7.6	–	319	6.6	–	–		USAF 1995 SWMPR
38SLW	9/18/96	–	0.0	4.97	21	278	7.24	-198	–		USAF 1996 SWMPR
8621	10/17/96	NO PARAMETERS TAKEN FOR THIS SAMPLE							–		USAF 1996 SWMPR
8621	08/26/97	NO PARAMETERS TAKEN FOR THIS SAMPLE							nd		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.

DP44 Battery Shop Leach Field

COCs, RAOs, and ARARs

BTEX compounds and chlorinated solvents are COCs for DP44. The following table lists ARARs established to address groundwater quality at DP44 and other OU 3,4,5 source areas. RAOs have not been established for OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

Source Area DP44 is located near the Large Aircraft Maintenance Hangar. As originally defined, DP44 included the battery shop (Building 1141) and the area around Building 1138 between the runway taxiway and Flightline Avenue west of the North Street intersection. It was defined as a source area because the battery shop and Building 1138 may have discharged waste into a leach field system within the area. However, subsequent investigations revealed most contamination is located south of the hangar and is probably related to past jet-engine maintenance activities in the hangar. Contaminants of concern are fuel-related compounds and solvents in soil and groundwater.

DP44 was originally selected for remedial action under the OU 3,4,5 ROD. A pilot soil vapor extraction (SVE) system was operated in September 1995. The results of the pilot testing indicated low contaminant concentrations which did not warrant continued SVE operation.

The ROD amendment was completed in 1997 and is currently under review by the EPA and ADEC. The ROD ammendment recommends continued groundwater monitoring and institutional controls as the selected remedy for DP44.

Previous Activities

The RI/FS identified solvent and fuel compound concentrations in soil and groundwater samples. The groundwater samples were collected in 1994 from temporary groundwater probes that have since been decommissioned. The extent of TCE in groundwater is shown in Figure DP44-2. No groundwater samples were collected under the 1995 SWMP.

Monitor wells 44M04, 44M07, 44M08, and 44M11I were sampled for VOCs during the 1996 field season. TCE and cis-1,2 DCE were detected in 44M04 at concentrations of 78 µg/L and 130 µg/L, respectively, which exceed site specific ARAR MCLs. Low levels of toluene, ethylbenzene, and xylene compounds were detected in 44M04, 44M07, and 44M08. These results are attributed to possible cross contamination. These BTEX compounds did not exceed site specific ARAR MCLs.

1997 Results

During the 1997 field season wells 44M04, 44M08, and 44MW11I were monitored using field screening test kits. Monitor well 44M05 was located under an above ground storage tank and was not sampled. Immunoassay results indicated total BTEX concentrations below detection limits (<20 ppb) in 44M08 and 44MW11I, while 44M04 displayed a concentration of 30 ppb. Total BTEX concentrations are consistent with previous analytical results. Monitor well 44MW11I displayed a PCE concentration of 14.7 ppb. No other chlorinated solvents were detected. TCE and PCE concentrations detected by the DLE test kit are not consistent with previous analytical results. Further monitoring for TCE and PCE compounds will be required to verify the 1997 field screening results.

Cumulative immunoassay and analytical results indicate total BTEX concentrations have not significantly changed since groundwater monitoring was initiated. Monitor wells 44M04, 44M08, and 44MW11I have consistently displayed low to non detectable BTEX concentrations.

References for DP44:

1994 Sitewide Groundwater Monitoring Program Report, PNL, January 1995
1995 OU 3,4,5 Remedial Investigation Report, PNL, May 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 OU 3,4,5 Remedial Design, USAF, May 1996
1996 OU 2,3,4,5 Proposed ROD Amendments, USAF, May 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997

References for DP44 (continued):

1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for DP44:

List of Tables for DP44:

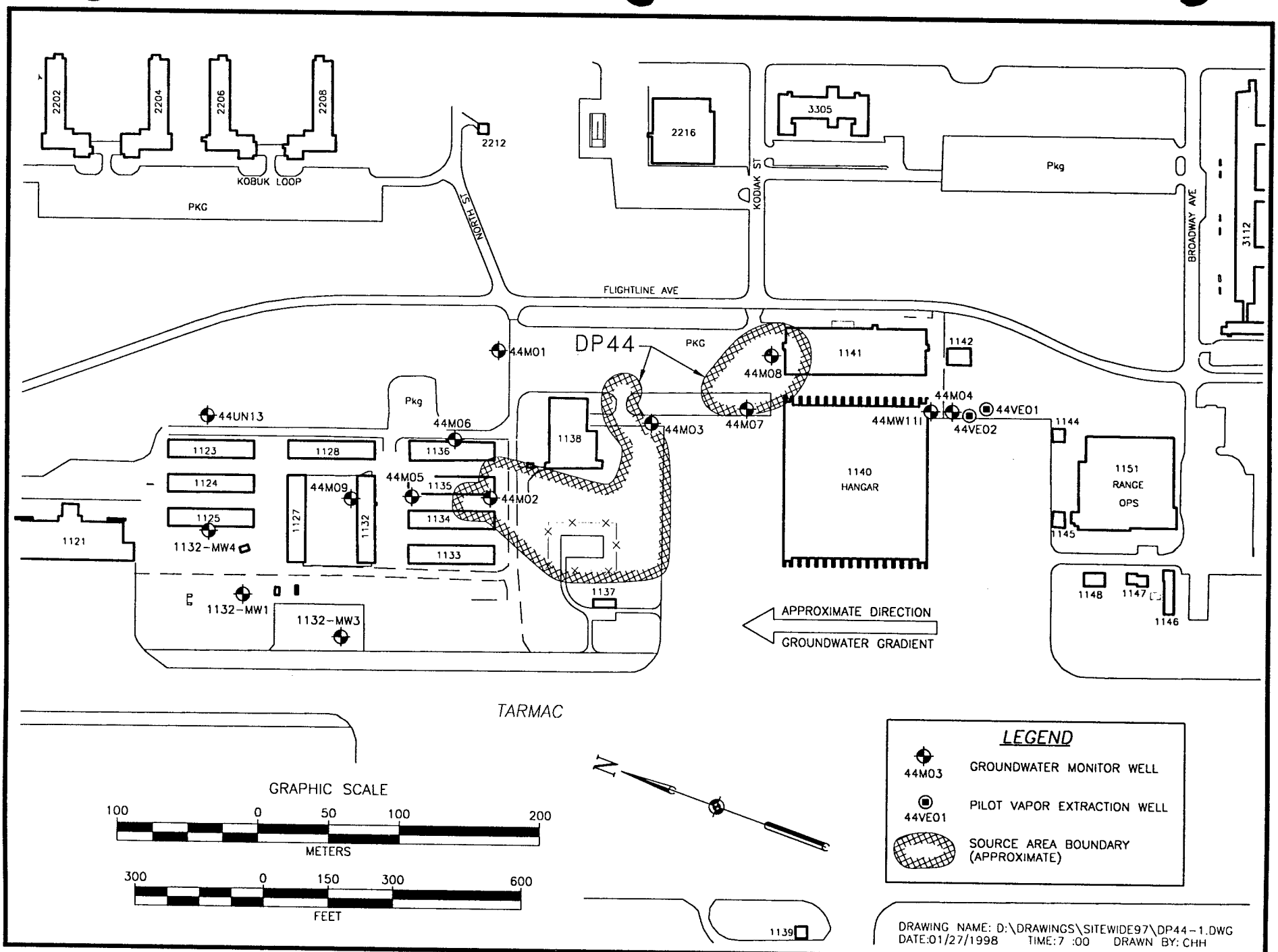


Figure DP44-1. DP 44 Site Plan Showing Groundwater Monitor Well and Pilot Vapor Extraction Well Locations, Eielson AFB, Alaska

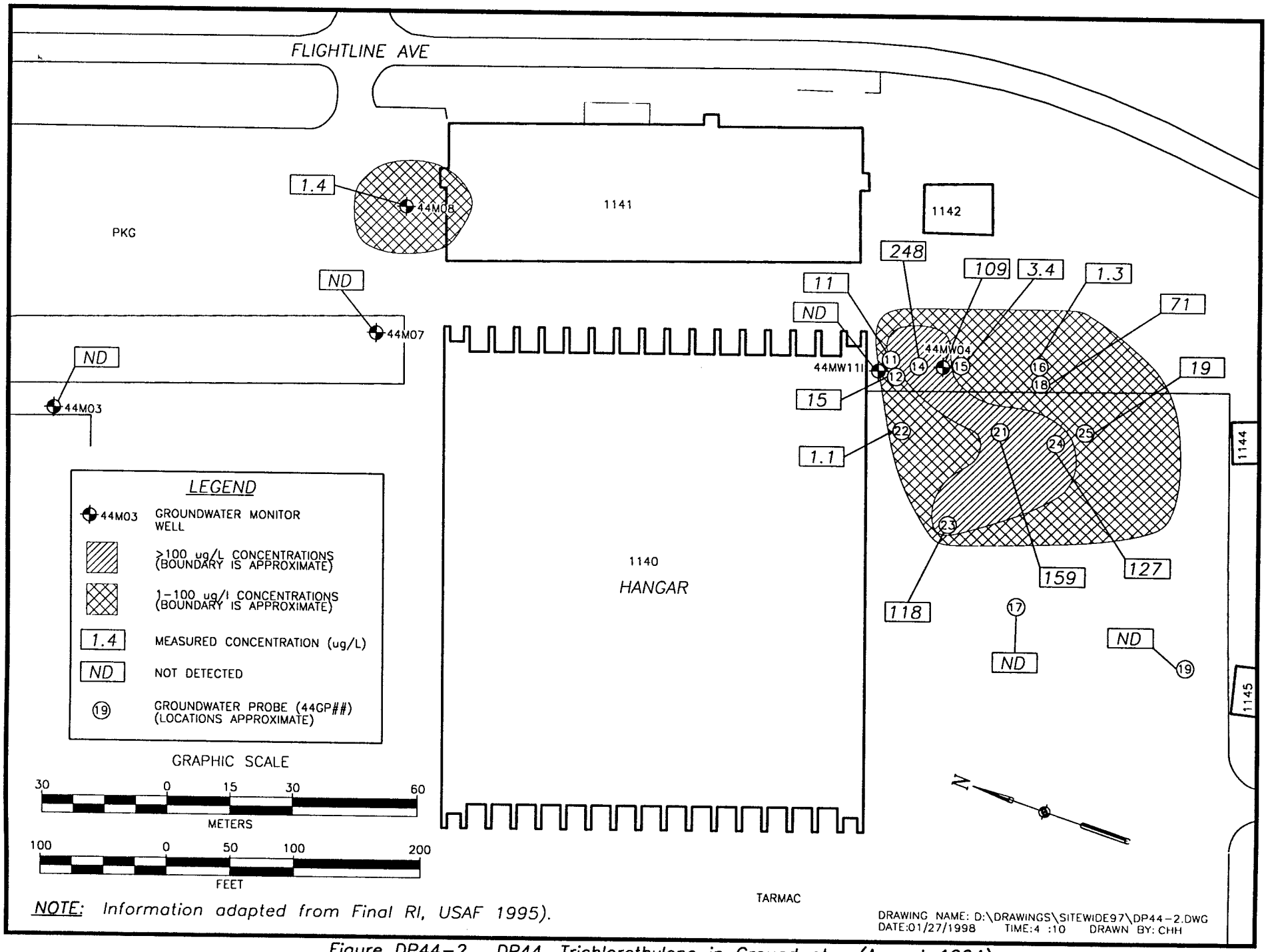


Figure DP44-2. DP44, Trichlorethylene in Groundwater (August 1994)

TABLE DP44-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, DP44, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	TCE	c-1,2-DCE	t-1,2-DCE	Analytical Methods	Notes	Reference
44M01	8/15/94	<0.5	<1.0	<0.5	<0.5	--	--	<1.0	3.2	4.1	1,4	a	PNL 1995 OU3,4,5 RI
44M02	6/10/92	<2.0	<2.0	<2.0	<5.0	--	--	<1.0	<1.0	<1.0	1,4	a	PNL 1993 OU2 RI
44M02	8/18/92	<2.0	<2.0	<2.0	<5.0	--	--	<1.0	1.1	<1.0	1,4	a	PNL 1995 OU3,4,5 RI
44M02	8/15/94	1.1	<1.0	<0.5	<0.5	--	--	<1.0	1.5	0.7	1,4	a	PNL 1995 OU3,4,5 RI
44M03	6/10/92	<2.0	<2.0	<2.0	<5.0	--	--	1.2	6.1	1.4	1,4	a	PNL 1993 OU2 RI
44M03	8/15/94	<0.5	<1.0	<0.5	<0.5	--	--	<1.0	7.9	3.0	1,4	a	PNL 1995 OU3,4,5 RI
44M04	6/10/92	<2.0	<2.0	<2.0	<5.0	--	--	2,500	260	5.4	1,4	a	PNL 1993 OU2 RI
44M04	8/19/92	<2.0	<2.0	<2.0	<5.0	--	--	48	93	2.9	1,4	a	PNL 1995 OU3,4,5 RI
44M04	8/15/94	<0.5	<1.0	<0.5	<0.5	--	--	109	118	2.9	1,4	a	PNL 1995 OU3,4,5 RI
44M04	8/20/96	<1.0	4.3	2.5	17.6	--	--	78	130	<1.0	1,4	a, c	USAF 1996 SWMPR
44M05	6/10/92	3.7	<2.0	<2.0	<5.0	--	--	<1.0	5.9	1.3	1,4	a	PNL 1993 OU2 RI
44M05	8/18/92	5.3	<2.0	<2.0	<5.0	--	--	<1.0	10	1.5	1,4	a	PNL 1995 OU3,4,5 RI
44M06	6/10/92	<2.0	<2.0	<2.0	<5.0	--	--	<1.0	5.5	2.1	1,4	a	PNL 1993 OU2 RI
44M06	8/19/92	<2.0	<2.0	<2.0	<5.0	--	--	<1.0	5.0	1.9	1,4	a	PNL 1995 OU3,4,5 RI
44M06	8/15/94	<0.5	<1.0	<0.5	<0.5	--	--	<1.0	4.9	3.0	1,4	a	PNL 1995 OU3,4,5 RI
44M07	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	<1.0	<1.0	<1.0	1,4	a	PNL 1993 OU2 RI
44M07	8/28/92	<2.0	<2.0	<2.0	<5.0	--	--	<1.0	1.8	<1.0	1,4	a	PNL 1995 OU3,4,5 RI
44M07	8/15/94	<0.5	<1.0	<0.5	<0.5	--	--	<1.0	2.9	0.8	1,4	a	PNL 1995 OU3,4,5 RI
44M07	8/20/96	<1.0	4.2	2.4	16.9	--	--	<1.0	<1.0	<1.0	1,4	a, c	USAF 1996 SWMPR
44M08	8/16/94	<0.5	<1.0	<0.5	<0.5	--	--	1.4	2.9	1.2	1,4	a	PNL 1995 OU3,4,5 RI
44M08	8/20/96	<1.0	2.6	1.6	11.7	--	--	1.2	2.1	<1.0	1,4	a, c	USAF 1996 SWMPR

TABLE DP44-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	TCE	c-1,2-DCE	t-1,2-DCE	Analytical Methods	Notes	Reference
44MW11I	9/15/92	<2.0	<2.0	<2.0	<5.0	--	--	<1.0	<1.0	<1.0	1,4	a	PNL 1995 OU3,4,5 RI
44MW11I	8/16/94	5.2	6.0	0.7	5.1	--	--	<1.0	<1.0	0.5	1,4	a	PNL 1995 OU3,4,5 RI
44MW11I	9/3/96	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	1,4	a	USAF 1996 SWMPR

Notes:
a. No compounds other than those listed or noted were detected above the reporting limits.
b. Additional compounds detected: perchloroethene - 0.7 µg/L
c. Concentrations of toluene, ethylbenzene, and xylenes may be the result of field cross contamination.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

I Intermediate depth well.
TCE Trichloroethene.
c-1,2-DCE cis-1,2,-dichloroethene.
t-1,2-DCE trans-1,2-dichloroethene.

TABLE DP44-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, DP44, BATTERY SHOP LEACH FIELD, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results			Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2] (ppb)		
44M04	8/20/96	2.17	–	11.8	81	271	6.98	–	–	–	–		USAF 1996 SWMPR
44M04	9/17/97	0.60	5.7	11.5	23	328	7.35	111	30	nd	nd		USAF 1997 SWMPR
44M07	8/20/96	2.1	–	12.4	13	496	6.62	–	–	–	–		USAF 1996 SWMPR
44M08	8/20/96	2.53	–	13.1	75	311	7.05	–	–	–	–		USAF 1996 SWMPR
44M08	9/18/97	0.70	6.8	12.3	5	296	7.13	185	0.00nd	nd	nd		USAF 1997 SWMPR
44M08	9/18/97	0.54	5.3	12.8	0	303	7.53	56	–	–	–	a	USAF 1997 SWMPR
44MW11I	9/3/96	0.032	–	4.98	1.5	258	7.32	-13.7	–	–	–		USAF 1996 SWMPR
44MW11I	9/22/97	0.1	0.9	6.1	<5	304	6.90	55	0.00nd	nd	14.7		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Dräger Liquid Extraction (DLE) field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field test kit.
The lower detection limit is 10 ppb on the Dräger Liquid Extraction (DLE) field test kit.

a. Parameters duplicate.

WP45/SS57 Photo Lab/Fire Station Parking Lot

COCs, RAOs, and ARARs

BTEX compounds and chlorinated solvents are COCs for WP45. GRO and DRO were detected during the 1995 sampling event. The following table lists ARAR MCLs established to address groundwater quality at WP45 and other OU 3,4,5 source areas. RAOs have not been established for OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

WP45/SS57 Photo Lab/Fire Station Parking Lot are two source areas located adjacent to each other near the main taxiway along the west side of Flightline Avenue. Solvent contamination has been found in groundwater but not in soils at WP45. Fuel contamination has been found at SS57; the source is uncertain. The OU 3,4,5 ROD recommended WP45/SS57 for long term monitoring and institutional controls.

Previous Activities

A study of natural attenuation of contaminants at the two source areas was performed during the 1994 and 1995 field seasons. The 1994 SWMP involved sampling and analysis to confirm the analytical results completed for the natural attenuation study. Results indicated TCE was present in the groundwater.

In 1995, groundwater from wells 45M04 and 45MW08 was sampled and analyzed to monitor for the presence of chlorinated VOCs and fuel contaminants.

Monitor wells 45M01, 45M03, 45MW03I, 45M04, 45MW07, and 45MW08 were sampled for VOCs and PAHs during the 1996 field season. Benzene was detected in 45MW07 and 45MW08 at 12 µg/L and 3.6 µg/L, respectively. The benzene concentration displayed at 45MW07 exceeded site specific ARAR MCL. Toluene (14 µg/L), ethylbenzene (4.3 µg/L), and xylenes (21.3 µg/L) were also detected in 45MW08. TCE was detected in the monitor wells sampled in 1996 with concentrations ranging from 1.1 µg/L (45MW03I and 45MW07) to 2,000 µg/L (45MW08). Wells displaying TCE concentrations above ARAR MCL included 45M01 (440 µg/L), 45M03 (85 µg/L), 45MW08 (2,000 µg/L). Cis-1,2-DCE was detected in 45M01, 45M03, 45MW07, and 45MW08 with concentrations ranging from 1.5 µg/L at 45MW07 to 40 µg/L at 45M01. Trans-1,2-DCE was detected in 45M01 (52.0 µg/L) and 45M03 (12.0 µg/L). No DCE compounds exceed the site specific ARAR MCL. 1,1,1-trichloroethane was detected at a concentration of 30 µg/L in 45MW08, which is below the EPA drinking water MCL of 200 µg/L. PAH compounds detected included chloromethane (45MW03I - 1.3 µg/L) and 1,1-dichloroethane (45MW08 - 2.1 µg/L). Applicable ARAR MCLs and EPA drinking water MCLs were not identified for these compounds.

1997 Results

During the 1997 field season wells 45M01, 45M03, and 45MW08 were monitored using the field screening test kits. Immunoassay results indicate total BTEX concentrations below the detection limit (<20 ppb) in all wells monitored. TCE and PCE was detected in 45M01 (40.32 and 73.5 ppb, respectively), 45M03 (31.92 and 49 ppb, respectively), and 45M08 (99.12 and 107.8 ppb, respectively). All concentrations exceed the OU 3,4,5 ARAR MCLs. The elevated concentrations of PCE may be attributed to possible interference from TCE. The measuring range (concentration) of the TCE immunoassay test is 10 to 100 ppb, with a standard deviation of 30%. Previous analytical results have displayed TCE concentrations above 100 ppb.

Cumulative analytical and field screening data indicate groundwater quality has not significantly changed since groundwater monitoring was initiated. Total BTEX concentrations have remained at or below detection levels in monitor wells 45M01 and 45M03. Monitor well 45MW08 has previously shown elevated BTEX compounds, however, the concentrations have declined each year. WP45/SS57 has consistently shown elevated TCE concentrations. Further monitoring will be required to determine groundwater quality trends.

References for WP45/SS57:

1994 Sitewide Groundwater Monitoring Program Report, PNL, January 1995
1995 OU 3,4,5 Remedial Investigation Report, PNL, May 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996

References for WP45/SS57 (continued):

1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for WP45/SS57:

List of Tables for WP45/SS57:

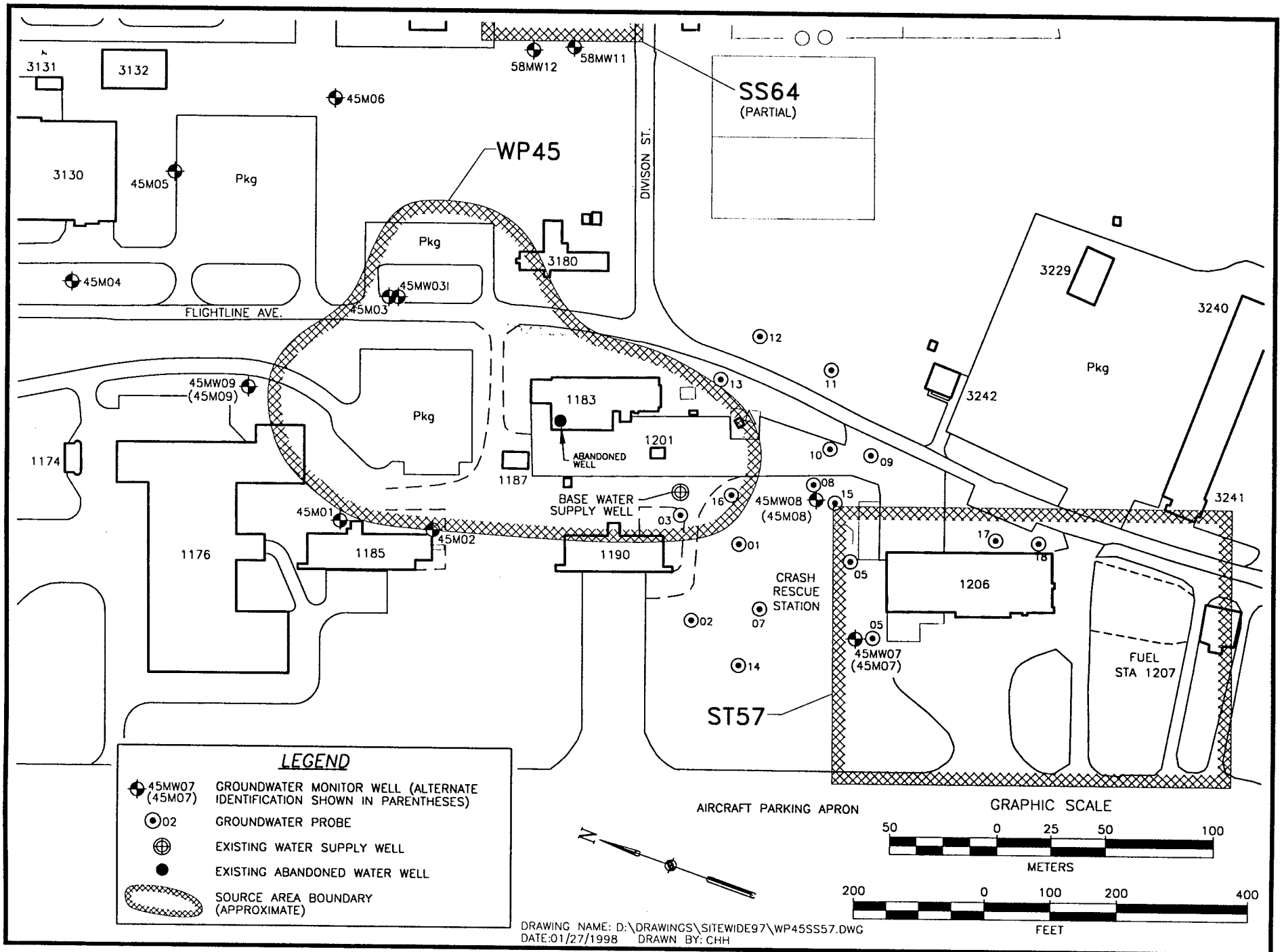


Figure WP45/SS57-1. WP45/SS57 Photo Lab, Building 1183, Eielson AFB, Alaska

TABLE WP45/SS57-1 CONCENTRATIONS (µg/L) OF BTEX, TPH GRO, AND TPH DRO IN GROUNDWATER SAMPLES, WP45/SS57, PHOTO LABORATORY, BUILDING 1183, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
45M01	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M01	8/18/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M01	8/27/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
45M02	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M02	8/18/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M03	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M03	8/18/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M03	8/28/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
45MW03I	8/31/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45MW03I	9/11/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
45M04	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M04	8/18/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M04	8/8/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1994 SWGMPR
45M04	9/12/95	<1.0	<1.0	<1.0	<1.0	53	130	1-3		USAF 1995 SWMPR
45M04	8/22/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
45M05	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M06	6/11/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45M06	9/14/92	<2.0	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45MW07	9/15/92	30	<2.0	<2.0	<5.0	--	--	1		PNL 1995 OU3,4,5 RI
45MW07	8/8/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1994 SWGMPR
45MW07	8/28/96	12	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR

TABLE WP45/SS57-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
45MW08	9/15/92	9.7	210	35	260	–	–			PNL 1995 OU3,4,5 RI
45MW08	9/18/95	11	120	18	128	2,600	1,500	1-3		USAF 1995 SWMPR
45MW08	8/22/96	3.6	14	4.3	21.3	–	–	1		USAF 1996 SWMPR
45MW09	9/14/92	<2.0	<2.0	<2.0	<5.0	–	–	1		PNL 1995 OU3,4,5 RI

Notes:

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 8310.

