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1997 Sitewide Monitoring Program Report



Eielson Air Force Base, Alaska

February 1998

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1997 Sitewide Monitoring Program Report

Eielson Air Force Base, Alaska

Prepared for:

Eielson Air Force Base, Alaska

Prepared by:

EA Engineering, Science, and Technology 3540 International Way Fairbanks, Alaska 99701

February 1998

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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

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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.

Source Area			Decision	
or Site	Grouping	Description	Document	Remedy
		••••••••••••••••••••••••••••••••••••••		
ST20	OUI	E-7, E-9 Complexes (Refueling Loop)	OULROD	Bioventing NAPI Recovery
ST20	OUI	E-8 Complex (Refueling Loop)	OUIROD	NFA. Monitoring
ST48	OUI	Power Plant Area	OUIROD	Bioventing, NAPI, Recovery
ST49	OUI	Alert Hangar	OUI ROD	NFA: Monitoring
SS50	OUI	Blair Lakes Vehicle Maintenance	OUI ROD	NAPL Recovery
S\$51	OUI	Blair Lakes Ditch	OUI ROD	NAPL Recovery
SS52	OUI	Blair Lakes Diesel Spill	OUI ROD	NAPL Recovery
SS53	OUI	Blair Lakes Fuel Spill	OUI ROD	NFA
DP54	OUI	Blair Lakes Drum Disposal	OUI 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
S127	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	004	Treated Effluent Infiltration Pond	OU 3,4,5 ROD	NFA
\$\$35	004	Asphalt Mixing Area	OU 3,4,5 ROD	Monitoring; Institutional Controls
5536	004	Drum Storage Site	OU 3,4,5 ROD	NFA
5537	004	Drum Storage, Asphalt Mixing Area	OU 3,4,5 ROD	NFA
5539	004	Asphalt Lake	OU 3,4,5 ROD	NFA
DPSS	OU4 (SER)	Birch Lakes Burial Site	OU 3,4,5 ROD	NFA
5158	004	Old QM Service Station	OU 3,4,5 ROD	Bioventing, Institutional Controls; Monitoring
5563	004	Asphalt Lake Spill Site	OU 3,4,5 ROD	NFA
5504	004	I rans Maintenance Spill Site	OU 3,4,5 ROD	NFA
LF01	OU5 (SER)	Original Base Landfill	011345 800	
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 34 5 ROD	NEA: Monitoring
LF06	OU5	Old Landfill	OU 3 4 5 ROD	NEA under FEA: Monitoring under Siturida
FT09	OU5	Fire Training Area	OU 3 4 5 ROD	Grouned with I E03
			00 J, 1, J ROD	Grouped when Er 05
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.		1
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TABLE 1-1 Source Area Status Summary

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Source Area			Decision	
or Site	Grouping	Description	Document	Remedy
·····				<u>Attaining</u>
WP34	none	Sewage Studie Drving Beds	TPD/State (no document)	Vist corriant to SED Dises ?
LF43	none	Ashestos Landfill	IRP/State	NOCOLITICA W OLA FILLO 2 Closed under SUR Dhase 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
			A	
SS01	Chena Res.	Building 500	IRP/State	Investigation required
ST10	OU2	E-2 POL Storage	OU2 ROD	Bioventing, NAPL Recovery
STII	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 1-1 Source Area Status Summary (continued)



Table 1-2 summarizes 1997 SWMP sampling activities, and the rationale is discussed in sitespecific 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 LF01	WELLS MONITORED 01MW03, 01MW04	*COCs VOCs, Metals	1997 SWMP SAMPLING ACTIVITY/OTHER COMMENTS 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

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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 Building 2375 UST Site	WELLS MONITORED MW-3, MW-6	*COCs BTEX, GRO, DRO	1997 SWMP SAMPLING ACTIVITY/OTHER COMMENTS **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;

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.

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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	WELLS		
AREA	MONITORED	*000	1997 SWMP SAMPLING
Come c			ACTIVITY/OTHER COMMENTS
ST56	septic system, well head	BTEX,	**Analyzed septic system and well
		Chlorinated	head for 8010 and 8020.
		Solvents	
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.

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

SITE/SOURCE	WELLS	*COCs	1997 SWMP SAMPLING
AREA	MONITORED		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.



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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.

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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.

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Generalized Hydrogeologic Cross Section (from PNL 1995 SWRI) Figure 1–3.
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-areaspecific 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 $(\mu g/L)$ 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.

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TABLE 1-3

AVERAGE METALS CONCENTRATIONS IN BACKGROUND GROUNDWATER SAMPLES (adapted from PNL SWGWMPR)

		Concentra	ation (µg/L)	
Metal	June 1992	June [993	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.

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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 μ g/L of benzene, which is below the EPA drinking water MCL of 5 micrograms per liter (μ g/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 $0.052 \mu g/L$ 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 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



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



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

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/O₂) 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:



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- 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

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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 μ g/L), 1,1,1-trichloroethane (2.5 μ g/L), and toluene (5.2 μ g/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 μ g/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 μ g/L. Xylenes were detected in 51MB4 at a concentration of 1.1 μ g/L. Bis (2-ethylhexyl) phthalate (BEHP), a common sampling and laboratory contaminant derived from plastics, was also measured just above the 10 μ g/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 μ g/L to 340 μ g/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

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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

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

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

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	North Boundary Wells, Eielson AFB, Alaska.
Table NBW-2	Concentrations (μ g/L) of Metals in Groundwater Samples, North
	Boundary Wells, Eielson AFB, Alaska.
Table NBW-3	Groundwater Parameter and Immunoassay Field Test Results, North
	Boundary Wells, Eielson AFB, Alaska

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

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

Well	Date			Concentration	(Then) r		4	Andutical		
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Methods	Notes	Reference
51MB1	8/25/92	<2.0	<2.0	0 62	\s \			-		
51MB1	8/19/93	<0.105	<0.056	<0.046	<0.202	1	100	1,4	.	TAL 1993 SWKI
51MB1	8/2/94	<1.0	<1.0	<1.0	<10	:	<250	1 / 10	उ त	
51MB1	9/6/95	<1.0	1.1	<1.0	<10 <10	~50 ~	007	1,4,10	а ,	
51MB1	8/1/96	<1.0	<1.0	<1.0	<1.0	001>	021	0-1	о 1 1 1 1 1 1	USAF 1995 SWIMFK
51MB1	10/2/97	<1.0	<1.0	<1.0	<1.0	-		1,4-0,5,10,13	ם כ	USAF 1997 SWMPR
51MB3	8/26/92	<2.0	<2.0	<2.0	<5.0	1	:	1 4	c	DNI 1005 SWD
51MB3	8/19/93	<0.105	<0.056	<0.046	<0.202	1	<100	1.4.10	50 E	PNI 1993 SWGMPR
51MB3	8/2/94	<1.0	<1.0	<1.0	<1.0	1	<250	1,4,10	ित्व	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	P	USAF 1996 SWMPR
51MB3	10/2/97	<1.0	<1.0	<1.0	<1.0	ł	ł	1,4	а	USAF 1997 SWMPR
51MB4	8/28/92	<2.0	<2.0	<2.0	<5.0	ł	1	1 4	5	DNI 1005 CWDI
51MB4	8/23/93	<0.105	<0.056	<0.046	<0.202	ł	<100	1.4.10	3 a	PNI 1993 SWGMPP
51MB4	8/2/94	<1.0	<1.0	<1.0	<1.0	ł	<250	1410	\$ 0	DNI 1004 SWCMDB
51MB4	9/5/95	<1.0	<1.0	<1.0	1.1	<50	<100	1-6	a.h	LISAF 1995 SWMPR
51MB4	8/1/96	<1.0	1.0	<1.0	1.2	<100	180	1.4-6.9.10.13	e e	UISAF 1996 SWMPR
51MB4	10/2/97	<1.0	<1.0	<1.0	<1.0	ł	1	1,4	67 (F	USAF 1997 SWMPR
51MB5	8/25/92	<2.0	<2.0	<2.0	<5.0	1	:	V I	c	DNI 1005 CHART
51MB5	8/19/93	<0.105	<0.056	<0.046	<0.202	;	~100	1 1 10	t c	DNI 1003 SWCM
51MB5	8/2/94	<1.0	<1.0	<1.0	<1.0	ł	<250	1410	5 7	PNI 1004 CWCMDD
51MB5	9/5/95	<1.0	<1.0	<1.0	<1.0	<50	130	1-6	; 4 ;	
51MB5	8/1/96	<1.0	<1.0	<1.0	<1.0	<100	170	1.4-6.9.10.13	d f	USAF 1996 SWMPR
51MB5	10/2/97	<1.0	<1.0	<1.0	<1.0	ł	1	1,4	ব্য	USAF 1997 SWMPR
08M01	8/25/92	<2.0	<2.0	<2.0	<5.0	1	;	1 4	đ	10/11 1005 CM/D1
08M01	8/19/93	<0.105	<0.056	<0.046	<0.202	:	<100	1,4,10	1 (1	PNL 1993 SWGMPR

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		Notes Reference	a,c PNL 1994 SWGMPR a PNL 1994 SWGMPR a,b USAF 1995 SWMPR d USAF 1996 SWMPR a USAF 1997 SWMPR
	Analytical	Methods	1,4,10 1,4 1-6 1,4-6,9,10,13 1,4
		TPH DRO	<250 - 170 340 -
mmin		TPH GRO	<pre>< 400</pre>
	(µg/L)	Xylenes	0.15 0.12 0.12 0.12
	Concentration	Ethylbenzene	<1.0 <1.0 <1.0 <1.0 <1.0
		Toluene	5.2 <1.0 <1.0 <1.0 <1.0
		Benzene	0.12 0.12 0.12 0.12 0.12
	Date _	Sampled	8/2/94 9/94 9/8/95 8/1/96 10/2/97
	Well	No.	08M01 08M01 08M01 08M01 08M01 08M01

TABLE NBW-1 (continued)

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 μ g/L.

c. Other compounds detected: chloromethane - 1.0 $\mu g/L$, 1,1,1-trichloroethane - 2.5 $\mu g/L$.

d. Other compounds detected: benzoic acid -3.0 ug/L e. Other compounds detected: fluorene - 2.6 ug/L

Analytical Methods:

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

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

n/J	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Copper	Iron	Lead	Magnesium	Manganese	Nickel	Potassium	Sodium	Vanadium	Zinc	Notes	Reference
	1993	:	1	1	;	;	;	;	1.4	;	:	:	;	1	;	1		PNL 1993 SWGMPR
	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
	9/6/95	6.69	1.1	34.5	38,300	Ş	4	248	<1.0	8,080	928	Ŷ	8,370	15,600	4	6.1	_	USAF 1995 SWMPR
	1993	;	1	;	1	1	ł	1	1.1	ł	ł	:	;	ł	ı	:		PNL 1993 SWGMPR
	8/2/94	8.5	5.5	68	42,400	2.5	1.2	1,130	<1.0	000'6	2,410	2.6	<3,260	5,800	1:1	2.3	-	PNL 1994 SWGMPR
	9/5/95	75	10.7	91.6	39,500	Ŷ	4	1,740	<1.0	8,130	1,910	₽	8,470	5,260	4	7.8	_	USAF 1995 SWMPR
	1993	I	1	;	:	1	:	;	1.7	:	ı	;	ł	;	;	ł	-	PNL 1993 SWGMPR
	8/2/94	26	6	16	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
	9/5/95	91.1	11.2	92.9	41,600	Ś	4	1,680	<1.0	9,430	1,190	€	9,840	4,800	4	10.2	-	USAF 1995 SWMPR
	1903	;	:	:	ł	;	:	:	<0.6	;	;	1	;	ı	I	;	I	PNL 1993 SWGMPR
	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	Π	PNL 1994 SWGMPR
	9/5/95	67	11.1	519	34,400	Ŷ	<4.0	391	<1.0	8,960	7,680	€	9,500	24,200	4	8	2	USAF 1995 SWMPR
	1993	I	1	:	ı	;	;	;	<0.6	1	1	I	I	;	ł	ł	н	NL 1993 SWGMPR
	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
	9/6/95	64.4	27.8	270	41,500	Ø	<4.0	6,750	<1.0	9,660	5,530	Ŷ	10,100	20,800	4	\$	2	USAF 1995 SWMPR
Ŭ	oncentration	SL																
	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		NL 1994 SWMP
	9/94	140	23	160	61,000	<1.0	4	006'6	<1.0	12,000	4,100	S	4,500	6,500	-	19		NL 1994 SWMP
	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	-	10		NL 1994 SWMP
	8/25/92	;	Ś	60	49,000	<20	<20	<30	Ś	9,700	1,100	<30	4,200	15,000	<30	<10	щ	NL 1992 SWGMPR
	8/19/93	;		58	;	1	;	84	<0.6	ł	1,300	;	;	;	1	;		NL 1993 SWGMPR
	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	0 .6≻		NL 1994 SWGMPR
	9/6/95	57.8	1.7	31.9	38,800	<5.0	4.1	374	<1.0	8,060	779	23.1	4,080	16,300	<4.0	13.2	2	JSAF 1995 SWMPR
	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		JSAF 1996 SWMPR

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TABLE NBW-2 (continued)

otes Reference	PNL 1992 SWGMPR	PNL 1993 SWGMPR	PNL 1994 SWGMPR	USAF 1995 SWMPR		USAF 1996 SWMPK	PNL 1992 SWGMPR	PNL 1993 SWGMPR	PNL 1994 SWGMPR	USAF 1995 SWMPR	USAF 1996 SWMPR	PNL 1992 SWGMPR	PNL 1993 SWGMPR	DII 1004 CAUCADD	LINE 1994 SWOMEN	USAF 1995 SWMPK	USAF 1996 SWMPR	PNL 1992 SWGMPR	PNL 1993 SWGMPR	PNL 1994 SWGMPR	USAF 1995 SWMPR	USAF 1996 SWMPR		PNL 1994 SWMP	PNL 1994 SWMP	PNL 1994 SWMP
Zinc No	<10	;	72	26.8	-	12.0	<43	;	61	31.3	:12.0	<10	;		ŧ .	21.3	12.0	<10	;	27	<11	12.0		63	120	8.8
Vanadium	<30	1	29	5.8	•	<8.0	<30	1	31	6	<8.0	<30	;	71	0	16.6	<8.0	<30	;	5.7	9.4	<8.0 <		24	52	36
Sodium	5,100	:	10,700	5,150		4,890	5,600	1	9,560	5,110	5,250	26,000	:	000 20	005.12	25,600	25,600	24,000	;	29,500	18,800	25,800		8,363	9,800	9,260
otassium	3,800	1	5,780	4,180		2,690	3,700	;	5,630	3,470	3,330	5,900	;	007.9	0,420	6,280	6,270	5,400	;	6,730	5,750	5,980		5,650	7,900	6,500
Nickel	<30	;	30	<9.0		<15.0	32	;	4	€	<15.0	<30	:	1	77	38.3	<15.0	<30	ł	9.5	22.4	<15.0		31	77	48.8
Manganese	1,600	1,700	3,120	2,010		2,250	1,200	1,000	3,060	1,660	1,220	11,000	. 1		8,930	7,790	7,890	6,300	1	7,350	4,790	6,010		3,875	6,500	4,980
Magnesium	9,500	1	17,400	9,380		9,950	13,000	;	21,200	11,500	11,400	12.000			12,300	10,400	090'6	13.000	. 1	12,900	8,940	10,700		17,375	26,000	20,800
Lead	v	<0.6	16	7.3		<1.0	7.6	7	22	3.7	<1.0	ý	4 01	0.02	7.3	4.6	<1.0	Ś	<0.6	2.3	<1.0	<1.0		21	48	32.6
Iron	4,300	2.700	22.100	8.130		3,960	15,000	5,900	20,600	8,480	6,040	1.100		:	8,720	4,900	2,220	7.400	1	9.190	6.550	9,280		16,938	33,000	23,800
Conner	5 7	;	54	13.9		<6.0	<20	;	601	12.8	<6.0	<20	ļ	1	26	17.5	<6.0	<20	1	8.2	<3.0	<6.0		75	140	105
Chromium	<20	;	17	13.6		<6.0	31	۱	18	8.1	<6.0	<20	ì	1	11	16	<6.0	<20	1	2.5	18.1	<6.0		20	46	30.4
Calcium	49.000	:	57,700	40.200		45,400	46,000	1	60,200	44,800	48,100	47 000	000111	;	41,000	37,300	37,400	55 000		56.300	38 400	49,100		58.625	66.000	64,900
Rarium	120	8	216	129		89.68	160	100	351	147	128	260	8	1	498	631	629	060		737	255	315		269	420	342
Arcenic	13	: 5	45	154		12.7	31	19	37	19.4	22.3	=	-	;	19	18.7	18	μ	; ;	11	28.3	26.8		25	63	37
Aluminum		:	0130	3 350		142	;	;	10.100	3.810	1,400	ł		;	4,640	2,000	122	;	1	526	111	<25.0		7.538	18,000	11,500
Date	8/76/97	50/01/8	70/18	9/5/05		8/1/96	8/28/92	8/25/93	8/2/94	915/95	8/1/96	6175107	7610710	8/19/93	8/2/94	9/5/95	8/1/96	10/9/18	6/10/03	1004	0/8/05	8/1/96	oncentration	9/94	70/6	9/94
6/1	=	• =	• •	3 3	3	P	7	=	7	5	Þ	=	3	3	Þ	Þ	Þ	:	• =		3 5	, ,	D put	=	, =	
Well	SIMB3	SIMB3	SIMPS	SIMBS		51MB3	51MB4	51 MB4	51MB4	51MB4	51MB4	SIMBS	COMIC	51MB5	51MB5	51MB5	51MB5	10M00	TOTAION	10M00	TOTATOO	10M80	Backaro	RGM	BGMX	BGUCL

Notes: f. u. BGMX BGUCL

Field filtered.

Total (unfiltered). Mean concentration of samples collected from background wells in 1994. Maximum concentration of samples collected from background wells in 1994. 95% Upper confidence limits of samples collected from background wells in 1994.

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TABLE NBW-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS,

USAF 1996 SWMPR USAF 1997 SWMPR USAF 1995 SWMPR USAF 1997 SWMPR USAF 1997 SWIMPR USAF 1995 SWMPR USAF 1996 SWMPR USAF 1997 SWMPR USAF 1997 SWMPR USAF 1997 SWMPR USAF 1995 SWMPR USAF 1996 SWMPR USAF 1997 SWMPR USAF 1997 SWMPR USAF 1995 SWMPR USAF 1997 SWMPR USAF 1996 SWMPR USAF 1997 SWMPR USAF 1997 SWMPR USAF 1997 SWMPR Reference Notes (qdd) PCE² 1 2 1 1112 1 1 1 12 1 - 1 Pa I 1 1 1 1 1 Immunoassay Results TCE² (ddd) 1 2 1 l ba L 1 1 1 ł 1 1 1 2 1 11121 BTEX¹(ppb) 0.01nd 0.00nd 0.00nd 0.01nd 0.01nd 0.01nd Total 8 pu 1 1 pu 1 1 nd 20 50 1 1 1 NORTH BOUNDARY WELLS, EIELSON AFB, ALASKA eH (mv) -116 38 **4**8 1 7 26 -1 22 - 841 641 41-32 8 7 26 6.59 8.85 7.16 Hd 7.32 7.38 7.4 6.87 8.04 7.58 7.75 7.83 7.60 7.74 6.83 8.30 7.15 7.43 7.1 6.9 7.3 Conductivity (mmhos/cm) 140 309 357 316 125 266 283 283 262 324 230 278 282 282 244 250 1110 326 447 380 394 Turbidity (NTV) Parameters - v Ω V + -15 0 17 13 12068 24 12 7 31 - 24 2 Temperature ູ່ ບູ 11.6 12.3 10.8 8.8 12 9.7 9.5 9.5 6.8 11 6.6 11.0 7 4.5 5.4 6.9 4.4 10.2 6.8 14 Oxygen (% saturation) Dissolved - 122 - - 61 14 14 - 122 Dissolved Oxygen (mg/L) 2.85 0.82 2.28 6.62 1.49 2.99 0.55 0.61 2.61 9.01 2.14 4.1 8.2 3.7 0.91 5.4 6.3 0.56 5.1 Sampled 9/12/97 722/97 10/2/97 9/12/97 9/24/97 0/2/97 9/12/97 8/1/96 9/24/97 9/12/97 9/24/97 9/6/95 9/5/95 8/1/96 9/5/95 8/1/96 0/2/97 9/5/95 8/1/96 0/2/97 Date Well No. 51MB3 511MB5 51MB3 51MB3 51MB4 51MB4 511MB4 51MB5 51MB5 51MB5 51MB5 51MB1 51MB1 51MB1 51MB1 51MB1 51MB3 51MB3 51MB4 51MB4

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				Reference	IISAF 1995 SWMPR	IISAF 1995 SWMPP	IISAF 1995 SWMPR	IISAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1997 SWMPR	USAF 1997 SWMPR
				Notes							
	lts		PCE ²	(qdd)	1	1	1	I	I	pu	ł
	assay Resu		TCE ²	(qdd)	ł	1	I	1	1	pu	t
	Immuno		Total	BTEX ¹ (ppb)	1	I	1	I	30	40	pu
				eH (mv)	I	ł	I	φ	-59	7	-39
tinued)				рН	7.6	7	7.4	6.84	8.02	7.49	7.58
NBW-3 (cont			Conductivity	(mmhos/cm)	175	340	330	410	486	400	436
TABLE]	ameters		Turbidity	(NTV)	ł	1	ł	9	ų	4	6
	Par		Temperature	(°C)	11	11	6	10.2	9.4	9.2	7.7
		Dissolved	Oxygen (%	saturation)	1	1	I	ł	64	17	29
		Dissolved	Oxygen	(mg/L)	4	3.2	4	4.39	7.24	1.88	3.29
			Date	Sampled	8/31/95	9/8/95	9/12/95	8/1/96	9/12/97	9/24/97	10/2/97
				Well No.	10M80	08M01	08M01	08M01	08M01	08M01	08M01

Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

² Dråger Liquid Extraction (DLE) field test kit.

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. nd.

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 μ g/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 μ g/Kg. The lowest on-base PCB concentration (39 μ g/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 μ g/Kg (rainbow trout collected at Pete's Crossing) to <14 μ g/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:

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

List of Tables for Garrison Slough:

Table GS-1PCB Concentrations in Fish Specimens Collected From 1993 thru 1997, EielsonAFB, Alaska.



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)

Location Upper Garrison	Sample # B07DE8	Date 9/93	Fish Mass (gm)	Species	Result (µg/kg)	Comment
Upper Garrison	B07DE8	9/93	(gm)	Species	(µg/кg)	Comment
Upper Garrison	B07DE8	9/93				
Slough (SS 35)			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	8/6/96				fished 0.5 hrs elec.shckng
	Caught					l hour hook and line
	No Fish Caught At	Station Du	ring 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 S	Station Du	ring 1997 Field	Season		
Arctic Ave./	AA-MR-01A	8/4/96	570	Gravling	7100	Field duplicates: 01 A &P
Manchu Rd	AA-MR-01R	8/4/96	570	Gravling	2300	Skin-on fillet
(sediment removal	AA-MR-02	8/4/96	444	Gravling	12000	Skin-on fillet
area)	A A - MR - 03	8/4/96	476	Gravling	2600	Skin-on fillet
	AA-MR-04	8/4/96	440	Gravling	6300	Skin-on fillet
	AA-MR-05	8/4/96	230	Gravling	7600	Skin-on fillet
	AA-MR-06	8/4/96	186	Gravling	670	Skin-on fillet

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TABLE GS-1 (continued)

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

					РСВ	
Station			Fish Mass		Result	
Location	Sample #	Date	(gm)	Species	(µg/kg)	Comment
Arctic Ave./	AA-MR-97-01	9/4/97	349	Grayling	430	Skin-on fillet
Manchu Rd.	AA-MR-97-01DUP	9/4/97	349	Grayling	450	Skin-on fillet
(sediment removal	AA-MR-97-02	9/4/97	602	Grayling	290	Skin-on fillet
area) continued	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	Gravling	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 S	tation Du	ring 1997 Fiel	d Season		
Flightline Pond (DP 44)	B07DG1	9/93	not reported	Pike	207	Fillet plus Organs
	No Fish Caught At S	tation Du	ring 1997 Field	d 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 S	tation Du	ring 1997 Field	d Season		
Wastewater Treatment	STP-12A	8/6/06	612	Gravling	040	Field Duplicator
Plant	STP-12B	8/6/96	612	Grayling	240	2 Longnose sucker not kept
	No Fish Caught At S	tation Du	ring 1997 Field	1 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	Gravling	200	Skin-on fillet
	GS-FS-DS-97-02	9/4/97	610	Gravling	71	Skin-on fillet
	GS_FS_US_07_02	0/ <u>/</u> /07	585	Dilto	20	Skin on fillet
	GS_FS_US_07_04	2/ 1 /2/ 0/17/07	505	FIKC	1200	Skin-Oll Illiet
	GS_FS_DS_07_04	0/2/07	580	Grouling	1200	Skin-On Innet Skin on fillet
	00-18-00-18-00	312191	<u> </u>	Graying	430	Skin-on fillet

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					PCB	
Station			Fish Mass		Result	
Location	Sample #	Date	(gm)	Species	(µg/kg)	Comment
Garrison Slough/	GS-NS-97-01	9/3/97	200	Rainbow Tr.	110	Skin-on fillet
New Station	GS-NS-97-02	9/17/97	70	Rainbow Tr.	<14	Skin-on fillet
Moose Creek -	MC-PC-19	8/8/96	238	Rainbow Tr.	79	23 Fish Caught in One
Petes Crossing	MC-PC-19	8/8/96	126	Rainbow Tr.	59	Shocking Run;
(off-base)	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/	Fish 1	1994	not reported	Grayling	216	Skin-on fillet
Garrison Slough	Fish I Duplicate	1994	not reported	Grayling	247	Skin-on fillet
Confluence	Fish 2	1994	not reported	Grayling	< 20	Skin-on fillet
(off-base)	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
		0 10 1 0 0		- ··		
	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 Cought At S	tation Dur	ing 1007 Eigl	d Caseer		· · · · · · · · · · · · · · · · · · ·
Moose Creek -	MC-05-15	8/8/06	112 1997 Flei	Crewling	< 15	Search to all the first 2 has not
Ocare St	MC 05 16	0/0/90 9/9/06	112	Graying	< 15	Sport tackie for 3 nours
(off-base)	MC 05 17	0/0/90 9/9/06	129	Graying	50	
(UII-Uase)	MC-05-17	0/0/90 9/9/06	232	Graying	25	all 96 samples are
	MC-0J-16	0/0/90	94	Graying	82	Skin-on fillet
	MC-05-97-01	9/3/07	120	Gravling	<14	Skin on fillet
	MC-08-97-02	9/3/97	95	Rainbow Tr	~14	Skin-on fillet
	MC-08-97-03	9/3/97	219	Gravling	~1 4 60	Skin-on fillet
	MS-0S-97-03	9/3/07	219	Gravling	50	Skin-on fillet
	MC-08-97-04	9/3/97	160	Gravling	<14	Skin-on fillet
	MC-08-97-05	9/3/07	145	Gravling	>1 4 22	Skin-on fillet
		715171	173	Graying	~~~~~	

TABLE GS-1 (continued)

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

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 μ g/L and 5,320 μ g/L, respectively. GRO concentration in MW3 was 9,200 μ g/L. DRO ranged from 110 μ g/L to 2,000 μ g/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 μ g/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 μ g/L (23 September 1996), 540 μ g/L (23 September 1996), and 3,010 μ g/L (5 August 1996), respectively. These concentrations were below MCLs. Maximum GRO and DRO concentrations

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were also detected in MW-3 at 18,000 μ g/L (23 September 1996), and 1,900 μ g/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 μ g/L, respectively. The benzene concentration exceeds the ADEC MCL of 5 μ g/L. GRO was detected in MW-3 (9,000 μ g/L), while DRO was detected in both MW-3 and MW-6 (1,900 and 180 μ g/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:

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Building 2375, UST at Building 2375, Eielson AFB, Alaska.Table B2375-2Groundwater Parameter and Immunoassay Field Test Results, Building
2375, UST at Building 2375, Eielson AFB, Alaska.

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Figure B2375–1. Building 2375 Site Plan Showing Locations of Groundwater Monitor Wells, Eielson AFB, Alaska
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		D		O, USI AI BUI	CURCES DAIN	ELLSON	AFB ALASK			
Well	Date			Concentration	(Tott) u			Analytical		
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Methods	Notes	Reference
IWM	10/2/95	<1.0	<1.0	<1.0	<1.0	<50	120	1-3		119 A D 1005 SVIN ADD
IWM	8/5/96	12	6.3	<10	3 6	<100	011	1010		ATTAN CCCL TAGO
N/N/1	20/1/0						110	1,7,10		USAF 1990 SWMPK
T AA TAT	0614716	11		<1.0	I.1	<100	<100	1,9,10		USAF 1996 SWMPR
MW3	10/2/95	061	860	630	3 640	0000		, -		
CITIV V	01510		000		0+0'c	7,400	7,000	<u></u>]		USAF 1995 SWMPR
	06/010	170	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	ł	000'6	1,900	9,10,11	B	USAF 1997 SWMPR
MW4	9/29/95	<1.0	<1.0	<10	<10	5 6	140			
MW4	8/5/96	<10	017				041	<u></u>		USAF 1993 SWMFK
V VIII V		0.1.	0.12	0.1		<100	140	1,9,10		USAF 1996 SWMPR
IVI W4	96/57/6	0.1>	<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		TISAF 1005 SUM AD
MW6	8/5/96	<1.0	<1.0	<1.0	<1.0	<100	210	01.61		AUNAC CCL TICO
MW6	9/23/96	<1.0	<1.0	<1.0	<1.0	<100	210 101>	01 0101		TISAE 1006 SWIMP
MW6	10/0/6	<10	<10				001	1,7,10	,	USAL 1990 SWINER
		0.12	0.17	0.12	I	<100	180	9,10,11	م	USAF 1997 SWMPR
MW8	9/28/95	<1.0	<1.0	<1.0	<1.0	<50	120	1-3		IISAF 1995 SWAMPR
MW8	8/5/96	<1.0	<1.0	<1.0	<1.0	<100	200	1.9.10		USAF 1996 SWAMP
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		UISAE 1005 SWADD
DP-1	8/6/96	1.6	<1.0	<1.0	<10	<100	020	1010		ATTAINS 2001 TAND
DP-I	9/11/6	1.5	<1.0	<1.0	<1.0	<100	<100	1,9,10		USAF 1996 SWMPR
Analytical M	fethods:									
•	1. 8020.	5	3. ADEC 8100M		5. 8270	7 8760	9 AK101	-	1 603	
1	2. ADEC 801	5M. 4	4. 8010.	•	6. 8080.	8. 8240.	10. AK102.	-	T. 002	
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.

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

	Reference	USAF 1995 SWMPR	IISAF 1995 SWMPR	UISAF 1996 SWMPR	LISAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1995 SWMPR	USAF 1995 SWMPR	USAF 1996 SWMPR	TISAF 1996 SWIMP	USAF 1997 SWMPR	USAF 1995 SWMPR	USAF 1995 SWMPR	
	Notes													
Immunoassay Results	Total BTEX ¹	I	ł	t	I	t	I	I	I	1	I	I	I	
	eH (mv)	ł	ł	63	6-	-55	I	1	38	67	7	I	I	
	Hq	7.24	7.05	69.9	6.86	7.38	6.92	6.79	6.77	6.79	8.15	6.8	7.2	
	Conductivity (mmhos/cm)	300	800	658	361	1056	310	410	468	247	391	350	270	
arameters	Turbidity (NTU)	1	ł	27	46	46	ł	:	112	78	78	ł	ł	
Ч	Temperature (°C)	œ	10	8.8	8.42	11.8	6	6	7.9	6.84	9.1	6	6	
	Dissolved Oxygen (% saturation)	1	ł	:	ł	3.7	I	ł	ł	1	9.6	I	1	
	Dissolved Oxygen (mg/L)	1.4	1.6	0.7	0.12	0.39	4.1	3.1	1.04	0.184	0.86	2.9	2	
I	Date Sampled	10/29/95	10/02/95	08/05/96	09/23/96	09/02/97	09/29/95	09/29/95	08/05/96	09/23/96	09/02/97	09/28/95	09/29/95	
	Well No.	IWM	MW3	MW3	MW3	MW3	MW4	MW6	MW6	MW6	MW6	MW8	DP-1	

Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

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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.

сос	ARAR (Groundwater) - Drinking water MCL
Volatile Or	ganic 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 O	rganic Compounds		
DDT			
Chlordane	2 μg/L		
Inorganic	Compounds		
'Lead	15 μg/L		
²Silver	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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for LF01:

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	Analytical Results (revised from PNL 1994 SER Phase 2).
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	LF01, Eielson AFB, Alaska

List of Tables for LF01 (continued):

Table LF01-3	Concentrations (μ g/L) of Metals in Groundwater Samples, LF01, Eielson
	AFB, Alaska.
Table LF01-4	Groundwater Parameters and Immunoassay Field Test Results, LF01,
	Eielson AFB, Alaska.



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)

Det Of Colours Area Complete Data 7100 x 114005 Intestigations											
Parameter Analyzed	Unite	Det.	1022	M01	01M02	1084	011	IW10	1000	Conc.	Location
Oil and Grease			1999	1988-Dup.	1988	1984	1986	1987	1988	Range	of Max.
PCBs	με/L	0.5				ND			ļ	2,000	UIMWIO
Pesticides	µe/L	0.002-0.02					1	í			
Phenols	ue/L	10				ND					
TDS	ug/L	1000	196.000	222.000	188.000	ne -	180.000	Linknown	204.000	100 000 000 00	012/01
TOC		1000	120,000	222,000	100,000	1 000	180,000	Unknown	204,000	180,000-222,00	
TOX	ug/L	10]		1,000				1,000	01/01/0
nH (field)	1 10					09 2.95		ł		89	01MW10
Spec Cond @ 25°C	umbos/m			l .		0.80		1		6.85	01MW10
Spec. Cont. (g 25 C	punnosvem					211				211	01MW10
Petroleum Hydrocarbons			ND				ND	Unknown			
Purgeable Halocarbons											
Chlorobenzene	110/1.	0.34	ND	0 371	ND					0.000	
Chloromethane	197	0.4	ND		0.566		ND			0.3/1	
1.2-Dichloroethene	10/I	0.4	ND	ND	0.500				2.00	0.566-2.06	01MW10
Trichlorfluoromethene		0.2		ND	ND		ND		0.387	0.387	01MW10
Themorradioneurane	με/L	0.44	ND	ND	ND		3.0		ND	3.0	01MW10
Purgeable Aromatics											
Benzene	ue/L	0.15	ND	0.23	ND		ND		ND	0.77	011/01
Toluene	με/L	0.25	ND	0.35	ND		ND			0.23	01M01
	, 10 -2	0.20		0.55			ND		ND	0.35	UIMUI
Semi-VOC			ND	ND	ND				ND		
Arsenic					1						1
Arsenic, total	цα/Т.	1.8	89	16.9	117				21	21.160	011/01
Arsenic, dissolved	ug/I.	18	50	60	ND				J.I.	3.1-10.9	
	~~~		5.0	0.0					ND	5.0-0.0	01M01
Lead											
Lead total	шо/Т.	14	23.8	647	53.0	20	NID		63	62647	011 (01
Lead dissolved	ug/L	14	60	ND	ND	20	ND		0.2	0.2-04.7	01M01
	~~~		0.0		ND				ND	6.0	OIMOI
Mercury		1									
Mercury, total	ue/ī.	0.2	ND		0.6				ND	0.6	011/02
Mercury, dissolved		0.2	ND	ND	ND					0.8	01M02
-											
ICP Metals Scan											
Aluminum, total	μg/L	30	17,900	59.600	102.000				4 960	4 960-102 000	011/02
Arsenic, total	µµ2/L	40	8.9	16.9	11.7				31	31-160	011/02
Barium, total	ue/L	1.8	377	914	1.240				127	127-1 240	011407
Barium, dissolved	ue/L	1.8	100	200	100			1	00	00 200	011/02
Cadmium, total	ue/L	3.0	ND	ND	3.8				ND	200	011/01
Calcium, total	uø/L	13	60.800	76 100	83,000			1	51 400	J.0	01M02
Calcium, dissolved	μο/Γ.	13	52 200	54 200	44,300				18,000	31,400-83,000	01M02
Chromium, total	ue/L	6.0	28 1	120	198					44,500-54,200	01M01
Cobalt, total	μο/Ι.	60	19.1	62.9	83.4				82	40.1-170	01M02
Copper, total	ug/I.	30	84.0	325	322	f	1		122	0.2-03.4	01M02
ron, total	ue/T	20	23 400	07 300	164 000		1		7260	7 260 164 000	01M01
ron, dissolved		20	40	40	40				1,300	7,500-164,000	01M02
ead, total	ug/L	30		100	100				JU 00	30-40	01M01/02
vagnesium total	100/T	44	16100	12 800	50 mon				ND	100	01M01/02
Jagnesium, dissolved	100/T		0 880	10 300	8 190				11,300	11,300-50,000	01M02
Asonanese total	110/T	14	1 240	2 260	2 180				9,100	8,180-10,300	01M01
Aggranese discolved	μη/Γ μη/Γ	1.7	800	000	3,160	1		1	435	435-3,180	01M02
Vickel total	реу С. 110/Т	20	37 4	117	40				10	10-900	01M01
otassium total		408	6 400	12 000	15 000			1	ND	37.4-197	01M02
otassium dissolved		408	2 520	2 670	13,000				3,950	3,950-15,800	01M02
odium total		82	7 100	4,070	4,310	i			2,480	2,310-2,670	01M01
odium dissolved	риду 1. ца/Т	82	4 220	1 280	4,000				4,720	4,720-14,700	01M02
anadium totel	на/т	10	42.2	4,500	4,000				4,020	4,000-4,380	01M01
inc. total	Her L	20	72.2	270	200				ND	42.2-288	01M02
inc dissolved		2.0	12.1	210	418				30.8	30.8-418	01M02
/1.w, (13301104	her 1	2.0	40	40	40				40	40	01M01/02/W10
Common Anions	1										
bloride	/r	200	1 840	1.250	1167						1
ulfate	μα/Γ	500	27 470	20.000	1,10/				1,198	1,167-1,849	01M01
unot	р _щ уг.	500	34,420	30,900	33,130	1	1		31,420	30,900-33,150	01M02
litrogen	l		ND								ſ
The open			ND	ND	NU				ND		
	L										

ND Parameter not detected.

Unknown Reference unavailable at this time.

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TABLE LF01-2	CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES,
	LI UI, EIELSUN AFB, ALASNA

2

	Notes Reference	PNL 1994 SER PHASE 2	a USAF 1996 SWMPR	BNI 1994 SER PHASE 3	a USAF 1996 SWMPR		
Analytical	Methods		7	1.4	1		
	TPH DRO		:	ł	ł		
	TPH GRO		I	ł	ł		nits.
ion (µg/L)	Xylenes	ntainer	<1.0	<.202	<1.0		e reporting lin
Concentrati	Ethylbenzene	lyzed - broken co	<1.0	<0.046	<1.0		ere detected abov
	Toluene	not ana	<1.0	<0.056	<1.0		those listed w
	Benzene		<1.0	<0.105	<1.0		nds other than
Date	Sampled	8/93	8/20/96	8/93	8/20/96		a. No compou
Well	No.	01M03	01M03	01M04	01M04	Notes:	

Analytical Methods:

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

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

Well No. fi	Date 'u Sampled	Aluminum	Antimony	Arsenic 1	Barium B	seryllium (admium	Calcium C	hromium	Cobalt Co	pper li	2 I	cad Magn	esium Man	iganese Ni	ckel Potz	ssium Sele	nium Si	ver Sod	um Thal	lium Vana	dium Zin	ic Notes	Reference
VIOSSIO	(ED																							
01M01	f 6/93	<32.5	<69.4	<1.0	110	1.0	<4.70	49,000	12	<4.05	3.0	72 <ì	1.0 8,5	00	160 <1	7.9 3,	100	4	87 3.7		۵	84 3.4	4 . 7 .	NL 1993 SWGMPR
01M01	r 8/93	<32.5	<69.4	<2.0	84	<0.814	<4.70	49,000	<5.42	5.2	2.7 <	:16 ≪	0.6 8,5	200	55 <1	7.9 2,	800	•	.87 4,0	- 2		84 4.6	- -	NL 1993 SWGMPR
10W10	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	006	•	1.0 4,6	' 8	⊽	.0 3.0	d 0	NL 1994 SWGMPR
0110	507	2027	404	012	43	<0.814	<4 70	44.000	<5.42	<4.05 <	2.65 <	21 <1	1.0 8.2	00	3.1 <1	7.9 1,	009	4	.87 3,8	8	V	84 <3.4	4 P	NL 1993 SWGMPR
ZOWIO	C 0/0 2		1.60	0.17	F 5	110.0-	<4.70	44 000	<5 47	45 <	2.65 <	14 <	1.4 7.5	00	2.2 <1	7.9 3,	1 00	۲ ۲	.87 3,8	8		84 3.9	4	NL 1993 SWGMPR
01M02	1 8/95	140	*:67	0.7	57	: :	1	49,000	<1.0	-1.0 -1.0	4.0 1	20	1.0 8,8	8	9.0	Э.	009	v	1.0 6,5	' 8	⊽	.0 12	<u>د</u>	NL 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	v	1.0 4,1	' 0		.0 4.5	d.	NL 1994 SWGMPR
Backgrour	d Concentra	ations											1			•				5	-		2	
BGM	f 9/94	43	ł	8.3	101	<1.0	<1.0	51,750	<1.0	1.3	2.4 1,	736 4	1.0	450	,789 2	uic v,⊿	00000000000000000000000000000000000000	•••	0.1 10.4 10.1	28	⊽ = 	0.0 0.0		NL 1994 SWGMPR
BGMX	f 9/94	140	I	23	160	0.12	0.12	61,000	0.12	<u>9</u> . ₹	4.0 7.1 7.1	9006 12 080	11 01	400 400	720 3	i u i u	000	· •	1.0 5.3.	2 2	: _	0 10	. 6.	NL 1994 SWGMPR
BGUC	f 9/94	74	1	C.41	671	0.12	0.1×	000,10	0.12	7	ń 1.	200	-			1								
TOTAL																								
010010	20/9	120	<69.4	2.0	110	<0.814	<4.70	49.000	<5.42	<4.05 <	2.65 2	1> 09	1.0 9,1	00	1> 061	7.9 3,	. 000		.87 3.9(- 0	⊘	84 <3.4	14 PI	NL 1993 SWGMPR
	5/03 ·	021	<60.4	0.0	8	<0.814	<4.70	50.000	9.7	4.4	3.1 1.	500 <1	1.9 8,5	00	300 <1	7.9 3,	. 100	4	.87 4,10	; 0		84 5.8	2	NL 1993 SWGMPR
01M01	1 9/94	15,000	2.0	24	420	<1.0	3.0	64,000	43	29	140 33.	,000	17 23,1	000	500 7	7, 7,	100	⊽ 1	0.0 9,7(-		0 120	E C	NL 1994 SWGMPR
				:	;			000	5	2017	0 27 6	1	0	003	12	1 0 1	200	0	87 3.90	i Q	v V	84 <3.4	P D	VI. 1993 SWGMPR
01M02	1 6/93	560	<69.4	2.0	S 8	<0.814	0.4.1	45,000	4.0 7 4		2 CO.7			8	6 00 7 10	7.9 3.	008	. 6	87 3.70	2 9	. 4	4.02	. 4	NL 1993 SWGMPR
01M02	u 8/93	160	<0.4	077 X	49 410	<0.814	10	43,000 64 000	46	,	130 33.	000	18 26.	000 4	800	. 7. 9	. 06	'⊽'	9,8(120	E C	NL 1994 SWGMPR
701010		000101	2	1	2								1						i i	9	2	;	2	
01M03 1	1 8/93	5,900	;	3.6	160	1	;	54,000	Ξ	;	11 8,	000	9 12	000	5 00	, c , c , c , c , c , c , c , c , c , c	002				- 9 	22		NL 1994 SEK PHASE 2 5 A F 1005 SWADD
01M03 1	и 8/20/96	629	<2.0	<2.0	44.9	<1.0	<1.0	46,000	<6.0	<11.0	<6.0 1,	1 060	.4 9,1	40	746 <1	5.0 .5	1 20 4	∛ ∩	.,c 0.4	7	9 D.	N <17	D D	SAF 1990 SWMFK
10110	0.01	002 6		2.0	001	1	ł	51.000	7 5	I	5.9 5.	700 4.	Ч P	001	500 <1	7.9 4,	. 005	•	- 4,5(- 0		16	E	NL 1994 SER PHASE 2
01M04	0.0/0 U	000.00	: 2	7.C	071	• 7	0	61 000	; ;	91	130 35	000	09	000	560	'9 6	000	v	0 8,20	;	. 4	120	P	NL 1994 SWGMPR
01M04	u 8/94 1 8/20/96	20,000	1.8 2.0	0.61 2.0	53.7	0.1≻	!	48,500	€ 0.9	<11.0	6.6 L.	570	2.	6 011	1.5 <1	5.0 2,	850	5.0 <∠	1.0 4,00	0	.0	0 <12.	0	SAF 1996 SWMPR
Backgrou	nd Concentr	ations		ų	0,0	0	5	363 03	06	13 76	75 16	038 7	1 17	375 3	875 3	5.		v	0 8.30		. 24	1 63	PI	VL 1994 SWMP
BGM	u 9/94	850,1	0.12	រ រ	607	0.12	0.12	000 99	3 4	15	140 33	000	18 26	000	500			v	0 9,80	1	. 52	120	PI	VL 1994 SWMP
BGUC	u 9/94	11.500	2.0	37	342	4.01.0	<1.0	64,900	30.4	20.8	105 23	800 32	2.6 20,	800 4	.980 4	8.8 6.	500	v	.0 9,20		×.	88.8	E E	4L 1994 SWMP
Notes:	1																							
ų.	Field filte	med.																						

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Total (unfiltered).

'n

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

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			Reference	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR
			Notes				
sults		PCE ²	(ddd)	ł	1	ı	t
oassay Res		TCE ²	(qdd)	I	1	I	ł
Immun		Total	BTEX ¹ (ppb)	I	1	1	I
			eH (mv)	188	162	169	192
			H	6.98	6.79	7.13	6.22
		Conductivity	(mmhos/cm)	227	318	231	316
Parameters		Turbidity	(NIN)	27	\$	11	Ŷ
		Temperature	(j)	7.1	6.7	1.2	2.0
	Dissolved	Oxygen (%	saturation)	1	26.2	I (18.5
	Dissolved	Oxygen	(mg/L)	2.96	3.16	0.83	2.54
		Date	Sampled	08/20/96	16/07/80	08/20/96	16/07/80
		Well M.	WCII INO.	01M03	01MU3	01M04	01M04

Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

² Dråger 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	COC (cont.)	ARAR (Groundwater) - Drinking water MCL (cont.)
Volatile Or	ganic Compounds	Trichloroethene	5 μg/L
Benzene	5 µg/L	Tetrachloroethylene	5 μg/L
Toluene	1,000 μg/L	Vinyl Chloride	2 µg/L
Ethylbenzene	700 μg/L	Semivolatile	Organic Compounds
Xylenes	10,000 μg/L	DDT	
1,4-Dichlorobenzene	75 μg/L	Chlordane	2 μg/L
1,2-Dichloroethane	5 µg/L	Inorga	nic Compounds
cis-1,2-Dichloroethene	70 μg/L	ıLead	15 µg/L
trans-1,2-	100 μg/L	²Silver	100 µg/L



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 μ g/L, while monitor wells 02M01,

02MW9, and 02M0B displayed low ($\leq 0.8 \ \mu g/L$) 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 μ g/L to 153 μ g/L. These concentrations are above EPA drinking water MCL of 50 μ g/L and the 95% background UCL of 37 μ g/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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for LF02:

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

List of Tables for LF02:

Table LF02-1	Concentrations (μ g/L) of Organic Compounds in Groundwater Samples.
	LF02, Eielson AFB, Alaska.
Table LF02-2	Concentration (μ g/L) of Non-BTEX Volatile Organic Compounds in
	Groundwater Samples, LF02, Eielson AFB, Alaska.
Table LF02-3	Concentrations (μ g/L) of Metals in Groundwater Samples, LF02, Eielson
	AFB, Alaska.

List of Tables for LF02 (continued):

Table LF02-4Groundwater Parameter and Immunoassay Field Test Results, LF02,
Eielson AFB, Alaska.



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

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	Reference		LNL 1990 UU 2,4,5 KI	PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3.4 5 RI	PNI 1905 OII 3 4 5 DI		USAF 1996 SWMPR	PNL 1995 OU 3.4 5 RI			PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3.4.5 RI	LISAF 1996 SWMPR		PNI, 1995 OII 3 4 5 BT		IN C,4,5 UU CEEL LINI	PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3.4.5 RI	USAF 1996 SWMPR	DNI 1005 OII 3 4 5 DI		IN C.4.5 UU CEEL INI	PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3.4.5 RI	USAF 1996 SWMPR		01	02.
	Notes																												AKI	0. AKI
Analvtical	Methods	-	-	-	1		• 0	-		-	4 ,	1	I	7	•	1	. –	-	1	I	7		•	4	-	-	٢		6	1
	TPH DRO	;	•	ł	1	:		1	1	1		I	ł	1		ł	ł	ł	ł	ł	ł	I	1	}	1	1	1		8260.	8240.
	TPH GRO	ł	ł	ł	1	1		1	ł	ł		1	1	ł		1	ł		ł	:	ł	ł	ł		1	1	1		7.	%
on (µg/L)	Xylenes	<0.202	707.0-	<0.202	<1.0	<1.0	01	1.0	0.24	<0.202		0.17	<1.0	<1.0		<0.202	<0.202	1010	<1.U	<1.0	0.2	<0.202	<0.202		<1.0	<1.0	0.3		6. 8270.	6. 8080.
Concentrati	Ethylbenzene	0.048		0.066	<1.0	<1.0	60	7.0	0.049	<0.046		0.1	<1.0	<1.0		0.13	<0.046		×1.U	<1.0	0.3	<0.046	<0.046		<1.0	<1.0	<1.0		3100M.	U
	Toluene	<0.056		90.02	<1.0	<1.0	0.8	0.0	1.0	<0.056	ΨK	2	2.2	73		0.14	<0.056		0.1/	<1.0	0.3	<0.056	<0.056		1. 0	<1.0	<1.0		3. ADEC 8	4. 8010.
	Benzene	0.13		0.11	<1.0	<1.0	<10	0.1	<0.105	<0.105	<10	0.1,	<1.0	<1.0		0.16	<0.105	< 7	0.17	<1.0	<1.0	<0.105	<0.105		-1.0	<1.0	<1.0			015M.
Date	Sampled	5/93	0/03	C 6 / 0	6/16/94	8/18/94	8/22/96		5/93	8/93	6/16/94		8/3/94	8/22/96		5/93	8/93	6/16/04		8/3/94	8/22/96	5/93	8/93	10/21/2	0/10/24	8/3/94	8/28/96	Methods:	. 8020.	. ADEC 8
Well	No.	02M01	LOPACO		02M01	02M01	02M01		02M02	02M02	02M02		70W70	02M02		02MW9	02MW9	0/MM/CU	C 11 14170	6MW20	02MW9	02M0B	02M0B	UNACO	001/120	17MUB	02M0B	Analvtical 1	1	7

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

Reference	DNI 1005 OTT 3 4 5 DT	UN C'5'S DO CALL THI	IN CHECOD COLUMN	IN C'H'C DO CCCI TNI	USAF 1996 SWMPR		FNL 1995 OU 3,4,5 KI	PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3.4.5 RI	USAF 1996 SWMPR		PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3.4.5 RI	USAF 1996 SWMPR	PNI 1005 OII 3 4 5 DI	DAT 2 A C TO 2001 DAT	NIC'S COOCCUTINT	FNL 1993 UU 3,4,5 KI	PNL 1995 OU 3,4,5 RI	USAF 1996 SWMPR		
Notes	•	d a	st o	3 0	5 03		Ø	ß	æ	ব	đ		æ	cs	8	đ	53	α	5 c	5	J	đ	8		
Analytical Methods	4	- ব	· 4	. 4	-	-	1 ·	4	4	4	7	-	4.	4	4	4	7	. 4	· 4	• •	+ -	4	2		
Naphthalene	1	I	ł	ł	0.2		ł	ł	ł	1	<1.0		1	I	1	1	<1.0	I	I	ł		1	<1.0		
1,2,4- TMB	1	ł	ł	I	0.4	ł		1	I	I	0.3	ł	I	ł	1	1	<1.0	ł	ł	I	ł	1	<1.0		
PCE	0.078	0.074	<0.50	<0.50	<1.0	40 M40			<0.50	<0.50	<1.0	010	0.10	-0.049	<0.50	<0.50	<1.0	<0.049	<0.049	<0.50	<0.50		<1.0		
TCE	6.5	4.5	<0.50	<0.50	<1.0	<0.065	500.02	con.u/	00.0>	<0.50	<1.0	<0.065	200.02	con.u/	<0.50	<0.50	<1.0	<0.065	<0.065	<0.50	<0.50	22-	1.0		:
t-1,2- DCE	1.9	1.4	<1.0	1.4	1.0	<0.149	<0 140		-1.U	<1.0	<1.0	0.17	<0.140		<1.0 2	<1.0	<1.0	<0.149	<0.149	<1.0	<1.0		0.1~		- - -
с-1,2- DCE	7.6	4.3	ł	1	7.0	<0.127	<0.177	141.00	ł	1	<1.0	<0.127	<0.177	171.02	I	I	<1.0	<0.127	<0.127	1	I	0 1 1	0.17		-
Methylene Chloride	0.12	0.11	<1.0	1.7	0.6	<0.056	0.085			0.1×	0.9	0.094	0.084		0.17	1.1	0.5	0.069	<0.056	<1.0	<1.0	<10	0.12		/ volatila anami
Date Sampled	5/93	8/93	6/16/94	8/18/94	8/22/96	5/93	8/93	6/16/94	101218	+41C10	96/77/8	5/93	8/93	6/16/04	10/2/8		96/77/2	5/93	8/93	6/16/94	8/3/94	8/28/96			No non BTEV
Well No.	02M01	02M01	02M01	02M01	02M01	02M02	02M02	02M02	CUMCO		701MI70	02MW9	02MW9	02MW9	02 MMV0		6 M M70	02M0B	10M20	02M0B	02M0B	02M0B		Notes:	a

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

Analytical Methods:

	1. 8020. 2. ADE(C 8015M.	м 4.	ADEC 8100M. 8010.	و. ج	8270. 8080.	7. 8.	8260. 8240.	9. 10.	AK101. AK102.
DCE PCE	Dichle Trichl Perchl	oroethene. oroethylene. loroethene (tetrach	lloroeth	nene).						

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

Well No.	Date f/u Sampl	e led Alumin	um Antimor	ny Arseni	c Barium	Beryllium	Cadmiun	m Calcium	Chromium	Cobalt	Copper	Iron 1	Lead M	agnesium N	Aanganese	Nickel	otassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc Note	s Reference
DISSOL	(ED																							
02M01	f 6/15/5	94	1 -	2.11	199	0.1∧ V	0.15		<1.0 3.4	1 12	1 12	1,750	1.7	17,300 16.500		3.4 1.2	8.33 8.830	<3.0	<1.0	18,800 17,800	: 1	2.4	- 4.9	PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI
02M01	f 8/4/9	94 23.9	<1.0	21.4	242	0.7>	0.12	43,900	t. n	0.12	0.12	0+0*0	2.17		07011	! :								
02M02 02M02	f 6/15/5 f 8/4/9.	94 - 1 14 8.8	25.1 71.4		38.3 37.7	<1.0 <1.0	0.1> 0.1>	1 1	<1.0 4.2	- 2.1	- 1≥	22,600 18,000	1.0 <1.0	32,400 17,400	 1,670	8.1 10.0	15,500 1,640	- 3.0	0.12	23,600 12,500		3.7	3.9	PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI
02MW9 02MW9	f 6/15/9 f 8/4/9.	94 - 14 14.3	<1.0	11.7 24.0	86.1 98.4	<1.0 2.0	!<br <br 0.1>	-29,700	1.0 2.3		+ ¹	3,570 8,300	0.1≥ 1.0	9,130 7,440		4.1 1.9	2,780 2,680	- 3.0	0.1> 0.1>	4,250 4,110		- 3.3	- 6.7	PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI
02M0B 02M0B	f 6/15/5 f 8/4/9	94 14 27.1	<1.0	24.8	42.2	Sample <2.0	: damaged <1.0	in transit. 36,100	2.3	<1.0	3.2	4,650	<1.0	9,190	1,030	2.1	2,750	1	<1.0	3,980	;	2.8	4.7	PNL 1995 OU 3,4,5 RI
Backgrou	nd Concentr	rations		0 3	101	012	012	51 750	<10	13	2.4	1.736	<1.0	10.450	1,789	2.3	3,400	1	<1.0	4,563	1	<1.0	5.6	PNL 1994 SWMP
BGM	FU/U 3	4	:	; ; ;	161	012	<10	61 000	<10	3.0	4.0	. 006.6	<1.0	12.000	4,100	5.0	4,500	ł	<1.0	6,500	:	1.0	61	PNL 1994 SWMP
BGUCL	f 9/94	4 140 4 74	11	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	ŀ	<1.0	5,340	1	1.0	10	PNL 1994 SWMP
TOTAL																								
107100	6/03	10010	109/	81	\$10	<0.814	<4.7	79 000	32	<4.05	61	49.000	18	32,000	1,400	32	11,000	1	<2.87	25,000	1	48	100	PNL 1995 OU 3,4,5 RI
101/120	26/C II	000 C 1		5 FF	010	<0.814	4.8	58.000	9.3	<4.05	9.7	18,000	4.3	22,000	890	<17.9	9,300	1	<2.87	22,000	ı	12	20	PNL 1995 OU 3,4,5 RI
	12/2 n 0/2/2	54 FC		35.3	266	<1.0	<1.0	1	7.6	1	:	18,400	8.6	21,900	1	12.4	9,930	<3.0	<1.0	24,500	•	1	:	PNL 1995 OU 3,4.5 RI
10MCU	. 8/4/9	4 6660	<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 8/22/5	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	3,400	<1.0	<8.0	<12.0	USAF 1996 SWMPR
001100		1	102	G	73	<0.814	747	1 000	<5.42	<4.05	<2.65	20.000	2.3	18.000	830	<17.9	7,300	;	⊲2.87	0000	1	<3.84	21	PNL 1995 OU 3,4,5 RI
20M20	56/C n	350	+:07 (3 3	÷ %	<0.814	4.9	34.000	<5.42	<4.05	<2.65	0.900	2.5	7,700	740	<17.9	2,700	1	<2.87	4,200	;	<3.84	9.3	PNL 1995 OU 3,4,5 RI
2014120	12/9 n	10	1	43.9	101	<1.0	<1.0	1	2.1	;	;	31,200	2.7	32,500	:	11.9	15,800	⊲3.0	<1.0	26,800	1	1	;	PNL 1995 OU 3,4.5 RI
20M00	8/4/9	14 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	<1.0	4,300	1	11.0	77.6	PNL 1995 OU 3,4.5 RI
02M02	u 8/22/5	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
0/10/100	6/02	1 500	1097	ç	270	<0.814	<47	54.000	<5.42	<4.05	<2.65	27.000	6.2	14,000	1,300	<17.9	5,000	1	⊲2.87	5,800	1	⊲3.84	37	PNL 1995 OU 3,4,5 RI
6 M MIZO	24/C II		1.00	3 6	240	<0.814	<47	50,000	8.0	<4.05	6.5	22.000	1.5	12,000	1,300	<17.9	4,700	1	2.87	5,700	1	8.8	18	PNL 1995 OU 3.4,5 RI
6 M W70	. 6/15/C	04 I.		695	205	<1.0	<1.0	1	8.4	:	1	24,100	8.5	13,200	1	12.9	11,000	⊲3.0	<1.0	8,580	1	1	:	PNL 1995 OU 3,4.5 RI
6 M M CU	8/4/9	1 3 2 20	19.8	58.1	171	2.0	<1.0	34.500	Ξ	4.0	26.2	20,500	8.0	10,800	1,230	12.9	3,730	1	<1.0	8,390	:	14.5	76	PNL 1995 OU 3,4,5 RI
02MW9	u 8/22/5	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
aurico	5/02	100	V 09/2	140	000	<0.814	<4.7	32.000	<5.42	<4.05	<2.65	36.000	8.2	8,200	1,500	<17.9	2,000	1	2.87	4,000	:	<3.84	28	PNL 1995 OU 3.4.5 RI
	26/0 n	101'r c	4.002 U	£ 5	077	<0.814	50	46.000	<5.42	<4.05	4.4	19.000	1.2	8,600	1,300	<17.9	2,600	1	<2.87	4,300	1	8.7	9.8	PNL 1995 OU 3,4,5 RI
02M0B	· 6/15/5	1 2	; ;	64.7		<1.0	<1.0	1	3.3	1	1	21.400	3.5	9,190	;	6.9	1,950	<3.0	<1.0	6,100	1	ı	1	PNL 1995 OU 3.4.5 RI
02M0B	u 8/4/9	14 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	1	35.2	126	PNL 1995 OU 3,4.5 KI
02M0B	u 8/28/5	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	< <u>4.0</u>	4,230	<1.0	<8.0	<12.0	USAF 1996 SWMPK

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Reference	NL 1994 SWMF NL 1994 SWMF NL 1994 SWMF	
Notes	~ ~ ~	
Zinc	63 120 88.8	
Vanadium	24 52 36	
Thallium		
Sodium	8,363 9,800 9,260	
Silver	<l< td=""><td></td></l<>	
Selenium		
Potassium	5,650 7,900 6,500	
Nickel	31 77 48.8	
Manganese	3,875 6,500 4,980	
Magnesium	17,375 26,000 20,800	
Lead	21 48 32.6	
Iron	16,938 33,000 23,800	
Copper	75 140 105	
Cobalt	13.75 31 20.8	
Chromium	20 46 30.4	
Calcium	58,625 66,000 64,900	н. n 1994.
admium	<pre><1.0</pre> <pre><1.0</pre> <pre><1.0</pre> <pre><1.0</pre>	. 1994. Ils in 199 Id wells i
Beryllium C	<1.0 <1.0 <1.0	round wells in ackground we
Barium	269 420 342	m backg d from b
Arsenic	25 63 37	lected fr s collecte mples cc
Antimony	<1.02.0<2.0	samples col n of sample
Aluminum	000 7,538 18,000 11,500	ed. ltered). entration of concentratio r confidence
Date Sampled	oncentratic 9/94 9/94	Field filter Total (unfi Mean conc Maximum 35% Uppe
l f/u	round C u L u L	
Wel No.	Backe BGM BGMX BGUC	Notes: f. u. BGMX BGMX

TABLE LF02-3 (continued)

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

1

		SWMPP	SWMPR	SWMPR	SWMPR	SWMPR	SWMPR	
	ang d	I ISAF 1996	USAF 1997	USAF 1996	USAF 1996	USAF 1997	USAF 1996	
	Notes	TION						
sults	DCF ² (muh)		1	1	I	I	I	
assav Re	TCE ²	1	ł	I	I	ł	1	
Immuno	Total BTEX ¹ (pnh)		ł	ł	ł	ł	ł	
	eH (mv)	1	40	1	1	138	I	
	Ha	6.78	6.85	6.55	6.79	6.43	6.81	
	Conductivity (mmhos/cm)	371	438	426	250	508	222	
Parameters	Turbidity (NTU)	141	Ŷ	٢	182	Ŷ	764	
	Temperature (°C)	۳	3.9	5.7	1.6	4.6	5.8	
	Dissolved Oxygen (% saturation)	1	31	I	I	37.5	I	
	Dissolved Oxygen (mg/L)	0.08	4.03	4.27	0.38	4.75	3.45	
1	Date Sampled	08/22/96	08/20/97	08/22/96	08/28/96	08/20/97	08/22/96	
	Well No.	02M01	02M01	02M02	02M0B	02MW08	02MW9	

¹ RaPID Assays Ohmicron Total BTEX field test kit. ² Dräger Liquid Extraction (DLE) field test kit.