I Intermediate depth well.

TABLE WP45/SS57-2 CONCENTRATIONS (µg/L) OF HALOGENATED VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, WP45/SS57, PHOTO LABORATORY, BUILDING 1183, EIELSON AFB, ALASKA

Well No.	Date Sampled	Chloro-methane	Vinyl Chloride	1,1-DCE	Methylene Chloride	c-1,2-DCE	t-1,2-DCE	1,1-DCA	Chloro-form	1,2-DCA	1,1,1-TCA	TCE	PCE	Analytical Methods	Notes	Reference
45M01	6/10/92	--	<2.0	--	<5.0	47.0	13.0	<1.0	<0.5	<0.5	<0.5	330.0	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M01	8/18/92	--	<2.0	--	<5.0	38.8	39.0	<1.0	<0.5	<0.5	<0.5	370	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M01	8/27/96	<1.0	<1.0	<1.0	<1.0	40.0	52.0	<1.0	<1.0	<1.0	<1.0	440	<1.0	4,13	a	USAF 1996 SWMPR
45M02	6/10/92	--	<2.0	--	<5.0	<1.0	1.2	<1.0	<0.5	<0.5	<0.5	37.0	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M02	8/18/92	--	<2.0	--	<5.0	3.6	6.6	<1.0	<0.5	<0.5	<0.5	1.3	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M03	6/11/92	--	<2.0	--	<5.0	9.3	2.5	<1.0	<0.5	<0.5	<0.5	<1.0	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M03	8/18/92	--	<2.0	--	<5.0	25.0	11.0	<1.0	<0.5	<0.5	<0.5	100	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M03	8/28/96	<1.0	<1.0	<1.0	1.4	16.0	12.0	<1.0	<1.0	<1.0	<1.0	85	<1.0	4,13	a,b	USAF 1996 SWMPR
45MW03I	8/31/92	--	<2.0	--	<5.0	2.6	<1.0	<1.0	<0.5	<0.5	<0.5	1.7	<0.5	4	a	PNL 1995 OU3,4,5 RI
45MW03I	9/11/96	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	4,13	a	USAF 1996 SWMPR
45M04	6/11/92	--	<2.0	--	<5.0	1.4	<1.0	<1.0	<0.5	<0.5	<0.5	2.6	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M04	8/18/92	--	<2.0	--	<5.0	2.2	<1.0	<1.0	<0.5	<0.5	<0.5	4.4	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M04	8/8/94	<1.0	<0.5	<0.5	<1.0	--	<1.0	<1.0	<1.0	<0.5	<1.0	4.7	<0.50	4	a	PNL 1994 SWGMPR
45M04	9/12/95	<1.0	<1.0	<1.0	<1.0	--	<1.0	<1.0	<1.0	<1.0	<1.0	3.3	<1.0	4	a	USAF 1995 SWMPR
45M04	8/22/96	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	3.3	<1.0	4,13	a	USAF 1996 SWMPR
45M05	6/11/92	--	<2.0	--	<5.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<1.0	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M06	6/11/92	--	<2.0	--	<5.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<1.0	<0.5	4	a	PNL 1995 OU3,4,5 RI
45M06	9/14/92	--	<2.0	--	<5.0	<1.0	<1.0	<1.0	<0.5	<0.5	<0.5	<1.0	<0.5	4	a	PNL 1995 OU3,4,5 RI
45MW07	9/15/92	--	<2.0	--	<5.0	3.5	<1.0	<1.0	<0.5	1.1	<0.5	2.0	0.9	4	a	PNL 1995 OU3,4,5 RI
45MW07	8/8/94	<1.0	<0.5	<0.5	<1.0	--	<1.0	<1.0	<1.0	1.2	<1.0	2.0	0.84	4	a	PNL 1994 SWGMPR
45MW07	8/28/96	<1.0	<1.0	<1.0	1.7	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	4,13	a,b	USAF 1996 SWMPR

TABLE WP45/SS57-2 (continued)

Well No.	Date Sampled	Chloro-methane	Vinyl Chloride	1,1-DCE	Methylene Chloride	c-1,2-DCE	t-1,2-DCE	1,1-DCA	Chloro-form	1,2-DCA	1,1,1-TCA	TCE	PCE	Analytical Methods	Notes	Reference
45MW08	9/15/92	--	<2.0	--	<5.0	31	<1.0	6.6	100	<0.5	100	7,200	1.0	4	a	PNL 1995 OU3,4,5 RI
45MW08	9/18/95	1.8	<1.0	1.1	1.1	--	<1.0	4.7	81	<1.0	66	2,300	1.5	4	a	USAF 1995 SWMPR
45MW08	8/22/96	<1.0	<1.0	<1.0	<1.0	8.0	<1.0	2.1	46	<1.0	30	2,000	<1.0	4,13	a	USAF 1996 SWMPR
45MW09	9/14/92	--	<2.0	--	<5.0	9.8	25.0	<1.0	<0.5	<0.5	<0.5	14.0	<0.5	4	a	PNL 1995 OU3,4,5 RI

Notes: a. No compounds other than those listed were detected above method reporting limits.
b. Methylene chloride suspected to be the result of laboratory contamination (compound detected in laboratory method blank at 1.3 ug/L).

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421.
12. 6020
13. 8310.

DCE Dichloroethene.
DCA Dichloroethane.
TCA Trichloroethane.
TCE Trichloroethene.
PCE Perchloroethene (tetrachloroethene).

I Intermediate depth well.

TABLE WP45/SS57-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, WP45/SS57, PHOTO LABORATORY, BUILDING 1183, EIELSON AFB, ALASKA

		Parameters							Immunoassay Results				
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2] (ppb)	Notes	Reference
45M01	8/27/96	1.09	--	9.3	2	482	6.71	19	--	--	--		USAF 1996 SWMPR
45M01	9/17/97	1.29	12	10	10	380	7.39	140	0.00nd	40.32	73.5		USAF 1997 SWMPR
45M03	8/28/96	0.95	--	9	0	307	6.89	--	--	--	--		USAF 1996 SWMPR
45M03	9/17/97	0.80	7.3	9.6	0	360	7.5	97	nd	31.92	49.0		USAF 1997 SWMPR
45MW03I	9/11/96	--	1.8	4.57	0	233	7.41	-98.3	--	--	--		USAF 1996 SWMPR
45M04	9/12/95	2.6	--	11	--	300	6.8	--	--	--	--		USAF 1995 SWMPR
45M04	8/22/96	4.41	--	9.2	25	303	6.83	--	--	--	--		USAF 1996 SWMPR
45M07	8/28/96	1.69	--	8	73	305	6.76	--	--	--	--		USAF 1996 SWMPR
45MW08	9/18/95	2.4	--	11	--	340	6.93	--	--	--	--		USAF 1995 SWMPR
45MW08	8/22/96	0.7	--	7.8	6	309	6.52	--	--	--	--		USAF 1996 SWMPR
45MW08	9/17/97	1.6	14.5	9.2	0	336	7.31	88	0.00nd	99.12	107.8		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Dräger Liquid Extraction (DLE) field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field test kit.
The lower detection limit is 10 ppb on the Dräger Liquid Extraction (DLE) field test kit.

ST48 Power Plant Fuel Leak

COCs, RAOs, and ARARs

BTEX compounds are COCs for ST48. GRO, DRO, TCE, and 1,2-DCA have also been detected during previous sampling events. The following table lists RAOs and ARAR MCLs established to address groundwater quality at ST48 and other OU1 sites.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L

Site Setting

ST48 is a fuel release area located south and east of the base power plant. It is thought that fuel was released from a buried multi-fuel pipeline in the vicinity of well 48M01. Interim remedial actions have been conducted since 1992 to investigate NAPL recoverability and implement a bioventing system at the source area. The bioventing system has been operating since the 1993 field season.

Base supply well D, located north of the power plant building, pumps groundwater from approximately 130 feet deep to supply potable water to the base drinking water distribution system. Monitor wells 48M04, 48M05, and 48M06 are nested wells and are screened at approximately 12.5-22.5 ft bgs, 37.5-47.5 ft bgs, and 89.0-99.0 ft bgs, respectively. These nested wells permit sampling groundwater from discrete depths within the aquifer near the base supply well.

Per the OU1 ROD, the selected remedy for ST48 is bioventing to reduce the fuel source in the upper aquifer. The bioventing system was expanded in 1996 and modified in 1997. Modifications to the bioventing system included burial of all above ground piping, construction and installation of an airflow manifold, and installation of a vapor monitoring point near 48M01. The bioventing system continues operation.

Previous Activities

NAPL and dissolved BTEX compounds have been detected during previous groundwater monitoring rounds in the area of the fuel release southwest of the power plant. Well 53M03 is located in an area of high concentrations of dissolved fuel compounds. The March 1995 sampling event detected lower concentrations of dissolved contaminants than previously observed. It is

possible the vadose zone was partially frozen at the time of sampling, and preferential air pathways developed within the area of the bioventing system. The lower concentrations of dissolved contaminants may have been caused by greater than usual aeration of the area surrounding the well.

Results from nested monitor wells near supply well D indicated BTEX compounds below the EPA drinking water MCL of 5 µg/L. TCE and other chlorinated hydrocarbons have also been detected in monitor wells at this source area. The suspected chlorinated hydrocarbon source is a previously existing dry well at building 3423, approximately 500 feet south of ST48, that may have been used for solvent disposal.

Monitor wells 48M01, 48M04, 48M05, 48M06, 48M07, 48M08, 53M03 and product probes 48PP13, 48PP28, 48PP102 were sampled during the 1996 field season for VOCs. Monitor well 48M01 was sampled without purging due to the presence of 1.37 ft NAPL. Benzene concentrations ranged from below detection limits (multiple points) to 6,700 µg/L at 48PP13. Wells displaying benzene concentrations above the site specific RAOs and ARAR MCLs included 48M01 (4,600 µg/L), 48M08 (570 µg/L), 48PP13 (6,700 µg/L), 48PP102 (6.2 µg/L), and 53M03 (390 µg/L). Wells 48M08 and 48PP13 displayed toluene concentrations at 2,300 and 3,700 µg/L, respectively. These toluene concentrations are above the site specific RAO and ARAR MCL. 1,2-DCA was also detected in 48M01 at 14 µg/L, which is above the EPA drinking water MCL of 5 µg/L.

1997 Results

During the 1997 field season, monitor wells 48M01, 48M04, 48M05, 48M06, and 53M03 were sampled for VOCs. Benzene concentrations ranged from below detection limits (48M04 and 48M06) to 3,800 µg/L (48M01). Wells displaying benzene concentrations above site specific RAOs and ARAR MCLs included 48M01 (3,800 µg/L), 48M05 (5 µg/L), and 53M03 (170 µg/L). No other compounds were detected above applicable RAOs and ARAR MCLs. 1,2-DCA was detected in 48M01 at 4 µg/L, below the EPA drinking water MCL of 5 µg/L. Chloromethane was detected in 48M01 (2 µg/L), 48M04 (0.7 µg/L), 48M05 (1.0 µg/L), and 53M03 (1.0 µg/L). No EPA drinking water MCL was identified for this compound.

Cumulative analytical data indicate that groundwater quality has not significantly changed since groundwater monitoring was initiated. Low to non detectable BTEX concentrations have consistently been displayed in wells 48M04, 48M05, and 48M06. Benzene concentrations in 48M01 and 53M03 continue to remain the same order of magnitude. 1,2-DCA concentrations have consistently been detected in well 48M01. The remaining wells have consistently displayed low to non detectable concentrations of chlorinated compounds.

Results of quarterly monitoring of base supply well D indicates non detectable BTEX concentrations in February 1997 and November 1997. During the May 1997 sampling event, p,m-xylenes were detected at 92.7 µg/L, which is below the site specific RAOs and ARAR MCLs. Results of the August 1997 (3rd quarter) monitoring event were not available.

Recovery well SRW3 was decommissioned on 26 September 1997. During decommissioning, the well casing was sheared at 3 ft bgs. The remaining well casing and borehole were filled with bentonite. The wood shed surrounding SRW3 was also removed and disposed of at the FNSB Landfill.

References for ST48:

1994 OU1 Record of Decision, USAF, September 1994
1995 OU1 Remedial Design, USAF, November 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST48:

List of Tables for ST48:

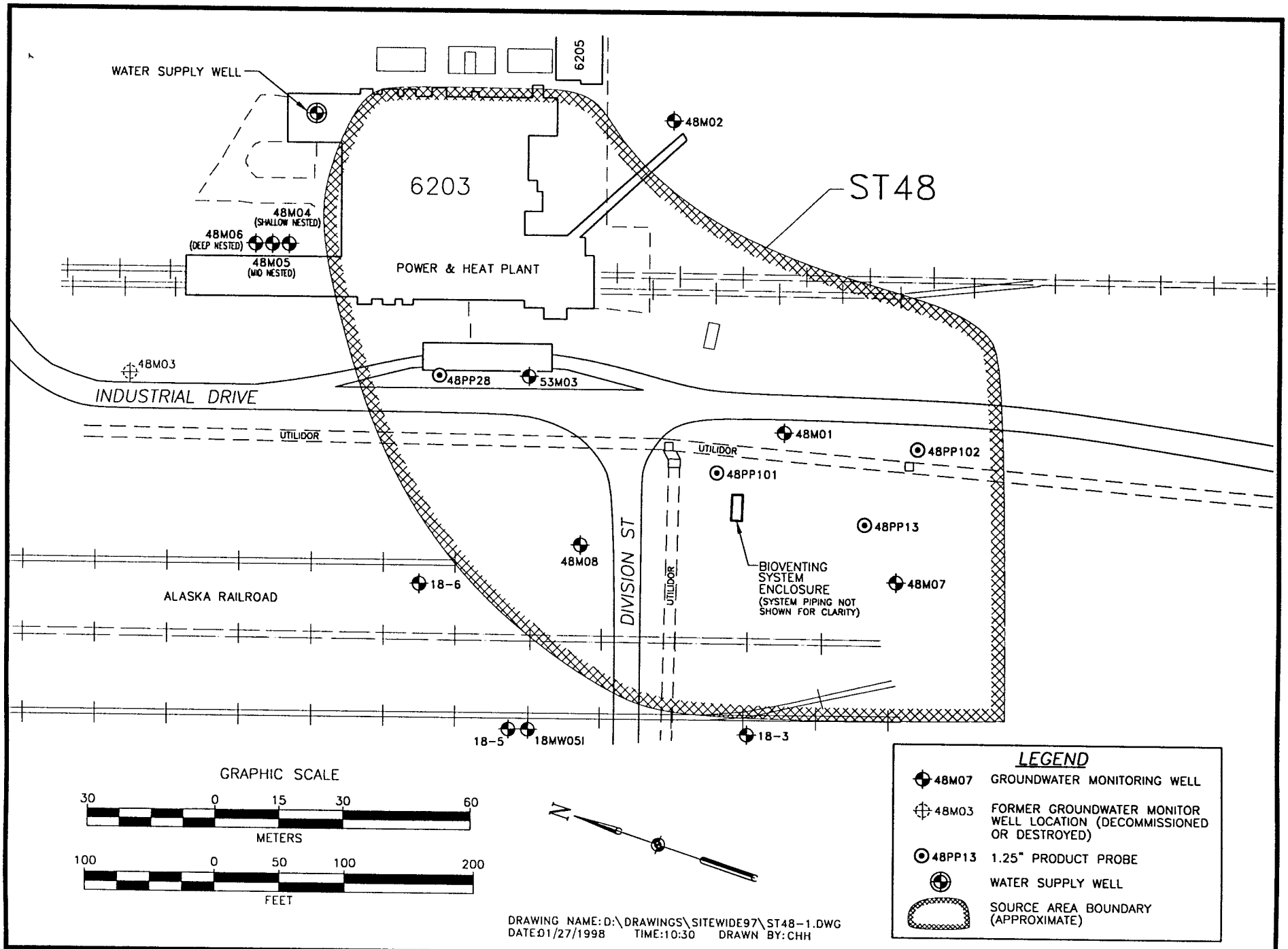


Figure ST48-1. ST48 Site Plan Showing Locations of Groundwater Monitor Wells, Eielson AFB, Alaska

TABLE ST48-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST48, POWERPLANT FUEL SPILL, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	TCE	1,2-DCA	trans-1,2-dichloroethylene	Analylitical Methods	Notes	Reference
18-3	1986	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--			BEAR
18-3	1986	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--			BEAR
18-3	1986	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--			BEAR
18-3	9/15/91	<5.0	<5.0	3.0	8.0	--	--	2.0	--	--	5,6,8	a	PNL 1993 OU2 RI
18-3	8/21/93	<0.105	1.2	9.1	61	--	--	0.9	--	--	1,4	a	PNL 1993 SWGMPR
18-3	7/27/94	<1.0	<1.0	<1.0	2.7	130	15,000	1.9	--	--	1-4	b,c	USAF 1995 OU1 RD
18-3	8/8/94	<1.0	<1.0	<1.0	<1.0	--	--	1.4	--	--	1,4	a	PNL 1994 SWGMPR
18-3	9/7/94	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	--	--	8	a	IT 1994 EMR
18-3	10/4/94	<1.0	<1.0	<1.0	<1.0	71		<1.0	--	--	1,2,4	b,c	USAF 1995 OU1 RD
18-3	3/16/95	1.6	1.6	1.6	4.0	280	990	2.7	--	--	1-4	b,c	USAF 1995 OU1 RD
18-3	9/18/95	1.2	<1.0	<1.0	1.3	<50	2,800	--	--	--	1-3		USAF 1995 SWMPR
18-3	8/12/96	<1.0	<1.0	1.0	4.0	--	--	1.1	--	--	1,4	b	USAF 1996 SWMPR
18-3	9/8/97	1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	1,4	l	USAF 1997 SWMPR
18-5	1986	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--			BEAR
18-5	1986	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--			BEAR
18-5	1986	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--			BEAR
18-5	9/15/91	<5.0	<5.0	<5.0	<5.0	--	--	2.0	--	--	5,6,8	a	PNL 1993 OU2 RI
18-5	7/22/94	<1.0	<1.0	<1.0	<1.0	150	120	1.1	--	--	1-4	b	USAF 1995 OU1 RD
18-5	10/4/94	<1.0	<1.0	<1.0	<1.0	<50	1,900	<1.0	--	--	1-4	b	USAF 1995 OU1 RD
18-5	8/12/96	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	--	--	1,4	b	USAF 1996 SWMPR
18-6	1986	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--			BEAR
18-6	1986	<5.0	<5.0	<5.0	<5.0	--	--	--	--	--			BEAR
18-6	9/15/91	<5.0	<5.0	<5.0	<5.0	--	--	<5.0	--	--	5,6,8	a	PNL 1993 OU2 RI
18-6	5/18/93	<2.0	--	--	--	--	--	<1.0	--	--			PNL 1994 OU1 RI
18-6	7/26/94	<1.0	<1.0	<1.0	<1.0	<50	<100	<1.0	--	--	1-4	b	USAF 1995 OU1 RD
18-6	10/4/94	<1.0	<1.0	<1.0	<1.0	<50	600	<1.0	--	--	1-4	b	USAF 1995 OU1 RD

TABLE ST48-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	TCE	1,2-DCA	trans-1,2-dichloroethylene	Analylitical Methods	Notes	Reference
48M01	1989	1,390	49	143	1,550	--	--	--	--	--	1,5	a	HLA 1992 RI/FS
48M01	5/19/93	910	--	--	--	--	--	<1.0	--	--	1,4,5		PNL 1994 OU1 RI
48M01	7/27/94	3,900	350	230	1,960	14,000	230,000	<1.0	36	--	1-4	b,d,e	USAF 1995 OU1 RD
48M01	10/4/94	3,600	82	170	1,240	13,000	--	<1.0	54	--	1,2,4	d	USAF 1995 OU1 RD
48M01	7/27/95	2,900	200	110	1,100	4,600	50,000	<25	32	--	1-4	b	USAF 1995 OU1 RD
48M01	9/8/95	3,300	89	480	5,100	25,000	97,000	<20	<20	--	1-4	b,d,i	USAF 1995 OU1 RD
48M01	7/29/96	4,600	87	290	1,980	--	--	<5.0	14	--	1,4	b,j	USAF 1996 SWMPR
48M01	9/11/97, 10/1/97	3,800	62	220	1,420	--	--	<1.0	4	<1.0	1,4	b,l	USAF 1997 SWMPR
48M03	10/6/89	0.34	<0.25	<0.5	<0.85	--	--	--	--	--			BEAR
48M03	10/6/89	<0.02	<0.3	<0.46	<0.4	--	--	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
48M03	5/18/93	<2.0	--	--	--	--	--	0.31	--	--	1,4,5		PNL 1994 OU1 RI
48M03	7/25/94	<1.0	<1.0	<1.0	<1.0	<50	270	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M03	10/4/94	<1.0	<1.0	<1.0	<1.0	<50	120	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M03	7/24/95	<1.0	<1.0	<1.0	1.1	<50	2,900	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M04	9/29/89	<0.02	<0.3	<0.5	<0.4	--	--	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
48M04	5/17/93	0.12	--	--	--	--	--	<1.0	--	--	1,4,5		PNL 1994 OU1 RI
48M04	7/21/94	<1.0	<1.0	<1.0	<1.0	<50	120	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M04	8/3/94	<1.0	<1.0	<1.0	<1.0	--	--	<0.5	<0.5	--	1,4	b	PNL 1994 SWGMP
48M04	10/5/94	<1.0	<1.0	<1.0	<1.0	<50	130	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M04	9/8/95	<1.0	<1.0	<1.0	<1.0	<50	150	<1.0	<1.0	--	1-4	b	USAF 1995 SWMPR
48M04	7/23/96	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	--	1,4	b,j	USAF 1996 SWMPR
48M04	9/15/97	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	1,4	b,l	USAF 1997 SWMPR
48M05	9/29/89	28.5	<0.3	<0.5	1.62	--	--	--	--	--			BEAR
48M05	9/29/89	3.01	<0.25	<0.46	<0.4	--	--	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
48M05	5/17/93	1.3	--	--	--	--	--	0.64	--	--	1,4,5		PNL 1994 OU1 RI
48M05	7/21/94	1.3	<1.0	<1.0	<1.0	<50	230	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M05	8/3/94	<1.0	<1.0	<1.0	<1.0	--	--	<0.5	<0.5	--	1,4	b	PNL 1994 SWGMP
48M05	10/5/94	<1.0	<1.0	<1.0	<1.0	<50	2,100	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M05	9/7/95	2.2	<1.0	<1.0	<1.0	56	<100	<1.0	<1.0	--	1-4	b	USAF 1995 SWMPR
48M05	7/24/96	1.2	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	--	1,4	b,j	USAF 1996 SWMPR
48M05	9/15/97	5.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	1,4	b,l	USAF 1997 SWMPR

TABLE ST48-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	TCE	1,2-DCA	trans-1,2-dichloroethylene	Analylitical Methods	Notes	Reference
48M06	9/28/89	<0.2	<0.3	<0.46	<0.85	--	--	--	--	--			BEAR
48M06	9/28/89	<0.15	<0.25	<0.5	<0.4	--	--	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
48M06	5/17/93	<2.0	--	--	--	--	--	0.63	--	--	1,4,5		PNL 1994 OU1 RI
48M06	7/26/94	<1.0	<1.0	<1.0	<1.0	<50	140	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M06	8/3/94	<1.0	<1.0	<1.0	<1.0	--	--	<0.5	<0.5	--	1,4	b	PNL 1994 SWGMP
48M06	10/5/94	<1.0	<1.0	<1.0	<1.0	<50	2,900	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M06	9/7/95	<1.0	<1.0	<1.0	<1.0	<50	<100	<1.0	<1.0	--	1-4	b	USAF 1995 SWMPR
48M06	7/25/96	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	--	1,4	b,j	USAF 1996 SWMPR
48M06	9/15/97	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	1,4	b	USAF 1997 SWMPR
48M07	10/9/89	3.63	<0.3	<0.5	<0.4	--	--	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
48M07	5/18/93	0.36	--	--	--	--	--	2.1	--	--	1,4,5		PNL 1994 OU1 RI
48M07	7/20/94	<1.0	<1.0	1.1	2.0	300	1,100	<1.0	<1.0	--	1-4	b,f	USAF 1995 OU1 RD
48M07	10/4/94	<1.0	<1.0	<1.0	<1.0	<50	520	<1.0	<1.0	--	1-4	b	USAF 1995 OU1 RD
48M07	3/16/95	6.3	15	7.8	28	360	390	1.8	<1.0	--	1-4	b,g	USAF 1995 OU1 RD
48M07	7/25/96	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	--	1,4	b,f,j	USAF 1996 SWMPR
48M08	5/27/93	130	--	--	--	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
48M08	7/24/95	210	3,200	830	3,700	11,000	4,500	<25	<25	--	1-4	b	USAF 1995 OU1 RD
48M08	7/25/96	570	2,300	550	2,160	--	--	<1.0	<1.0	--	1,4	b,f,j	USAF 1996 SWMPR
48PP13	7/26/95	7,200	5,400	370	1,800	32,000	60,000	<25	47	--	1-4	b	USAF 1995 OU1 RD
48PP13	7/18/96	6,700	3,700	250	1,360	--	--	<20	61	--	1,4	b,j	USAF 1996 SWMPR
48PP28	7/26/95	64	540	480	4,100	14,000	180,000	<25	<25	--	1-4	b	USAF 1995 OU1 RD
48PP28	7/18/96	<1.0	150	280	3,600	--	--	<1.0	<1.0	--	1,4	b,j	USAF 1996 SWMPR
48PP101	7/26/95	250	11	160	960	7,800	58,000	<5.0	<25	--	1-4		USAF 1995 OU1 RD
48PP102	7/18/96	6.2	5.0	160	660	--	--	<1.0	<1.0	--	1,4	b,f,j	USAF 1996 SWMPR
53M03	10/6/89	318	230	<0.5	1,990	--	--	--	--	--	1,5	a	HLA 1992 RI/FS; BEAR
53M03	10/6/89	299	53.2	<0.5	1,990	--	--	--	--	--			BEAR
53M03	9/91	460	53	100	890	--	--	1.0	<5.0	--	5,6,8	a	PNL 1993 OU2 RI
53M03	5/18/93	120	--	--	--	--	--	0.42	--	--	1,4,5		PNL 1994 OU1 RI
53M03	7/27/94	220	44	110	660	9,100	45,000	<1.0	2.3	--	1-4	b	USAF 1995 OU1 RD
53M03	10/5/94	460	11	27	164	3,000	56,000	<1.0	1.2	--	1-4	b	USAF 1995 OU1 RD
53M03	3/10/95	1.9	2.9	1.6	9.3	<100	230	2.1	<1.0	--	1-4	b	USAF 1995 OU1 RD

TABLE ST48-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	TCE	1,2-DCA	trans-1,2-dichloroethylene	Analylitical Methods	Notes	Reference
53M03	7/24/95	190	15	27	260	2,400	61,000	<1.0	1.5	--	1-4	b,h	USAF 1995 OU1 RD
53M03	9/8/95	240	25	47	490	2,300	7,000	<1.0	<1.0	--	1-4	b	USAF 1995 SWMPR
53M03	7/25/96	390	26	87	410	--	--	<1.0	<1.0	--	1,4	b,j	USAF 1996 SWMPR
53M03	9/2/97	170	21	72	570	--	--	<1.0	<1.0	<1.0	1,4	b,l	USAF 1997 SWMPR

Notes:
a. For additional compounds detected, see reference.
b. No compounds other than those listed or noted were detected above the reporting limits.
d. Sampled without purging, sampled after 10 gal. purged 16 March 1995.
e. Additional compounds detected: chloroethane - 3.2 µg/L.
f. Additional compounds detected: chloromethane - 2.7 µg/L, 48M07 - 5.6 µg/L, 48M08 - 1.8 µg/L, 48 PP102 - 2.2 µg/L.
g. Well was frozen, hot water was introduced and 3 gal. purged before sampling.
h. Additional compounds detected: 1,4 dichlorobenzene - 2.4 µg/L.
i. Additional compounds detected: chloroform - 58 µg/L, probably the result of laboratory dilution water contamination.
j. Methylene chloride detected in concentrations ranging from 2.6 - 84 ug/L, suspected to be the result of laboratory contamination.
l. Additional compound detected: chloromethane - 2 µg/L (48M01), 0.7 µg/L (48M04), 1.0 µg/L (18-3,48M05, 53M03).

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TCE Trichloroethene.
DCA Dichloroethane.

TABLE ST48-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST48, POWER PLANT FUEL SPILL, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)		
48M01	7/27/95	NO PARAMETERS, WELL SAMPLED W/O PURGE (NAPL IN WELL)							–		USAF 1995 OU1 RD
48M01	9/8/95	NO PARAMETERS, WELL SAMPLED W/O PURGE (NAPL IN WELL)							–		USAF 1995 OU1 RD
48M01	7/29/96	NO PARAMETERS, WELL SAMPLED W/O PURGE (NAPL IN WELL)							–		USAF 1996 SWMPR
48M01	9/11/97	3.34	34	15.0	0	671	7.67	-45	–		USAF 1997 SWMPR
48M01	10/1/97	0.07	0.7	14.7	Hi	628	7.19	-57	–		USAF 1997 SWMPR
48M03	7/24/95	1.6	–	8	–	630	7.5	–	–		USAF 1995 OU1 RD
48M04	9/7/95	3.9	–	17	–	420	7.1	–	–		USAF 1995 OU1 RD
48M04	7/23/96	3.1	–	14	4	830	6.7	120	–		USAF 1996 SWMPR
48M04	9/15/97	8.77	83	11.7	45	430	8.09	66	–		USAF 1997 SWMPR
48M05	9/7/95	2.7	–	15	–	150	7.1	–	–		USAF 1995 OU1 RD
48M05	7/24/96	0.34	–	9.2	4	514	7.1	-119	–		USAF 1996 SWMPR
48M05	9/15/97	8.49	74	8.3	35	346	8.12	-16	–		USAF 1997 SWMPR
48M06	9/8/95	3.1	–	6	–	200	6.9	–	–		USAF 1995 OU1 RD
48M06	7/25/96	1.09	–	5.4	2	300	7.05	-121	–		USAF 1996 SWMPR
48M06	9/15/97	8.23	65	4.5	29	242	8.84	-31	–		USAF 1997 SWMPR
48M07	7/25/96	3.93	–	7.5	20	444	6.97	-71	–		USAF 1996 SWMPR
48M08	7/24/95	1.2	–	8.2	–	570	7.3	–	–		USAF 1995 OU1 RD
48M08	7/25/96	5.74	–	9.1	3	666	6.89	-84	–		USAF 1996 SWMPR
53M03	7/24/95	1.4	–	9.4	–	475	7.15	–	–		USAF 1995 OU1 RD
53M03	9/8/95	2.4	–	10	–	440	6.6	–	–		USAF 1995 OU1 RD
53M03	7/25/96	4.09	–	9	10	770	6.48	-62	–		USAF 1996 SWMPR

TABLE ST 48-2 (continued)

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1] (ppb)		
53M03	9/2/97	0.61	5.9	12.9	14	560	7.14	-3	--		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Drager Liquid Extraction (DLE) field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.

ST49 Building 1300 Fuel Leak

COCs, RAOs, and ARARs

BTEX compounds and chlorinated solvents are COCs for ST49. GRO and DRO have also been detected during previous sampling events. The following table lists RAOs and ARAR MCLs established to address groundwater quality at ST49 and other OU1 source areas. The OU1 ROD stipulates the selected remedy for ST49 is no further action with continued groundwater monitoring.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L

Site Setting

Building 1300 is the Alert Hangar, is a large hangar at the south end of the main runway used for readiness exercises and missions. The hangar is in a restricted area on the flight line. ST49 includes the area under Building 1300 and the area north of the building. It is thought that fuel was accidentally released from either the fuel tanks at the south end of the building or from piping in the vicinity of the utility room. NAPL has been detected in wells 49GMW, 49M02, and 49RW01 (located close to 49M02). NAPL has been recovered from 49GMW and 49RW01 using air-lift pumps or passive skimmers periodically emptied by hand. Recovered fuel is disposed of by the base HazMat facility. Less than 100 gallons of fuel have been recovered from the two wells since 1992. The skimmers in the wells are prone to fouling with a black slime.

Previous Activities

Analytical results for ST49 indicated BTEX compounds in the vicinity of the NAPL plume were generally below 50 µg/L. Chlorinated compounds were detected at concentrations less than 10 µg/L in the area north of the building.

During the 1996 field season, monitor wells 49M01, 49M02, 49M05 and 49M06 were sampled for VOCs. NAPL recovery wells 49GMW and 49RW01 were gauged and contained 1.32 ft and 0.13 ft of NAPL, respectively. BTEX compounds were detected in 49M01, 49M02, 49M05, and 49M06, with benzene concentrations ranging from below detection limits (49M01 and 49M02) to 7.4 µg/L in 49M05. 49M05 is the only well displaying benzene concentrations above site specific RAOs and ARAR MCLs. TCE concentrations ranged from below detection limits (multiple

points) to 4.5 µg/L in 49M05. These TCE concentrations were below the EPA drinking water MCL of 5 µg/L. Well 49M06 displayed a dichlorofluoromethane concentration of 1.4 µg/L. An applicable EPA drinking water MCL was not identified for this compound.

1997 Results

During the 1997 field season, monitor wells 49M05 and 49M06 were monitored using field screening test kits. Monitor wells 49M05 and 49M06 displayed a total BTEX concentration of 60 and 90 ppb, respectively. The total BTEX concentrations are higher than previous analytical results. The elevated total BTEX results may be attributed to possible interference with gasoline and diesel petroleum products. Elevated concentrations of GRO and DRO had previously been detected in these wells. TCE and PCE concentrations were below the detection limit of the immunoassay test kit of 10 ppb. The chlorinated solvent results are consistent with previous analytical results.

Due to the lack of correlation between analytical and 1997 immunoassay data, a trend of groundwater quality can not currently be determined. Further monitoring of BTEX compounds is required to confirm the 1997 immunoassay results.

On 11 August 1997, monitor well 49M02, recovery well 49RW01, and product probes 49PP103 and 49PP104 were decommissioned due to construction activities along the north side of Building 1300. On 26 September 1997, monitor wells 49M03 and 49M04 were decommissioned due to poor condition. All wells and product probes were decommissioned by removing the well casing and filling the borehole with bentonite.

References for ST49:

1994 OU1 Record of Decision, USAF, September 1994
1995 OU1 Remedial Design, USAF, November 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST49:

Figure ST49-1 ST49 Site Plan Showing Locations of Groundwater Monitor Wells, Eielson AFB, Alaska.

List of Tables for ST49:

Table ST49-1 Concentrations (μg/L) of Organic Compounds in Groundwater Samples, ST49, Building 1300 LUST Spill Site, Eielson AFB, Alaska.

List of Tables for ST49 (continued):

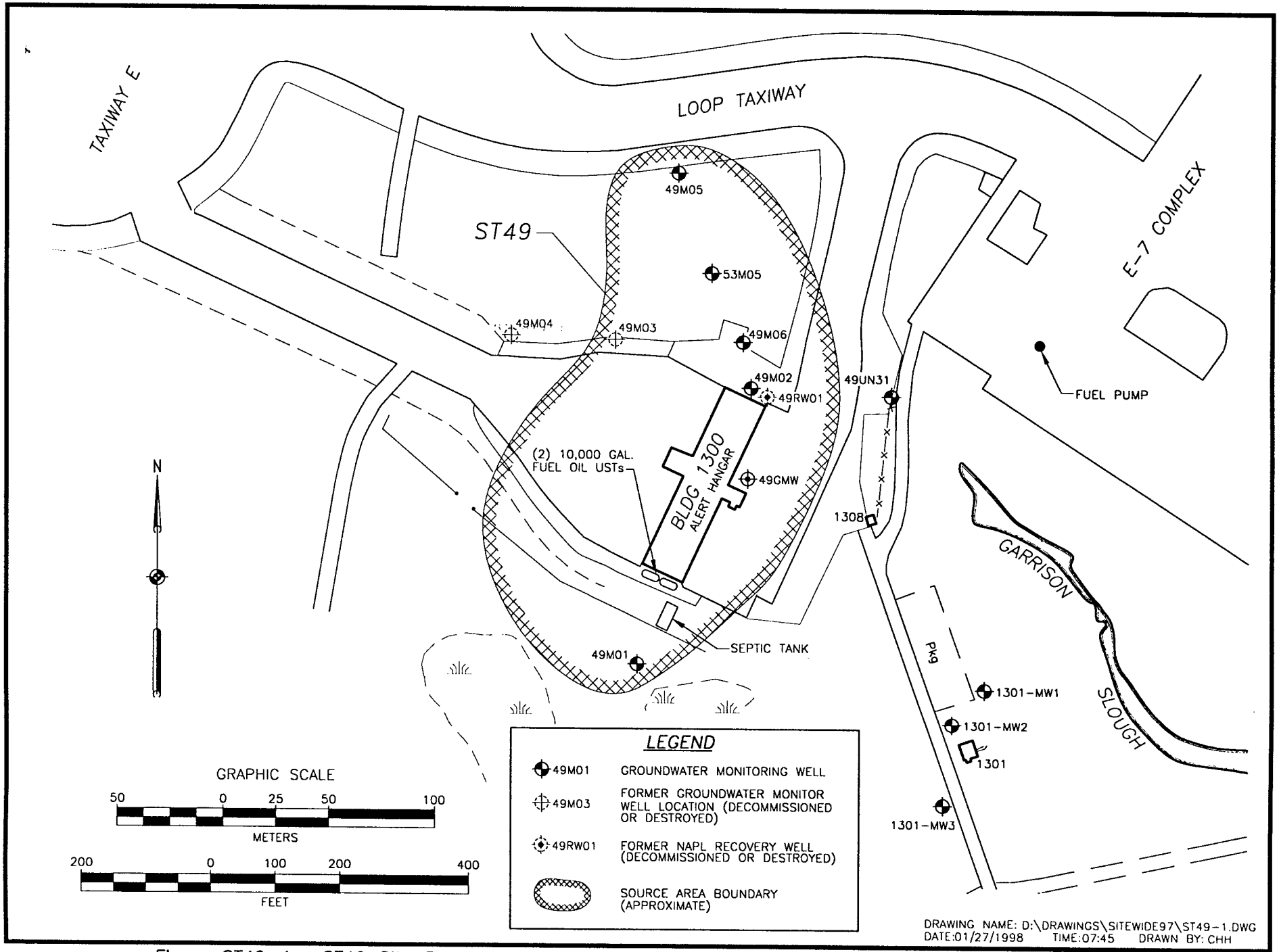


Figure ST49-1. ST49 Site Plan Showing Locations of Groundwater Monitor Wells, Eielson AFB, Alaska

TABLE ST49-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST49, BUILDING 1300 LUST SPILL SITE, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)								Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	DCDFM	TCE			
49M01	9/4/89	<0.2	<0.3	<0.5	<0.4	--	--	--	<1.0	1,4,5,13	a	HLA 1992 RI/FS; BEAR
49M01	1989	<0.15	0.31	<0.46	<0.85	--	--	--	--			BEAR
49M01	5/25/93	<2.0	--	--	--	--	--	--	<1.0	1,4,5		PNL 1994 OU1 RI
49M01	7/20/94	<1.0	<1.0	<1.0	<1.0	<50	1,700	--	<1.0	1-4	b	USAF 1995 OU1 GMIR
49M01	8/2/96	<1.0	<1.0	<1.0	1.0	--	--	<1.0	<1.0	1,4	e	USAF 1996 SWMPR
49M02	9/19/89	0.33	0.83	2.35	5.95	--	--	--	0.96	1,4,5,13	a	HLA 1992 RI/FS; BEAR
49M02	1989	0.59	0.49	5.37	18.1	--	--	--	--			BEAR
49M02	5/26/93	<2.0	--	--	--	--	--	--	0.18	1,4,5,13		PNL 1994 OU1 RI
49M02	7/27/94	<1.0	<1.0	9.7	26.5	400	4,900	--	2.2	1-4	b,c	USAF 1995 OU1 GMIR
49M02	9/30/94	2.6	6.4	10	38.3	510	--	--	--	1,2,4	b,c	USAF 1995 OU1 GMIR
49M02	8/2/96	<1.0	<1.0	1.9	6.7	--	--	<1.0	2.5	1,4	e	USAF 1996 SWMPR
49M03	9/4/89	4.35	<0.3	0.63	0.94	--	--	--	<1.0	1,4,5,13	a	HLA 1992 RI/FS; BEAR
49M03	1989	4.71	<0.25	0.55	<0.85	--	--	--	--			BEAR
49M03	5/18/93	<2.0	--	--	--	--	--	--	<1.0	1,4,5		PNL 1994 OU1 RI
49M03	9/30/94	9.0	3.6	<1.0	1.6	76	560	--	<1.0	1-4	b	USAF 1995 OU1 GMIR
49M04	9/4/89	1.37	<0.3	<0.5	<0.4	--	--	--	<1.0	1,4,5,13	a	HLA 1992 RI/FS; BEAR
49M04	1989	0.57	<0.25	<0.2	<0.85	--	--	--	<1.0			BEAR
49M04	5/25/93	2.9	--	--	--	--	--	--	0.35	1,4,5		PNL 1994 OU1 RI
49M04	7/19/94	<1.0	<1.0	<1.0	<1.0	<50	<100	--	<1.0	1-4	b	USAF 1995 OU1 GMIR
49M04	9/30/94	2.9	5.1	<1.0	2.5	95	<100	--	<1.0	1-4	b	USAF 1995 OU1 GMIR
49M05	9/19/89	2.47	0.72	0.92	<0.4	--	--	--	6.9	1,4,5,13	a	HLA 1992 RI/FS; BEAR
49M05	5/26/93	8.2	--	--	--	--	--	--	8.2	1,4,5		PNL 1994 OU1 RI
49M05	7/20/94	13	<1.0	<1.0	<1.0	130	1,500	--	6.1	1-4	b	USAF 1995 OU1 GMIR
49M05	8/8/94	3.8	<1.0	<1.0	<1.0	--	--	--	5.8	1-4	b	USAF 1995 OU1 GMIR
49M05	9/30/94	6.8	3.0	<1.0	<1.0	110	790	--	3.1	1-4	b	USAF 1995 OU1 GMIR
49M05	8/2/96	7.4	<1.0	<1.0	1.2	--	--	<1.0	4.5	1,4	b	USAF 1996 SWMPR

TABLE ST49-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	DCDFM	TCE	Analytical Methods	Notes	Reference
49M06	9/12/89	1.35	<0.3	3.26	<0.4	--	--	--	2.7	1,4,5,13	a	HLA 1992 RI/FS; BEAR
49M06	5/26/93	1.9	--	--	--	--	--	--	4.8	1,4,5		PNL 1994 OU1 RI
49M06	10/4/94	<1.0	<1.0	8.6	18	230	2,000	--	6.0	1-4	b,d	USAF 1995 OU1 GMIR
49M06	9/29/95	2.1	1.0	8.1	16	180	1,900	2.3	2.9	1-4	b	USAF 1995 OU1 GMIR
49M06	8/2/96	1.7	<1.0	4.2	9.6	--	--	1.4	3.8	1,4	e	USAF 1996 SWMPR
53M05	9/19/89	0.47	<0.3	<0.5	<0.4	--	--	--	3.9	1,4,5	a	HLA 1992 RI/FS; BEAR
53M05	1989	<0.15	<0.25	0.72	3.99	--	--	--	--			BEAR
53M05	5/25/93	0.77	--	--	--	--	--	--	2.9	1,4,5		PNL 1994 OU1 RI
53M05	7/19/94	<1.0	<1.0	<1.0	<1.0	67	3,700	--	<1.0	1-4	b	USAF 1995 OU1 GMIR
53M05	9/30/94	1.4	2.8	<1.0	<1.0	79	270	--	1.3	1-4	b	USAF 1995 OU1 GMIR

Notes:
a. For additional compounds detected, see reference.
b. No compounds other than those listed or noted were detected above the reporting limits.
c. Gauged 19 July, sampled 27 July without purging, sampled again 30 September without purging.
d. Additional compounds detected: trichlorofluoromethane - 1.9 µg/L, 1,1,1-trichloroethane - 1.1 µg/L.
e. Additional compounds detected: Methylene chloride - 49M01 - 1.0 µg/L, 49M02 - 1.2 µg/L, 49M06 - 1.1 µg/L, probably the result of laboratory contamination (compound was also detected in laboratory method blank at 1.5 ug/L).

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421.
12. 6020.
13. 8310.

DCDF Dichlorodifluoromethane
TCE Trichloroethene

TABLE ST49-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST49, BUILDING 1300 LUST SPILL SITE, EIELSON AFB, ALASKA

		Parameters							Immunoassay Results				
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2] (ppb)	Notes	Reference
49M01	8/2/96	3.29	--	4.8	5	322	6.63	-35	--	--	--		USAF 1996 SWMPR
49M02	8/2/96	0.72	--	3.0	9	302	6.67	-13	--	--	--		USAF 1996 SWMPR
49M05	8/2/96	0.62	--	6.2	8	362	6.61	-25	--	--	--		USAF 1996 SWMPR
49M05	9/19/97	2.26	20	9.7	10	334	7.48	34	60	nd	nd		USAF 1997 SWMPR
49M06	9/29/95	1.7	--	7.0	--	340	6.89	--	--	--	--		USAF 1995 SWMPR
49M06	8/2/96	2.42	--	3.6	21	334	6.52	-22	--	--	--		USAF 1996 SWMPR
49M06	9/18/97	2.89	25	7.7	0	422	6.97	62	90	nd	nd		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Drager Liquid Extraction (DLE) field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.
The lower detection limit is 10 ppb on the Drager Liquid Extraction (DLE) field test kit.

SS50–52 Blair Lake Facility

COCs, RAOs, and ARARs

BTEX compounds are the COCs for SS50-52. GRO and DRO have also been detected during previous sampling events. The following table lists RAOs and ARAR MCLs established to address groundwater quality at SS50-52 and other OU1 sites.

COC	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 µg/L	5 µg/L
Toluene	1,000 µg/L	1,000 µg/L
Ethylbenzene	700 µg/L	700 µg/L
Xylenes	10,000 µg/L	10,000 µg/L

Site Setting

SS50–52 Blair Lake Facility is a remote facility inside a bombing target range approximately 25 miles west of the base. The buildings at the facility are constructed on a gravel pad approximately 8 feet thick that was placed over the wet muskeg natural surface in the area. Fuel releases occurred from several sources along supply lines running from the large above-ground storage tanks to the generators, heaters, and day tanks at the facility buildings. NAPL is present in well 50M01, RW1, RW2, and RW3.

Per the OU1 ROD, the selected remedy for SS50–52 was continued NAPL recovery and bioventing, as required. The RD for the source area indicated a bioventing system could lead to permafrost degradation, resulting in increased NAPL mobility. Based on this finding, it was determined bioventing would not be used to remediate the site (USAF, 1995i).

NAPL has been historically recovered from a 12-inch-diameter steel recovery well (RW2) near 50M01. More than 760 gallons of NAPL were recovered from this well from October 1992 to June 1995 using air-lift pumps powered by a compressor inside the facility. The NAPL recovery system was not operated from June 1995 to October 1996.

Due to the relatively thick layer of NAPL (approximately 1 ft) which appeared in the three recovery wells during winter 1996/1997, the NAPL recovery system was repaired and restarted on 6 February 1997. Approximately 215 gallons of NAPL were recovered from the recovery wells from October 1996 through April 1997 using various recovery techniques; including passive skimmers, a peristaltic pump, hand bailers and the NAPL recovery system. The NAPL recovery

system was shut down in April 1997 due to reduced NAPL recharge in RW-02. The system was re-started in August 1997 when a sufficient quantity of NAPL had returned to RW-02. Approximately 68 additional gallons of NAPL were recovered between August and October 1997, for a total of approximately 283 total gallons since the system was re-started in October 1996.

Previous Activities

1995 analytical results for SS50–52 indicated dissolved BTEX compounds were present. Well points that were installed in the area of the pump islands in 1993 were found destroyed in 1995.

Monitor wells 50M05, 50M06 and 50M07 were sampled for BTEX compounds during the 1996 field season. 50M01 was not sampled due to frozen groundwater. Benzene concentrations ranged from below detection limits (50M06) to 120 µg/L (50M05). The benzene concentration detected in 50M05 is above the site specific RAO and ARAR MCL. No other BTEX compounds exceeded site specific ARAR MCLs and RAOs.

1997 Results

Monitor wells 50M06 and 50M07 were sampled for BTEX compounds during the 1997 field season. Monitor well 50M05 was found destroyed and 50M07 was sampled in its place. 50M07 was selected for sampling due to its similar location in relationship to the above ground fuel storage tanks. Monitor well 50M01 was not sampled due to frozen groundwater. Xylenes were detected in 50M07 at 4 µg/L. No compounds exceeded site specific RAOs or ARAR MCLs. No other compounds were detected.

Cumulative analytical data for wells sampled in 1997 indicates groundwater quality has not changed significantly since groundwater monitoring was initiated. BTEX compounds continue to remain at low to non detectable levels in monitor wells 50M06 and 50M07. NAPL continues to accumulate in the recovery wells in recoverable quantities.