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 Or	ganic 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 Or	rganic Compounds
DDT	
Chlordane	2 μg/L
Inorganic	Compounds
'Lead	15 μg/L
²Silver	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.

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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 μ g/L), 03M13 (42 μ g/L), and 09M02 (13 μ g/L). A TCE concentration of 63 μ g/L was also detected in 03M08, exceeding the OU 3,4,5 ARAR MCL of 5 μ g/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 μ g/L to 97 μ g/L, exceeding the EPA drinking water MCL of 6 μ g/L. Other semivolatiles detected included phenol (03M01 - 3.0 μ g/L), naphthalene (03M01 - 1.5 μ g/L; 03M08 - 22.0 μ g/L), diethyl phthalate (03M08 - 17.0 μ g/L), and benzoic acid (03M01 - 5.0 μ g/L; 03M13 - 3.0 μ g/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, 1997
1996 Sitewide Groundwater Monitoring Report, USAF, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures 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.

List of Tables for LF03:

Table LF03/FT09-1	Concentrations (μ g/L) of BTEX compounds, TPH GRO, and TPH DRO in Groundwater Samples, LF03/FT09, Eielson AFB, Alaska
Table LF03/FT09-2	Concentrations (μ g/L) of Non-BTEX Volatile Organic Compounds in
	Groundwater Samples, LF03/F109, Eleison AFB, Alaska.
Table LF03/FT09-3	Concentrations (μ g/L) of Semivolatile Organic Compounds in
	Groundwater Samples, LF03/FT09, Eielson AFB, Alaska
Table LF03/FT09-4	Concentrations (μ g/L) of Metals in Groundwater Samples, LF03/FT09, Eielson AFB, Alaska.
Table LF03/FT90-5	Groundwater Parameter and Immunoassay Field Test Results, LF03/FT09, Eielson AFB, Alaska.





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





SKA		Reference		PNL 1995 OU3.4.5 RU	PNI, 1995 OT13 4 5 RT	DNI 1006 OT 12 4 6 DI	THE 1999 CO3,4,0 KI	FINL 1995 UU3,4,5 KI	PNL 1995 UU3,4,5 KI	USAF 1995 OU1,3,4,5 RDWP	USAF 1996 SWMPR	DNT 1006 OT12 1 6 DT	NI C.4. COO CCCI TNI T	FNL 1992 UU5,4,5 KI	PNL 1995 OU3,4,5 RI	INI 1666 OLIS 1 5 BI	DAU 1005 OUT 1 2 2 2	TNL 1992 UU3,4,5 KU	PNL 1995 OU3,4,5 RI	PNI 1995 OI13 4 5 DI			USAF 1996 SWMPR	DNI 1005 OT13 A 5 DI		PNL 1995 0U3,4,5 RI	PNL 1995 OU3.4.5 RI	PNI 1995 OLI3 4 5 BI	PNI 1005 OI13 A 5 DI	USAF 1996 SWMPR
FB, ALA		Notes																												
IELSON A	Analytical	Methods		1	I		4 -	-	T	1- 3	7	-	4 -	T	1		•	4	1	-		• 1	7		• -	4		l		Ľ
03/FT09, EI		TPH DRO		1	ł	:	;	}.	1	1,000	I	:	1	8	ł	:	:		1	ł	;		1	:		1	ł	ł	;	ł
MPLES, LF		TPH GRO		ł	:	1	ł			<20	;	ł	I		1	ł	1		1	1	ł		ł	ł		ł	ł	ł	;	ł
NATER SA	tion (µg/L)	Xylenes	•	19.5	18.4	7	5 5	5 0		2.4	1.8	72.1	351		<1.0	<0.85	<0.40		1.6	<0.85	<0.40		0.1~	<0.85	<0.40		Ŷ	<5.0	<1.0	<1.0
IN GROUND	Concentral	Ethylbenzene		3.74	5.64	\$	<2.0	5		<1.0	0.4	24.8	0.79		<1.0	<0.46	<0.5	t	1.7	<0.46	1.11	0 I V	0.17	<0.46	<0.5	, , ,	7	<2.0	<1.0	<1.0
PH DRO		Toluene		0. /0	1.43	₽	<2.0	<1.0		+. +	<1.0	81.8	1.75		<1.0	<0.25	<0.30	3 6	C.2	<0.25	<0.30	012	0.1.	<0.25	<0.30		7	<2.0	<1.0	<1.0
AND		Benzene	0.05	<i>CC.</i> 0	0.84	6	<2.0	1.7	017	0.17	<1.0	11.5	3.92	< 1	VI	0.71	<0.2		0.12	6.53	4.00	00	2.4	0.40	0.25	22	0.0	5.9	<1.0	0.3
	Date	Sampled	1088	00/1	1989	6/92	8/21/92	8/5/94	20/20/0	CC11716	96/1/90	1988	1989	01210	46/C/0	1988	1989	8/5/07	+61010	1988	1989	8/7/96		1988	1989	C0/C1/9	76/71/0	8/21/92	8/8/94	8/14/96
	Well	No.	031/01	TOTALCO	03M01	03M01	03M01	03M01	03M01		IUMICU	03M02	03M02	031400	7010100	03M03	03M03	031/103	COTAICO	03M04	03M04	03M04		03M05	03M05	DIMOS		CUMEU	03M05	03M05

TABLE LF03/FT09-1 CONCENTRATIONS (µg/L) OF BTEX COMPOUNDS, TPH GRO,

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TABLE LF03/FT09-1 (continued)

USAF 1995 OU1, 3, 4, 5 RDWP PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RU PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RU PNL 1995 OU3,4,5 RU PNL 1995 OU3,4,5 RI **USAF 1996 SWMPR USAF 1996 SMWPR USAF 1996 SWMPR USAF 1996 SWMPR USAF 1996 SWMPR USAF 1996 SWMPR** Notes Reference Analytical Methods 1-3 5 TPH DRO 47,000 ł 1 I 1 1 1 1 1 ł 1 1 1 1 1 1 1 ł 1 1 ł ł ł | | TPH GRO 17,000 | | ł ł ł 1 ł 1 1 1 H 1 1 ł ł 1 1 ł 1 1 I. ł ł ł Concentration (µg/L) Xylenes <0.40 <0.85 <0.40 <0.85 <5.0 <5.0 <1.0 <1.0 <1.0 <1.0 <0.40 <0.40 <1.0 ♡ 10.1 <1.0 <1.0 <1.0 <1.0 <1.0 Ŷ - 16 77 66 $\overline{\mathbf{v}}$ Ethylbenzene <0.46 ₹.0 <0.46 <0.5 <1.0 <1.0 <0.5 **2**.0 <1.0 <1.0 7 5.04 <1.0 <0.5 <1.0 <1.0 <1.0 <1.0 \heartsuit 3.50 <1.0 38 338 23 $\overline{\nabla}$ Benzene Toluene <0.30 <0.25 ₹.0 <0.25 <0.30 <1.0 <1.0 <2.0 <1.0 <0.30 <1.0 6.79 <1.0 <1.0 <1.0 ₽ ₽ 1 09 430 350 5.66 <1.0 <1.0 <1.0 $\overline{\nabla}$ <0.15 <0.2 <1.0 <1.0 <0.15 <2.0 <0.2 <2.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 7 0.24 <1.0 \heartsuit 0.9 0.42 0.6 18 **₹** ∞ $\overline{\mathbf{v}}$ Sampled 6/12/92 8/21/92 8/14/96 6/12/92 8/21/92 8/14/96 0/4/95 8/8/94 8/13/96 Date 1989 8/8/94 8/13/96 1988 1989 8/9/94 8/7/96 8/9/94 1988 1989 1989 8/9/94 1989 8/9/94 8/9/94 8/7/96 1989 03M06 03M06 03M06 03M10 03M06 03M06 03M07 03M07 03M07 03M06 03M07 03M07 03M08 03M08 03M08 03M10 03M07 03M08 03M09 03M09 03M10 03M11 03M11 03M11 03M12 03M12 Well ю Х

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	lotes Reference	DNT 1005 OTS 1.5 T		FNL 1995 003,4,5 KI	PNL 1995 OU3,4,5 RI	PNL 1995 OU3,4,5 RI	USAF 1995 OU1,3,4,5 RDWP	USAF 1996 SWMPR		PNL 1995 OU3,4,5 RI		HLA 1992 LF03/FT09 RI/FS	PNL 1995 OU3,4,5 RI	HI A 1002 I E03/ET200 BI/ES	PNL 1995 OF 13 4 5 PT		HI A 1997 I E03/ET06 DIÆS	PNL 1995 OU3,4,5 RI		PNL 1995 OU3,4,5 RI	IN C,4,500 C661 JNJ	PNL 1995 OU3,4,5 RI	THE FULL POINT HAD	DAL (4) OU3,4,5 KU		FNL 1999 UU3,4,5 KI	USAF 1996 SWMPR	PNL 1995 OU3,4,5 RI		USAF 1995 OU1,3,4,5 RDWP
Analytical	Methods	-		- +			1- 1	7	-	. =1			1	-	•	•		1	-	-	4	1	-	4	4 -	- 1	7	I		1-3
	TPH DRO		1	ł	:	1	130	I	:	I		1	I	ł	ł		1	ł		1	ł	ł	ł	ł	1	ł	1	ł		160
	TPH GRO	ł	:		ł	1 6	067	:	ł	ł		ł	ł	:	ł		1	ł	1			ł	:	ł	ł		1	ł		0<>
tion (µg/L)	Xylenes	<0.40	Ŷ	~~ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	0.0	0.1	0.1/	<1.0	<0.40	<1.0	01/	0.17	<1.0	<1.0	<1.0		<1.0	<1.0	<0.40	<1.0	5	<1.0	<0.85	<0.40	<10			<1.0		<1.U
Concentra	Ethylbenzene	<0.5	\$	<2.0	<10	0.12	0.1.	<1.0	<0.5	<1.0	<10 2	0.17	<1.0	<1.0	<1.0		<1.0	<1.0	505	<1.0		<1.0	<0.46	<0.5	<1.0	1.0	0.17	<1.0		^1.U
	Toluene	<0.30	¢	<2.0	<10	01>		<1.0	<0.30	<1.0	<1.0		<1.U	<1.0	<1.0		<1.0	<1.0	<0.30	<1.0		<1.0	<0.25	<0.30	<1.0	<10	0.12	<1.0	012	N.1/
	Benzene	45.9	24	35	1.8	<10		42.0	8.87	<1.0	<10		0.1	<1.0	<1.0		<1.0	<1.0	6.15	2.4		<1.0	20.0	14.3	<1.0	13.0	0.01	<1.0	<10	0'7
Date	Sampled	1989	6/12/92	8/21/92	8/10/94	10/4/95	201210	06/1/0	1989	8/10/94	1989	8/10/04	+c ini io	1989	8/10/94		1989	8/10/94	1989	8/10/94		8/12/94	1988	1989	8/11/94	8/7/96		8/12/94	10/12/95	
Well	No.	03M13	03M13	03M13	03M13	03M13	031112	CITAICO	03M14	03M14	03M15	031/15	CITAICO	03M16	03M16		03M17	03M17	03M18	03M18		10M00	09M02	09M02	09M02	09M02		09M03	EAMW01	

TABLE LF03/FT09-1 (continued)

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4				T/	ABLE LF03	3/FT09-1 (co	ntinued)			
Well	Date .			Concentra	tion (µg/L)			Analytical		
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	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 M	ethods: 1. 8020. 2. ADEC 8	015M.	3. ADEC 4. 8010.	8100M.	5. 8270. 5. 8080.	7. 8260. 8. 8240.	9. AK101. 10. AK102.	11. 7421. 12. 6020.	13. 8310.	

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

		U/FS							21/1-0			IJFS			I/FS			I/FS						1/1:0	LL2						IJFS					L/FS				VFS				
	U3,4,5 RI	F03/FT09 F	U3,4,5 RI	U3,4,5 RI	U3,4,5 RI	SWMPR	SWMPR	113 4.5 RI	EN3/ETNO E	10 7 V C 1		F03/FT09 R	U3,4,5 RI	U3,4,5 RI	F03/FT09 R	SWMPR	13 4 5 B I	F03/FT09 R	U3,4,5 RI	U3.4.5 RI	U3.4.5 RI	SWMPR		U3,4,5 KU For arrow P	10 7 7 6 DI				WIMK	J3,4,5 RI	F03/FT09 R	J3,4,5 RI	J3,4,5 RI	J3.4,5 RI	WMPR	F03/FT09 R	J3,4,5 RI	WMPR	WMPR	-03/FT09 R	J3.4.5 RI	WMPR	WMPR	
eference	VL 1995 O	LA 1992 L	4L 1995 O	VL 1995 O	NL 1995 O	SAF 1995	SAF 1996	U. 1995 O	1 C001 V		0 6661 71	A 1992 L	IL 1995 O	IL 1995 O	.A 1992 L	AF 1996	0 1995 0	A 1992 L	IL 1995 O	IL 1995 O	IL 1995 O	AF 1996		U 2661 1	A 1992 D	D 0661 1	L 1005 0		AF 1996	LL 1995 OI	A 1992 L	L 1995 OI	L 1995 OI	L 1995 01	AF 1996	A 1992 LI	L 1995 OI	AF 1995 S	AF 1996 S	A 1992 LI	L 1995 OI	AF 1996 S	AF 1997 S	
Notes Re	ď	H	a	a	a Pr	ۍ ۹	a	á	: 5	1	Ē.	Ħ	a PN	Чd	H	a,c US	d	÷	aPN	a PN	a PN	a US		£ 3	Ë ë				a a	Nd	H	aPN	a	a PN	a US	H	a PN	a US	a,d US	H	a PN	SN	a US	
/tical hods	-		-	_		2	7	_								7						7													2			7	-					
Analy Meth	4	ч	4	4	4	4	¢	4		r •	Ŧ	4	4	4	4	°,	P	. 4	4	4	4	9		4 •	4 -	- t	+ -	+ ;	ó	4	4	4	4	4	ò	4	4	4	è.	4	4	9	9	
PCB	ł	;	:	1	1	1	<1.0	1			1	:	1	I	1	<1.0	1	1	1	I	1	<1.0		1	I	:	•	1 -	0.1>	1	:	1	:	:	<1.0	:	:	ł	<1.0	1	1	<1.0	<1.0	
DCB	;	1	1	;	<1.0	<1.0	<1.0	:			0.12	:	<1.0	;	:	<1.0	:	;	1	1	<1.0	<1.0		I	۱	1	1		0.1>	1	1	1	:	<1.0	<1.0	1	25	14	27	1	<1.0	1	1	
L DCB	1	<1.00	2.0	₽.0	2.0	<1.0	<1.0	:			0.12	<1.0	<1.0	I	<1.00	<1.0	1	<1.00	2.0	2.0	<1.0	<1.0		1	00.12	200	0.17		0.1>	ł	<1.00	2.0	2 .0	<1.0	<1.0	5.12	82	31	39	<1.00	<1.0	1	ł	
E DCB	1	1	5 -	5 -	5 <1.0	0 <1.0	0 <1.0	1		1 7	0.12	1	5 <1.0	:	:	0 <1.0	1		5	5	5 <1.0	0 <1.0		1	۰.	! ^ •	1 7		0.1> 0	I	1	۶ ۱	s I	5 <1.0	0 <1.0	1	<10	2.3	5.0	:	5 <1.0	:	:	
E		- 8	0 [.]	0 0	5 ⊘.	0 <1.	0 <1.		. 5	- «	⊳	- 00	¢.	:	5	. <u>1</u>	5	1 8	0.0	0 <0.	5 .0	0 <1.		-	н я В а	0 9 9					: 00	0 [.]	0 [.]	5 0	0 <1.	5	53	4	31	- 8	5 0		1	
A -	v. 0	<0.6	5 <l.< td=""><td>5 <u></u>∠l.</td><td>0 0</td><td>0 <1.</td><td>0 <1.</td><td>5 6</td><td></td><td></td><td>⊳</td><td>9.0≻</td><td>0 0</td><td>1.9</td><td>2.2</td><td>0 0.5</td><td>ę</td><td>~0.6 0.6</td><td>5 کل</td><td>S <1.</td><td>0. <0.</td><td>0 <1.</td><td></td><td>0</td><td>°</td><td>÷ ;</td><td></td><td></td><td>0 V</td><td>0⊳</td><td>⊲0.6</td><td>s <i.< td=""><td>5 <i.< td=""><td>0 0</td><td>0 <1.</td><td>8.5</td><td>0 15</td><td>0 40</td><td>0 63</td><td>9.0≻</td><td>9 9</td><td></td><td>1</td><td></td></i.<></td></i.<></td></l.<>	5 <u></u> ∠l.	0 0	0 <1.	0 <1.	5 6			⊳	9 .0≻	0 0	1.9	2.2	0 0.5	ę	~0.6 0.6	5 کل	S <1.	0. <0.	0 <1.		0	°	÷ ;			0 V	0⊳	⊲0.6	s <i.< td=""><td>5 <i.< td=""><td>0 0</td><td>0 <1.</td><td>8.5</td><td>0 15</td><td>0 40</td><td>0 63</td><td>9.0≻</td><td>9 9</td><td></td><td>1</td><td></td></i.<></td></i.<>	5 <i.< td=""><td>0 0</td><td>0 <1.</td><td>8.5</td><td>0 15</td><td>0 40</td><td>0 63</td><td>9.0≻</td><td>9 9</td><td></td><td>1</td><td></td></i.<>	0 0	0 <1.	8.5	0 15	0 40	0 63	9 .0≻	9 9		1	
11	1	•	5. 0.	.5 ⊖	5 41.	0.	0 <1.	1			₹	1	5 -1-	1	1	0 <1.			5 <0.	5	5 <1.	0 <1.		1	1 4	• ₽	0.4		0	1	1	.5 0.	5 0	5	0.	1	0.	4	.0 <1.	1	5 <1	· ·	1	
- 10 - 10	•	47	9	0> 0.	0> 0.	1> 0.	4 <1	;			ē. ₽	- 00‡	0 [.]	•	- 00t	.0.			0	0	0> 0.	.0		•	••••••••••••••••••••••••••••••••••••••	0. ¢	0; ¢	n, .	⊽ 0.	:	+00	0 [°]	0°	© 0:	.0 1	+00 -	3 3	3	1 <1	400	0 0	, , , ,	•	
	, ~	0.5		~	~		0		'	÷.	V	0	~	•	⁷ 0⊽	~		- ⁻ 0>	; ⊽	' ⊽	∠	⊽		۰ ~	°. '	. ∠	⊽ .	<u>,</u>		, ~	°.	~	⊽	~	⊽	0	ę	-	-	0>	; \ \		'	
Total I DCE	3C.0>	:	4.3	3.4	1	:	2.0	0.00	0.07	:	:	'	1	0.400	;	10.4	0.00	0.440	< 10	1.6	<1.0	1.0		<0.38	1	<1.0	12	0.1>	0.5	₹0.3£	1	<1.0	<1.0	<1.0	<1.0	'	<10	1	31.3	1	1	1	1	
t-1,2- DCE	:	:	<1.0	<1.0	<1.0	<1.0	<1.0		:	1	<1.0	:	<1.0	;	ł	0.4		1	012	<1.0	<1.0	<1.0		:	1	<1.0	<1.0	<1.0	<1.0	1	;	<1.0	<1.0	<1.0	<1.0	:	<10	<1.0	0.3	1	<10		:	
c-1,2- DCE	1	;	4.3	3.4	1	<5.0	2.0		1	;	:	:	1	1	:	10.0		1		91	1	1.0		ı	1	<1.0	1.2	:	0.5	;	:	<1.0	<1.0	1	<1.0	1	1	45	31	;			1	
dethylene Chloride	:	<1.40	<5.0	\$.0	<1.0	<1.0	<1.0		:	<1.40	<1.0	<1.40	<1.0	:	<1.40	<1.0		: ج	0	20 20 20	<1.0	<1.0		:	<1.40	<5.0	<5.0	1.0	<1.0	1	<1.40	<5.0	<5.0	<1.0	<1.0	1.61	250	67	17	07 17	017	71.0		
L CFM	1	;	1	1	1	<1.0	<1.0		;	;	1	;		:	;	<1.0		1			;	<1.0		ł	:	;	:	;	<1.0	,	;	;	;	;	<1.0	;	1	2.9	<1.0		;			
hloro- thane	1	2.38	ł	1	<1.0	<1.0	1.0		:	0.770	<1.0	0.770	<1.0	;	0 770	<1.0			0.1.0	1 1	<1.0	<1.0	2	1	0.770	ı	;	<1.0	<1.0	;	0.770	;	:	<1.0	<1.0	13.0	<10	49	<1.0		1 7	0.12		
Vinyl C	2.08	531	9.5	4.5	1	5	<1.0	:	<0.2	0.800	<0.5	<0.200 <	<0.5	<0.7	0.78	<1.0		0.975	22] ;	 0 74	90	2	0.873	2.56 <	2.0	2.3	0.84	0.5	<0.2	<0.200 <	2.0	<2.0	<0.5	<1.0	<0.200	17	<10	0.8	000.07	20.200	C.D.		
Chloro- methane		2 53	•	1	<1.0	69	<1.0		:	8.16	<1.0	10.4	<1.0	1	3 71	<1.0		1	<0.400	1	- 10	<10	0.12	1	<0.400	1	•	<1.0	<1.0	1	<0.400	1	1	<1.0	<1.0	<0.400	01/	2, 2	<1.0		<0.400	0.1>		
DCDFM		5 16	1	:	5.8	? ⊻	0.15		1	<0.600	2.2	<0.600	<1.0	;	009.02	<1.0		1	1.28	,	: 2	710	0.12	1	1.41	:	;	<1.0	<1.0	:	<0.600	1	,	<1.0	<1.0	<0.600 	200.02	40	36		<0.000	2.0	11	
2- exanone			;	,		10	<u>,</u>		•	1	;	1	ı					1	:	ı	1		1	ł	1	1	;	;	1	ı	;	1	;	1	1	1		- 009	ş 1		1	:	: :	
lethyl- ntanone H				;			2 1		•	,	,	;	,					:	:	;			1	,	1	•	;		:	1	,	1	;	,		1					:	:		
4-M ne 2-pen																																						-						
2- Butanoi			1				? :		1	1	:	1	1		•	: :		1	:	1	1	1	I	1	:	1	1	1	I	1		. 1	1	1	1	1	I	1 10			1	;	: :	
Acetone		•				1 2	2 1		;	ł	:	;	:		:	1 1		1	1	:		1	:	1	ı	:	1	1	;		I		:	1			•	: ²	<u>,</u> ,		I	:	: :	
Date Sampled	0001	1000	C0/9	72/0	7211710	14/10/0	96/1/8	5	1988	1989	8/5/94	1080	8/2/94	0001	1000	8/7/96		8861	6861	6/92	76/17/8	8/8/94	8/14/90	1988	6861	6/92	8/21/92	8/8/94	8/14/96	0001	0001	6/0/9	8/74/97	6/8/04	8/14/96	0001	1967	1014105	8/6/96		6861	8/9/94	10/24/96 9/8/97	
Well No.	101100	INMEN	INMED	TOMICO	INMED	INMCO	03M01		03M02	03M02	03M02	20M02	03M03	101100	+0IMICO	03M04		03M05	03M05	03M05	COMED	201420	CUMEU	03M06	03M06	03M06	03M06	03M06	03M06	LUMO	1011100	LOWCO	10M07	101100	03M07	007400	SUM CU	80MC0	03M08		03M09	03M09	03M09 03M09	

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TABLE LF03/FT09-2 (continued)

Reference	HLA 1992 LF03/FT09 RI/FS	PNL 1995 OU3.4,5 RI	USAF 1996 SWMPR	HLA 1992 LF03/FT09 RL/FS	PNI 1005 0113 4 5 RI			HLA 1992 LF03/FT09 RJ/FS	PNL 1995 OU3.4.5 RI	USAF 1996 SWMPR		HLA 1992 LF03/FT09 RI/FS	PNL 1995 OU3,4,5 RI	PNL 1995 OU3,4,5 RI	PNL 1995 OU3,4,5 RI	USAF 1995 SWMPR	USAF 1996 SWMPR	HLA 1992 LF03/FT09 RI/FS	PNI. 1995 OU3.4.5 RI		HLA 1992 LF03/FT09 RI/FS	PNL 1995 OU3,4,5 RI	UI A 1000 I E03/ET00 D1/EC	PNI 1995 DI13 4 5 RI		HLA 1992 LF03/FT09 RI/FS	PNL 1995 OU3,4,5 KI	HLA 1992 LF03/FT09 RI/FS	PNL 1995 OU3,4,5 RI	HLA 1992 LF03/FT09 RI/FS	PNL 1995 OU3,4,5 RI		PNL 1995 OU3,4,5 RI	DNI 1005 OLI3 4 5 RI	USAF 1996 SWMPR		HLA 1992 LF03/FT09 RI/FS	
Notes		a	63				9		9	63			a	a	8	8	a		e	1		a		đ	3		63		a		a				a.c		,	a
Analytical Methods	4	4	6,7	4	Ŧ	r ,	1'0	4	4	6,7		4	4	4	4	4,7	6,7	4	4		4	4	-	+ 4		4	4	4	4	4	4		4 -	* •	6.7		4 -	r
PCB	:	1	<1.0	:	I	1	0.17	1	1	<1.0		ı	ı	ł	ı	1	<1.0	;	;		:	;			l	;	;	1	:	,	1		1		0 17		ı	:
1,2- DCB	:	<1.0	<1.0	;	017	, ,	0.17	ı	<1.0	<1.0		ı	1	;	<1.0	<1.0	<1.0		<10		;	<1.0		: 17	0.17	;	<1.0	;	<1.0	;	<1.0		I	1 7	017		1	0.12
1,4- DCB	<1.00	<1.0	<1.0	<1.00	01/	, ,	0.12	<1.00	;	<1.0		<1.00	20	2.0	<1.0	<1.0	<1.0	<1.00	012		<1.00	<1.0	00	B)	2.17	<1.00	<1.0	<1.00	<1.0	001>	<1.0		1	0.1	017		00.1×	n.1^
1,3- DCB	:	<1.0	<1.0	;	077	7	0.12	1	<1.0	<1.0		ł	1	ı	<1.0	<1.0	<1.0	1	012		1	<1.0			0.17	:	<1.0	1	<1.0	:	<1.0		ı	1	012		1	0.12
PCE	:	<0.5	<1.0	1	201		D.12	I	<0.5	<1.0		:	<0.5	<0.5	<0.5	<1.0	<1.0	1	< 0 S	2	;	<0.5			2	ı	<0.5	ı	<0.5	1	<0.5		ı	ı ç			ļ	<u>.</u>
TCE	<0.600	<0.5	<1.0	009 U>	200	<u>, </u>	0.12	<0.600	<0.5	0.4		1.09	<1.0	1.1	0.82	<1.0	0.7	151		j	3.58	2.2	007.07	<0.00 .0.5 .0.7 .0.5 .0.0		<0.600	<0.5	1.80	1.4	<0.600	<0.5		0.607	0.828	to 7		<0.600	C.V>
1,1,1 TCA	1	1.5	<1.0	I	1		0.1>	I	0 1 0	<1.0		I	<0.5	<0.5	<1.0	<1.0	<1.0	۱	017	P.1.	1	<1.0		17	0.12	1	<1.0	1	<1.0	1	<1.0		1	1	0.1	2	1	0.1>
1,2- DCA	•	<0.5	<1.0	ł		3:	0.1>	;	< 0 S	<1.0		1	<0.5	<0.5	<0.5	<1.0	<1.0	;	201	2	:	<0.5		ļ	<u>.</u>	ı	<0.5	I	<0.5	1	<0.5		:	ļ			1	CU>
-I,I DCA	<0.400	<1.0	<1.0	-0 400		0.15	0.1>	<0.400	<10	<1.0		<0.400	<1.0	<1.0	<1.0	<1.0	<1.0	<0.400	001-0-	ı	<0.400	;		<0.400	1	<0.400	I	<0.400	;	0,400	P0+-0-		1	<0.400	0.1	0.17	<0.400	<1.0
Total 1,2- DCE	1	1	0.4		:	1	2.0	ı	;	10		1	2.9	4.1	<1.0	ı	3.0		I	:	1	:		:	ı	;	ı	1	1				0.490	:	1	0.0	1	;
t-1,2- DCE	:	<1.0	<1.0		1	<1.0	<1.0	;	017	0.12	0.12	1	<1.0	<1.0	<1.0	<1.0	<1.0		1	0.1>	ı	<1.0		;	ı	1	<1.0	;	<1.0		1017	2	I	ı i	0.15	P. 7	1	<1.0
c-1,2- DCE		1	0.4		ı	1	2.0	1			2	1	2.9	4.1	1	<5.0	3.0		1	:	:	;		:	:	;	:	1	I		1	I	1	1	1	0.0	ı	ł
Methylene Chloride	<1.40	<1.0	<1.0		0.81	<1.0	<1.0	<140			0.12	<1.40	<5.0	1	<1.0	<1.0	<1.0	01.14	21:40 21:0	0.1>	<1.40	<1.0		<1.40	;	<1.40	<1.0	<1.40	<1.0	4	04.1	0.17	ı	<1.40	<1.0	0.12	<1.40	<1.0
TCFM		1	<1.0		1	1	<1.0	ł	I	1 7	P. 7	;	;	ı	:	<1.0	<1.0		1	;	1	;		ł	:	;	;	;	ı		;	:	1	1	1	0.1>	I	:
Chloro- ethane		<1.0	<1.0		7.00	<1.0	1.0				P. 72	1	1	:	<1.0	012	<1.0		1	<1.0	I	<1.0		I	<1.0	1	<1.0	:	<1.0		17	P. 7	I	:	<1.0	0.1>	;	<1.0
Vinyl	<0.200	<0.5	<1.0		<0.200	<0.5	<1.0	0000	2 07		0.12	0.569	<2.0	0.0	0 54	<10	<1.0		007'0>	<0.5	<0.700	<0.5 20.5		<0.200	<0.5	<0.200	<0.5	<0.200	<0.5		<0.200	C.0>	0.953	0.571	<0.5	6.1>	<0.200	<0.5
Chloro-	<0.400	<1.0	0.1>		<0.400	<1.0	<1.0	007.07		0.12	0.12	<0.400	:	;	<10	012	<1.0		<0.400	<1.0	<0.400	<1.0		<0.400	:	<0.400	<1.0	<0.400	<1.0		<0.400	0.1>	1	0.407	<1.0	<1.0	<0.400	<1.0
DCDEM	<0.600	012	<1.0		<0.600	<1.0	<1.0		4.71	41.0	1.0	<0.600	I	;	012	017	<1.0		<0.600	<1.0	0.600	<1.0		<0.600	•	<0.600	<1.0	<0.600	<1.0		<0.600	0.1>	;	<0.600	<1.0	1.0	3.38	<1.0
2-		1	: 1		I	1	ı		1	1	1	ı	1	1		1 1	? :		;	•		. 1		1	ł	:	;	1	1		;	I	;	:	:	:	;	ı
4-Methyl-		1			•	:	1		:	ł	I	:	1		ł	1 7	1		ı	ł		: 1		ł	;	1	I	ł	:		1	1	;	;	1	ı	:	I
2-	Esutanone	1			1	;	1		ł	۱	;	;	1		1	1	<u></u> , 1		;	:				1	ı	1	;	;			:	ı	I	1	1	;	ı	1
	Acetone				ł	1	;		:	•	:	1		1	•	1 5	2		:	:			ł	;	ł		1				:	ı	1	;	;	1	:	:
Date	Sampled	0/0/0	8/13/96		1989	8/9/94	8/13/96		1989	8/9/94	8/1/96	1080	C0/9	74/0	76/17/8	8/10/94	26/4/01 8/7/96	5	1989	8/9/94	0001	1989 8/0/04		6861	8/9/94	1000	8/9/94	0001	8/9/94		1989	8/12/94	1988	6861	8/11/94	96/L/8	1989	8/12/94
Weil	No.		01M50		03M11	03M11	03M11		03M12	03M12	03M12	021412		C1141C0	CIMC0	CIM50	51M50		03M14	03M14		03MI5	CIMICO	03M16	03M16	11110	03M17	017400	03M18		10M00	10W60	09M02	09M02	09M02	09M02	00M03	09M03

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

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								TABL	E LF03/F	T09-2 (con	ntinued)									
Well No. 5 b.	Date 2- Sampled Acetone Butanc Chloromethane and vinyl ch Other compounds detected: i	4-Mel one 2-penta iloride data re isopropylbenz	thyl- 2- unone Hexam ported are EPA xere between 0	one DCDFM Method 8010 .4 mg/L to 0.8	Chloro- I methane results. Both mg/L.	Vinyl Ch Chloride ett compounds w	lloro- hane TCFM ere reported at	Methylene Chloride t <5 µg/L using	c-1,2- t- DCE Di g EPA Metho	1,2- Total 1, CE DCE d 8260.	1.1- 1,1-	1,2- 1,1 DCA TC	, I- X TCE	L,1 PCE DC	- 1,4- B DCB	1,2- DCB PC	Analytic B Method	tal Is Notes	Reference	
d. Analytical Me 1. 2.	 Other compounds detected: ethods: 8020. ADEC 8015M. 	Chlorobenzei 3. ADE 4. 8010	ie - 2.0 mg/L, :C 8100M.	sopropylbenze 5. 8270. 6. 8080.	cne - 1.0 mg/L	, n-propylbenz 7. 8260. 8. 8240.	zene - 0.6 mg/l 9. AK 10. AK	, 1,3,5-trimeth 101. 102.	hylbenzene - (6.0 mg/L, tert-I	Butylbenzene	2.0 mg/L, 1,	2,4-trimethyl	benzene - 18.	0 mg/L and p	-isopropyltolı	iene - 8.0 mg/L	1		
DCDFM TCFM DCE DCA TCA TCC PCE PCE PCB	Dichlorodifluoromethane. Trichlorochtueromethane. Dichloroechtane. Trichloroechtane. Trichloroechtane. Perchloroechtene. Perchloroethene. Perchloroethene. Perchloroethene.	ethene).																		
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TABLE LF03/FT09-3CONCENTRATIONS (µg/L) OF SEMIVOLATILE ORGANICCOMPOUNDS IN GROUNDWATER SAMPLES, LF03/FT09, EIELSON AFB, ALASKA

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Notes Reference	HI A 1997 I F03/FT09 D1/FC	PNI 1005 OF 12 4 5 DI	IISAF 1905 SULVED	a,e,f USAF 1996 SWMPR	HI A 1997 I F03/FT09 PI/FS	PNL 1995 OU3,4,5 RI	HI & 1007 I EN3/ET/00 DI/ES	PNL 1995 OU3,4,5 RI	HI A 1903 I E03 ÆT00 BIÆS	a,f USAF 1996 SWMPR	HI A 1907 I E03/ET100 D1/EC	PNI 1005 OI 13 A 5 DI	a,f USAF 1996 SWMPR	HI & 1907 I E03 ÆTAG DIÆS	DNI 1005 OT 12 4 5 DT	a USAF 1996 SWMPR	HI A 1003 I E03 APTON BIANS	PNI, 1995 OF13 4 5 R1	a USAF 1996 SWMPR	HLA 1992 LF03/FT09 RI/FS	PNL 1995 OU3.4.5 RI	a.b.c USAF 1995 SWMPR	a,c,d USAF 1996 SWMPR	HLA 1992 LF03/FT09 RI/FS
Analytical Methods	13	56	56	5-7,13	13	5,6	13	5,6	13	5-7,13	13	56	5-7,13	13	2 Y Y	5-7,13	13	5.6	5-7,13	13	5,6	5,6	5-7,13	13
bis (2-Ethylhexyl) phthalate		3.5	9.0	<10	I	<10	1	78	1	76	1	<10	<10	I	<10	6.0	1	<10	10	1	<200	<10	<10	1
Pentachloro- phenol	ł	<50	<50	<50	1	<50	1	<50	:	<10	:	<50	<50	1	<50	<50	:	<50	<50	ł	<1,000	20.0	<50	ł
Diethyl phthalate	1	<10	<10	<10	I	<10	1	<10	ł	<10	ł	<10	<10	;	<10	<10	1	<10	<10	1	<200	120.0	17.0	ł
Naph- thalene	3.61	<10	<10	1.5	<0.470	<10	<0.470	<10	<0.470	<1.0	<0.470	<10	<1.0	<0.470	<10	<1.0	<0.470	<10	<1.0	0.551	√200	15.0	22.0	<0.470
Benzoic Acid	ł	<50	4.0	5.0	ł	<50	1	<\$0	1	<50	1	<50	<50	ł	<50	<50	:	<50	<50	ł	<1,000	6,400	<50	ł
4-Methyl- phenol	1	<10	<10	<10	1	<10	1	<10	ł	<10	1	<10	<10	ł	<10	<10	ł	<10	<10	1	6,200	4,400	<10	I
Phenol	ł	<10	4.0	3.0	1	<10	ł	<10	1	<10	1	<10	<10	1	<10	<10	;	<10	<10	1	062	01>	<10	ł
Date Sampled	1989	8/5/94	9/27/95	8/1/96	1989	8/5/94	1989	8/5/94	1989	8/1/96	1989	8/8/94	8/14/96	1989	8/8/94	8/14/96	1989	8/8/94	8/14/96	1989	8/9/94	C6/4/01	8/1/8	1989
Well No.	03M01	03M01	03M01	03M01	03M02	03M02	03M03	03M03	03M04	03M04	03M05	03M05	03M05	03M06	03M06	03M06	03M07	03M07	03M07	03M08	801V10	031/108	03M08	03M09

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		TOD DIVES	5 RT	PR		T09 RI/FS	5 RI	PR	TAD DIRE		PR		T09 RLFS	5 RI	PR	PR			זע	T09 RI/FS	5 RI		109 KUFS	N	T09 RI/FS	i RI	nno D1/E c	i RI	T09 RL/FS
	Votes Reference	HI A 1007 1 EN3 /E	1/CO 17 7/CI VIII	a USAF 1996 SWM		HLA 1992 LF03/F	PNL 1995 OU3,4,	B USAF 1996 SWM	HT A 1007 1 E03/E	JICO IT TCCI UTI	a USAF 1996 SWM		HLA 1992 LF03/F	PNL 1995 OU3,4,5	a USAF 1995 SWM	a USAF 1996 SWM	LT A 1002 I EA3 /E-	DNT 1005 DNT 1005 DI 12	FINE 1993 UU3,4,2	HI A 1992 I F03/F	PNL 1995 OU3,4,5		HLA 1992 LFU3/F		HLA 1992 LF03/F	PNL 1995 OU3,4,5	HI A 1000 I E03.6"	PNL 1995 OU3,4,5	HLA 1992 LF03/F1
Analytical	Methods 1	13	5.6	5-7,13		13	5,6	5-7,13	13	56	5-7,13	5	13	5,6	5,6	5-7,13	13	5 Y Y	o, r	13	5,6	-	56	2	13	5,6	13	5,6	13
bis (2-Ethylhexyl)	phthalate	ł	<10	<10		:	<10	<10	ł	<10	<10		:	<10	10.0	<10	:	<10	017	:	<10		- 10 - 10	•	ł	<10	I	<10	ł
Pentachloro-	phenol	ł	<50	<50		ł	<u>\$0</u>	<50	:	<50	<50		1	00	<50	<50	1	<50)	ł	<50	1	<20) 1	ł	<50	:	<50	ł
Diethyl	phthalate	;	<10	<10		1	<10	<10	1	<10	<10		: ;	01v	<10	<10	ł	<10	2	ł	<10	ł	<10		;	<10	ł	<10	ł
Naph-	thalene	<0.470	<10	<1.0	027 07	×0.470	<10	<1.0	<0.470	<10	<1.0	027.02			0I>	<1.0	<0.470	<10		<0.470	<10	<0.470	<10		<0.470	<10	<0.470	<10	<0.470
Benzoic	Acid	;	<50	<50		1	000	002	I	<50	<50	1	031	00	00	3.0	ł	<50	1	1	<50	ł	<50		:	<50	I	<50	I
4-Methyl-	phenol	ł	<10	<10		1 -	012	~10	ł	<10	<10	I	017	01/1	~ 10	<10	ł	<10		:	<10	I	<10		ł	<10	ł	<10	ł
	Phenol	ł	<10	<10	ł		012	014	;	<10	<10	I	217		210	<10	ł	<10		1	<10	ł	<10		1	<10	ł	<10	ł
Date	Sampled	1989	8/9/94	8/13/96	1980	101010	96/2/2	04/01/0	1989	8/9/94	8/1/96	1989	8/10/01	10/1/05	04/4/01	8/1/96	1989	8/10/94		1989	8/10/94	1989	8/10/94		1989	8/10/94	1989	8/10/94	1989
Well	No.	03M10	03M10	03M10	03M11		111MICO	TTATCO	03M12	03M12	03M12	03M13	031413	CIMICO		03M13	03M14	03M14		03M15	03M15	03M16	03M16		03M17	03M17	03M18	03M18	10M60

TABLE LF03/FT09-3 (continued)

<u>،</u>

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- - 13 HLA 1992 LF03/FT09 RUFS 1.1 <0	1	<50 <10
 13 HLA 1992 LF03/FT09 RI/FS < -0 <50 <10 5,6 PNL 1995 OU3,4,5 RI re detected above reporting limits. lyzing the sample from 03M08, the semivolatile results may exhibit a negative bias. Heptachlor Epoxide - 0.19 µg/L, Acenaphthylene - 4.5 µg/L and Fluorene - 0.19 µg/L. Heptachlor Epoxide - 0.19 µg/L, Acenaphthylene - 4.5 µg/L and Fluorene - 0.19 µg/L. 8270. 7. 8260. 9. AK101. 11. EPA 7421. 13. EPA 8310. 8240. 10. AK102. 12. EPA 6020. 	0	<0.470 <50 <10 <50 <1.0
re detected above reporting limits. Jyzing the sample from 03M08, the semivolatile results may exhibit a negative bias. HC - 0.70 μg/L, Heptachlor Epoxide - 0.19 μg/L, Acenaphthylene - 4.5 μg/L and Fluorene - 0.19 μg/L. Li bias. 8270. 7. 8260. 9. AK101. 11. EPA 7421. 13. EPA 8310. 8080. 8. 8240. 10. AK102. 12. EPA 6020.	0	- <0.470 <50 1.3
8270. 7. 8260. 9. AK101. 11. EPA 7421. 13. EPA 8310. 8080. 8. 8240. 10. AK102. 12. EPA 6020.	ö ∵ p ci ⊢ č	er than those listec ha-BHC - 0.057 μ encountered when 3HC - 0.10 μg/L, be maphthylene - 1.1 xhibit a slight neg
	ý ý	0M. 6

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

8		MPR	IMPR	3,4,5 KI	/MPR	3,4,5 RI	3,4,5 RI	3,4,5 RI 3,4,5 RI	3,4,5 RI 3,4,5 RI	3,4,5 RI 3,4,5 RI	3,4,5 RI MPR	1,4,5 RI	1,4,5 RI	(,4,5 RI	(4,5 RI	1,4,5 RJ MPR	,4,5 RI	.4.5 RI	,4.5 RI	.4.5 RI	,4.5 RI	.4.5 RI	.4.5 RI	.4.5 RI
Referen		NL 1993 SWG	NL 1993 SW(NL 1995 UUS	SAF 1995 SV	NL 1995 OUs	4L 1995 OUs	4L 1995 OUs 4L 1995 OUs	VL 1995 OUS	4L 1995 OUS	4L 1995 OUS SAF 1995 SW	IL 1995 OUS	IL 1995 OUS	IL 1995 OUS	IL 1995 OUS	IL 1995 OUS SAF 1995 SW	IL 1995 OUs	IL 1995 OUs	IL 1995 OUsi	IL 1995 OUS	IL 1995 OUS	L 1995 OUs	LL 1995 OUs2	EsUO 2661 JI
Notes		E.	E a	2	5	Ы	ł	22	£ £	4	4 5	đ	ď	ď	Ł	4 S	A	Чd	A	Z	A	N	N	N
Zinc		€3.44	5.0	4.9	<6.0	4.1	5.9	- 8 .5	- 6.3	5.5	172 32.2	3.6	3.8	1.1	8.3	2.8 <6.0	3.4	<2.0	-2.0	5.5	<2.0	2.1	<2.0	2.8
Vanadium		<3.84	4.4	4.1	<4.0	1.5	1.6	<30 </th <th><30<1.0</th> <th><30</th> <th>4.7 <4.0</th> <th><1.0</th> <th><1.0</th> <th><1.0</th> <th>20.9</th> <th><1.0 <4.0</th> <th><1.0</th> <th><1.0</th> <th><1.0</th> <th>3.8</th> <th><1.0</th> <th><1.0</th> <th><1.0</th> <th><1.0</th>	<30<1.0	<30	4.7 <4.0	<1.0	<1.0	<1.0	20.9	<1.0 <4.0	<1.0	<1.0	<1.0	3.8	<1.0	<1.0	<1.0	<1.0
Thallium		ł.	Ļ	١.	:	:	I	11	1 1	: :	11	ı	ı	ł	ł,	11	ł	I,	I	ł	:	1	1	1
Sodium		63,000	70,000	006,00	86,500	7,710	3,650	6,000 5,330	5,400 4,550	6,100 3,580	98,800 72,400	6,570	7,740	16,700	4,730	8,320 8,270	8,140	5,630	3.820	3,900	6,910	3,770	15,100	4,610
Silver		4.3	<2.87	0.1>	1	<1.0	<1.0	<20 <1.0	<20 <1.0	2020	41.0	<1.0	<1.0	<1.0	<1.0	1.0 1.0	<1.0	<1.0	<1.0	<1.0	0.1>	o.1>	<1.0	0.1>
Selenium		ı	:	;	ı	•	:	: :	11	11	: :	ł	:	:	;	1 1	;	ı	ı	ı	1	1	ı	:
Potassium		17,000	17,000	12,000	20,300	4,200	2,710	3,600 3,750	3,500 3,870	2,400 2,660	48,500 50,200	5,600	5,200	7,770	4,330	4,430 20,500	4,060	3,710	2,760	2,760	3,740	2,800	6.560	3,570
Nickel		<17.9	<17.9	5.0	0 .6≻	2.6	3.3	⊰30 1:9	30 1.0	<30 <1.0	30.6 16.9	3.8	2.9	4.8	9.3	1.9 12.2	2.5	3.2	2.0	2.4	2.9	5.2	4.1	3.4
Manganese		006	820	913	361	1,170	1,010	810 658	730 594	310 295	8,290 6,020	3,410	2,790	4,680	1,890	1,440 1.070	2,920	1,280	1,630	2,800	2,210	2,040	2,470	2,200
Magnesium		78,000	83,000	49,900	006'61	15,400	10,400	13,000 11,500	12,000 10,900	8.700 8,200	52,700 48,100	12,900	13,600	19,000	10,400	18,800 21,700	14,500	13,200	10,400	11,300	13,400	11.500	22,400	11,000
Lead		<1.0	1	<1.0	1.2	<1.0	<1.0	- 1.3	÷	- ^{0.1} >	18.6 1.3	1.5	4.2	<1.0	10.6	<1.1 1.1	<1.0	1.2	<1.0	3.4	<1.0	<1.0	<1.0	2.2
lron		31,000	28,000	29,300	2,960	9.510	25,500	4 , 800 7,450	6,000 4,250	370 2,050	568,000 474,000	7,690	5,620	4,550	1.930	 8,070	ł	:	:	:	1	:	:	:
Copper		<2.65	-2.65	:<br 0	<4.0	<1.0	<1.0	<20 <1.0	<20 <1.0	<20 <1.0	172 <40	<1.0	<1.0	7.1	12	<1.0 <4.0	<1.0	1.7	11	4.8	<1.0	2.8	1.7	<1.0
Cobalt		<4.05	<4.05	<1.0	:	<1.0	<1.0	<20 <1.0	<1.0	<20 <1.0	2.1	1.4		2.6	18	Ξ:	<1.0	1.5	1.8	3.6	1.5	2.0	1.2	<1.0
Chromium		<5.42	<5.42	11.6	<5.0	<1.0	2.0	<20 <1.0	<1.0 <1.0	0.1≥	26 9.1	<1.0	<1.0	1.8	92	<0.0 6.0	<1.0	<1.0	<1.0	8.6	<1.0	<1.0	<1.0	<1.0
Calcium		120,000	110,000	92,600	46,500	57,500	46,000	51,000 42,600	50,000 42,600	40,000 35,200	638,000 456,000	55,200	68,800	85,100	46,000	69,300 67,000	66,700	67.500	51,400	56,100	63,100	53,400	76,600	55,400
Cadmium		<4.70	<4.70	≤1.0	;	<1.0	<1.0	<pre><10</pre> <pre></pre>	<10 <1.0	<10 <1.0	-1.0 	<1.0	<1.0	<1.0	3.8	<pre><1.0</pre>	<1.0	<1.0	<1.0	2.9	<1.0	<1.0	<1.0	<1.0
Beryllium		<0.814	0.82	20	ł	2 .0	<2.0	€.0 ≤1.0	<3.0 <1.0	<3.0 <1.0	- 2.0	<1.0	<1.0	<2.0	1.6	 - 	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0
Barium		860	1,100	772	396	251	143	180 179	150 132	120 128	406 309	188	145	318	182	166 157	178	106	89.5	132	180	156	347	140
Arsenic		3.0	2.3	10.5	4.9	25.3	5.3	- 22.3	 14.3	- 45	3.5 5.7	25.2	24.3	16	362	6.7 13.3	18.6	4.5	5.3	69.1	17.6	<3.0	5.3	14.9
Antimony		<69.4	<69.4	<1.0	1	<1.0	<1.0	<200 <1.0	<200 <1.0	<200 <1.0	1.6 	<1.0	<1.0	<1.0	4.8	<1.0	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	<1.0	<1.0
Aluminum		<32.5	250	39.9	148	18.6	41.6		- 12.5	1 9	211 458	10.3	15.6	11.2	404	32.8 87.3	56	₿	ŝ	31	37.5	40.2	ŝ	51.3
Date Sampled	a	6/93	8/93	8/5/94	10/6/95	8/5/94	8/5/94	6/12/92 8/8/94	6/12/92 8/8/94	6/12/92 8/8/94	8/9/94 10/4/95	8/9/94	8/9/94	8/9/94	8/9/94	8/10/94 10/4/95	8/10/94	8/10/94	8/10/94	8/10/94	8/10/94	8/12/94	8/11/94	8/12/94
D'u	OLVEL	l I	ſ	J	f	ł	J f	ت	بت بت ا		ц ц	f	J	J	J.	نب نب مە :-	y.	ъ.	J.	J	J.	J.	L	ي.
Wel No.	DISSI	03M01	03M01	03M01	03M01	03M02	03M03	03M05 03M05	03M06 03M06	03M07 03M07	03M08 03M08	03M09	03M10	03M11	03M12	03M13 03M13	03M14	03M15	03M16	03M17	03M18	10M60	09M02	09M03

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TABLE LF03/FT09-4 (continued)

Reference	PNL 1994 SWMP PNL 1994 SWMP PNL 1994 SWMP	PNL 1995 OU&3,4,5 R PNL 1995 OU&3,4,5 R PNL 1993 SWGMPR PNL 1995 OU&3,4,5 R1 PNL 1995 OU&3,4,5 R1 USAF 1995 SWMPR USAF 1996 SWMPR	PNL 1995 OUs3,4,5 RJ PNL 1995 OUs3,4,5 RJ	USAF 1996 SWMPR	PNL 1995 OU53,4,5 RJ USAF 1996 SWMPR	PNL 1995 OU\$3,4,5 RI USAF 1996 SWMPR	PNL 1995 OU53,4,5 RJ USAF 1996 SWMPR	PNL 1995 OUs3.4.5 RI USAF 1995 SWMPR USAF 1996 SWMPR	PNL 1995 OUs3,4.5 RI	PNL 1995 OUs3,4.5 RI USAF 1996 SWMPR	PNL 1995 OUs3,4,5 RJ USAF 1996 SWMPR	PNL 1995 OUs3.4.5 RI USAF 1996 SWMPR	PNL 1995 OUs3,4,5 RI USAF 1995 SWMPR USAF 1996 SWMPR	PNL 1995 OUs3.4.5 RI
Zinc Notes	5.6 19 10	18,400 110 44 170 390 <6.0	1,030 63.6	<12.0	98.8 15.1	43.1 <12.0	29.8 <12.0	249 250 168	17.7	20 <12.0	49.6 <12.0	131 <12.0	20.4 11.4 <12.0	28.3
Vanadium	<1.01.01.0	2,430 <30 <3.84 14 27.2 <4.0 <8.0	33.9 20.2	<8.0	18.1 ≪8.0	10.6 <8.0	<1.0 <8.0	4.9 <4.0 <8.0	3.4	2.1 <8.0	12. 8 <8.0	43 <8.0	1.4 <4.0 ≪8.0	5.4
hallium		1 1 1 1 1 1 0		<1.0	<	- 1.0	- 1.0	· · · ⊳	ı	- 1.0	- ¹ .0	- 1.0	1 1 1	ı
Sodium	4,563 6,500 5,340	- 72,000 61,000 68,000 83,100 63,600	10,900 6,360	6,750	10,100 7,100	8,380 4,900	6,650 4,370	91,500 80,600 66,300	9,860	11.000 8,690	17,000 13,800	10,100 5,710	10,400 7.570 8.290	10.300
Silver	0.1> 0.1> 0.1>	- <20 4.3 <1.0 4.0	<1.0	<4.0	1.0 <4.0	1.0 <4.0	1.0 <4.0	1.0 4.0	1.0	1.0 <4.0	1.0 <4.0	1.0 <4.0	<pre><1.0 </pre>	<1.0
Selenium		1 1 1 1 1 1 2		2.0	- 6		- ~23	1 I SI	ı	- 42	- 52	- 20	2.0	1
otassium	3,400 4,500 3,800		5,060 2,770	4,870	5,390 4,300	4,160 3,460	2,500 2,480	46,600 57,000 33,800	5,860	5,440 6,110	9,020 8,120	6,520 4,340	5,100 23,400 4,340	4,970
Nickel P	2.3 5.0 3.2	18,400 <30 <17.9 20 23.5 <9.0 <15.0	41.2 19.5	<15.0	28.1 <15.0	14.6 <15.0	4.3 <15.0	27.2 15.9 <15.0	10	7.7 <15.0	18 <15.0	53.2 <15.0	4.9 9.7 <15.0	8.2
Manganese	1,789 4,100 2,720	16,900 920 900 890 1,070 382 382	1,510 1,210	2.520	962 925	735 641	332 336	7,420 7,080 5,460	3,810	3,2 80 3,040	4,760 4,300	2.480 2.280	1.500 840 1.270	3,030
lagnesium	10,450 12,000 11,400		23,800 14,500	13,200	16,100 14,700	12,600 11,400	7,820 8,560	49,900 55,800 48,600	12,600	13,400 14,900	18,200 17,500	18.000 11.600	18,600 23,600 15,600	14.900
Lead M	<1.0 <1.0 <1.0	1,130 - 2.0 35.7 1.4	61.9 16.2	<1.0	19 5.9	14.6 2.5	1.4 <1.0	11 23.8 4.2	1.9	1.5 11.8	10.2 <1.0	40.5 <1.0	1.3 1.5 1.0	5.6
Iron	1,736 9,900 3,980	.,180,000 32,000 38,000 50,600 44,000 41,960 18,700	29,300 9,510	9,930	25,500 17,800	14,500 8,300	2,830 2,830	545,000 543,000 492,000	15,400	10,400 8,460	20,600 14,400	30,800 4,950	 9.650 11,500	1
Copper	2.4 4.0 3.1	5,440 <20 <2.65 9.7 34 <6.0	89.6 56.2	<6.0	64.2 8.7	50.4 <6.0	6.11 ≪6.0	20.2 <40.0 <300	15.3	14.6 <6.0	39.5 <6.0	136 <6.0	5.7 <4.0 <6.0	24.5
Cobalt	1.3 3.0 <3.0	- ~ ~20 <20 <4.05 6.7 6.7	15.6 6.5	<11.0	9.8 <11.0	3.3 <11.0	<1.0 <11.0	2.3 - <11.0	3.3	1.1 <11.0	7.8 <11.0	22.8 <11.0	1.6 <	2.3
Chromium	0.1> 0.1>	1,890 <20 <5.42 9.2 16.2 <6.0	28.7 14.1	<6.0	16.5 <6.0	9.1 <6.0	1.5 ≪6.0	20.7 9.1 <6.0	2.2	2.1 ≪6.0	5.9 <6.0	24.2 <6.0	1.2 <5.0 6.0	2.9
Calcium	51,750 61,000 57,600	 120,000 120,000 120,000 48,500 82,400	72,000 53,200	56,300	53,100 52,700	47,600 45,000	35,900 39,500	584,000 538,000 514,000	56,800	70,300 83,800	74.400 73,000	55,100 50,400	68.100 72.800 57,200	66,200
Cadmium	<l< td=""><td> < 0 <4.70 <4.70 <1.0</td><td>11.7 <1.0</td><td><1.0</td><td>0.1></td><td><1.0 <1.0</td><td><1.0 <1.0</td><td>1.9 0.1></td><td><1.0</td><td><1.0 <1.0</td><td><1.0 <1.0</td><td>1.1 <1.0</td><td><pre><1.0</pre></td><td><1.0</td></l<>	< 0 <4.70 <4.70 <1.0	11.7 <1.0	<1.0	0.1>	<1.0 <1.0	<1.0 <1.0	1.9 0.1>	<1.0	<1.0 <1.0	<1.0 <1.0	1.1 <1.0	<pre><1.0</pre>	<1.0
Beryllium	<1.0<1.0<1.0<1.0		2.0	0.1>	<1.0 <1.0	0.1> 0.1>	<pre><1.0</pre> <pre></pre>	<l< td=""><td>o.1></td><td><1.0</td><td><1.0 <1.0</td><td>0.1> 0.1></td><td><!--:<br--></td><td><1.0</td></l<>	o.1>	<1.0	<1.0 <1.0	0.1> 0.1>	:<br	<1.0
Barium	101 160 129	15,300 1,100 970 1,200 1,070 424 672	503 249	186	311 246	192 133	131 129	375 371 388	208	169 158	400 310	340 161	189 163 153	218
Arsenic	8.3 23 14.5	64.6 	80.6 12	26.9	45.4 33.3	22.1 12.7	5.1 3.9	5.4 <5.0 2.3	45	34.6 19	46.7 36.9	70.5 9.6	11 13.2 9.4	28.2
Antimony	111		<1.0 <1.0	2.0	1.0 <2.0	1.0 42.0	1.0 <2.0	1.5 - 2.5	1.0	1.0 2.0	1.0 -2.0	1.8 2.0	- 2.0	<1.0
Aluminum	s 43 140 74	 5,800 7,380 1,080	9,440 4.960	<25.0	4,900 2,450	2,490 488	120 <25.0	333 748 <25.0	173	136 <25.0	2,120 <25.0	11,000 <25.0	376 86.5 <25	2,140
Date Sampled	ncentration 9/94 9/94	1988 8/21/92 6/93 8/93 8/5/94 10/6/95 8/7/96	8/5/94 8/5/94	8/7/96	8/8/94 8/14/96	8/8/94 8/14/96	8/8/94 8/14/96	8/9/94 10/4/95 8/7/96	8/9/94	8/9/94 8/13/96	8/9/94 8/13/96	8/9/94 8/7/96	8/10/94 10/4/95 8/7/96	8/10/94
l B/u	round Co f L f		а э -	3	а п				7			3 3		3
No.	Backe BGM BGMX BGMX	TOT. 03M01 03M01 03M01 03M01 03M01 03M01 03M01	03M02 03M03	03M04	03M05 03M05	03M06 03M06	03M07 03M07	03M08 03M08 03M08	03M09	03M10 03M10	03M11 03M11	03M12 03M12	03M13 03M13 03M13	03M14

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TABLE LF03/FT09-4 (continued)

Well No.	Da f/u Samp	ıte pled Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium (hromium	Cobalt C	opper	Iron	Lead Mag	gnesium M	anganese	lickel Pc	tassium	elenium	Silver	odium 7	allium V	anadium	Zinc N	otes Ref	erence
03M15	u 8/10	V94 20,700	<1.0	16.4	323	<1.0	1.1	74,700	22.3	8	98.6	1	21.8 21	1,900	3,490	40	6,270	:	<1.0	9,310	I	30.3	71.4	5661 JNd	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 15	9,900	3,380	32.5	5,900	1	<1.0	7,360	1	28.9	92.2	5661 JNA	OUs3,4,5 RI
03M17	u 8/10,	v94 7,710	<1.0	11.4	269	<1.0	<1.0	57,500	10.1	6.4	48.3	1	14.3 14	4,200	3,260	15.4	4,470	1	<1.0	6,670	1	14.9	50.8	5661 JNA	OUs3,4,5 RI
03M18	u 8/10,	v94 37 , 800	<1.0	38	632	<1.0	2.5	91,100	31.8	26	252	1	50.5 31	1,500	2,980	56.5	8,510	1	1.4	2,800	;	49.4	126	5661 JNA	0Us3,4,5 RI
10W60	u 8/12/	194 895	<1.0	5.5	208	<1.0	<1.0	50,800	2.3	3.6	18.6	1	2.4 11	1,200	2,860	8.8	3,330	:	<1.0	5,790	1	3.7	26.1	5661 JNd	OUs3,4,5 RI
09M02 09M02	u 8/11. u 8/7/	/94 2,410 96 <25.0	<1.0 <2.0	25.3 17.2	473 360	<1.0 <1.0	2.0 <1.0	72,600 59,700	4.7 <6.0	3.2	27.4 <6.0 1		8.8 22 ≤1.0 19	2,000 9,300	2,580 1,900	14.3	7,150 6,050	- 5.0	<0.15	6,800 2,100	- 1.0	7.9 ≪8.0	37 <12.0	PNL 1995 (USAF 1996	OUs3,4,5 RI SWMPR
60M03	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	0.1>	7,180	ł	7.7	32.7	5661 JNA	JUs3,4,5 RI
Backgroun	d Concent	trations	:	:	1				ş		-	000	;	360	3 E 0 c	;			- - -	536		5	5	5 1001 ING	diverse
BGM BGMY	6/6 n	34 7,538 v4 18.000	<1.0 2 0 C	5 5	269 470	0.1>0.1>	0.1>	58,625 66.000	50 46	5/.51 31	c 140 140	3.000 3.000	48 26	د/ د. / 000,9	6,500	16	000'2					2 2	120	PNL 1994 S	SWMP
BGUCL	6/6 n	11,500	2.0 2.0	37	342	<1.0	<1.0	64,900	30.4	20.8	105 22	3,800	32.6 20	,800	4,980	48.8	6,500	:	<1.0	,260	,	36	88.8	PNL 1994 S	SWMP
Notes:																									
:	Analys	sis not performed	1 in sample.																						
f.	Field t	filtered.																							
'n.	Total ((unfiltered).																							
BGM	Mean	concentration of	samples colle	cted from	backgrot	und wells in	1994.																		
BGMX BGUCL	Maxin 95% (num concentratio Upper confidence	on of samples timits of sar	collected	from back	cground wel 1 backgroun	ls in 1994. d wells in 19	94.																	

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TABLE LF03/FT09-5 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, LF03/FT09, EIELSON AFB, ALASKA 2

					Parameters				Immun	oassav Res	ults		
		Dissolved	Dissolved										
	Date	Oxygen	Oxygen (%	Temperature	Turbidity	Conductivity			Total BTEX ¹	TCE ²	PCE ²		
Well No.	Sampled	(mg/L)	saturation)	(C)	(UTN)	(mmhos/cm)	Hd	eH (mv)	(ppb)	(dqq)	(ddd)	Notes	Reference
03M01	09/21/95	1.1	ł	10	1	500	7.25	1	I	1			
03M01	08/07/96	0.65	1	6.3	S	763	999	-85	. I	1			TIE 1 TO CONTRACT TO CONTRACT
03M01	08/21/97	17	13.8	60	361	001		ç,	ł	1	ł		USAF 1996 SWMPR
			0.01	0.0	100	87/	61.1	51-	ł	1	I		USAF 1997 SWMPR
03M04	08/01/96	2.9	1	6.3	Ŷ	350	7.56	1	1	1	1		119.45 1006 SMM
03M04	08/21/97	0.62	4.8	4.2	12	446	7.81	-59	ł	I	1		USAF 1997 SWMPR
03M05	08/08/06	at 0			-								
SOLICO	06/00/00	01.0	1	+ .+	1	333	6.78	φ	ł	I	1		USAF 1996 SWMPR
CUMICU	08/14/90	0.13	1	4.0	~	328	6.84	11	ł	ł	ı		USAF 1996 SWMPR
03M06	08/08/96	0.18	1	4	0	280	6 88	74	1				
03Mf06	00/1/1/00	-						5	1	ł	1		USAF 1996 SWMPR
DOTATCO	06/141 /00	1.0	1	4.2	0	280	7.01	16	I	ı	I		USAF 1996 SWMPR
03M07	08/08/96	0.25	I	3.5	0	224	6.96	48	1	;	I		IISAF 1006 SWMADD
03M07	08/14/96	0.08	I	3.1	0	224	7.14	-34	ł	I	1		USAF 1996 SWMPR
03M08	10/04/95	1.4	ł	8	1	2700	6.48	1	ł	ł	t		USAF 1995 SWMPR
80M60	96//0/80	0.6	ł	7.9	6	3080	6.27	4 8	ı	1	1		IISAF 1996 SWMPP
03M08	08/22/97	1.6	14	9.1	Π	3220	6.83	-58	ł	I	ł		USAF 1997 SWMPR
03M09	09/08/97	0.74	6.0	5.3	0	417	8.0	4	ł	ı	ı		USAF 1997 SWMPR
03M10	08/08/96	0.79	I	5.2	6	467	6.67	121	I	I	1		
03M10	08/13/96	3.72	1	9.2	303	437	6.83	1	1	1	1		
03M10	08/21/97	1.32	111	11	00	, C.3	22.5	16		l	ł		NAMPK 1990 SWMPK
			7 • 7 •	1.1	67	770	701	f	ł	ı	I		USAF 1997 SWMPR
03M11	08/08/96	0.64	ı	8	9	485	ę	L-	I	I	;		
03M11	08/13/96	2.16	1	07	47	446	, o y		1	ł	I		USAL 1990 SWMFK
03M11	08/01/07	0.66	2		F	044	70.0	1	1	I	1		USAF 1996 SWMPR
	111700	00'0	<i>v.</i> 7	C.Y	1	800	7.54	4	1	1	1		USAF 1997 SWMPR

TABLE LF03/FT09-5 (continued)

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			Reference	USAF 1996 SWMPR	USAF 1997 SWMPR		NAM CVAL TACU	USAF 1996 SWMPR	USAF 1997 SWMPR		TISAE 1007 SWIND	USAL 1991 SWINER	USAF 1995 SWMPR	USAF 1995 SWMPR	USAF 1995 SWMPR	USAF 1995 SWMPR	
			Notes														
sults		PCE ²	(ddd)	:	I	l	1	ł	1	ł	1	l	I	1	I	ł	
oassay Res		TCE ²	(ddd)	1	I	ł	I	ł	I	1	1		1	1	I	ł	
Immuno		Total BTEX ¹	(ddd)	1	1	1	ł	1	1	ı	I		I	1	1	ţ	
			eH (mv)	ł	-86	I		1	28	ł	17	i	I	ł	I	ł	
			Hq	7.49	8.56	7.26	8 9	0.0	6.54	6.61	6.63		7.13	9.11	6.84	6.76	
		Conductivity	(mmhos/cm)	321	416	370	373		412	417	470		330	330	800	220	
Parameters		Turbidity	(UTU)	150	6	ł	Š	, ·	Ŷ	100	\$		1	1	I	ı	
		Temperature	(j)	8.6	7.0	7.0	4.0		3.9	8.0	6.4		6.0	6	7	8	
	Dissolved	Oxygen (%	saturation)	1	11.1	1	1		14.4	1	-2.1		1	ł	I	I	
	Dissolved	Oxygen	(mg/L)	50.21	1.3	2.7	1.12	1 01	1.87	2.78	-0.27		1.8	2.3	7	1.6	
		Date	Sampled	06//0/90	08/21/97	10/04/95	08/01/96	20/01/00	16/61/90	08/01/96	08/19/97		10/12/95	10/12/95	10/10/95	10/10/95	
			Well No.	211/100	03M12	03M13	03M13	031/112	CIMCO	09M02	09M02		EAMW01	EAMW02	EAMW03	EAMW04	Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit. ² Drager Liquid Extraction (DLE) field test kit.

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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.

MCL (cont.)

сос	ARAR (Groundwater) - Drinking water MCL	COC (cont.)	ARAR (Groundwater) Drinking water MCL (co
Volatile Or	ganic Compounds	Trichloroethene	5 μg/L
Benzene	5 μg/L	Tetrachloroethylene	5 μg/L
Toluene	1,000 μg/L	Vinyl Chloride	2 μg/L
Ethylbenzene	700 µg/L	Semivolatile	e Organic Compounds
Xylenes	10,000 µg/L	DDT	
1,4-Dichlorobenzene	75 μg/L	Chlordane	2 μg/L
1,2-Dichloroethane	5 μg/L	Inorga	nic Compounds
cis-1,2-Dichloroethene	70 μg/L	'Lead	15 μg/L
trans-1,2- Dichloroethene	100 µg/L	² Silver	100 μg/L

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 (μ g/L) to 1,300 μ g/L in all of the samples (Table LF04-1). The

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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 μ g/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 μ g/L (Table LF04-1). The compound 3,4-methylphenol was detected in all samples at estimated concentrations of 1 μ g/L to 42 μ g/L. 2-methylphenol was also detected in the sample from 04M07 at 10 μ g/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 μ g/L, which is below the OU 3,4,5 ARAR MCL of 1,000 μ g/L. Other BTEX compounds were detected in low concentrations (below ARAR MCLs), or were below detection limits. Total arsenic concentrations ranged from 52.9 μ g/L (04M04) to 126 μ g/L (04M02), which is above the drinking water MCL of 50 μ g/L and the background 95% UCL of 37 μ g/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 μ g/L to 280 μ g/L. 2-methylphenol was detected in 04M07 at 7.0 μ g/L. Concentrations of benzoic acid, ranging from 11 μ g/L to 36 μ g/L, were detected in 04M01, 04M03, 04M04, and 04M07. Phenol was detected in 04M03 and 04M04 in concentrations of 2 μ g/L and 40 μ g/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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

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

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	Samples, LF04, Old Army Landfill and EOD Area, Eielson AFB, Alaska,
Table LF04-2	Concentrations (μ g/L) of Metals in Groundwater Samples, LF04, Old
	Army Landfill and EOD Area, Eielson AFB, Alaska
Table LF04-3	Concentrations (μ g/L) of Semivolatile Organic Compounds in
	Groundwater Samples, LF04, Old Army Landfill and EOD Area, Eielson AFB, Alaska.
Table LF04-4	Groundwater Parameter and Immunoassay Field Test Results, LF04, Old Army Landfill and EOD Area, Eielson AFB, Alaska.



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

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Reference	USAF 1996 SWMPR	PNL 1994 SWGMPR USAF 1996 SWMPR	PNL 1994 SWGMPR USAF 1996 SWMPR	PNL 1994 SWGMPR USAF 1996 SWMPR		PNL 1994 SWGMPR USAF 1996 SWMPR	
Notes	ದ	6 3 63	অ অ	ದ ವ		ದ ದ	
Analytical Methods	9	1,4,9,10 6	1,4,9,10 6	1,4,9,10 6		1,4,9,10 6	
TPH DRO	;	380	550 	1,300			g limits.
TPH GRO	ł	<250 	<250	<250		1,900	e the reportin
on (µg/L) Xylenes	<1.0	<br 0</td <td><!--<br--><!--0</td--><td><pre>1> 0.1></pre></td><td>y well.</td><td><10 <1.0</td><td>scted above</td></td>	<br 0</td <td><pre>1> 0.1></pre></td> <td>y well.</td> <td><10 <1.0</td> <td>scted above</td>	<pre>1> 0.1></pre>	y well.	<10 <1.0	scted above
Concentrati Ethylbenzene	<1.0	</td <td><1.0 <1.0</td> <td><!--<br--><!--</td--><td>npled due to dr</td><td><10 <1.0</td><td>listed were dete</td></td>	<1.0 <1.0	<br </td <td>npled due to dr</td> <td><10 <1.0</td> <td>listed were dete</td>	npled due to dr	<10 <1.0	listed were dete
Toluene	<1.0	<pre></pre>	<pre><!----> <!-- </pre--></pre>	<1 0.5	Not sar	290 230	than those
Benzene	<1.0	<pre></pre>	<1><1.0	<pre></pre>		<10 <1.0	ounds other
Date Sampled	8/12/96	8/18/94 8/15/96	8/4/94 8/15/96	8/4/94 8/15/96	8/15/96	8/4/94 8/15/96	a. No compx
Well No.	04M01	04M02 04M02	04M03 04M03	04M04 04M04	04M05	04M07 04M07	Notes:

	11 8210	0100 111
	9 AK101	10. AK102
	7, 8260	8. 8240.
	5. 8270.	6. 8080.
	. ADEC 8100M.	. 8010.
	ε.	: 8015M. 4
Analytical Methods:	1. 8020.	2. ADEC

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	Ţ	ABLELF	04-2 CI	ONCE	NTRAT	d) SNOL	ig/L) OF	METAL	S IN GF	COUNE	WAT	ER SAN	APLES,	LF04, OI	LD AR	MYLA	NDFIL	L AND	EOD A	REA, I	EIELSO	N AFB	, ALAS	KA.	
Well No. f/	Date 1 Sampled	Aluminum ,	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium Cl	nomium C	obalt Cc	pper	on Le	ad Magnes	sium Manga	nese Nic	kel Potas	sium Sele	nium Sil	/er Sodi	um Thal	ium Vana	dium Zi	nc Notes	Reference	
ATOSSID	g																								
04M02 f	6/12/92	1	<200	:	350	<3.0	0 1>	140,000	<20	• 20	20 68	- 000	. 84,00	00 1,80	ð 4	0,9,0	8	v ,	50,0	; 8	₩.	⊽ 9	0	PNL 1995 OU3,4,5 RJ	
Background.	Concentratic	502		:	ł	•	e T	19219	5	~	1	136 <1	0 10.4	50 1.78	5 6	3.4	8	⊽	.0 4,5	53	⊽	.0 .5	9	PNL 1994 SWMP	
BGM f	9/94	43	;		101	0.12	0.12	00/15	0.12	1 2	+ 0 +	י 1> 006	.0 12,00	00 4,10	0	0 4.5	8	⊽	.0 6,5	- 00		0	6	PNL 1994 SWMP	
BGMX I BGUCL f	9/94	140 74		14.5	129	<1.0	<1.0	57,600	<1.0	3.0	3.1 3,	980 <1	.0 11,40	00 2,72	ю 1	2 3,8	8	⊽	.0 5,3	- 9	<u> </u>	0	0	PNL 1994 SWMP	
TOTAL																									
04M01 u	8/12/96	<25.0	5.1	163	201	<1.0	<1.0	263,000	21.3	11.0	6.0 38	,600 <1	.0 292.0	923		5.0 12,	00	0. ≜>	.0 290,	l> 000	.0 53	.17	ŝ	USAF 1996 SWMPR	
									305		24.	1000		8.80	35	•		•	•	•	•	- 78	68	PNL 1995 OU3,4,5 RI	
04M02 u	1988	ı	;	107	2,540	1	1		0 00	1 6	101 101	2 0000	110.0	00 4.40	00	0 14.0	00	v	0 58,(- 00	. 15	0 24	9	PNL 1995 OU3,4,5 RI	
04M02 u	6/12/92	:	~ <u>~</u> 00	120	1,400	0.0	010	240,000	16	0,1	101 DS1 DS1	- 000 c		5.50	00	30 16,0	0	v	0 67,0	- 00	•	- 51	10	PNL 1995 OU3,4.5 RI	
04M02 L	8/24/92	:	98 7 8	:	7 200	8.4 8.0	01> <10	250,000	280	140	310 310	- 000,0	- 170,0	00 5,90	90 36	60 19,0	00	V I	0 54,(- 00	. 48	9 9	01	PNL 1995 OU3,4.5 RI	
04M02 L	e 4/13/95	- 1	017	182	00217	. 0.0 20	<1.0	230.000	14	29	9.5 14	0,000 2	8 100,0	00 4,60	00 7	0 8,5	8	⊽.	.0 65,(- 00	9	1 3	0	PNL 1994 SWGMPR	
1 20M40	10/0/05	1,000	27	011	1.840	1	1	1	268	;	1	- 74	- 9	:	•	, ,		•	•		• •	• •		USAF 1995 SWMPK	
04M02 u	8/15/96	442	2.0	126	358	<1.0	<1.0	109,000	<6.0		:6.0 78	,400 1.	9 64,4	00 1,25	50 29	.2 8,0	02	ð. ≙	.0 38,0	⊽ 8	o. ⊗	0	6	USAF 1996 SWMFK	
		ſ	5	000	007	2	012	150.000	94	51	4.6 20	1.000.0	4 53,0	00 3,80	0 5	3 4,8	8	⊽	.0 22,0	- 00	-	2 3	4	PNL 1994 SWGMPR	
04M03 L	8/94	71	0.12	222	000	2.2			85	: 1	:		ب ۱	:	'	•		•	•	•	•	•		USAF 1995 SWMPR	
04M03 1	8/15/96		- 2.0	6 8	900 (81	<1.0	<1.0	106,000	6.0	35.2	\$6.0 12	2,000 3	.0 36,8	00 2,63	30 27	.8 6,4	30 <	2.0	.0 21,	00	8° 80	.0 29	.6	USAF 1996 SWMPR	
	5								:	5	:	000	0 10	JL 1 00	ş	3 46	8	⊽	0 24.0	- 00		с С	7	PNL 1994 SWGMPR	
04M04 L	1 8/94	370	<1.0	81	270	2.0	<1.0	180,000	<u> </u>	2	¥ =		<u> </u>	3	2	•••				•		•		USAF 1995 SWMPR	
04M04 1	1 10/9/95	1	•	44.7	280	1 -	1 -		0.0		80	1 006	6 73.0	00 2.17	70 25	9.4 4.2	20 <	2.0 <4	.0 21.	500 <1	8≎ 0:	.0 25	6.9	USAF 1996 SWMPR	
04M04 1	1 8/15/96	<25.0	0.2>	6.70	4 1 0	0.12	2.17	000'101	2								:					•	ç	DNIL 1005 OLI3 4 5 BT	
04M07	1 9/14/92	:	<200	1	380	<3.0	<10	89,000	30	<20	40 65	.000		1.5(88	0 0	8 8	v \ ,	14.1		· ·	。。 ,。		PNL 1995 OU3.4.5 RI	
04M07 L	1 4/13/93	:	<200	1	470	⊲3.0	<10	84,000	99	20	30	000	- 39.0	15,1 00	22		3 8	/	0 14			, 6 , 6		PNL 1994 SWGMPR	
04M07	1 8/94	6,200	<1.0	51	380	<2.0	<1.0	90,000	26	16	46 29 29	000'	0,96 0			t	v 90	00		10	· 8⊳ 0.	0 20		USAF 1996 SWMPR	
04M07	ı 8/15/96	56.2	<2.0	55.0	187	<1.0	<1.0	81,600	<6.0		0.05	1 006'0	C'67 N.	-0-1 -0-1	Ŷ		2	2							
Background	Concentrati	SUO				1			ç	92 0	ž	020	17.3	76 38	75	5.6	50	v	0.8	63 -	- 7	4	5	PNL 1994 SWMP	
BGM	1 9/94	7,538	<1.0	52	269	<1.0	0.15	CZ0,8C	Q ¥	21.51	140 140	000	8 26.0	00 6.5	2 8	5'1 1	8	•	3,6 0.1	. 00		2 13	20	PNL 1994 SWMP	
BGMX	ы 9/94 2014	18,000	2:0	63	420	0.12	0.12	00,000 64 900	30.4	20.8	107 107	3,800 3.	2.6 20,8	800 4.9	80 41	3.8 6.1	00	v 1	.0 9,2	- 09		6 85	8.8	PNL 1994 SWMP	
BGUCL	и 9/94	000011	0.72	ò	740	n. 1/	0.12																		
Notes: f	Field filte	her																							
: ;;	Total (uni	filtered).				:																			
BGM BGMX	Mean con Maximum	acentration of	samples col	lected froi s collected	m backgr d from ba	ound wells i ckground w	n 1994. ells in 199⁄																		
BGUCL	95% Upi	ber confidence	e limits of s	mples col	llected fro	m backgrou	nd wells in	1994.																	

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

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	•		Ŭ	oncentration (μg/L	· (*			
Vell No.	Date Sampled	Phenol	2-Methyl- phenol	3/4 Methyl- phenol (total)	Benzoic Acid	Analytical Methods	Notes	Reference
4M01	8/15/96	<10	<10	5.0	11	5, 6, 11	a,c	USAF 1996 SWMPR
4M02 4M02	8/18/94 8/15/96	<10 <10	<10 <10	1.0 10	1 \$	5, 6, 11 5, 6, 11	a,b a,c	PNL 1994 SWGMPR USAF 1996 SWMPR
4M03 4M03	8/4/94 8/15/96	<10 40	<10 <10	30 280	- 36	5, 6, 11 5, 6, 11	a,b a,c	PNL 1994 SWGMPR USAF 1996 SWMPR
4M04 4M04	8/4/94 8/15/96	<10 2.0	<10 <10	9.0 28	14	5, 6, 11 5, 6, 11	a,b a,c	PNL 1994 SWGMPR USAF 1996 SWMPR
4M05	8/12/96		Not sa	mpled due to dry	well.			
4M07 4M07	8/4/94 8/15/96	<10 <10	10 7.0	42 42	12	5, 6, 11 5, 6, 11	a,b a,c	PNL 1994 SWGMPR USAF 1996 SWMPR
t it	a. No comp . 8270 ana . Some sen	ounds other lysis was for nivolatile res	than those lis c phenols only sults may exhi	ted were detected ibit a slight negati	above the re ive bias.	porting limits.		
alytical] 1 2	Methods: 1. 8020. 2. ADEC 80	3 015M. 4). ADEC 810 . 8010.	MOM.	5. 8270. 5. 8080.	7. 8260. 8. 8240.	9. AK 10. AK	101. 11. 8310 102.

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

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					Parameters				Immin	Dassav Re	sulte		
	Date	Dissolved Oxygen	Dissolved Oxygen (%	Temperature	Turbidity	Conductivity			Total	TCE ²			
Well No.	Sampled	(mg/L)	saturation)	(°C)	(NTU)	(mmhos/cm)	Hq	eH (mv)	BTEX ¹ (ppb)	(ddd)	PCE ² (ppb)	Notes	Reference
04M01	8/12/96	2.34	I	4.8	10	260	6.96	Ŷ	8	ł	ł		USAF 1996 SWMPR
04M02	8/12/96	0.53	1	10.3	œ	781	6.38	-0.36	ł	1	1		USAF 1996 SWMPR
04M03	8/12/96	0.63	1	9.4	6	735	6.38	-48	I	1	1		USAF 1996 SWMPR
04M04 04M04	08/15/96 08/22/97	0.94 4.66	_ 38.7	5.5 6.4	4 4	869 1582	6.38 7.14	-41 -65	11	11	11		USAF 1996 SWMPR USAF 1997 SWMPR
04M07 04M07	08/15/96 08/22/97	0.8 10.4	- 84	3.7 5.2	22	580 848	6.42 7.87	-89	11	1 1	11		USAF 1996 SWMPR USAF 1997 SWMPR
Mitter and a second sec													

Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

² Drager Liquid Extraction (DLE) field test kit.

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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.

СОС	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	'15 μg/L	'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 μ g/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 $1.0 \mu g/L$. 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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for LF05:

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

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Table LF05-1	Concentrations (μ g/L) of Organic Compounds in Groundwater Samples,
	LF05, Old Army Landfill, Eielson AFB, Alaska.
Table LF05-2	Concentrations (μ g/L) of Metals in Groundwater Samples, LF05, Old
	Army Landfill, Eielson AFB, Alaska.
Table LF05-3	Concentrations (μ g/L) of Non-BTEX Volatile Organic Compounds in
	Groundwater Samples, LF05, Eielson AFB, Alaska.
Table LF05-4	Groundwater Parameter and Immunoassay Field Test Results, LF05, Old
	Army Landfill, Eielson AFB, Alaska



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

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	al Reference	PNL 1993 SWGMPR USAF 1996 SWMPR	PNL 1993 SWGMPR	988 (PNL1993 SER Phase 1)
	- Analytic Notes	b a,b	Ą	5M01 in 19
	Methods	1,4 7	1,4	sample from (
	Methylene Chloride	<0.056 1.0	<0.056	groundwater
	TPH DRO	1 1	I	detected in a ng limits.
ration (μg/L	TPH GRO	11	ł	.765 ug/L) (e the reporti
Concen	Xylenes	<0.202 <1.0	<0.202	methane (0 tected abov
	Ethylbenzene	<0.046 <1.0	<0.046	l trichlorofluorc e listed were de
	Toluene	<0.056 <1.0	<0.056	5 ug/L) and r than those
	Benzene	<0.105 <1.0	<0.105	ethane (1.9 ounds othe
	Date Sampled	8/93 8/22/96	8/93	a. Chlorom b. No comp
	Well No.	05M01 05M01	05M03	Notes:

Analytical Methods:

	AK101.	AK102.
	9.	10.
	260.	240.
	7. 8	∞ ∞
	8270.	8080.
	ς.	6.
	ADEC 8100M.	8010.
	.	4
	1. 8020.	2. ADEC 8015M.
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TABLE LF05-2 CONCENTRATIONS (µg/L) OF METALS IN GROUNDWATER SAMPLES, LF05, OLD ARMY LANDFILL, EIELSON AFB, ALASKA

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PNL 1993 SER Phase 1 Final PNL 1993 SER Phase 1 Final PNL 1993 SER Phase I Final PNL 1993 SER Phase 1 Final PNL 1993 SWGMPR PNL 1993 SER Phase 1 Final PNL 1993 SER Phase 1 Final Reference PNL 1993 SWGMPR PNL 1993 SWGMPR PNL 1994 SWGMPR PNL 1994 SWGMPR USAF 1995 SWMPR USAF 1996 SWMPR PNL 1994 SWGMPR USAF 1995 SWMPR PNL 1993 SWGMPR PNL 1993 SWGMPR PNL 1994 SWGMPR PNL 1994 SWMP PNL 1994 SWMP PNL 1994 SWMP Iron Lead Magnesium Manganese Notes --2,500 2,850 2,300 2,000 1,700 1,789 4,100 2,720 --2,800 3,260 1,720 2,300 3,875 ł : --10,000 16,900 14,000 12,000 12,000 10,450 12,000 11,400 --11,000 9,800 16,900 8,960 --14,000 12,000 17,375 ł ł ł 70 <0.88 ; <u> </u>; <1.0 <0.6 <1.0 <1.0 <1.0 <1.0 1.1 <0.6 7.0 1.4 13.7 <1 21 48 32.6 ł ; ï 16,938 33,000 23,800 --950 1,100 610 1,736 9,900 3,980 --970 1,200 1,660 --1,300 1,100 7,900 950 : ł l'u Sampled Aluminum Antimony Arsenic Barium Beryllium Cadmium Calcium Chromium Cobalt Copper -2.65 2.6 <4.0 2.4 4.0 3.1 <6.0 3.0 75 140 105 ; ł <4.05 <4.05 <11.0 - 4.3 <4.05 1.3 3.0 3.0 13.75 31 20.8 : 22 4.5 <u>:</u> 5.0 ; ÷ ł ; <5.42 <5.42 <1.0 <1.0</pre> 139 <5.42 1.2 <5.42 8.0 <5.42 <5.0 <6.0 24.6 35.8 20 46 30.4 ţ ł --54,000 113,000 51,750 61,000 57,600 --59,000 53,000 113,000 57,300 65,000 62,000 61,000 65,000 63,000 66,000 66,000 64,900 58,625 : : ł ; <4.70 <4.70 <4.70</pre> <4.70 <1.0 <1.0 <4.70 <1.0 : 17 <1.0 0.1> <1.0 <1.0 <1.0 <1.0 ł ł ł ł ; 1 <0.814 <0.814 <0.814 <!> : ÷ <1.0 <!> 1.0 <1.0 :- 1 1.91 <1.0 <u>.</u> 0.1> 0.i> ł ÷ ł ł ł ł 100 211 ,030 110 100 111 200 200 110 83 101 160 488 110 110 160 420 342 363 269 4.0 2.7 3.0 8.3 23 4.0 6.9 1.0 16.4 8.4 4.4 7.3 5.4 6.8 2 8.9 3.0 8.0 8.0 25 37 <69.4 4.0 -- <69.4 ; <u>1</u> <69.4</td><1.0</td> <69.4 <1.0 : 7 <1.0 2.0 ; : : : ł ł ; <32.5 20 18,000 1.4 140 96 251 251 7,538 :- 55 t --150 40 3,600 ł : **Background Concentrations Background Concentrations** 1988 8/8/94 9/29/95 9/29/94 8/22/96 9/29/94 8/24/93 9/29/95 Date 1988 6/93 8/93 1988 1988 6/93 8/93 9/94 9/94 1988 8/94 1988 9/94 9/94 9/94 9/94 DISSOLVED **ب** ۰. 3 ⊐ = 3 = 3 TOTAL Well No. BGUCL 05M03 05M03 05M03 05M03 BGMX 05M01 05M02 05M01 05M02 05M03 05M03 05M03 BGMX 05M01 05M01 05M01 05M01 05M01 05M01 05M03 BGM BGM

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PNL 1994 SWMP PNL 1994 SWMP

6,500 4,980

26,000 20,800

=

BGUCL

TABLE LF05-2 (continued)

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PNL 1993 SER Phase 1 Final PNL 1994 SWGMPR **USAF 1995 SWMPR** PNL 1993 SWGMPR PNL 1993 SWGMPR PNL 1993 SWGMPR PNL 1994 SWGMPR PNL 1994 SWGMPR **USAF 1995 SWMPR USAF 1996 SWMPR** PNL 1993 SWGMPR PNL 1993 SWGMPR PNL 1994 SWGMPR PNL 1994 SWMP PNL 1994 SWMP PNL 1994 SWMP Notes Reference Zinc <6.0 <3.44 <5.0 <3.44 <6.0 <12.0 <3.44 81.6 90.8 <3.7 32 2.4 3.0 40 5.6 19 10 304 22 60 50 Potassium Selenium Silver Sodium Thallium Vanadium <4.0 <3.84 <3.84 <1.0 <3.84 <1.0 <1.0 : 2 1.0 190 <8.0 35.9 44.1 <4.2 **4**.1 4.6 ł ł 01 <1.0 ł 1 1 t I. 1 1 1 1 1 1 1 : 1 ł ÷ 1 1 1 1 --3,200 4,880 3,300 3,900 6,500 3,600 4,563 5,340 3,800 5,600 4,930 3,160 3,300 4,000 7,000 ; ł ł <2.87 <2.87 <1.0 <1.0 <2.87 <1.0 <1.0 <1.0 <2.87 <1.0 <4.0 <2.87 <1.0 ł ł ł ł ; ł ł ł ł : : 2.0 ł - 1 ł ł - 1 ł 1 : I. ł ł 1 ł : ł 1 ł 15,600 3,300 -2,100 2,100 3,100 3,400 4,500 15,400 3,800 4,700 3,800 3,700 3,100 3,100 4,400 ł ł ł ł : Nickel <17.9 <17.9 <17.9 <15.0 <17.9 <17.9 17.5 3.9 15.7 4.1 28.7 43.1 2.3 5.0 3.2 122 ł ; ł Ś 12 Sampled 8/8/94 9/29/95 9/29/94 1988 8/24/93 8/94 9/29/95 8/22/96 Date 9/29/94 1988 1988 1988 6/93 8/93 Background Concentrations 8/93 9/94 9/94 1988 1988 9/94 6/93 ſ/u 4 -Ξ ⊐ Þ n ⊐ = E а а DISSOLVED Well TOTAL No. BGUCL 05M01 05M01 05M01 05M02 05M03 05M03 05M03 05M03 BGMX 05M01 05M03 05M01 05M02 05M03 05M03 05M03 05M01 05M01 05M01 BGM

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TABLE LF05-2 (continued)

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Well No.	ſ/I	Date Sampled	Nickel	Potassium	Selenium	Silver	Sodium	Thallium	Vanadium	Zinc	Notes	Reference
Background BGM BGM X	Concer u	utrations 9/94 0/04	31	5,650	I	<1.0	8,363		24	63		PNL 1994 SWMP
BGUCL	ı, ⊐	9/94	48.8	6,500	11	 	9,260	11	52 36	120 88.8		PNL 1994 SWMP PNL 1994 SWMP
Notes:												
f. u. BGM BGUCL		Field filtered. Fotal (unfilte: Mean concent Maximum con 5% Upper c	red). tration of s: ncentration onfidence l	amples colle of samples (limits of sam	cted from t collected fr ples collec	aackgrou om back, ted from	nd wells ir ground we backgroun	1 1994. :lls in 1994. nd wells in 1	(994.			

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

		R R
		9 SWMI
	erence	AF 199
	tes Ref	ns/
cal	ds No	
Analytic	Method	1
1,2-	DCB	<1.0
1,4-	DCB	<1.0
1,3-	DCB	<1.0
	PCE	<1.0
	TCE	<1.0
1,1,1-	TCA	<1.0
1,2-	DCA	<1.0
1,1-	DCA	<1.0
otal 1,2	DCE	<1.0
t-1,2- T	DCE	<1.0
c-1,2-	DCE	0.1>
Methylene	Chloride	1.0
	TCFM	<1.0
Chloro-	ethane	<1.0
Vinyl	Chloride	<1.0
Chloro-	methane	<1.0
	DCDFM	<1.0
Date	Sampled	8/22/96
Well	No.	05M01

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

Analytical Methods:

9. AK101.	10. AK102.
7. 8260.	8. 8240.
. 8270.	. 8080.
ADEC 8100M 5	8010. 6
Э.	4
8020.	ADEC 8015M.
-	r,

DCDFM TCFM DCE DCA TCA TCE PCE DCB

Dichlorodiffuoromethane. Trichlorofluoromethane. Dichloroethene. Dichloroethane. Trichloroethane. Trichloroethane. Perchloroethene (retrachloroethene). Dichlorobenzene.

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TABLE LF05-4 GROU

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

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

Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

a. Parameters duplicate

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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.

сос	ARAR (Groundwater) - Drinking water MCL
Volatile Or	ganic 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 Or	ganic Compounds			
DDT				
Chlordane	2 μg/L			
Inorganic	Compounds			
'Lead	15 μg/L			
²Silver	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.

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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:

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

List of Tables for LF06:

- Table LF06-1 Summary of Contaminants Analyzed for and Detected in Groundwater (μg/L) (from PNL 1995 OU3,4,5 RI).
- Table LF06-2Volatile Organic Compounds Analyzed for and Detected in Groundwater ($\mu g/L$) in
August 1994 using Method 8010/8020 (from PNL 1995 OU3,4,5 RI).
- Table LF06-3 Concentrations (µg/L) of Organic Compounds in Groundwater Samples, LF06, Old Landfill, Eielson AFB, Alaska.
- Table LF06-4 Concentrations (µg/L) of Metals in Groundwater Samples, LF06, Old Landfill, Eielson AFB, Alaska.
- Table LF06-5
 Groundwater Parameter and Immunoassay Field Test Results, LF06, Old Landfill, 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	
061404	Chromium, total	49.8	NA	
061405	Dichlorodifluoromethane		1.04	
COIVION	Dichiorodilluoromethane		3.38	
	1 oluene		0.35	
061406	Methylene chloride		2.11	
0014100	no volatile organic			
(a) UT A 1090	compounds detected			
(a) FILA 1989.				
(b) HLA 1990.				
(c) Duplicate				
NA = not analyzed.				
D = 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)

			06M02		06M04	06M05		06M06	[
Constituent	CAS #	LT	Result	LT	Result	Result	LT	Result	CRQL	MDL
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	0.5
1,1,1-Trichloroethane	71-55-6	<	1.0	<	1.0	1.0	<	1.0	1.0	03
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	03
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	0.5
trans-1,3-Dichloropropene	10061-02-6	<	0.5	<	0.5	0.5	<	0.5	0.5	0.1
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	0.5
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	0.0
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 quant	ification unit.									





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

	Reference	USAF 1996 SWMPR	PNL 1993 SWGMPR USAF 1996 SWMPR	PNL 1993 SWGMPR		
	Notes	B	ca ca	æ		AK101. AK102
	Analytical Methods	7	1,4 7	1,4		7. 8260. 8. 8240. 10.
	Total DRO	1	: :	ł	ıg limits.	
	Total GRO	1	11	ł	the reportin	5. 8270. 5. 8080.
L)	Xylenes	<1.0	<0.202 <1.0	<0.202	cted above	У
ncentration (µg/	Ethylbenzene	<1.0	<0.046 <1.0	<0.046	listed were dete	 ADEC 8100 4. 8010.
Co	Toluene	<1.0	<0.056 <1.0	<0.056	than those	
	Benzene	<1.0	<0.105 <1.0	<0.105	ounds other	015M.
	Date Sampled	8/15/96	8/93 8/15/96	8/93	. No compc	Aethods: . 8020. . ADEC 8(
	Well No.	06M02	06M04 06M04	06M05	Notes: a	Analytical N 1 2

9. AK101. 10. AK102.

7. 8260. 8. 8240.

5. 8270. 6. 8080.

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

Well No. f	'u Sample.	d Aluminum	Antimony	Arsenic	Barium	Beryllium	Cadmium	Calcium Ch	romium 0	Cobalt Co	pper Ir	on Lea	d Magnesiu	m Manganese	Nickel	Potassium S	Selenium	Silver	odium Th	allium Va	madium	Zinc	lotes	Reference
DISOLVE	7																							
Backgroun BGM BGMX BGUCL	L Concentral F 9/94 F 9/94 F 9/94	tions 43 140 74		8.3 23 14.5	101 160 129	0.1>0.1>0.1>	<l< td=""><td>51,750 61,000 57,600</td><td><1.0 <1.0 <1.0</td><td>3.0 3.0 3.0 3.0</td><td>2,4 1,7 2,9 2,5 1,3 3,5</td><td>36 41 80 41</td><td>0 10,450 0 12,000 0 11,400</td><td>1,789 4,100 2,720</td><td>2.3 5.0 3.2</td><td>3,400 4,500 3,800</td><td></td><td><1.0<1.0<1.0<1.0</td><td>4,563 6,500 5,340</td><td></td><td> <0.1 0.1 0.1 </td><td>5.6 19 10</td><td>222</td><td>vl. 1994 SWMP vl. 1994 SWMP vl. 1994 SWMP</td></l<>	51,750 61,000 57,600	<1.0 <1.0 <1.0	3.0 3.0 3.0 3.0	2,4 1,7 2,9 2,5 1,3 3,5	36 41 80 41	0 10,450 0 12,000 0 11,400	1,789 4,100 2,720	2.3 5.0 3.2	3,400 4,500 3,800		<1.0<1.0<1.0<1.0	4,563 6,500 5,340		 <0.1 0.1 0.1 	5.6 19 10	222	vl. 1994 SWMP vl. 1994 SWMP vl. 1994 SWMP
TOTAL																					:		;	
06M02	л 8/15/9 (6 <25.0	<2.0	19.7	137	<1.0	<1.0	50,100	<6.0	<11.0 <	6.0 5,7	750 <1.	069'6 0	1,130	<15.0	2,950	2.0	<4.0	5,390	<1.0	8.0	12.0	a	SAF 1996 SWMPR
06M04 06M04	ц 8/93 1 8/15/9€	58 5 <25.0	<69.4 <2.0	3.5 10.4	150 155	0.1>	<4.70 <1.0	55,000 52,300	<5.42 <	<pre><4.05 4</pre>	6.0 <u>1</u> 6	9 E	4 12,000 0 10,900	1,600 1,850	<17.9 <15.0	3,600 3,490		<2.87 <4.0	5,300 6,810		4.1 <8.0	<3.44 18.9	a a C D	vL 1993 SWGMPR SAF 1996 SWMPR
06M05	а 8/93	120	<69.4	12	120	0.87	<4.70	52,000	<5.42	4.4	2.65 3,9	00 4.0	8,800	1,400	<17.9	3,200	;	<2.87	4,500	,	<3.84	44.6	a	VL 1993 SWGMPR
Backgroun BGM BGMX BGUCL	l Concentral u 9/94 u 9/94 u 9/94	tions 7,538 18,000 11,500	<1.0 2.0 <2.0	25 63 37	269 420 342	0.1> 0.1> 0.1>	<1.0 <1.0 <1.0	58,625 66,000 64,900	20 46 30.4	13.75 31 1 20.8 1	75 16, 40 33, 05 23,	938 21 000 48 800 32	17,375 26,000 6 20,800	3,875 6,500 4,980	31 77 48.8	5,650 7,900 6,500		0.1>0.1>0.1>	8,363 9,800 9,260		24 52 36	63 120 88.8	222	4L 1994 SWMP 4L 1994 SWMP 4L 1994 SWMP
Notes:	No othe	r compounds	other than t	hose liste	ed were d	letected abc	ove the rep	orting limit	Ś															

f. u. BGM BGMX BGUCL

ivo otner compounds otner tnan those itsted were detected above the reportin Field filtered. Total (unfiltered). Mean concentration of samples collected from background wells in 1994. Maximum concentration of samples collected from background wells in 1994. 95% Upper confidence limits of samples collected from background wells in 1994.

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

1

		Reference	115 AF 1006 SWAIDD	USAF 1997 SWMPR	IISAF 1996 SWMPP	USAF 1997 SWMPR
		Notes				
Immunoassay Results	Total	BTEX ¹ (ppb)	:	ł	1	:
		eH (mv)	70	48	59	70
		Ηd	7.08	7.06	7.3	7.33
	Conductivity	(mmhos/cm)	253	420	252	356
Parameters	Turbidity	(NTU)	×	Ş	-	Ŷ
	Temperature	(°C)	5.1	5.8	10.2	10.4
	Dissolved Oxveen (%	saturation)	ł	17.8	:	21.4
	Dissolved Oxygen	(mg/L)	0.63	2.2	2.56	2.36
	Date	Sampled	8/12/96	8/20/97	8/12/96	8/20/97
		Well No.	06M02	06M02	06M04	06M04

Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

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



r

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.

сос	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	115 μg/L	'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 μ g/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 μ g/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 μ g/L (14-2). Wells displaying benzene concentrations above site specific RAOs and ARAR MCLs included 10-3 (150 μ g/L), 14-2 (460 μ g/L), and W-1 (71 μ g/L). No other compounds were detected above site specific RAOs or ARAR MCLs. DRO was detected at 10-8 at a concentration of 310 μ g/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 μ g/L of bis (2-ethylhexyl) phthalate, exceeding the EPA MCL of 6 μ g/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.

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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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST10/SS14:

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

List of Tables for ST10/SS14:

- 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.
 Table ST10/SS14-2 Groundwater Parameter and Immunoassay Field Test Results, ST10/ST14,
- 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	Date				Concentratio	on (µg/L)	Cuc line	A Mathulanathalana	Manhthalana	Analytical Methods	Notes	Reference
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	I PH DKO	2- Memyinapunalene	Napimiaicite	Alialy ucal Intellious	THORS	
		005 -	0.500	090	0 800	ı	I	1	1	5,6.8	a,b	PNL 1993 OU2 RI
1-01	16/6	1,500	000,6	067	400	3 700	\$ 700	1	;	1-3		USAF 1995 SWMPR
10-1	9/27/95	120	006	00	144	00,'r	00117		;	_		LISAF 1996 SWMPR
10-1	8/28/96	29	57	4.1	35	;	1	1	-			TICAE 1007 SWMPD
10-1	9/10/97	-	6	<1.0	7	ı	ı	<10	210	Ĵ	-	
10-24	9/01	5.0	2.0	7.0	130	ı	ł	ł	ï	5,6,8	9	PNL 1993 OU2 RI
17-01		2	ì									
10-3	19/9	30	5.0	24	220	1	;	1	ı	5,6,8	a	PNL 1993 OU2 RI
6 01	90/0/0	1	<1.0	<1.0	4.1	1	I	ł	1	-		USAF 1996 SWMPR
5-01	06/97/9	0.17 1 fts	2.1. F	-	σ	1	;	<10	<10	1,5	, L	USAF 1997 SWMPR
10-3	16/01/6	001	4	-								
7 01	10/0	0 \$ 2	<5.0	<5.0	<5.0	1	ı	1	:	5,6,8	8	PNL 1993 OU2 RI
4-01	1414	2.7			0		ł	:	;	1		USAF 1996 SWMPR
10-4	8/28/96	<1.0	<1.0	<1.0	61.0	1	1					
10-5	16/6	1.0	3.0	<5.0	<5.0	1	ł	١	ł	5,6,8	e	PNL 1993 OU2 RI
	10/0	√€ 0	0.2	<51) <	<5.0	ł	1	;	ï	5,6,8	63	PNL 1993 OU2 RI
0-01	1712	0.0							1	-		LISAF 1996 SWMPR
10-6	96/6/6	<1.0	1.2	<1.0	<1.0	1	ı	1	I	-		
	10/0	014	002 0	011	750	1	1	1	1	5,6,8	a,c	PNL 1993 OU2 RI
8-01	16/6	450	7,100	011	0		ł	1	:	-		USAF 1996 SWMPR
10-8	8/28/96	<1.0	<1.0	0.1>	N.12	•				0101	4	115 A E 1007 SWMDD
10-8	10/1/97	<1.0	<1.0	<1.0	<1.0	<100	310	ł	1	1,9,10	=,	U3ML 1771 3 WINE N
10/11/01	10/0		<50	<5.0	<5.0	1	;	I	1	5,6,8	a	PNL 1993 OU2 RI
I OIM MOT	1.616	7.7		017	017	;	;	1	1	-		USAF 1996 SWMPR
10MW81	96/6/6	<1.0	<1.0	S1.U	0.17	ł						
0/11/101	10/0	66 0	<\$ 0	<510 25.0	<5.0	:	1	I	ı	5,6,8	g	PNL 1993 OU2 RI
10MW9	14/6	0.7	2.2	2.2						-		TISAF 1996 SWMPR
10MW9	8/28/96	<1.0	<1.0	<1.0	<1.0	I	1	I	I	-		
10MW10	16/6	<5.0	<5.0	<5.0	<5.0	ł	ı	١	ł	5,6,8	e	PNL 1993 OU2 RI
										3 7 5		DNI 1003 OLI2 BI
11WW01	16/6	<5.0	<5.0	<5.0	<\$.0	ł	:	I	ı	0,010	9	N 200 C(() TVI

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TABLE ST10/SS14-1 (continued)

lleW	Date				Concentratio	n (μg/L)			•		Note N	D officerroot
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	2- Methylnapthalene	Naphthalene	Analytical Methods	INDICS	Velocitie
			ç	ĥ	00	ı	1	ł	1	1		IT 1994 EMR
10MW12	10/10/94	9.0	0.7>	0.77	, .			I	:	1.4	P	PNL 1995 SWRI
10MW12	2/1/95	10.6	0.33	<0.2	<0.4	1	1	I				LISAF 1995 SWMPR
10MW12	10/11/95	<1.0	<1.0	<1.0	<1.0	<50	150	I	:	2 -		LISAE 1006 SWMDP
10MW12	96/6/6	6.3	<1.0	<1.0	<1.0	ı	۱	ı	1	- :		
10MW12	9/15/97	3.0	<1.0	<1.0	<1.0	I	1	<10	01>	<u>c;</u>		
		000	000 1	150	200	1	ł	ı	ł	5,6,8	61	PNL 1993 OU2 RI
14-2	16/6	800	1,200	001				1	:	_		USAF 1996 SWMPR
14-2	8/28/96	83	330	160	540	1	1	: ;		. :		LISAF 1997 SWMPR
14-2	26/01/6	460	490	110	410	•	:	17	+	<u>, , , , , , , , , , , , , , , , , , , </u>	Ĵ.	
14-3	16/6	<5.0	<5.0	<5.0	<5.0	I	ł	ı	ł	5,6,8	ej	PNL 1993 OU2 RI
W.1	10/6	200	2.0	<5.0	3.0	:	I	1	ı	5,6,8	cs.	PNL 1993 OU2 RI
				017	10.2	1	;	1	1	-		USAF 1990 5 W M FR
W-1	8/28/96	110	3.0	o:1-	7.01			<10	<10	1.5	e.i	USAF 1997 SWMPR
N-1	9/10/97	71	16	<1.0	24	1	I	012		ł		
	. Ear additions	d compounds det	ected see referen.	ų								
NOICES	a. rui auunuun b. Additional ce	omnounds detects	ed: 2-butanone -	12 µg/L.								
	c. Additional cr	vmoonnds detecte	ed 2-hutanone - 2	20 ug/L.								
-	d Additional c	ompounds detect	ed: cis-1.2-DCE	- 0.30 µg/L.								
,	e. Additional co	mpounds detecte	:d: phenol - 4 μg/I	÷								
	f. Additional co.	mpounds detecte	d: bis (2-ethylhex	yl) phthalate - 2500 μg	Л.							
	g. Additional co	mpounds detects	ed: phenol - 3 μg/l	L, 2-methylphenol - 4 μ	g/L, 4-methylphe	nol -2 µg/L, benz	oic acid - 12 με	уL				
	h. Chromatogra	aphic pattern of I	DRO analysis does	not appear to be indica	itive of a petroleur	in product. It of laboratory e	ontamination (8	also detected in the				
	 Bis (2-ethylh method blank) 	exyl) phthalate v).	vas detected below	reporting initial version								
Analytical Me	sthods:		3 ADEC 8100M		5. 8270.		7. 8260.	9. AK101.				
	1. 8020. 2. ADEC 801:	SM.	4. 8010.	:	6. 8080.		8. 8240.	10. AK102.				

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I Intermediate depth well.

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

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	c g	Reference	IISAF 1995 SWMPB	UINA 2001 TISU	11SAF 1997 SWMPP	USAF 1997 SWMPR	IISAF 1996 SWMPD	11SAF 1997 SWMPP	USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1996 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1996 SWMPR	USAF 1995 SWMPR		IISAF 1996 SWMPP	USAF 1997 SWMPR	DISAF 1006 SWADD	USAF 1997 SWMPR
		Notes																			
Immunoassay Results	Total	BIEX (ppb)	1	:	ł	ł	1	1	;	ł	ł	1	:	ł	ł	ł		:	ł	1	ł
	V) 110	eH (mv)	1	-20	43	40	-86	70	06-	-47	-110	-35	0	-110	-51	:	-167.8	-167.8	ċ	11.5	-67
		Hd	7.15	7.16	7.39	7.55	7.06	7.32	7.66	7.29	6.85	7.17	7.43	7.52	7.06	6.93	7.4	7.4	8.06	7.04	7.85
	Conductivity (mmbos/cm)		230	180	270	238	160	264	246	148	182	150	232	213	179	240	206	206	262	188	353
Parameters	Turbidity	(011)	ł	62	33	72	14.9	605	110	78	0.6	33.5	18	0	2.6	ł	6.6	6.6	31	×	0
	Temperature	(2)	12	9.37	11.4	9.3	7.26	7.9	7.5	5.13	4.52	6.51	5.1	1.74	5.66	11	11.44	11.44	12.5	8.87	9.2
	Dissolved Oxygen (% saturation)	(monining	:	1	6.9	87	ł	12	5.2	I	:	ł	1.0	ł	ł	ł		2.1	58	:	15
	Dissolved Oxygen (me/L)	(m.A)	2.7	0.184	0.73	9.81	0.187	1.41	0.61	0.283	0.026	0.168	0.1	0.008	0.103	2.6	0.021	:	6.02	0.184	1.75
	Date Sampled		9/27/95	8/28/96	6/10/67	10/1/97	8/28/96	9/10/97	10/2/97	8/28/96	96/6/6	8/28/96	10/1/97	96/6/6	8/28/96	9/11/95	06/6/6	96/6/6	9/15/97	8/28/96	9/10/97
	Well No.		10-1	10-1	10-1	1-01	10-3	10-3	10-3	10-4	10-6	10-8	10-8	10MW81	10MW9	10MW12	10MW12	10MW12	10MW12	14-2	14-2

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TABLE ST 10/ST14-2 (continued)

.

			Reference	USAF 1997 SWMPR	IISAF 1996 SWMPR	A IMAR DOLL TICO	NJINIMO 1221 JACO	USAF 1997 SWMPR		
			Notes							
Immunoassay Results		Total	BTEX ¹ (ppb)	;	:	ł	;	ł		
			eH (mv)	-78	-82	-13		-12		
			Hq	7.43	7.18	7 66	00.1	6.44		
		Conductivity	(mmhos/cm)	306	157	167		264		
Parameters		Turbidity	(NTU)	9	-	C	•	2		
		Temperature	(°C)	8.3	3.46	3.0		3.1		
	Dissolved	Oxygen (%	saturation)	1.1	;	ł		1.5		
	Dissolved	Oxygen	(mg/L)	0.13	0.059	ГО		0.20		
3	L	Date	Sampled	10/1/97	8/28/96	6/01/6		10/1/97		
			Well No.	14-2	W-1	N-I		1-M		Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit. ² Dräger Liquid Extraction (DLE) field test kit.

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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.

сос	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 μg/L	5 μ g/ 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	'15 μg/L	'15 μg/L

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 μ g/L, 1.2 μ g/L, and 1.5 μ g/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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST11:

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

List of Tables for ST11:

- Table ST11-1 Concentrations (µg/L) of Organic Compounds in Groundwater Samples, ST11, Fuel-Saturated Area, Eielson AFB, Alaska.
- Table ST11-2
 Groundwater Parameter and Immunoassay Field Test Results, 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

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H_11							THE SOL	2 í n	Nev	
No.	Sampled	Benzen	Toluene	Ethylbenzene	on (µg/L) Xylenes	TPH GR	TPH DRO	Analytical Methods	Notes	Reference
1-11	16/6	<5.0	<5.0	≤0.	<5.0	1	1	568	•	PNI 1903 OI 12 BI
11-1	8/12/96	<1.0	<1.0	<1.0	1.1	ł	:	о'о'с Т	đ	USAF 1996 SWMPR
11-2	16/6	<5.0	≤5.0	<5.0	≤5.0	:	ł	5,6,8	æ	PNI, 1993 OI 12 RI
11-2	8/12/96	<1.0	<1.0	<1.0	<1.0	ł	I	1	1	USAF 1996 SWMPR
11-3	16/6	1.0	≤5.0	<2.0	<5.0	;	ł	568	α	19 CI IO 2001 ING
11-3	8/24/93	<0.105	0.26	0.22	1.8	ł	ł	1.4	5 00	PNI 1993 SWGMPR
11-3	8/5/94	<1.0	<1.0	<1.0	<1.0	;	;	1.4	. 4	PNI, 1994 SWGMPR
11-3	9/13/95	<1.0	<1.0	<1.0	<1.0	<50	130	1-3	1	USAF 1995 SWMPR
11-3	8/14/96	<1.0	<1.0	<1.0	1.2	1	ł	1		USAF 1996 SWMPR
11-4	16/6	<5.0	<5.0	<5.0	<5.0	ł	ł	568	α	19 CI 10 2001 ING
11-4	8/12/96	<1.0	<1.0	<1.0	<1.0	1	:	1	3	USAF 1996 SWMPR
11-5	16/6	<5.0	<5.0	<5.0	≤.0	ł	ł	568	α	19 CI 10 2001 IND
11-5	8/12/96	<1.0	<1.0	<1.0	1.5	;	ł	1	\$	USAF 1996 SWMPR
11-6	16/6	<5.0	<5.0	<5.0	<5.0	ł	:	568	α	19 CI IO 2001 ING
11-6	8/12/96	<1.0	<l></l>	<1.0	<1.0	;	ł	1	3	USAF 1996 SWMPR
11-7	16/6	<5.0	<5.0	<5.0	<5.0	!	1	5.6.8	æ	PNI. 1993 OI 17 RI
11-7	8/12/96	<1.0	<1.0	<1.0	<1.0	ł	1	1	1	USAF 1996 SWMPR
Notes:	a. For addit	tional comp	ounds dete	cted, see referer	lce.					
Analytical	Methods: 1. 8020. 2. ADEC 8	3 3015M. 4	. ADEC { . 8010.	3100M. 5 6	. 8270. . 8080.		7. 8260. 8. 8240.		9. 10. A.	K101. K102.

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TABLE ST11-2 GRO

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

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

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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	140 μg/L	
Naphthalene	220 µg/L	
Lead	'15 μg/L	'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 μ g/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 μ g/L. Analytical data indicated monitor well 26-1 contained a lead concentration above the applicable RAO and ARAR action levels of 15 μ g/L. EDB was detected in 13MW07 at a concentration of 39 μ g/L, which exceeds the EPA drinking water MCL of 0.05 μ g/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 μ g/L (13MW07). Wells displaying benzene concentrations above site specific RAOs and ARARs included 13MW07 (560 μ g/L), 26-1 (240 μ g/L), and 26-12 (18 μ g/L). Toluene concentrations above the site specific RAO and ARAR were observed at 13MW07 and 26-1 (1600 and 2600 μ g/L, respectively). Monitor well 26-1 also displayed an ethylbenzene concentration (1,200 μ g/L) exceeding the site specific RAO and ARAR MCL. Lead concentrations (dissolved and total) in 26-1 exceed the ARAR action level of 15 μ g/L. Lead

concentrations in 26-1 also exceed the 1994 background UCLs of $<1 \mu g/L$ (dissolved lead) and 32.6 $\mu g/L$ (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 μ g/L) and bis (2-ethylhexyl) phthalate (11 μ g/L) which exceed EPA MCLs of 1 and 6 μ g/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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures 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.
 Figure ST13/DP26-2 ST13/DP26, E-10 Detail Showing Monitor Well Locations, Eielson AFB, Alaska.