References for SS50-52:

1994 OU1 Record of Decision, USAF, September 1994
1995 OU1 Remedial Design, USAF, November 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for SS50-52:

List of Tables for SS50-52:

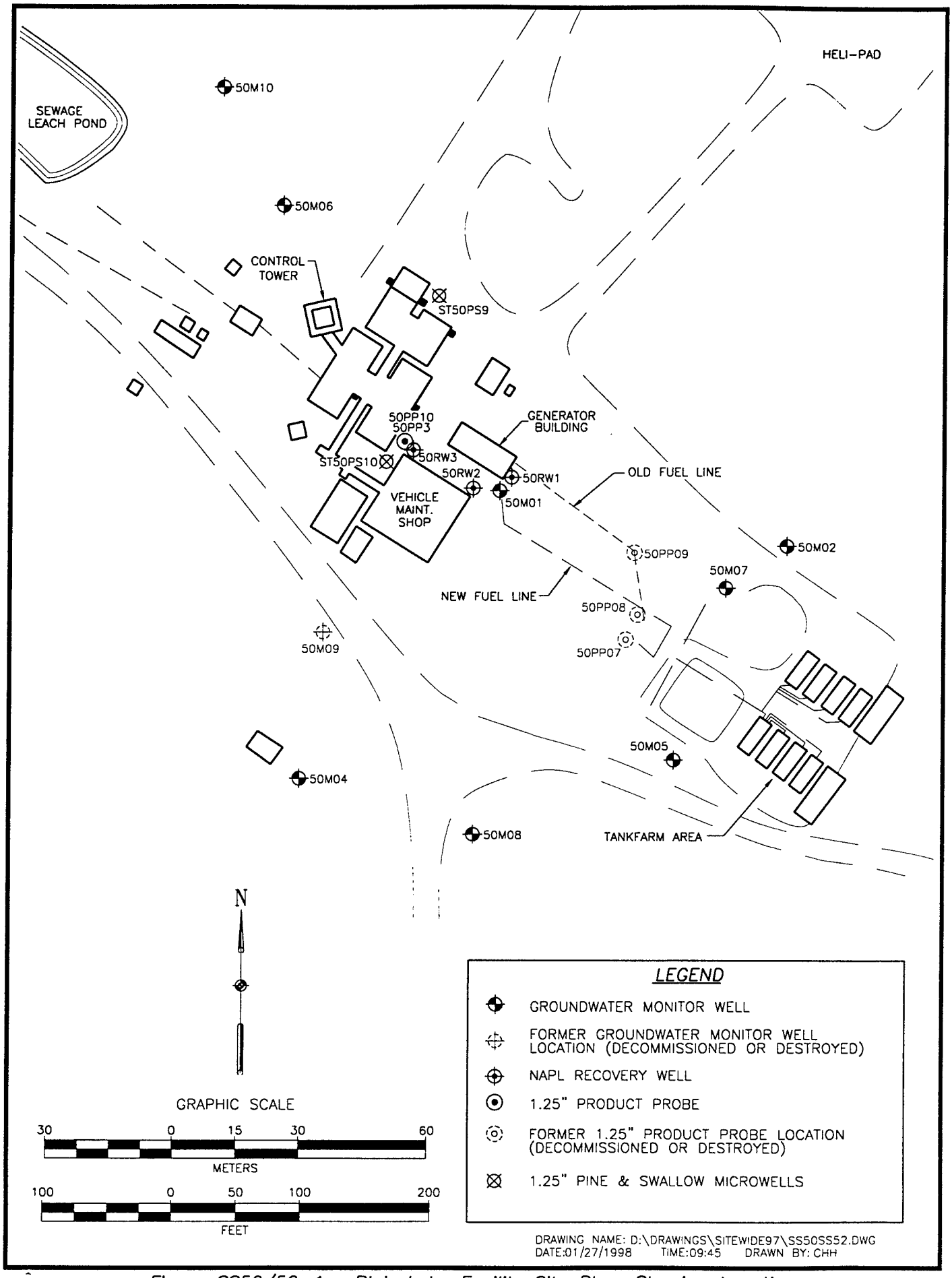


Figure SS50/52-1. Blair Lake Facility Site Plan, Showing Locations of Monitor Wells, Eielson AFB, Alaska

TABLE SS50-SS52-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, SS50-SS52 BLAIR LAKE, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
50M01	10/2/89	335	2,080	2,210	6,940	--	--	1,4,5		HLA 1992 RI/FS
50M01	12/31/89	65.2	261	332	1,860	--	--			BEAR
50M01	5/26/93	28	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
50M01	9/14/95	450	620	420	2,400	5,500	490,000	1-3		
50M01	10/9/96	No sample was collected - well was frozen.								USAF 1996 SWMPR
50M01	10/10/97	No sample was collected - well was frozen.								USAF 1997 SWMPR
50M02	10/1/89	<0.2	<0.3	<0.5	<0.4	--	--	1,4,5		HLA 1992 RI/FS
50M02	12/31/89	<0.15	<0.25	<0.46	<0.85	--	--			BEAR
50M02	5/25/93	<2.0	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
50M02	12/14/94	<1.0	<1.0	<1.0	<1.0	59	<100	1-3		USAF 1995 OU1 RD
50M05	10/2/89	108	8.37	342	126	--	--	1,4,5		HLA 1992 RI/FS
50M05	12/31/89	44.3	52.5	136	602	--	--			BEAR
50M05	5/25/93	290	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
50M05	12/14/94	4.0	1.3	39	53.9	660	590	1-3		USAF 1995 OU1 RD
50M05	9/14/95	5.8	1.1	15	16	<50	990			
50M05	10/9/96	120	2.6	56	177	--	--	1		USAF 1996 SWMPR
50M06	10/1/89	3.84	<0.3	<0.5	<0.4	--	--	1,4,5		HLA 1992 RI/FS
50M06	12/31/89	3.0	<0.25	<0.46	<0.85	--	--			BEAR
50M06	5/24/93	<2.0	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
50M06	12/14/94	<1.0	<1.0	<1.0	<1.0	<50	130	1-3		USAF 1995 OU1 RD
50M06	9/14/95	<1.0	<1.0	<1.0	<1.0	<50	170	1-3		
50M06	10/9/96	<1.0	<1.0	<1.0	1.6	--	--	1		USAF 1996 SWMPR
50M06	10/10/97	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1997 SWMPR

TABLE SS50-SS52-1 (continued)

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
50M07	10/2/89	3.8	2.69	0.99	11.3	--	--	1,4,5		HLA 1992 RI/FS
50M07	5/24/93	<2.0	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
50M07	12/14/94	<1.0	<1.0	<1.0	<1.0	50	<100	1-3		USAF 1995 OU1 RD
50M07	9/14/95	<1.0	<1.0	<1.0	<1.0	<50	63	1-3		
50M07	10/9/96	4.0	6.0	3.5	18.1	--	--	1		USAF 1996 SWMPR
50M07	10/10/97	<1.0	<1.0	<1.0	4	--	--	1		USAF 1997 SWMPR
50M10	10/2/89	<0.2	<0.3	<0.5	<0.4	--	--	1,4,5		HLA 1992 RI/FS
50M10	5/24/93	0.77	--	--	--	--	--	1,4,5		PNL 1994 OU1 RI
50M10	12/14/94	<1.0	<1.0	<1.0	<1.0	60	<100	1-3		USAF 1995 OU1 RD
50PS3	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	d	CRREL 1995
50PS4	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	d	CRREL 1995
50PS7	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	d	CRREL 1995
50PS8	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	d	CRREL 1995
50PS10	9/14/95	<1.0	1.2	<1.0	6.8	<50	2,700	1-3		USAF 1995 OU1 RD
50PS11	10/6/94	160	230	510	1060	8400	250,000	--	d	CRREL 1995
50PS12	10/6/94	990	45	160	180	1700	<700	--	d	CREEL 1995
50PS14	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	d	CRREL 1995
50PS16	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	d	CRREL 1995

TABLE SS50-SS52-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Analytical Methods	Notes	Reference
50PS17	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	d	CRREL 1995
50PS18	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	d	CRREL 1995

Notes:
a. No compounds other than those listed were detected above the reporting limits.
b. No compounds other than those listed were detected above the reporting limits set forth in the SWMP Workplan (USAF 1995).
c. Chromatogram is dominated by large peak not characteristic of diesel.
d. Field gas chromatograph was used for sample analysis.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE SS50-52-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, SS50-SS52, BLAIR LAKE FACILITY, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results	Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1]		
50M01	10/9/96			WELL	FROZEN				--		USAF 1996 SWMPR
50M01	10/10/97			WELL	FROZEN				--		USAF 1997 SWMPR
50M05	10/9/96	0.99	--	-0.03	593	505	7.04	-22	--		USAF 1996 SWMPR
50M06	10/9/96	0.39	--	2.67	1630	171	7.03	144	--		USAF 1996 SWMPR
50M06	10/10/97	2.21	16.7	3.7	HI	464	7.7	132	--		USAF 1997 SWMPR
50M07	10/9/96	--	60	-0.09	20.9	319	7.13	102	--		USAF 1996 SWMPR
50M07	10/10/97	32.7	--	2.8	69	860	7.15	129	--		USAF 1997 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

ST56 Engineer Hill Area

COCs, RAOs, and ARARs

BTEX compounds and chlorinated solvents are the COCs for ST56. The following table lists and ARAR MCLs established to address groundwater quality at ST56 and other OU 3,4,5 source areas. RAOs have not been established for OU 3,4,5 source areas. The OU 3,4,5 ROD selected continued groundwater monitoring and institutional controls for this source area.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

The ST56 source area is an active munitions storage and maintenance compound approximately three miles north-northeast of the main part of the base. The facility is used by active military personnel during duty hours. Water from the facility supply well contains COCs including solvents, particularly tetrachloroethylene (PCE), and fuel-related compounds at levels less than 50 µg/L. The original source has not been identified. The COCs are in groundwater originating from the bedrock aquifer. The hydrogeology is complex and non-homogeneous. Additional wells in the bedrock would probably not provide enough information to delineate the extent of contamination, or change the conceptual understanding of the site setting. Groundwater flow direction in the bedrock aquifer is fracture controlled and my not correlate with estimated gradient direction. Monitor wells in the alluvium near the septic tanks may not be downgradient from the known contamination at the supply wells.

Groundwater from the supply well is not currently used for drinking water. An alternate source of drinking water is supplied to the facility. The well water is plumbed into the heating system, the sinks, toilets, and the industrial shops.

Wastewater is routed to a leach field below the facility. The septic tank and leach field system were upgraded in 1995. The septic system was exempt from permitting due to the limited number of personnel occupying the facility.

The wastewater discharge at the leach field must meet State Water Quality Standards of 18 Alaska Administrative Code 70 (18 AAC 70). ADEC issued a letter to the U.S. Air Force stating the levels of concern for this discharge are drinking water MCLs, and the point of compliance should be at the discharge location.

Previous Activities

Water from the supply well contains PCE (measured at up to 59 µg/L). Chlorinated VOCs and BTEX compounds were found in 1993 in groundwater samples near the leach field discharge at levels of less than 10 µg/L. TCE and PCE were the only compounds measured above their respective ARAR MCLs of 5 µg/L.

Samples were collected from the supply well and water distribution piping in January 1996. One wastewater sample was collected and analyzed from the septic tank; it did not contain BTEX or chlorinated VOC compounds at detectable concentrations. Water from the wellhead piping and Building 6152 tap displayed PCE concentrations of 4.2 µg/L and 13 µg/L, respectively. The PCE concentration at Building 6152 tap exceeded the site specific ARAR MCL of 5 µg/L.

Samples were collected from well head piping, Building 6152 tap, the septic tank, and monitor wells 56MW04 and 56MW05 for VOCs during the 1996 summer field season. No samples were collected from monitor well 56MW03 because the well was dry. PCE was detected at the Building 6152 tap and well head piping at 15 µg/L and 3.4 µg/L, respectively. The PCE concentration at Building 6152 tap exceeded site specific ARAR MCL. No BTEX compounds or TCE were detected in the wells, 6152 tap, well head, or septic tank.

1997 Results

During the 1997 field season, the septic tank and well head piping were monitored for BTEX and chlorinated solvents. PCE was detected in the well head piping at 4.0 µg/L, below the site specific ARAR MCL. No other compounds were detected. Results are consistent with previous analytical data.

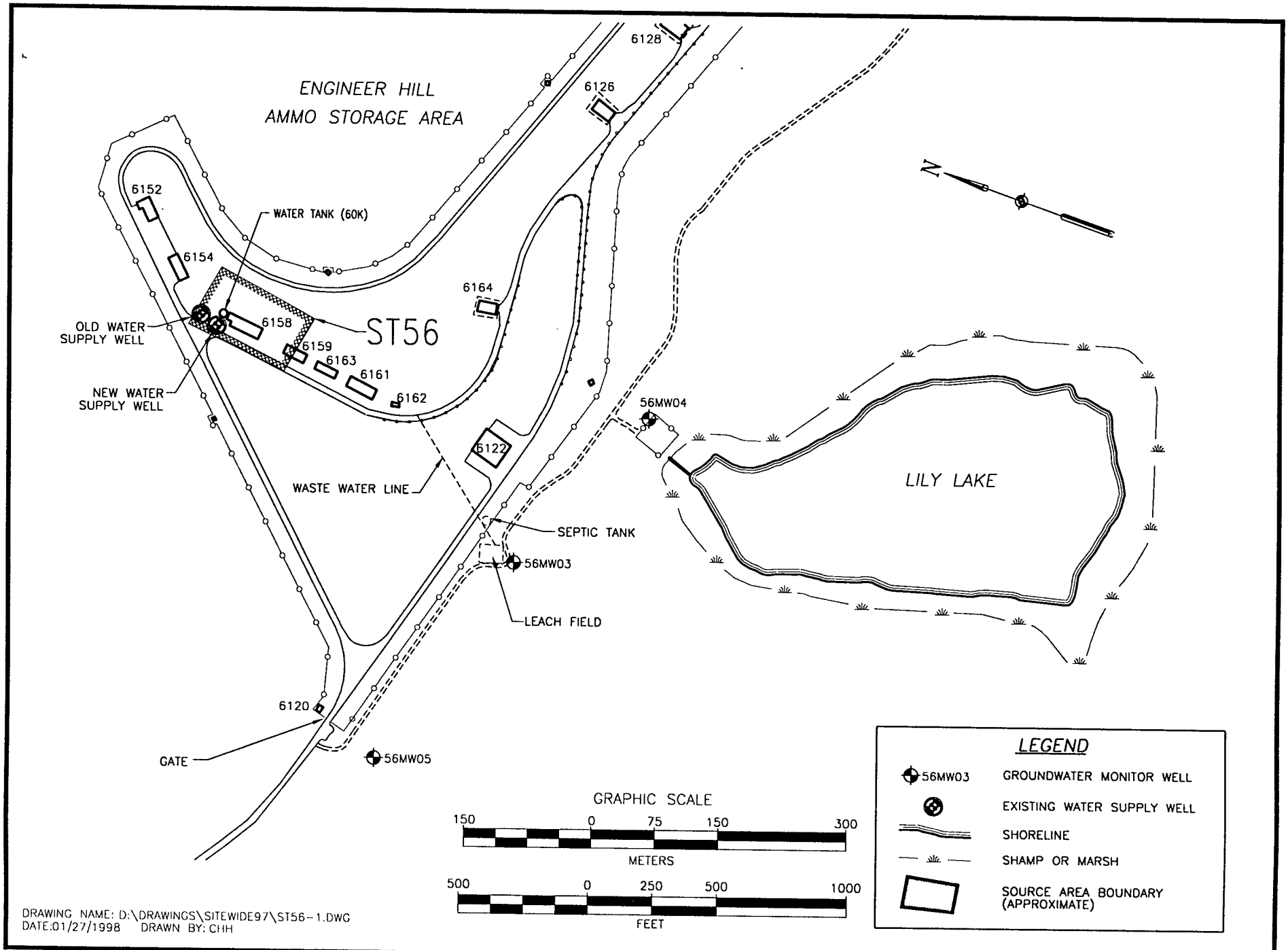
Cumulative analytical data indicates groundwater quality has not changed significantly since groundwater monitoring was initiated. PCE concentrations in the well head piping are at the same order of magnitude from previous sampling events. BTEX and TCE concentrations remain low to non detectable.

References for ST56:

1996 OU 3,4,5 Remedial Design, USAF, May 1996
1995 OU 3,4,5 Record of Decision, USAF, September 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST56:

List of Tables for ST56:



ST56-1. ST56 Site Plan, Engineer Hill Area, Eielson AFB, Alaska

TABLE ST56-1 CONCENTRATIONS (µg/L) OF BTEX COMPOUNDS IN WATER SAMPLES, ST56, ENGINEER HILL AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO			
56MW03	8/93	0.13	1.0	0.15	1.1	--	--	1		USAF 1995 OU1,3,4,5 RDW
56MW03	9/5/96	No sample was taken because well was dry.								USAF 1996 SWMPR
56MW04	8/17/94	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1995 OU1,3,4,5 RDW
56MW04	9/5/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
56MW05	8/17/94	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1995 OU1,3,4,5 RDW
56MW05	9/5/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
6152 tap	1/25/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 OU3,4,5 RD
6152 tap	8/29/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
well head	1/25/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 OU3,4,5 RD
well head	8/29/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
well head	9/8/97	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1997 SWMPR
septic tank	1/25/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 OU3,4,5 RD
septic tank	8/29/96	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1996 SWMPR
septic tank	9/8/97	<1.0	<1.0	<1.0	<1.0	--	--	1		USAF 1997 SWMPR

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TABLE ST56-2 CONCENTRATIONS (µg/L) OF HALOGENATED VOLATILE ORGANIC COMPOUNDS IN WATER SAMPLES, ST56, ENGINEER HILL AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Methylene Chloride	TCE	PCE	1,3-DCB	Analytical Methods	Notes	Reference
56MW03	8/93	0.11	6.5	0.11	0.11	4	a	USAF 1995 OU1,3,4,5 RDWP
56MW04	8/17/94	<1.0	<1.0	<1.0	<1.0	4	a	USAF 1995 OU1,3,4,5 RDWP
56MW04	9/5/96	<1.0	<1.0	<1.0	<1.0	4	a,b	USAF 1996 SWMPR
56MW05	8/17/94	<1.0	<1.0	<1.0	<1.0	4	a	USAF 1995 OU1,3,4,5 RDWP
56MW05	9/5/96	<1.0	<1.0	<1.0	<1.0	4	a	USAF 1996 SWMPR
6152 tap	1/25/96	<1.0	<1.0	13	<1.0	4	a	USAF 1996 OU3,4,5 RD
6152 tap	8/29/96	1.4	<1.0	15	<1.0	4	a,b	USAF 1996 SWMPR
well head	1/25/96	<1.0	<1.0	4.2	<1.0	4	a	USAF 1996 OU3,4,5 RD
well head	8/29/96	1.7	<1.0	3.4	<1.0	4	a,b	USAF 1996 SWMPR
well head	9/8/97	<1.0	<1.0	4.0	<1.0	4	a	USAF 1997 SWMPR
septic tank	1/25/96	<1.0	<1.0	<1.0	<1.0	4	a	USAF 1996 OU3,4,5 RD
septic tank	8/29/96	1.4	<1.0	<1.0	<1.0	4	a,b	USAF 1996 SWMPR
septic tank	9/8/97	<1.0	<1.0	<1.0	<1.0	4	a	USAF 1997 SWMPR

Notes:
a. No compounds other than those listed were detected above the reporting limits.
b. Methylene chloride is suspected to be the result of laboratory contamination (compound was also detected in laboratory method blank at 1.3 ug/L).

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.

TCE Trichloroethene.
PCE Perchloroethene (tetrachloroethene).
DCB Dichlorobenzene.

TABLE ST56-3 ANALYTICAL DATA (µg/L) FROM THE ENGINEER HILL WATER SUPPLY WELL AND BUILDING 6152 TAP
(ST56) EIELSON AFB, ALASKA.
(REVISED FROM FINAL RI, USAF 1995; USAF 1994 MEMO)

Engineer Hill	1986	1987		1988				1989							1990				1991		1994	1994*
Groundwater Data	Dec.	Sept.	Dec.	Jan.	Mar.	Apr.	Jul.	Jan.	Apr.	May	Jun.	Jul.	Aug.	Oct.	Jan.	Apr.	Jul.	Oct.	Jan.	Apr.	Mar.	Mar.
Volatile Organic																						
Benzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.4	ND	ND	ND	ND	ND	ND
n-Butylbenene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	11	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
tert-Butylbenzene	ND	ND	0.522	ND	ND	ND	ND	0.4	ND	ND	2.0	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Chlorobenzene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1-Dichloroethylene	0.41	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND
Ethylbenzene	ND	0.028	ND	ND	ND	ND	ND	ND	ND	ND	27	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Isopropylbenzene	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	4.1	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	8.2	ND	ND	ND	ND	ND	0.9	ND	ND	ND	ND	ND
n-Propylbenzene	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	5.7	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	48	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA	ND	ND
Tetrachloroethylene	48	24.6	40	15	12	23	14	ND	41	59	ND	48	ND	5.2	4.4	ND	4.1	ND	7.7	6.3	25.1	13.8
Toluene	19.6	0.05	ND	ND	ND	ND	ND	ND	ND	ND	220	ND	ND	ND	ND	ND	0.4	ND	ND	ND	ND	ND
1,1,1-Trichloroethane	0.04	NA	ND	ND	ND	ND	ND	ND	ND	ND	NA	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA
Trichloroethylene	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	30	1.4	ND	ND	ND	ND	ND	ND	ND	ND	0.6	0.4
1,3,5-Trimethylbenzene	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	15	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
1,2,5-Trimethylbenzene	NA	ND	ND	ND	ND	ND	ND	ND	ND	ND	38	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Xylenes	NA	0.17	ND	ND	ND	ND	ND	ND	ND	ND	199	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Metals																						
Arsenic	4.0	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	21	NA	NA	NA	NA	NA	NA
Copper	ND	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	107	NA	NA	NA	NA	NA	NA
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	271	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	385	NA	NA	NA	NA	NA	NA
Zinc	700	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	746	NA	NA	NA	NA	NA	NA
Chloride	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	2.0	NA	NA	NA	NA	NA	NA
Nitrate	NA	0.70	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	1.1	NA	NA	NA	NA	NA	NA
Sulfate	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	20	NA	NA	NA	NA	NA	NA

* = Water sample obtained from tap in Building 6152.
NA = Not applicable or analyzed.
ND = Not detected.
MDL = Method detection limit.

TABLE ST56-4 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST56, ENGINEER HILL AREA, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results			Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2] (ppb)		
SEPTIC TANK	01/25/96			NO PARAMETERS TAKEN					--	--	--		USAF 1995 SWMPR
SEPTIC TANK	08/29/96			NO PARAMETERS TAKEN					--	--	--		USAF 1996 SWMPR
SEPTIC TANK	09/08/97			NO PARAMETERS TAKEN					--	--	--		USAF 1997 SWMPR
WELL HEAD	01/25/96	--	--	--	--	--	--	--	--	--	--		USAF 1995 SWMPR
WELL HEAD	08/29/96	--	36.9	9.86	1	202	7.49	163	--	--	--		USAF 1996 SWMPR
WELL HEAD	09/08/97	6.92	77	19.1	33	297	8.38	118	--	--	--		USAF 1997 SWMPR
BLDG. 6152 TAP	08/29/96	--	58	9.18	4.7	205	6.7	208	--	--	--		USAF 1996 SWMPR
56MW04	09/05/96	--	24.6	4.26	68	288	6.31	42	--	--	--		USAF 1996 SWMPR
56MW05	09/05/96	--	34	2.2	1480	546	7.18	-23	--	--	--		USAF 1996 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Dräger Liquid Extraction (DLE) field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field test kit.
The lower detection limit is 10 ppb on the Dräger Liquid Extraction (DLE) field test kit.

SS57: see WP45/SS57

ST58 Old Quartermaster Service Station

COCs, RAOs, and ARARs

BTEX and lead are COCs for ST58. GRO, DRO, DCE and TCE have also been detected during previous sampling events. The following table lists ARAR MCLs established to address groundwater quality at ST58 and other OU 3,4,5 source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

ST58 is a former service station site decommissioned in 1988. This site is approximately one acre in size located on the northwest corner of Division Street and Wabash Avenue. During decommissioning, the above-ground tanks and some of the underground piping were removed. Fuel contamination was identified in the soil and groundwater during the RI/FS. In 1993, a soil vapor survey and soil sampling was conducted to identify the location of the most highly contaminated soil at the site. Approximately 700 cubic yards of petroleum-contaminated soil was removed from an excavation for use in a composting demonstration.

The OU 3,4,5 ROD selected bioventing as the remedial action for this source area. Data gap RD work in the Fall of 1995 included a soil vapor survey and groundwater sampling in the area of the BTEX plume. New well points were installed to permit sampling immediately downgradient of the former tank pit. Groundwater samples were collected and analyzed for BTEX. The

investigation indicated dissolved BTEX compounds were present at much lower concentrations than detected prior to excavation of the 700 cubic yards of soil. Based on these results, installation of a bioventing system was not recommended.

The results of the ST13/DP26 lead speciation and mobility study (IT, 1995) were considered applicable to lead in groundwater at ST58. EPA concluded that lead at ST13/DP26 was no longer mobile and was not amenable to treatment using pump and treat technology. Based on these findings, it was determined that active remediation of lead in groundwater would not be conducted at ST58 or at ST13/DP26. Lead concentrations in groundwater were to be monitored at both source areas as part of the SWMP.

Previous Activities

The results of groundwater monitoring are shown in Table ST58-1. The excavation of the 700 cubic yards of contaminated soil discussed above was performed shortly after the 1993 sampling event. Some monitor points installed prior to 1994 were destroyed during construction of the new building located downgradient of the old service station site.

Monitor wells 58MW10, 58MW11, 58MW12, product probes 58PP101, 58PP102, 58PP103, and microwells 58PS3, 58PS9, 58PS10, and 58PS12 were sampled for VOCs, PAHs, and lead during the 1996 field season. Ethylene dibromide (EDB) was added to the analyte list because it was historically used as a leaded gasoline additive. Product probe 58PP104 was dry and not sampled. Product probe 58PP102 was initially found dry but was driven approximately one ft. further into the ground which allowed enough groundwater to enter the probe for sampling.

Ethylbenzene and xylenes were detected in 58MW10, 58PP101, and 58PP103, with the highest concentrations occurring in 58MW10 (3.9 µg/L and 15.1 µg/L, respectively). No BTEX compounds were detected above site specific ARAR MCLs. Lead concentrations ranged from below detection limits (58PS12) to 77.8 µg/L (58PP101). Lead concentrations in 58PP101 (77.8 µg/L), 58PP102 (30 µg/L), 58PP103 (61.9 µg/L) were above the site specific ARAR MCL. EDB was not detected in samples collected at the site. Cis-1,2-DCE was detected in 58PS3 (6.4 µg/L) and 58PS10 displayed concentrations of cis-1,2-DCE (15 µg/L) and trans-1,2-DCE (12 µg/L). 58PS10 also displayed a TCE concentration of 12 µg/L, which is above the site specific ARAR MCL. Wells 58PS3 and 58PS10 are located downgradient of SS64 and are considered part of the SS64 plume.

Benzo[a]pyrene was detected in 58PP103 at 0.048 µg/L, below the EPA drinking water MCL of 0.2 µg/L. Other PAHs detected included chloromethane (58PS3 - 1.7 µg/L; 58PS9 - 1.4 µg/L), naphthalene (58PP103 - 1.4 µg/L), fluorene (58PP103 - 0.18 µg/L), phenanthrene (58PP103 - 0.37 µg/L), and benzo[a]fluoranthene (58PP103 - 0.017 µg/L). Applicable ARAR MCLs and EPA drinking water MCLs were not identified for these PAH compounds.

1997 Results

During the 1997 field season, total BTEX immunoassay testing was used for monitor well 58MW10 with a result of 80 ppb. The total BTEX concentration is within the range of previous analytical results.

References for ST58:

1995 OU 3,4,5 Record of Decision, USAF, September 1995
1996 OU 3,4,5 Remedial Design, USAF, May 1996
1996 OU 2,3,4,5 Proposed ROD Amendments, USAF, May 1996
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST58:

List of Tables for ST58:

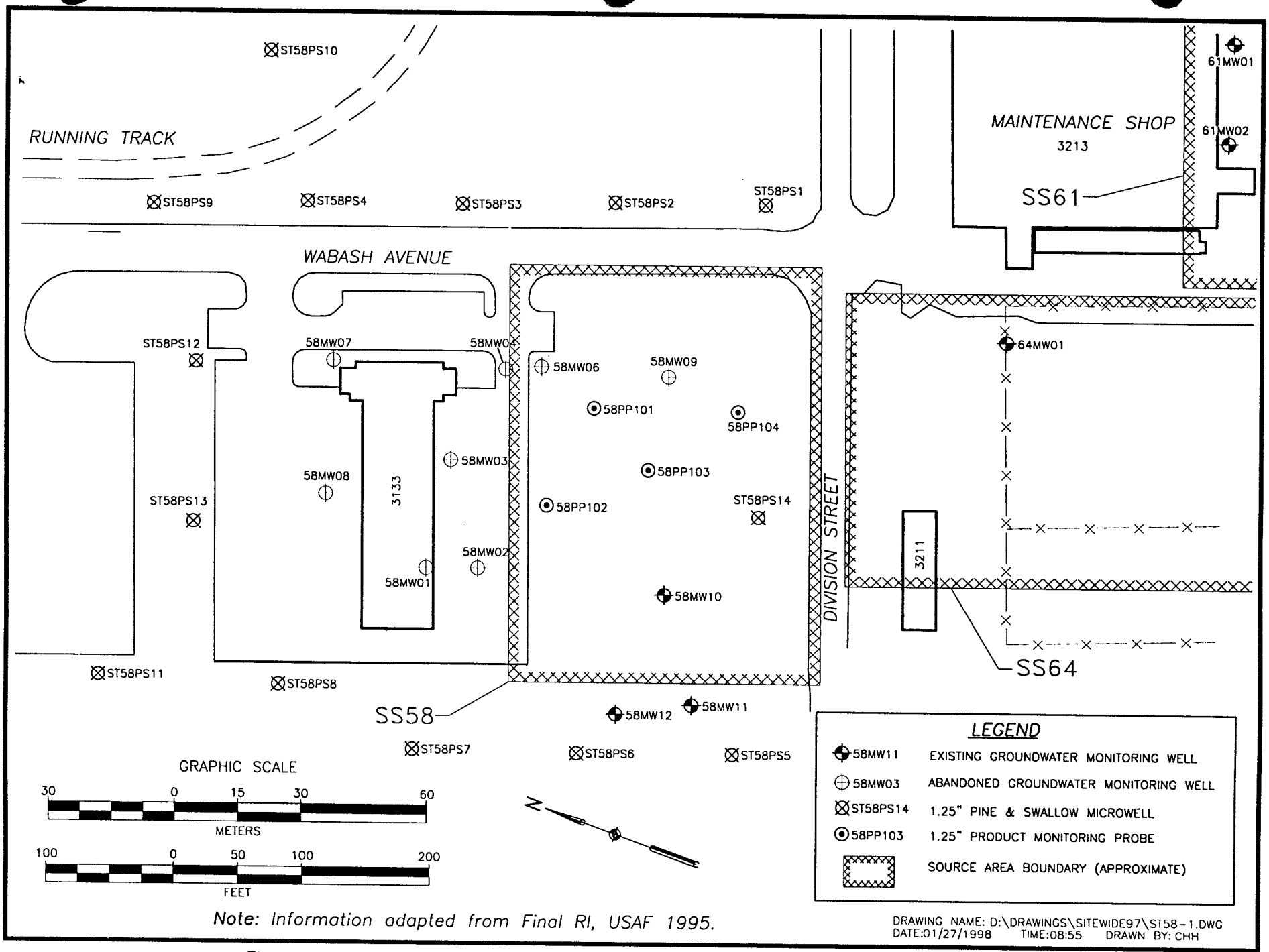


Figure ST58–1. ST58 Site Plan Showing Locations of Groundwater Monitor Wells and Well Points, Eielson AFB, Alaska

TABLE ST58-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS AND LEAD IN GROUNDWATER SAMPLES, ST58, OLD QUARTERMASTER SERVICE STATION, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	Methylen Chloride	cis-1,2 DCE	rans-1,2 DCE	TCE	Total Lead	nalytical Methods	Notes	Reference
58MW01	1/92	<0.2	<1.5	<1.0	<3.0	–	–	<1.0	–	–	–	–	8	a	PNL 1995 OU3,4,5 RI
58MW01	4/93	<0.65	<0.73	<0.49	<1.7	<2,000	200	1.8	–	–	–	35	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW02	1/92	<0.2	<1.5	<1.0	<3.0	–	–	<1.0	–	–	–	–	8	a	PNL 1995 OU3,4,5 RI
58MW02	4/93	<0.65	<0.73	<0.49	<1.7	<2,000	<100	<1.6	–	–	–	39	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW03	1/92	5.4	<1.5	<1.0	<3.0	–	–	<1.0	–	–	–	–	8	a	PNL 1995 OU3,4,5 RI
58MW03	4/93	3.7	<0.73	<0.49	<1.7	<2,000	<100	2.3	–	–	–	41	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW04	1/92	72	<1.5	1.4	<3.0	–	–	<1.0	–	–	–	–	8	a	PNL 1995 OU3,4,5 RI
58MW04	4/93	98	<0.73	<0.49	<1.7	–	300	2.3	–	–	–	63	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW05	1/92	85	<1.5	<1.0	<3.0	–	–	<1.0	–	–	–	–	8	a	PNL 1995 OU3,4,5 RI
58MW05	4/93	29	<0.73	<0.49	<1.7	<2,000	100	2.3	–	–	–	40	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW06	1/92	<0.2	<1.5	<1.0	<3.0	–	–	<1.0	–	–	–	–	8	a	PNL 1995 OU3,4,5 RI
58MW06	4/93	<0.65	<0.73	<0.49	<1.7	<2,000	<100	2.3	–	–	–	44	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW07	1/92	<0.2	<1.5	<1.0	<3.0	–	–	<1.0	–	–	–	–	8	a	PNL 1995 OU3,4,5 RI
58MW07	4/93	<0.65	<0.73	<0.49	<1.7	<2,000	100	2.4	–	–	–	110	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW08	1/92	145	<1.5	43	14	–	–	<1.0	–	–	–	–	8	a	PNL 1995 OU3,4,5 RI
58MW08	4/93	180	<0.73	110	29	<2,000	700	2.2	–	–	–	51	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW09	4/93	24	2.8	–	45	260,000	99,000	2.3	–	–	–	130	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW10	4/93	450	140	–	830	<2,000	7,000	9.0	–	–	–	89	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW10	9/25/95	30	24	110	610	1,800	–	–	–	–	–	–	1,2	a	USAF 1995 OU1,3,4,5 RDWP
58MW10	9/3/96	<1.0	<1.0	3.9	15.1	–	–	<1.0	<1.0	<1.0	<1.0	10	1,4,11,1	c	USAF 1996 SWMPR
58MW11	4/93	1.3	1.1	–	–	<2,000	100	2.0	–	–	–	170	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW11	10/4/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–			Pine & Swallow, 1994
58MW11	9/3/96	<1.0	<1.0	<1.0	<1.0	–	–	<1.0	<1.0	<1.0	<1.0	7.2	1,4,11,1	c	USAF 1996 SWMPR

TABLE ST58-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	Methylen Chloride	cis-1,2 DCE	rans-1,2 DCE	TCE	Total Lead	nalytical Methods	Notes	Reference
58MW12	4/93	<0.65	<0.73	<0.49	<1.7	<2,000	300	2.0	–	–	–	180	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW12	9/3/96	<1.0	<1.0	<1.0	<1.0	–	–	<1.0	<1.0	<1.0	<1.0	6.3	1,4,11,1	c	USAF 1996 SWMPR
58PP101	9/22/95	<1.0	1.1	1.1	<1.0	<50	–	–	–	–	–	–	1,2		USAF 1995 OU1,3,4,5 RDWP
58PP101	9/5/96	<1.0	<1.0	2.0	4.6	–	–	<1.0	<1.0	<1.0	<1.0	77.8	1,4,11,1	c	USAF 1996 SWMPR
58PP102	9/22/95	<1.0	<1.0	<1.0	<1.0	<50	–	–	–	–	–	–	1,2		USAF 1995 OU1,3,4,5 RDWP
58PP102	9/16/96	<1.0	<1.0	<1.0	<1.0	–	–	<1.0	<1.0	<1.0	<1.0	30	1,4,11,1	c	USAF 1996 SWMPR
58PP103	9/22/95	<1.0	2.2	22	54	5,000	–	–	–	–	–	–	1,2		USAF 1995 OU1,3,4,5 RDWP
58PP103	9/5/96	<1.0	<1.0	1.7	4.2	–	–	<1.0	<1.0	<1.0	<1.0	61.9	1,4,11,1	d	USAF 1996 SWMPR
58PP104	9/22/95	<1.0	<1.0	<1.0	<1.0	<50	–	–	–	–	–	–	1,2		USAF 1995 OU1,3,4,5 RDWP
58PS1	9/14/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994
58PS2	9/14/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	8.1	<3.0	<1.0	–		f	CRREL 1994
58PS3	9/14/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994
58PS3	9/16/96	<1.0	<1.0	<1.0	<1.0	–	–	<1.0	6.4	<1.0	<1.0	12.9	1,4,11,1	e	USAF 1996 SWMPR
58PS4	9/15/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994
58PS4	10/4/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994
58PS5	9/15/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994
58PS6	9/15/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994
58PS7	9/15/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994
58PS8	9/15/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994
58PS9	9/16/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994
58PS9	9/16/96	<1.0	<1.0	<1.0	<1.0	–	–	<1.0	<1.0	<1.0	<1.0	4.3	1,4,11,1	e	USAF 1996 SWMPR
58PS10	9/16/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	22	5.7	14	–		f	CRREL 1994
58PS10	9/16/96	<1.0	<1.0	<1.0	<1.0	–	–	<1.0	15	2.7	12	1.9	1,4,11,1	c	USAF 1996 SWMPR
58PS11	9/21/94	<2.0	<2.0	<3.0	<3.0	<120	<700	–	<6.0	<3.0	<1.0	–		f	CRREL 1994

TABLE ST58-1 (continued)

Well No.	Date Sampled	Concentration (µg/L) Benzene	Toluene	Ethyl-benzene	Xylenes	TPH GRO	TPH DRO	Methylen Chloride	cis-1,2 DCE	rans-1,2 DCE	TCE	Total Lead	nalytical Methods	Notes	Reference
58PS12	10/4/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	<6.0	<3.0	<1.0	--		f	CRREL 1994
58PS12	9/16/96	<1.0	<1.0	<1.0	<1.0	--	--	<1.0	<1.0	<1.0	<1.0	<1.0	1,4,11,1	c	USAF 1996 SWMPR
58PS13	10/4/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	<6.0	<3.0	<1.0	--		f	CRREL 1994
58PS14	10/4/94	<2.0	<2.0	<3.0	<3.0	<120	<700	--	<6.0	<3.0	<1.0	--		f	CRREL 1994

Notes:
a. For additional compounds detected, see reference.
b. TPH GRO and TPH DRO were analyzed by Data Chem Labs by EPA Method 8015, not ADEC GRO (8015M) and ADEC DRO (8100M). Methylene chloride is suspected to be a laboratory contaminant for these samples (found in laboratory blanks).
c. No compounds other than those listed were detected above the reporting limits.
d. Additional compounds detected: naphthalene - 1.4 mg/L, fluorene - 0.18 mg/L, phenanthrene - 0.37 mg/L, benzo[a]fluoranthene - 0.017 mg/L, benzo[a]pyrene - 0.048 mg/L.
e. Additional compounds detected: chloromethane - 58PS3 - 1.7 mg/L, 58PS9 - 1.4 mg/L.
f. Field gas chromatograph was used for sample analysis.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 742
13. 8310
12. 6020

TABLE ST58-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST58, OLD QUARTERMASTER SERVICE STATION, EIELSON AFB, ALASKA

		Parameters							Immunoassay Results		
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	Notes	Reference
58MW10	9/3/96	--	8.8	7.73	492	350	6.67	78	--		USAF 1996 SWMPR
58MW10	8/27/97	4.16	39	11.5	118	516	6.58	77	80		USAF 1997 SWMPR
58MW11	9/3/96	--	22.3	7.91	440	321	7.0	137	--		USAF 1996 SWMPR
58MW12	9/3/96	--	25.5	7.62	402	287	6.96	180	--		USAF 1996 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

SS61 Vehicle Maintenance Building 3213

COCs, RAOs, and ARARs

BTEX compounds and chlorinated solvents are the COCs for SS61. The following table lists ARAR MCLs established to address groundwater quality at SS61 and other OU 3,4,5 source areas. RAOs have not been established for OU 3,4,5, source areas.

COC	ARAR (Groundwater) - Drinking water MCL
Volatile Organic Compounds	
Benzene	5 µg/L
Toluene	1,000 µg/L
Ethylbenzene	700 µg/L
Xylenes	10,000 µg/L
1,4-Dichlorobenzene	75 µg/L
1,2-Dichloroethane	5 µg/L
cis-1,2-Dichloroethene	70 µg/L
trans-1,2-Dichloroethene	100 µg/L

COC (*cont.*)	ARAR (Groundwater) - Drinking water MCL (*cont.*)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 µg/L
Vinyl Chloride	2 µg/L
Semivolatile Organic Compounds	
DDT	----
Chlordane	2 µg/L
Inorganic Compounds	
[1]Lead	15 µg/L
[2]Silver	100 µg/L

1 - EPA Action Level 2 - Secondary MCL

Site Setting

This source area is in the center of the developed portion of the base, just north of the water treatment plant pond on Garrison Slough, and is on the east and south sides of the Vehicle Maintenance Shop (Building 3213). COCs are fuel-related compounds and solvents in soil and groundwater. The source appears to be a former dry well previously located on the south side of the building. During construction of the addition to Building 3213, this dry well and one additional dry well, along with surrounding soil, were removed.

The OU 3,4,5 ROD selected groundwater monitoring and institutional controls as the remedy for the source area. It is believed the remaining solvent impact is below the water table and removal or active remediation would be difficult and would not decrease the time required to meet the RAOs.

Previous Activities

TCE and petroleum-related compounds were detected in wells 61MW01 and 61MW02 during the OU 3,4,5 RI. A microwell investigation delineated a plume of dissolved TCE and DCE to the north-northwest of the wells.

During the 1996 field season, monitor wells 61MW01, 61MW02, 61MW03, and microwells 61PS3, and 61PS17 were sampled for VOCs, PAHs, and lead. EDB was added to the analyte list because it was historically used as a leaded gasoline additive. BTEX compounds were detected in 61MW02 at 3.8 µg/L benzene, 29 µg/L toluene, 7.6 µg/L ethylbenzene, and 43 µg/L xylenes; BTEX compounds were below detection limits for all other wells and probes. No BTEX concentrations were above site specific ARAR MCLs. TCE was detected in 61MW02 at 21 µg/L, which is above the site specific ARAR MCLs. Other chlorinated compounds included 1,2-DCB (61MW01, 61MW02), cis-1,2-DCE (61MW02, 61PS17), trans-1,2-DCE (61MW02, 61PS17), and PCE (61PS3). None of these concentrations exceed the site specific ARAR MCLs. Naphthalene (61MW02 - 11 µg/L), chloromethane (61PS3 - 2.4 - 3.5 µg/L), and dichlorodifluoromethane (61MW03 - 1.0 µg/L) were also detected. Applicable ARAR MCLs and EPA drinking water MCLs were not identified for these compounds. Lead was detected in 61MW01, 61PS3, and 61PS17 ranging in concentrations from 1.9 µg/L (61MW01) to 7.6 µg/L (61PS17). The lead concentrations did not exceed the site specific ARAR MCLs.

1997 Results

During the 1997 field season, field screening test kits were used to monitor well 61MW02. Results indicate elevated concentrations of total BTEX (580 ppb), TCE (15.12 ppb), and PCE (29.4 ppb). TCE results are consistent with previous analytical data. BTEX and PCE concentrations are slightly higher than previous analytical data.

Current results indicate TCE concentrations have not changed significantly from the 1996 monitoring event. Due to the variability in total BTEX concentrations, a groundwater trend can not be established. Additional monitoring is required to verify the total BTEX results.

References for SS61:

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1995 OU 3,4,5 Remedial Investigation Report, PNL, May 1995
1995 Sitewide Groundwater Monitoring Report, USAF, 1996
1996 Sitewide Monitoring Program Workplan, USAF, 1996
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for SS61:

Figure SS61-1 SS61 and SS64 Site Plan, Eielson AFB, Alaska.

List of Tables for SS61:

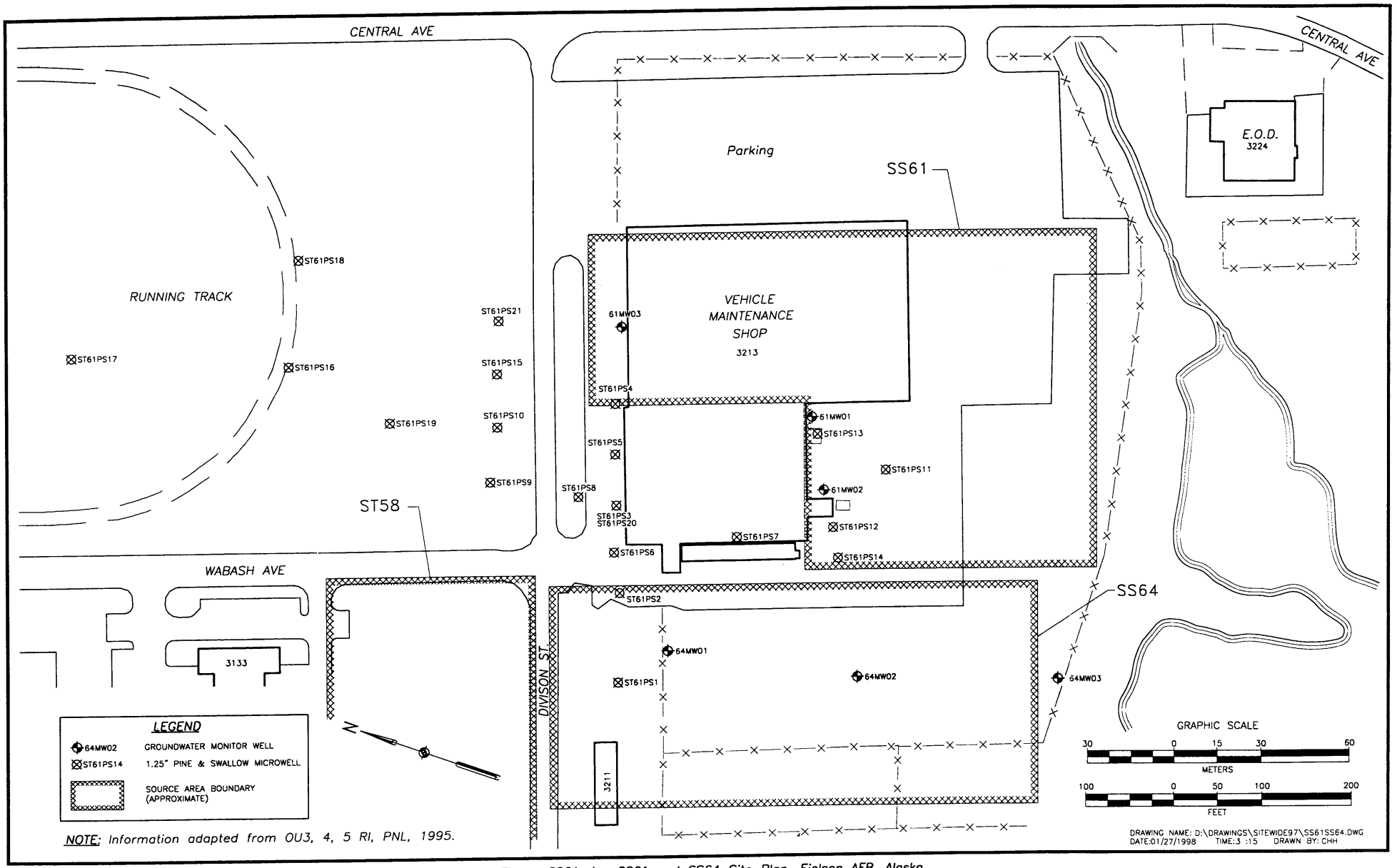

Figure SS61–1. SS61 and SS64 Site Plan, Eielson AFB, Alaska

TABLE SS61-1 CONCENTRATIONS (µg/L) OF BTEX COMPOUNDS IN GROUNDWATER SAMPLES, SS61, VEHICLE MAINTENANCE, BUILDING 3213, EIELSON AFB, ALASKA

Well No.	Date Sampled	Concentration (µg/L)						Analytical Methods	Notes	Reference
		Benzene	Toluene	Ethylbenzen	Xylenes	TPH GRO	TPH DRO			
61MW01	8/18/94	2.8	6.8	3.6	25.8	--	--	1		PNL 1995 OU3,4,5 RI
61MW01	9/16/96	<1.0	<1.0	<1.0	<1.0	--	--	1,11		USAF 1996 SWMPR
61MW02	8/18/94	<100	250	<100	290	--	--	1		PNL 1995 OU3,4,5 RI
61MW02	9/16/96	3.8	29	7.6	43	--	--	1,11		USAF 1996 SWMPR
61MW03	8/17/94	<1.0	<1.0	<1.0	<1.0	--	--	1		PNL 1995 OU3,4,5 RI
61MW03	9/16/96	<1.0	<1.0	<1.0	<1.0	--	--	1,11		USAF 1996 SWMPR
61PS3	9/16/94	<2.0	<2.0	<3.0	<3.0	<120	<700			Pine & Swallow, 1994
61PS3	9/16/96	<1.0	<1.0	<1.0	<1.0	--	--	1,11		USAF 1996 SWMPR
61PS17	9/21/94	<2.0	<2.0	<3.0	12	<120	<700			Pine & Swallow, 1994
61PS17	9/23/96	<1.0	<1.0	<1.0	<1.0	--	--	1,11		USAF 1996 SWMPR

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421

TABLE SS61-2 CONCENTRATIONS (µg/L) OF NON-BTEX ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, SS61, VEHICLE MAINTENANCE, BUILDING 3213, EIELSON AFB, ALASKA

Well No.	Date Sampled	TCE	1,2-DCB	Naph-thalene	3/4-Methyl-henol (Total	2-Methyl aphthalen	cis-1,2 DCE	trans-1,2 DCE	PCE	Chloro-methane	Analytical Methods	Notes	Reference
61MW01	8/18/94	1.0	18	12	16	6.0	–	–	–	–	4,5	a	PNL 1995 OU3,4,5 RI
61MW01	9/12/96	<1.0	9.5	–	–	–	1.5	<1.0	<1.0	<1.0	4	a	USAF 1996 SWMPR
61MW01	9/16/96	<1.0	1.2	<1.8	–	–	<1.0	<1.0	<1.0	<1.0	4,11,12	a	USAF 1996 SWMPR
61MW02	8/18/94	78	<10	38	<10	16	–	–	–	–	4,5	a	PNL 1995 OU3,4,5 RI
61MW02	9/12/96	28	1.7	–	–	–	9.8	1.4	3.3	<1.0	4	a	USAF 1996 SWMPR
61MW02	9/16/96	21	1.3	11	–	–	9.8	1.3	3.1	<1.0	4,11,12	a	USAF 1996 SWMPR
61MW03	8/17/94	<0.5	1.9	<10	<10	<10	–	–	–	–	4,5	a	PNL 1995 OU3,4,5 RI
61MW03	9/12/96	<1.0	<1.0	–	–	–	<1.0	<1.0	<1.0	<1.0	4	b	USAF 1996 SWMPR
61MW03	9/16/96	<1.0	<1.0	<1.8	–	–	<1.0	<1.0	<1.0	<1.0	4,11,12	a	USAF 1996 SWMPR
61PS3	9/16/94	<1.0	–	–	–	–	<6.0	<3.0	<1.0	–			Pine & Swallow, 1994
61PS3	9/12/96	<1.0	<1.0	–	–	–	<1.0	<1.0	<1.0	3.5	4	a	USAF 1996 SWMPR
61PS3	9/16/96	<1.0	<1.0	<1.8	–	–	<1.0	<1.0	<1.0	2.4	4,11,12	a	USAF 1996 SWMPR
61PS17	9/21/94	<1.0	–	–	–	–	12	4.5	<1.0	–			Pine & Swallow, 1994
61PS17	9/23/96	<1.0	<1.0	<1.8	–	–	24	4.4	<1.0	<1.0	4,11,12	a	USAF 1996 SWMPR

Notes: a. No compounds other than those listed were detected above the reporting limits.
b. Additional compounds detected: dichlorodifluoromethane - 1.0 mg/L.

Analytical Methods:

1. 8020.
2. ADEC 8015M.
3. ADEC 8100M.
4. 8010.
5. 8270.
6. 8080.
7. 8260.
8. 8240.
9. AK101.
10. AK102.
11. 7421

TCE Trichloroethene.
DCB Dichlorobenzene.
DCE Dichloroethene.
PCE Percholorethene (tetrachlorethene).