List of Tables for ST13/DP26:

 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.
 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.





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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 ÷

	Reference	PNL 1993 OU2 RI	PNL 1993 OU2 RI	PNL 1993 OU2 RI IT 1995 TS ITIR	PNL 1993 OU2 RI IT 1995 TS ITIR	PNL 1993 OU2 RI	IT 1995 TS ITIR	IT 1995 TS ITR EA 1996 SWMPR EA 1997 SWMPR	IT 1995 TS ITIR	PNL 1993 OU2 RI	PNL 1993 SWGMPR	11 1995 IS 11 IK FA 1995 SWMPR	EA 1996 SWMPR	EA 1997 SWMPR	PNI, 1993 OU2 RI	PNL 1993 OU2 RI
	Notes	đ	ಹ	æ	đ	63		e,f gj		63			9	ч	æ	I
1	Analyucal Methods	5,6,8,11	5,6,8,11	5,6,8,11 11	5,6,8,11 11	5,6,8,11	1,9-11	1,9-11 1,4,11 1,5	11-6,1	5,6,8,11	1,4,11	1,9-11 1-3	1,4,11	1,5,11,12	5.6.8.11	5,6,8
Tatol	Lead	3.3	41.4	1.9 3.6	6.3 3.0	<3.0	5.1	9.4 5.5 -	<3.0	334	420		216	90.9	1.3	1
Discoluted	Lead	1	ł	- 3.0	3.0	I	<3.0	<	<3.0	1	66 2	S 1	ı	41.3	ł	ł
	Napthalene	ł	I	11	11	I	t	1 1 1	1	1	I	11	ł	46	I	ł
) 2-Methvl	z-muuyi napthalene	ł	I	11	11	ł	ł	1	ł	I	:	1 1	ı	17	ł	ł
ration (μg/l	TPH DRO	I	I	11	11	1	560	910	<500	ł	- 100	5,100	1	ł	1	ł
Concent	TPH GRO	I	1	11	11	I	6,200	13,000 -	490	ł	- 11	24,000	1	1	1	I
	Xylenes	<5.0	2,100	160	49	<5.0	790	1,500 4,200 4,000	34	6,300	9,800 6,400	8,300	9,500	7,200	230	53
Ethvl-	benzene	<5.0	320	34	26	<5.0	110	330 630 680	5.3	1,100	050	1,200	1,200	1,200	40	8.1
	Toluene	<5.0	720	- 31	6.0	<5.0	240	680 1600 1600	<5.0	3,000	000,7 2,000	3,200	3,300	2,600	150	37
	Benzene	1.0	68	58	170	<5.0	87	380 610 560	33	510	760 360	450	360	240	140	37
Date	Sampled	16/6	16/6	9/91 1/95	9/91 16/6	16/01	7/95	7/95 8/28/96 9/10/97	7/95	16/6	56/17/8 7/95	10/10/95	8/28/96	76/11/6	16/6	8/20/92
Well	No.	13-1	13-2	13-3 13-3	134 134	13MW5	13MW06	13MW07 13MW07 13MW07	13MW08	26-1	26-1 26-1	26-1	26-1	26-1	26-2	26-2

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(continued)	
TABLE ST13/DP26-1 (

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	Reference	10 01 O 100 I		1995 TS ITR	I 1002 001 1	1995 TS ITTR		IL 1993 OU2 RI	1995 TS ITIR	IL 1993 OU2 RI	IL 1993 OU2 RI	II. 1993 OI 12 BI	II 1003 SWGMPD	IL 1994 SWGMPR	T 1003 OI 17 DI		XI I I S I C661	IL 1993 OU2 RI	IL 1993 SWGMPR	1995 TS ITIR	L 1993 OU2 RI			
	tes				Va r		•	E.	Ħ	AA I	A	d	ā	: Æ	ď		11	A	S P	Н	s PN	M	A	NA
	Ŷ	a	£°	5	c	ą				8	8		3 0	3 03	a	3		æ	ຜົ		B	đ	đ	đ
	Analytical Methods	56811	568	11-9,1	9 7 5	0,0,0 11-0.1		5,6,8,11	11	5,6,8,11	5,6,8,11	5.68.11	140,000	1,4	11875		11-4,1	5,6,8,11	1,4, 11	11-6,1	5,6,8,11	5,6,8,11	5,6,8	5,6,8
	l Total Lead	4.0	2 1	<3.0	1	⊴3.0		1.4	⊲3.0	<1.0	<1.0	<1.0	1	ł	<10 <10		.0</p	795	690	5,100	71.5	1.8	1	I
	Dissolved Lead	1	1	<3.0	I	<3.0		ł	<3.0	1	1	ł	ł	I	1	5	0.0	i	55	490	I	ł	1	1
tration (µg/L)	Napthalene	1	ł	ł	1	1		1	ł	I	I	ł	ł	I	1		1	ł	ı	ł	ł	ł	ł	ł
	2-Methyl napthalene	1	ł	I	I	ł		I	1	ł	I	1	1	I	1		I	ł	ł	ł	ł	I	1	1
	TPH DRO	ľ	I	<500	I	<500		1	ł	ł	ł	ł	1	I	ł	~\$00	202	ł	ł	250,000	1	ł	I	ł
Concer	TPH GRC	1	1	<250	I	<250		1	1	I	ł	ł	1	ł	ł	~~~~		ł	I	31,000	I	;	ł	ł
	Xylenes	11	<5.0	<5.0	<5.0	<5.0		5.0	1	120	70	1.0	<0.202	<1.0	<5.0	< Y 0	2	5,400	9,100	9,800	2,300	<5.0	<5.0	<5.0
	Ethyl- benzene	11	2.0	<5.0	<2.0	<5.0		1.0	ł	15	7.0	<5.0	<0.046	<1.0	<5.0	<5.0	2	610	990	830	220	<5.0	2.0	2 .0
	Toluene	<5.0	2.0	<5.0	<2.0	<5.0	1	<5.0	ł	31	7.0	<5.0	<0.16	<1.0	<5.0	<5.0))	4,200	8,500	8,200	520	<5.0	2.0	2.0
	Benzene	53	14	<5.0	2 .0	<5.0	i	75	1	220	92	2.0	0.39	<1.0	<5.0	<\$0	2	1,400	2,700	3,100	280	16	2.0	<2.0
	Date Sampled	16/01	8/20/92	7/95	9/14/92	7/95		16/6	26/1	16/6	16/6	16/6	8/21/93	8/2/94	16/6	2017		16/6	8/21/93	7/95	16/6	16/6	6/11/9	8/17/92
Well	Well No.	26MW02I	26MW02I	26MW02I	26MW02D	26MW02D		26-3	26-3	26-4	26-5	26-6	26-6	26-6	26-7	26-7) 	26-8	26-8	26-8	26-8A	26-10	70-10	26-10

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TABLE ST13/DP26-1 (continued)

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		lotes Reference		N 700 6661 7113 8	a,b PNL 1993 OU2 RI	a PNL 1993 OU2 RI			EA 1995 SWMPR	EA 1996 SWMPR	j EA 1997 SWMPR			R FNL 1993 UUZ KI	a PNL 1993 OU2 RI	a PNL 1993 SWGMPR	a PNL 1993 OU2 RI		N 700 CAL THE B	e EA 1996 SWMPR	i EA 1997 SWMPR	TT 1005 TC TT	VIII CI CAAI II	e EA 1996 SWMPR	DATI 1005 CUTTO	NAC CALL THIS B	EA 1995 SWMPR	EA 1996 SWMPR
	Analytical	Methods N	11975	11,0,0,11	5,6,8	5,6,8	56811	1160606	<u>.</u> -	1,4,11	1,5	11895	56011	11,0,0,0	5,6,8	1,4	5,6,8,11	11975	11,0,0,1	1,4,11	1,5	=	11	1,4,11	V I	1,1	1-3	1,4,11
	I Total	Lead	A C	1	1	1	3.0	2	1	<1.0	ł	3.2		1	ł	ł	<1.0	1 4		2.3	ł	63 0		<1.0	ł		1	6.6
	Dissolved	Lead	1	ł	ł	ł	I		I	I	ł	1	1	l	I	t	1	ł		1	I	<3.0	2.7	1	1		I	I
	1 IV - 14	Napthalene	ł		1	1	ł		I	1	<10	t	ł	ļ	1	I	I	I		ł	<10	I		I	1		1	ł
(2-Methyl	napthalene	I		ł	ł	ł		I	I	<10	ł	I		ł	I	I	I		I	<10	ł		I	1		1	t
tration (µg/I	Carl bar	UXU HAI	1		ł	I	1	760	200	1	I	ł	ł		I	ł	1	1		1	ł	ł		1	1		087	1
Concen	Uational.		I		1	I	1	610	010	1	ł	I	1		I	ł	I	1	1	I	I	I		1	ŧ	150	00	I
	Vulanac	AVICILES	<5.0	0 2 1		<5.0	<5.0	336	2.00	59	<1.0	<5.0	<5.0	0 5 2		0.56	7.0	<5.0	111		0.1>	1	د ۲	0.1×	<0.4		0.12	1,860
	Ethyl- benzene	ocirciic	<5.0	20		<2.0	<5.0	1		4. 0	<1.0	<5.0	0.0	2 0 0		0.14	10	<5.0	01		0.1>	1	د ۲	0.12	<0.2		0.17	170
	Toluene	I NINCIIC	<5.0	000	0.4	47 .0	2.0	100		0.4	<1.0	<5.0	0.2∕	00		<0.13	<5.0	<5.0	11		1.0	ł	017	0.17	0.38		0.17	530
	Renzene	הכודכרוור	59	41	::	11	140	44	: ;	7	8	<5.0	<u>2</u> .0	0 (>		0.17	110	<5.0	<1.0		0.12	ł	1 >	0.17	<0.2	< 1 >	0.17	110
ļ	Late	nord line	16/6	6/11/9		76/11/8	16/6	10/3/95	20/00/0	06/07/0	16/01/6	16/6	6/11/92	26/11/8	2011/0	66/17/0	16/6	16/6	8/28/96	L0/11/0	16/11/6	7/95	8/20/06	0/1/410	1994	10/11/05		8/28/96
117.11	No		26-11	26-11		11-07	26-12	26-12	11 76	71-07	70-17	26-13	26-13	26-13	21 22	61-07	26-14	26-15	26-15	31 76	CI-07	26-16	26-16	01-0 -	26-19	26-19		26MW20

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TABLE ST13/DP26-1 (continued)

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Mell D	late			D41.1		Concentr	ation (µg/L			1				
o. San	mpled	Benzene	Toluene	Eunyl- benzene	Xylenes 1	PH GRO 1	TPH DRO	2-Methyl napthalene	Napthalene	Dissolved Lead	Total Lead	Analytical Methods	Notes	Reference
W21 7.	26/1	8.5	<5.0	1.9	6.3	360	<500	I	I	≪3.0	<3.0	1,9-11	I P	T 1995 TS ITIR
W22 7.	26/1	32	<5.0	<5.0	<5.0	230	<500	ł	ı	<3.0	⊲3.0	1,9-11	Ц	T 1995 TS ITIR
W23 7.	195	300	<5.0	34	640	3,000	540	ł	ł	<3.0	⊲3.0	11-6,1	d I	T 1995 TS ITIR
: Bacl Bacl Bacl	kgrounc kgrounc kgrounc	1 mean coi 1 maximur 1 95 percei	ncentratio n concent nt UCL cc	ons for lead rations for oncentratic	 dissolve lead: dissons for lead 	d, <1.0 μg/ solved, <1.0 i: dissolvec	L; total, 21) μg/L; tota 1 , <1.0 μg/I	μg/L. I, 48 μg/L. L; total, 33 μ	g/L.					
H Big F Add F Add	For addi Addition Nell abs Not scre Additions additions dditions additiona additiona is (2-etl sthod bl	titional con nal compol and compol and oned in al compou al compou al compour rophenol - il compour tion (also hylhexyl) ank).	appounds d unds deter allow par ands detect o detected nds detect nds detect detected detected phthalate	letected, se cted: chloi tt of aquife tted: methy l in laborat ted: 1,2 Di ted: 2,4-dii ted: 2,4-dii bis (2-eth bis (2-eth bis (2-eth bis (2-eth vas detect was detect	er referenc roform - 1. rr. dene chlor tory metho bromoetha methylphenol hylphenol ylihexyl)ph rthylhexyl) ory method ref below i	e. 4 μg/L, cis- ide - betwer d blank at 1 une - 39 μg/L nol -2 μg/L, 4 (thalate - 11 phthalate - 1 phthalate - 1 blank). reporting lii	-DCE - 1.1 en 1.4 and L.3 mg/L). L. , benzoic at -methylphe μg/L (labo 3 μg/L, su: mits, susper	μg/L. 1.8 μg/L, sus cid - 17 μg/L mol - 19 μg/J spected to be cted to be th	pected to be t , acetophenor , 2,4-dimeth mination sus the result of lab	the result of the result of viphenol - 7 ected), ace laboratory oratory con	laborato 9 µg/L, c tophenon taminatio	гу liethylphthala e - 24 µg/L. on (also detec	te -3 μg/ ted in the	-î .
tical Metho 1.8 2. A	ods: 8020. ADEC 8	3 8015M. 4	ADEC 8010.	8100M. 5	5. 8270. 5. 8080.	ک ۲. 80	8260. 8240.		9. AK101. 10. AK102.		11. 742 12. 601			
ermediate c sep well.	depth w	ell.												

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

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	ſ										
				[Parameters				Immunoassay Results		
		Dissolved	Dissolved						mincavi		
111 11 211	Date	Oxygen	Oxygen (%	Temperature	Turbidity	Conductivity			Total BTEX ¹		
well No.	Sampled	(mg/L)	saturation)	(ĴC)	(NTU)	(mmhos/cm)	Hd	eH (mv)	(ddd)	Notes	Reference
138600											
	06/97/90	0.14	:	8.2	0	268	6.84	ł	1		EA 1996 SWIMPR
13MW07	09/10/97	0.86	7.7	9.2	0	306	7.35	89	I		FA 1997 SWMPP
13MW07	10/01/97	0	0	7	9	286	7.14	-58	I		FA 1997 SWMPP
26-1	10/10/95	2.9	ł	80	ł	430	6.73	ł	I		FA 1005 CUMB
26-1	08/28/96	1.21	1	9.7	0	255	671	1			TA 1007 GUD ED
26-1	09/11/97	6.4	57	10	• •	313	0.00	7	1		EA 1990 SWMPK
26-1	09/18/07	1 77	16.4	- C C I	1 (0,00		1		EA 1997 SWMPR
	1/101/00	1.//1	10.4	5.01	0	297	7.14	4	1		EA 1997 SWMPR
26-12	10/03/95	1.7	I	×	;	240	275	;	;		
26-12	08/28/96	1.53	ł	47	V1	174	107	1	I		EA 1993 3WMFK
76-17	20/01/00	10.0	t	- t F 0	+ (-	+07	0.9/	ł	1		EA 1996 SWMPR
21-02	16/01/60	19.0	1.2	8.7	70	303	7.40	112	1		EA 1997 SWMPR
71-07	10/01/97	2.20	20	7.3	44	270	6.97	57	1		EA 1997 SWMPR
26-15	08/28/96	0.16	1	57	c	157	07				
26-15	20/11/00	10.01		1	.	707	٥. ٧	1	1		EA 1996 SWMPR
CI-07	16/11/60	10.01	84	7.5	0	310	8.89	62	ł		EA 1997 SWMPR
26-16	08/29/96	ł	20.7%	5.45	13.3	226	6.86	135	ł		EA 1996 SWMPR
26-19											
(26MW19)	10/11/95	3.1	ł	S	:	205	6.79	I	I		EA 1995 SWMPR
26MW20	08/28/96	0	1	6.0	0	261	6.77	;	ł		EA 1996 SWMPR
Notes:											
	יים מים ¹	0	E		T						
	Karu AS	says Unm	icron Total E	3TEX field te	st kit.						

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SS14 E-2 Railroad JP4 Spill: see ST10



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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.

сос	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 (yd³) 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 μ g/L (multiple wells) to 2.7 μ g/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 μ g/L and 15,000 μ g/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 μ g/L, 4.0 μ g/L, and 1.1 μ g/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 μ g/L.

1997 Results

Monitor well 18-3 was sampled for VOCs during the 1997 field season. Benzene was detected at 1.0 μ g/L, which is below the RAO and ARAR MCL of 5 μ g/L. Chloromethane was also detected at 1 μ g/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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST18:

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

List of Tables for ST18:

Table ST18-1	Concentrations (μ g/L) of Organic Compounds in Groundwater Samples,
Till OTIO O	ST18, Oil Boiler Fuel Spill, Eielson AFB, Alaska.
Table ST18-2	Groundwater Parameter and Immunoassay Field Test Results, ST18, Oil
	Boiler Fuel Spill, Eielson AFB, Alaska

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

CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, **TABLE ST18-1**

PNL 1993 SWGMPR USAF 1995 OUI RD PNL 1994 SWGMPR USAF 1995 OUI RD USAF 1995 OUI RD **USAF 1995 SWMPR USAF 1996 SWMPR USAF 1997 SWMPR** USAF 1995 OUI RD USAF 1995 OUI RD **JSAF 1996 SWMPR USAF 1996 SWMPR** PNL 1993 OU2 RI IT 1994 EMR IT 1994 EMR Notes Reference BEAR BEAR BEAR BEAR BEAR BEAR b,c b,c ъ, С œ ස ත් ත් đ œ a, Þ م ہ م م æ പെ Analytical Methods 5,6,8 5,6,8 5,6,8 1,4 1,4 8 8 8 1,2,4 1-4 1,3 1,4 1,4 1,4 5,6,8 8 1,4 5,6,8 14 44 ST18, OIL BOILER FUEL SPILL, EIELSON AFB, ALASKA TCE 1.0 ≤5.0≤1.0≥1.1≤1.0≤1.0≤1.0≤1.0≤1.0 - 2.0 1.1 1.0 ⊲.0 2.0 ≤5.0 1.0 2.0 0.9 1.9 1.4 1 1 I 1 1 TPH GRO TPH DRO --15,000 1 1 990 1 1 1 1 2 0 1 t 1 1 1 t 1 1 1 1 1 1 1 2 8 I I 1 1 1 1 Concentration (µg/L) Toluene Ethylbenzene Xylenes 0.0 \$.0 \$5.0\$8.0\$61\$2.7\$1.0 ≤3.0 <5.0 <1.0
 4.0
 1.3
 4.0 ₫.0 ≤1.0 \$.0 \$.0 \$.0 \$.0 ≤1.0 ≤1.0 ≤1.0 ₹.0 \$.0 <1.0 0.0 \$000 \$5.0 <u></u>\$00 9.1 <1.0 \$.0 <1.0 \$0.0 3.0 <1.0 1.6 <1.0 1.0 ≤1.0 \$2.0 €.0 ≤1.0 ≤1.0 <1.0 \$.0 \$.0 <1.0 \$0.0 \$00 \$0.0 \$.0 \$.0 5.0 <1.0 <1.0 \$0.0 ≤1.0 <1.0 ≤1.0 <1.0 ₹0.0 ≤5.0 ≤5.0 \$.0 <1.0 ≤1.0 ≤1.0 ₫.0 ≤2.0 1.6 Sampled Benzene ₫.105 \$.0 \$0.0 \$000 ≤5.0 \$.0 0.12 0.1⊃ \$0.0 ₹0.0 <1.0 1.6 1.2 ≤1.0 \$000 \$0.0 \$0.0 \$0.0 <1.0 <1.0 ≤1.0 \$.0 <1.0 ₹0.0 1.0 8/21/93 7/27/94 0/4/94 3/16/95 9/18/95 9/15/91 8/12/96 7/22/94 Date 8/8/94 9/7/94 9/15/91 10/4/94 8/12/96 8/20/96 1986 1986 1986 76/8/6 9/9/94 1986 16/6 16/6 1986 1986 10/91 18MW05 18MW05 18MW05 18-2 18-3 Well 18-1 18-3 18-3 18-3 18-3 18-5 18-3 18-3 18-3 18-3 18-3 18-5 18-5 18-5 18-5 18-5 18-5 18-3 18-3 18-3 No.

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CONCENTRATIONS ($\mu g/L$) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, ST18, OIL BOILER FUEL SPILL, EIELSON AFB, ALASKA **TABLE ST18-1**

	Reference	BFAR	BFAR	PNI. 1993 OI 17 RI	Id II 10 700 I INd	LISAF 1995 OF IT RD	USAF 1995 OUI RD	PNI 1993 OI 17 PI	IT 1994 EMR	PNL 1993 OU2 RI	
	Notes			8	I	Ą	م ہ	α	1 03	đ	
Analytical	Methods			5.6.8		4	4	568	ç S	5,6,8	
	TCE	ł	ł	\$.0	<1.0	<1.0	<1.0	1.0	\$5.0	1.0	
	TPH DRO	ł	ł	ł	1	<100	600	1	I	· 1	
(T)	TPH GRO	ł	ł	1	1	\$0	%	ł	ł	I	
tration (µg	Xylenes	\$.0	<5.0	≪5.0	I	<1.0	<1.0	\$.0	<5.0	<5.0	
Concen	Ethylbenzene	€.0	≪0.0	≤.0	I	<1.0	<1 .0	<5.0	≪5.0	≪3.0	
	Toluene	≤.0	<5.0	≤5.0	1	<1.0	<1.0	≪5.0	€.0	€.0	
	Benzene	<5.0	≤5.0	€.0	Q.0	<1.0	<1.0	<5.0	≤5.0	€.0	
Date	Sampled	1986	1986	16/51/6	5/18/93	7/26/94	10/4/94	16/6	9/1/94	16/6	
Well	No.	18-6	18-6	18-6	18-6	18-6	18-6	18-7	18-7	18-8	

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:

AK101.	AK102.
6	10.
_	~
8260	8240
7.	œ
5. 8270.	6. 8080.
ADEC 8100M.	8010.
e.	4
8020.	ADEC 8015M.
Ξ.	ц.

Intermediate depth well. Trichloroethene. TCE I

			Reference	USAF 1995 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR		ATTINIAC OCCL TROO	USAL 1990 SWMFR
	_		Notes						
Results		PCE ²	(qdd)	1	ł	ł	1	•	ł
oassav I		TCE ²	(qdd)	I	ł	ł	ł	}	1
Immun	Total	BTEX	(qdd)	1	ł	ł	I		I
			eH (mv)	1	ł	4	ł	08	8
			μd	6.74	6.54	7.59	6 84	10.0 CC L	77.1
		Conductivity	(mmhos/cm)	320	329	368	317	757	4
ameters		Turbidity	(NTU)	ł	10	71	160	-	
Par		Temperature	(°C)	12	11.7	15.2	6.7	43	2
	Dissolved	Oxygen (%	saturation)	I	1	24	ł	I	
	Dissolved	Oxygen	(mg/L)	2.4	1.85	2.35	1.39	0.08	
		Date	Sampled	09/18/95	08/12/96	16/80/60	08/12/96	08/20/96	
		Well	.oV	18-3	18-3	18-3	18-5	8MW05	Notes:

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

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Note

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.

сос	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 μ g/L	10,000 μ g/L
Naphthalenes:		
2 -Methylnaphthalene	140 μ g/L	
Naphthalene	220 μg/L	
Lead	'15 μg/L	'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 μ g/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 μ g/L (19PS11) to 2,160 μ g/L (19PS4), with the highest total BTEX concentration (20,070 μ g/L) occurring in 19PS4. TPH GRO concentrations ranged from 59.8 μ g/L (19PS11) to 61,500 μ g/L (19PS8). TPH DRO concentrations ranged from 320 μ g/L (19PS13) to 318,000 μ g/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 μ g/L, 7,600 μ g/L, and 28,500 μ g/L, respectively. Microwell 19PS31 displayed the highest benzene concentration at 2,200 μ g/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 μ g/L (multiple points) to 130,000 μ g/L (19PS8). GRO concentrations ranged from <500 μ g/L (multiple points) to 52,000,000 μ g/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:

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

List of Tables for ST19:

Table ST19-1	Concentrations (μ g/L) of Organic Compounds in Groundwater Samples,
	ST19, JP4 Fuel Line Spill Area, Eielson AFB, Alaska.
Table ST19-2	Groundwater Parameter and Immunoassay Field Test Results, ST19, JP4
	Fuel Line Spill Area, Eielson AFB, Alaska.



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



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

:

	Reference		THE 1993 CUZ NU	11 1394 EMIR 118 A F 1006 SUITABD	USAT 1990 SWINFR	PNI, 1993 OI 12 RI	PIL 1993 OF 17 RI	PI TO COLUMN	PNL 1993 01/2 RI	PNI, 1993 OLI2 RI	PNL 1993 OU2 RI; PNL 1995 SWRI	INI 1993 OUZ RI	ING CITO FOOL	T 1994 FMR	JSAF 1996 SWMPR	NI 1003 OLI'S DI	NL 1995 SWRI	NI, 1993 SWGMPR	NI 1994 SWGMPR	T 1994 EMR	JSAF 1995 SWMPR	JSAF 1996 SWMPR		NL 1994 SWGMPK	T 1994 EMR	JSAF 1995 SWMPR	JSAF 1996 SWMPR
	Notes		t c	8						8.0	a,d	a	a			a	;	.a	- -		-	-	•	- '	<u>م</u>	-	1
Analytical	Methods	875	2 2 2 3	1910	11/11	1	ł	1	I	5.6.8	1,4	5,6,8	5.6.8	00	1,9,10	568	26262	1.4	1.4	~ ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	I-3	1,9,10		1,4	×	1-3	1,9,10
	TPH DRO	1	1	840	2	1	;	1	1	1	ł	ı	ł	1	<500	1	1	ł	I	1	<100	<500		ł	1	260	≤500
	TPH GRO	1	1	430	2	I	I	ı	1	1	ł	I	ł	1	<100	ł	ł	ł	ł	1	<100	<100		I	1	<50	<100
(μg/L)	Xylenes	130	4.3	5.1		1,100	2,500	3,200	2,800	2,300	4,000	1.0	<5.0	<5.0	<1.0	<5.0	<5.0	<0.202	<1.0	<1.0	<1.0	<1.0	707		J.	<1.0	<1.0
Concentration	Ethylbenzene	42	8.1	1.5		I	240	140	86	390	610	<5.0	<5.0	≤5.0	<1.0	<5.0	<5.0	<0.046	<1.0	<1.0	<1.0	<1.0	0.78	2.2	U 2	<1.0	<1.0
	Toluene	4.0	59	<1.0		1,500	3,600	6,800	4,100	1,500	1,900	5.0	<5.0	<5.0	<1.0	<5.0	<5.0	<0.056	<1.0	<1.0	<1.0	<1.0	05 0>			<1.0	<1.0
	Benzene	6.0	9.5	<1.0		71	ł	35	ł	20	11	€.0	3.0	≤5.0	<1.0	<5.0	≤3.0	<0.105	<1.0	<1.0	<1.0	<1.0	1.04	27		0'I>	<1.0
Date -	Sampled	16/6	9/1/94	9/11/6		1986	1987	1988	1988	16/6	6/11/92	16/6	16/6	9/8/94	9/11/96	16/01	1992	8/24/93	8/2/94	9/1/94	9/14/95	9/11/6	9/1/94	70/01/6	30/11/01	(6/11/01	9/11/96
Well	No.	1-61	1-61	19-1		19-2A	19-2A	19-2A	19-2A	19-2A	19-2A	19-3	19-4	19-4	19-4	19MW06	19MW06	19MW06	19MW06	19MW06	19MW06	19MW06	19MW07	19MW07			19MW07

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TABLE 19-1 (continued)

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	Reference	CRRFI 1995	NTL 11/16/95 RPT.	CRREL 1995	NTL 11/16/95 RPT.	NTL 11/16/95 RPT.	CRREL 1995	CREEL 1995	NTL 11/16/95 RPT. USAF 1996 SWMPR	CRREL 1995	CREEL 1995	CRREL 1995	NTL 11/16/95 RPT.	NTL 11/16/95 RPT.	CRRFI 1995	NTL 11/16/95 RPT.	CRREL 1995	USAF 1996 SWMPR
	Notes	C)	U			U	U		U	U	υ			Û	•	Û	,
Analytical	Methods	I	1,9,10	1	1,9,10	1,9,10	1	I	1,9,10 1,9,10	1	I	1	1,9,10	1,9,10	I	1,9,10	I	1,9,10
	TPH DRO	23.000	106,000	39,000	128,000	31,100	17,000	<700	318,000 52,000,000	18,000	<700	<700	1,180	35,200	00</th <th>320</th> <th>1.200</th> <th>1,900</th>	320	1.200	1,900
	TPH GRO	18.000	5,750	18,000	24,100	16,700	16,000	<120	61,500 130,000	26,000	<120	310	59.8	5220	<120	108	160	260
u (μg/L)	Xylenes	950	1,680	1,280	2,970	2,310	480	3.0	2,760 28,500	1,110	€.0	4.7	2.34	1720	3.0	<0.40	0 .€	<1.0
Concentratio	Ethylbenzene	270	379	470	1,040	578	290	⊴.0	570 7,600	300	0.€>	0.€	0.39	204	€.0	0.20	3.0	<1.0
	Toluene	410	593	3,200	13,900	9,450	460	Q .0	7,870 8,600	1,300	Q .0	Q .0	1.21	2100	Q.0	⊲0.30	\$0.5	<1.0
	Benzene	140	37	420	2,160	929	140	5.8	200 600	210	2 .0	2.0	0.37	25	Q .0	3.15	18	<1.0
Date	Sampled	9/2/94	10/23/95	9/5/94	10/23/95	10/23/95	9/5/94	9/5/94	10/23/95 9/12/96	9/6/94	9/6/94	9/6/94	10/23/95	10/23/95	9/6/94	10/23/95	9/6/94	9/16/96
Well	No.	18991	19PS1	19PS3	19PS4	19PS5	19PS6	19PS7	19PS8 19PS8	6S461	19PS10	118461	11S461	19PS12	19PS13	19PS13	19PS14	19PS14

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TABLE 19-1 (continued)

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	Reference	CRRFI, 1995	NTL 11/16/95 RPT.		USAF 1996 SWMPR	CRREL 1995	CRREL 1995	CRREL 1995	CRREL 1995	NTL 11/16/95 RPT.	CRREL 1995	CRRF1 1005	USAF 1996 SWMPR	CRREL 1995	CRREL 1995	CRREL 1995	CRREL 1995	CRREL 1995	NTL 11/16/95 RPT.	USAF 1996 SWMPR
	Notes	U	ŀ		U	U	U	U	v		υ	C	•	U	U	v	U	U	,	
Analytical	Methods	I	1,9,10		1,9,10	1	ł	I	I	1,9,10	ł	1	1,9,10	I	ł	I	1	I	1,9,10	1,9,10
	TPH DRO	<100	1,900	001/	120	<700	46,000	22,000	1,200	3,430	00</th <th><700</th> <th><\$00</th> <th>98,000</th> <th>24,000</th> <th>1,500</th> <th><700</th> <th>00/></th> <th><250</th> <th>200</th>	<700	<\$00	98,000	24,000	1,500	<700	00/>	<250	200
:	TPH GRO	<120	260	<120	<100	<120	12,000	23,000	2,800	868	<120	<120	<100	>31,000	21,000	1,200	<120	<120	<10	<100
(ˈ/ˈɡ/ʃ	Xylenes	3.0	0.45	20	<1.0	₫.0	440	289	214	444	⊴.0	Q.0 0	<1.0	750	860	11	₫.0	3.0	<0.40	<1.0
Concentration	Ethylbenzene	0.€	1.13	40	<1.0	€.0	350	250	26	28.2	0.€>	3.0	<1.0	420	370	43	€.0	€.0	<0.20	<1.0
	Toluene	Q.0	0.82	2 0	<1.0	<2.0	640	280	6	1.08	42.0	Q .0	<1.0	1,200	820	4.2	2 .0	2 .0	<0.30	<1.0
	Benzene	Q.0	7.4	2.0	<1.0	Q .0	300	190	12	0.44	Q .0	Q .0	<1.0	400	180	43.0	4.2	Q.0	<0.20	<1.0
Date .	Sampled	9/6/94	10/23/95	9/6/94	9/24/96	9/1/94	9/1/94	9/7/94	9/1/94	10/23/95	9/1/94	9/1/94	9/12/96	9/1/94	9/1/94	9/1/94	9/1/94	9/8/94	10/26/95	96/91/6
Well	No.	19PS15	19PS15	19PS17	19PS17	19PS18	618461	19PS20	19PS21	19PS21	19PS22	19PS23	19PS23	19PS24	19PS25	19PS26-A	19PS26-B	19PS27	19PS27	19PS27

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USAF 1996 SWMPR USAF 1996 SWMPR JSAF 1996 SWMPR NTL 11/16/95 RPT. NTL 11/16/95 RPT. CRREL 1995 **CRREL 1995** Notes Reference U 0 o Ð ø ø Ð U o ø Analytical Methods -1,9,10 1,9,10 1,9,10 1,9,10 1,9,10 1 1 1 1 1 ł I TABLE 19-1 (continued) TPH GRO TPH DRO 58,700 15,000 00 √ 2,800 00/> 3,800 00/> 1,020 570 11,000 7,600 00 √ 310 b. No compounds other than those listed were detected above the reporting limits. 20,000 40,900 6,600 24,000 <120</pre> 5,200 710 202 <100 9,400 <120 630 -A (11.16 - 21.00 ft bgs); -B (21.00 - 30.84 ft bgs). d. Reported as 19-02 in PNL 1993 OU2 RI, 19-02A in PNL 1995 SWRI. -A (2.30 - 12.14 ft bgs); -B (21.98 - 31.83 ft bgs). -A, -B, extentions represent different screened interval depths in the well. Ethylbenzene Xylenes e. Field gas chromatograph was used for sample analysis. 1,020 2,330 2,480 Concentration (µg/L) ₹ 0.0 147 21 1.27 <1.0 0.0 V 1.4 161 13 277 c. Other compounds detected: 2-butanone - 48 μ g/L. a. For additional compounds detected, see reference. 0.0 ♡ <1.0 v 0.0 120 13 0.39 <1.0 450 650 450 13 76 Toluene 2,000 10,400 5,000 Ø.0 <1.0 6.03 <1.0 **8** 0 200 140 8.8 110 4 Benzene Ø.0 <1.0 480 1,960 2,200 11.0 25.8 Ø 0:0 110 43 3.5 8.8 6.6 19PS29 & 19PS30 Sampled 10/23/95 0/23/95 96/91/6 9/12/96 9/14/94 9/23/96 9/8/94 9/8/94 9/8/94 9/8/94 9/8/94 9/8/94 9/8/94 Date 19PS26 Analytical Methods: **I9PS29-A** 19PS29-B **A-062461** 19PS30-B 19PS30-B 19PS30-B 19PS28 19PS28 19PS31 19PS32 19PS33 19PS31 19PS31 Well ю́Х Notes:

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AK101. AK102.

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8260. 8240.

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8080.

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5. 8270.

3. ADEC 8100M.

4. 8010.

2. ADEC 8015M.

1. 8020.

	Reference	USAF 1996 SWMPR USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1995 SWMPR USAF 1996 SWMPR USAF 1997 SWMPR	USAF 1995 SWMPR USAF 1996 SWMPR
	Notes				
Immunoassay Results	Total BTEX ¹ (ppb)		ł	ı ı pı	11
	eH (mv)	-94.3 75	-70.7	- 18 122	 -145
	Hq	7.32 7.40	7.49	6.5 7.10 7.42	6.9 7.48
	Conductivity (mmhos/cm)	232 394	661	60 70 86	220 224
arameters	Turbidity (NTU)	168.7 61	120.8	- 84 18	- 1.8
ł	Temperature (°C)	3.45 4.5	3.83	10 5.77 6.9	5 2.89
•	Dissolved Oxygen (% saturation)	6.6 6.8	33.1	 38.9 28	2.0
	Dissolved Oxygen (mg/L)	- 0.86	1	7.1 - 3.27	2.0
R.	Date Sampled	09/11/96 08/25/97	09/11/96	9/14/95 9/11/96 9/19/97	10/11/95 09/11/96
	Well No.	19-1 19-1	19-4	19MW06 19MW06 19MW06	19MW07 19MW07

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.

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GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS,

TABLE 19-2

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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.

сос	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 μ g/L) and total BTEX concentrations (40,900 μ g/L) was detected in 20PP104. A benzene concentration of 12,000 μ g/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 μ g/L). TPH DRO was detected at all locations, with the highest concentration detected at 20M04 (22,000 μ g/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 μ g/L in well 53M04. Wells displaying benzene concentrations above the RAO and ARAR MCL included 20M03 (65 μ g/L), 20M04 (2,400 μ g/L), 20M09 (240 μ g/L), and 53M04 (8,600 μ g/L). Well 20M04 also displayed a toluene concentration of 2,500 μ g/L, and well 53M04 displayed a toluene concentration of 12,000 μ g/L, and ethylbenzene concentration of 1,000 μ g/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 μ g/L (53M04). Monitor well 20M09 displayed a benzene concentration of 140 μ g/L, exceeding the site specific RAO and ARAR MCL. Monitor well 53M04 displayed benzene (1,800 μ g/L), toluene (6,900 μ g/L), and ethylbenzene (890 μ g/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 (2ethylhexyl) phthalate concentration of 17 μ g/L, which is above the EPA drinking water MCL of 6 μ g/L. Other SVOCs detected included phenol (3.0 μ g/L - 20M09, 37 μ g/L 53M04); 2methylphenol (160 μ g/L - 53M04); 4-methylphenol (5.0 μ g/L - 20M11, 82 μ g/L - 53M04); 2,4dimethylphenol (46 μ g/L - 53M04); benzoic acid (30 μ g/L - 53M04); naphthalene (76 μ g/L -53M04) and 2-methylnaphthalene (48 μ g/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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST20 (E-7):

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

List of Tables for ST20 (E-7):

- Table ST20(E-7)-1Concentrations ($\mu g/L$) of Organic Compounds in Groundwater Samples,
ST20 (E-7), Eielson AFB, Alaska.
- Table ST20(E-7)-2Groundwater Parameter and Immunoassay Field Test Results, ST20(E-7)Refueling Loop, Eielson AFB, Alaska.



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

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

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	Notes Reference	UT & 1000 BITES. B.	DEAD		FINE 1994 OUT KL	USAF 1995 OU1 RD	USAF 1995 OUI RD	ur A 1002 BIES.	DEAD	DEAK	FNL 1994 OUI RI	USAF 1995 OUI RD	EA 1995 OUT RD	a USAF 1995 OUT RD		USAF 1996 SWMPR	HI A 1000 DIGS: DEAD	DEAD			USAF 1995 OUI RD	USAF 1995 OUI RD	USAF 1995 OUI RD	USAF 1996 SWMPR	aria pula cont f HI	THAN 1992 NUFS, BEAK	BEAR	USAF 1995 OUI RD	USAF 1995 OUT RD	USAF 1996 SWMPR
Analvtical	Methods	-	-	1 1 5	, , ,	<u>.</u>	1-3	-	•		C,4,1	1-3	1-3	1-3	¦ -	-			371	·,+,1		1-3	1-3	****	-	-		1-3	1-3	I
	Acetophenone																													
	TPH DRO	I	I	1	500	000	<100	I	ł	l	1	1,000	270	2,200		1	1	1	1		72,000	1,900	006'6	1	1		1	1,200	260	ł
μg/L)	TPH GRO	1	1	I	150	3	\$0	1	1		1	370	930	340	1	1	ł	ł	1	25,000	000,000	26,000	50,000	1	I		1	50	<50	1
centration (Xylenes	40.4	<0.85	ł	с 7	0.17	<1.0	28.5	290			39.7	77	16	16	2	3,820	3.820		0 400	2,400	3,790	3,200	1,920	<0.4	20.02	C8.U>	<1.0	<1.0	1.3
Cor	Ethylbenzene	<0.5	<0.46	1	<10 2	0.1	0.1>	6.27	87	; 1		18	23	3.4	<10	217	1,030	1,130	1	3 700	000	880	480	580	<0.46	201	C.U.	<1.0	<1.0	<1.0
	Toluene	<0.3	⊲0.25	1	0 I 2		0.1>	30.9	348	I	0	0.0	<1.0	5.2	<1.0	2.7	13,200	15,800	. 1	810		/,/00	3,800	2,500	0.83	0.02	0.00 2	<1.0	<1.0	<1.0
	Benzene	<0.2	33	0.0	<10		0.12	262	1.190	110		120	300	120	65	5	7,170	11,500	190	5 300		0,000	2,800	2,400	0.32	<015		<1.0	<1.0	<1.0
Date .	Sampled	9/2/89	1989	5/23/93	7/12/94	10/00/0	4616716	9/2/8	1989	5/23/93	1114/04	0.000	9/29/94	7/5/95	7/29/96		9/6/89	1989	5/24/93	7/14/94	10/06/0	46/00/E	C6/01//	96/67//	1989	1080		46/71//	9/29/94	9/23/96
Well	No.	20M02	20M02	20M02	20M02	CUMUC	701017	20M03	20M03	20M03	20MAD2		20M03	20M03	20M03		20M04	20M04	20M04	20M04	POMOC	FOINIO2	201104	20M04	20M05	20M05	201102		20M05	20M05

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					TAB	LE ST20(E	-7)-1 (conti	nued)			
Well	Date	i		Con	icentration ((T)ou			Andratical		
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Acetophenone	Methods	Notes	Reference
20M09	9/2/89	1,190	€.0>	19.3	40.4	I	1		-		
20M09	1989	1,120	<0.25	24.6	<0.85	1			1		HLA 1992 KU/FS; BEAR
20M09	5/24/93	6	1	1	I	ł	,				BEAK
20M09	7/12/94	430	8.9	18	181		1 1		C, 4, 1		PNL 1994 OUI RI
20M09	70/07/0	430			1.01	004			l-3		USAF 1995 OUI RD
OUNAC	20/01/2			1.0	5.0	1,100	240		1-3		USAF 1995 OUI RD
201AI02	C6/01/1	3/0	0.1>	2.4	9.1	1,000	710		1-3	8	USAF 1995 OUT RD
60W07	91/23/96	240	<1.0	<1.0	1.1	ł	1		-		ITSAF 1996 SULVED
20M09	8/28/97	140	<1.0	<1.0	<1.0	ı	I	<10	1,5	٩	USAF 1997 SWMPR
20M10	6/1/6	2.65	0.3	ح ا ہ	ح <u>ا</u> 1						
20M10	1989	4 77	<0.25	10.46	20 07	ł	I				BEAK
OIMOC	7/13/04				C0.7/	1	ł				BEAR
OTAOC		0.17	0.12	1.0	0.1>	\$0	130		1-3		USAF 1995 OUI RD
	4616716		0.1>	<1.0	<1.0	<\$0	120		1-3		USAF 1995 OUI RD
20M11	9/14/89	1.3	1 67	2 (2	101						
20M(11	5/22/03	ې : ۲	10.1		17.1	ł	1		-		HLA 1992 RIFS; BEAR
1 I MOC			1.	1	I	1	1		1,4,5		PNL 1994 OU1 RI
	1/13/94	<1.0	<1.0	<1.0	<1.0	50	940		1-3		USAF 1995 OFF
20M11	9/29/94	<1.0	<1.0	<1.0	1.1	50	1,200		<u>.</u>		LISAF 1995 OT 1 D
20M11	3/9/95	1.3	1.4	<1.0	3.5	<100	2 400) (
20M11	7/5/95	<1.0	<1.0	<1.0	<1.0	050	2 300		<u>.</u> :		
20M11	9/23/96	<1.0	2.0	<1.0	1.3		000- * -		<u>-</u>	æ	
20M11	8/28/97	<1.0	<10	<10		ł	ł	ç	- ;		USAF 1996 SWMPR
			2		0.17	1	I	<10	2,1	υ	USAF 1997 SWMPR
20M12	9/13/89	40.2	⊲0.3	<0.5	40>	ł	I		-		
20M12	5/23/93	Q.0	I	1	I	ł	-				TLA 1992 KU/FS; BEAK
20M12	7/13/94	<1.0	<10	<10		03			1,4,0		FNL 1994 OUI RI
20M12	P0/0C/0	012		0.17	0.17	3	400		I-3		USAF 1995 OUI RD
		0.17	0.1/	0.12	o.1>	0€	<100		1-3		USAF 1995 OUI RD
53M04	68/9/6	6.980	15.900	1 120	3 350						
53M04	1989	12,000	19 700	1 050		I	1		-		HLA 1992 RIFS, BEAR
53M04	5/24/93		00.6.	0001	0000	ł	1				BEAR
TOTALS			1	1	1	I	1		1,4,5		PNL 1994 OU1 RI
40Micc	46/C1//	4,400	720	2,400	11,820	210,000	20,000		1-3		USAF 1995 OUT RD
401WICC	46/67/6	2,100	6,000	460	1,690	53,000	5,000		1-3		USAF 1995 OUI RD
53M04	7/10/95	4 200	10.000	\$20	000 0	70,000					
			10,000	740	00c.c	رvuu, ۲	9,000		1- 3		USAF 1995 OUI RD

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

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

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		2	æ	D	D	D	Q	
	Reference	USAF 1996 SWMP	USAF 1997 SWMP	USAF 1995 OUI R	USAF 1995 OUI R	USAF 1995 OUI R	USAF 1995 OUI RI	
	Notes		q					
Analytical	Methods		1,5	1-3	1-3	1-3	1-3	
	Acetophenone		<10					
	TPH DRO	1	1	6,800	8,600	12,000	7,900	ssel. 1g/L
μ <u>ε</u> /L)	TPH GRO	1	I	27,000	41,000	4,300	92,000	cteristic of die ohthalate - 2 μ
icentration (Xylenes	3,710	3,440	4,200	5,700	700	5,100	ak not chara thylhexyl) _I
Cor	Ethylbenzene	1,000	890	1,100	1,500	110	1,800	ated by large pea - 3 μg/L, bis (2-e
	Toluene	12,000	6,900	8,700	22,000	58	22,000	ram is domir cted: phenol
	Benzene	8,600	1,800	2,400	11,000	150	12,000) chromatog pounds dete
Date	Sampled	9/23/96	8/28/97	7/31/95	7/25/95	7/25/95	7/31/95	a. TPH DRC D. Other com
Well	No.	53M04	53M04	20PP12	20PP17	20PP101	20PP104	Notes: E

c. Other compounds detected: 4-methylphenol - 5 μ g/L. d. Other compounds detected: phenol - 37 μ g/L, 2-methylphenol - 160 μ g/L, 4-methylphenol - 82 μ g/L, 2,4-dimethylphenol - 46 μ g/L, benzoic acid - 30 μ g/L, naphthalene - 76 μ g/L, 2-methylnaphthalene - 48 μ g/L, bis (2-ethylhexyl) phthalate - 17 μ g/L.

Analytical Methods:

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

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SULTS,			Reference		USAF 1996 SWMPK	USAF 1996 SWMPR	USAF 1996 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR
IST RE			Notes										
Y FIELD TE A	Immunoassay	Results	Total BTEX ¹ (ppb)		I	I	t	I	I	I	I	ī	1
JNOASSA B, ALASK			eH (mv)	oc	07	-28	-46.4	-75.7	36	-37.5	-31	83.9	-15
D IMMU SON AF			Hq	0 7	0.0	6.81	6.8	6.85	7.13	6.12	6.74	6.42	6.85
METER AN LOOP, EIEL			Conductivity (mmhos/cm)	CVC	747	379	339	379	386	1468	1992	645	488
ER PARA JELING J	Daramatars		Turbidity (NTU)	۲۲	4	11	687	2097	0	180	410	66	0
UNDWATH (E-7) REFU			Temperature (°C)	76	2.	7.1	3.2	5.6	4.8	7.7	10.8	4.9	5.0
c GRC ST2(Dissolved Oxygen (% saturation)	I		ł	1	ł	4.1	ł	5.0	ł	4.1
r20(E-7)-3			Dissolved Oxygen (mg/L)	1.96)	0.4	0.12	0.19	0.52	0.24	0.54	0.11	0.51
TABLE S'			Date Sampled	01/29/96		07/29/96	09/23/96	09/23/96	08/28/97	09/23/96	08/28/97	09/23/96	08/28/97
1			Well No.	20M03		20M04	20M05	20M09	20M09	20M11	20M11	53M04	53M04

Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

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TABLE ST20(E-7)-2

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.

сос	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 μ g/L (multiple locations) to 570 μ g/L (20M06), with the highest total BTEX concentration (9,600 μ g/L) detected in 20PP79. TPH GRO was detected in 20M06, 20M16, 20PP48, 20PP52, 20PP79, 20PP80 and 20PP801, with the highest concentration (10,000 μ g/L) detected at 20PP79. TPH DRO was detected at all locations, with the highest concentration (4,000 μ g/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

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20M06, 20PP79, and 20PP801, with benzene concentrations ranging from below detection limits (multiple points) to 46 μ g/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 Groundwater Monitoring Report, USAF, 1997
1996 Sitewide Groundwater Program Workplan Addendum, 1997

List of Figures for ST20 (E-8):

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	ST20 (E-8) Refueling Loop, Eielson AFB, Alaska.
Table ST20(E-8)-2	Groundwater Parameter and Immunoassay Field Test Results, ST20(E-8)
	Refueling Loop, Eielson AFB, Alaska



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TAB	LE ST20(1	E-8)-1 C	ONCENT	RATIONS (μ) Γ20 (E-8) REF	g/L) OF O	RGANIC (LOOP, EII	COMPOUN ELSON AF	VDS IN GF B, ALASK	KOUNI	DWATER SAMPLES,
Well	Date			Concentratio	on (µ£/L)			Analvtical		
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Methods	Notes	Reference
20M06	68/9/6	62.3	3,040	431	1.550	1	ł	15	α	HI A 1900 RIJES: BEAD
20M06	1989	481	939	87	236	ł	I	n t	\$	BEAR
20M06	5/20/93	570	I	ł	I	1	ł	1.4.5		PNI 1994 OTH RT
20M06	7/11/94	19	16	6.2	99	3,500	2,100	1-3 -		USAF 1995 OUI RD
20M06	9/28/94	LT	250	27	63	870	240	1-3		USAF 1995 OTH RD
20M06	3/9/95	1.5	1.9	<1.0	<1.0	380	200	1-3	U	USAF 1995 OUI RD
20M06	7/6/95	1.6	72	24	45	3,400	4,000	1-3	م	USAF 1995 OUT RD
20M06	7/30/96	<1.0	<1.0	<1.0	1.1	I	1	-		USAF 1996 SWMPR
20M13	6/12/80	<0.2	<0.3	<0.5	<0.4	1	1	15	a	HI A 1007 DI/FS: DE AD
20M13	5/24/93	2 .0	1	I	1	ł	ł	145	3	PNI 1004 OTTI DI
20M13	7/11/94	<1.0	<1.0	<1.0	<1.0	<50	110			USAF 1995 OUT RD
20M13	9/28/94	<1.0	<1.0	<1.0	<1.0	<50	100	1-3		USAF 1995 OUI RD
20M14	9/13/89	0.45	0.87	<0.5	<04	I	I	2	c	UT A 1003 BYRG. DE AD
20M14	5/25/93	<2.0	ł	1	1	ł	1	1 4 5	5	DNI 1004 OTI DI
20M14	7/12/94	<1.0	<1.0	<1.0	<1.0	<50	380			115AF 1005 OT1 DD
20M14	9/29/94	<1.0	6.1	<1.0	<1.0	<50	230			USAF 1995 OUI RD
20M15	9/14/89	<0.2	<0.3	<0.5	<0.4	ł	I	15	a	HI A 1007 DI/EC. DE AD
20M15	5/25/93	2.0	ł	1	1	I	I	145	3	PNI 1004 OTT DI
20M15	7/11/94	<1.0	<1.0	<1.0	<1.0	<50	150			USAF 1995 OUT RD
20M15	9/28/94	<1.0	<1.0	<1.0	<1.0	<50	130	1-3		USAF 1995 OUI RD
20M15	3/9/95	<1.0	<1.0	<1.0	<1.0	<100	<100	1-3		USAF 1995 OUI RD
20M15	7/30/96	<1.0	<1.0	<1.0	<1.0	1	ł	1		USAF 1996 SWMPR
20M16	9/14/89	<0.2	<0.3	<0.5	<0.4	1	I	1.5	α	HI A 1993 RIVES READ
20M16	7/11/94	<1.0	<1.0	<1.0	<1.0	67	<100	l-3	I	USAF 1995 OUT RD
20M16	9/28/94	<1.0	<1.0	<1.0	<1.0	110	180	1-3		USAF 1995 OUI RD
20M16	3/9/95	1.3	1.1	<1.0	1.5	<100	150	1-3		USAF 1995 OUI RD
20M16	7/6/95	<1.0	<1.0	<1.0	<1.0	54	420	1-3	Ą	USAF 1995 OUI RD
20M16	7/30/96	<1.0	<1.0	<1.0	<1.0	1	ł	1		USAF 1996 SWMPR

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b. TPH DRO chromatogram is dominated by large peak not characteristic of diesel.
 c. Sampled without purging

Analytical Methods:

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

	Dafaran	USAF 1996 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR	
	Notes	I III	I	ł	ø	I	
Immunoassay Results	Total BTEX ¹	-	1	pu	1	ł	
	eH (mv)	116	118	135	127	136	
	Ha	6.53	6.58	7.26	6.97	6.41	
	Conductivity (mmhos/cm)	270	267	376	374	213	
Parameters	Turbidity (NTU)	6	6	11	18	Ś	
	Temperature (°C)	4.5	9.7	8.7	7.8	6.6	
	Dissolved Oxygen (% saturation)		I	36.8	23	ł	
	Dissolved Oxygen (mg/L)	2.46	4.71	4.20	2.73	3.41	
	Date Sampled	7/30/96	7/30/96	8/26/97	8/26/97	7/30/96	
	Well No.	20M06	20M15	20M15	20M15	20M16	

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.

сос	RAO/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 μg/L	5 μg/L
Toluene	l,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.

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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 $<1.0 \ \mu g/L$ (multiple locations) to 180 $\mu g/L$ (20M07), with the highest total BTEX concentration occurring at 20M07 (797 $\mu g/L$). TPH GRO concentrations ranged from $<50 \ \mu g/L$ (20M21, 20M22, and 20M26) to 25,000 $\mu g/L$ (20M07). TPH DRO was detected at all locations with concentrations ranging from 110 $\mu g/L$ (20M20) to 27,000 $\mu g/L$ (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 μ g/L benzene, 17 μ g/L toluene, 37 μ g/L ethylbenzene, and 252 μ g/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):

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

List of Tables for ST20 (E-9):

Table ST20(E-9)-1	Concentrations ($\mu g/L$) of Organic Compounds in Groundwater Samples,
	ST20 (E-9) Refueling Loop, Eielson AFB, Alaska.
Table ST20(E-9)-2	Groundwater Parameter and Immunoassay Field Test Results, ST20(E-9)
	Refueling Loop, Eielson AFB, Alaska.



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Well	Date			٢	montration (, T.,			•		
o N	Samuled	Bentene	Tolucia	E41.41	V	18/L)			Analytical		
	and man	DUIDAIN	1 Uluciic	ruiyioenzene	Aylenes	IPH GKO	OXU HAI	Chlorobenzene	Methods	Notes	Reference
10M	1989	3.0	60	24	432	ł	I	1	1.5		HT A 1007 DI/CC: DC AD
M01	1989	3,060	2,010	24	2.200	1	I	1	2	1	DEAD
M01	5/19/93	<2.0	1	ł	1	1	1		3 7 1		DEAK
M01	7/15/94	37	82	300	\$30	0000		ł	c,+,1		FNL 1994 UUI KI
VIOI	F0/8C/0	; ;	20 3			0,200	3, /00	1	1-3		USAF 1995 OUI RD
	10/01/0	1.0	0.7	0.0	40	630	1,100	1	I-3		USAF 1995 OUI RD
	C6/01/5	<1.0	2.7	<1.0	3.7	100	<100	ı	I-3		USAF 1995 OUI RD
101	7/6/95	3.9	88	25	260	3,400	2,300	1	1-3	م	USAF 1995 OUI RD
101	7/29/96	<1.0	<1.0	1.9	6.6	ł	ı	1	1		USAF 1996 SWMPR
407	9/12/89	4,430	6,600	387	1.590	I	1	1	•	ı	at na shina cont t Hi
~I07	1989	0.47	0.28	<0.46	<0.85	I	ł	1	1,1	đ	FLA 1992 NUFS; BEAK
407	5/20/93	660	1	1	1		ł	I			BEAK
VI07	F6/61/L	740	2 300	270	1 050	76 000		1	1,4,5		FNL 1994 OUI RI
407	6/28/94	350	020	070	006'I	000,62	14,000	ł	1-3		USAF 1995 OUI RD
107	3/16/05		0.7	0.1	000	0,100	I,	ł	1,2	o	USAF 1995 OUI RD
		007	400	017	830	9,000	6,800	I	1-3	o	USAF 1995 OUI RD
101	56/01/2	077	120	120	550	3,700	9,400	ł	1-3		USAF 1995 OUI RD
	06/67/1	180	0/	81	466	1	:	1	1		USAF 1996 SWMPR
107	16/87/8	63	17	37	252	ł	1	<1.0	1,4		USAF 1997 SWMPR
408	68/9/6	98	1.7	1 2	٣t	ł					
80V	1989	1.33	1.16	==≤0.46	733		I	I	c,1	4	HLA 1992 KUFS; BEAR
¥08	5/20/93	440	1	ł	1	1	! 1	1			BEAK
801	7/18/94	140	<1.0	<10	<1.0	300	010	l	1,4,J		FNL 1994 OUL KI
408	9/28/94	25	<1.0	3.4	212	000	071	1	<u></u>		USAF 1995 OUI RD
108	3/10/05	30		1	ic	100	001	1	2		USAF 1995 OUI RD
208	20/2/1	5 6	0.1	0.1 <u>~</u>	8.7	<001	<100	1	I-3		USAF 1995 OUI RD
00		2 ;	0.1/	1.1	5.1	260	1,300	1	1-3	0	USAF 1995 OUI RD
001	06/67/1	10	0.1>	<1.0	2.8	:	ł	1	1		USAF 1996 SWMPR
202	8/28/91	0.1>	<1.0	<1.0	<1.0	1	ł	<1.0	1,4		USAF 1997 SWMPR
<i>·</i> 120	9/14/89	<0.2	<0.3	<0.5	<0.4	1	ı	I	13	•	HI & 1007 DI/CC. DC AD
420	1989	1	ł	I	:	:	1	I	ł	1	
120	\$/19/93	2.0	1	1	1	ł	1	1	1 1 6		BEAK
V20	7/18/94	<1.0	<1.0	<1.0	<1.0	<\$0	400	1	, , , ,		FNL 1994 UUI KI
1 20	9/21/94	<1.0	<1.0	0 I>	012	\$0 }	000	I			USAF 1995 OUT RD
		2		A.1.	0.17	2	110	1	I-3		USAF 1995 OUI RD

TABLE ST20 (E-9)-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES.

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Well	Date			Ŭ	oncentration (p	ug/L)			Analytical
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Chlorobenzene	Methods
20M21	5/19/93	2 .0	ı	1	I	ı	1	ſ	1 1 6
20M21	7/18/94	<1.0	<1.0	<1.0	<1.0	€0	560	I	1-3
20M22	68/21/6	30.5	<0.3	40.5	<0.4	I	:	1	3 1
20M22	1989	1	ı	1		1	1	1	c,1
20N122	5/25/93	<2.0	I	I	1	1	ł	I	145
20Nf22	7/27/94	<1.0	<1.0	<1.0	<1.0	€0	180	ı	1-3
20M22	9/27/94	<1.0	<1.0	<1.0	<1.0	9€	120	I	1-3
20M23	9/12/89	178	1.07	11.2	<0.4	1	1	1	\$ 1
20M23	1989	1	ł	I	1	ı	I	1	
20M23	5/20/93	2.1	1	I	3	1	1		145
20N123	7/18/94	<1.0	<1.0	<1.0	<1.0	<\$0	510	t	
20M23	9/27/94	<1.0	<1.0	<1.0	<1.0	€0	180	1	
20M23	7/29/96	<1.0	<1.0	<1.0	1.2	1	1	;	·
20N123	8/28/97	<1.0	<1.0	<1.0	<1.0	1	ı	<1.0	1,4
20M24	9/26/89	2.25	0.56	≤0.5	40>	ł	I	1	*
20M24	1989	i	1	1	I	ł	1		1
20M24	\$/20/93	0.93	ł	1	ı	I	1	1 1	145
20M24	7/18/94	1.6	<1.0	<1.0	2.4	<\$0	530	1	
20N124	9/27/94	<1.0	<1.0	<1.0	<1.0	<\$0	180	1	1 1
20M25	7/27/94	16	53	12	129	1,300	1,200	1	1-3
20M25	9/28/94	4.2	2.2	5.0	37.6	1,700	, 1	ı	1.2
20M25	7/10/95	4.2	1.9	1.4	5.1	400	610	ı	1-3
20M26	5/24/93	2.0	I	1	ı	I	ł	I	571
20M26	7/27/94	<1.0	<1.0	<1.0	<1.0	€0	<100	1	
20M26	9/27/94	<1.0	<1.0	<1.0	<1.0	€	120	ł	
20M26	1996	Didn	tot sample bec	ause well is located	l in restricted a	rrca.			
20PP58	7/31/95	190	48	26	530	2,000	870	ı	1-3
20PP115	8/1/8	340	3,600	270	4,200	14,000	27,000	I	1-3
20PS22V	8/1/95	22	2,200	520	3,200	10.000	9.900	1	1-3

HLA 1992 RI/FS; BEAR

BEAR

PNL 1994 OUI RI USAF 1995 OUI RD USAF 1995 OUI RD

USAF 1995 OUI RD USAF 1995 OUI RD USAF 1995 OUI RD

PNL 1994 OUI RI USAF 1995 OUI RD USAF 1995 OUI RD

USAF 1996 SWMPR

USAF 1995 OUI RD

USAF 1995 OUI RD USAF 1995 OUI RD

USAF 1995 OUI RD USAF 1996 SWMFR USAF 1997 SWMFR

USAF 1995 OUI RD

PNL 1994 OUI RI

-TARIF STONE-01-1 HLA 1992 RJFS; BEAR BEAR PNL 1994 OUI RI

PNL 1994 OUI RI USAF 1995 OUI RD

Reference

USAF 1995 OUI RD USAF 1995 OUI RD

HLA 1992 RI/FS; BEAR BEAR

Montation (µgL) Analytical Xylence TPH GRO TPH DRO Chlorobenzene Methods Notes Reference <1.0 270 500 - 1-3 USAF 1995 OUI RD areacteristic of dicsel. - 1-3 USAF 1995 OUI RD areacteristic of dicsel. - 1-3 USAF 1995 OUI RD stracteristic of dicsel. - 1-3 USAF 1995 OUI RD areacteristic of dicsel. - 1-3 USAF 1995 OUI RD areacteristic of dicsel. - 1-3 USAF 1995 OUI RD was frozen on 10-Mar-95, hot water poured into well and purged 5 gal. before sampling. 9. AK101. 9. AK101. 6. 8080. 8. 8240. 9. AK102. 10. AK102. 10. AK102.	Analytical Analytical Ethylbenzene Xylenes TPH GRO TPH DRO Chlorobenzene Methods Notes Reference <1.0 <1.0 270 500 - 1-3 USAF 1995 OUI RD reference. 1-3 USAF 1995 OUI RD reference. 1-3 USAF 1995 OUI RD reference. 1-3 USAF 1995 OUI RD reference. reference. terrester terrester terrester terrester 0M. 5 8270. 7. 8260. 9. AK101. 6. 8080. 8. 8240. 10. 10. AK102.	Tolucine Ethylbenzene Xularytical Analytical $7-10$ -1.0 210 270 500 -1.3 USAF 1995 OUI RD 4 -1.0 -1.0 210 270 500 -1.3 USAF 1995 OUI RD 4 -1.0 -1.0 270 500 -1.3 USAF 1995 OUI RD 4 -1.0 -1.0 270 200 -1.3 USAF 1995 OUI RD 4 -1.0 -1.0 270 200 -1.3 -1.3 -1.3 3 -1.0 -1.0 -1.0 -1.0 -1.3 -1.3 -1.3 4 8010 . -1.0 -1.820 -1.820 -1.320 -1.320 -1.320 4 8010 . -1.820 -1.820 -1.820 -1.920 -1.920 -1.920 4 8010 . -1.8200 -1.8200 -1.8200 -1.9200 -1.9200 -1.9200 -1.9200 -1.9200 -1.9200 -1.9200 -1.9200 -1.9200 -1.9200 <t< th=""><th><1.0 <1.0 <1.0 270 500 - 1.3 USAF 1995 OUI RD latite compounds detected, see reference. . . 1.3 USAF 1995 OUI RD . chromatogram is dominated by large peak not characteristic of disesl. . . 7.856. <t< th=""><th></th><th></th><th></th><th></th><th></th></t<></th></t<>	<1.0 <1.0 <1.0 270 500 - 1.3 USAF 1995 OUI RD latite compounds detected, see reference. . . 1.3 USAF 1995 OUI RD . chromatogram is dominated by large peak not characteristic of disesl. . . 7.856. . <t< th=""><th></th><th></th><th></th><th></th><th></th></t<>					
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Subsect at the image of th	Concentration (HgL) Ethylbenzene Xylense TPH GRO TPH DRO Chlorobenzer <1.0	Toluene Ethylbenzene Xylenus TPH GRO TPH DRO Chlorobenzen <1.0	 <1.0 <1.0 <1.0 <1.0 <1.0 270 500		Ana		rged 5 pal.	0 0
nocentration (µg/L) Xylenes TPH GRO TPH DRO <1.0 270 500 <1.0 270 500 satesteristic of diesel. was frozen on 10-Mar-95, hot water poured in 5. 8270. 7. 8260. 6. 8080. 8. 8240.	Concentration (1g/L) Ethylbenzene Xylenes TPH GRO TPH DRO <1.0 <1.0 270 500 <1.0 1.0 500 reference. y large peak not characteristic of diesel. t purging. 20M07 was frozen on 10-Mar-95, hot water poured in t purging. 20M07 was frozen on 10-Mar-95, hot water poured in 0.0. 5. 8270. 7. 8260. 6. 8080. 8. 8240.	Tolucne Ethylbenzene Xylenes TPH GRO TPH DRO <1.0	 <1.0 <1.0 <1.0 500 500 latile compounds detected, see reference. chromatogram is dominated by large peak not characteristic of diesel. ected in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 20M07 was frozen on 10-Mar-95, hot water poured in well, sampled without purging. 		do-oft	-	ito well and pu	•
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Xylenes <1.0 <1.0 was frozen on 5. 8270. 6. 8080.	Ethylbenzene Xylenes <1.0 <1.0 <1.0 <1.0 y large peak not characteristic of t purging. 20M07 was frozen on 0M. 5. 8270. 6. 8080.	Tolucne Ethylbenzene Xylenes <1.0	 <1.0 <1.0 <1.0 <1.0 <1.0 latile compounds detected, see reference. chromatogram is dominated by large peak not characteristic of ected in well, sampled without purging. 20M07 was frozen on 3. ADEC 8100M. 5. 8270. 5M. 4. 8010. 6. 8080. 	g/L)	TPH GRO	270	diesel. 10-Mar-95, hot	
	Ethylbenzene <1.0 <1.0 y large peak not ch t purging. 20M07 0M.	Tolucne Ethylbenzene <1.0	 <1.0 <1.0 <1.0 <1.0 latile compounds detected, see reference. chromatogram is dominated by large peak not cleeted in well, sampled without purging. 20M07 3. ADEC 8100M. 5M. 4. 8010. 		Vicciu auton (µ Xvienes	<1.0	haracteristic of o was frozen on	5. 8270. 6. 8080.
Sampled Benzene Toluene 8/1/95 <1.0	Sampled Benzene 8/1/95 <1.0 a. For semivolatile compound b. TPH DRO chromatogram c. Product detected in well, s thods: 1. 8020. 2. ADEC 8015M.	Sampled 8/1/95 b. TPH DRO b. TPH DRO c. Product det thods: 1. 8020. 2. ADEC 801 2. ADEC 801		Well	No.	20PS27V	Notes:	Analytical Met

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suLTS,			Reference	USAF 1996 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR
IST RES			Notes							
Y FIELD TE CA	Immunoassay Results	Totol DTEV	1000 D1CA	1	I	ł	1	I	I	1
JNOASSA B, ALASk			eH (mv)	-25	48	-51	76	46	106	120
D IMMI SON AI			Hq	6.75	6.55	7.22	6.45	6.83	6.62	6.95
METER AN LOOP, EIEL		Conductivity	(mmhos/cm)	213	396	450	416	514	363	392
JELING	Parameters	Turhidity	(NTU)	11	7	0	46	72	19	34
UNDWATH (E-9) REFU		Temperature	(°C)	5.9	11.9	13.5	8.5	9.3	11.9	9.4
2 GRO ST20		Dissolved Oxvgen (%	saturation)	I	ł	17	1	17	ł	21.2
ľ20 (E-9)-		Dissolved Oxvgen	(mg/L)	1.27	2.25	1.76	1.98	1.95	1.38	2.38
TABLE S		Date	Sampled	7/29/96	7/29/96	8/28/97	7/29/96	8/28/97	7/29/96	8/28/97
-			Well No.	20M01	20M07	20M07	20M08	20M08	20M23	20M23

¹ RaPID Assays Ohmicron Total BTEX field test kit.

Notes:

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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 Or	ganic 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 Or	rganic Compounds
DDT	
Chlordane	2 μg/L
Inorganic	Compounds
¹ Lead	15 μg/L
²Silver	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 μ g/L in B-18. Wells displaying benzene concentrations above the site specific ARAR MCL include B-4 (17 μ g/L), B-18 (1,300 μ g/L), and 53M01 (95 μ g/L). Elevated toluene, ethylbenzene, and xylenes concentrations were displayed in B-4, B-18, and 53M01. B-18 displayed a toluene concentration (8,900 μ g/L) which exceeded site specific ARAR MCLs. No other BTEX compounds exceeded site specific ARAR MCLs. Lead was detected in B-4 (1.4 μ g/L) and B-18 (5.8 μ g/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:

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

List of Tables for DP-25:

Table DP25-1	Concentrations (μ g/L) of Organic Compounds and Lead in Groundwater
Table DP25-2	Samples, DP25, E-6 Fuel Tank Sludge Burial Pit, Eielson AFB, Alaska. Concentrations ($\mu g/L$) of PAH Organic Compounds in Groundwater
Table DP25-3	Samples, DP25, E-6 Fuel Tank Sludge Burial Pit, Eielson AFB, Alaska. Groundwater Parameter and Immunoassay Field Test Results, DP25, E-6
	Fuel Tank Sludge Burial Pit, Eielson AFB, Alaska.



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

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Notes Reference	PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI a,b PNL 1995 OU 3,4,5 RI Pine & Swallow, 1994	PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3,4,5 RJ a,b PNL 1995 OU 3,4,5 RJ Pine & Swallow, 1994 USAF 1996 SWMPR	a,b PNL 1995 OU 3,4,5 RI a,b PNL 1995 OU 3,4,5 RI	a,b PNL 1995 OU 3,4,5 RI	PNL 1995 OU 3,4,5 RI a,b PNL 1995 OU 3,4,5 RI Pine & Swallow, 1994	 a PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI a,b PNL 1995 OU 3,4,5 RI Pine & Swallow, 1994 	PNL 1995 OU 3,4,5 RI
Analytical Methods	1,4,11 1,4,11 1,4,11 8,11	1,4,11	1,4,11 8,11 1,11	8,11 8,11	8,11	1,4,11 8,11	1,4,11 1,4,11 8,11	1,4,11
Total Lead	11121	1 1	12 - 12	12 42	40	362 33 -	291 <5.0 9.2 -	5.0
Dissolved Lead		1 1	1 1 1 1	: :	ł	111		ł
TPH DRO	 <700	1 1	- 1,100 7,400	<100 <100	<100	- <100 <700	- - 1,100 2,800	ł
ion (μg/L) TPH GRO		1 1	 1,900 19,000 	<2,000 <2,000	<2,000	- <2,000 <120	- 950 4,300	ł
Concentrat Xylenes	 180 280 300 135		2,600 1,710 2,630	<5.0 <5.0	<5.0	- \$ 3.0	- 480 230 230	8,600
Ethyl- benzene	- 22 - 22 24	- 2.0	 840 330.0	11	ł		- 150 - 150	1,000
Toluene		1 1	34,000 250 710 69	<5.0 <5.0	<5.0	- <5.0 <2.0	1,200 210 36 94	6,800
Benzene	290 61 150 69	250 3.0	 <5.0 17	<5.0 <5.0	<5.0	- <2.0	150 53 20 31	46
Date Sampled	1988 6/10/92 8/10/92 4/6/93 9/20/94	1988 1988	1988 4/6/93 9/20/94 8/20/96	4/7/93 4/8/93	4/8/93	1988 4/6/93 9/20/94	1988 8/12/92 4/14/93 9/20/94	1988
Well No.	8-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	B-2 B-3	Щ Щ Щ Щ Щ Щ 4 4 4 4	B-5 B-6	B-7	B-14 B-14 B-14	B-15 B-15 B-15 B-15	B-16

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TABLE DP25-1 (continued)

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PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RU PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RU PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RI PNL 1995 OU 3,4,5 RU PNL 1995 OU 3,4,5 RI Pine & Swallow, 1994 **USAF 1996 SWMPR** JSAF 1996 SWMPR **CRREL**, 1994 Notes Reference a,b a,b a,b æ đ Ö 8 8 đ ଷ Analytical Methods 1,4,11 1,4,11 1,4,11 1,4,11 1,4,11 1,4,11 4,11 1,4,11 1,4,11 1,4,11 1,4,11 8,11 8,11 8,11 1,11 8,11 8,11 8,11 1,11 1,4,11 Lead Total 44.3 66.4 21 49 <5.0 5.7 16 <5.0 <5.0 <5.0 <5.0 <1.0 5.0 5.0 5.8 6.0 30 1 1 55 8.0 Dissolved Lead <1.0 <1.0 <1.0 <1.0 <1.0 ł 1 1 1 1 1 1 1 ł ł 1 ł ł 1 1 1 ł Xylenes TPH GRO TPH DRO 17,000 <100 <100 <100 I I 017 ł 1 1 ł 1 1 1 1 1 1 ł : : ł 1 Concentration (µg/L) 28,000 <2,000 <2,000</pre> <2,000 <2,000</pre> 1 1 1 ł 1 1 1 1 1 1 1 ł I 2,340 5,200 <0.85 <5.0 9,100 3,400 <5.0 <5.0 <0.85 <5.0 <5.0 <0.85 <5.0 <5.0 <1.0 <0.85 <0.85 <5.0 <5.0 1.11 13 ł benzene Ethyl-1,900 1,100 1,100 <0.46 <0.46 <0.46 <0.46 <0.46 <\$.0 2,000 ₹ 0.7 ₹ 0.7 <2.0 <1.0 <0.46 <2.0 1 ł I ł 1 Toluene 11,300 24,000 6,100 8,900 8,900 7.0 <0.25 **2**.0 <\$.0 <0.25 <0.25 <0.25 <0.25 <2.0 <5.0 <0.25 5.0 <5.0 <1.0 **2**.0 <5.0 Benzene 7,900 1,700 2,810 1,700 <0.15 <0.15 <0.15 3.0 <2.0 <\$.0 <0.15 <2.0 <\$.0 5.0 <5.0 <1.0 ₹.0 <5.0 3.3 ł Sampled 4/14/93 1988 4/14/93 0/6/94 8/20/96 8/11/92 8/11/92 8/11/92 1988 8/11/92 4/7/93 Date 4/7/93 8/20/96 1988 1988 1988 4/7/93 4/7/93 1994 1988 1988 1988 25M02 25M02 25M03 25M04 25M05 25M01 25M01 25M01 25M02 25M04 25M06 25M06 25M04 25M04 25M06 B-17 B-17 B-18 B-18 B-18 B-18 B-18 Well No.

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	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. 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.
 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, 48 µg/L. Background maximum concentrations for lead: dissolved, <1.0 µg/L; total, 31 µg/L. Background maximum concentrations for lead: dissolved, <1.0 µg/L; total, 33 µg/L. Background maximum concentrations for lead: dissolved, <1.0 µg/L; total, 31 µg/L. Background maximum concentrations for lead: dissolved, <1.0 µg/L; total, 31 µg/L. Background Methods: j. ADEC 8015M. d. 8010. f. 8020. g. AK101. g. AK101. g. 3270. g. 8, 8240. g. AK101. g. 3310 	 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. 	
M01 1988 985 4,680 902 2,810 <-1.0 16 1,4,11 PNL 1995 OU 3,4,5 R1 001 4,893 60 170 740 730 <2,000	M01 1988 985 4,680 902 2,810 <1.0 16 1,4,11 PNL 1995 OU 3,4,5 RI M01 4/8/93 60 170 740 730 <2,000	M01 1988 985 4,680 902 2,810 <1.0 16 1,4,11 PNL 1995 OU 3,4,5 R1 M01 4/8/93 60 170 740 730 <2,000

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

2

			0	oncentration (p	ug/L)						
Vaphthaicne Acenaphthylene	Acenaphthylene	 Fluorenc	Phenanthrene	Fluoranthene	Pyrene	Benzo [a] - anthracene	Benzo [b] fluoranthene	Benzo [k] - fluoranthene	Benzo [a] - pyrene	Analytical Methods	Notes Reference
37.0 <2.3	2.3	0.17	0.53	0.90	0.30	0.096	0.022	0.012	0.029	12	USAF 1996 SWMP
44 2.7	2.7	0.53	1.0	0.71	<0.27	0.120	<0.018	<0.019	⊲0.024	12	USAF 1996 SWMP
<1.8 2.3	2.3	<0.21	<0.64	<0.21	<0.27	<0.014	<0.018	<0.019	⊴0.024	12	USAF 1996 SWMP
7.9 - 2.3	23	0.11	<0.64	<0.21	<0.27	<0.014	<0.018	<0.019	⊲0.024	12	USAF 1996 SWMP
3. ADEC 8100M. 4. 8010	ADEC 8100M. 8010		4) Q	5. 8270. 6. 8080.		7. 8 260. 8. 8240.	0,	9. AK101. 10. AK102.		11. 7421. 12. 8310	

9 AK101	10. AK102.	
7. 8260.	8. 8240.	
5. 8270.	6. 8080.	
3. ADEC 8100M.	4.8010	
1. 8020.	2. ADEC 8015M.	

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.

			Reference	USAF 1996 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR
			Notes								
, ALASKA	Immunoassay Results	Totol	BTEX ¹ (ppb)	1	ł	0.00nd	:	pu	pu	:	1,070
SON AFB.			eH (mv)	ł	I	80	1	-16	-66	I	-39
IT, EIEL			Hq	6.7	6.57	7.64	6.92	7.77	8.64	6.91	7.61
BURIAL P			Conductivity (mmhos/cm)	265	361	318	275	344	298	361	394
SLUDGE	Parameters	Th: dite.	(UTU)	36	48	42	32	ñ	28	4	40
JEL TANK		Temperature	(°C)	11.2	7.9	12.2	12	10.4	9.2	11.9	10.6
25, E-6 Fl		Dissolved	oxygen (% saturation)	I		14.0	I	4.5	22.0	ł	0.6
DP		Dissolved	(mg/L)	1.64	4.01	1.48	2.98	0.49	2.4	3.12	0.98
		Date	Sampled	8/20/96	8/20/96	8/25/97	8/20/96	8/25/97	8/25/97	8/20/96	8/25/97
			Well No.	B-4	B-18	25-2	25M04	25M04	25M06	53M01	53M01

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.

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TABLE DP25-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS,

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DP26: see ST13/DP26

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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.

сос	ARAR (Groundwater) - Drinking water MCL
Volatile Or	ganic 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 Or	ganic Compounds
DDT	
Chlordane	2 μg/L
Inorganic	Compounds
'Lead	15 µg/L
²Silver	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 μ g/L to 54 μ g/L. In June 1992, total lead concentrations were measured at 12 μ g/L to 120 μ g/L in

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groundwater samples. These values, however, are not directly comparable with the 1994 data because of different sample preparation procedures. The 1994 result of 54 μ g/L in the groundwater sample from well B-8 exceeds the 1994 UCL total lead background value of 33 μ g/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 μ g/L, 7 μ g/L, and 47 μ g/L, respectively. No BTEX concentrations were detected above site specific ARAR MCLs. Lead concentrations ranged from <1.0 μ g/L (B-11, B-13) to 3.5 μ g/L (B-19). No lead concentrations exceeded the site specific ARAR MCLs. Naphthalene (1.1 μ g/L - B-19), dibenzo [a,h] anthracene (0.021 μ g/L - B-13), and benzo [k] fluoranthene (0.011 μ g/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 Report, USAF, 1997
1997 Sitewide Groundwater Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST27:

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

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Groundwater Samples, ST27, E-11 Fuel Storage Tank Area, Eielson AFB,
Alaska.

List of Tables for ST27 (continued):

Table ST27-2Concentrations (μg/L) of PAH Organic Compounds in Groundwater
Samples, ST27, E-11 Fuel Storage Tank Area, Eielson AFB, Alaska.Table ST27-3Groundwater Parameter and Immunoassay Field Test Results, ST27, E-11
Fuel Storage Tank Area, Eielson AFB, Alaska.

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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

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				Co	ncentration (ug/L)						
Well	Date			Ethyl-				Dissolved	Total	Analytical		
No.	Sampled	Benzene	Toluene	benzene	Xylenes	TPH GRO	TPH DRO	Lead	Lead	Methods	Notes	Reference
B-8	6/10/92	<2.0	<2.0	<2.0	<5.0	1	1	ł	22	1411	α	PNI 1995 011345 R
B-8	8/14/92	<2.0	<2.0	<2.0	<5.0	ł	ł	ł	84	1411	5 a	PNI 1995 OII 3 4 5 B
B-8	8/5/94	ł	ł	ł	:	<250	<250	ł	54		1	PNI 1994 SWGMPR
B-8	10/6/95	<1.0	<1.0	<1.0	<1.0	<50	150	<1.0	8.7	14.11	8	USAF 1995 SWMPR
B-8	8/20/96	<1.0	6.6	2.9	19.8	ł	ł	ł	3.4	1,11	Ą	USAF 1996 SWMPR
B-9	6/11/92	<2.0	<2.0	<2.0	<5.0	:	ł	;	6.8	1.4.11	đ	PNI, 1995 OU 3 4 5 R
B-9	8/14/92	<2.0	<2.0	<2.0	<5.0	ł	1	1	<5.0	1,4,11	. c3	PNL 1995 OU 3,4,5 R
B-10	6/11/92	<2.0	<2.0	<2.0	<5.0	I	ł	ł	21	1.4.11	ø	PNL 1995 OU 3.4.5 R
B-10	8/14/92	<2.0	<2.0	<2.0	<5.0	1	ł	ł	<5.0	1.4.11		PNI, 1995 OU 3 4 5 R
B-10	4/14/93	ł	1	ł	I	ł	1	ł	22	11	1	PNL 1995 OU 3,4,5 R
B-11	6/11/92	<2.0	<2.0	<2.0	<5.0	ł	ł	ł	12	1,4,11	đ	PNL 1995 OU 3.4.5 R
B-11	8/14/92	<2.0	<2.0	<2.0	<5.0	I	1	:	<5.0	1,4,11	Ø	PNL 1995 OU 3.4.5 R
B-11	4/14/93	ł	ł	ł	ł	I	ł	1	18	11		PNL 1995 OU 3.4.5 R
B-11	8/5/94	I	ł	:	ł	<250	<250	ł	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	8	USAF 1995 SWMPR
B-11	8/20/96	<1.0	7.0	3.3	22.2	I	I	1	<1.0	1,11	Ą	USAF 1996 SWMPR
B-12	6/11/92	<2.0	<2.0	<2.0	<5.0	I	I	I	<5.0	1,4,11	8	PNL 1995 OU 3.4.5 R
B-12	8/21/92	1	<2.0	<2.0	<5.0	ł	ł	ł	<5.0	1,4,11	c	PNL 1995 OU 3,4,5 R
B-13	6/11/92	<2.0	<2.0	<2.0	<5.0	1	ł	1	120	1,4,11	ø	PNL 1995 OU 3.4.5 R
B-13	4/14/93	ł	ł	1	ł	;	ł	1	<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	8	USAF 1995 SWMPR
B-13	8/20/96	<1.0	<1.0	1.3	9.0	ł	I	1	<1.0	1,11	Ą	USAF 1996 SWMPR

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					TAI	BLE ST27-	l (continued					
				ů	ncentration (ug/L)						
Well No.	Date Sampled	Benzene	Toluene	Ethyl- benzene	Xylenes	TPH GRO	TPH DRO	Dissolved Lead	Total Lead	Analytical Methods	Notes	Reference
B-14	1988	ł	I	1	ł	ł	:		367	11 7 1		
B-14	4/14/93	<5.0	<5.0	ł	<5.0	<2,000	<100	1	33	8,11	83	FNL 1995 OU 3,4,5 R
B-19	6/11/92	<2.0	<2.0	<2.0	<5.0	ł	I	:	18	11 7 1	d	DNI 1005 OT13 1 5 D
B-19	8/14/92	<2.0	<2.0	<2.0	<5.0	ł	1	ł	66	1411	c i a	DNT 1005 OU 3,4,5 K
B-19	4/14/93	1	ł	1	1	ł	ł	I	0.0 2.2	11,7,1,1	9	
B-19	8/5/94	ł	ł	ł	1	<250	<250	1	7 Q	11-0		TINE 1993 UU 5,4,5 K
B-19	10/5/95	<1.0	<1.0	<1.0	<1.0	52	120	<10		11 1-1	¢	TISAE 1005 SULADD
B-19	8/20/96	<1.0	16.0	7.0	47.0	1	1	1	3.5	1,11	م ہ	USAF 1996 SWMPR
Notes:	a. No compo b. Toluene, et	unds other tha hylbenzene, a	in those listed nd xylenes oo	d were detect oncentrations	ed above the may be the r	reporting limites the second se	its. cross contamir	lation.				
	Background r Background r Background 9	nean concentr naximum con 05 percent UC	ations for lea centrations fo L concentrati	id: dissolved or lead: disso ions for lead:	l, <1.0 μg/L; blved, <1.0 μ dissolved, <	total, 21 μg/L g/L; total, 48 <1.0 μg/L; tot	µg/L. al, 33 µg/L.					
Analytica	I Methods: 1. 8020. 2. ADEC 80	15M.	3. ADEC 81 4. 8010.	100M.	5. 8270. 6. 8080.		7. 8260. 8. 8240.	9. 10.	AK101. AK102.		11. 7421	

TABLE ST27-1 (continued)

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

te	Naphthalene	Concentration (mg/ Dibenzo [a,h] - Anthracene	L) Benzo [k] - Fluoranthen	Analytical Methods	Notes	Reference
< <u>1</u> .	20	<0.030	<0.019	13	5	USAF 1996 SWMPR
<1.8		<0.030	<0.019	13		USAF 1996 SWMPR
<1.8		0.021	0.011	13		USAF 1996 SWMPR
1.1		<0.030	<0.019	13		USAF 1996 SWMPR
3. ADEC 81(MOC	5. 8270.	7. 8260.	9. 8270.	11. 7421.	13. 8310
4.8010		6. 8080.	8. 8240.	10. 8080.	12. 6020.	

			Reference	IISAF 1995 SWAPP		USAF 1997 SWMPR	II AND THE PARTY OF THE PARTY	VINA CALL TAGU	USAF 1997 SWMPP		USAF 1996 SWMPR	ISAF1995 SWMPP	ATTAL SCOLUTION	USAF 1997 SWMPR
			Notes											
Immunoassay Results		Total	BTEX ¹ (ppb)	I	1	pu	ł		pu	1	1	1	I	pu
			eH (mv)	I	ł	114	I	l	137	. 1	I	ł	I	45
			Hq	6.84	69	7.36	6 93	7	7.07	7.15	7.2	7.04	6.95	7.01
		Conductivity	(mmhos/cm)	190	206	334	190	209	288	180	100	210	314	388
Parameters		Turbidity	(NTU)	ł	87	20	I	144	40	1	<10	1	59	22
		Temperature	(°C)	7	9.2	9.4	7	8.5	9.0	٢	12	7	8.8	8.8
	Dissolved	Oxygen (%	saturation)	1	I	5.3	I	ł	7	I	ł	I	ł	7.4
	Dissolved	Oxygen	(mg/L)	3.1	0.98	09.0	5.4	0.67	0.79	2.8	6	2.6	3.27	0.84
		Date	Sampled	10/6/95	8/20/96	8/26/97	10/6/95	8/20/96	8/26/97	10/5/95	8/20/96	10/5/95	8/20/96	8/26/97
			Well No.	B-8	B-8	B-8	B-11	B-11	B-11	B-13	B-13	B-19	B-19	B-19

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.

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TABLE ST27-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS,

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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

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 PCBcontaminated 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 19911994 OU2 Record of Decision, USAF, September 19941997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for SS31:

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

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

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 Or	ganic 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 O	rganic Compounds
DDT	
Chlordane	2 μg/L
Inorganic	Compounds
'Lead	15 μg/L
²Silver	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 μ g/kg), DDD (72,000 μ g/kg), and DDE (3,700 μ g/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

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List of Figures for SS35:

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

List of Tables for SS35:

Table SS35-1	Concentrations (μ g/L) of Organic Compounds and Lead in Groundwater Samples, SS35, Asphalt Mixing and Drum Burial Area, Eielson AFB, Alaska
Table SS35-2	Concentrations (μ g/kg) of Pesticide Compounds in Vegetation, Surface Water, Invertebrate and Sediment Samples, SS35, Asphalt Mixing and
Table SS35-3	Drum Burial Area, Eielson AFB, Alaska. Concentrations ($\mu g/L$) of Pesticide and PCB Compounds in Groundwater
	Alaska.
Table SS35-4	Groundwater Parameter and Immunoassay Field Test Results, SS35, Asphalt Mixing and Drum Burial Area, Eielson AFB, Alaska.

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

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ate Toluene ppled Benzene Toluene 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0 0/92 <2.0 <2.0
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ate <u>ate Benzene</u> 0/92 <2.0 0/92 <2.0 0/92 <2.0 0/92 <2.0 0/92 <2.0 0/92 <2.0 0/92 <2.0

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

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. Background mean concentrations for lead: dissolved, <1.0 μ g/L; total, 21 μ g/L.

Analytical Methods:

. 8020.	с.	ADEC 8100M.	S.	8270.	۲.	8260.	.6	AK101.	11. EPA 7421.
ADEC 8015M.	4	8010.	6.	8080.	ø	8240.	10.	AK102.	

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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	Date	Cone	centration (µ	g/kg)	Analytical		
<u>ID</u>	Sampled	4,4-DDE	4,4-DDD	4,4-DDT	Methods	Notes	Reference
Sediment near 35M02	10/24/96	3,700	72,000	47,000	6	а	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	с	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	6	b	USAF 1996 SWMPR
Vegetation	10/3/97	<1.2	6.0	0.55	6	d	USAF 1997 SWMPR
Notes:	a. Other conb. No otherc. Other cond. Other con	npounds det compounds i npounds det npounds det	ected: Hepta reported abo ected: Endos ected: Dieldr	chlor Epoxid ve detection ulfan Sulfate in at 0.52 μβ	le at 26 μg/kg limits. e at 23 μg/kg. g/kg.		
Analytical Methods:	1 0000						

 1. 8020.
 3. ADEC 8100M.
 5. 8270
 7. 8260.
 9. AK101.

 2. ADEC 8015M.
 4. 8010.
 6. 8080
 8. 8240.
 10. AK102.



AL AREA,		Reference	USAF 1997 SWMPR	USAF 1997 SWMPR	USAF 1997 SWMPR
M BURI		Notes	ct	ct	5
AND DRU	Analvtical	Methods	I	1	1
F MIXINC ALASKA		PCB	<1.0	<1.0	<1.0
ASPHAL ON AFB.	(T)	4,4-DDT	<0.1	<0.1	<0.1
.ES, SS35, EIELS	entration (mg	4,4-DDD	<0.1	<0.1	<0.1
ER SAMPL	Conce	4,4-DDE	<0.1	<0.1	<0.1
UNDWATE	Date	Sampled	9/8/97	9/2/97	9/2/97
GKO		Well Number	35M02	35M05	35M08

TABLE SS35-3 CONCENTRATIONS (µg/L) OF PESTICIDE AND PCB COMPOUNDS IN

Notes:

a. No compounds other than those listed were detected.

Analytical Methods: 1. 8080.

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

2

			Reference	USAF 1997 SWMPR	USAF 1997 SWMFR	USAF 1997 SWMPR	
			Notes				
4	3	PCE ²	(ddd)	1	ł	ł	
Line D acri	nent Aneen	TCE ²	(ddd)	I	I	ł	
Immino		Total	BTEX ¹ (ppb)	ł	1	ŧ	
	T		eH (mv)	58	13	62	
			푀	00	7.45	7.68	
		Conductivity	(mmhos/cm)	294	357	297	
meters		Turbidity	(NTU)	0	0	13	
Par		Temperature	(c)	6.9	9.5	7.6	
	Dissolved	Oxygen (%	saturation)	6.6	7.1	11.5	
	Dissolved	Oxygen	(mg/L)	0.78	0.79	1.34	
		Date	oampica	6/8/6	76/2/6	76/2/6	
		Well No.	MCH INO.	35M02	35M05	35M08	Notec.

NOICS.

¹ RaPID Assays Ohmicron Total BTEX field test kit.

² Dråger Liquid Extraction (DLE) field test kit.

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. nd.

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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.

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Previous Activities

During the 1994 field season, seven wells at WP38 were sampled. Benzene was detected in two samples, at 400 μ g/L (38M01) and 44.5 μ g/L (38SLW - the former water supply well). Benzene was detected in these wells in 1993 at concentrations of 910 μ g/L and 140 μ g/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 μ g/L), 38SLW (110 μ g/L), and 8621 (340 μ g/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 μ g/L and the 1994 background UCL of 32.6 μ g/L in 38M02 (169 μ g/L) and 38M06 (155 μ g/L). Arsenic was detected in concentrations above the EPA drinking water MCL of 50 μ g/L and 1994 background UCL of 37.0 μ g/L in 38M02 (153 μ g/L), 38M06 (115 μ g/L), and 38M07 (88.9 μ g/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:

Figure WP38-1	WP38 Showing Existing Monitor Wells and Water Supply Wells, OU-6, Eielson AFB, Alaska.
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List of Tables for WP38:

Table WP38-1	Concentrations (μ g/L) of Organic Compounds in Groundwater Samples
Table WP38-2	WP38, Ski Lodge Well Contamination, Eielson AFB, Alaska. Concentrations ($\mu g/L$) of Metals in Groundwater Samples WP38, Ski
T-11- WD20-2	Lodge Area, Eielson AFB, Alaska.
Table WP38-3	Groundwater Parameter and Immunoassay Field Test Results, WP38, Ski Lodge Well Contamination, Eielson AFB, Alaska.





Ţ	ABLE WP38-1	CONCENT WP38, SKI	ΓRATIONS (μg/ LODGE WELL	L) OF ORC CONTAMI	ANIC COM	POUNDS IN ELSON AFE	I GROUNDV 3, ALASKA	VATER	SAMPLES,
Date			Concentration	(']/an)			Amol.dia1		
Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Methods	Notes	Reference
1988	868	1 400	916	1 000					
0001	000	1,400	81c	1,890	1	1	1.5	8	ES 1994 OUG BI
1989	510	96.6	21.3	230	1	1	, I 2		EC 1004 OILC DI
1992	590	5.9	4.4	38			Ĵ,	5	ES 1994 UU0 KI
£6/6/L	010	5		9		1		J	ES 1994 OU6 RI
	017	4	2.07	20	3,760	1,340	1,9,10		ES 1994 OU6 RI
8/9/94	400	<100	<100	<100	I	1	14		
10/17/96	490	1 4	16	•			ŗ		FINL 1994 OWGMPK
	•		1.0	7.0	ł	I	-	50	USAF 1996 SWMPR
1988	<0.15	0.64	<0.46	<0.95					
1980	0002	0007		0.07	1	I	C,1	đ	ES 1994 OU6 RI
0001	07.04	00.04	00.02	<0.40	ł	ł	1,5	8	ES 1994 OU6 RI
7661	< <u>2.</u> U	0.7	4 .0	<5.0	ł	ł		ر	FS 1004 OT 15 DI
7/9/93	<0.3	<0.3	<0.3	<0.7	<60 <	20/	0101	•	
8/6/94	<10	0 1				6	1,2,10		ES 1994 OU6 RI
	0.17	0.17	<1.0	<1.0	i	1	1,4	م	PNL 1994 SWGMPR
46/67/71	<0.2	<0.3	0.22	2.48	1	1			VI TIO COL STORE
10/11/95	<1.0	<1.0	<1.0	<1.0	<50	160	¢ •		WINNE CKI THEN
8/19/96	<10). 	2	100	<u>.</u> -		USAF 1995 SWMPR
>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>	0.17	2.77	.u</td <td>0.1></td> <td>ŀ</td> <td>1</td> <td>-</td> <td></td> <td>TICAE 1006 CUD CD</td>	0.1>	ŀ	1	-		TICAE 1006 CUD CD

38M01

Well

*

No.

38M01 38M01

38M01

38M01 38M01 38M02 38M02 38M02 38M02 38M02 38M02

1,9,10 1,4 1,9,10 1,9,10 1,5 1,5 1,5 - -1118911 820 830 111811 1118 1118 <0.85<0.40 <5.0 ≤0.7 <0.85<0.40 <1.0 <0.4 <5.0 <0.7 <0.85 <0.40 <5.0 <0.7 <lu><lu><lu><lu><u <0.46<0.50 <1.0 <0.2 \$0.0 0.0 0.82 2.030.3 <0.25<0.30 4.04.04.04.04.05.034.04.054.0</li 2.15 2.02 <0.3 0.43 1.1 <0.3 3.77 <0.20 \$0.0 €.0 0.19 0.43 <2.0 <0.3 1988 1989 1992 7/9/93 8/6/94 12/29/94 1992 7/10/93 1992 7/10/93 1988 1989 19**8**8 1989 38M03 38M03 38M03 38M03 38M03 38M03 38M03 38M04 38M04 38M05 38M05 38M05 38M04 38M04 38M05

USAF 1995 SWMWP

ES 1994 OU6 RI ES 1994 OU6 RI ES 1994 OU6 RI ES 1994 OU6 RI

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38M02 38M02

USAF 1996 SWMPR

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TABLE WP38-1 (continued)

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	s Reference		ES 1994 UU6 KI	PNL 1994 SWGMPR	USAF 1996 SWMPR		ES 1994 OU6 KI	ES 1994 OU6 RI	IISAF 1995 SUMMUP	USAF 1996 SWMPR		ES 1994 0U6 KI	PNI 1004 SWCARDD	USAF 1995 SWMWP		ES 1994 UU6 KI	PNL 1994 SWGMPR	USAF 1995 SWMWP	USAF 1996 SWMPR		E2 1994 UU6 KI	PNL 1994 SWGMPR	USAF 1995 SWMWP	LISAF 1995 SWAAPD	USAF 1996 SWMPR	USAF 1996 SWMPR
	Note	'	ವ,	م			5		e.	1			ء.	>		•	٥				•	σ	ب			60
Analitical	Methods	1 5	, , , ,	1,4	-	31	, 1	1,9,10		1,4	01.01	1,7,10	1.4		0101	1,7,10	1,4		1	1 0 10	1,7,10	1,4		1-3	1	-
	TPH DRO		ł	ł	1		ļ	07>	1	ł	070		1	I	285	6	ł	1	I	560	2022	ł	I	220	1	ł
	TPH GRO	1		1	ł	ł	000	228	1	ł	-60	PPr	1	I	(yy)	2	ł	1	ł	<300	2	1	ł	<100	ł	ı
(ue/L)	Xylenes	<0.40		0.12	<1.0	<04		7.0	1	<1.0	0.77		<1.0	1.54	<0.7	<10	190	10.0	<1.0	<4.0	<10	200	10.0	<1.0	<1.0	5.5
Concentration	Ethylbenzene	<0.50	<10		0.1>	<0.5	01	0.1	I	<1.0	<0.3		1.U	0.38	<0.3	<1.0	<0>	1.07	<1.0	2.0	<10	202 202	7.0	<1.0	<1.0	3.8
	Toluene	<0.30	<1.0	1	0.1~	14.7	12	!	ł	1.0	<0.3	10	2.17	<0.3	<0.3	<1.0	0.72		1.3	2.0	<1.0	0 07		21.0	<1.0	3.0
	Benzene	<0.20	<1.0	<10	0.17	<0.2	1.0		1	0.1>	<0.3	<10	0.1.	0.25	<0.3	<1.0	0.21		<1.0	140	20	44.5	45	,	110	340
Date	Sampled	1989	8/10/94	10/1/96		1989	1993	3/30/05		06/77/8	7/8/93	8/4/94		12/29/94	7/8/93	8/6/94	12/29/94		9/18/96	7/8/93	3/9/94	12/29/94	1/96	0/11	9/18/96	10/17/96
Well	No.	38M06	38M06	38M06		38M07	38M07	38M07		1010100	38M16	38M16		38M16	38M17	38M17	38M17		38M18	38SLW	38SLW	38SLW	38SI W	111 1000	383LW	8621

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Well Da No. Samp 8626 198 8626 198 8626 198 8626 198 8625 198 8626 198 8625 198 8625 198 8625 198 90 cotes: a. For cote b. No cot c. 1992 c. 1992 c. 1992	e Toluene <0.25 3.0	Concentration /			<u>1)</u>			
8626 198 8626 198 8626 198 a. For c b. No c c. 1992 de de	<0.25	Ethylbenzene	(µg/L) Xylenes	IPH GRO	TPH DRO	Analytical Methods	Notes Ref	rence
otes: a. For (b. No c c. 1992 de de de	D .c	<0.46 <0.50	<0.85 <0.40	11	11	1,5 1,5	a ES a ES	1994 OU6 RI 1994 OU6 RI
e. A sa det f. Fluor g. Well	i detected, see refer than those listed w ed by EPA Method ivailable in the ES is detected: 1,2-DC ed by the Air Force ie was detected in a thout purge.	ence. ere detected above 503.1. 1,2-Dichlo 1994 OU6 Rl refer 'A - 0.65 μg/L. on 30 March 1992 t sample collected	the reporting roethane (DC ence. from 38M07 on 30 March	A) was deter A) was deter Perchlorov 1995 by the	sted at 10 μgΛ sthene was de Air Force fror	L in well 38N tected - 8.54 n 38SLW - 0.	01. Addition gL; trichlorc 4 μgL.	al 503.1 compounds ethane (sic) was
1								
nalytical Methods: 1. 802(ADEC 8100 4. 8010. 	IM. 5. 6.	8270. 8080.	L 80	8260. 8240.		. AK101. 0. AK102.	
		ad by EPA Method vvailable in the ES is detected: 1,2-DC ed by the Air Force the was detected in ε thout purge. 3. ADEC 8100 4. 8010.	ad by EPA Method 503.1. 1,2-Dichlo ivailable in the ES 1994 OU6 RI refet is detected: 1,2-DCA - 0.65 μ g/L. ed by the Air Force on 30 March 199! et was detected in a sample collected thout purge. 3. ADEC 8100M. 5. 4. 8010. 6.	ad by EPA Method 503.1. 1,2-Dichloroethane (DC. vvailable in the ES 1994 OU6 RI reference. Is detected: 1,2-DCA - 0.65 µg/L. ed by the Air Force on 30 March 1995 from 38M07 et was detected in a sample collected on 30 March thout purge. 3. ADEC 8100M. 5. 8270. 4. 8010. 6. 8080.	ad by EPA Method 503.1. 1,2-Dichloroethane (DCA) was detectivailable in the ES 1994 OU6 RI reference. Is detected: 1,2-DCA - 0.65 μg/L. ed by the Air Force on 30 March 1995 from 38M07. Perchlorov et was detected in a sample collected on 30 March 1995 by the thout purge. 3. ADEC 8100M. 5. 8270. 7. 4. 8010. 6. 8080. 8	ad by EPA Method 503.1. 1,2-Dichloroethane (DCA) was detected at 10 μg/l vailable in the ES 1994 OU6 RI reference. Is detected: 1,2-DCA - 0.65 μg/L. ed by the Air Force on 30 March 1995 from 38M07. Perchloroethene was de ie was detected in a sample collected on 30 March 1995 by the Air Force fron thout purge. 3. ADEC 8100M. 5. 8270. 7. 8260. 4. 8010. 6. 8080. 8. 8240.	ad by EPA Method 503.1. 1,2-Dichloroethane (DCA) was detected at 10 μg/L in well 38M ⁱ vvailable in the ES 1994 OU6 RI reference. Is detected: 1,2-DCA - 0.65 μg/L. ed by the Air Force on 30 March 1995 from 38M07. Perchloroethene was detected - 8.54 μ e. was detected in a sample collected on 30 March 1995 by the Air Force from 38SLW - 0.5 thout purge. 3. ADEC 8100M. 5. 8270. 7. 8260. 9 4. 8010. 6. 8080. 8, 8, 240	ad by EPA Method 503.1. 1,2-Dichloroethane (DCA) was detected at 10 μg/L in well 38M01. Addition: vailable in the ES 1994 OU6 RI reference. Is detected: 1,2-DCA - 0.65 μg/L. ed by the Air Force on 30 March 1995 from 38M07. Perchloroethene was detected - 8.54 μg/L; trichloro ed by the Air Force on 30 March 1995 from 38M07. Perchloroethene was detected - 8.54 μg/L; trichloro the was detected in a sample collected on 30 March 1995 by the Air Force from 38SLW - 0.94 μg/L. thout purge. 3. ADEC 8100M. 5. 8270. 7. 8260. 9. AK101. 4. 8010. 6. 8080. 8.270. 7. 8260. 9. AK101.

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

L

Well No.	ť/n	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Conner	Iron	l ead	Maonesium	eseneoneM	Nichal	Dotoccium	1		t		• •
DISSID	VED										0		I AICHOL	1111	liminoc		ZIUC	Notes	Kelerence
38M01 38M01	ئ ے کے	1988 8/10/94	40 120		40 4.8	63,200 93,000			100 75	6.0 <1.0	26,600 32,000	20 59	3.9	2,100 1,100	66,000 13,000	- 1.0	700 41	ша	ES 1994 OU6 RI NL 1994 SWGMPR
38M02 38M02 38M02		1988 8/6/94 10/11/95	<30 18 302	 <3.0 3.4	200 100 92.9	1,660 250,000 248,000		- 7.3 12	200 33 <63	<1.4 <1.0 1.5	70,500 86,000 87,500	2,700 230 561	- 12 11.5	4,550 4,800 84,900	26,200 16,000 14,800	- 1 - 10 - 10 - 10	30 4.6 9.2		ES 1994 OU6 RI NL 1994 SWGMPR JSAF 1995 SWMPR
38M03 38M03	<u>د</u>	1988 8/6/94	90 6.0		200 140	30,500 26,000		<1.0	60 24	<1.4 <1.0	10,900 7,800	20 <15		1,930 2,500	12,900 5,500	r 1.0	200 <5.1	ще	ES 1994 OU6 RI NL 1994 SWGMPR
38M04	ي. ا	1988	40	ł	50	22,300	:	;	50	4.1	6,830	20	:	<408	6,820	ł	300	ш	S 1994 OU6 RI
38M05	f	1988	<30	:	70	63,700	;	1	90		28,900	70	:	1,580	34,100	ł	500	ш	S 1994 OU6 RI
38M06	ب	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	ď	NL 1994 SWGMPR
38M17	ۍ ا	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	<u>а</u> ,	NL 1994 SWGMPR
38SLW 38SLW	ليس ليس	8/9/94 1/5/96	<57 <155	<3.0 <1.0	190 83.1	34,000 43,400	<1.0 <5.0	<1.0 <4.0	4,200 5,000	<1.0 <1.0	26,000 21,700	76 347	<1.0 <9.0	1,700 1,780	7,200 6,400	 <td>29 18.7</td><td>2 D</td><td>NL 1994 SWGMPR ISAF 1995 SWMPR</td>	29 18.7	2 D	NL 1994 SWGMPR ISAF 1995 SWMPR
8626	÷	1988	<30	;	100	98,700	:	:	3,200	<l'</l'	40,700	2,200	:	2,620	6,710	;	400	ш	S 1994 OU6 RI
Backgrou BGM BGMX BGUCL TOTAL	U U U U U U	oncentrati 9/94 9/94 9/94	ons 43 140 74	8.3 23 14.5	101 160 129	51,750 61,000 57,600	<1.0 <1.0 <1.0	2.4 4.0 3.1	1,736 9,900 3,980	<1.0<1.0<1.0<1.0	10,450 12,000 11,400	1,789 4,100 2,720	2.3 5.0 3.2	3,400 4,500 3,800	4,563 6,500 5,340	<pre><1.0</pre>	5.6 19 10		NL 1994 SWMP NL 1994 SWMP NL 1994 SWMP
38M01 38M01 38M01 38M01		1988 7/9/93 8/10/94 10/17/96	39,200 285		200 9.6 <22.0	82,400 78,900	25.4 <4.0 1.4 <6.0	50.8 6.2 <6.0	41,700 428	92.4 <2.0 3.1 5.5	43,500 25,800	807 65 62.2	609 8.8 <15.0	4,920 1,940	76,700 11,900	44.9 <8.0	1,900 67 1,710	a Ming D a	S 1994 OU6 RI S 1994 OU6 RI NL 1994 SWGMPR SAF 1996 SWMPR

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TABLE WP38-2 (continued)

PNL 1994 SWGMPR **USAF 1995 SWMPR** PNL 1994 SWGMPR JSAF 1996 SWMPR PNL 1994 SWGMPR **USAF 1996 SWMPR** ES 1994 OU6 RI PNL 1994 SWGMPR PNL 1994 SWGMPR **USAF 1996 SWMPR** PNL 1994 SWGMPR **USAF 1995 SWMPR USAF 1996 SWMPR USAF 1996 SWMPR** USAF 1996 SWMPR ES 1994 OU6 RI ES 1994 OU6 RI ES 1994 OU6 RI ES 1994 OU6 RI Reference ES 1994 OU6 RI Notes م æ 260 1,560 995 Magnesium Manganese Nickel Potassium Sodium Vanadium Zinc --22 69.8 154 6.9 337 907 80 185 : 160 73.4 859 84.1 167 526 : ; ł : : 3 93 1,000 566 18.0 <1.0 <4.0 200 <1.0 11.2 86.3 8.0
 8.0 ×8.0 400 562 56.7 <10 1 1 1 45 1 - 15 1 82 ł 23,000 26,800 30,100 26,800 14,700 24,300 6,000 11,000 10,400 39,000 --12,000 20,300 17,400 6,750 **..** 6,900 6,510 8,190 6,870 7,800 ; ł ; 234,000 13,000 22,200 12,000 16,800 2,880 2,100 2,830 6,070 1,610 3,330 --5,700 3,000 --2,400 1,750 1,730 2,000 1,940 5,260 ł : ł ł <15.0 <15.0 --2.5 <9.0 714 461 <u>г</u> 31.8 70.6 : 80 8 970 618 8 44.2 ~20 ł 1 ł - 53 : 🖺 13,400 11,500 3,500 3,370 3,200 2,360 2,850 5,200 -- 4,900 8,910 2,500 42.6 6.3 132 524 401 787 54.2 ł 1 : 20 130,000 257,000 220,000 100,000 82,400 12,600 38,000 84,000 89,600 24,300 47,200 25,000 22,300 15,900 35,700 7,800 9,110 23,600 --9,500 ł ; ł ÷ ł Lead 50 17.3 <2.0 420 5.2 2.0 <1.0 13.2 15.2 <2.0 210 18.7 200 20.8 <1.0 169 155 7.9 2:0 2.8 <1.0 89 31 4.4 1.6 180,000 330,000 326,000 119,000 663,000 422,000 22,500 180,000 49,000 239,000 13,600 5,720 -- 4,900 5,560 5,300 5,480 Iron 3,690 665 : 1 82 ; 1 ; : Copper <1.0 10.0 34.9 250 777 494 <3.0 14.7 28.9 650 42.7 : 0 21.8 <4.0 <6.0 <6.0 543 ł ł 1 62 1.3 ł : Calcium Chromium 513 <4.0 <6.0 23.2 <4.0 616 342 €.0 <4.0 <1.0 <6.0 <4.0 670 667 49.5 <4.0 33.5 <4.0 <5.0 <6.0 <6.0 76 7.0 48 8.8 1.6 350,000 523,000 511,000 128,000 189,000 140,000 290,000 127,000 112,000 34,400 28,000 29,100 74,000 58,100 37,000 33,000 46,400 53,000 4,880 ł ; ł : ł ł ł Sampled Aluminum Arsenic Barium 1,100 3,860 2,420 2,400 2,440 <22.0 83.2 263 204 140 175 433 -- 026 1 44 562 85.3 69.69 189 1 ł ł ł : 7 <34.0 <3.0 <3.0 88.9 : 2 2.0 50 153 115 : 8 ----391 : : : : ł 91 ł ł ł 180,000 331,000 231,000 130,000 35,000 10,400 25,100 --13,000 12,100 8,150 2,180 3,300 <155 <25.0 90,4 892 : 5 35.4 ł 24 ł ; 1 10/17/96 10/11/95 7/10/93 10/1/96 8/22/96 96/81/6 7/9/93 8/6/94 8/19/96 8/10/94 7/9/93 8/6/94 7/10/93 8/4/94 8/6/94 9/18/96 Date 1988 1988 1988 1988 7/8/93 7/8/93 7/8/93 8/9/94 1/6/96 1988 ſ/u E 3 Ξ ⊐ = Þ 3 = Þ ⊐ 3 = þ 3 3 Þ Ħ ⊐ Ξ = 3 38SLW 38M03 38M03 38M04 38M05 38M06 38M07 38M16 38M17 38M17 38SLW 38SLW Well 38M02 38M02 38M02 38M02 38M02 38M03 38M04 38M05 38M06 38M16 38M18 38SLW ŝ 8626 8621

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TABLE WP38-2 (continued)

Well No.	f/u S	Date Sampled	Aluminum	Arsenic	Barium	Calcium	Chromium	Conner	Iron	V pee I	miisenool	Monte	T I I I		:					
											unicariân	Mailgalicsc	INICKEL	otassium	milboc	anadium	Zinc	Notes	Reference	
Backgrou BGM BGMX BGMX BGUCL b. b. b. f. f. u. BGM BGMX BGUCL	A A A A BA C	9/94 9/94 9/94 9/94 9/94 9/94 Vell sam dditiona diditiona ield filter fean conc fean c	jons 7,538 18,000 11,500 pled witho pled witho cd. thered). intration of concentration r confidenc	25 63 37 at purge. :tected: :samples :samples :samples	269 420 342 Antimon collected f samples	58,625 66,000 64,900 9 - 3.1 μg/l from backgi cted from backgi collected fr	20 46 30.4 L, Cobalt - ² round wells i ackground w om backgrou	75 140 105 105 45.7 μg/L 1994. ells in 199	16,938 33,000 23,800 and Sele 4. n 1994.	21 48 32.6 nium - `	17,375 26,000 20,800 7.3 µg/L	3,875 6,500 4,980	31 77 48.8	5,650 7,900 6,500	8,363 9,800 9,260	24 36 36	63 88.8 88.8		PNL 1994 SWMP PNL 1994 SWMP PNL 1994 SWMP	

	ttes Reference	USAF 1996 SWMFR USAF 1997 SWMFR	USAF 1995 SWMPR USAF 1996 SWMPR USAF 1997 SWMPR	USAF 1996 SWMPR USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1996 SWMPR USAF 1997 SWMPR	USAF 1995 SWMPR USAF 1996 SWMPR	USAF 1996 SWMPR USAF 1997 SWMPR
Immunoassay Results	Total BTEX ¹ (ppb) No	0.02nd	- -0.00nd	- Pu		- 0.01nd	1 1	- pu
	eH (mv)		1 6	-293 -24	30	-71.3 8	-198	
	Hd	र्म म्	6.8 7.28 6.83	7.41 7.73	6.46	6.22 6.52	6.6 7.24	ш ш
	Conductivity (mmhos/cm)	or this sampl	1100 1310 1478	260 462	400	765 1295	319 278	R THIS SAMPLJ R THIS SAMPLJ
Parameters	Turbidity (NTU)	TAKEN FC TAKEN FC	– H1 966	1596 HI	Η	1740 134	- 21	TAKEN FO TAKEN FO
	Temperature (°C)	PARAMETERS PARAMETERS	4 4.8 3.5	1.74 3.9	1.6	6.7 6.5	7.6 4.97	PARAMETERS
Discoluad	Oxygen (% saturation)	ON NO	33 - 1	3.2 17.6		1 0	- 0.0	ION
Discolved	Oxygen (mg/L)		5.3 9.95 4.16	- 2.27	0.29	93 1.2	1.6 -	
	Date Sampled	10/17/96 8/26/97	10/11/95 8/19/96 9/19/97	10/1/96 10/3/97	08/22/96	9/18/96 9/18/97	1/5/96 9/18/96	10/17/96 08/26/97
	Well No.	38M01 38M01	38M02 38M02 38M02	38M06 38M06	38M07	38M18 38M18	38SLW MJ28E	8621 8621

TABLE WP38-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, WP38. SKI LODGE WELL CONTAMINATION FIFL SON AFR ALASKA

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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.

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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.

СОС	ARAR (Groundwater) - Drinking water MCL	COC (cont.)	ARAR (Groundwater) - Drinking water MCL (cont
Volatile Or	ganic Compounds	Trichloroethene	5 μg/L
Benzene	5 µg/L	Tetrachloroethylene	5 μg/L
Toluene	1,000 µg/L	Vinyl Chloride	2 μg/L
Ethylbenzene	700 µg/L	Semivolatile	e Organic Compounds
Xylenes	10,000 µg/L	DDT	
1,4-Dichlorobenzene	75 μg/L	Chlordane	2 μg/L
1,2-Dichloroethane	5 μg/L	Inorga	nic Compounds
cis-1,2-Dichloroethene	70 μg/L	'Lead	15 μg/L
trans-1,2- Dichloroethene	100 µg/L	²Silver	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 44M111 were sampled for VOCs during the 1996 field season. TCE and cis-1,2 DCE were detected in 44M04 at concentrations of 78 μ g/L and 130 μ g/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 44MW111 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 44MW111, while 44M04 displayed a concentration of 30 ppb. Total BTEX concentrations are consistent with previous analytical results. Monitor well 44MW111 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 44MW111 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

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References for DP44 (continued):

1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for DP44:

Figure DP44-1	DP44 Site Plan Showing Groundwater Monitor Well and Pilot Vapor
	Extraction Well Locations, Eielson AFB, Alaska.
Figure DP44-2	DP44, Trichloroethylene in Groundwater (August 1994).

List of Tables for DP44:

Table DP44-1	Concentrations (μ g/L) of Organic Compounds in Groundwater Samples,
	DP44, Eleison AFB, Alaska.
Table DP44-2	Groundwater Parameter and Immunoassay Field Test Results, DP44,
	Battery Shop Leach Field, Eielson AFB, Alaska.