TABLE SS61-3 CONCENTRATIONS (µg/L) OF METALS IN GROUNDWATER SAMPLES, SS61, VEHICLE MAINTENANCE, BUILDING 3213, EIELSON AFB, ALASKA

Well No.	f/u	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Sodium	Vanadium	Zinc	Notes	Reference
DISSOLVED																			
61MW01	f	10/94	661	23.7	228	55,700	3.3	4.4	9,280	1.5	12,700	3,890	11.8	7,080	13,100	2.1	13.5		PNL 1995 OU3,4,5 RI
61MW02	f	10/94	123	59.1	16.7	62,400	26.9	50.6	20,900	22.3	13,100	4,080	16.6	7,380	20,500	10.7	15.1		PNL 1995 OU3,4,5 RI
61MW03	f	10/94	75.5	12.7	263	86,800	<1.0	<1.0	7,880	<1.0	21,300	2,910	11.2	6,490	9,920	<1.0	7.7		PNL 1995 OU3,4,5 RI
Background Concentrations																			
BGM	f	9/94	43	8.3	101	51,750	<1.0	2.4	1,736	<1.0	10,450	1,789	2.3	3,400	4,563	<1.0	5.6		PNL 1994 SWMP
BGMX	f	9/94	140	23	160	61,000	<1.0	4.0	9,900	<1.0	12,000	4,100	5.0	4,500	6,500	1.0	19		PNL 1994 SWMP
BGUCL	f	9/94	74	14.5	129	57,600	<1.0	3.1	3,980	<1.0	11,400	2,720	3.2	3,800	5,340	1.0	10		PNL 1994 SWMP
TOTAL																			
61MW01	u	10/94	24,200	30.3	1,340	93,600	56.1	1.8	10,000	15.2	26,400	8,820	153	9,740	14,900	165	340		PNL 1995 OU3,4,5 RI
61MW01	u	9/16/96	--	--	--	--	--	--	--	1.9	--	--	--	--	--	--	--		USAF 1996 SWMPR
61MW02	u	10/94	8,670	81.2	243	74,000	26.9	50.6	44,700	30.8	17,700	4,670	51.25	8,350	23,600	101	149		PNL 1995 OU3,4,5 RI
61MW02	u	9/16/96	--	--	--	--	--	--	--	<1.0	--	--	--	--	--	--	--		USAF 1996 SWMPR
61MW03	u	10/94	6,740	20.9	534	96,800	11.8	69.8	28,600	40.4	25,800	3,690	41.3	7,460	10,900	28.6	99.1		PNL 1995 OU3,4,5 RI
61MW03	u	9/16/96	--	--	--	--	--	--	--	<1.0	--	--	--	--	--	--	--		USAF 1996 SWMPR
61PS3	u	9/16/96	--	--	--	--	--	--	--	3.3	--	--	--	--	--	--	--		USAF 1996 SWMPR
61PS17	u	9/23/96	--	--	--	--	--	--	--	7.6	--	--	--	--	--	--	--		USAF 1996 SWMPR

TABLE SS61-3 (continued)

Well No.	f/u	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Sodium	Vanadium	Zinc	Notes	Reference
BGM	u	9/94	7,538	25	269	58,625	20	75	16,938	21	17,375	3,875	31	5,650	8,363	24	63		PNL 1994 SWMP
BGMX	u	9/94	18,000	63	420	66,000	46	140	33,000	48	26,000	6,500	77	7,900	9,800	52	120		PNL 1994 SWMP
BGUCL	u	9/94	11,500	37	342	64,900	30.4	105	23,800	32.6	20,800	4,980	48.8	6,500	9,260	36	88.8		PNL 1994 SWMP

Notes:

f.	Field filtered.
u.	Total (unfiltered).
BGM	Mean concentration of samples collected from background wells in 1994.
BGMX	Maximum concentration of samples collected from background wells in 1994.
BGUCL	95% Upper confidence limits of samples collected from background wells in 1994.

TABLE SS61-4 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, SS61, VEHICLE MAINTENANCE, BUILDING 3213, EIELSON AFB, ALASKA

Well No.	Date Sampled	Parameters							Immunoassay Results			Notes	Reference
		Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	pH	eH (mv)	Total BTEX[1](ppb)	TCE [2] (ppb)	PCE[2] (ppb)		
61MW01	9/12/96	--	19.4	6.86	119	219	6.97	49.8	--	--	--		USAF 1996 SWMPR
61MW01	9/16/96	--	9.7	7.13	12.4	206	7.29	39	--	--	--		USAF 1996 SWMPR
61MW02	9/12/96	--	1.2	6.46	13.5	270	6.54	-38	--	--	--		USAF 1996 SWMPR
61MW02	9/16/96	--	5.2	7.64	11	265	6.63	-8	--	--	--		USAF 1996 SWMPR
61MW02	9/19/97	1.56	14	9.7	47	417	6.81	18	580	15.12	29.4		USAF 1997 SWMPR
61MW03	9/12/96	--	2.2	9.22	178	328	6.43	204	--	--	--		USAF 1996 SWMPR
61MW03	9/16/96	--	4.9	9.21	105	315	6.55	77	--	--	--		USAF 1996 SWMPR

Notes:

[1] RaPID Assays Ohmicron Total BTEX field test kit.

[2] Dräger Liquid Extraction (DLE) field test kit.

nd. The lower detection limit is 20 ppb on the RaPID Assay Total BTEX field kit.
The lower detection limit is 10 ppb on the Dräger Liquid Extraction (DLE) field test kit.

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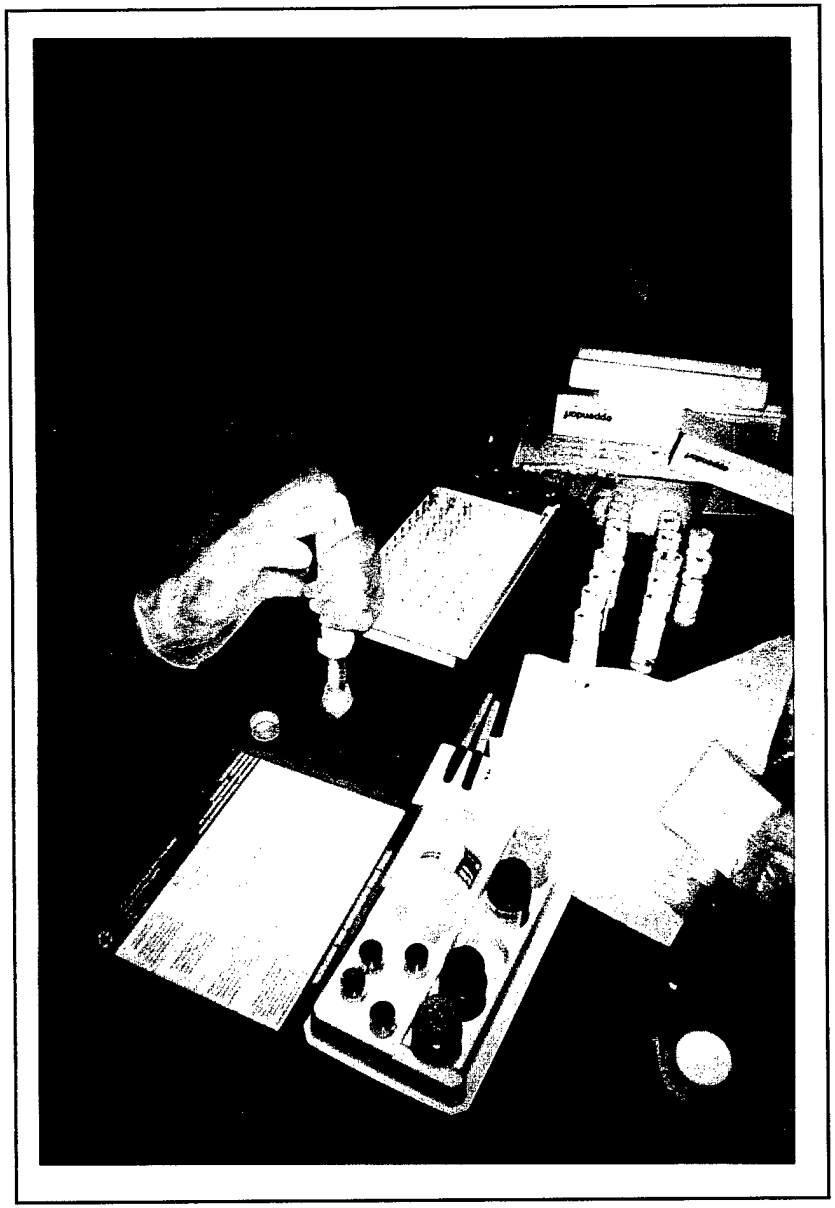
Appendix A
1997 Field Activity Photographs

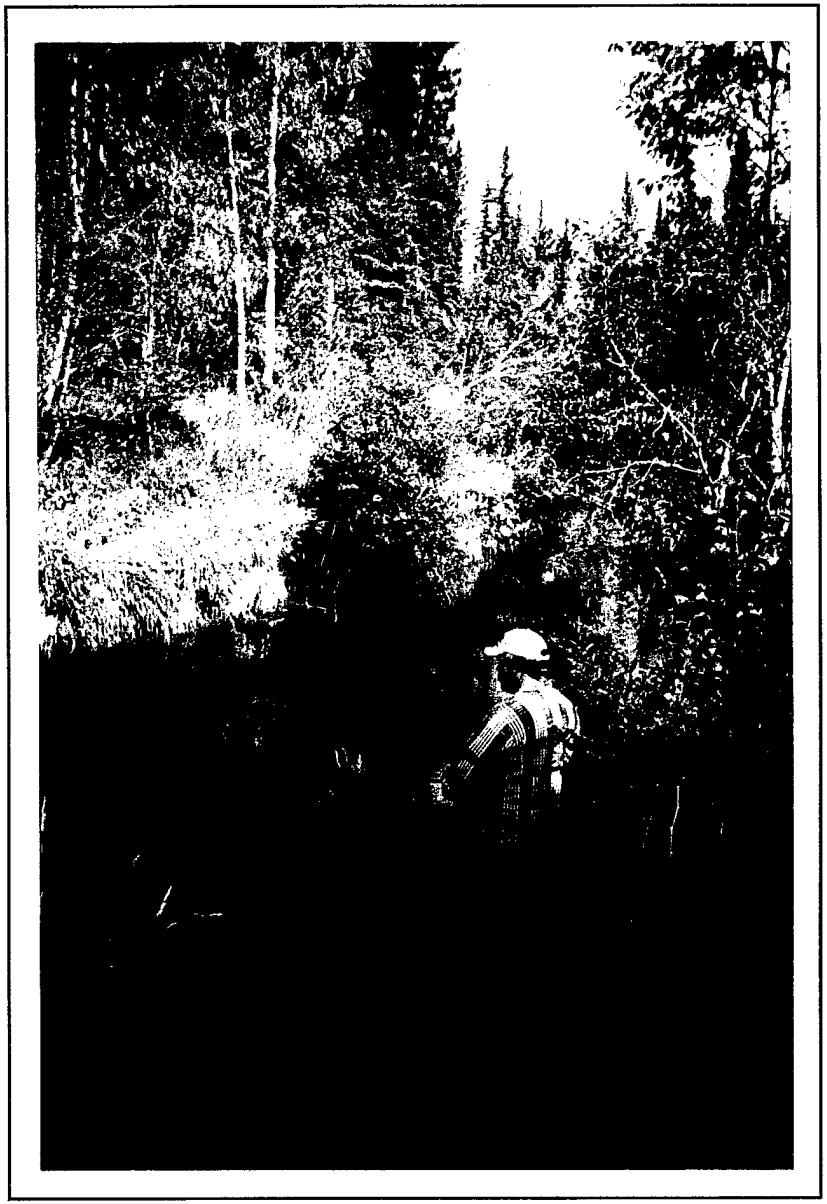
PHOTOGRAPH LOG
1997 SITEWIDE MONITORING FIELD ACTIVITIES



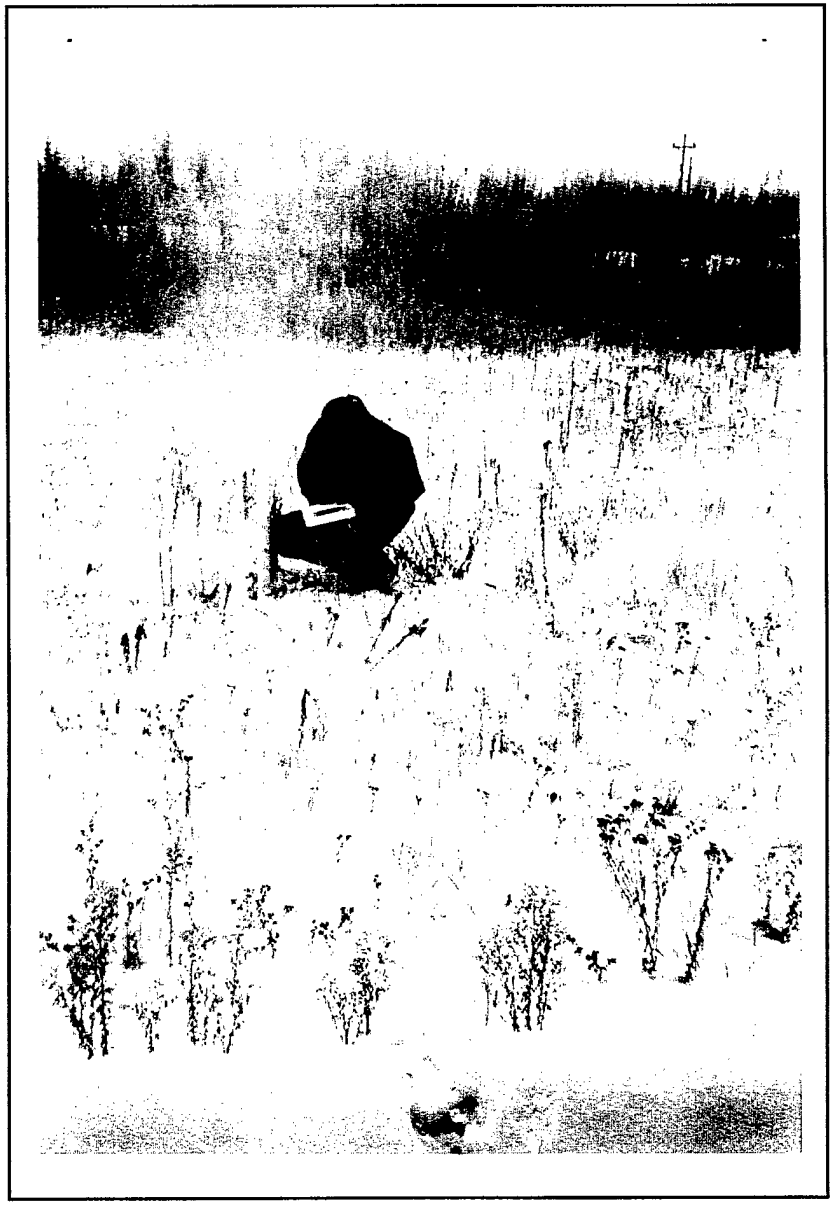
Exposure No. 1. Analysis of water samples using Ohmicron total BTEX immunoassay test kit.

Exposure No. 2. Collection of fish specimens from Garrison Slough.

PHOTOGRAPH LOG
1997 SITEWIDE MONITORING FIELD ACTIVITIES



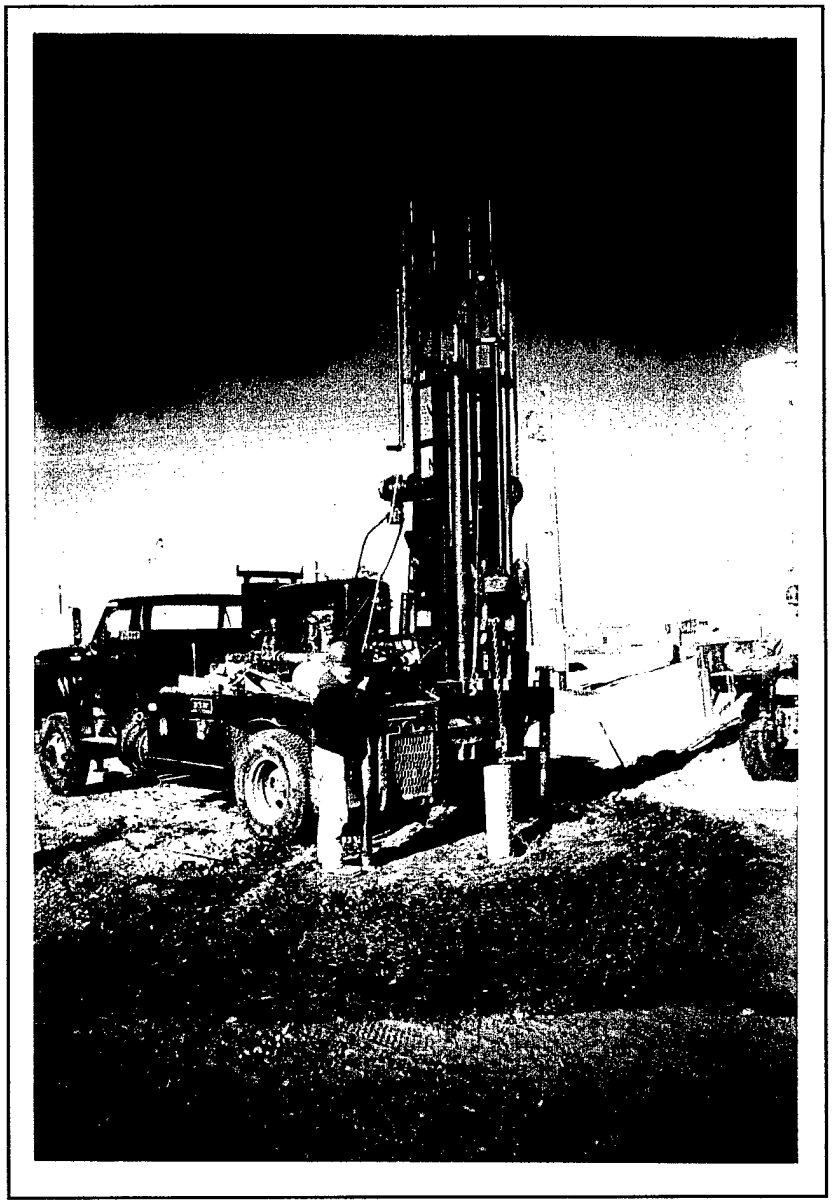
Exposure No. 3. Fish collection activities from Garrison Slough.



Exposure No. 4. View of Monitor Well Inventory field activities.

PHOTOGRAPH LOG
1997 SITEWIDE MONITORING FIELD ACTIVITIES

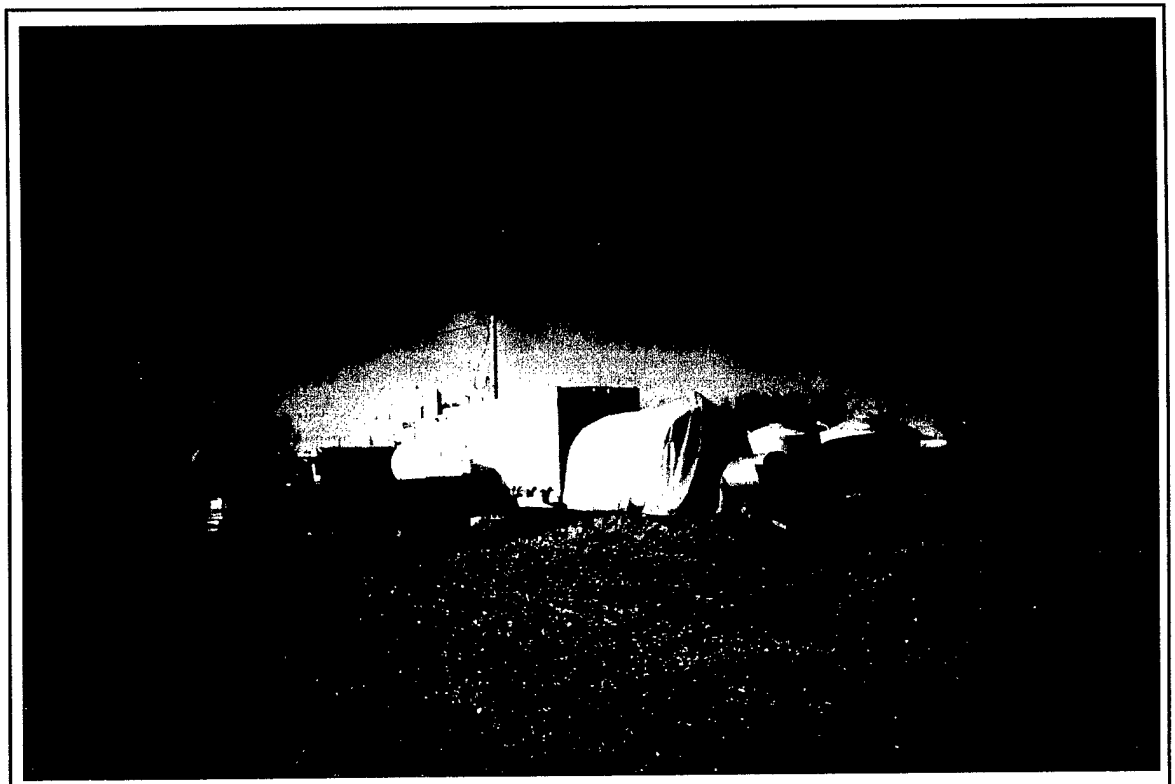
Exposure No. 5. Use of GPS units to obtain monitor well coordinates.



Exposure No. 6. Removal of PVC well casing during well decommissioning activities.

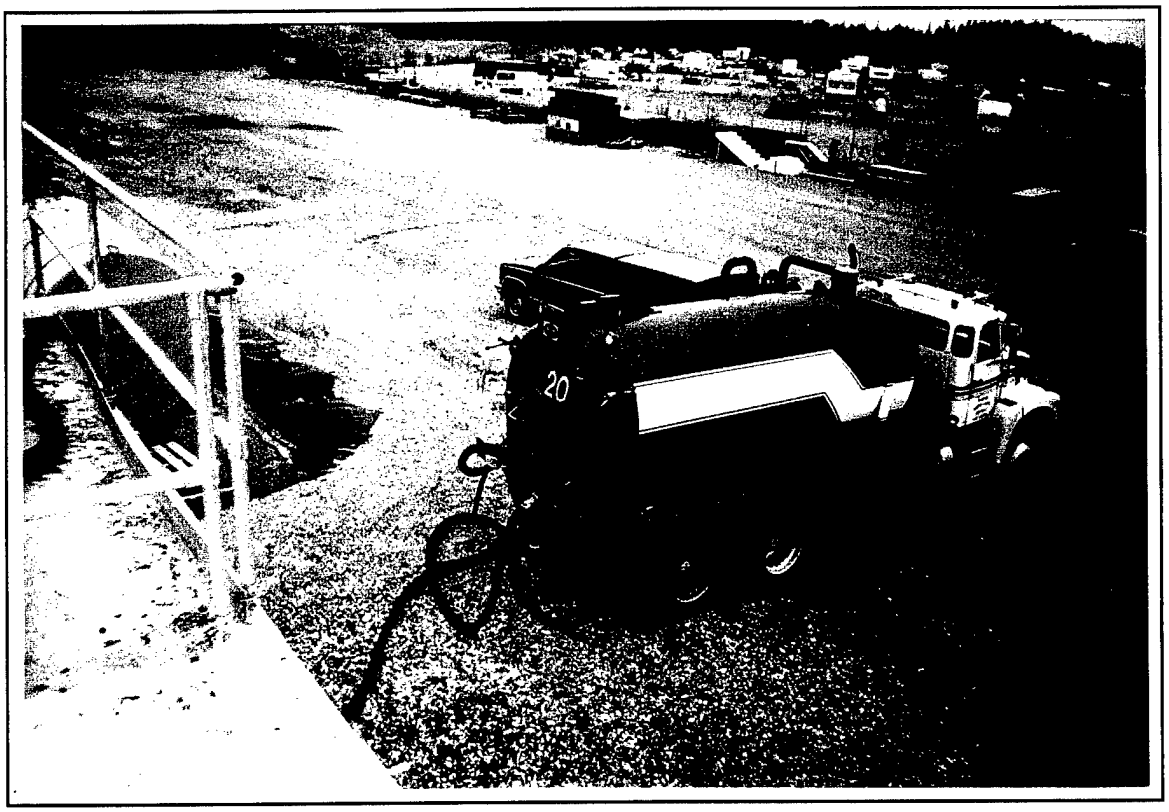
PHOTOGRAPH LOG
1997 SITEWIDE MONITORING FIELD ACTIVITIES

Exposure No.7. Placement of bentonite chips in well borehole during well decommissioning activities.

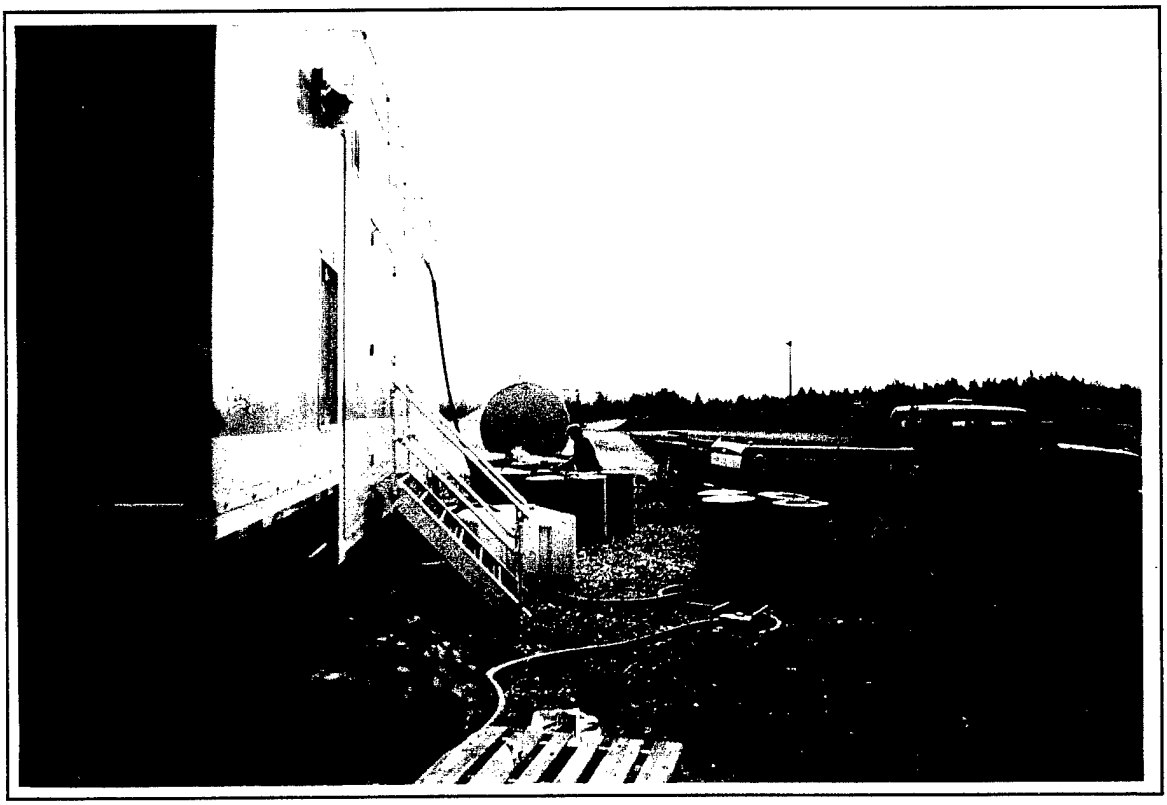


Exposure No. 8. Operation of MWTS during 1997 field season.