TABLE DP44-1 CONCEN

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

	Notes Reference	a PNL 1995 OU3,4,5 RI		a FNL 1993 0U2 RI	a FNL 1995 OU3,4,5 RI a PNL 1995 OU3,4,5 RI		a PNL 1993 OU2 RI 3 DNI 1005 OU2 A 5 DI		a PNL 1993 OU2 RI	a DNI 1005 DI 13 4 5 DI		A CITISAE 1006 SWATED	a, v Ushir 1990 a Wirk	3 PNI 1003 OF 10 DT		3 PNI 1003 OF 17 DT		a PNL 1995 OU3,4,5 RI		a PNL 1993 OU2 RI	a PNL 1995 OU3,4,5 RI	a PNL 1995 OU3,4,5 RI	a, c USAF 1996 SWMPR		a PNL 1995 OU3,4,5 RU	a, c USAF 1996 SWMPR
	Analytical Methods	1,4	¥ I		t, t, t,		1,4 1 4		1,4	1.4	4	1.4		1.4	1.4	1.4	14	1,4	-	1,4	1,4	1,4	1,4		1,4	1,4
	t-1,2- DCE	4.1	012	012 012	0.7	-	3.0		5.4	2.9	2.9	<1.0		1.3	1.5	2.1	1.9	3.0		0.17	<1.0	0.8	<1.0	с -	1.4	<1.0
	c-1,2- DCE	3.2	<10	11	1.5	19	1.0 7.9		260	93	118	130		5.9	10	5.5	5.0	4.9	012	.	1.8	2.9	<1.0	0 6		2.1
	TCE	<1.0	<10	<1.0	<1.0	1)	<1.0		2,500	48	109	78		<1.0	<1.0	<1.0	<1.0	<1.0	<10		1.0	<1.0	<1.0	1 4	•	1.2
	TPH DRO	1	:	1	ł	I	ł		1	ł	1	ł		ł	:	ł	ł	ł	ł		1	1	I	ł		1
	TPH GRO	;	ł	ł	1	;	ł		ł	ł	ł	I		1	1	1	1	1	:		:	:	ł	1		ł
1 (µg/L)	Xylenes	<0.5	<5.0	<5.0	<0.5	<5.0	<0.5	ļ	<>.0	<5.0	<0.5	17.6		<5.0	<5.0	<5.0	<5.0	<0.5	<5.0	~ ~ ~		<.U>	16.9	<0.5	r 11	11./
oncentration	Ethyl- benzene	<0.5	<2.0	<2.0	<0.5	<2.0	<0.5	Ģ	72. 0	<2.0	<0.5	2.5		<2.0	<2.0	<2.0	<2.0	<0.5	<2.0	< 2 0	0.4 V	c.02	2.4	<0.5	1 6	1.0
Ö	Toluene	<1.0	<2.0	<2.0	<1.0	<2.0	<1.0		0.2	<2.0	<1.0	4.3		<2.0	<2.0	<2.0	<2.0	<1.0	<2.0	<20		0.17	4.2	<1.0	26	2.4
	Benzene	<0.5	<2.0	<2.0	1.1	<2.0	<0.5			<2.0	<0.5	<1.0		3.7	5.3	<2.0	<2.0	<0.5	<2.0	<2.0	2 0 2		<1.U	<0.5	<10	~~~
	Date Sampled	8/15/94	6/10/92	8/18/92	8/15/94	6/10/92	8/15/94	C0/01/9	76/01/0	8/19/92	8/15/94	8/20/96		6/10/92	8/18/92	6/10/92	8/19/92	8/15/94	6/11/92	8/28/92	8/15/04	20/00/8	06/07/0	8/16/94	8/20/96	
	Well No.	44M01	44M02	44M02	44M02	44M03	44M03	AAMAA		44M04	44M04	44M04		44M05	44M05	44M06	44MIU6	44MU6	44M07	44M07	44M07	TOMAN	10101-++	44M08	44M08	

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TABLE DP44-1 (continued)

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11/11			0	oncentration	(μ <u>g</u> /L)									
No.	Date	Benzene	Toluene	Ethyl- benzene	Xylenes	TPH GRO	TPH DRO	TCE	c-1,2- DCE	t-1,2- DCE	Analytical Methods	Notes	Reference	
44MW111 44MW111 44MW111 44MW111 Notes:	9/15/92 8/16/94 9/3/96 Addition	<2.0 5.2 <1.0 ounds other al compound ations of tolu	 <2.0 6.0 <1.0 <1.0 than those the detected: thylt 	<2.0 0.7 <1.0 <1.0 listed or note perchloroet perchloroet	 <5.0 5.1 <1.0 <1.0 ed were dete hene - 0.7 p xylenes ma 			<1.0 <1.0 <1.0 <1.0 orting lin	<1.0 <1.0 <1.0 <1.0 nits.	<1.0 0.5 <1.0 <1.0	1,4 1,4 1,4	თ თ	PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI USAF 1996 SWMPR	
A nalitical N	المعلمة													

Analytical Methods:

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

Trichloroethene. cis-1,2,-dichloroethene. trans-1,2-dichloroethene. TCE H

c-1,2-DCE t-1,2-DCE

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TEST RESULTS,
OASSAY FIELD 7 N AFB, ALASKA
TER AND IMMUN H FIELD, EIELSOI
ATER PARAMET RY SHOP LEACF
GROUNDW DP44, BATTE
TABLE DP44-2

1

		s Reference	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR		USAF 1996 SWMPR	USAF 1997 SWMPR	11SAF 1006 SULAD	USAF 1997 SWMPR
		Notes						Ø		
	nor ²	(ppb)	I	pu	ı		1	3 1	1	14.7
<u> </u>	TTCE 2	(ppb)	I	pu	ł		1 2	21	ı	pu
Tenen	Total	BTEX ¹ (ppb)	ł	30	I	I	0 00nd		I	0.00nd
		eH (mv)	1	111	I	I	185	56	-13.7	55
		Hd	6.98	7.35	6.62	7.05	7.13	7.53	7.32	6.90
	Conductivity	(mmhos/cm)	271	328	496	311	296	303	258	304
ameters	Turbidity	(NTU)	81	73	13	75	Ŷ	0	1.5	Ŷ
Par	Temperature	(°C)	11.8	C.11	12.4	13.1	12.3	12.8	4.98	6.1
	Dissolved Oxygen (%	saturation)	1 5	 -	ł	I	6.8	5.3	ł	0.9
	Dissolved Oxygen	(mg/L)	2.17	00.0	2.1	2.53	0.70	0.54	0.032	0.1
	Date	Sampled	8/20/96 9/17/97		8/20/96	8/20/96	9/18/97	9/18/97	9/3/96	1617716
		Well No.	44M04 44M04		44M07	44M08	44M08	44M08	44MW111	44MW I I I

Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

² Dråger Liquid Extraction (DLE) field test kit.

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. nd.

a. Parameters duplicate.

WP45/SS57

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 Or	ganic 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 Or	rganic Compounds						
DDT							
Chlordane	2 μg/L						
Inorganic	Compounds						
'Lead	15 μg/L						
²Silver	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

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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:

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

List of Tables for WP45/SS57:

Table WP45/SS57-1	Concentrations (μ g/L) of BTEX, TPH GRO, and TPH DRO in
	Groundwater Samples, WP45/SS57, Photo Laboratory, Building 1183,
	Eielson AFB, Alaska.

- Table WP45/SS57-2Concentrations (μg/L) of Halogenated Volatile Organic Compounds in
Groundwater Samples, WP45/SS57, Photo Laboratory, Building 1183,
Eielson AFB, Alaska.
- Table WP45/SS57-3Groundwater Parameter and Immunoassay Field Test Results, WP45/SS57,
Photo Laboratory, Building 1183, Eielson AFB, Alaska.

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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

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ASKA		Reference		PNL 1995 OU3,4,5 RI	PNL 1995 OU3 4 5 RI	USAF 1996 SWMPR		PNL 1995 OU3,4,5 RI	PNL 1995 OU3,4,5 RI		PNL 1995 OU3,4,5 RI	PNL 1995 OU3,4,5 RI	USAF 1996 SWMPR		PNL 1995 OU3,4,5 RI	USAF 1996 SWMPR		FNL 1999 OU3,4,5 RI	PNL 1995 OU3,4,5 RI	PNL 1994 SWGMPR	USAF 1995 SWMPR	USAF 1996 SWMPR	DNI 1005 OLT2 / EDI	N C'+'COO CEET THIT	PNL 1995 OI 13 4 5 RI	PNL 1995 OU3,4,5 RU		FNL 1995 UU3,4,5 KI	PNL 1994 SWGMPR USAF 1996 SWMPR
FB, AL		Notes																											
ELSON AI	A - 1 - 1	Methods		1	-	1		1	1	-	-	1	1	•	-	1	-		-		1-3	1		•	1	1	-		
i 1183, Ell		TPH DRO		1	I	1		ł	1		1	1	1		I	t	1	í	I	1	130	ł	1		1	ł			
SUILDINC		TPH GRO		1	ł	1		1	1	I	ł	I	ł		ł	I	1		ł	1 (55	1	1		1	1	ł	1	I
ALUKY, H	(]/aii) u	Xylenes	¢ L	0.0	0.0	<1.0	0 2 1	<u>,</u>	0.0	<\$0		0.0	-1.0	<50	, c	0.17	< <u>5</u> 0	2.5 2.5	, ç	0. V	0.17	o.l>	≤0.0		\$.0	€.0	\$.0	<1.0	<1.0
10 LABUK	Concentratio	Ethylbenzene	ŝ	0, V V V	0.7	<1.0	000	2 ¢	0.7	2.0	0		~I.U	0	0 I 2	0.12	2.0	0.0	1	0.1	0. Z	0.12	2.0		6 0 0	~7.0	0.2	<1.0	<1.0
		Toluene	2		7.0	<1.0	00	ې ا	0.37	2.0	00	, , , ,	0.1	2.0	<10	2	2 .0	2.0	<10	<10		0.17	2.0		6 (0 (0.7	2.0	<1.0	<1.0
CICL TH		Benzene	ç			<1.0	070) j	2.0	2.0		0.14	2.0	<1.0	9	Q.0	0.0	<1.0	012	01>	0.17	42.0	4	000	0.7	30	<1.0	12
	Date	Sampled	6/11/9	8/18/92		96/17/8	6/11/92	8/18/97		6/11/92	8/18/92	8/28/96	5	8/31/92	9/11/96		6/11/92	8/18/92	8/8/94	9/12/95	8/22/96		6/11/92		0/11/92	7/11/1	9/15/92	8/8/94	8/28/96
	Well	No.	45M01	45M01	151401		45M02	45M02		45M03	45M03	45M03		45MW03I	45MW03I		45M04	45M04	45M04	45M04	45M04		45M05	45N 40C	45M06		45MW07	45MW07	45MW07

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4 -TARLE WP45/SS57_1 (c

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9. AK101. 10. AK102. /. 8260. 8. 8240. TATAO 4. 8010. 2. ADEC 8015M.

I Intermediate depth well.

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TED 100 000 000 000 000 000 000 000 000 00	ATORY, BUI ATORY, BUI I,I- Chloro- DCA form Cd.0 60.5 Cd.0 Cd.0 60.5 Cd.0 60.5	TED VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER BUILDING 1183, EIELSON AFB, ALASKA	1,2- 1,1,1- DCA TCA TCE PCE Methods Notes Reference	<0.5 <0.5 330.0 <0.5 4 a PNL 1995 OU3 4 5 RI	<0.5 <0.5 370 <0.5 4 a PNL 1995 013 4 5 RI	<1.0 <1.0 440 <1.0 4,13 a USAF 1996 SWMPR	<0.5 <0.5 37.0 <0.5 4 a PNL 1995 OU3 4.5 RI	<0.5 <0.5 1.3 <0.5 4 a PNL 1995 OU3,4,5 RI	<0.5 <0.5 <1.0 <0.5 4 a PNI. 1995 OI13 4 5 RI	<0.5 <0.5 100 <0.5 4 a PNI. 1995 0113 4 5 RI	<1.0 <1.0 85 <1.0 4,13 a,b USAF 1996 SWMPR	<0.5 <0.5 1.7 <0.5 4 a PNI 1995 OU3 4 5 BI	<1.0 <1.0 1.1 <1.0 4,13 a USAF 1996 SWMPR	<0.5 <0.5 2.6 <0.5 4 * DNI 1005 OUT3 4 5 DI	<0.5 <0.5 4.4 <0.5 4 a pNI 1005 0114 a FI	<0.5 <1.0 4.7 <0.50 4 a PNI 1994 SWGMPR	<1.0 <1.0 3.3 <1.0 4 a USAF 1995 SWMPR	<1.0 <1.0 3.3 <1.0 4,13 a USAF 1996 SWMPR	<0.5 <0.5 <1.0 <0.5 4 a PNL 1995 OU3,4,5 RI	<0.5 <0.5 <1.0 <0.5 4 a PNI, 1995 OI13 4 5 RI	<0.5 <0.5 <1.0 <0.5 4 a PNL 1995 OU3,4,5 RI	1.1 <0.5 2.0 0.9 4 a PNL 1995 OU3 4 5 RI	1.2 <1.0 2.0 0.84 4 a PNL 1994 SWGMPR	
FHAL ABOR ABOR DCE DCE 330.0		HOTOL	c-1,2- DCE	47.0	38.8	40.0	<1.0	3.6	9.3	25.0	16.0	2.6	<1.0	1.4	2.2	1	I	<1.0	<1.0	<1.0	<1.0	3.5	I	
Hg/L) OF HAL Hg/L) OF HAL c-1,2- t-1,2- DCE DCE 47.0 13.0 38.8 39.0 40.0 52.0 40.0 52.0 40.0 52.0 33.6 6.6 9.3 2.5 9.3 2.5 11.0 1.2 16.0 12.0 16.0 12.0 11.4 <1.0	Jug/L) O Jug/L) O c-1,2- DCE DCE 38.8 38.8 9.3 36 9.3 36 9.3 36 9.3 36 9.3 9.41.0 1.4 1.4 1.4 1.4 1.4 1.4 1.4 1.5 1.6 1.6 1.7 1.8 1.9 1.10 1.10 <	/SS57, PF	Methylene Chloride	<5.0	<5.0	<1.0	<5.0	<5.0	<5.0	<5.0	1.4	<5.0	<1.0	<5.0	<5.0	<1.0	<1.0	<1.0	<5.0	<5.0	<5.0	<5.0	<1.0	
TIONS (µg/L) OF HAL /SS57, PHOTOLABOR Methylene c-1,2- t-1,2- chloride DCE DCE <5.0 47.0 13.0 <5.0 38.8 39.0 <1.0 40.0 52.0 <1.0 40.0 52.0 <1.0 40.0 52.0 <1.0 25.0 11.0 1.4 16.0 12.0 <5.0 2.5 11.0 1.4 16.0 12.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 <5.0 <1.0 <1.0 <1.0 <5.0 <1.0 <1.0 <1.0 <5.0 <1.0 <1.0 <1.0	TIONS (µg/L) O /SS57, PHOTOI I Methylene c-1,2- Chloride DCE <5.0 47.0 <5.0 38.8 <1.0 40.0 <5.0 3.6 <5.0 3.6 <5.0 2.6 <1.0 1.4 <5.0 2.6 <1.0 1.4 <5.0 2.6 <1.0 - <1.0 -	ENTRA WP45,	1,1- DCE	I	ł	<1.0	1	1	ł	ł	<1.0	ł	<1.0	ł	!	<0.5	<1.0	<1.0	ł	ł	ı	1	<0.5	<
NTRATIONS (µg/L) OF HAL WP45/SS57, PHOTOLABOR 1,1- Methylene c-1,2- t-1,2- 1,1- Methylene c-1,2- t-1,2- - <5.0 47.0 13.0 - <5.0 47.0 13.0 - <5.0 47.0 13.0 - <5.0 47.0 13.0 - <5.0 38.8 39.0 - <5.0 47.0 13.0 - <5.0 31.6 6.6 - <5.0 31.6 6.6 - <5.0 2.5 11.0 2.5 - <5.0 2.6 <1.0 <1.0 < < < < <<1.0 - <5.0 1.4 <1.0 <1.0 - < < < <<1.0 - < < < <<1.0 - < < < < < - < <	SNTRATIONS (µg/L) O WP45/SS57, PHOTOI O 1,1- Methylene c-1,2- DCE Chloride DCE - <5.0	CONCE MPLES,	Vinyl Chloride	<2.0	2.0	<1.0	<2.0	2.0	<2.0	2.0	<1.0	2 .0	<1.0	2.0	<2.0	<0.5	<1.0	<1.0	~2 .0	2.0	2.0	2 .0	<0.5	< ,
CONCENTRATIONS (µg/L) OF HAL Vinyl 1,1- Methylene c-1,2- t-1,2- Vinyl 1,1- Methylene c-1,2- t-1,2- Cloride DCE Chloride DCE DCE Clo - - 5:0 47.0 13.0 Clo - - 5:0 3.8 39.0 Clo - - 5:0 3.6 6.6 Clo - - 5:0 3.5 5.5 Clo - - 5:0 3.5 5.5 Clo - 1.4 16:0 12.0 10 Clo - 1.4 16:0 12.0 10 Clo	CONCENTRATIONS (µg/L) O WPLES, WP45/SS57, PHOTOI Vinyl 1,1- Methylene c-1,2- Vinyl 1,1- Methylene c-1,2- Coloride DCE Chloride DCE C.0 - - - - C.0 - - - - - C.0 - - - - - - C.0 -	S57-2 SAI	Chloro- methane	ł	ı	<1.0	ī	I	I	1	<1.0	ı	1.3	I	ł	<1.0	<1.0	<1.0	1	ł	ł	I	<1.0	ر آ
S577-2 CONCENTRATIONS (µg/L) OF HAL SAMPLES, WP45/SS57, PHOTOLABOR Chloro- Vinyl 1,1- Methylene c-1,2- t-1,2- - - - - - - - - - 2.0 - - - - - - - - - - - - - - - - - - - - - - - - - - -	SS77-2 CONCENTRATIONS (µg/L) O SAMPLES, WP45/SS57, PHOTOI Chloro- Vinyl 1,1- Methylene c-1,2- methane Chloride DCE Chloride DCE - - - - 47.0 - - - - 40.0 - - - - 50.0 47.0 - - - - - 40.0 - - - - - 40.0 - - - - - - - - </td <td>: WP45/S</td> <td>Date Sampled</td> <td>6/10/92</td> <td>8/18/92</td> <td>8/27/96</td> <td>6/10/92</td> <td>8/18/92</td> <td>6/11/92</td> <td>8/18/92</td> <td>8/28/96</td> <td>8/31/92</td> <td>9/11/96</td> <td>6/11/92</td> <td>8/18/92</td> <td>8/8/94</td> <td>9/12/95</td> <td>8/22/96</td> <td>6/11/92</td> <td>6/11/92</td> <td>9/14/92</td> <td>9/15/92</td> <td>8/8/94</td> <td>2010010</td>	: WP45/S	Date Sampled	6/10/92	8/18/92	8/27/96	6/10/92	8/18/92	6/11/92	8/18/92	8/28/96	8/31/92	9/11/96	6/11/92	8/18/92	8/8/94	9/12/95	8/22/96	6/11/92	6/11/92	9/14/92	9/15/92	8/8/94	2010010
Bytats/SS57-2 CONCENTRATIONS (µg/L) OF HAL SAMPLES, WP45/SS57, PHOTOLABOR Date Chloro- Vinyl 1,1- Methylene c-1,2- t-1,2- Sampled methane Chloride DCE Chloride DCE Chloride DCE t-1,2- Sil8/92 -	Bytats/SS57-2 CONCENTRATIONS (µg/L) O Date Chloro- Vinyl 1,1- Methylene c.1,2- Sampled methore Vinyl 1,1- Methylene c.1,2- Sampled methoride DCE Chloride DCE Chloride DCE 6/10/92 -	, TABLI	Well No.	45M01	45M01	45M01	45M02	45M02	45M03	45M03	45M03	45MW03I	45MW03I	45M04	45M04	45M04	45M04	45M04	45M05	45M06	45M06	45MW07	45MW07	

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TABLE WP45/SS57-2 (continued)	,1- Methylene c-1,2- t-1,2- 1,1- Chloro- 1,2- 1,1,1- Analytical CE Chloride DCE DCA form DCA TCA TCE PCE Methods Notes Reference	- <5.0 31 <1.0 6.6 100 <0.5 100 7,200 1.0 4 a PNL 1995 OU3,4,5 RI .1 1.1 - <1.0 4.7 81 <1.0 66 2,300 1.5 4 a USAF 1995 SWMPR 1.0 <1.0 8.0 <1.0 2.1 46 <1.0 30 2,000 <1.0 4,13 a USAF 1996 SWMPR	- <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	listed were detected above method reporting limits. be the result of laboratory contamination (compound detected in laboratory method blank at 1.3 ug/L).	00M. 5. 8270. 7. 8260. 9. AK101. 11. 7421. 13. 8310. 6. 8080. 8. 8240. 10. AK102. 12. 6020
TABLE W	e e-1,2- t-1,2- DCE DCE	31 <1.0 - <1.0 8.0 <1.0	9.8 25.0	cted above meth	5. 8270. 6. 8080.
	1,1- Methylen DCE Chloride	- <5.0 1.1 1.1 <1.0 <1.0	- <5.0	se listed were dete to be the result of	8100M.
	oro- Vinyl hane Chloride	- <2.0 8 <1.0 .0 <1.0	- <2.0	ls other than tho	3. ADEC M. 4. 8010.
	Date Chl Sampled metl	9/15/92 - 9/18/95 1. 8/22/96 <1	9/14/92	. No compound . Methylene ch	fethods: . 8020. . ADEC 80151
~	Well No.	45MW08 45MW08 45MW08	45MW09	Notes: a	Analytical M 1 2

- DCE DCA TCA PCE
- Dichloroethene. Dichloroethane. Trichloroethane. Trichloroethene. Perchloroethene (tetrachloroethene).
- Intermediate depth well. Ι

S57-3 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS.	45/SS57, PHOTO LABORATORY, BUILDING 1183, EIELSON AFB, ALASKA
TABLE WP45/SS57-3	WP45/SS5

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	tes. Reference	USAF 1996 SWMPR USAF 1997 SWMPR	USAF 1996 SWMPR USAF 1997 SWMPR	USAF 1996 SWMPR	USAF 1995 SWMPR USAF 1996 SWMPR	USAF 1996 SWMPR	USAF 1995 SWMPR USAF 1996 SWMPR USAF 1997 SWMPR
	Ř P F	3.5	- 0.0	,	1 1	1	
sulte	L P(. 4	•		•	1 1 0
assav Re	TCE ²	- 40.32	- 31.92	1	11	I	- - 99.12
Imml	Total BTEX ¹ (pob)	- 0.00nd	- pu	I	11	1	- - 0.00nd
	eH (mv)	19 140	-	-98.3	11	ł	1188
	Hd	6.71 7.39	6.89 7.5	7.41	6.8 6.83	6.76	6.93 6.52 7.31
	Conductivity (mmhos/cm)	482 380	307 360	233	300 303	305	340 309 336
ameters	Turbidity (NTU)	2 10	00	0	- 25	73	001
Par	Temperature (°C)	9.3 10	9.6	4.57	11 9.2	80	11 7.8 9.2
	Dissolved Oxygen (% saturation)	- 12	- 7.3	1.8	11	ł	- 14.5
	Dissolved Oxygen (mg/L)	1.09 1.29	0.95 0.80	ł	2.6 4.41	1.69	2.4 0.7 1.6
	Date Sampled	8/27/96 9/17/97	8/28/96 9/17/97	9/11/96	9/12/95 8/22/96	8/28/96	9/18/95 8/22/96 9/17/97
	Well No.	45M01 45M01	45M03 45M03	45MW03I	45M04 45M04	45M07	45MW08 45MW08 45MW08

Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

² Dråger Liquid Extraction (DLE) field test kit.

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. nd.



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.

сос	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 μg/L	5 μg/L
Toluene	l,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

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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 μ g/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 μ g/L at 48PP13. Wells displaying benzene concentrations above the site specific RAOs and ARAR MCLs included 48M01 (4,600 μ g/L), 48M08 (570 μ g/L), 48PP13 (6,700 μ g/L), 48PP102 (6.2 μ g/L), and 53M03 (390 μ g/L). Wells 48M08 and 48PP13 displayed toluene concentrations at 2,300 and 3,700 μ g/L, respectively. These toluene concentrations are above the site specific RAO and ARAR MCL. 1,2-DCA was also detected in 48M01 at 14 μ g/L, which is above the EPA drinking water MCL of 5 μ g/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 μ g/L (48M01). Wells displaying benzene concentrations above site specific RAOs and ARAR MCLs included 48M01 (3,800 μ g/L), 48M05 (5 μ g/L), and 53M03 (170 μ g/L). No other compounds were detected above applicable RAOs and ARAR MCLs. 1,2-DCA was detected in 48M01 at 4 μ g/L, below the EPA drinking water MCL of 5 μ g/L. Chloromethane was detected in 48M01 (2 μ g/L), 48M04 (0.7 μ g/L), 48M05 (1.0 μ g/L), and 53M03 (1.0 μ g/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 μ g/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:

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

List of Tables for ST48:

Table ST48-1	Concentrations (μ g/L) of Organic Compounds in Groundwater Samples.
	ST48, Powerplant Fuel Spill, Eielson AFB, Alaska.
Table ST48-2	Groundwater Parameter and Immunoassay Field Test Results, ST48,
	Powerplant Fuel Spill, Eielson AFB, Alaska



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

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PNL 1994 SWGMPR PNL 1993 SWGMPR USAF 1995 OUI RD USAF 1995 OUI RD USAF 1995 OU1 RD **USAF 1995 SWMPR USAF 1996 SWMPR USAF 1997 SWMPR** USAF 1995 OUI RD USAF 1995 OUI RD **USAF 1996 SWMPR** USAF 1995 OUI RD USAF 1995 OUI RD PNL 1993 OU2 RI PNL 1993 OU2 RI PNL 1993 OU2 RI PNL 1994 OUI RI IT 1994 EMR Notes Reference BEAR BEAR BEAR BEAR BEAR BEAR BEAR BEAR þ, က ကို ကို ကို લ્ટ હ • م _ a.o م م æ A Analylitical Methods 5,6,8 1,4 1,4 1,4 8 8 8 1,2 4 1,4 1,4 1,4 1,4 5,6,8 5,6,8 <u>444</u> 77 dichloroethylene trans-1,2-<1.0 1 1 1 1 1 1 1 1 1 11111 Ethylbenzene Xylenes TPH GRO TPH DRO TCE 1,2-DCA <1.0 1 1 1 1 1 1 1 1 1 1 1111 <5.0 2.0 0.9 1.9 1.4 <1.0 2.7 <1.0 0.12 <1.0 \$0.0 <1.0 <1.0 1.1 2.0 1 1 ł ł 1 1 1 1.1 1 1 15,000 2,800 1,200,1 g 1 1 1 1 1 1 1 1 1 ł L I 1 1 Concentration (µg/L) 130 - -38 33 1 1 11128 1 1 ł 1 1 11188 <5.0 <5.0 ≤1.0 \$.0 <1.0 ≤\$.0 <1.0 \$.0 8.0 61 2.7 4.0 1.3 4.0 <1.0 \$0.0 \$3.0 \$3.0 ≤1:0 <1.0 \$.0 <3.0 ≤5.0 **¦** 10. <1.0 3.03.0 ₫.0 <1.0 <1.0 \$.0 <1.0 1.6 <1.0 3.0 1.0 \$3.0 0.5 ≤3.0 3.0≤1.0 9.1 <1.0 <1.0 \$.0 ₹.0 ≤3.0 **-** 1.0 ≥ Toluene \$.0
 \$.0 <5.0 <1.0 <3.0 <1.0 <1.0 <1.0 <1.0 ≤3.0 1.2 ≤3.0 \$.0 \$.0 ≤\$.0 <1.0 <1.0 <1.0 ≤3.0 ≤5.0 1.6 \$.0 <1.0 <1.0 I Benzene <0.105 3.05.05.0 <5.0 <5.0 0.1> <1.0 500 <1.0 <1.0 <1.0 §. §. <5.0 \$.0 <1.0<1.0<1.0 <u>\$.0</u> <5.0 2.01.0 1.6 1.2 <1.0 1.0 Sampled 8/21/93 7/27/94 10/4/94 9/15/91 3/16/95 9/18/95 8/12/96 9/8/97 9/1/94 10/4/94 8/12/96 Date 1986 1986 1986 8/8/94 9/15/91 7/22/94 5/18/93 7/26/94 10/4/94 1986 1986 1986 1986 1986 9/15/91 Well No. 18-3 18-3 18-3 18-3 18-3 18-3 18-3 18-3 18-3 18-3 18-3 18-3 18-5 18-5 18-5 18-5 18-3 18-5 18-5 18-5 18-6 18-6 **18-6** 18-6 18-6 18-6

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TABLE ST48-1 (continued)

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		votes Reference				UN IND CAR ISAS OUI KD	d USAF 1995 OUI RD	b USAF 1995 OUI RD	b,d,i USAF 1995 OUI RD	b.j USAF 1996 SWMPR	b, I USAF 1997 SWMPR	READ		a nla 1992 KU/FS; BEAK	PNL 1994 OUT RI		b USAF 1995 OUI RD	b USAF 1995 OUI RD		BUIL 1004 CVI DE AN						b, I USAF 1997 SWMPR		BEAK	a HLA 1992 RUFS; BEAR	PNL 1994 OUI RI	b USAF 1995 OUI RD	b PNL 1994 SWGMP	b USAF 1995 OUI RD	b USAF 1995 SWMPR	b.j USAF 1996 SWMPR	b,I USAF 1997 SWMPR
	Analylitical	Methods	3 1	, 1 s	1,4,0 1,4	ţ	1,2,4	4	4	1,4	1,4		3 6		1,4,5	<u>†</u>	4	4	51	1 4 5	1, 1, 1 1, 1 1, 1	1 -				1,4			1,5	1,4,5	4	1,4	4	14	1,4	1,4 1
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		1,2-DCA	1		35		†	32	<20	14	4	ł	ł		1 7	9. C	1.1	<1.0	1	1	<10	\$ (Þ	210 210	<1.0	<10	<1.0	i	I	1	1	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0
	TCE		1	<1 O	012	2	0.17	9	8	€.0	<1.0	1	1	0.21			<u>.</u>	0.1>	1	<10	012	<0.5	<1.0	<1.0	<1.0	<1.0	I	1	1	0.64	<1.0	≪0.5	<1.0	<1.0	<1.0	<1.0
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	трн сво		1	:	14,000	13,000	12,000	4,000	25,000	1	1	I	I	ł	- 6	0 <u>5</u> 0	3	20	1	1	<50	1	\$0	<50	1	ł	ł		1	I	<50	1	<50	56	1	ł
	Xvlenes	VININ	1.550	1	1.960	1 240	1,100	1,100	001,0	1,980	1,420	<0.85	<0.4	ł	<1.0	<10	2.7	1-1	<0.4	ł	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	1.62		t .0/	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Ethvlbenzene	AllATINGI	143	1	230	170	011	011	480	290	220	⊲0.5	⊴0.46	1	<1.0	<1.0	, - - -	0.12	<0.5	:	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<0.46	P .7	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
	Toluene		49	ł	350	82	000	0	2 0	87	62	<0.25	<0.3	1	<1.0	<1.0		0.17	€.0>	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.3	<0.25	12.00	1	0.12	0.1>	0.1>	0.1>	0.12	0.1>
	Benzene		1,390	910	3,900	3.600	000 6	3 200	000.5	4,600	3,800	0.34	<0.02	<2.0	<1.0	<1.0	017	0.17	<0.02	0.12	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	28.5	3 01	1.2	j	č. 1	0.12 2	0.1>	7.7	1.2	0.0
ſ	Date Sampled		1989	5/19/93	7/27/94	10/4/94	20/LC/L	0/6/02	2010012	%/6/11/6	10/1/97	10/6/89	10/6/89	5/18/93	7/25/94	10/4/94	20/4/17		9/29/89	5/17/93	7/21/94	8/3/94	10/5/94	9/8/95	7/23/96	9/15/97	9/29/89	9/29/89	5/17/03		9/1/7/1 8/1/0/1	8/2/94	46/C/01		06/67/1	16/01/6
	Well No.		48M01	48M01	48M01	48M01	48M01	481401	TOTATO	46MU1	48M01	48M03	48M03	48M03	48M03	48M03	48M03		48M04	48M04	48M04	48M04	48M04	48M04	48M04	48M04	48M05	48M05	481405	COMOL	201/104	CUIVI04	CUIV34	201/04	48NIU5	48MIU2

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TABLE ST48-1 (continued)

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HLA 1992 RIFS; BEAR HLA 1992 RI/FS; BEAR HLA 1992 RI/FS; BEAR USAF 1995 OUI RD **USAF 1995 SWMPR USAF 1996 SWMPR USAF 1997 SWMPR** USAF 1995 OUI RD USAF 1995 OUI RD USAF 1995 OUI RD USAF 1995 OUI RD **USAF 1996 SWMPR** USAF 1995 OUI RD **USAF 1996 SWMPR** USAF 1995 OUI RD USAF 1996 SWMPR USAF 1995 OUI RD USAF 1996 SWMPR USAF 1995 OUI RD USAF 1995 OUI RD USAF 1995 OUI RD **USAF 1996 SWMPR** USAF 1995 OUI RD PNL 1994 SWGMP PNL 1994 OUI RI PNL 1994 OUI RI PNL 1994 OUI RI PNL 1993 OU2 RI PNL 1994 OU1 RI Notes Reference BEAR BEAR b, Ĺj þ,ť b,g b,£j b, Ľj مممم م ۾: æj <u>ت</u> م 2: م -1 م م م Analylitical Methods 1,5 1,4,5 1,5 1,4,5 1,4,5 14 <u>777</u> 1,4 5,6,8 1,4,5 14 1,4 4 7 <u>7</u> 7 I,5 Ţ 1,4 <u>7</u> 7 dichloroethylene trans-1,2-<1.0 111111 1 1 1 1 1 1 1 1 1 1 1 1 1 t ł 1111 1 1 1,2-DCA <1.0 **6**0.5 <1.0 <1.0 <1.0 <1.0 <1.0 1.0 <1.0 <1.0 <1.0 <1.0 1 🖗 0:1⊳ 1 1 1 9 \$3 ₫.0 1:2 <1.0 1 1 47 61 23 1 1 TCE <1.0 0.63 <1.0 ≤1.0 <1.0 \$0.5 ≤1.0 ≤1.0 <1.0 <1.0 <1.0 1 1 51 1.8 1 🖗 $\frac{3}{2}$ 9 ≤1.0 5.0 ≤1.0 0.42 <1.0 2.1 <1.0 1.0 1 1 TPH DRO 2,900 180,000 <100 - - 1,100 4,500 60,000 58,000 520 390 45,000 56,000 230 4 1 1 1 1 ł ł 1 ł ł ŧ ł 1 1 ł 1 Concentration (µg/L) TPH GRO 11,000 32,000 14,000 \$00 \S \S 7,800 1 360 330 1 9,100 3,000 11 1 ł 1 1 I I ł ł 1 1 1 1 Xylenes <0.85 <1.0 6.4 <1.0 3,700 2,160 ≤1.0 <1.0 ≤1.0 <1.0 <1.0 1,800 1,360 4,100 3,600 <1.0 6.4 1 07 1,990 1 28 960 660 89 660 164 9.3 ł Ethylbenzene <0.46 ⊲0.5 <1.0 <1.0 <1.0 <1.0 <1.0 <1.0 - 1.1 1.1 2.8 60.5 <1.0 830 1 370 ²⁸0 160 6.5 <0.5 160 δų I 110 27 Toluene <0.25 <1.0 <1.0 <1.0 <1.0 <1.0 3,200 2,300 <0.3 <1.0 <1.0 5,400 3,700 <1.0 <u>6</u>.9 15 1 540 150 230 53.2 ł 5.0 33. Π 11 2.9 14 Benzene <a>0.2<a>0.15 1.0 1.0 <1.0 <1.0 <1.0 <1.0 <1.0 7,200 6,700 2.0 3.63 0.36 ≤1.0 <1.0 45 ≤ 1.0 6.3 130 210 570 318 299 460 120 220 250 6.2 460 1.9 Well No. Sampled 9/28/89 7/25/96 9/15/97 10/9/89 5/18/93 7/20/94 9/28/89 5/17/93 7/26/94 10/5/94 10/4/94 3/16/95 7/25/96 5/27/93 7/24/95 7/25/96 7/26/95 7/18/96 Date 8/3/94 7/126/95 7/26/95 9/1/95 7/18/96 10/6/89 10/6/89 5/18/93 7/27/94 10/5/94 3/10/95 16/6 48PP102 48M06 48M06 53M03 48M06 48M06 48M06 48M06 48PP13 48PP101 53M03 48M06 48M06 48M07 48M07 48PP28 53M03 53M03 53M03 48M06 48M07 48M07 48M07 48M07 48M08 48M08 48MI08 48PP13 48PP28 53M03 53M03

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		Keterence	USAF 1995 OUI RD	USAF 1995 SWMPR	USAF 1996 SWMPR	USAF 1997 SWMPR					
		Notes	þ,h	Ą	Þ.i	e l					
	Analylitical	Methods	4	4	1.4	1,4					
	trans-1,2-	ulchlorocurylene	1	ı	1	<1.0	2 - 2.2 µg/L. amination. s, 53M03).		-i ci		
		VY-	1.5	<1.0	<1.0	<1.0	48 PP10 48 rP10 ater cont t of laboi		AK10] AK102		
	- H		0.1	1.0	1.0	1.0	.8 μg/L, ilution w the result		9. 10.		
g/L)			o1,000 <	2,000 <	1	ı	oorting limits. g/L, 48M08 - 1 ing. t of laboratory d suspected to be (48M04), 1.0 µ		7.8260. 8.8240.		
centration (µ	трн сро		2,400	2,300	:	I	above the rep urch 1995. MO7 - 5.6 µ AL. bly the result bly the result 0.7 µg/L,				
Cone	Xvlenes	2010	707	490	410	570	2. ere detected i purged 16 Ms 3.2 μg/L. 48 gal. purged 1 zene - 2.4 μg zene - 2.4 μg ging from 2. μg/L (48M0		5. 8270. 6. 8080.		
	Ethvlhenzene	27	; !	4/	87	72	d, see reference sted or noted w d after 10 gal ihloromethane - : troduced and 3 i,4 dichloroben i,4 dichloroben ihloroform - 58 reentrations rar vomethane - 2		100M.		
	Toluene	15	2 2	9	26	21	unds detected than those lis ging, samplex is detected: c water was in b detected: c is detected: c is detected: c detected in con detected: chlo		3. ADEC 81 4. 8010.		
	Benzene	81		047	88	170	ional comps ounds other without pur al compound frozen, hot il compound il compound e chloride d compound		015M.	ne. ne.	
•	Date Sampled	7/74/95	0/0/02	10/010	96/57/1	16/2/6	 For additi For additi No compositiona Additiona Additional Additional 	•	Methods: . 8020. . ADEC 8(richloroethe Vichloroethau	
	Well No.	53M03	531403	COINICC	50M05	53M03	Notes and a set of the	•	Analytical 1 2	TCE 1 DCA E	

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GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS,

		7-01-10	ST48, I	OWER PL	ANT FUE	ELEK AND L SPILL, EI	IMMUNC ELSON A	ASSAY F FB, ALA	TELD TEST	r resul	TS,
					Parameters				Immunoassay Results		
il No.	Date Sampled	Dissolved Oxygen (me/L)	Dissolved Oxygen (% saturation)	Temperature	Turbidity	Conductivity	17	V	Total BTEX ¹	;	
			(IIOIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	(2)	(011)	(IIIIIIIIOS/CIII)	H	eH (mv)	(qdd)	Notes	Reference
10W8	7/27/95	-	NO PARAMET	TERS, WELL S	AMPLED W	/O PURGE (NAI	T IN WELL		ł		USAF 1995 OU1 RD
SM01	9/8/95 7/2010/2	~ ^	NO PARAMET	TERS, WELL S	AMPLED W	/O PURGE (NAI	L IN WELL		1		USAF 1995 OUI RD
INNI	06/67/1		NO PARAME	FERS, WELL S	AMPLED W	/O PURGE (NAI	JL IN WELL	_	ł		USAF 1996 SWMPR
	20/11/6	3.34	34	15.0	0	671	7.67	45	I		USAF 1997 SWMPR
IUMs	10/1/01	0.07	0.7	14.7	Hi	628	7.19	-57	1		USAF 1997 SWMPR
3W03	7/24/95	1.6	ł	00	I	630	7.5	I	ł		USAF 1995 OU1 RD
(M04	<i>9/1/95</i>	3.9	1	17	I	420	71	ł			
M04	7/23/96	3.1	I	14	~	020			ł		UN IND C661 TRSU
MAA	0/15/07	<i>LL</i> 0	6		, ;	0.00	0./	120	ł		USAF 1996 SWMPR
LOTAT		0.17	çõ	11.7	45	430	8.09	66	1		USAF 1997 SWMPR
M05	<i>3611</i> /95	2.7	ł	15	I	150	7.1	I	I		USAF 1995 OT1 PD
M05	7/24/96	0.34	1	9.2	4	514	11	-110	1		
M05	9/15/97	8 49	PL	6.9	36				I		UDAF 1990 SWMFK
			ţ	C.0	6	340	8.12	-16	ł		USAF 1997 SWMPR
M06	9/8/95	3.1	1	6	1	200	6.9	ł	I		
M06	7/25/96	1.09	ł	5.4	7	300	7.05	-121			
M06	9/15/97	8.23	65	4.5	29	242	8.84	- - -			USAF 1990 SWMPK
											N JIM C / CCI TYCO
M07	7/25/96	3.93	ł	7.5	20	444	6.97	11-	ł		USAF 1996 SWMPR
M08	7/24/95	1.2	ł	8.2	I	570	7.3	I	ł		
M08	7/25/96	5.74	ł	01	"	777	007	2			TN IOD CALL INCO
	i				n	000	0.89	-84	I		USAF 1996 SWMPR
M03	7/24/95	1.4	I	9.4	ł	475	7.15	I	1		
M03	9/8/95	2.4	ł	10	ł	740	22		I		UN IUU CEEL INGU
M03	7175196	4 00		2 6	6		0.0	1	ł		USAF 1995 OUI RD
			I	ע	01	0/1	6.48	-62	1		USAF 1996 SWMPR

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					Reference	USAF 1997 SWMPR
					Notes	
	Immunoassay	Results		Total BTEX ¹	(ddd)	1
~					eH (mv)	ċ
ontinued					μd	7.14
E ST 48-2 (c				Conductivity	(mmhos/cm)	560
TABL		Parameters		Turbidity	(NTU)	14
				Temperature	(c)	12.9
			Dissolved	Oxygen (%	saturation)	5.9
			Dissolved	Oxygen	(mg/L)	0.61
				Date	Sampled	9/2/97
~				111.11.211	Well No.	53M03

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.

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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.

сос	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 μ g/L. Chlorinated compounds were detected at concentrations less than 10 μ g/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 μ g/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

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points) to 4.5 μ g/L in 49M05. These TCE concentrations were below the EPA drinking water MCL of 5 μ g/L. Well 49M06 displayed a dichlorofluoromethane concentration of 1.4 μ g/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, 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 ST49-1Concentrations (μ g/L) of Organic Compounds in Groundwater Samples,
ST49, Building 1300 LUST Spill Site, Eielson AFB, Alaska.

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List of Tables for ST49 (continued):

Table ST49-2Groundwater Parameters and Immunoassay Field Test Results, ST49,
Building 1300 LUST Spill Site, Eielson AFB, Alaska.

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ST49 Site Plan Showing Locations of Groundwater Monitor Wells, Eielson AFB, Alaska Fiqure ST49-1.

TABLE ST49-1 CONCENTRATIONS (µg/L) OF ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES,

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HLA 1992 RI/FS; BEAR HLA 1992 RIVFS; BEAR HLA 1992 RI/FS; BEAR HLA 1992 RIFS; BEAR HLA 1992 RI/FS; BEAR USAF 1995 OUI GMIR USAF 1995 OU1 GMIR USAF 1995 OUI GMIR **USAF 1996 SWMPR USAF 1996 SWMPR** PNL 1994 OUI RI Notes Reference BEAR BEAR BEAR BEAR ъ, ъ, e ھ o o -م. م م æ م. م م م Analytical Methods 1,4,5,13 1,4,5,13 1,4,5,13 1,4,5,13 1,4,5,13 4,5,13 1,4,5 1,2,4 1,4,5 1,4,5 1,4,5 ST49, BUILDING 1300 LUST SPILL SITE, EIELSON AFB, ALASKA 7 I,4 7 **1**,4 7 <u>4</u> 4 7 444 TCE ≤1.0 <1.0 <1.0 <1.0 0.18 1.0 <1.0 <1.0 <1.0 <1.0 0.35 <1.0 <1.0 0.96 2.2 6.9 8.2 ł. - 23 6.1 5.8 3.1 4.5 t I Ethylbenzene Xylenes TPH GRO TPH DRO DCDFM <1.0 <1.0 1 1 1 1 11 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1,700 4,900 <100 <100 1,500 1 1 1118 181 1 1 1 1 1 1 1 1 1112/1 1 510 δ % 1 10 131 Concentration (µg/L) 1 1 1 1118 1 1 1 ⊲0.85 <0.85 <1.0 5.95 26.5 38.3 0.94 6.4 <0.85 <1.0 <1.0 <1.0 8.4 1.0 18.1 <1.0 1.2 6.7 1.1 <u>8</u> ł 2.5 1 ł ł <0.46 <1.0 **6**0.5 <1.0 <u>60.2</u> <1.0 5.37 <1.0 <1.0 <1.0 <1.0 2.35 9.7 10 1.9 0.63 0.55 <1.0 **6**0.5 <1.0 0.92 I I I I 1 Toluene - 10.1 ⊲0.25 <1.0 ⊲0.25 <1.0 0.31 0.83 0.49 <1.0 6.3 €.03 <1.0 0.72 <1.0 <1.0 <u>6</u>.3 6.4 3.6 1.0 ł 5.1 3.0 I ł I Benzene <1.0 **5**0 0.33 0.59 0.0 <1.0 <1.0 0.7 ℃ <1.0 <1.0 2.9 1.37 0.57 2.6 4.71 2.9 4.35 9.0 2.47 8.2 13 3.8 6.8 7.4 Sampled 5/25/93 7/20/94 9/19/89 5/26/93 7/27/94 9/30/94 5/18/93 9/30/94 5/25/93 7/19/94 9/19/89 7/20/94 8/2/96 9/30/94 5/26/93 9/4/89 1989 8/2/96 9/4/89 1989 9/4/89 8/8/94 9/30/94 8/2/96 Date 1989 1989 49M02 49M02 49M02 49M02 49M02 49M02 49M03 49M01 49M03 49M03 49M04 49M04 49M04 49M01 49M01 49M01 49M03 49M04 49M04 49M05 49M05 49M05 49M05 49M05 49M01 49M05 Well å

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USAF 1996 SWMPR

<1.0

Well	Date			5	Concentration	n (ue/L)				Analytical		
.oN	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	DCDFM	TCE	Methods	Notes	Reference
49M06	9/12/89	1.35	<0.3	3.26	⊲0.4	I	ı	1	77	1 4 5 12		UI A 1000 BILEO. DE AD
49M06	5/26/93	1.9	1	ł					ì	CT * C * F	đ	nLA 1992 NJFS, BEAK
201101			•		1	1	I	ł	4.8	I,4,0		PNL 1994 OUI RI
43MU0	10/4/94	<1.0	<1.0	8.6	18	230	2.000	ł	6.0	4	Ч	TISAE 1005 OF IT CAMP
49M06	9/29/95	2.1	1.0	8.1	16	180	1 000	" "			3.	NIND IOD CCCI LIVED
101101					2	100	1,700	C.4	7.7	<u>†</u>	۵	USAF 1995 OUI GMIR
49MU6	8/2/96	1.7	<1.0	4.2	9.6	1	ł	1.4	3.8	1,4	υ	USAF 1996 SWMPR
53M05	9/19/89	0.47	<0.3	<0.5	<0.4	ł	1	ł	10	1 1 5		UI A 1000 DIEG. DE 4D
53M05	1989	<0.15	<0.25	0.72	3 00	ł				· · · · ·	5	nLA 1992 KUFS; BEAK
202 606						l	1	1	t			BEAK
CUIVICC	5610710	0.11	1	I	1	1	1	I	2.9	1.4.5		PNI. 1994 OFFE BI
53M05	7/19/94	<1.0	<1.0	<1.0	<1.0	67	3.700	ł	012	14	4	
53M05	70/02/6	14	3.6		< 1/	Ċ					5	VIIMO IOO CCCI JUCO
			4.0	A.1/	N.12	6	2/0	1	1.3	4	q	USAF 1995 OUI GMIR

TABLE ST49-1 (continued)

x

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

b. No compounds other than those listed or noted were detected above the reporting limits.

USAF 1995 OU1 GMIR

c. Gauged 19 July, sampled 27 July without purging, sampled again 30 September without purging. d. Additional compounds detected: trichlorofluoromethane - 1.9 $\mu g/L$, 1,1,1-trichloroethane - 1.1 $\mu g/L$.

e. Additional compounds detected: Methylene chloride - $49M01 - 1.0 \mu g$ L, $49M02 - 1.2 \mu g$ L, $49M06 - 1.1 \mu g$ L, probably the result of laboratory contamination (compound was also detected in laboratory method blank at 1.5 ug/L).

Analytical Methods:

13 8310		
11. 7421	12. 6020.	
AK101.	AK102.	
<u>6</u>	01	
7. 8260.	8. 8240.	
8270.	8080.	
s.	è.	
. ADEC 8100M.	. 8010.	
ę.	4	
1. 8020.	2. ADEC 8015M.	

Dichlorodifluoromethane Trichloroethene DCDF TCE

	,

			Daforonna	Velet elle	USAF 1996 SWMPR	USAF 1996 SWMPR		USAF 1997 SWMPR	IISAF 1005 SUMADD	ATTANA CULT TADO	USAF 1997 SWMPR
			Notes	TAULO							
		Its	PCE ²	10441	ł	I	ł	pu	1	I	nd
LASKA	,	assay kesu	TCE ²	(0.44)	1	I	I	pu	I	ł	pu
ON AFB, AI	•		Total BTEX ¹ (nnh)		I	ł	1	60	1	I	90
EIELS			eH (mv)		-35	-13	-25	34	ı	-22	62
SITE,			Hq		6.63	6.67	6.61	7.48	6.89	6.52	6.97
UST SPILL			Conductivity (mmhos/cm)		322	302	362	334	340	334	422
3 1300 LI	amatare		Turbidity (NTU)	, ,	Ś	6	×	10	1	21	0
BUILDING	Par		Temperature (°C)		4.8	3.0	6.2	9.7	7.0	3.6	T.T
ST49,		Dissolved	Oxygen (% saturation)		I	ł	I	20	I	ł	25
		Dissolved	Oxygen (mg/L)		3.29	0.72	0.62	2.26	1.7	2.42	2.89
		••••	Date Sampled		8/2/96	8/2/96	8/2/96	<i>L6/61/6</i>	9/29/95	8/2/96	6/18/02
			Well No.		49M01	49M02	49M05	49M05	49M06	49M06	49M06

GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, **TABLE ST49-2**

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Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

² Drager Liquid Extraction (DLE) field test kit.

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. nd.

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.

сос	RAOs/Final Remediation Goals (Groundwater)	ARAR (Groundwater) - Drinking water MCL
Benzene	5 μg/L	5 μg/L
Toluene	l,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 μ g/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 μ g/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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

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List of Figures for SS50-52:

Figure SS50-52-1 Blair Lake Facility Site Plan, Showing Locations of Monitor Wells, Eielson AFB, Alaska.

List of Tables for SS50-52:

 Table SS50–52-1
 Concentrations (μg/L) of Organic Compounds in Groundwater Samples, SS50-SS52 Blair Lake, Eielson AFB, Alaska.
 Table SS50-52-2
 Groundwater Parameter and Immunoassay Field Test Results, SS50-SS52, Blair Lake Facility, Eielson AFB, Alaska.

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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

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	otes Reference	SERIE COOL V III	READ	DEAR	FNL 1994 UUI KI		USAF 1997 SWMPR	UI A 1001 BTRES	CJ/N 1222 U/C3	DEAK	PNL 1994 OUI RI	USAF 1995 OUI RD			BEAK	PNL 1994 OUI RI	USAF 1995 OUI RD		USAF 1996 SWMPR		REAP			UN TUO CAR INSOUT KU		USAF 1996 SWMPR	USAF 1997 SWMPR
Analytical	Methods N	145	L,T,L	1 1 5	1,4,J	C-1		145	J. (T. (1	115	1,4,0	1-3	145	L,T,L		L,4,D	1-3		1	145	J. 67. 64	1 4 5	1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1		<u>.</u> .	1	1
	TPH DRO	:	1		490,000	1000		:	1	ł	ł	<100	ł		ł	1	590	066	:	ł	ł	1	130		1/0	1	1
	TPH GRO	ł	I	ł	5 500	· · ·		:	1		:	59	1	ł	8	1	660 22	<50	1	ł	;	1	<50	00	001	1	I
1 (μg/L)	Xylenes	6.940	1.860		2.400	z, co I was frozen	l was frozen.	<0.4	<0.85		ł	<1.0	126	607	-		9.5C	16	177	<0.4	<0.85	ł	<10	012	0.12	1.0	<1.0
Concentration	Ethylbenzene	2,210	332	:	420	as collected - wel	as collected - wel	<0.5	<0.46		1	<1.0	342	136	} }	00	95	cl	56	<0.5	<0.46	ł	<1.0	<1.0	017	0.17	<1.0
	Toluene	2,080	261	1	620	No sample w	No sample w	<0.3	<0.25	ł	< Ţ	<1.0	8.37	52.5	ł	۲ ع	C.1	1.1	2.6	<0.3	<0.25	ł	<1.0	<10	<10	0.1.	<1.0
	Benzene	335	65.2	28	450			<0.2	<0.15	<2.0		0.1>	108	44.3	290) 0 + 4	0.0	120	3.84	3.0	<2.0	<1.0	<1.0	<1.0		<1.U
Date	Sampled	10/2/89	12/31/89	5/26/93	9/14/95	10/9/96	10/10/97	10/1/89	12/31/89	5/25/93	10/1/01	12/14/94	10/2/89	12/31/89	5/25/93	12/14/04	20/V1/0	C6/+1/6	10/9/96	10/1/89	12/31/89	5/24/93	12/14/94	9/14/95	96/6/01		1 A/N1 /N1
Well	No.	50M01	50M01	50M01	50M01	50M01	50M01	50M02	50M02	50M02	CONVOS	ZUINIUC	50M05	50M05	50M05	50M05	SOMOS	COINTOC	CUMUC	50M06	50M06	50M06	50M06	50M06	50M06	SOMARS	notatoc

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							(22)			
Well	Date			Concentration	(ng/L)			Analutical		
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Methods	Notes	Reference
50M07	10/2/89	3.8	2.69	66 ()	11 3			34 1		
50M07	5/24/93	<0.0>	1			ł	ł	1,4,0		HLA 1992 KU/FS
50M07	12/14/94	<10				1	1	1,4,5		PNL 1994 OUI RI
SOMOT	20/1/02	0.17	0.17	~1.U	1.1	00	<100	1-3		USAF 1995 OUI RD
	C6/41/2	0.12		<1.0	<i.0< td=""><td><50</td><td>63</td><td>1-3</td><td></td><td></td></i.0<>	<50	63	1-3		
/nWnc	10/9/96	4.0	6.0	3.5	18.1	1	I	_		IISAF 1996 SWARD
50M07	10/10/97	<1.0	<1.0	<1.0	4	I	1			USAF 1997 SWMPR
50M10	10/2/89	<0.2	<0.3	<0.5	<0.4	ł		3 7 1		
50M10	5/24/93	0.77	1		÷	;	I	1,4,0		HLA 1992 KUFS
50M10	12/14/94	<1.0	<1.0	<1.0	<1.0	90	<100	1,4,5 1-3		PNL 1994 OUI RI USAF 1995 OUI RD
50PS3	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	ł	р	CRREL 1995
50PS4	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	ł	q	CRREL 1995
50PS7	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	ł	q	CRREL 1995
50PS8	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	ł	p	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	ł	q	CRREL 1995
50PS12	10/6/94	066	45	160	180	1700	<700	I	q	CREEL 1995
50PS14	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	ł	q	CRREL 1995
50PS16	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	I	q	CRREL 1995

TABLE SS50-SS52-1 (continued)

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							(no			
Well No.	Date Sampled	Benzene	Toluene	Concentration Ethvlbenzene	<u>ι (μg/L)</u> Xvlenes	TPH GRO	Oan Har	Analytical	Nates	Ş
S17	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700		d d	CRREL 1995
S18	10/6/94	<2.0	<2.0	<3.0	<3.0	<120	<700	ł	φ	CRREL 1995
cs:	a. No compo b. No compo c. Chromatog d. Field gas c	unds other than unds other than gram is dominal .hromatograph	those listed w those listed w ted by large pe was used for s	vere detected abov vere detected abov eak not characteris ample analysis.	e the reportin e the reportin stic of dicsel.	ıg limits. ıg limits set fr	orth in the SV	VMP Workpli	an (USAF	1995).
lytical	Methods: 1. 8020. 2. ADEC 80	15M.	3. ADEC 81 [.] 4. 8010.		5. 8270. 5. 8080.		7. 8260. 8. 8240.		9. AK1 10. AK1	01. 22.
tewide Mor	toring Report Draft - C	ħ.2			2-239					

TABLE SS50-52-2GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS,
SS50-SS52, BLAIR LAKE FACILITY, EIELSON AFB, ALASKA

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					Parameters				ummunoassay Results		
		Dissolved	Dissolved								
	Date	Oxygen	Oxygen (%	Femperature	Turbidity	Conductivity					
Well No.	Sampled	(mg/L)	saturation)	(c)	(NTU)	(mmhos/cm)	μd	eH (mv)	Total BTEX ¹	Notes	Reference
50M01	10/9/96			WELL	FROZEN						
50M01	10/10/97			WIFLI	EDOTEN				1		USAF 1990 SWMPK
					LINUZEIN				ł		USAF 1997 SWMPR
SONADS	10/0/05	000									
COTATOC	0616101	66.0	I	-0.03	593	505	7.04	-22	I		USAF 1996 SWMPR
ONIMING	06/6/01	0.39	I	2.67	1630	171	7.03	144	I		IISAF 1996 SWMPR
50M06	10/10/97	2.21	16.7	3.7	Н	464	7.7	132	I		IISAF 1007 SWARD
								1			V JIM MC / CCT TUCO
50M07	10/9/96	ł	60	60.0-	20.9	319	7 13	100			
	2010101							101	1		USAL 1990 SWMPK
	16/01/01	32.1	1	2.8	69	860	7.15	129	I		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	COC (cont.)	ARAR (Groundwater) - Drinking water MCL (cont.)				
Volatile Or	ganic Compounds	Trichloroethene	5 μg/L				
Benzene	5 μg/L	Tetrachloroethylene	5 μg/L				
Toluene	1,000 µg/L	Vinyl Chloride	2 μg/L				
Ethylbenzene	700 µg/L	Semivolatile Organic Compounds					
Xylenes	10,000 μg/L	DDT					
1,4-Dichlorobenzene	75 μg/L	Chlordane	2 μg/L				
1,2-Dichloroethane	5 μg/L	Inorga	nic Compounds				
cis-1,2-Dichloroethene	70 μg/L	'Lead	15 µg/L				
trans-1,2- Dichloroethene	100 μg/L	² Silver	100 μg/L				

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 μ g/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.

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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 μ g/L). Chlorinated VOCs and BTEX compounds were found in 1993 in groundwater samples near the leach field discharge at levels of less than 10 μ g/L. TCE and PCE were the only compounds measured above their respective ARAR MCLs of 5 μ g/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 μ g/L and 13 μ g/L, respectively. The PCE concentration at Building 6152 tap exceeded the site specific ARAR MCL of 5 μ g/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 μ g/L and 3.4 μ g/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 μ g/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, 1997
1996 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

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Figure ST56-1 ST56 Site Plan, Engineer Hill Area, Eielson AFB, Alaska.

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Table ST56-1	Concentrations (μ g/L) of BTEX Compounds in Water Samples, ST56.
	Engineer Hill Area, Eielson AFB, Alaska.
Table ST56-2	Concentrations (μ g/L) of Halogenated Volatile Organic Compounds in
	Water Samples, ST56, Engineer Hill Area, Eielson AFB, Alaska,
Table ST56-3	Analytical Data ($\mu g/L$) from the Engineer Hill Water Supply Well (ST56).
	Data from 1986 are from Older Well. Data from 1990-1994 are from New
	Well. Analytical Data for Tap Water Collected from Building 6152 is also
	Shown, Eielson AFB, Alaska. (Revised from Final RI, USAF 1995;
	Building 6152 Tap Water Data from USAF 1994 Memo)
Table ST56-4	Groundwater Parameter and Immunoassay Field Test Results, ST56,
	Engineer Hill Area, Eielson AFB, Alaska.