PHOTOGRAPH LOG
1997 SITEWIDE MONITORING FIELD ACTIVITIES



Exposure No. 9. View of vacuum truck used for spent activated carbon change out.



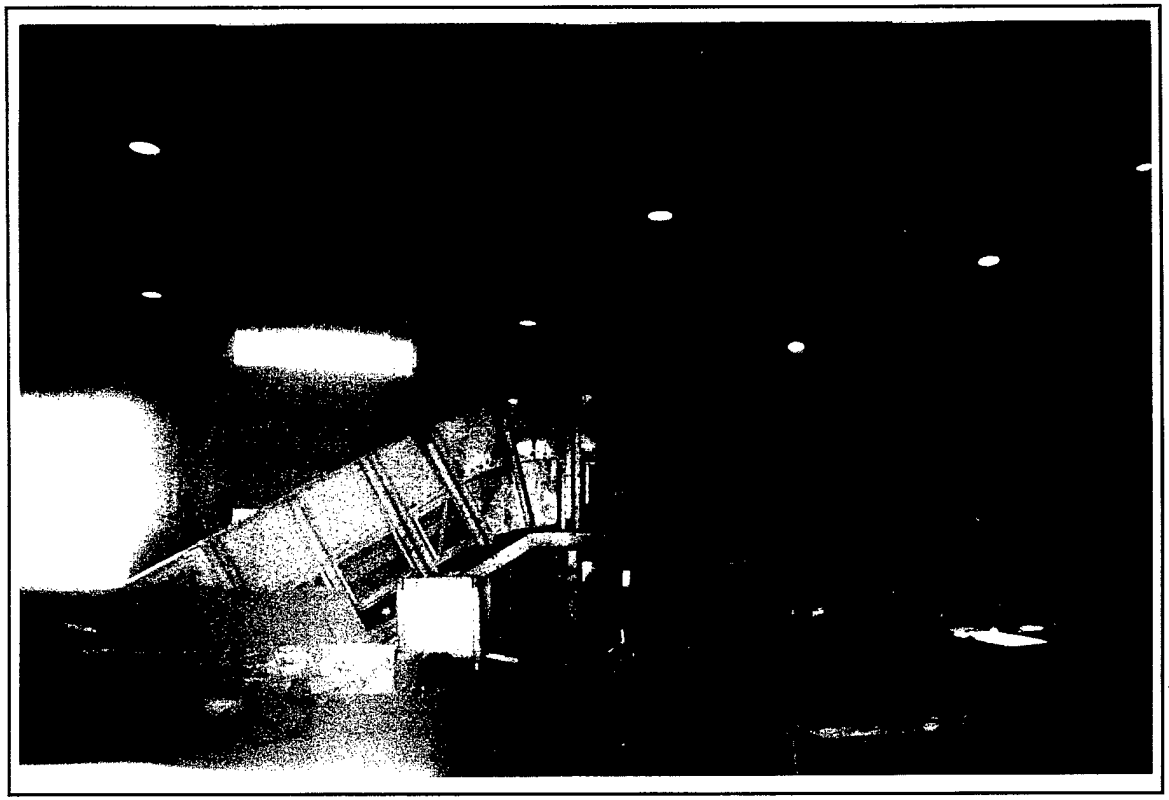
Exposure No. 10. Replacement of new activated carbon into MWTS pressure vessels.

PHOTOGRAPH LOG
1997 SITEWIDE MONITORING FIELD ACTIVITIES

Exposure No. 11. View of empty drum disposal activities.

Exposure No. 12. De-heading of empty closed top drum

PHOTOGRAPH LOG
1997 SITEWIDE MONITORING FIELD ACTIVITIES



Exposure No. 13. View of North Star Borough Recycling facility where empty steel drums were recycled.

Exposure No. 14. View of Garrison Slough Fish Barriers.

Appendix B
List of Table Referencess

LIST OF REFERENCES FOR TABLES

Abbreviated Title	Formal Title
BEAR	Basewide Environmental Analysis and Restoration Database
CRREL, 1994	Cold Regions Research and Engineering Laboratory (CRREL). 1994. *Final Report on Microwell Investigations of OU 3, 4, & 5, at Eielson Air Force Base,Alaska.* Fall 1994.
CRREL, 1995a	Cold Regions Research and Engineering Laboratory (CRREL). 1995. *Draft Final Report on Microwell Investigations of Underground Storage Tanks and the Cargain Road Spill at Eielson Air Force Base, Alaska.* Fall 1994.
CRREL, 1995b	Cold Regions Research and Engineering Laboratory (CRREL). 1995. *Report on Microwell Investigations of OU 1 & 2 at Eielson Air Force Base, Alaska.* Fall 1994.
EA 1993 SWGMPR	EA Engineering, Science, and Technolgy (EA). 1993. *Sitewide Groundwaer Monitoring Program Report, Eielson Air Force Base, Alaska.* December.
EA 1994 SWGMPR	EA Engineering, Science, and Technology (EA). 1995. *Sitewide Groundwater Monitoring Program Report, Eielson Air Force Base, Alaska.* January.
EA 1995 OU1 GMIR	EA Engineering, Science, and Technology (EA). 1995. *Operable Unit 1 Groundwater Monitoring Interim Results, July-October 1994. Eielson Air Force Base, Alaska.* March.
EA 1995 SWMPWP	EA Engineering, Science, and Technology (EA). 1995. *Sitewide Monitoring 1995 Workplan, Eielson Air Force Base, Alaska.* November.
EA 1995 OU1 RD	EA Engineering, Science, and Technology (EA). 1995. *Final Operable Unit 1 Remedial Design, Eielson Air Force Base, Alaska.* November.
EA 1995 OU1,3,4,5 RDWP	EA Engineering, Science, and Technology (EA). 1995. *Draft Operable Units 1,3,4,5 Remedial Design Workplan, Eielson Air Force Base, Alaska.* November.
EA 1995 SWMPR	EA Engineering, Science, and Technology (EA). 1996. *Final 1995 Sitewide Monitoring Program Report, Eielson Air Force Base, Alaska.* May.

LIST OF REFERENCES FOR TABLES (continued)

Abbreviated Title	Formal Title
EA 1996 OU3,4,5 RD	EA Engineering, Science, and Technology (EA). 1996. *Draft Final Operable Units 3, 4, and 5 Remedial Design, Eielson Air Force Base, Alaska.* May.
EA 1996 SWMPR	EA Engineering, Science, and Technology (EA). 1996. *Final 1995 Sitewide Monitoring Program Report, Eielson Air Force Base, Alaska.* May.
EA 1997 SWMPWPA	EA Engineering, Science, and Technology (EA). 1997. *Final Sitewide Monitoring Program Workplan Addendum, Eielson Air Force Base, Alaska.* July.
EA 1996-1997 GSPSR	EA Engineering, Science, and Technology (EA). 1997. *Final Garrison Slough Pilot Study Report, Eielson Air Force Base, Alaska.* December.
ES 1994 OU6 RI	Engineering Science (ES). 1994. *Operable Unit 6 Remedial Investigation Report, Eielson Air Force Base, Alaska.* Prepared for HQ AFCEE/ES Environmental Services Directorate by Engineering Science, Richland, Washington.
HLA 1992 LF03/FT09 RI/FS	Harding Lawson Associates (HLA). 1992. *Source Area 3/9, New Base Landfill/Fire Training Area Installation Restoration Program Remedial Investigation/Feasibility Study.* Report for Eielson Air Force Base. Alaska. Prepared by HLA for the Headquarters 11th Air Force 11AF/DEPV, Elmendorf Air Force Base, Alaska.
HLA 1992 RI/FS	Harding Lawson Associates (HLA). 1992. *Source areas ST20, ST48, ST49, and ST50 Installation Restoration Program Remedial Investigation/Feasibility Study.* Report for Eielson Air Force Base, Alaska. Prepared by HLA for the Headquarters 11th Air Force 11AF/DEPV, Elmendorf Air Force Base, Alaska.
IT 1994 EMR	IT Corporation (IT). 1995. *Eielson OU2 Environmental Monitoring 1994 Field Activities Report.* Prepared for AFCEE, Brooks AFB, TX. February.
IT 1995 TS ITIR	IT Corporation (IT). 1995. *Eielson OU2 Source Areas ST13/26 Treatability Study Informal Technical Information Report, Draft.* Prepared for AFCEE, Brooks AFB, TX. September.

LIST OF REFERENCES FOR TABLES (continued)

Abbreviated Title	Formal Title
Pine and Swallow, 1994	Pine & Swallow, 1994. *Subsurface Investigations, Site 19, Stie 1307, and Site 1132, Eielson Air Force Base, Alaska.* December 1994. Located in Appendix of CRREL 1995a report.
PNL 1992 SWGMPR	U.S. Air Force (USAF). 1992. *Sampling and Analysis Results for the North Boundary Wells, Eielson Air Force Base, Alaska.* Prepared by Pacific Northwest Laboratory, Environmental Management Operations, Richland, Washington.
PNL 1993 SER Phase 1 Final	U.S. Air Force (USAF). 1993. *Source Evaluation Report Phase 1.* Prepared by Pacific Northwest Laboratory, Richland, Washington. October.
PNL 1993 SWGMPR	U.S. Air Force (USAF). 1993. *Site-Wide Ground-Water Monitoring Program 1993 Report, Eielson Air Force Base, Alaska.* Prepared by Pacific Northwest Laboratory, Environmental Management Operations, Richland, Washington. December.
PNL 1993 OU2 RI	U.S. Air Force (USAF). 1993. *Eielson AFB, Alaska, Remedial Investigation/Feasibility Study Operable Unit 2 Remedial Investigation Report, Final.* United States Air Force Environmental Restoration Program. October.
PNL 1994 SWGMPR	U.S. Air Force (USAF). 1995. *Site-Wide Ground-Water Monitoring Program 1994 Report, Eielson Air Force Base, Alaska.* Prepared by Pacific Northwest Laboratory, Environmental Management Operations, Richland, Washington. January.
PNL 1994 OU1 RI	U.S. Air Force (USAF). 1994. *Operable Unit 1 Remedial Investigation Report, Eielson Air Force Base, Alaska.* Prepared by Pacific Northwest Laboratory, Richland, Washington.
PNL 1994 SER Phase 2	U.S. Air Force (USAF). 1994. *Source Evaluation Report, Phase 2 Investigation, Limited Field Investigation.* Prepared by Pacific Northwest Laboratory, Richland, Washington. October.

LIST OF REFERENCES FOR TABLES (continued)

Abbreviated Title	Formal Title
PNL 1995 OU3,4,5 RI	U.S. Air Force (USAF). 1995. *Operable Units 3, 4, and 5 Remedial Investigation Report, Final.* Prepared by Pacific Northwest Laboratory, Environmental Management Operations, for the U.S. Air Force, Eielson Air Force Base, Alaska. May.
PNL 1995 SWRI	U.S. Air Force (USAF). 1995. *Sitewide Remedial Investigation Final Report, Eielson Air Force Base, Alaska.* Prepared by Pacific Northwest Laboratory, Environmental Management Operations, Richland, Washington. August.

Appendix C
Summary of Sitewide Water Levels, NAPL Levels, and NAPL Thickness

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
				OU5 / LF02			
02M01	05/95	531.21	N/P	9.65	0.00	521.56	
	09/21/95		N/P	9.84	0.00	521.37	
	01/96		N/P	9.71	0.00	521.50	
	03/96		N/P	9.35	0.00	521.86	
	04/96		N/P	9.20	0.00	522.01	
	06/06/96		N/P	10.52	0.00	520.69	
	11/01/96		N/P	10.57	0.00	520.64	
	03/24/97		N/P	11.11	0.00	520.10	
	04/16/97		N/P	10.89	0.00	520.32	
	05/16/97		N/P	9.93	0.00	521.28	
	06/16/97		N/P	10.65	0.00	520.56	
	07/10/97		N/P	10.85	0.00	520.36	
	08/08/97		N/P	10.57	0.00	520.64	
	09/16/97		N/P	10.78	0.00	520.43	
	10/09/97		N/P	10.75	0.00	520.46	
02M02	05/95	531.67	N/P	9.44	0.00	522.23	
	09/21/95		N/P	9.65	0.00	522.02	
	01/96		N/P	9.24	0.00	522.43	
	03/96		N/P	8.92	0.00	522.75	
	04/96		N/P	8.69	0.00	522.98	
	06/06/96		N/P	8.9	0.00	---	Groundwater frozen at time of gauging
	11/01/96		N/P	10.16	0.00	521.51	
	03/24/97		N/P	10.51	0.00	521.16	
	04/16/97		N/P	10.25	0.00	521.42	
	05/16/97		N/P	9.41	0.00	522.26	
	06/16/97		N/P	10.09	0.00	521.58	
	07/10/97		N/P	10.32	0.00	521.35	
	08/08/97		N/P	10.03	0.00	521.64	
	09/16/97		N/P	10.25	0.00	521.42	
	10/09/97		N/P	10.21	0.00	521.46	
02MW9	05/95	529.56	N/P	---	0.00	---	Well not gauged.
	09/21/95		N/P	7.54	0.00	522.02	Well originally installed as W-9
	01/96		N/P	8.11	0.00	521.45	
	03/96		N/P	7.89	0.00	521.67	
	04/96		N/P	7.83	0.00	521.73	
	06/06/96		N/P	9.65	0.00	519.91	
	11/01/96		N/P	8.18	0.00	521.38	
	03/24/97		N/P	8.91	0.00	520.65	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU5 / LF02 (cont.)							
02MW9 (cont.)	04/16/97		N/P	8.76	0.00	520.80	
	05/16/97		N/P	7.35	0.00	522.21	
	06/16/97		N/P	8.20	0.00	521.36	
	07/10/97		N/P	8.50	0.00	521.06	
	08/08/97		N/P	8.11	0.00	521.45	
	09/16/97		N/P	8.38	0.00	521.18	
	10/09/97		N/P	8.40	0.00	521.16	
OU5 / LF03 - FT09							
03M06	05/95	550.83	N/P	13.71	0.00	537.12	
	09/21/95		N/P	13.75	0.00	537.08	
	01/96		N/P	13.57	0.00	537.26	
	03/96		N/P	13.05	0.00	537.78	
	04/96		N/P	13.04	0.00	537.79	
	06/06/96		N/P	14.29	0.00	536.54	
	11/04/96		N/P	14.67	0.00	536.16	
	03/21/97		N/P	13.83	0.00	537.00	
	04/18/97		N/P	13.94	0.00	536.89	
	05/16/97		N/P	14.20	0.00	536.63	
	06/16/97		N/P	14.57	0.00	536.26	
	07/10/97		N/P	14.74	0.00	536.09	
	08/07/97		N/P	14.47	0.00	536.36	
	09/16/97		N/P	14.47	0.00	536.36	
	10/09/97		N/P	14.35	0.00	536.48	
03M08	05/95	547.55	N/P	7.55	0.00	---	Groundwater frozen at time of gauging;
	09/21/95		N/P	9.43	0.00	538.12	
	01/96		N/P	9.59	0.00	537.96	
	03/96		N/P	9.14	0.00	538.41	
	04/96		---	---	---	---	Not Measured due to ponding of surface water around well.
	06/06/96		N/P	8.48	0.00	---	Groundwater frozen at time of gauging;
	11/04/96		N/P	10.69	0.00	536.86	
	03/24/97		N/P	9.80	0.00	537.75	
	04/18/97		N/P	9.65	0.00	537.90	
	05/16/97		N/P	9.91	0.00	537.64	
	06/19/97		N/P	10.52	0.00	537.03	
	07/10/97		N/P	10.74	0.00	536.81	
	08/08/97		N/P	10.53	0.00	537.02	
	09/16/97		N/P	---	0.00	---	Not measured due to low flow equipment stuck in well.
	10/09/97		N/P	---	0.00	---	Not measured due to low flow equipment stuck in well.