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ST56 Site Plan, Engineer Hill Area, Eielson AFB, Alaska
Well	Date			Concentra	tion (µg/L)			Analytical		
No.	Sampled	Benzene	Toluene	Ethylbenzene	Xylenes	TPH GRO	TPH DRO	Methods	Notes	Reference
56MW03	8/93	0.13	1.0	0.15	1.1	ł	ł	,		IISAE 1005 OI 11 2 4 5 DDM
56MW03	9/2/96			No sample wa	s taken beca	use well was o	lty.	•	_	USAF 1996 SWMPR
56MW04	8/17/94	<1.0	<1.0	<1.0	<1.0	1	1			
56MW04	9/2/96	<1.0	<1.0	<1.0	<1.0	1	ł	44	_	USAF 1996 SWMPR
56MW05	8/17/94	<1.0	<1.0	<1.0	<1.0	I	I		-	
56MW05	9/2/96	<1.0	<1.0	<1.0	<1.0	ł	ł			USAF 1996 SWMPR
6152 tap	1/25/96	<1.0	<1.0	<1.0	<1.0	1	;		-	Ca 3 7 610 2001 A 811
6152 tap	8/29/96	<1.0	<1.0	<1.0	<1.0	ł	ł			USAF 1996 SWMPR
well head	1/25/96	<1.0	<1.0	<1.0	<1.0	I	1		,	USAF 1006 OI 12 4 5 BD
well head	8/29/96	<1.0	<1.0	<1.0	<1.0	ł	ł	•		TSAF 1996 SULVED
well head	9/8/97	<1.0	<1.0	<1.0	<1.0	ł	ł			USAF 1997 SWMPR
septic tank	1/25/96	<1.0	<1.0	<1.0	<1.0	I	1	_	F	164F 1006 OT13 4 6 DD
septic tank	8/29/96	<1.0	<1.0	<1.0	<1.0	1	ł	•	-	ISAF 1996 SWMPP
septic tank	9/8/97	<1.0	<1.0	<1.0	<1.0	1	ł	1		JSAF 1997 SWMPR
Analytical N	lethods: 1. 8020.		3. ADEC 81	00M.	5. 8270.	(-	. 8260.	6	AK 101	
	2. ADEC 80	15M. 4	4. 8010.	U	6. 8080.	œ	. 8240.	10	. AK102	

CONCENTRATIONS (μg/L) OF BTEX COMPOUNDS IN WATER SAMPLES, ST56, ENGINEER HILL AREA, EIELSON AFB, ALASKA **TABLE ST56-1**

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TABLE ST56-2 CONCENTRATIONS (µg/L) OF HALOGENATED VOLATILE ORGANIC COMPOUNDS IN WATER SAMPLES, ST56, ENGINEER HILL AREA, EIELSON AFB, ALASKA

4

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	ત્ર	USAF 1995 OU1,3,4,5 RDWP
56MW04 56MW04	8/17/94 9/5/96	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	44	a a,b	USAF 1995 OU1,3,4,5 RDWP USAF 1996 SWMPR
56MW05 56MW05	8/17/94 9/5/96	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	44	50 50	USAF 1995 OU1,3,4,5 RDWP USAF 1996 SWMPR
6152 tap 6152 tap	1/25/96 8/29/96	<1.0 1.4	<1.0 <1.0	13 15	<1.0 <1.0	44	a a,b	USAF 1996 OU3,4,5 RD USAF 1996 SWMPR
well head well head well head	1/25/96 8/29/96 9/8/97	<1.0 1.7 <1.0	<1.0 <1.0 <1.0	4.2 3.4 4.0	<1.0 <1.0 <1.0	444	a a,b a	USAF 1996 OU3,4,5 RD USAF 1996 SWMPR USAF 1997 SWMPR
septic tank septic tank septic tank	1/25/96 8/29/96 9/8/97	<1.0 1.4 <1.0	<1.0 <1.0 <1.0	<1.0 <1.0 <1.0	<1.0 <1.0 <1.0	444	a a,b	USAF 1996 OU3,4,5 RD USAF 1996 SWMPR USAF 1997 SWMPR
Notes: t	a. No compou . Methylene	ands other than chloride is sus	those listed	l were detect the result of	ed above the rep [laboratory cont	orting limits. amination (com	pound was	also detected in laboratory method

Analytical Methods:

blank at 1.3 ug/L).

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

Trichloroethene.

Perchloroethene (tetrachloroethene). Dichlorobenzene. TCE PCE DCB

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	Engineer Hill	Groundwater Data Volatile Organic	Benzene	n-Butylbenene	tert-Butylbenzene	Cniorobenzene	Frhvlhenzene	Isonronvibenzene	Nanhthalene	n-Pronvlhenzene	1,1,2,2-Tetrachloroethane	Tetrachloroethylene	Toluene	1,1,1-Trichloroethane	Trichloroethylene	1,3,5-Trimethylbenzene	1,2,5-Trimethylbenzene	Xylenes	Metals	Arsenic	Copper	Iron	Manganese	Zinc	Chloride	Nitrate Sulfate	

Water sample obtained from tap in Building 6152.
 Not applicable or analyzed.
 Not detected.
 Method detection limit.

* NDL MDL

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GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST56, ENGINEER HILL AREA, EIELSON AFB, ALASKA **TABLE ST56-4**

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				Dar	amataro					4			
			-	I al	allicicis				Immun	oassay Kesu	ults		
	Date	Dissolved	Dissolved Oxygen (%	Temperature	Turbidity	Conductivity			Total	TCF ²	PCF ²		
Well No.	Sampled	(mg/L)	saturation)	(°C)	(NTU)	(mmhos/cm)	μd	eH (mv)	BTEX ¹ (ppb)	(dqq)	(ppb)	Notes	Reference
SEPTIC													
TANK	01/25/96			NO PARAM.	ETERS TA	KEN			:	:	ł		USAF 1995 SWMPR
TANK	08/29/96			NO PARAM	ETERS TA	KEN			1	ł	:		USAF 1996 SWMPR
TANK	09/08/97			NO PARAM	ETERS TA	KEN			ł	ı	1		USAF 1997 SWMPR
WELL			·										
HEAD WELL	01/25/96	ł	1	ł	ł	1	ł	I	ł	ł	ł		USAF 1995 SWMPR
HEAD WELL	08/29/96	ł	36.9	9.86	-	202	7.49	163	I	1	:		USAF 1996 SWMPR
HEAD	09/08/97	6.92	77	19.1	33	297	8.38	118	ł	ł	1		USAF 1997 SWMPR
BLDG.	20/00/80		03	- - -	t		l						
	06167100	l	ØC	9.18	4./	C 07	6.7	208	1	1	:		USAF 1996 SWMPR
56MW04	09/02/96	:	24.6	4.26	68	288	6.31	42	I	ł	;		USAF 1996 SWMPR
56MW05	09/02/96	;	34	2.2	1480	546	7.18	-23	I	ł	ł		USAF 1996 SWMPR
Notes:	_						-	•					
	¹ RaPID As	isays Ohmic	ron Total BT	'EX field test k	cit.								

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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.

² Dräger Liquid Extraction (DLE) field test kit.

nd.

SS57: see WP45/SS57

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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.

сос	ARAR (Groundwater) - Drinking water MCL
Volatile Or	ganic 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 μ g/ L

COC (cont.)	ARAR (Groundwater) - Drinking water MCL (cont.)
Trichloroethene	5 µg/L
Tetrachloroethylene	5 μg/L
Vinyl Chloride	2 μg/L
Semivolatile Or	ganic Compounds
DDT	
Chlordane	2 μg/L
Inorganic	Compounds
'Lead	15 μg/L
²Silver	100 μg/L

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.

1 - EPA Action Level

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 μ g/L and 15.1 μ g/L, respectively). No BTEX compounds were detected above site specific ARAR MCLs. Lead concentrations ranged from below detection limits (58PS12) to 77.8 μ g/L (58PP101). Lead concentrations in 58PP101 (77.8 μ g/L), 58PP102 (30 μ g/L), 58PP103 (61.9 μ g/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 μ g/L) and 58PS10 displayed concentrations of cis-1,2-DCE (15 μ g/L) and trans-1,2-DCE (12 μ g/L). 58PS10 also displayed a TCE concentration of 12 μ g/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 μ g/L, below the EPA drinking water MCL of 0.2 μ g/L. Other PAHs detected included chloromethane (58PS3 - 1.7 μ g/L; 58PS9 - 1.4 μ g/L), naphthalene (58PP103 - 1.4 μ g/L), fluorene (58PP103 - 0.18 μ g/L), phenanthrene (58PP103 - 0.37 μ g/L), and benzo[a]fluoranthene (58PP103 - 0.017 μ g/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, 1997
1997 Sitewide Monitoring Program Workplan Addendum, USAF, 1997

List of Figures for ST58:

Figure ST58-1	ST58 Site Plan Showing Locations of Groundwater Monitor Wells and
	Well Points, Eielson AFB, Alaska.

List of Tables for ST58:

Table ST58-1Concentrations (μg/L) of Organic Compounds and Lead in Groundwater
Samples, ST58, Old Quartermaster Service Station, Eielson AFB, Alaska.Table ST58-2Groundwater Parameter and Immunoassay Field Test Results, ST58, Old
Quatermaster Service Station, 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

1

Well No.	Date Sampled	Benzene	Toluene	Ethyl- benzene	Xylenes	C GRO	oncentra TPH DRO	ttion (μg/L) Methylen Chloride	cis-1,2 DCE	rans-1,2 DCE	TCE	Total Lead	nalytical Methods	Notes	Reference
58MW01 58MW01	1/92 4/93	⊲0.2 ⊲0.65	<1.5 <0.73	<1.0 <0.49	⊲3.0 <1.7	- 2,000	200	<1.0 1.8	11	11	11	35 -	8 8,11	a, a b	PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI
58MW02 58MW02	1/92 4/93	<0.2 <0.65	<1.5 <0.73	<1.0 ⊲0.49	⊲3.0 <1.7	,000,5	ı 00 ⊽	<1.0 <1.6	11	11	ŧ I	33 1	8 8,11	a, a Ú	PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI
58MW03 58MW03	1/92 4/93	5.4 3.7	<1.5 <0.73	<1.0 <0.49	⊲3.0 <1.7	- 2,000	ı 100	<1.0 2.3	1 1	11	11	14	8 8,11	a a Ç	PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI
58MW04 58MW04	1/92 4/93	72 98	<1.5 <0.73	1.4 <0.49	⊲3.0 <1.7	11	300	<1.0 2.3	1 1	1 1	1 1	63 -	8 8,11	a b b	PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI
58MW05 58MW05	1/92 4/93	85 29	<1.5 <0.73	<1.0 49	⊲3.0 <1.7	- 2,000	100	<1.0 2.3	11	I I	11	1	8 8,11	a, a b	PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI
58MW06 58MW06	1/92 4/93	<0.2 <0.65	<1.5 <0.73	<1.0 ≪0.49	⊲.0 <1.1	- 2,000	ı 100	<1.0 2.3	1 1		11	14	8 8,11	a, a b	PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI
58MW07 58MW07	1/92 4/93	<0.2 <0.65	<1.5 <0.73	<1.0 <0.49	⊲.0 <1.7	- 2,000	100	<1.0 2.4	11	11	1 1	- 110	8 8,11	a, b, b	PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI
58MW08 58MW08	1/92 4/93	145 180	<1.5 <0.73	43 110	14 29	- 2,000	- 100	<1.0 2.2	11	11	1 1	- 21	8 8,11	a, b d, a	PNL 1995 OU3,4,5 RI PNL 1995 OU3,4,5 RI
58MW09	4/93	24	2.8	I	45	260,000	000'66	2.3	ł	ł	I	130	8,11	a,b	PNL 1995 OU3,4,5 RI
58MW10 58MW10 58MW10	4/93 9/25/95 9/3/96	450 30 <1.0	140 24 <1.0	- 110 3.9	830 610 15.1	 2,000 1,800 	7,000	9.0 		1	ı ı ∑	89 10 1	8,11 1,2 .4,11,1	a,b s	PNL 1995 OU3,4,5 RJ USAF 1995 OU1,3,4,5 RDWP USAF 1996 SWMPR
58MW11 58MW11 58MW11	4/93 10/4/94 9/3/96	1.3 42.0 <1.0	1.1 2.0 1.0	- ₫.0	۲.0 1.0	<2,000 <120	100	2.0 <	- ≤6.0 <1.0	- ∆.0 1.0	- ⊳ ⊳ 1.0	170 - 7.2 1	8,11 ,4,11,1	a, b c	PNL 1995 OU3,4,5 RI Pine & Swallow, 1994 USAF 1996 SWMPR

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		- nalytical Methods	8,11 1,4,11,1	1,2 1,4,11,1	•
		Total Lead	180 6.3	- 77.8	
		TCE	- 1.0 1.0	- 1.0	
		rans-1,2 DCE	1 10.	- 1.0 1.0	
inued)		cis-1,2 DCE	- 1.0 −1.0	۲ <u>۱</u> .0	
8-1 (conti	ation (µg/L	Methylen Chloride	2.0 <1.0	- 10.12	
E ST5	oncentr	TPH DRO	300	1 1	l
TABL	с С	TPH GRO	2,000	- 50	()
		Xylencs	<1.7 <1.0	<1.0 4.6	<10
		Ethyl- benzene	≪0.49 <1.0	1.1 2.0	<1.0

.

USAF 1995 OU1,3,4,5 RDWP USAF 1996 SWMPR USAF 1995 OUI,3,4,5 RDWP USAF 1996 SWMPR USAF 1995 OU1,3,4,5 RDWP USAF 1996 SWMPR USAF 1995 OU1,3,4,5 RDWP PNL 1995 OU3,4,5 RI USAF 1996 SWMPR **USAF 1996 SWMPR** CRREL 1994 USAF 1996 SWMPR **USAF 1996 SWMPR** CRREL 1994 CRREL 1994 CRREL 1994 CRREL 1994 **CRREL 1994** CRREL 1994 CRREL 1994 CRREL 1994 CRREL 1994 CRREL 1994 CRREL 1994 Notes Reference a, b o o o ъ 4. 4 U 4. يب U - 1,2 30 1,4,11,1 - 1,2 61.9 1,4,11,1 12.9 1,4,11,1 1,4,11,1 1,4,11,1 1,2 1.4 1 0 I ł I L 1 1 Ł t I I. · 1∨ ı 7 <1:0</pre> ≤1:0 <1.0 <1.0 <1.0 <1.0 0.1≤ ≤1.0 ≤1.0 <1.0 <1:0 ł 7 7 ı 1.0 I 10. Ø.0 <1.0 0.0 V 0. V 0.0 0 Ø.0 0 б 0.0 Ø.0 0.0 ©.0 Ø.0 0 0.0 0 <1.0 © 0;0 5.7 I - 1 10 ı . 7 6.0 6.0 \$ 6.0 8 6.0 ≪6.0 6.0 6.0 6.0 6.4 8.1 I. 15 - [™] I 10.1 <1.0 <1.0 - 1.5 ł 1 1 1 1 ł 1 ł I ł ł I 00 √ 00℃ 00℃ 8 V V V 001∕> 00 ℃ 00 √ 00 √ 00℃ 00℃ 00℃ 1 1 1 1 I ł I t 5,000 <120 <120 <120 <120 <120 <120 <120 **7** 1 <120 <120 <120 ŝ <120 <120 I ł ł I 0.1 7 √ ≤1.0 б 0;0 0.0 V <1.0 0.0 0 ð. 0 Ø.0 0;0 V 0.0 0.0 0.0 0.0 0.0 V 0.1> Ø.0 Ø 2 2 2 2 2.0 7.7 <1.0 0 0 Ø.0 0.12 0.0 V V ₹ 0.00 0.0 Ø.0 0 0. V Ø.0 <1.0 0.1⊳ Ø.0 1.1 Benzene Toluene €0.73 <1.0 l.1 ⊲1.0 <1.0 <1.0 2.2 <1.0 <1.0 0. 0 Ø 0;0 Ø.0 1.0 <u>6</u> 0 0 0 0 0 8 00 8 *б* Ø.0 0,0 <1.0 0.12 *8* 0,0 ⊲0.65 <1.0 0.1> ≤1.0 0.1≥ 1.0 1.0 <1.0 ∠1 б 0; **Å** 800 <1.0 ₹ 0.0 *б*і й 8 б 0; *б* 8 0 7 *8* 0.0 <1.0 0.12 *б* Sampled 9/22/95 9/16/96 9/22/95 9/5/96 9/22/95 9/5/96 9/22/95 9/14/94 9/16/96 9/14/94 9/14/94 Date 4/93 9/3/96 9/15/94 10/4/94 9/15/94 9/15/94 9/15/94 9/15/94 9/16/94 9/16/96 9/16/94 9/16/96 9/21/94 58PP101 58PP101 58PP102 58PP102 58PP103 58PP103 58MW12 58MW12 58PP104 Well ν. 58PS10 58PS10 58PS11 58PS1 58PS2 58PS3 58PS3 58PS4 58PS4 58PS5 58PS6 58PS7 58PS8 58PS9 58PS9

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TABLE ST58-1 (continued)

1

	Reference	CRREL 1994 USAF 1996 SWMPR	CRREL 1994	CRREL 1994	
	Notes	ر د ل	L.	Ψ	
	nalytical Methods	1,4,11,1			
	Total Lead	1.0	I	I	
	TCE	0.1> 1.0	<1.0	<1.0	
	rans-1,2 DCE	∆.0 1.0	₫.0	₫.0	
_	cis-1,2 DCE	6.0	6.0	≪6.0	
ation (µg/L)	Methylen Chloride	- ► 1.0	ł	1	
oncentra	TPH DRO	-/00	100</td <td><!--100</td--><td></td></td>	100</td <td></td>	
0	TPH GRO	<120	<120	<120	
	Xylenes	⊲3.0 <1.0	€.0	€.0	eference.
	Ethyl- benzene	3.0 ≤1.0	€.0	₫.0	scted, see r
	Toluene	⊲2.0 <1.0	Q .0	Q .0	ounds dete
	Benzene	∆.0 <1.0	2 .0	Q .0	onal comp
	Date Sampled	10/4/94 9/16/96	10/4/94	10/4/94	a. For additi
	Well No.	58PS12 58PS12	58PS13	58PS14	Notes:

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:

11. 742 13. 8310	12. 6020
9. AK101.	10. AK102.
ADEC 8100M. 7. 8260.	8010. 8. 8240.
з.	4
1. 8020.	2. ADEC 8015M.

				Reference	USAF 1996 SWMPR	USAF 1997 SWMPR	USAF 1996 SWMPR		USAF 1996 SWMFK
ASKA				Notes					
N AFB, AL/	Immunoassay Peculte	Thomas a	Total	BTEX ¹ (ppb)	ł	80	ł		ı
OSTATA				eH (mv)	78	11	137	190	100
ALIUN,				μd	6.67	6.58	7.0	90 Y	2.0
KVICE 21/			Conductivity	(mmhos/cm)	350	516	321	787	5
o tek or	arameters		Turbidity	(NTU)	492	118	440	402	2
			Temperature	(°C)	7.73	11.5	7.91	7.62	
		Dissolved	Oxygen (%	saturation)	8.8	39	22.3	25.5	
6010		Dissolved	Oxygen	(mg/L)	I	4.16	ł	1	
		•	Date	Sampled	9/3/96	8/27/97	9/3/96	9/3/96	
				Well No.	58MW10	58MW10	58MW11	58MW12	

T58-2 GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, ST58. OLD OUARTERMASTER SERVICE STATION FIELSON AEP AT ASY A **TABLE ST58-2**

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Notes:

¹ RaPID Assays Ohmicron Total BTEX field test kit.

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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.

сос	ARAR (Groundwater) - Drinking water MCL
Volatile Or	ganic 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 Or	ganic Compounds			
DDT				
Chlordane	2 μg/L			
Inorganic	Compounds			
'Lead	15 µg/L			
³ 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.

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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 μ g/L benzene, 29 μ g/L toluene, 7.6 μ g/L ethylbenzene, and 43 μ g/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 μ g/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 μ g/L), chloromethane (61PS3 - 2.4 - 3.5 μ g/L), and dichlorodifluoromethane (61MW03 - 1.0 μ g/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 μ g/L (61MW01) to 7.6 μ g/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:

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, 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.

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List of Tables for SS61:

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Table SS61-1	Concentrations (μ g/L) of BTEX Compounds in Groundwater Samples.
	SS61, Vehicle Maintenance, Building 3213, Eielson AFB, Alaska.
Table SS61-2	Concentrations (μ g/L) of Non-BTEX Organic Compounds in Groundwater
	Samples, SS61, Vehicle Maintenance, Building 3213, Eielson AFB, Alaska
Table SS61-3	Concentrations (μ g/L) of Metals in Groundwater Samples, SS61 Vehicle
	Maintenance, Building 3213, Eielson AFB, Alaska
Table SS61-4	Groundwater Parameter and Immunoassay Field Test Results SS61
	Vehicle Maintenance, Building 3213, Eielson AFB, Alaska.

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TABLE SS61-1 CONCENTRATIONS (µg/L) OF BTEX COMPOUNDS IN GROUNDWATER SAMPLES, SS61, VEHICLE MAINTENANCE, BUILDING 3213, EIELSON AFB, ALASKA

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Reference	PNL 1995 OU3,4,5 RI USAF 1996 SWMPR	PNL 1995 OU3,4,5 RI USAF 1996 SWMPR	PNL 1995 OU3,4,5 RI USAF 1996 SWMPR	Pine & Swallow, 1994 USAF 1996 SWMPR	Pine & Swallow, 1994 USAF 1996 SWMPR	11. 7421
l Notes						1. 2
Analytica Methods	1 1,11	1 1,11	1 1,11	1,11	1,11	. AK10 0. AK10
TPH DRO	11	11	11	<700		7. 8260. 9. 8. 8240. 10
IPH GRO	11		11	<120	<120	
tion (µg/L) Xylenes	25.8 <1.0	290 43	<1.0 <1.0	<3.0 <1.0	12 <1.0	5. 8270. 6. 8080.
Concentra Ethylbenzen	3.6 <1.0	<100 7.6	<1.0 <1.0	<3.0 <1.0	<3.0 <1.0	8100M.
Toluene	6.8 <1.0	250 29	<1.0 <1.0	<2.0 <1.0	<2.0 <1.0	i. ADEC . 8010.
Benzene	2.8 <1.0	<100 3.8	<1.0 <1.0	<2.0 <1.0	<2.0 <1.0	3 015M. 4
Date Sampled	8/18/94 9/16/96	8/18/94 9/16/96	8/17/94 9/16/96	9/16/94 9/16/96	9/21/94 9/23/96	lethods: 8020. ADEC 80
Well No.	61MW01 61MW01	61MW02 61MW02	61MW03 61MW03	61PS3 61PS3	61PS17 61PS17	<u>Analytical M</u> 1. 2.

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CONCENTRATIONS (µg/L) OF NON-BTEX ORGANIC COMPOUNDS IN GROUNDWATER SAMPLES, SS61 VEHICLE MAINTENANCE. RUILDING 3213, EIFLSON AFR. ALASKA TABLE SS61-2

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			1000			AINCE, DU		<u>3213, EU</u>	ITOON	Arb, AL	ASKA		
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	1	1	1	I	4 5	a	TING 1 605 OT 13 4 5 DI
61MW01	9/12/96	<1.0	9.5	ł	ł	1	1.5	<1.0	<1.0	<1.0	r } ⊲	τι α	115 AF 1006 SUMADD
61MW01	9/16/96	<1.0	1.2	<1.8	I	I	<1.0	<1.0	<1.0	<1.0	4,11,12	3 63	USAF 1996 SWMPR
61MW02	8/18/94	78	<10	38	<10	16	1	I	I	1	45	d	TA 7 1005 OT13 4 5 DI
61MW02	9/12/96	28	1.7	ł	;	: 1	9.8	1	5 5	<10	, t	ct c	TISAE 1006 CV1 44
61MW02	9/16/96	21	1.3	11	ł	I	9.8	1.3	3.1	<1.0	4,11,12	5 65	USAF 1996 SWMPR
61MW03	8/17/94	<0.5	1.9	<10	<10	<10	I	1	1	I	4.5	α	PNI 1005 OI13 4 5 DI
61MW03	9/12/96	<1.0	<1.0	1	ł	I	<1.0	<10	<10	<10	- -	ب	TICKET TOOL STUDY
61MW03	9/16/96	<1.0	<1.0	<1.8	ł	I	<1.0	<1.0	<1.0	<1.0	4,11,12	5 03	USAF 1996 SWMPR
61PS3	9/16/94	<1.0	ł	ł	I	I	<6.0	3.0	<1.0	1			Pine & Swallow 1004
61PS3	9/12/96	<1.0	<1.0	1	1	ł	<1.0	<1.0	<1.0	3.5	4	æ	TISAF 1996 SWMPP
61PS3	9/16/96	<1.0	<1.0	<1.8	I	I	<1.0	<1.0	<1.0	2.4	4,11,12	5 63	USAF 1996 SWMPR
61PS17	9/21/94	<1.0	I	ł	1	ł	12	4.5	<10	1			Dine & Cumlour 1004
61PS17	9/23/96	<1.0	<1.0	<1.8	1	I	24	4.4	<1.0	<1.0	4,11,12	æ	USAF 1996 SWMPR
Notes:	a. No compc b. Additional	ounds oth compour	er than those nds detected	: listed w	ere detected ab difluoromethar	ove the repo ie - 1.0 mg/I	rting limi	its.					

Analytical Methods:

11.7421		
AK101.	AK102.	
9.	10.	
8260.	8240.	
7.	×.	
5. 8270.	6. 8080.	
ADEC 8100M.	8010.	
ų.	4	
1. 8020.	2. ADEC 8015M.	

 TCE
 Trichloroethene.
 DCE
 Dichloroethene.

 DCB
 Dichlorobenzene.
 PCE
 Percholorethene (tetrachlorethene).

CONCENTRATIONS (μg/L) OF METALS IN GROUNDWATER SAMPI SHICLE MAINTENANCE, BUILDING 3213, EIELSON AFB, ALASKA
FABLE SS61-3

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Well No.	n/J	Date Sampled /	Aluminum	t Arsenic	Bariun	1 Calcium (Chromium	Copper	Iron Lea	ad Magnesiu	um Manganes	ie Nickel	Potassium	Sodium V	/anadium	Zinc Notes	e Reference
DISSOLY	ED																
61MW01	÷	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	ι	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	L	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
Backgroun	d Con	<u>icentrations</u>															
BGM RGMY	دست دب	9/94 0/0/	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
	- 4	1010		3	001	00,10	0'l>	4.0	1> 006'6	.0 12,000	4,100	5.0	4,500	6,500	1.0	61	PNL 1994 SWMP
BUUCE	-	9/94	/4	C.41	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	=	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
Inwikito	3	06/01/6	:	ł	:	1	:	ł	-	-	1	ł	;	:	;	ł	USAF 1996 SWMPR
61MW02 61MW02	n n	10/94 9/16/96	8,670 	81.2	243 	74,000 	26.9 	50.6 	44,700 30. <1.	.8 17,700 .0	4,670	51.25 	8,350 	23,600 	101	149 	PNL 1995 OU3,4,5 RI USAF 1996 SWMPR
61MW03	n	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	1.66	PNL 1995 OU3,4,5 RI
61MW03	3	9/16/96	:	1	1	:	;	1		:	1	:	:	ł	ł	ł	USAF 1996 SWMPR
61PS3	3	9/16/96	:	ł	;	;	:	:	3.5	:	ı	:	:	ł	;	ł	USAF 1996 SWMPR
61PS17	a	9/23/96	ł	;	:	1	:	1	- 7.6	5	ı	1	:	ł	:	1	USAF 1996 SWMPR

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TABLE SS61-3 (continued)

.

rence	SWMP SWMP SWMP	
Refer	L 1994 9 L 1994 9 L 1994 9	
otes	N A N A	
Zinc N	63 120 38.8	
adium	24 52 36	
ium Van	6 0 0	
m Sod	8,3 9,2	
Potassiu	5,650 7,900 6,500	
Nickel	31 77 48.8	
Manganese	3,875 6,500 4,980	
Aagnesium	17,375 26,000 20,800	
Lead N	8 21 0 48 0 32.6	1994. Is in 199.
r Iron	16,93 33,00 23,80	in 1994 ells in ind wel
I Coppe	75 140 105	d wells round w ackgrou
Chromium	20 46 30.4	ackgroune om backg ed from b
Calcium (58,625 66,000 64,900	ted from b ollected fro
Barium	269 420 342	s collec mples c of samp
Arsenic	25 63 37	f sample ion of sa ce limits
Aluminum	7,538 18,000 11,500	ed. iltered). concentrati r confidenc
Date Sampled	9/94 9/94 9/94	Field filter Total (unfi Mean conc Maximum 95% Uppe
ŋ/J		
Well No.	BGM BGMX BGUCL	Notes: f. u. BGMX BGUCL

				Para	neters				Immunoa	ssav Result	s		
Well No.	Date Sampled	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% saturation)	Temperature (°C)	Turbidity (NTU)	Conductivity (mmhos/cm)	Hu	eH (mv)	Total	TCE ²	PCE ²		e F
					(0)		a.			(odd)	(add)	Notes	Kelerence
61MW01	9/12/96	ł	19.4	6.86	119	219	6.97	49.8	ł	1	1		USAF 1996 SWMPR
61MW01	9/16/96	ł	9.7	7.13	12.4	206	7.29	39	:	ł	;		USAF 1996 SWMPR
													115 4 1 1 006
61MW02	9/12/96	ł	1.2	6.46	13.5	270	6.54	-38	ł	1	1		SWMPR
61MW02	9/16/96	ı	5.2	7.64	Ξ	265	6.63	°	ł	I	:		USAF 1996 SWMPR
61MW02	<i>L6/61/6</i>	1.56	14	9.7	47	417	6.81	18	580	15.12	29.4		USAF 1997 SWMPR
													116 4 5 1005
61MW03	9/12/96	1	2.2	9.22	178	328	6.43	204	;	ł	ł		SWMPR
61MW03	96/91/6	:	4.9	9.21	105	315	6.55	77	ł	I	:		USAF 1996 SWMPR
Notes:													
	¹ RaPID A	Assays Ohm	icron Total B'	TEX field test	kit.								

GROUNDWATER PARAMETER AND IMMUNOASSAY FIELD TEST RESULTS, SS61. VEHICLE MAINTENANCE RUITINING 3213 FIFT SON AFR AT ASKA TABLE SS61-4

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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. nd.

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² Dräger Liquid Extraction (DLE) field test kit.

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Appendix A 1997 Field Activity Photographs









Exposure No. 2. Collection of fish specimens from Garrison Slough.





Exposure No. 3. Fish collection activities from Garrison Slough.

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.





Exposure No.7. Placement of bentonite chips in well borehole during well decommissioning activities.

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.







Exposure No. 11. View of empty drum disposal activities.

Exposure No. 12. De-heading of empty closed top drum







Exposure No. 14. View of Garrison Slough Fish Barriers.

Exposure No. 13. View of North Star Borough Recycling facility where empty steel drums were recycled.

Appendix B List of Table Referencess

LIST OF REFERENCES FOR TABLES

Abbreviated Title

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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.
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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.
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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.

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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 SUMMAR	LY OF SITE	WIDE WA'	TER LEVELS	NAPI I FV	FIC AND NABL THICKNESS
			ALL DATA IN FE	ET - OUTLINE!	DATA PRESENTE) IN FIGURES 2-1 /	ND 2-2 AND WALL INLONDEDD
:						Corrected Ground	
Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Water Elevation	Comments
					JU5 / LF02		
02M01	05/95	531.21	N/P	9.65	00.0	531 5 6	
	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 06/02/02		d/N	9.20	0.00	522.01	
	06/00/00		A/P	10.52	0.00	520.69	
	03/24/97		NP	10.57	0.00	520.64	
	04/16/97		NP	10.89	000	01.020	F
	05/16/97		NP	5.63	0.00	20.102	7
	06/16/97		N/P	10.65	0.00	82.12C	
	01/10/97		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	03/95	531.67	a/N	0 11	90 0		
	09/21/95		a/N	¥70	0.00	522.23	
	01/96				0.00	20.225	
	03/96		N/P N/D	9.24 0.03	0.00	522.43	
	04/96		ANN ANN	8.92	0.00	522.75	
	06/06/96		N/P	8.09 0.0	0.00	522.98	
	11/01/96		d/N	0.7 10 16	0.00	1	Groundwater frozen at time of gauging
	03/24/97		N/P	10.51	0.00	10.120	
	04/16/97		N/P	10.25	0.00	521.42	Ţ
	05/16/97		N/P	9.41	0.00	522.26	7
	00/10/02		A/N	10.09	0.00	521.58	
	16/01//0		d/N	10.32	0.00	521.35	
	09/16/97		d/N	10.05	0.00	521.64	
	10/09/97		d/N	10.01	0.00	521.42	ſ
			1771	17.01	0.00	221.40	
02MW9	05/95	529.56	N/P	I	0.00	I	Well not gauged.
	C6/17/60		A/P	7.54	0.00	522.02	Well originally installed as W-9
	06/10		A/N	8.11	0.00	521.45	•
	06/CD		N/P	7.89	0.00	521.67	
	06/06/96		N/P	7.83	0.00	521.73	
	11/01/96		N/P	2.07 8.18	0.00	16.610	
	03/24/97		N/P	8.91	0.00	82.12C	

P.	APPENDIX C	SUMMAF	XY OF SITE	WIDE WAT	FER LEVELS ,	NAPL LEV	ELS, AND NAPL THICKNESS
			ALL DATA IN FI	EET - OUTLINED	DATA PRESENTED	IN FIGURES 2-1 A Corrected	ND 2-2
Well		*Casing	Depth to	Depth to	HSJ	Ground Water	
N0.	Date	Elevation	HSH	Water	Thickness	Elevation	Comments
				OUS	/ LF02 (cont.)		
02MW9 (cont.)	04/16/97		N/P	8.76	0.00	\$20.80	
	05/16/97		N/P	7.35	0.00	522.21	
	06/16/97 07/10/97		A/P	8.20	0.00	521.36	
	08/08/97		N/N N/P	8.50	0.00	521.06	
	09/16/97		N/P	8.38	0.00	521.45 521.18	
	10/09/97		N/P	8.40	0.00	521.16	
				005 /	/ LF03 - FT09		
03M06	05/95	550.83	N/P	13.71	0.00	517 I J	
	09/21/95		N/P	13.75	0.00	537.08	
	01/96		N/P	13.57	0.00	537.26	
	03/96		en n	13.05	0.00	537.78	
	06/00/96		4/N Ø/N	13.04	0.00	537.79	
	11/04/96		d/N	14.27	0.00	536.54	
	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		A/P	14.57	0.00	536.26	
	1.6/01/10		N/P	14.74	0.00	536.09	
	09/16/97		N/P A/N	14.47	0.00	536.36	
	10/09/97		N/P	14.35	0.00	536.36 536.48	
03M08	05/95 09/21/95	547.55	A/N B/N	7.55	0.00	I	Groundwater frozen at time of gauging;
	01/96		N/P	9.43	0.00	538.12	1
	03/96		N/P	9.14	0.00	538.41	
	04/96		ł	I		1.000	Not Measured this to conding of surface material material
	06/06/96		N/P	8.48	0.00	1	Groundwater frozen at time of gauging
	11/04/96 03/74/07		A/N	10.69	0.00	536.86	
	04/18/97		N/P	9.80	0.00	537.75	F
	05/16/97		UN UN	10.6	0.00	537.90	
	06/19/97		J/N D/N	16.6	0.00	537.64	
	01/10/62		d/N	20.01	0.00	537.03	
	08/08/97		N/P	10.53	0.00	537.07	
	09/16/97		N/P	ł	0.00		Not measured due to low flow anticement stuck in the
	10/09/97		N/P	I	0.00	1	Not measured due to low flow equipment stuck in well.
							The second second start admitter start and the second starts

		C,	•			Ground	
	Date	-Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Water Elevation	Comments
				0U5 / L)	F03 - FT09 (cc	int.)	
[10	05/95	544.75	A/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 03/17/07		Π/Ν Δ	8.15	0.00	536.60	
	04/16/07		d/N	7.69	0.00	537.06	ſ
	04/19/97		N/P	7.55	0.00	537.20	
	/.6/91/CN		N/P	7.81	00.00	536.94	ľ
	00/10/02		N/P	8.40	0.00	536.35	
	1.6/01//0		N/P	8.62	0.00	536.13	
	16/80/80		N/P	8.28	0.00	536.47	
	6/1/6/0		N/P	8.30	0.00	536.45	
	10/09/97		N/P	8.11	0.00	536.64	
16	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	
	06/00/06		N/P	10.65	0.00	538.21	
	11/04/96		N/P	91.11	0.00	537.67	
	03/21/97		N/P	1.80	0.00	ł	Groundwater frozen at time of calloing
	04/17/97		N/P	10.15	0.00	538.71	
	05/16/97		N/P	10.40	0.00	538.46	1
	06/16/97		A/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	[]
2	05/95	546.59	N/P	1.00	0.00	538 AQ	
	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	
	06/00/96		NP	9.70	0.00	536.89	
	96//.0/11		N/P	10.14	0.00	536.45	
	16/17/20		N/P	9.39	0.00	537.20	
	04/18/97		N/P	9.46	0.00	537.13	
	16/01/00		N/P	9.70	0.00	536.89	

V	PPENDIX C	SUMMAF	NOF SITE	WIDE WA	TER LEVELS	NAPL LEVI	ELS, AND NAPL THICKNESS
			ALL DATA IN FI	LET - OUTLINEI) DATA PRESENTEI	IN FIGURES 2-1 A Corrected	ND 2-2
Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Ground Water Elevation	Commente
				0U5 / L	F03 - FT09 (co	ıt.)	
09M02 (cont.)	06/16/97		N/P	10.13	0.00	536.46	
	26/01/20		N/P	10.30	0.00	536.29	
	08/08/97 09/16/97		q/N d/N	9.97 10.01	0.00	536.62	
	10/09/97		N/P	9.90	0.00	536.69 536.69	
				0	US / LF06		
06M05	05/95	541.36	q/N	7 14	90 0	537 SS	
	09/21/95		A/N	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 06/06/06		A/N	8.43	0.00	532.93	
	11/04/96		a/N a/N	8.94	0.00	532.42	
	03/21/97		N/P	01.6	0.00	531.79	
	04/17/97		N/P	8.83	0.00	532.50	
	05/16/97		N/P	9.37	0.00	00 125	
	6//10/02		N/P	9.93	0.00	531.43	
	76/60/20		N/P	10.13	0.00	531.23	
	08/07/97		q/N en	9.80	0.00	531.56	
	10/08/97		U/N	70.7	0.00	531.67	 Г
	1/10/101		NI	9.37	0.00	531.99	
06M06	05/95	540.93	Ν/Ρ	8.28	0.00	532.65	
	09/21/95		A/N	8.36	0.00	532.57	
	06/10		a/N	8.63	0.00	532.30	
	96/50		4/N	8.29	0.00	532.64	
	06/06/96			1.6.1	0.00	532.96	
	11/04/96			8.71	0.00	532.22	
	03/21/97		NP	8.72 8.72	0.00	531.63 537 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	
	76/60/20 55/55/55		N/P	10.07	0.00	530.86	
	08/07/97 09/15/97		η.N Φ.N	9.73	0.00	531.20	
L	10/08/97		J.N.	9.38	0.00	531.55	
]			1.1.1	2.00	0.00	C8.16C	

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 Corrected

	*Casing	Depth to	Denth to	HSd	Ground	
- 1	Elevation	PSH	Water	Thickness	w ater Elevation	Comments
			0U2	/ ST10 - SS14		
	542.17	Δ/N	7.11	000	63 € DC	
5		N/P	7.44	0.00	00.000 534 73	
		N/P	7.81	0.00	534.36	
		N/P	7.36	0.00	534.81	
		N/P	7.00	0.00	535.17	
8 8		N/P	8.02	0.00	534.15	
<u>s</u> :		I	I	I	1	Well decomnissioned 27 Sep 1996
76		ł	1	I	ł	Well decommissioned 27 Sep 1996
\$	547.22	N/P	10.12	0.00	10	
/95		N/P	10.39	0.00	536.83	
96		NP	10.63	0.00	536.59	
96		N/P	10.36	0.00	1	(frontochuater frozen et time of can river
96		A/P	10.16	0.00	1	Groundwater frozen et time of sunction
6/96		N/P	11.02	0.00	536.20	ACCOUNTS AND ALL ALL ALL ALL ALL ALL ALL ALL ALL AL
7/96		N/P	11.50	0.00	535.72	
1/97		N/P	10.75	0.00	536.47	
8/97		N/P	10.54	0.00	536.68	[
6/97		N/P	10.92	0.00	536.30	1
16/97		N/P	11.65	0.00	535.57	
1.6/60		N/P	11.87	0.00	535.35	
16/10		N/P	11.56	0.00	535.66	
12120		N/P	11.55	0.00	535.67	
16/80		N/P	11.29	0.00	535.93	[]
/95	541.66	N/P	4.26	0.00	537.40	
:1/95		NP	4.62	0.00	537.04	
/96		NP	6.04	0.00	I	Groundwater frozen at time of canoring
/96		N/P	5.05	0.00	ł	Groundwater frozen et time of conning.
96		N/P	2.65	0.00	I	Ponding of surface water around unit obtained
96/90		N/P	ł	0.00	I	Well mossibly frost heaved
7/96		N/P	6.14	0.00	535.52	The postory a cot area ver
197		N/P	5.60	0.00		Groundwater frozen et time of converse
16/3		N/P	5.43	0.00	1	Growindwater frozen at time of caucium, W-11
2/97		N/P	5.32	0.00	1	L cromentary noted in this of gauging, well severely neared. Groundwater frozen at time of cauciace Wull contents. L.
16/		N/P	6.26	0.00	535.40	יייייייייייייייייייי איייייי אייייייייי
16		N/P	6.54	0.00	535.12	
76		N/P	6.10	0.00	535.56	
101		N/P	6.16	0.00	535.50	
171		N/P	5.94	0.00	535.72	

	APPENDIX (C SHMMAE	V OF SITE	WIDE W V	TED I EXTEL C		
			ALL DATA IN FI	EET - OUTLINE	D DATA PRESENTE), INATL LEV. D IN FIGURES 2-1 . Corrected	ELS, AND NAPL THICKNESS and 2-2
Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH	Ground Water	
				0U2 / S	T10 - SS14 (co	nt.)	Comments
14-3	05/95	541.75	N/P	6.27	0.00	535.48	
	09/21/95		N/P	6.46	0.0	535.29	
-	01/96		N/P	3.10	0.00		Groundwater frozen at time of canoniana
	03/96		N/P	3.09	0.00		Crownward LOZEN at thing of gauging
	04/96		N/P	5.43	0.00	1	Groundwater frozen at time of municipal
	96/90/90		ł	1	I	1	Bentonite blockage in well casing.
	11/07/96			ł	1	I	Bentonite blockage in well casing.
	16/17/60		Π/Ν	5.80	0.00	ł	Groundwater frozen at time of gauging;
					JU2 / ST11		
1-11	05/95	541.55	N/P	10.26	0.00	531.29	
	C6/17/60		N/P	10.96	0.00	530.59	
	96/10		A/P	10.44	00.0	531.11	
	03/96		N/P	10.15	0.00	531.40	
	04/96		A/P	10.00	0.00	531.55	
	06/00/00		N/P	10.37	0.00	531.18	
	02/10/11		I	I	ł	I	Well not located - covered by snow
	20/21/00		1	1	1	1	Well not located - covered by snow
	04/10/21		N/P	10.12	00.0	531.43	
	16/01/00		a'n	10.90	0.00	530.65	i
	16/01/00			11.38	0.00	530.17	
	08/01/97		N/N D/N	80.11 90.11	0.00	530.02	
	16/60/60		N/P	11.00	0.00	17.066	
	10/08/97		N/P	10.50	00.0	531.05	
				002	/ ST13 - DP26		
13-1	05/95	550.43	N/P	11.05	0.00	{ 30 39	
	09/21/95		N/P	11.21	0.00	539.22	
	01/96		N/P	11.01	0.00	539.42	
	03/96		NP	10.54	0.00	539.89	
	04/96		N/P	10.47	0.00	539.96	
	06/00/00		A/N	11.76	0.00	538.67	
	04/90		d'N B	12.20	0.00	538.23	
	16/17/0		N/P	13.28	0.00	537.15	Unsure of measuring point at toc
	05/10/02		N/P	11.37	0.00	539.06	
	16/07/00		N/P	11.60	0.00	538.83	
			IV/F	14.11	0.00	538.52	

ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2 Corrected

						Currente	
Well		*Casing	Depth to	Depth to	HSA	Water	
N0.	Date	Elevation	HSH	Water	Thickness	Elevation	Comments
				0U2 / S	F13 - DP26 (c	ont.)	
(1003) 1-61	16/60/10		N/P	12.06	0.00	538.37	
	16/10/20		a/v	11.75	0.00	538.68	
	10/00/01		N/P	11.83	0.00	538.60	ſ
	10/08/21		Α/Ν	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	11.100	
	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	1	Groundwater frozen at time of caucinor
	06/00/90		N/P	9.35	0.00	I	Croundwater frozen at time of caucium well accelely.
	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	
	<i>16/60/L0</i>		N/P	11.47	0.00	536.68	
	08/07/97		A/N	11.14	0.00	537.01	
	1.6/01/60		ΝΡ	11.22	0.00	536.93	
	10/09/97		NP	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	I	Groundwater frozen at time of gauging.
	04/96		N/P	9.87	0.00	1	Groundwater frozen at time of gauging
	96/90/90		N/P	10.36	0.00	536.70	
	03/71/95		N/P	11.15	0.00	535.91	
	04/17/97		d/N	10.01	0.00	536.73	ſ
	05/16/97		NP	10.69	0.00	536.69 536.37	
	06/16/97		N/P	11.10	0.00	535.96	
	16/60/10		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	
6-15	05/95	544.65	N/P	9.88	0.00	534.77	
	09/21/95		A/N	9.96	0.00	534.69	
	01/96		P/N	8.89	0.00	535.76	
	06/60		N/P	8.57	0.00	536.08	

	APPENDIX C	SUMMAF	XY OF SITE	WIDE WAT	FER LEVELS	, NAPL LEV	ELS, AND NAPL THICKNESS
			ALL DATA IN FE	ET - OUTLINED	DATA PRESENTEI) IN FIGURES 2-1 / Corrected	LND 2-2
Well		*Casing	Denth to	Denth to	HSd	Ground	
N0.	Date	Elevation	HSH	Water	Thickness	W ater Elevation	Comments
				LS / ZNO	713 - DP26 (co	nt.)	
26-15 (comt.)	04/06		en en				
	06/06/96		N/P	05.01	0.00	535.30	
	11/04/96		JVI DVD	10.73	0.00	233.86	
	03/21/97		N/P N/P	10.71	0.00	533.94	
	04/17/97		NP	10.08	0.00	73 453	F
	05/16/97		N/P	10.56	0.00	534.09	Ţ
	26/61/90		NP	10.96	0.00	533.69	
	<i>L6/60/L0</i>		N/P	11.03	0.00	533.62	
	08/07/97		N/P	10.73	0.00	533.92	
	L6/60/60		N/P	10.80	0.00	533.85	
	10/08/97		N/P	10.54	0.00	534.11	[]
				0	<u>U2 / ST16</u>		
16-2	05/95	540.57	N/P	9.6	0.00	\$30.97	
	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	
	06/C0/11		d/N	9.71	0.00	530.86	
	16/17/00		N/P	9.17	0.00	531.40	ſ
	04/16/07		N/P	8.87	0.00	531.70	
	06/16/97		N/N N/P	10.16	0.00	530.41 520.50	
	<i>L6/60/L0</i>		d/N	10.92	0.00	79.67C	
	08/07/97		N/P	10.59	0.00	579 98	
	16/60/60		N/P	10.00	0.00	530.57	
	10/08/97		N/P	9.45	0.00	531.12	
				6	10 / 0110		
					07/2118		
18-2	05/95	540.87	N/P	10.98	0.00	529.89	
	09/21/95		NP	10.29	0.00	530.58	
	01/96		A/P	10.70	0.00	530.17	
	03/96		N/P	10.64	0.00	ł	Groundwater frozen at time of gauging;
	04/96 06/06/06		d'N	10.63	0.00	I	Groundwater frozen at time of gauging
	11/05/96		N/P	10.65	0.00	1	Groundwater frozen at time of gauging;
	03/21/97		a/N	10.77	0.00	529.74	
					,	~~~~	