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
				OU5 / LF03 - FT09 (cont.)			
03M10	05/95	544.75	N/P	7.36	0.00	537.39	
	09/21/95		N/P	7.37	0.00	537.38	
	03/96		N/P	7.03	0.00	537.72	
	04/96		N/P	6.73	0.00	538.02	
	06/06/96		N/P	7.97	0.00	536.78	
	11/04/96		N/P	8.15	0.00	536.60	
	03/21/97		N/P	7.69	0.00	537.06	
	04/18/97		N/P	7.55	0.00	537.20	
	05/16/97		N/P	7.81	0.00	536.94	
	06/16/97		N/P	8.40	0.00	536.35	
	07/10/97		N/P	8.62	0.00	536.13	
	08/08/97		N/P	8.28	0.00	536.47	
	09/16/97		N/P	8.30	0.00	536.45	
	10/09/97		N/P	8.11	0.00	536.64	
03M16	05/95	548.86	N/P	9.81	0.00	539.05	
	09/21/95		N/P	10.01	0.00	538.85	
	01/96		N/P	10.13	0.00	538.73	
	03/96		N/P	9.59	0.00	539.27	
	04/96		N/P	9.31	0.00	539.55	
	06/06/96		N/P	10.65	0.00	538.21	
	11/04/96		N/P	11.19	0.00	537.67	
	03/21/97		N/P	1.80	0.00	—	Groundwater frozen at time of gauging
	04/17/97		N/P	10.15	0.00	538.71	
	05/16/97		N/P	10.40	0.00	538.46	
	06/16/97		N/P	10.98	0.00	537.88	
	07/09/97		N/P	11.20	0.00	537.66	
	08/07/97		N/P	10.93	0.00	537.93	
	09/16/97		N/P	10.90	0.00	537.96	
	10/08/97		N/P	10.77	0.00	538.09	
09M02	05/95	546.59	N/P	8.1	0.00	538.49	
	09/21/95		N/P	9.08	0.00	537.51	
	01/96		N/P	9.02	0.00	537.57	
	03/96		N/P	8.57	0.00	538.02	
	04/96		N/P	8.45	0.00	538.14	
	06/06/96		N/P	9.70	0.00	536.89	
	11/07/96		N/P	10.14	0.00	536.45	
	03/21/97		N/P	9.39	0.00	537.20	
	04/18/97		N/P	9.46	0.00	537.13	
	05/16/97		N/P	9.70	0.00	536.89	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU5 / LF03 - FT09 (cont.)							
09M02 (cont.)	06/16/97		N/P	10.13	0.00	536.46	
	07/10/97		N/P	10.30	0.00	536.29	
	08/08/97		N/P	9.97	0.00	536.62	
	09/16/97		N/P	10.01	0.00	536.58	
	10/09/97		N/P	9.90	0.00	536.69	
OU5 / LF06							
06M05	05/95	541.36	N/P	7.14	0.00	534.22	
	09/21/95		N/P	8.51	0.00	532.85	
	01/96		N/P	8.85	0.00	532.51	
	03/96		N/P	8.67	0.00	532.69	
	04/96		N/P	8.43	0.00	532.93	
	06/06/96		N/P	8.94	0.00	532.42	
	11/04/96		N/P	9.57	0.00	531.79	
	03/21/97		N/P	9.10	0.00	532.26	
	04/17/97		N/P	8.83	0.00	532.53	
	05/16/97		N/P	9.37	0.00	531.99	
	6//16/97		N/P	9.93	0.00	531.43	
	07/09/97		N/P	10.13	0.00	531.23	
	08/07/97		N/P	9.80	0.00	531.56	
	09/15/97		N/P	9.69	0.00	531.67	
	10/08/97		N/P	9.37	0.00	531.99	
06M06	05/95	540.93	N/P	8.28	0.00	532.65	
	09/21/95		N/P	8.36	0.00	532.57	
	01/96		N/P	8.63	0.00	532.30	
	03/96		N/P	8.29	0.00	532.64	
	04/96		N/P	7.97	0.00	532.96	
	06/06/96		N/P	8.71	0.00	532.22	
	11/04/96		N/P	9.30	0.00	531.63	
	03/21/97		N/P	8.72	0.00	532.21	
	04/17/97		N/P	8.46	0.00	532.47	
	05/16/97		N/P	9.33	0.00	531.60	
	06/16/97		N/P	9.90	0.00	531.03	
	07/09/97		N/P	10.07	0.00	530.86	
	08/07/97		N/P	9.73	0.00	531.20	
	09/15/97		N/P	9.38	0.00	531.55	
	10/08/97		N/P	9.08	0.00	531.85	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
				OU2 / ST10 - SS14			
10-4	05/95	542.17	N/P	7.11	0.00	535.06	
	09/21/95		N/P	7.44	0.00	534.73	
	01/96		N/P	7.81	0.00	534.36	
	03/96		N/P	7.36	0.00	534.81	
	04/96		N/P	7.00	0.00	535.17	
	06/06/96		N/P	8.02	0.00	534.15	
	11/07/96		---	---	---	---	Well decommissioned 27 Sep 1996
	03/21/97		---	---	---	---	Well decommissioned 27 Sep 1996
10-6	05/95	547.22	N/P	10.12	0.00	537.10	
	09/21/95		N/P	10.39	0.00	536.83	
	01/96		N/P	10.63	0.00	536.59	
	03/96		N/P	10.36	0.00	---	Groundwater frozen at time of gauging;
	04/96		N/P	10.16	0.00	---	Groundwater frozen at time of gauging;
	06/06/96		N/P	11.02	0.00	536.20	
	11/07/96		N/P	11.50	0.00	535.72	
	03/21/97		N/P	10.75	0.00	536.47	
	04/18/97		N/P	10.54	0.00	536.68	
	05/16/97		N/P	10.92	0.00	536.30	
	06/16/97		N/P	11.65	0.00	535.57	
	07/09/97		N/P	11.87	0.00	535.35	
	08/07/97		N/P	11.56	0.00	535.66	
	09/09/97		N/P	11.55	0.00	535.67	
	10/08/97		N/P	11.29	0.00	535.93	
10MW11	05/95	541.66	N/P	4.26	0.00	537.40	
	09/21/95		N/P	4.62	0.00	537.04	
	01/96		N/P	6.04	0.00	---	Groundwater frozen at time of gauging;
	03/96		N/P	5.05	0.00	---	Groundwater frozen at time of gauging;
	04/96		N/P	2.65	0.00	---	Ponding of surface water around well observed
	06/06/96		N/P	---	0.00	---	Well possibly frost heaved.
	11/07/96		N/P	6.14	0.00	535.52	
	03/21/97		N/P	5.60	0.00	---	Groundwater frozen at time of gauging;
	04/18/97		N/P	5.43	0.00	---	Groundwater frozen at time of gauging; Well severely heaved.
	05/16/97		N/P	5.32	0.00	---	Groundwater frozen at time of gauging; Well severely heaved.
	06/16/97		N/P	6.26	0.00	535.40	
	07/09/97		N/P	6.54	0.00	535.12	
	08/07/97		N/P	6.10	0.00	535.56	
	09/15/97		N/P	6.16	0.00	535.50	
	10/08/97		N/P	5.94	0.00	535.72	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU2 / ST10 - SS14 (cont.)							
14-3	05/95	541.75	N/P	6.27	0.00	535.48	
	09/21/95		N/P	6.46	0.00	535.29	
	01/96		N/P	3.10	0.00	---	Groundwater frozen at time of gauging;
	03/96		N/P	3.09	0.00	---	Groundwater frozen at time of gauging;
	04/96		N/P	5.43	0.00	---	Groundwater frozen at time of gauging;
	06/06/96		---	---	---	---	Bentonite blockage in well casing.
	11/07/96		---	---	---	---	Bentonite blockage in well casing.
	03/21/97		N/P	5.80	0.00	---	Groundwater frozen at time of gauging;
OU2 / ST11							
11-1	05/95	541.55	N/P	10.26	0.00	531.29	
	09/21/95		N/P	10.96	0.00	530.59	
	01/96		N/P	10.44	0.00	531.11	
	03/96		N/P	10.15	0.00	531.40	
	04/96		N/P	10.00	0.00	531.55	
	06/06/96		N/P	10.37	0.00	531.18	
	11/07/96		---	---	---	---	Well not located - covered by snow
	03/24/97		---	---	---	---	Well not located - covered by snow
	04/16/97		N/P	10.12	0.00	531.43	
	05/16/97		N/P	10.90	0.00	530.65	
	06/16/97		N/P	11.38	0.00	530.17	
	07/09/97		N/P	11.53	0.00	530.02	
	08/07/97		N/P	11.28	0.00	530.27	
	09/09/97		N/P	11.00	0.00	530.55	
	10/08/97		N/P	10.50	0.00	531.05	
OU2 / ST13 - DP26							
13-1	05/95	550.43	N/P	11.05	0.00	539.38	
	09/21/95		N/P	11.21	0.00	539.22	
	01/96		N/P	11.01	0.00	539.42	
	03/96		N/P	10.54	0.00	539.89	
	04/96		N/P	10.47	0.00	539.96	
	06/06/96		N/P	11.76	0.00	538.67	
	11/04/96		N/P	12.20	0.00	538.23	
	03/21/97		N/P	13.28	0.00	537.15	Unsure of measuring point at toc
	04/17/97		N/P	11.37	0.00	539.06	
	05/20/97		N/P	11.60	0.00	538.83	
	06/16/97		N/P	11.91	0.00	538.52	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU2 / ST13 - DP26 (cont.)							
13-1 (cont.)	07/09/97		N/P	12.06	0.00	538.37	
	08/07/97		N/P	11.75	0.00	538.68	
	09/15/97		N/P	11.83	0.00	538.60	
	10/08/97		N/P	11.78	0.00	538.65	
13-3	05/95	548.15	N/P	10.36	0.00	537.79	
	09/21/95		N/P	10.44	0.00	537.71	
	01/96		N/P	10.25	0.00	537.90	
	03/96		N/P	9.74	0.00	538.41	
	04/96		N/P	9.20	0.00	---	Groundwater frozen at time of gauging;
	06/06/96		N/P	9.35	0.00	---	Groundwater frozen at time of gauging; well possibly frost heave
	11/04/96		N/P	11.43	0.00	536.72	Well possibly frost heaved.
	03/21/97		N/P	10.74	0.00	537.41	
	04/17/97		N/P	10.73	0.00	537.42	
	05/16/97		N/P	10.99	0.00	537.16	
	06/16/97		N/P	11.35	0.00	536.80	
	07/09/97		N/P	11.47	0.00	536.68	
	08/07/97		N/P	11.14	0.00	537.01	
	09/15/97		N/P	11.22	0.00	536.93	
	10/09/97		N/P	11.18	0.00	536.97	
26-5	05/95	547.06	N/P	10.28	0.00	536.78	
	09/21/95		N/P	10.38	0.00	536.68	
	01/96		N/P	10.16	0.00	536.90	
	03/96		N/P	9.92	0.00	---	Groundwater frozen at time of gauging;
	04/96		N/P	9.87	0.00	---	Groundwater frozen at time of gauging;
	06/06/96		N/P	10.36	0.00	536.70	
	11/04/96		N/P	11.15	0.00	535.91	
	03/21/97		N/P	10.33	0.00	536.73	
	04/17/97		N/P	10.37	0.00	536.69	
	05/16/97		N/P	10.69	0.00	536.37	
	06/16/97		N/P	11.10	0.00	535.96	
	07/09/97		N/P	11.20	0.00	535.86	
	08/07/97		N/P	10.91	0.00	536.15	
	09/15/97		N/P	10.93	0.00	536.13	
	10/08/97		N/P	10.85	0.00	536.21	
26-15	05/95	544.65	N/P	9.88	0.00	534.77	
	09/21/95		N/P	9.96	0.00	534.69	
	01/96		N/P	8.89	0.00	535.76	
	03/96		N/P	8.57	0.00	536.08	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU2 / ST13 - DP26 (cont.)							
26-15 (cont.)	04/96		N/P	9.35	0.00	535.30	
	06/06/96		N/P	10.79	0.00	533.86	
	11/04/96		N/P	10.71	0.00	533.94	
	03/21/97		N/P	10.15	0.00	534.50	
	04/17/97		N/P	10.08	0.00	534.57	
	05/16/97		N/P	10.56	0.00	534.09	
	06/19/97		N/P	10.96	0.00	533.69	
	07/09/97		N/P	11.03	0.00	533.62	
	08/07/97		N/P	10.73	0.00	533.92	
	09/09/97		N/P	10.80	0.00	533.85	
	10/08/97		N/P	10.54	0.00	534.11	
OU2 / ST16							
16-2	05/95	540.57	N/P	9.6	0.00	530.97	
	09/21/95		N/P	8.82	0.00	531.75	
	01/96		N/P	9.21	0.00	531.36	
	03/96		N/P	8.89	0.00	531.68	
	04/96		N/P	8.67	0.00	531.90	
	06/06/96		N/P	9.23	0.00	531.34	
	11/05/96		N/P	9.71	0.00	530.86	
	03/21/97		N/P	9.17	0.00	531.40	
	04/16/97		N/P	8.87	0.00	531.70	
	05/16/97		N/P	10.16	0.00	530.41	
	06/16/97		N/P	10.75	0.00	529.82	
	07/09/97		N/P	10.92	0.00	529.65	
	08/07/97		N/P	10.59	0.00	529.98	
	09/09/97		N/P	10.00	0.00	530.57	
	10/08/97		N/P	9.45	0.00	531.12	
OU2 / ST18							
18-2	05/95	540.87	N/P	10.98	0.00	529.89	
	09/21/95		N/P	10.29	0.00	530.58	
	01/96		N/P	10.70	0.00	530.17	
	03/96		N/P	10.64	0.00	----	Groundwater frozen at time of gauging;
	04/96		N/P	10.63	0.00	----	Groundwater frozen at time of gauging;
	06/06/96		N/P	10.65	0.00	----	Groundwater frozen at time of gauging;
	11/05/96		N/P	11.13	0.00	529.74	
	03/21/97		N/P	10.77	0.00	530.10	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU2 / ST18 (cont.)							
18-2 (cont.)	04/16/97		N/P	10.45	0.00	530.42	
	05/19/97		N/P	11.56	0.00	529.31	
	06/16/97		N/P	11.96	0.00	528.91	
	07/09/97		N/P	12.26	0.00	528.61	
	08/07/97		N/P	11.93	0.00	528.94	
	09/09/97		N/P	11.41	0.00	529.46	
	10/08/97		N/P	10.95	0.00	529.92	
OU2 / ST19							
19-4	05/95	546.90	N/P	7.34	0.00	539.56	
	09/21/95		N/P	7.60	0.00	539.30	
	01/96		N/P	7.94	0.00	538.96	
	03/96		N/P	7.81	0.00	---	Groundwater frozen at time of gauging;
	04/96		N/P	7.72	0.00	---	Groundwater frozen at time of gauging;
	06/06/96		N/P	7.78	0.00	---	Groundwater frozen at time of gauging;
	11/05/96		N/P	9.03	0.00	537.87	
	03/21/97		N/P	2.50	0.00	---	Groundwater frozen at time of gauging;
	04/17/97		N/P	3.23	0.00	---	Groundwater frozen at time of gauging;
	05/16/97		N/P	7.96	0.00	---	Groundwater frozen at time of gauging;
	06/16/97		N/P	7.88	0.00	539.02	
	07/09/97		N/P	9.09	0.00	537.81	
	08/07/97		N/P	8.75	0.00	538.15	
	09/15/97		N/P	8.74	0.00	538.16	
	10/08/97		N/P	8.60	0.00	538.30	
OU2 / ST20 (E-7)							
20M02	05/95	547.75	N/P	8.17	0.00	539.58	
	09/21/95		N/P	8.50	0.00	539.25	
	01/96		N/P	8.78	0.00	538.97	
	03/96		N/P	8.21	0.00	539.54	
	04/96		N/P	8.01	0.00	539.74	
	06/06/96		N/P	9.30	0.00	538.45	
	11/06/96		N/P	9.85	0.00	537.90	
	03/21/97		N/P	9.09	0.00	538.66	
	04/17/97		N/P	8.92	0.00	538.83	
	05/16/97		N/P	8.93	0.00	538.82	
	06/16/97		N/P	9.47	0.00	538.28	
	07/08/97		N/P	9.69	0.00	538.06	
	08/08/97		N/P	9.34	0.00	538.41	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU2 / ST20 (E-7) (cont.)							
20M02 (cont.)	09/15/97		N/P	9.46	0.00	538.29	
	10/09/97		N/P	9.39	0.00	538.36	
OU2 / ST20 (E-8)							
20M06	05/95	549.52	N/P	7.39	0.00	542.13	
	09/21/95		N/P	7.81	0.00	541.71	
	01/96		N/P	8.27	0.00	541.25	
	03/96		N/P	7.64	0.00	541.88	
	04/96		N/P	7.44	0.00	542.08	
	06/06/96		N/P	8.74	0.00	540.78	
	11/06/96		N/P	9.38	0.00	540.14	
	03/21/97		N/P	8.58	0.00	540.94	
	04/17/97		N/P	8.34	0.00	541.18	
	05/16/97		N/P	8.33	0.00	541.19	
	06/16/97		N/P	8.94	0.00	540.58	
	07/08/97		N/P	9.23	0.00	540.29	
	08/08/97		N/P	8.86	0.00	540.66	
	09/15/97		N/P	8.93	0.00	540.59	
	10/09/97		N/P	8.85	0.00	540.67	
OU2 / ST20 (E-9)							
20M21	05/95	548.63	N/P	7.32	0.00	541.31	
	09/21/95		N/P	7.71	0.00	540.92	
	01/96		N/P	8.18	0.00	540.45	
	03/96		N/P	7.60	0.00	541.03	
	04/96		N/P	7.39	0.00	541.24	
	06/06/96		N/P	8.70	0.00	539.93	
	11/06/96		N/P	9.31	0.00	539.32	
	03/21/97		N/P	8.60	0.00	540.03	
	04/17/97		N/P	8.40	0.00	540.23	
	05/16/97		N/P	8.38	0.00	540.25	
	06/16/97		N/P	9.02	0.00	539.61	
	07/08/97		N/P	9.30	0.00	539.33	
	08/08/97		N/P	8.95	0.00	539.68	
	09/15/97		N/P	9.00	0.00	539.63	
	10/09/97		N/P	8.91	0.00	539.72	
20M24	05/95	546.02	N/P	5.43	0.00	540.59	
	09/21/95		N/P	5.73	0.00	540.29	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU2 / ST20 (E-9) (cont.)							
20M24 (cont.)	01/96		---	---	---	---	Not located - flush mount well covered with snow.
	03/96		---	---	---	---	Not located - flush mount well covered with snow.
	04/96		N/P	5.31	0.00	540.71	
	06/06/96		N/P	7.25	0.00	538.77	
	11/07/96		N/P	7.25	0.00	538.77	
	03/24/97		N/P	6.37	0.00	539.65	
	04/17/97		N/P	6.13	0.00	539.89	
	05/16/97		N/P	6.25	0.00	539.77	
	06/16/97		N/P	6.91	0.00	539.11	
	07/09/97		N/P	7.20	0.00	538.82	
	08/07/97		N/P	6.85	0.00	539.17	
	09/15/97		N/P	6.88	0.00	539.14	
	10/09/97		N/P	6.75	0.00	539.27	
OU4 / DP25							
25M03	05/95	543.71	N/P	4.52	0.00	539.19	
	09/21/95		N/P	6.47	0.00	537.24	
	01/96		N/P	5.16	0.00	---	Groundwater frozen at time of gauging;
	03/96		N/P	5.12	0.00	---	Groundwater frozen at time of gauging;
	04/96		N/P	5.12	0.00	---	Groundwater frozen at time of gauging;
	06/06/96		N/P	5.95	0.00	---	Measuring point moved when opening PVC piping in well.
	11/07/96		N/P	6.35	0.00	537.36	
	03/21/97		N/P	5.62	0.00	538.09	
	04/18/97		N/P	5.49	0.00	---	Groundwater frozen at time of gauging;
	05/16/97		N/P	5.69	0.00	---	Groundwater frozen at time of gauging;
	06/16/97		N/P	6.43	0.00	537.28	
	07/09/97		N/P	6.76	0.00	536.95	
	08/07/97		N/P	6.22	0.00	537.49	
	09/15/97		N/P	6.31	0.00	537.40	
	10/08/97		N/P	6.11	0.00	537.60	
53M01	05/95	545.75	N/P	6.12	0.00	539.63	
	09/21/95		N/P	6.38	0.00	539.37	
	01/96		N/P	6.94	0.00	538.81	
	03/96		N/P	6.38	0.00	539.37	
	04/96		N/P	6.00	0.00	539.75	
	06/06/96		N/P	---	0.00	---	Well possibly frost heaved.
	11/07/96		N/P	8.03	0.00	537.72	
	03/21/97		N/P	7.28	0.00	538.47	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU4 / DP25 (cont.)							
53M01 (cont.)	04/18/97		N/P	7.02	0.00	538.73	
	05/16/97		N/P	7.34	0.00	538.41	
	06/16/97		N/P	8.06	0.00	537.69	
	07/09/97		N/P	8.43	0.00	537.32	
	08/07/97		N/P	7.92	0.00	537.83	
	09/15/97		N/P	8.01	0.00	537.74	
	10/08/97		N/P	7.81	0.00	537.94	
OU4 / WP32							
32M02	05/95	530.13	N/P	9.55	0.00	520.58	
	09/21/95		N/P	9.86	0.00	520.27	
	01/96		N/P	9.23	0.00	520.90	
	03/96		N/P	8.80	0.00	521.33	
	04/96		N/P	9.17	0.00	520.96	
	06/06/96		N/P	10.15	0.00	519.98	
	11/05/96		N/P	10.61	0.00	519.52	
	03/21/97		N/P	10.44	0.00	519.69	
	04/16/97		N/P	10.08	0.00	520.05	
	05/16/97		N/P	10.01	0.00	520.12	
	06/19/97		N/P	10.45	0.00	519.68	
	07/10/97		N/P	10.51	0.00	519.62	
	08/07/97		N/P	10.43	0.00	519.70	
	09/16/97		N/P	10.52	0.00	519.61	
	10/09/97		N/P	—	0.00	530.13	No measurement because well has been decommissioned.
32M0C	05/95	525.90	N/P	11.42	0.00	514.48	Well was originally installed at GW-32C
	09/21/95		N/P	11.54	0.00	514.36	
	01/96		N/P	11.27	0.00	514.63	
	03/96		N/P	11.29	0.00	514.61	
	04/96		N/P	11.26	0.00	514.64	
	06/06/96		N/P	11.96	0.00	513.94	
	11/07/96		—	—	—	—	Well was not located during gauging event.
	03/24/97		N/P	4.28	0.00	521.62	Need to confirm well location, all previous DTW measurements
	04/23/97		N/P	4.18	0.00	521.72	
	05/19/97		N/P	3.72	0.00	522.18	
	06/16/97		N/P	4.14	0.00	521.76	
	07/10/97		N/P	4.43	0.00	521.47	
	08/07/97		N/P	4.16	0.00	521.74	
	09/16/97		N/P	4.31	0.00	521.59	
	10/09/97		N/P	4.32	0.00	521.58	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU4 / SS35							
35M06	05/95	542.68	N/P	9.65	0.00	533.03	
	09/21/95		N/P	9.95	0.00	532.73	
	01/96		N/P	10.11	0.00	532.57	
	03/96		N/P	10.09	0.00	532.59	
	04/96		N/P	9.82	0.00	532.86	
	06/06/96		N/P	10.35	0.00	532.33	
	11/05/96		N/P	10.65	0.00	532.03	
	03/21/97		N/P	10.36	0.00	532.32	
	04/17/97		N/P	10.27	0.00	532.41	
	05/16/97		N/P	10.70	0.00	531.98	
	06/16/97		N/P	10.87	0.00	531.81	
	07/09/97		N/P	10.85	0.00	531.83	
	08/07/97		N/P	10.61	0.00	532.07	
	09/12/97		N/P	10.66	0.00	532.02	
	10/08/97		N/P	10.21	0.00	532.47	
35M07	05/95	541.20	N/P	8.64	0.00	532.56	
	09/21/95		N/P	8.64	0.00	532.56	
	01/96		N/P	---	0.00	---	Not located - flush mount well covered with snow.
	03/96		N/P	---	0.00	---	Not located - flush mount well covered with snow.
	04/96		N/P	8.40	0.00	532.80	
	06/06/96		N/P	8.94	0.00	532.26	
	11/05/96		N/P	9.33	0.00	531.87	
	03/21/97		N/P	8.84	0.00	532.36	
	04/17/97		N/P	8.62	0.00	532.58	
	05/16/97		N/P	9.30	0.00	531.90	
	06/16/97		N/P	9.70	0.00	531.50	
	07/09/97		N/P	9.81	0.00	531.39	
	08/07/97		N/P	9.56	0.00	531.64	
	09/12/97		N/P	9.34	0.00	531.86	
	10/09/97		N/P	8.95	0.00	532.25	
OU4 / SS37							
37-1	05/95	546.59	N/P	10.52	0.00	536.07	
	09/21/95		N/P	10.08	0.00	536.51	
	01/96		N/P	9.60	0.00	536.99	
	03/96		N/P	9.13	0.00	537.46	
	04/96		N/P	9.39	0.00	537.20	
	06/06/96		N/P	10.50	0.00	536.09	
	11/05/96		N/P	10.83	0.00	535.76	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU4 / SS37 (cont.)							
37-1 (cont.)	03/21/97		N/P	9.90	0.00	536.69	
	04/17/97		N/P	10.16	0.00	536.43	
	05/19/97		N/P	10.48	0.00	536.11	
	06/16/97		N/P	10.77	0.00	535.82	
	07/09/97		N/P	10.89	0.00	535.70	
	08/07/97		N/P	10.67	0.00	535.92	
	09/12/97		N/P	10.73	0.00	535.86	
	10/09/97		N/P	10.54	0.00	536.05	
OU4 / SS39							
39M04	05/95	537.06	N/P	11.12	0.00	525.94	
	09/21/95		N/P	11.24	0.00	525.82	
	01/96		N/P	11.00	0.00	526.06	
	03/96		N/P	10.63	0.00	526.43	
	04/96		N/P	10.75	0.00	526.31	
	06/06/96		N/P	11.46	0.00	525.60	
	11/05/96		N/P	11.74	0.00	525.32	
	03/24/97		N/P	11.58	0.00	525.48	
	04/17/97		N/P	11.44	0.00	525.62	
	05/20/97		N/P	11.49	0.00	525.57	
	06/19/97		N/P	11.83	0.00	525.23	
	07/08/97		N/P	11.90	0.00	525.16	
	08/08/97		N/P	11.59	0.00	525.47	
	09/15/97		N/P	11.64	0.00	525.42	
	10/09/97		N/P	11.69	0.00	525.37	
OU3 / DP44							
44M01	05/95	538.53	N/P	11.34	0.00	527.19	
	09/21/95		N/P	11.24	0.00	527.29	
	01/96		N/P	11.48	0.00	527.05	
	03/96		N/P	11.22	0.00	527.31	
	04/96		N/P	10.97	0.00	527.56	
	06/06/96		N/P	11.60	0.00	526.93	
	11/07/96		N/P	12.06	0.00	526.47	
	03/24/97		N/P	11.74	0.00	526.79	
	04/16/97		N/P	11.31	0.00	527.22	
	05/16/97		N/P	11.57	0.00	526.96	
	06/19/97		N/P	12.11	0.00	526.42	
	07/08/97		N/P	12.16	0.00	526.37	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU3 / DP44 (cont.)							
44M01 (cont.)	08/07/97		N/P	11.80	0.00	526.73	
	09/09/97		N/P	11.83	0.00	526.70	
	10/09/97		N/P	11.74	0.00	526.79	
44M04	05/95	535.41	N/P	7.73	0.00	527.68	
	09/21/95		N/P	7.61	0.00	527.80	
	01/96		---	---	---	---	Not located - flush mount well covered with snow.
	03/96		---	---	---	---	Not located - flush mount well covered with snow.
	04/96		N/P	---	---	---	Groundwater frozen at time of gauging;
	06/06/96		N/P	6.84	0.00	---	Groundwater frozen at time of gauging;
	11/07/96		---	---	---	---	Not located - flush mount well covered with snow.
	03/24/97		---	---	---	---	Not located - flush mount well covered with snow.
	04/16/97		---	---	---	---	Not gauged, monument filled w/ water, maybe snowmelt
	05/19/97		N/P	8.14	0.00	527.27	
	06/19/97		N/P	8.55	0.00	526.86	
	07/08/97		N/P	8.60	0.00	526.81	
	08/07/97		N/P	8.33	0.00	527.08	
	09/12/97		N/P	8.20	0.00	527.21	
	10/09/97		N/P	8.20	0.00	527.21	
44M09	05/95	536.75	N/P	3.74	0.00	---	Groundwater frozen at time of gauging;
	09/21/95		N/P	9.98	0.00	526.77	
	01/96		N/P	---	0.00	---	Not located - flush mount well covered with snow.
	03/96		N/P	---	0.00	---	Not located - flush mount well covered with snow.
	04/96		N/P	9.73	0.00	527.02	
	06/06/96		N/P	10.36	0.00	526.39	
	11/07/96		N/P	10.85	0.00	525.90	
	03/24/97		N/P	10.59	0.00	526.16	
	04/16/97		N/P	10.20	0.00	526.55	
	05/16/97		N/P	10.39	0.00	526.36	
	06/19/97		N/P	10.80	0.00	525.95	
	07/08/97		N/P	10.85	0.00	525.90	
	08/07/97		N/P	10.53	0.00	526.22	
	09/09/97		N/P	10.56	0.00	526.19	
	10/09/97		N/P	10.47	0.00	526.28	
OU3 / WP45							
45M04	05/95	539.55	N/P	9.28	0.00	530.27	
	09/21/95		N/P	9.05	0.00	530.50	
	01/96		N/P	9.30	0.00	530.25	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU3 / WP45 (cont.)							
45M04 (cont.)	03/96		N/P	9.03	0.00	530.52	
	04/96		N/P	8.80	0.00	530.75	
	06/06/96		N/P	9.40	0.00	530.15	
	11/07/96		N/P	9.82	0.00	529.73	
	03/24/97		N/P	9.40	0.00	530.15	
	04/18/97		N/P	9.05	0.00	530.50	
	05/16/97		N/P	9.67	0.00	529.88	
	06/19/97		N/P	10.17	0.00	529.38	
	07/08/97		N/P	10.24	0.00	529.31	
	08/07/97		N/P	9.97	0.00	529.58	
	09/12/97		N/P	9.74	0.00	529.81	
	10/09/97		N/P	9.60	0.00	529.95	
SS46							
46M01	05/95	528.04	N/P	6.83	0.00	521.21	
	09/21/95		N/P	7.04	0.00	521.00	
	01/96		N/P	6.20	0.00	521.84	
	03/96		N/P	5.69	0.00	522.35	
	04/96		N/P	6.12	0.00	521.92	
	06/06/96		N/P	7.32	0.00	520.72	
	11/05/96		N/P	7.64	0.00	520.40	
	03/21/97		N/P	7.47	0.00	520.57	
	04/16/97		N/P	7.16	0.00	520.88	
	05/20/97		N/P	7.25	0.00	520.79	
	06/19/97		N/P	7.60	0.00	520.44	
	07/08/97		N/P	7.68	0.00	520.36	
	08/08/97		N/P	7.46	0.00	520.58	
	09/15/97		N/P	7.61	0.00	520.43	
	10/09/97		N/P	7.61	0.00	520.43	
OU1 / ST48							
48M03	05/95	544.51	N/P	15.65	0.00	528.86	
	09/21/95		N/P	14.52	0.00	529.99	
	01/96		N/P	14.88	0.00	529.63	
	03/96		N/P	14.61	0.00	529.90	
	04/96		---	---	---	---	Well Destroyed

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU1 / ST49							
49M01	05/95	549.21	N/P	8.41	0.00	540.80	
	09/21/95		N/P	8.56	0.00	540.65	
	01/96		N/P	8.38	0.00	540.83	
	03/96		N/P	7.82	0.00	541.39	
	04/96		N/P	7.82	0.00	541.39	
	06/06/96		N/P	9.13	0.00	540.08	
	11/05/96		N/P	9.63	0.00	539.58	
	03/21/97		N/P	8.91	0.00	540.30	
	04/17/97		N/P	8.80	0.00	540.41	
	05/19/97		N/P	8.94	0.00	540.27	
	06/16/97		N/P	9.22	0.00	539.99	
	07/08/97		N/P	9.33	0.00	539.88	
	08/08/97		N/P	8.96	0.00	540.25	
	09/15/97		N/P	9.17	0.00	540.04	
	10/09/97		N/P	9.15	0.00	540.06	
53M05	05/95	549.26	N/P	8.84	0.00	540.42	
	09/21/95		N/P	9.04	0.00	540.22	
	01/96		N/P	8.90	0.00	540.36	
	03/96		N/P	8.37	0.00	540.89	
	04/96		N/P	8.36	0.00	540.90	
	06/06/96		N/P	9.64	0.00	539.62	
	11/05/96		N/P	10.09	0.00	539.17	
	03/21/97		N/P	9.43	0.00	539.83	
	04/17/97		N/P	9.37	0.00	539.89	
	05/19/97		N/P	9.47	0.00	539.79	
	06/16/97		N/P	9.82	0.00	539.44	
	07/08/97		N/P	9.93	0.00	539.33	
	08/08/97		N/P	9.59	0.00	539.67	
	09/15/97		N/P	9.79	0.00	539.47	
	10/09/97		N/P	9.73	0.00	539.53	
OU2 / WP60							
60M01	05/95	539.04	N/P	10.58	0.00	528.46	
	09/21/95		N/P	10.12	0.00	528.92	
	01/96		N/P	10.72	0.00	528.32	
	03/96		N/P	10.42	0.00	528.62	
	04/96		N/P	10.14	0.00	528.90	
	06/06/96		N/P	10.65	0.00	528.39	
	11/07/96		N/P	11.13	0.00	527.91	

APPENDIX C SUMMARY OF SITEWIDE WATER LEVELS, NAPL LEVELS, AND NAPL THICKNESS

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2

Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Corrected Ground Water Elevation	Comments
OU2 / WP60 (cont.)							
60M01 (cont.)	03/24/97		N/P	10.76	0.00	528.28	
	04/16/97		N/P	10.33	0.00	528.71	
	05/19/97		N/P	10.99	0.00	528.05	
	06/16/97		N/P	11.34	0.00	527.70	
	07/09/97		N/P	11.39	0.00	527.65	
	08/08/97		N/P	11.06	0.00	527.98	
	09/15/97		N/P	10.85	0.00	528.19	
	10/08/97		N/P	10.91	0.00	528.13	
60M03	05/95	539.08	N/P	10.72	0.00	528.36	
	09/21/95		N/P	10.21	0.00	528.87	
	01/96		N/P	10.71	0.00	528.37	
	03/96		N/P	10.49	0.00	528.59	
	04/96		N/P	10.21	0.00	528.87	
	06/06/96		N/P	10.65	0.00	528.43	
	11/07/96		N/P	11.05	0.00	528.03	
	03/24/97		N/P	10.78	0.00	528.30	
	04/16/97		N/P	10.43	0.00	528.65	
	05/19/97		N/P	11.06	0.00	528.02	
	06/16/97		N/P	11.36	0.00	527.72	
	07/09/97		N/P	11.42	0.00	527.66	
	08/08/97		N/P	11.11	0.00	527.97	
	09/15/97		N/P	10.88	0.00	528.20	
	10/08/97		N/P	10.92	0.00	528.16	
60M04	05/95	539.52	N/P	11.36	0.00	528.16	
	09/21/95		N/P	10.96	0.00	528.56	
	01/96		N/P	11.57	0.00	527.95	
	03/96		N/P	11.31	0.00	528.21	
	04/96		N/P	11.02	0.00	528.50	
	06/06/96		N/P	11.40	0.00	528.12	
	11/07/96		N/P	11.78	0.00	527.74	
	03/24/97		N/P	11.58	0.00	527.94	
	04/16/97		N/P	11.21	0.00	528.31	
	05/19/97		N/P	11.75	0.00	527.77	
	06/16/97		N/P	12.05	0.00	527.47	
	07/09/97		N/P	12.09	0.00	527.43	
	08/08/97		N/P	11.83	0.00	527.69	
	09/15/97		N/P	11.61	0.00	527.91	
	10/08/97		N/P	11.68	0.00	527.84	