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All I. INT. IN FRET - OTLLIND. INT. RELESTICT IN FIGURES 1. IND. 23 Will Contrected Contrected No. Dire Control Control No. Dire Control Control No. Control Control Control No. Control Control Control Period Dire Control Control Period Dire Control Control Provinci Nature Dire Control Control Period Dire Control State Control Provinci Nature Dire Control State Provinci Nature Dire State Control Provinci Nature Dire State Control Provinci Nature Dire State Control Provinci Nature Control State Control Provinci Nature Control State Control Provinc		APPENDIX (SUMMAF	IV OF SITE	WIDE WAT	TEVELS ,	NAPL LEVI	ELS, AND NAPL THICKNESS
Weil Connici No. Connici Elevation Connici Nater Connici Nater 10.2 STI 16 Depth to 00097 Nater Connici Nater Connici Nater 14.1 0.002 STI 16 Connici Nater Connici Nater Connici Nater 14.2 0.00397 N/N 115 0.00 3334 14.2 0.00397 N/N 115 0.00 3334 0.00397 N/N 115 0.00 3334 0.00397 N/N 115 0.00 3334 0.00397 N/N 1134 0.00 3334 0.0036 N/N 1149 0.00 3344 0.0036				ALL DATA IN FI	EET - OUTLINED	DATA PRESENTED	IN FIGURES 2-1 / Corrected	4ND 2-2
	Well		*Casing	Denth to	Denth to	HSd	Ground	
1012 / ST118 (cont) 0012 / ST18 (cont) 19.1 (mil) 0.1997 0.0 99.4 0.1997 0.19 0.0 99.4 0.1997 0.19 0.0 99.4 0.1997 0.0 99.4 0.0 99.4 0.1997 0.0 99.4 0.0 99.4 0.1997 0.0 99.4 0.0 99.4 0.1006 0.0 99.4 0.0 99.4 0.1006 0.0 99.4 0.0 99.4 0.100 0.0 99.4 0.0 99.4 0.100 0.0 99.4 0.0 99.4 0.100 0.0 99.4 0.0 99.4 0.1006 0.0 99.4 0.0 99.4 0.1009 0.0 99.4 0.0 99.4 0.1009 0.0 99.4 0.0 99.4 0.1009 0.0 99.4 0.0 99.4 0.1009 0.0 99.4	No.	Date	Elevation	HSd	Water	Thickness	Elevation	Comments
B3 (cont) (4467) NP 11.5 0.00 5331 060871 NP 11.5 0.00 23341 060871 NP 11.5 0.00 23341 060871 NP 11.3 0.00 23341 060871 NP 12.3 0.00 23341 000871 NP 13.4 0.00 23341 000871 NP 13.4 0.00 23341 000871 NP 13.4 0.00 23345 000871 NP 734 0.00 23345 000871 NP 734 0.00 23345 00066 NP 734 0.00 53345 000066 NP 738					0U2	/ ST18 (cont.)		
0.1997 0.19 0.10 39.43 0.0067 N/R 1.13 0.00 32.83 0.0067 N/R 1.13 0.00 32.83 0.0077 N/R 1.13 0.00 32.83 0.0067 N/R 1.13 0.00 32.83 0.0067 N/R 1.13 0.00 32.84 0.007 N/R 1.00 32.93 0.00 32.84 0.006 N/R 7.34 0.00 32.93 0.00 32.93 0.0156 N/R 7.34 0.00 33.93 0.00 33.94 0.0156 N/R 7.34 0.00 33.95 0.00 33.95 0.0156 N/R 7.34 0.00 33.87 0.00 33.95 0.0105 N/R 7.34 0.00 33.87 0.00 33.96 0.0105 N/R 7.34 0.00 33.97 0.00 0.00 33.96 0.0105 0.00	18-2 (cont.)	04/16/97		en e	10.46			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	~	05/19/97		N.F.	10.45	0.00	530.42	
(100)7 (11)0 (200)7 </td <td></td> <td>06/16/97</td> <td></td> <td></td> <td>90.11</td> <td>0.00</td> <td>529.31</td> <td></td>		06/16/97			90.11	0.00	529.31	
060071 NUP 11.2.6 0.00 53.61 1000071 NUP 11.41 0.00 53.94 1000 939.3 0.00 53.94 0.00 53.94 1015 NUP 7.34 0.00 53.93 0.00 53.94 0.05 NUP 7.34 0.00 53.93 0.00 53.94 0.05 NUP 7.34 0.00 53.95 0.00 53.95 0.060 NUP 7.35 0.00 53.95 0.00 53.95 0.01059 NUP 7.32 0.00 53.95 0.000 53.95 0.0104044 0.00 53.93 0.000 53.94 0.000 53.94 0.01050 NUP 7.32 0.00 53.94 0.000 53.94		16/01/00 16/00/20			11.96	0.00	528.91	
Image: Net of the second state of the secon		T6/C0/10			12.26	0.00	528.61	
104 103 114 000 329.45 104 053 545.40 NP 7.39 0.00 329.45 104 051.155 545.40 NP 7.34 0.00 359.56 1056 NP 7.34 0.00 539.56 Groundwate from at time of gauging. 0.866 NP 7.32 0.00 539.56 Groundwate from at time of gauging. 0.866 NP 7.72 0.00 539.56 Groundwate from at time of gauging. 0.866 NP 7.32 0.00 539.56 Groundwate from at time of gauging. 0.866 NP 7.32 0.00 539.57 Groundwate from at time of gauging. 0.866 NP 7.32 0.00 531.87 Groundwate from at time of gauging. 0.817.87 NP 3.33 0.00 531.87 Groundwate from at time of gauging. 0.817.87 NP 7.32 0.00 531.81 Groundwate from at time of gauging. 0.818.97 NP 2.31 0.00		26/60/60		A/N M/M	11.93	0.00	528.94	
134 0/2 / STI9 546.30 NP 7.34 000 593.56 136 0.39 546.30 NP 7.34 0.00 533.36 10.96 NP 7.34 0.00 533.36 Groundwate froom at time of gauging 0.056 NP 7.73 0.00 533.36 Groundwate froom at time of gauging 0.059 NP 7.73 0.00 537.87 Groundwate froom at time of gauging 0.010597 NP 2.39 0.00 537.87 Groundwate froom at time of gauging 0.012577 NP 2.39 0.00 537.87 Groundwate froom at time of gauging 0.01697 NP 2.39 0.00 538.13 Groundwate froom at time of gauging 0.01697 NP 2.39 0.00 538.13 Groundwate froom at time of gauging 0.01697 NP 8.24 0.00 538.13 Groundwate froom at time of gauging 0.01697 NP 8.24 0.00 538.13 Groundwate froom at time of gauging 0.016666<		10/08/97		N/P	10.95	0.00	529.46 529.92	ſ
104 0103 546.00 NP 7.44 0.00 339.56 10.36 NP 7.49 0.00 339.36 Grouthmare from at time of guiding 10.36 NP 7.49 0.00 339.36 Grouthmare from at time of guiding 10.36 NP 7.38 0.00 339.36 Grouthmare from at time of guiding 10.306 NP 7.38 0.00 33.36 Grouthmare from at time of guiding 10.307 NP 2.90 0.00 33.37 Grouthware from at time of guiding 0.41067 NP 2.30 0.00 33.37 Grouthware from at time of guiding 0.41077 NP 2.30 0.00 33.31 Grouthware from at time of guiding 0.41067 NP 2.31 0.00 33.41 Grouthware from at time of guiding 0.41077 NP 8.33 0.00 33.41 Grouthware from at time of guiding 0.41066 NP 8.47 0.00 33.41 Grouthware from at time of guiding 0.41067 <td< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>7</td></td<>								7
P34 0395 345.00 NP 7.34 0.00 539.30 0196 NP 7.31 0.00 539.30 539.30 0196 NP 7.31 0.00 539.30 539.30 0196 NP 7.32 0.00 539.30 546.50 NP 0196 NP 7.32 0.00 539.37 Coundwate from a time of guide 0105 NP 7.32 0.00 537.87 Coundwate from a time of guide 0105 NP 7.32 0.00 537.87 Coundwate from a time of guide 01105 NP 7.36 0.00 537.87 Coundwate from a time of guide 0100877 NP 7.36 0.00 537.87 Coundwate from a time of guide 0100877 NP 7.36 0.00 538.13 Coundwate from a time of guide 010087 NP 7.34 0.00 538.13 Coundwate from a time of guide 010087 NP 8.73 0.00 538.13 Coundwate					Õ	U2 / ST19		
072.05 NOV 7.34 0.00 339.55 0136 NP 7.34 0.00 339.55 0136 NP 7.24 0.00 339.55 0136 NP 7.72 0.00 339.55 010506 NP 7.72 0.00 339.55 010107 NP 7.73 0.00 357.57 010107 NP 7.20 0.00 357.57 0101070 NP 7.28 0.00 357.57 0101071 NP 7.28 0.00 359.02 0101071 NP 7.28 0.00 359.02 0101071 NP 7.88 0.00 359.13 0101071 NP 8.74 0.00 338.16 01010877 NP 8.74 0.00 338.21 01010877 NP 8.74 0.00 338.21 01010877 NP 8.74 0.00 338.21 01010877 NP 8.71 </td <td>19-4</td> <td>20/20</td> <td>646.00</td> <td></td> <td></td> <td></td> <td></td> <td></td>	19-4	20/20	646.00					
0156 NP 7,84 0.00 539.30 0156 NP 7,74 0.00 539.30 0406 NP 7,74 0.00 539.30 0406 NP 7,73 0.00 537.37 0406 NP 7,73 0.00 537.37 01059 NP 7,73 0.00 537.37 010597 NP 2,59 0.00 537.37 010597 NP 7,58 0.00 537.31 010597 NP 7,58 0.00 537.81 010597 NP 7,58 0.00 537.81 010597 NP 87.4 0.00 533.13 010597 NP 87.3 0.00 533.14 010966 NP 87.3 0.0		20/16/00	04.040	N/P	7.34	0.00	539.56	
0.05 NP 7.34 0.00 538.96 Groundwater frozen at time of gauging 0.066/66 NP 7.72 0.00 537.87 Groundwater frozen at time of gauging 0.066/67 NP 7.73 0.00 537.87 Groundwater frozen at time of gauging 0.066/67 NP 7.73 0.00 537.87 Groundwater frozen at time of gauging 0.01097 NP 2.30 0.00 537.87 Groundwater frozen at time of gauging 0.01697 NP 7.32 0.00 537.87 Groundwater frozen at time of gauging 0.01697 NP 7.38 0.00 537.81 Groundwater frozen at time of gauging 0.01697 NP 7.39 0.00 538.15 Groundwater frozen at time of gauging 0.01697 NP 8.71 0.00 538.15 Groundwater frozen at time of gauging 0.01697 NP 8.71 0.00 538.15 Groundwater frozen at time of gauging 0.01697 NP 8.71 0.00 538.15 Groundwater frozen at time of gauging <td></td> <td>01/10</td> <td></td> <td>N/P</td> <td>7.60</td> <td>0.00</td> <td>539.30</td> <td></td>		01/10		N/P	7.60	0.00	539.30	
(49.6) N/P 7.81 0.00 Consolvent from a time of gauging 0.00666 N/P 7.73 0.00 Groundwate from a time of gauging 10.0057 N/P 7.73 0.00 Groundwate from a time of gauging 10.01797 N/P 2.90 0.00 Groundwate from a time of gauging 0.01797 N/P 2.91 0.00 Groundwate from a time of gauging 0.012197 N/P 7.38 0.00 Groundwate from a time of gauging 0.01297 N/P 7.38 0.00 Groundwate from a time of gauging 0.01297 N/P 7.36 0.00 Groundwate from a time of gauging 0.01697 N/P 7.38 0.00 Groundwate from a time of gauging 0.01697 N/P 7.38 0.00 Groundwate from a time of gauging 0.01697 N/P 8.74 0.00 Groundwate from a time of gauging 0.01097 3.813<		03/02		d/N	7.94	0.00	538.96	
06/05 NP 772 0.00 Chrundwater frozan at time of gauging (9/1/97) 11/05/96 NP 7.72 0.00 537.87 Chrundwater frozan at time of gauging (9/1/97) 0/1/1/97 NP 7.32 0.00 537.87 Chrundwater frozan at time of gauging (9/1/97) 0/1/1/97 NP 7.39 0.00 537.87 Chrundwater frozan at time of gauging (9/1/97) 0/1/1/97 NP 7.36 0.00 537.81 Chrundwater frozan at time of gauging (9/1/97) 0/1/97 NP 7.38 0.00 533.61 0/1/97 NP 87.9 0.00 538.15 0/1/97 NP 87.9 0.00 538.16 0/1/96 NP 87.9 0.00 538.21 0/1/97 NP 87.9 0.00 538.21 0/1/96 NP 87.9 0.00 538.21 0/1/96 NP 87.9 0.00 539.24 0/1/96 NP 87.9 0.00 539.24 <		20110		d/N	7.81	0.00	I	Groundwater frozen at time of gauging:
000000 NP 778 0.00 537.87 Croundwater forcen at time of gauging 032107 NP 3.23 0.00 537.87 Croundwater forcen at time of gauging 032107 NP 3.23 0.00 537.87 Croundwater forcen at time of gauging 041697 NP 7.88 0.00 539.02 Groundwater forcen at time of gauging 051697 NP 7.88 0.00 539.02 Groundwater forcen at time of gauging 051697 NP 7.88 0.00 539.02 Groundwater forcen at time of gauging 051697 NP 8.74 0.00 533.81 Groundwater forcen at time of gauging 0708997 NP 8.74 0.00 533.26 0.00 533.45 070897 NP 8.17 0.00 539.26 0.00 539.26 0196 NP 8.29 0.00 539.28 0.00 539.24 0108097 NP 8.17 0.00 539.24 0.00 539.24 010606		06/1-0		N/P	7.72	0.00	I	Groundwater frozen at time of gauging:
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $		06/00/00		d/N	7.78	0.00	I	Groundwater frozen at time of gauging
WIP Z30 0.00 — Croundwater frozen at time of gauging 04/1797 05/1657 N/P 3.50 0.00 — Groundwater frozen at time of gauging 05/1657 05/1657 N/P 7.56 0.00 — Groundwater frozen at time of gauging 05/167 07/0597 N/P 7.88 0.00 538.13 Groundwater frozen at time of gauging 08/0757 07/0597 N/P 8.73 0.00 538.13 Groundwater frozen at time of gauging 08/0757 08/0757 N/P 8.73 0.00 538.13 Groundwater frozen at time of gauging 08/0753 08/0757 N/P 8.73 0.00 538.13 Groundwater frozen at time of gauging 09/05 20002 05/95 547.75 0.00 538.15 Groundwater frozen at time of gauging 00/05 537.20 20002 05/95 N/P 8.17 0.00 538.27 0105 0106 539.24 0.00 539.24 010606 N/P 8.10 0.00 539.24 0106065 N/P 9.24		20/10/11		N/P	9.03	0.00	537.87	ð Þ
05/16/7 NP 3.23 0.00 — Groundwater facera at time of gauging 05/16/97 05/16/97 N/P 7.96 0.00 - Groundwater facera at time of gauging 03/15/97 05/16/97 N/P 7.96 0.00 539.12 Groundwater facera at time of gauging 03/15/97 05/16/97 N/P 8.73 0.00 538.13 Groundwater facera at time of gauging 03/15/97 09/15/97 N/P 8.74 0.00 538.13 Groundwater facera at time of gauging 03/15/97 2001 03/93 547.75 N/P 8.74 0.00 538.13 2002 05/93 547.75 N/P 8.10 0.00 539.24 2012 ST20 (E-7) N/P 8.17 0.00 539.24 01/96 N/P 8.21 0.00 539.24 537.20 01/96 N/P 8.21 0.00 539.24 537.24 01/96 N/P 9.30 0.00 539.24 537.24 01/96 N/P 9.30 0.		TO/17/CO		A/N	2.50	0.00	1	Groundwater frozen at time of gauging.
06/16/97 N/P 7.96 0.00 Croundwater frozen at time of gauging 06/09/7 N/P 7.88 0.00 533.15 0 0 533.02 07/09/7 N/P 8.73 0.00 538.15 0 0 538.16 09/15/97 N/P 8.73 0.00 538.15 0 0 538.16 09/15/97 N/P 8.74 0.00 538.16 0 0 538.16 09/15/95 547.75 N/P 8.74 0.00 539.28 0 0 538.16 20M02 05/95 547.75 N/P 8.17 0.00 539.58 0 0 0 539.58 0 0 539.54 0 0 0 539.54 0		16/11/20		A/N	3.23	0.00	1	Groundwater frozen at time of gauging
Officient N/P 7,88 0.00 539,02 0.01/37 N/P 9,99 0.00 539,12 0.01/377 N/P 8,73 0.00 538,15 0.01/377 N/P 8,74 0.00 538,15 0.01/357 N/P 8,74 0.00 538,16 0.01/357 N/P 8,17 0.00 538,16 0.01/356 N/P 8,17 0.00 538,30 0.196 N/P 8,17 0.00 538,31 0.196 N/P 8,17 0.00 538,32 0.196 N/P 8,17 0.00 538,32 0.196 N/P 8,17 0.00 539,53 0.196 N/P 8,17 0.00 539,54 0.196 N/P 8,20 0.00 539,54 0.106 538,45 0.00 538,45 0.00 0.11697 N/P 8,29 0.00 538,45 0.11697 N/P <td></td> <td>16/01/00</td> <td></td> <td>d/N</td> <td>7.96</td> <td>0.00</td> <td>1</td> <td>Groundwater frozen at time of gauging</td>		16/01/00		d/N	7.96	0.00	1	Groundwater frozen at time of gauging
080797 NP 9.09 0.00 537.81 091597 NP 8.73 0.00 538.15 091597 NP 8.74 0.00 538.15 091597 NP 8.74 0.00 538.15 091597 NP 8.74 0.00 538.15 091505 S47.75 NP 8.60 0.00 538.30 2002195 S47.75 NP 8.17 0.00 539.25 0196 NP 8.30 0.00 539.24 0196 NP 8.17 0.00 539.24 0196 NP 8.17 0.00 539.24 0196 NP 8.12 0.00 539.24 010696 NP 8.11 0.00 539.24 010696 NP 8.21 0.00 538.45 010696 NP 9.29 0.00 538.85 0497 NP 9.29 0.00 538.85 051697		10/00/20		d/N	7.88	0.00	539.02	5
001/597 N/P 8/3 0.00 538.15 100897 N/P 8/3 0.00 538.15 100897 N/P 8/3 0.00 538.16 2001597 N/P 8/17 0.00 538.16 20195 54775 N/P 8.17 0.00 538.30 0196 N/P 8.17 0.00 539.58 539.58 0196 N/P 8.17 0.00 539.58 539.54 0196 N/P 8.17 0.00 539.54 539.54 0196 N/P 8.17 0.00 539.54 539.74 0196 N/P 8.21 0.00 539.54 539.74 0106/96 N/P 8.29 0.00 538.65 539.54 05/16/97 N/P 9.29 0.00 538.83 56.16 05/16/97 N/P 9.24 0.00 538.83 56.16 07/08/97 N/P 9.24 0.00 538.81 <td></td> <td>08/07/97</td> <td></td> <td>N/P MM</td> <td>9.09</td> <td>0.00</td> <td>537.81</td> <td></td>		08/07/97		N/P MM	9.09	0.00	537.81	
100897 NP 8.44 0.00 538.16 20M02 05/95 547.75 NP 8.60 0.00 538.30 20M02 05/95 547.75 NP 8.17 0.00 538.30 20M02 05/95 547.75 NP 8.17 0.00 539.25 01/96 NP 8.17 0.00 539.25 539.75 01/96 NP 8.17 0.00 539.25 539.74 01/96 NP 8.21 0.00 539.24 539.74 030496 NP 8.21 0.00 539.24 539.74 0506697 NP 9.30 0.00 538.45 539.74 051697 NP 9.39 0.00 538.45 539.74 051697 NP 9.39 0.00 538.83 539.74 051697 NP 9.99 0.00 538.83 539.74 051697 NP 9.99 0.00 538.83 539.74		09/15/97			8.75	0.00	538.15	
20M02 05/95 547.75 N/P 8.0 0.00 538.30 20M02 05/95 547.75 N/P 8.17 0.00 539.58 09/21/95 547.75 N/P 8.17 0.00 539.58 09/21/95 N/P 8.17 0.00 539.58 01/96 N/P 8.78 0.00 539.25 01/96 N/P 8.78 0.00 539.44 03/96 N/P 8.01 0.00 539.44 01/06/96 N/P 8.01 0.00 539.44 01/06/96 N/P 9.30 0.00 539.74 01/06/96 N/P 9.99 0.00 539.56 01/06/97 N/P 9.99 0.00 538.66 05/16/97 N/P 9.47 0.00 538.28 07/08/97 N/P 9.47 0.00 538.28 07/08/97 N/P 9.44 0.00 538.28 07/08/97 N/P <t< td=""><td></td><td>10/08/97</td><td></td><td>N/P</td><td>8.74</td><td>0.00</td><td>538.16</td><td>ſ</td></t<>		10/08/97		N/P	8.74	0.00	538.16	ſ
20M02 05/95 547.75 N/P 8.17 0.00 539.58 20M02 05/95 547.75 N/P 8.17 0.00 539.58 0/21/95 N/P 8.17 0.00 539.54 0/196 N/P 8.17 0.00 539.54 0/196 N/P 8.21 0.00 539.54 0/196 N/P 8.21 0.00 539.54 0/106/96 N/P 8.21 0.00 539.54 0/106/97 N/P 9.30 0.00 539.54 0/106/97 N/P 9.35 0.00 539.54 0/106/97 N/P 9.93 0.00 538.65 0/108/97 N/P 9.93 0.00 538.83 0/108/97 N/P 9.24 0.00 538.82 0/108/97 N/P 9.24 0.00 538.83 0/108/97 N/P 9.34 0.00 538.84 0/108/97 N/P 9.34				N/F	8.60	0.00	538.30	
20M02 05/95 547.75 N/P 8.17 0.00 539.58 09/21/95 N/P 8.78 0.00 539.25 01/96 N/P 8.78 0.00 539.25 01/96 N/P 8.78 0.00 539.24 03/96 N/P 8.78 0.00 539.54 04/96 N/P 8.21 0.00 539.54 05/06/96 N/P 8.01 0.00 539.74 05/06/96 N/P 9.30 0.00 539.74 03/21/97 N/P 9.90 0.00 538.65 03/16/97 N/P 8.92 0.00 538.83 05/16/97 N/P 8.92 0.00 538.83 07/08/97 N/P 9.29 0.00 538.83 07/08/97 N/P 9.24 0.00 538.82 07/08/97 N/P 9.34 0.00 538.65 07/08/97 N/P 9.34 0.00 538.65					01)2	/ ST20 (F-7)		
09/21/95 547.75 NIP 8.17 0.00 539.58 09/21/95 NIP 8.17 0.00 539.58 01/96 NIP 8.78 0.00 539.25 01/96 NIP 8.78 0.00 539.25 03/96 NIP 8.78 0.00 539.54 04/96 NIP 8.21 0.00 539.74 06/06/96 NIP 9.30 0.00 539.74 06/06/96 NIP 9.30 0.00 539.45 11/06/96 NIP 9.30 0.00 538.45 03/21/97 NIP 9.93 0.00 538.65 03/21/97 NIP 8.92 0.00 538.83 05/16/97 NIP 8.92 0.00 538.82 05/16/97 NIP 9.47 0.00 538.82 07/08/97 NIP 9.49 0.00 538.66 07/08/97 NIP 9.54 0.00 538.66 0	201407	1910						
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	707410-7	56/00	547.75	N/P	8.17	0.00	539.58	
0.17.90 N/P 8.78 0.00 538.97 0.3/96 N/P 8.21 0.00 539.54 0.4/96 N/P 8.21 0.00 539.74 0.6/06/96 N/P 8.01 0.00 539.74 11/06/96 N/P 9.30 0.00 538.45 0.3/21/97 N/P 9.93 0.00 538.66 0.4/17/97 N/P 8.92 0.00 538.65 0.4/17/97 N/P 8.92 0.00 538.65 0.5/16/97 N/P 8.93 0.00 538.83 06/16/97 N/P 9.47 0.00 538.82 07/08/97 N/P 9.59 0.00 538.82 08/08/97 N/P 9.34 0.00 538.66 08/08/97 N/P 9.34 0.00 538.61		50/17/60		N/P	8.50	0.00	539.25	
04/96 N/P 8.21 0.00 539.54 04/96 N/P 8.01 0.00 539.74 06/06/96 N/P 8.01 0.00 539.74 11/06/96 N/P 9.30 0.00 538.45 03/21/97 N/P 9.99 0.00 538.66 04/17/97 N/P 8.92 0.00 538.83 05/16/97 N/P 8.92 0.00 538.82 05/16/97 N/P 8.93 0.00 538.82 05/16/97 N/P 9.99 0.00 538.82 05/16/97 N/P 9.47 0.00 538.82 05/16/97 N/P 9.47 0.00 538.82 07/08/97 N/P 9.49 0.00 538.06 08/08/97 N/P 9.34 0.00 538.41		96/10		N/P	8.78	0.00	538.97	
047.00 N/P 8.01 0.00 539.74 06/06/96 N/P 9.30 0.00 538.45 11/06/96 N/P 9.30 0.00 538.45 03/21/97 N/P 9.99 0.00 538.66 04/17/97 N/P 8.92 0.00 538.65 05/16/97 N/P 8.92 0.00 538.83 05/16/97 N/P 8.93 0.00 538.83 07/08/97 N/P 9.47 0.00 538.28 07/08/97 N/P 9.69 0.00 538.28 08/08/97 N/P 9.54 0.00 538.06 08/08/97 N/P 9.34 0.00 538.41		06/50		N/P	8.21	0.00	539.54	
0.000000 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 0.00 538.65 04/17/97 N/P 8.92 0.00 538.65 05/16/97 N/P 8.92 0.00 538.83 05/16/97 N/P 8.93 0.00 538.83 05/16/97 N/P 9.47 0.00 538.82 07/08/97 N/P 9.69 0.00 538.28 08/08/97 N/P 9.54 0.00 538.06 08/08/97 N/P 9.34 0.00 538.41		06/40		N/P	8.01	0.00	539.74	
11.00/30 N/P 9.85 0.00 537.90 03/11/97 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 0.00 538.82 07/08/97 N/P 9.69 0.00 538.28 08/08/97 N/P 9.34 0.00 538.06		06/00/00		N/P	9.30	0.00	538.45	
03/11/197 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 0.00 538.82 07/08/97 N/P 9.47 0.00 538.28 08/08/97 N/P 9.34 0.00 538.41		11/06/96		NP	9.85	0.00	537.90	
04/11/19/ N/P 8.92 0.00 538.83 0.00 538.83 0.00 538.82 0.00 0.00 538.82 0.00 0.00 538.82 0.00 0.00 538.82 0.00 0.00 538.82 0.00 538.28 0.00 538.28 0.00 538.28 0.00 538.28 0.00 538.06 0.00 538.06 0.00 538.41 0.00 0.00 538.41 0.0		03/21/97		NP	9.09	0.00	538.66	
02/16/9/ 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	-	04/1//97		N/P	8.92	0.00	538.83	
06/16/9/ 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		/ 6/91/cn		N/P	8.93	0.00	538.82	1
08/08/97 N/P 9.69 0.00 538.06 08/08/97 N/P 9.34 0.00 538.41		16/01/00		N/P	9.47	0.00	538.28	
0.00 538.41 538.41		16/00//0		N/P	9.69	0.00	538.06	
		16100100		N/P	9.34	0.00	538.41	

AND NAPL THICKNESS
APL LEVELS,
R LEVELS, N
TEWIDE WATER
SUMMARY OF SI
APPENDIX C

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	Ground Water Flevation	Commants	
				0U2 / S	T20 (E-7) (co)	nt.)	Comments	
20M02 (cont.)	09/15/97		ďN	0 46		00.001		
	10/09/97		N/P	9.39	0.00	538.29 538.36		
				OU2	2 / ST20 (E-8)			
20M06	05/95	549.52	N/P	7.39	0.00	547 12		
	09/21/95		N/P	7.81	0.00	541.71		
	01/96		N/P	8.27	0.00	541.25		
	03/96		A/N	7.64	0.00	541.88		
	04/90 06/06/96		d/N	7.44	0.00	542.08		
	11/06/96		N/P N/P	8.74 0.32	0.00	540.78		
	03/21/97		N/P	8.58 8.58	0.00	540.14		
	04/17/97		N/P	8.34	0.00	541.18		
	05/16/97		N/P	8.33	0.00	541.19	7	
	06/16/97		A/N	8.94	0.00	540.58		
	16/20/10		N/P	9.23	0.00	540.29		
	08/08/97		d'N a X	8.86	0.00	540.66		
	10/09/97		N/P	8.93 0.05	0.00	540.59	F	
			TAT	0.00	0.00	540.67		
				0U2	/ ST20 (E-9)			Τ
20M21	05/95	548.63	N/P	7.32	000	5 41 31		Τ
	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		
	11/06/96		d/N d/N	8.70	0.00	539.93		
	03/21/97		N/P	8.60	0.00	26.96C		<u>.</u>
	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		
	01/08/97		A/N	9.30	0.00	539.33		
	08/08/97		d'N B	8.95	0.00	539.68		
	10/00/01		A/N	9.00	0.00	539.63		
	16/60/01		N/P	8.91	0.00	539.72		
0M24	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	SUMMA!	XY OF SITE	WIDE WA	TER LEVELS,	NAPL LEVI	ELS, AND NAPL THICKNESS
			ALL DATA IN FI	EET - OUTLINEI	D DATA PRESENTED	IN FIGURES 2-1 A Corrected	ND 2-2
Well	4	*Casing	Depth to	Depth to	HSd	Ground Water	
N0.	Date	Elevation	HSH	Water	Thickness	Elevation	Comments
				0U2/S	T20 (E-9) (con	t.)	
ZUMZ4 (cont.)	01/96		I	1	1	1	Not located - flush mount well covered with snow.
	03/96		1	1	I	I	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	<u>.</u>
	04/17/97		N/P	6.13	0.00	539.89	
	05/16/97		N/P	6.25	0.00	539.77	1
	06/16/97		ΝP	6.91	0.00	539.11	
	107/09/97		N/P	7.20	0.00	538.82	
	08/07/97		N/P	6.85	0.00	539.17	
	09/15/97		NP	6.88	0.00	539.14	
	10/09/97		N/P	6.75	0.00	539.27	
					U4 / DP25		
25M03	05/95	543.71	N/P	4 57	000	530 TO	
	06/21/05		an n		0.00	61.660	
	01/96		AN OF	0.47	0.00	537.24	
	03/04		N/P	5.16	0.00	I	Groundwater frozen at time of gauging
	06/c0 20/10		d/N	5.12	0.00	I	Groundwater frozen at time of gauging
	04/90		N/P	5.12	0.00	1	Groundwater frozen at time of gauging
	06/00/00		Ν/P	5.95	0.00	I	Measuring point moved when opening PVC piping in well.
	96//0/11		N/P	6.35	0.00	537.36	
	16/17/00		d/N	5.62	0.00	538.09	
	10121120		N/P	5.49	0.00		Groundwater frozen at time of gauging.
	16/01/00		d/N	5.69	0.00	1	Groundwater frozen at time of gauging;
	10/00/20			0.43	0.00	537.28	
	08/07/97			0/.0	0.00	536.95	
	09/15/97		d/N	0.22	0.00	537.49 537 45	
	10/08/97		d/N	10.0	0.00	537.40 For 20	
			T AL	11.0	0.00	09//90	
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		NP	6.00	0.00	539.75	
	96/90/90		NP	I	0.00	I	Well possibly frost heaved.
	96//0/11		N/P	8.03	0.00	537.72	
	16/17/60		N/P	7.28	0.00	538.47	

i

Well Texture Increted Nu Depth to Eventing Pesh to Pesh to Person Pesh to Pesh to Pesh to Pesh to Pesh to Pesh to Pesh to Pesh to Pesh to Pesh to Pesh to				ALL DATA IN FI	TEL - OUTLINED	DATA PRESENTE	D IN FIGURES 2-1	4ND 2-2
Weil No. Caling Elevation (167) Date Elevation (167) Conting Elevation (167) Date Elevation (167) Conting (167) Date Elevation (167) Water (167) SMM (cont) Integration (167) Integration (16							Corrected	
Number Numer Data Numer Distribution Connection SMM (cont) (100) <th>Well No</th> <th>Data</th> <th>*Casing</th> <th>Depth to</th> <th>Depth to</th> <th>HSH</th> <th>Water</th> <th></th>	Well No	Data	*Casing	Depth to	Depth to	HSH	Water	
3NUL (ent.) OLI (DP2 (cont.) 3NUL (ent.) 0.11297 0.01 3341 0.11297 0.19 0.00 3341 0.11297 0.19 0.00 3373 0.11297 0.19 0.00 3373 0.11297 0.10 3373 0.00 0.11297 0.10 3373 0.00 0.11297 0.10 3373 0.00 3373 0.11297 0.10 3373 0.00 3373 0.11295 0.113 0.19 0.00 3373 0.11295 0.113 0.19 0.00 3373 0.11297 0.11 0.00 3173 0.00 0.11297 0.11 0.00 3126 0.00 3126 0.11297 0.11 0.00 3126 0.00 3126 0.11297 0.00 0.00 3126 0.00 3126 0.11297 0.00 0.00 3126 0.00 3126		Dalc	LICVATION	нсл	Water	Thickness	Elevation	Comments
SNMI (emt) MIBY NP 724 0.00 334.1 001097 NP 7.34 0.00 37.3 001097 NP 7.34 0.00 37.3 001097 NP 7.34 0.00 37.3 001097 NP 7.3 0.00 37.3 001097 NP 7.3 0.00 37.3 001197 NP 7.3 0.00 37.3 001197 NP 9.35 0.00 32.3 0011096 NP 9.35 0.00 32.3 0011 0.95 59.13 0.00 32.3 0012 0.95 0.00 32.03 0.00 0104 0.95 0.00 32.03 0.00 0104 0.00 32.03 0.00 32.03 0105 0.00 32.03 0.00 32.03 0106 0.00 32.03 0.00 32.03 01010709 0.00 32.03 </th <th></th> <th></th> <th></th> <th></th> <th>004</th> <th>/ DP25 (cont.)</th> <th></th> <th></th>					004	/ DP25 (cont.)		
001607 NB 731 000 352.4 001607 NP 20 377.9 377.9 001607 NP 20 00 377.9 0016 NP 20 00 377.9 0016 NP 20 00 377.9 012107 NP 21 00 323.3 012107 NP 21.0 00 33.0 012107 NP 21.3 00 33.0 012107 NP 21.3 00 33.0 010097 NP 21.3 00 33.0 010097 NP 21.3 00 33.0 010097 NP 21.4 00 33.0 010097 NP 11.4 00 33.0 <td< td=""><td>53M01 (cont.)</td><td>04/18/97</td><td></td><td>N/P</td><td>7.02</td><td>0.00</td><td>430 73</td><td>F</td></td<>	53M01 (cont.)	04/18/97		N/P	7.02	0.00	430 73	F
0(607 NP 8.6 0.0 3750 0(007 NP 8.0 0.0 3773 0(0157 NP 73 0.0 3773 0(0157 NP 73 0.0 3774 0(0157 NP 73 0.0 3774 0(1567 NP 73 0.0 3774 0(1567 NP 8.0 0.0 3793 0(1567 NP 8.8 0.0 50.3 0(1567 NP 8.8 0.0 50.3 0(1677 NP 1.1 0.0 319.3 0(1677 NP 0.0 319.3 0.0 0(1677 NP 0.0 319.3 0.0 0(1677 NP 0.0 319.3 0.0 0(1677 NP 0.0 319.4 0.0 0(1677 NP 0.0 319.4 0.0 0(1667 NP 1.14 0.0 319.4		05/16/97		N/P	7.34	0.00	538.41	Ţ
(01097) NP 843 (00 5773 (01159) NP 73 00 5773 (01159) NP 73 00 5773 (01159) NP 73 00 5773 (01150) NP 91 00 5773 (01150) NP 91 00 50.53 (0126) NP 91 00 50.33 (0126) NP 91 00 50.33 (0160) NP 91 00 50.33 (0160) NP 91 00 50.33 50.31 (0160) NP 91 00 50.31 91 (0160) NP 101 00 50.31 91 50.41 (0160) NP 101 00 30.31 91 50.41 91 50.41 (0160) NP 101 00 30.31 91 91 91 (0100) <		06/16/97		N/P	8.06	0.00	537.69	
(00)77 NP 7.23 0.00 377.34 00.0697 NP 7.81 0.00 377.34 33.010 0.0595 NP 7.81 0.00 377.34 33.011 NP 7.81 0.00 377.34 0.01 377.34 33.012 0.593 510.11 NP 9.35 0.00 510.35 510.11 0.936 NP 9.35 0.00 510.35 510.11 910.4 910.4 910.9		76/60/20		N/P	8.43	0.00	537.32	
WILTON NP 8(1) 0.00 3774 100871 NP 8(1) 0.00 3774 33M01 0595 39.013 NP 95.03 30.13 33M02 0595 39.013 NP 9.35 30.03 30.33 952129 NP 9.13 NP 9.32 30.03 30.33 952129 NP 9.17 0.00 52.03 30.33 952129 NP 9.17 0.00 52.03 30.33 952129 NP 9.17 0.00 52.03 30.33 952129 NP 10.13 0.00 52.03 30.33 952139 NP 10.13 0.00 53.03 30.33 952139 NP 10.13 0.00 53.03 30.33 952139 NP 10.13 0.00 53.03 30.33 952139 0.00 53.03 0.00 53.03 30.33 951100 0.01 <td></td> <td>08/07/97</td> <td></td> <td>N/P</td> <td>7.92</td> <td>0.00</td> <td>537.83</td> <td></td>		08/07/97		N/P	7.92	0.00	537.83	
Juney No 513 0.00 5734 0.00 5734 33M01 0.595 530.13<		10/01/2/97		N/P	8.01	0.00	537.74	
OUX OUX WP 9.50 OUX WP32 OUX 3330 5301 NP 9.50 000 50.35 53013 NP 9.50 000 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35 001 50.35		10/08/97		N/P	7.81	0.00	537.94	
33.002 0.913 50.11 NP 9.55 0.00 50.36 0.9136 NP 9.24 0.00 50.38 0.906 NP 9.24 0.00 50.36 0.906 NP 9.17 0.00 50.36 0.906 NP 9.17 0.00 50.36 0.905 NP 0.01 0.00 51.35 0.905 NP 0.01 0.00 51.95 0.91697 NP 0.00 51.95 0.00 0.91697 NP 0.00 51.95 0.00 0.91697 NP 0.00 51.95 0.01 0.91697 NP 0.00 51.95 0.00 0.91697 NP 0.00 51.95 0.01 0.91697 <td< td=""><td></td><td></td><td></td><td></td><td>ō</td><td>04 / WP32</td><td></td><td></td></td<>					ō	04 / WP32		
092195 NUP 533 000 5038 0596 NUP 9,1 0,00 5038 0596 NUP 9,1 0,00 5038 0596 NUP 9,1 0,00 5036 0596 NUP 0,01 50,00 50,03 0596 NUP 0,01 50,01 50,00 060597 NUP 0,01 50,01 50,01 071097 NUP 11,4 0,00 50,01 071097 NUP 11,4 0,00 50,01 0906 0,00 51,4 0,	32M02	79/90	430 13	ex				
MIP 9.16 0.00 53.0.7 0196 NP 9.17 0.00 53.0.3 0566 NP 9.17 0.00 53.0.3 0566 NP 0.01 53.0.3 53.0.3 0566 NP 0.01 53.0.3 53.0.3 0566 NP 0.01 0.00 53.0.3 0566 NP 0.01 0.00 53.0.3 051097 NP 0.00 53.0.3 0.00 051097 NP 0.00 53.0.3 0.00 051097 NP 0.00 53.0.3 0.00 07097 NP 0.00 53.0.3 0.00 07097 NP 0.03 53.0.3 0.00 53.0.3 071057 NP 0.03 53.0.3 0.00 53.0.3 070097 NP 11.24 0.00 53.0.3 0.01 54.0.3 070668 NP 11.24 0.00 514.6.3 0.00		30/10/00	C1.000		CC.K	0.00	520.58	
3200 NP 9.23 0.00 50.00 0466 NP 9.17 0.00 50.00 0466 NP 9.17 0.00 50.00 0466 NP 0.11 0.00 50.00 0461 NP 0.01 0.00 50.01 041097 NP 0.01 0.00 50.01 041697 NP 0.00 50.01 50.01 041697 NP 0.01 0.00 50.01 041697 NP 0.01 0.00 50.01 041697 NP 0.01 0.00 50.01 041697 NP 0.00 519.01 No meaurement because well has been docommissioned. 23013 NP 0.00 519.01 0.00 519.01 No meaurement because well has been docommissioned. 23014 NP 11.47 0.00 519.01 No meaurement because well has been docommissioned. 0196 NP 11.27 0.00 514.41 Well was originally		26/17/60		A/N B/N	9.86	0.00	520.27	
0496 NP 5.80 0.00 51.33 0496 NP 101 0.00 51.93 01697 NP 101 0.00 519.65 037197 NP 104 0.00 519.65 037167 NP 1043 0.00 519.65 037197 NP 1043 0.00 519.65 037197 NP 1043 0.00 519.65 037197 NP 1142 0.00 519.65 037195 NP 1142 0.00 519.65 0496 NP 1142 0.00 519.65 01969 NP 1142 0.00 519.65 0196 0.00 514.66 Vell wa		06/10		N/P	9.23	0.00	520.90	
2000 NP 0,11 0,00 32056 100596 NP 10,1 0,00 319,2 100597 NP 10,1 0,00 319,2 041657 NP 10,1 0,00 319,6 07/1097 NP 10,01 0,00 319,6 07/1097 NP 10,01 0,00 319,6 07/1097 NP 10,1 0,00 319,6 07/195 313,90 NP 11,4 0,00 319,6 07/195 NP 10,1 0,00 319,6 No meaurement because well has been decommissioned 07/1957 NP 11,12 0,00 314,6 Nell was originally installed at GW-32C 0792497 NP 11,25 0,00 314,6 Nell was originally installed at GW-32C		96/CD		d/N	8.80	0.00	521.33	
2000 10350 NP 1013 000 51938 07157 NP 104 0.00 51935 071697 NP 104 0.00 51956 071697 NP 104 0.00 51956 071697 NP 104 0.00 51956 071697 NP 104 0.00 51962 071997 NP 1031 0.00 51962 071997 NP 1043 0.00 51946 071997 NP 1124 0.00 51946 07199 323.90 NP 1142 0.00 51946 07199 NP 1127 0.00 51446 Well was originally installed at GW-33C 01966 NP 1127 0.00 51446 Well was originally installed at GW-33C 019795 NP 1127 0.00 51446 Well was originally installed at GW-33C 019697 NP 1127 0.00 51446 Well was origina		06/00/90		A/N Ø/N	9.17	0.00	520.96	
Matrix Natro 0.01 0.00 519.32 05/167 NP 0.04 0.00 519.65 05/167 NP 0.04 0.00 519.65 05/167 NP 0.01 0.00 519.65 07/1097 NP 0.01 0.00 519.65 07/1097 NP 0.01 0.00 519.65 07/1097 NP 0.04 0.00 519.65 07/1097 NP 0.04 0.00 519.65 07/1097 NP 0.03 519.61 No 07/1097 NP 0.03 519.61 No 07/1097 NP 0.03 519.61 No 07/197 NP 11.42 0.00 514.61 07/196 NP 11.27 0.00 514.61 07/197 NP 11.26 0.00 514.61 07/197 NP 11.27 0.00 514.61 07/1977 NP 4.14<		11/05/96		A/N M/M	10.15	0.00	519.98	
Q41697 NP Q00 5303 9393 051697 NP 100 000 53012 9393 051697 NP 1014 000 53012 9393 061097 NP 104 0.00 53013 906 061097 NP 1043 0.00 53013 Nonceastment 0911697 NP 1043 0.00 53013 Nonceastment 0911697 NP 1142 0.00 53013 Nonceastment 0911697 NP 1134 0.00 51436 Well was originally installed at GW-32C 0196 NP 1129 0.00 5146 Well was originally installed at GW-32C 0196 NP 1124 0.00 5146 Well was originally installed at GW-32C 0196 NP 1129 0.00 5146 Well was originally installed at GW-32C 019709 NP 1129 0.00 5146 Well was originally installed at GW-32C 01007096 NP		03/21/97		T/N T/N	10.01	0.00	519.52	
05/16/7 NP 100 0.00 520.12 05/19/7 NP 10.43 0.00 519.63 07/10/97 NP 10.43 0.00 519.63 07/10/97 NP 10.43 0.00 519.63 07/10/97 NP 10.43 0.00 519.61 08/07/97 NP 10.43 0.00 519.61 09/16/97 NP 11.42 0.00 519.61 09/16/97 NP 11.24 0.00 514.46 01/96 NP 11.27 0.00 514.66 03/96 NP 11.27 0.00 514.66 04/96 NP 11.27 0.00 514.66 04/96 NP 11.29 0.00 514.66 04/96 NP 11.29 0.00 514.66 07/097 NP 41.8 0.00 517.67 06/06/96 NP 11.26 0.00 517.45 07/1097 NP		04/16/97		N/P	10.08	000	40.41C	F
06(19)7 NP 10,0 000 530.12 07/1097 NP 10,4 0.00 530.12 07/1097 NP 10,43 0.00 530.12 07/1097 NP 10,43 0.00 539.6 07/1097 NP 10,43 0.00 539.6 09/1697 NP 10,43 0.00 539.6 09/1697 NP 11,42 0.00 539.1 09/1697 NP 11,42 0.00 539.1 09/1697 NP 11,27 0.00 534.6 0196 NP 11,27 0.00 514.6 0196 NP 11,27 0.00 514.6 0106/056 NP 11,27 0.00 514.6 012479 NP 11,26 0.00 514.6 012479 NP 11,26 0.00 514.6 012479 NP 11,26 0.00 514.6 012479 NP 4.18 <td></td> <td>05/16/97</td> <td></td> <td>đN</td> <td>10.01</td> <td>0.00</td> <td>C0.02C</td> <td>-</td>		05/16/97		đN	10.01	0.00	C0.02C	-
07/10/97 N/P 10.30 0.00 519.50 08/0797 N/P 10.43 0.00 519.70 08/0797 N/P 10.43 0.00 519.70 09/16/97 N/P 10.43 0.00 519.70 09/21/97 N/P 1.0.2 0.00 519.70 09/21/95 N/P 11.42 0.00 519.48 010/697 N/P 11.27 0.00 514.36 0196 N/P 11.27 0.00 514.66 010/697 N/P 11.27 0.00 514.66 010/696 N/P 11.26 0.00 514.66 010/097 N/P 11.26 0.00 514.66 010/097 N/P 11.26 0.00 514.66 010/097 N/P 11.26 0.00 513.46 010/097 N/P 4.18 0.00 513.46 010/097 N/P 4.18 0.00 51.77 08/0797		06/19/97		N/P	10.01	0.00	520.12	
08/07/97 N/P 10.43 0.00 513.01 0.016/97 0.016/97 0.016/97 0.016/97 0.016/97 0.016/97 0.016/97 0.016/97 0.016/97 0.016/97 0.016/97 0.016/97 0.016/97 0.00 519.61 0.00 519.61 0.00 519.61 0.01 519.61 0.01 519.61 N N 1.1.2 0.00 519.61 N N 1.1.2 0.00 519.61 N Nell was originally installed at GW-32C 01/96 0.07 0.17 11.27 0.00 514.63 Nell was originally installed at GW-32C 01/96 N/P 11.27 0.00 514.63 Nell was originally installed at GW-32C 01/96 N/P 11.27 0.00 514.63 Nell was originally installed at GW-32C 01/97 N/P 11.26 0.00 514.64 Nell was not located during gauging event. 01/07/97 N/P 4.18 0.00 521.62 Need to confirm well location, all previous DTW measurements 01/10/97 N/P		01/10/62		N/P	10.51	0.0	50.41C	
09/16/97 NP 10.23 0.00 51.61 No measurement because well has been decommissioned. 2MOC 05/95 525.90 NP - 0.00 519.61 No measurement because well has been decommissioned. 2MOC 05/95 525.90 NP 11.42 0.00 519.61 No 01/96 NP 11.27 0.00 514.48 Well was originally installed at GW-32C 01/96 NP 11.27 0.00 514.61 No 10.97 03/96 NP 11.29 0.00 514.61 Nell was originally installed at GW-32C 03/96 NP 11.27 0.00 514.61 Nell was originally installed at GW-32C 03/96 NP 11.27 0.00 514.61 Nell was originally installed at GW-32C 03/96 NP 11.26 0.00 514.61 Nell was originally installed at GW-32C 06/06/96 NP 11.26 0.00 514.64 Nell was originally installed at GW-32C 06/06/97 NP 4.18 0.00 <td></td> <td>08/07/97</td> <td></td> <td>N/P</td> <td>10.43</td> <td>0.0</td> <td>70.615</td> <td></td>		08/07/97		N/P	10.43	0.0	70.615	
International Number of the source well has been decommissioned. 2MOC 05/95 525.90 N/P 11.42 0.00 530.13 No measurement because well has been decommissioned. 0%21/95 525.90 N/P 11.42 0.00 514.48 Well was originally installed at GW-32C 0%05/96 N/P 11.27 0.00 514.63 Well was originally installed at GW-32C 0%06/96 N/P 11.27 0.00 514.63 Well was originally installed at GW-32C 0%06/96 N/P 11.26 0.00 514.63 Well was originally installed at GW-32C 0%06/96 N/P 11.26 0.00 514.61 Well was originally installed at GW-32C 0%06/96 N/P 11.26 0.00 513.94 Well was not located during gauging event. 0%1/97 N/P 4.18 0.00 521.62 Need to confirm well location, all previous DTW measurements 0%1/97 N/P 4.18 0.00 521.73 Need to confirm well location, all previous DTW measurements 0%1/97 N/P 4.14 <		09/16/97		N/P	10.52	0.00	519.61	
2M0C 0595 525.90 NP 11.42 0.00 514.48 Well was originally installed at GW-32C 01/96 N/P 11.54 0.00 514.63 Well was originally installed at GW-32C 01/96 N/P 11.27 0.00 514.63 Well was originally installed at GW-32C 01/96 N/P 11.29 0.00 514.63 Well was originally installed at GW-32C 04/96 N/P 11.29 0.00 514.63 Well was originally installed at GW-32C 04/96 N/P 11.26 0.00 514.63 Well was originally installed at GW-32C 04/96 N/P 11.26 0.00 514.63 Well was originally installed at GW-32C 04/97 N/P 11.96 0.00 513.94 Well was originally installed at GW-32C 05/16/97 N/P 4.18 0.00 521.62 Need to confirm well location, all previous DTW measurements 05/16/97 N/P 4.14 0.00 521.72 Need to confirm well location, all previous DTW measurements 07/10/97 N/P		10/09/97		N/P		0.00	530.13	No measurement because well has been decommissioned
09/21/95 N/P 11.54 0.00 514.36 well was originally installed at GW-32C 01/96 N/P 11.27 0.00 514.61 well was originally installed at GW-32C 04/96 N/P 11.29 0.00 514.61 well was originally installed at GW-32C 04/96 N/P 11.26 0.00 514.61 well was originally installed at GW-32C 06/06/96 N/P 11.26 0.00 514.61 well was originally installed at GW-32C 06/06/96 N/P 11.26 0.00 514.61 well was originally installed at GW-32C 06/06/96 N/P 11.26 0.00 513.44 well was not located during gauging event. 01/09/7 N/P 4.18 0.00 521.62 Need to confirm well location, all previous DTW measurements 05/19/7 N/P 4.14 0.00 521.72 Need to confirm well location, all previous DTW measurements 07/10/7 N/P 4.14 0.00 521.74 Need to confirm well location, all previous DTW measurements 07/10/7 N/P 4.31 </td <td>2M0C</td> <td>05/95</td> <td>525.90</td> <td>NP</td> <td>11.42</td> <td>0.00</td> <td>61140</td> <td></td>	2M0C	05/95	525.90	NP	11.42	0.00	61140	
01/96 N/P 11.27 0.00 514.63 03/96 N/P 11.29 0.00 514.63 04/96 N/P 11.29 0.00 514.63 04/96 N/P 11.26 0.00 514.64 05/06/96 N/P 11.26 0.00 514.64 11/07/96 - - - Well was not located during gauging event. 03/24/97 N/P 4.18 0.00 531.62 Well was not located during gauging event. 03/19/97 N/P 4.18 0.00 521.62 Need to confirm well location, all previous DTW measurements 05/16/97 N/P 4.14 0.00 521.72 Need to confirm well location, all previous DTW measurements 07/10/97 N/P 4.14 0.00 521.74 08/07/97 N/P 4.14 0.00 521.74 09/16/97 N/P 4.31 0.00 521.74 01/09/97 N/P 4.31 0.00 521.74		09/21/95		N/P	11.54	0.00	51436	wen was originally installed at GW-32C
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 11.26 0.00 514.64 06/06/96 N/P 11.96 0.00 514.64 11/07/96 - - - - 03/24/97 N/P 4.18 0.00 521.52 Neell was not located during gauging event. 03/24/97 N/P 4.18 0.00 521.62 Need to confirm well location, all previous DTW measurements 05/19/97 N/P 4.18 0.00 521.72 Need to confirm well location, all previous DTW measurements 05/16/97 N/P 4.14 0.00 521.75 Need to confirm well location, all previous DTW measurements 08/07/97 N/P 4.14 0.00 521.76 Need to confirm well location, all previous DTW measurements 09/16/97 N/P 4.16 0.00 521.77 0.00 521.74 09/16/97 N/P 4.31 0.00 521.74 521.74 521.74		01/96		N/P	11.27	0.00	514.63	
04/96 N/P 11.26 0.00 514.64 06/06/96 N/P 11.96 0.00 514.64 11/07/96 - - - Well was not located during gauging event. 03/24/97 N/P 4.18 0.00 513.94 Well was not located during gauging event. 03/24/97 N/P 4.18 0.00 521.62 Need to confirm well location, all previous DTW measurements 05/19/97 N/P 4.18 0.00 521.12 Need to confirm well location, all previous DTW measurements 05/19/97 N/P 4.14 0.00 521.13 Need to confirm well location, all previous DTW measurements 06/16/97 N/P 4.14 0.00 521.14 Need to confirm well location, all previous DTW measurements 09/16/97 N/P 4.16 0.00 521.47 Need to confirm well location, all previous DTW measurements 09/16/97 N/P 4.16 0.00 521.14 10/09/07 01/09/97 N/P 4.31 0.00 521.59 10/00/07 521.59 10/00/07		03/96		N/P	11.29	0.00	514.61	
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 0.00 513.94 03/24/97 N/P 4.18 0.00 521.62 Need to confirm well location, all previous DTW measurements 05/19/97 N/P 4.18 0.00 522.18 Need to confirm well location, all previous DTW measurements 05/19/97 N/P 4.14 0.00 522.18 Need to confirm well location, all previous DTW measurements 06/16/97 N/P 4.14 0.00 521.47 Need to confirm well location, all previous DTW measurements 09/16/97 N/P 4.16 0.00 521.47 0.00 521.47 09/16/97 N/P 4.31 0.00 521.59 0.00 521.51 10/09/97 N/P 4.31 0.00 521.59 0.00 521.59		04/96		N/P	11.26	0.00	514.64	
11/0//96 — — Well was not located during gauging event. $03/24/97$ N/P 4.28 0.00 521.62 Well was not located during gauging event. $04/23/97$ N/P 4.18 0.00 521.62 Need to confirm well location, all previous DTW measurements $05/19/97$ N/P 4.18 0.00 521.72 Need to confirm well location, all previous DTW measurements $05/16/97$ N/P 4.14 0.00 521.47 $07/10/97$ N/P 4.14 0.00 521.47 $08/07/97$ N/P 4.16 0.00 521.74 $09/16/97$ N/P 4.31 0.00 521.51 $10/09/97$ N/P 4.32 0.00 521.52 0.00 521.52 0.00 521.54		06/00/00		N/P	11.96	0.00	513.94	
09/16/97 N/P 4.28 0.00 521.62 Need to confirm well location, all previous DTW measurements 05/19/97 N/P 4.18 0.00 521.72 Need to confirm well location, all previous DTW measurements 05/19/97 N/P 4.14 0.00 521.72 Need to confirm well location, all previous DTW measurements 06/16/97 N/P 4.14 0.00 521.76 07/10/97 N/P 4.16 0.00 521.74 08/07/97 N/P 4.16 0.00 521.56 10/09/97 N/P 4.31 0.00 521.54		03//0/11		;	1	ļ	1	Well was not located during gauging event.
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		16/47/00		d/N	4.28	0.00	521.62	Need to confirm well location, all previous DTW measurements
$\begin{array}{cccccccccccccccccccccccccccccccccccc$		04/10/07		d/N	4.18	0.00	521.72	· ·
07/10/97 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 10/09/97 N/P 4.31 0.00 521.59 N/P 4.32 0.00 521.59		16/61/90		N/P	3.72	0.00	522.18	
08/07/97 NrP 4.43 0.00 521.47 08/07/97 NrP 4.16 0.00 521.74 10/09/97 NrP 4.31 0.00 521.59 0.00 521.59		10/01/20		N/P	4.14	0.00	521.76	
09/16/97 N/P 4.10 0.00 521.74 10/09/97 N/P 4.31 0.00 521.59 10/09/97 N/P 4.32 0.00 521.59		08/01/07		a/v A/A	4.43	0.00	521.47	
60102 00 V V V V V V V V V V V V V V V V V		09/16/97		N/P	4.10	0.00	521.74	
		10/09/97		a/N	1.21	0.00	521.59	

ALL MATA FERENCIPIO NY PRESERVED NY LOTES 2. AND 23 Well Contract Concreted Control Control No. Elevation PSH Control No. Control FSH Control Show 033 State Dirth Control Show 033 State Dirth Matr Old S33 Control S333 Control Show 033 State Dirth Matr Old S33 State State State Show 033 State State State State Show State State State State State <th< th=""><th>4</th><th>NPPENDIX (</th><th>C SUMMAR</th><th>Y OF SITE</th><th>WIDE WAT</th><th>TER LEVELS</th><th>, NAPL LEVE</th><th>LS, AND NAPL THICKNESS</th></th<>	4	NPPENDIX (C SUMMAR	Y OF SITE	WIDE WAT	TER LEVELS	, NAPL LEVE	LS, AND NAPL THICKNESS
Well -Coincing No. Depth to Elevation Periton FM var Coincin Nuter Coincin Nu				ALL DATA IN FI	EET - OUTLINEI) DATA PRESENTE	D IN FIGURES 2-1 A	ND 2-2
	Well		*Caeing	Danth to	Danth 40	11.50	Ground	
Mile 014/S35 OLI4/S35 3506 033 5458 NP 545 00 533.0 036 819 0.03 0.03 0.03 0.03 0.03 046 919 0.03 0.03 0.03 0.03 0.03 046 919 0.03 0.03 0.03 0.03 0.03 0466 919 0.03 0.03 0.03 0.03 0.03 0407 919 0.03 0.03 0.03 0.03 0.03 0.03 0407 919 0.01 0.03<	N0.	Date	Elevation	PSH	Water	Thickness	w ater Elevation	Comments
Skile 0.99 54.6 NP 56.6 0.00 33.03 0.056 NP 0.00 33.03 33.33 33.03 0.056 NP 0.00 33.23 33.03 33.03 0.056 NP 0.00 33.23 33.03 33.23 0.056 NP 0.00 33.23 33.33 33.33 0.056 NP 0.00 33.23 33.33 33.33 0.057 NP 0.00 33.23 33.33 33.33 33.33 0.0587 NP 0.00 33.13 0.00 33.13 33.33 0.0587 NP 0.07 0.00 33.13 33.43 33.43 33.43 33.43 33.43 33.43 33.44 33.44 33.44 33.44 33.44 33.44 33.44 33.44 33.44 33.44 33.44 33.44 33.44 33.44 34.44 34.44 34.44 34.44 34.44 34.44 34.44 3					0)U4 / SS35		
092195 NP 032 000 5323 04066 NP 101 000 5324 04066 NP 100 5324 5323 04066 NP 100 5324 5323 04057 NP 100 5324 5323 04079 NP 103 00 5324 04129 NP 103 00 5324 04129 NP 103 00 5324 04129 NP 103 00 5314 04129 NP 103 00 5314 04129 NP 103 00 5314 04169 NP 103 00 5324 0496	35M06	05/95	542.68	A/P	9.65	000	533 03	
0.06 0.0 0.01 0.00 0.01 0.06 0.0 0.0 0.00 0.01 0.066 0.0 0.0 0.00 0.01 0.066 0.0 0.00 0.00 0.00 0.0107 0.0 0.00 0.01 0.00 0.0107 0.0 0.00 0.01 0.01 0.0107 0.0 0.00 0.01 0.01 0.0107 0.0 0.00 0.01 0.01 0.0106 0.0 0.00 0.01 0.01 0.006 0.01 0.00 0.01 0.01 0.006 0.01 0.00 0.01 0.01 0.006 0.01 0.00 0.01 0.01 0.006 0.01 0.00 0.01 0.01 0.006 0.01 0.00 0.01 0.01 0.006 0.01 0.00 0.01 0.01 0.006 0.00 0.00 0.01		09/21/95		A/N	50.0	0.00	50.55C	
036 NP 000 9228 04066 NP 003 9223 04059 NP 003 9223 100696 NP 003 9223 041797 NP 003 9224 041797 NP 003 9224 041797 NP 003 9224 041797 NP 003 9224 061697 NP 003 9224 061697 NP 003 9324 061697 NP 003 9324 061697 NP 003 9324 061697 NP 003 9324 061997 NP 003 9324 061997 NP 033 00 93246 0709 NP 03 9324 00 93246 0709 NP 03 00 93246 00 00 0709 NP 00 93246 00 00		01/96		N/P	10.11	0.00	61.260 73 47	
0.06 NP 0.82 0.00 972.33 10056 NP 10.3 0.00 972.13 101056 NP 10.3 0.00 972.13 101056 NP 10.3 0.00 972.13 101056 NP 10.70 0.00 973.13 101277 NP 10.77 0.00 931.05 101277 NP 10.77 0.00 931.05 101277 NP 10.75 0.00 931.05 101277 NP 10.75 0.00 932.65 101277 NP 10.25 0.00 932.65 100665 NP 10.66 0.00 932.65 10056 NP 10.66 0.00 932.65 10056 NP 10.60 932.65 National values value		03/96		A/N	10.09	0.00	10.200	
100006 NP 103 000 92.33 100007 NP 100 001 93.14 10107 NP 107 0.00 93.13 10107 NP 107 0.00 93.13 101097 NP 107 0.00 93.13 101097 NP 107 0.00 93.13 101097 NP 105 0.00 93.13 100697 NP 105 0.00 93.24 100697 NP 1061 0.00 93.25 100697 NP 1021 0.00 93.26 100695 NP 1021 0.00 93.26 100697 NP 84 0.00 93.25 100597 NP 84 0.00 93.25 100597 NP 9.00 93.25 0.00 93.25 100597 NP 9.00 93.25 0.00 93.25 011057 NP <td< td=""><td></td><td>04/96</td><td></td><td>N/P</td><td>9.82</td><td>0.00</td><td>537 86</td><td></td></td<>		04/96		N/P	9.82	0.00	537 86	
1105% NP 1065 0.00 332.01 041797 NP 0.07 0.00 33.13 041797 NP 0.07 0.00 33.13 041797 NP 0.07 0.00 33.13 041667 NP 0.07 0.00 33.13 041677 NP 0.65 0.00 33.23 041677 NP 0.65 0.00 33.24 041677 NP 0.65 0.00 33.24 04056 NP 0.61 0.00 33.24 04056 NP 0.61 0.00 33.24 04056 NP 0.00 33.25 Not located - fluk mour well covered with now. 04357 NP 0.00 33.25 Not located - fluk mour well covered with now. 0456 NP 0.00 33.25 Not located - fluk mour well covered with now. 04556 NP 9.00 93.13 0.00 33.13 04567 NP 9.00		06/06/96		N/P	10.35	0.00	532.33	
(13217) N/P 10.5 0.00 32.13 (1057) N/P 10.7 0.00 32.14 (1057) N/P 10.7 0.00 32.14 (1057) N/P 10.7 0.00 32.14 (1057) N/P 10.6 0.00 32.17 (1057) N/P 10.61 0.00 32.27 (1057) N/P 10.51 0.00 32.27 (1056) N/P 10.51 0.00 32.24 (1056) N/P 10.51 0.00 32.24 (1056) N/P 10.21 0.00 32.24 (1056) N/P 2.	-	11/05/96		N/P	10.65	0.00	532.03	
(4/17) N/P 10.7 0.00 52.41 (0/167) N/P 10.7 0.00 53.18 (0/167) N/P 10.7 0.00 53.14 (0/167) N/P 10.8 0.00 53.14 (0/167) N/P 10.8 0.00 53.14 (0/167) N/P 10.6 0.00 53.27 (0/167) N/P 10.1 0.00 53.26 (0/167) N/P 10.1 0.00 53.26 (0/167) N/P 10.1 0.00 53.26 (0/167) N/P 8.40 0.00 53.26 (0/167) N/P 8.40 0.00 53.26 (0/167) N/P 8.40 0.00 53.16 (0/167) N/P 8.40 0.00 53.16 (0/167) N/P 9.31 0.00 53.16 (0/167) N/P 9.31 0.00 53.16 (0/167) N/P <t< td=""><td></td><td>03/21/97</td><td></td><td>N/P</td><td>10.36</td><td>0.00</td><td>532.32</td><td></td></t<>		03/21/97		N/P	10.36	0.00	532.32	
001697 NP 1070 000 5138 001697 NP 1087 0.00 513.81 001997 NP 1061 0.00 533.47 001297 NP 1061 0.00 533.47 001297 NP 1061 0.00 533.47 001295 NP 1061 0.00 533.47 001295 NP 864 0.00 533.47 00196 NP 864 0.00 533.47 0196 NP 864 0.00 533.47 0196 NP 864 0.00 533.45 0196 NP 864 0.00 533.45 0196 NP 864 0.00 533.45 0199 NP 864 0.00		04/17/97		N/P	10.27	0.00	532.41	
07/09/7 NP 10.87 0.00 53.18 07/09/7 NP 10.87 0.00 53.17 07/09/7 NP 10.61 0.00 53.27 07/09/7 NP 10.61 0.00 53.27 07/09/7 NP 10.61 0.00 53.27 07/09/7 NP 10.61 0.00 53.2.6 07/09/7 NP 8.64 0.00 53.2.6 012/15 S14.20 NP 8.64 0.00 53.2.6 010/05 NP - 0.00 53.2.6 Not located rink mout well coverd with snow. 03.66 NP 8.4 0.00 53.2.6 Not located rink mout well coverd with snow. 03.66 NP 8.4 0.00 53.1.8 Not located rink mout well coverd with snow. 03.66 NP 8.4 0.00 53.1.8 Not located rink mout well coverd with snow. 03.66 NP 8.4 0.00 53.1.8 Not located rink mout well coverd with snow.		05/16/97		N/P	10.70	0.00	531.98	1
000971 NP 10.85 0.00 531.83 000977 NP 10.66 0.00 532.07 09/1297 NP 8.64 0.00 532.56 01.96 NP 8.64 0.00 532.56 01.95 NP 8.64 0.00 532.56 01.95 NP 8.94 0.00 532.56 01.95 NP 8.93 0.00 532.56 01.95 9.31.87 NP 9.00 9.00 01.95 9.31.87 NP 9.00 9.00 01.95 9.31.87 0.00 <td></td> <td>06/16/97</td> <td></td> <td>N/P</td> <td>10.87</td> <td>0.00</td> <td>531.81</td> <td></td>		06/16/97		N/P	10.87	0.00	531.81	
NOT NP 1051 0.00 332.07 35M01 0595 341.20 N/P 10.61 0.00 332.47 0921295 N/P 10.21 0.00 332.47 Net located riths mout well covered with scow. 35M01 0595 541.20 N/P 8.64 0.00 332.45 092105 N/P 8.64 0.00 332.56 Net located riths mout well covered with scow. 01306 N/P - 0.00 332.45 Net located riths mout well covered with scow. 01305 N/P - 0.00 332.56 Net located riths mout well covered with scow. 01305 N/P - 0.00 332.56 Net located riths mout well covered with scow. 01005 0.10 332.56 0.00 332.56 Net located riths mout well covered with scow. 01005 0.00 332.56 0.00 332.56 Net located rith mout well covered with scow. 01005 0.00 332.56 0.00 332.56 Net located rith scow. 0		76/60/L0		N/P	10.85	0.00	531.83	
Mutual NP 1056 0.00 53.247 35M0* 0595 54.20 NP 1021 0.00 53.247 35M0* 0595 54.20 NP 864 0.00 53.245 0156 NP 8.64 0.00 53.256 0.00 53.256 0156 NP 8.64 0.00 53.256 0.00 53.256 0156 NP 8.64 0.00 53.256 Not located - flush mout well covered with snow. 0456 NP 8.84 0.00 53.1.87 Not located - flush mout well covered with snow. 04057 NP 8.83 0.00 53.1.87 Not located - flush mout well covered with snow. 051697 NP 8.83 0.00 53.1.87 Not located - flush mout well covered with snow. 051697 NP 8.83 0.00 53.1.97 Not located - flush mout well covered with snow. 051697 NP 9.10 0.00 53.1.97 Not located - flush mout well covered with snow. 051697		08/07/97		N/P	10.61	0.00	532.07	
35M01 0.0535 34120 NP 10.21 0.00 332.36 35M01 0.935 34120 NP 8.64 0.00 332.36 0136 NP - 0.00 32.36 - Not located fluid mount well covered with snow. 0136 NP - 0.00 32.36 Not located fluid mount well covered with snow. 01305 NP - 0.00 33.2.36 Not located fluid mount well covered with snow. 0406 NP 8.49 0.00 33.2.36 Not located fluid mount well covered with snow. 04077 NP 8.49 0.00 33.2.36 Not located fluid mount well covered with snow. 041707 NP 8.84 0.00 33.2.36 Not located fluid mount well covered with snow. 041707 NP 8.84 0.00 33.2.36 Not located fluid mount well covered with snow. 051697 NP 9.30 0.00 33.2.36 Not located fluid mount well covered with snow. 0710977 NP 9.31 0.00 33.2.3		16/21/60		N/P	10.66	0.00	532.02	
35.007 0535 341.20 NP 8.64 0.00 53.56 0921/95 NP 8.64 0.00 33.2,56 Not located - fluch mout well covered with store. 09496 NP - 0.00 33.2,56 Not located - fluch mout well covered with store. 0496 NP - 0.00 53.2,56 Not located - fluch mout well covered with store. 0496 NP 8.40 0.00 53.2,56 Not located - fluch mout well covered with store. 0497 NP 8.40 0.00 53.2,56 Not located - fluch mout well covered with store. 0405 NP 8.29 0.00 53.2,56 Not located - fluch mout well covered with store. 041657 NP 8.29 0.00 53.2,56 Not located - fluch mout well covered with store. 041657 NP 9.31 0.00 53.2,56 Not located - fluch mout well covered with store. 041657 NP 9.31 0.00 53.2,56 Not located - fluch mout well covered with store. 040695 NP 9.31 0.00		10/08/97		N/P	10.21	0.00	532.47	
072105 NP 8.61 0.00 532.60 0396 NP - 0.00 532.60 0396 NP - 0.00 532.60 0396 NP - 0.00 532.60 0396 NP 8.40 0.00 532.26 0406 NP 8.40 0.00 532.26 010779 NP 8.84 0.00 532.36 031697 NP 8.84 0.00 531.87 031697 NP 8.84 0.00 531.36 031697 NP 8.84 0.00 531.56 031697 NP 9.56 0.00 531.56 031697 NP 9.31 0.00 531.56 0312197 NP 9.31 0.00	35M07	05/95	541.20	N/P	8.64	000	33 623	
0196 NP - 0.00 - Not located - flash mount well covered with scov. 0396 NP - 0.00 - Not located - flash mount well covered with scov. 0496 NP 8,4 0.00 33.28 Not located - flash mount well covered with scov. 0496 NP 8,4 0.00 33.26 Not located - flash mount well covered with scov. 04507 NP 8,4 0.00 33.26 Not located - flash mount well covered with scov. 0451697 NP 8,4 0.00 33.26 Not located - flash mount well covered with scov. 0451697 NP 8,4 0.00 33.26 Not located - flash mount well covered with scov. 041797 NP 8,84 0.00 331.30 Not located - flash mount well covered with scov. 050797 NP 9,3 0.00 331.45 Not located - flash mount well covered with scov. 050797 NP 9,3 0.00 331.45 Not located - flash mount well covered with scov. 070997 NP 9,3 0.00		09/21/95		N/P	8.64	0.00	537 56	
0396 NP - 0.0 - Not located. flucth mount well covered with snow. 0306/96 NP 8.40 0.00 332.80 Not located. flucth mount well covered with snow. 03/21/97 NP 8.40 0.00 331.87 Not located. flucth mount well covered with snow. 03/21/97 NP 8.84 0.00 331.87 Not located. flucth mount well covered with snow. 03/16/97 NP 8.84 0.00 331.90 331.90 03/16/97 NP 9.81 0.00 331.90 331.90 03/16/97 NP 9.81 0.00 331.30 331.90 03/16/97 NP 9.81 0.00 331.46 331.90 03/16/97 NP 9.81 0.00 331.46 331.64 03/16/97 NP 9.84 0.00 331.64 331.64 03/16/97 NP 9.34 0.00 331.64 331.64 01/2/97 NP 9.34 0.00 331.64 331.64		01/96		N/P	I	0.00		Not located - fluch mount well concered with mount
0496 NP 840 0.00 532.80 1000000 1105/95 NP 834 0.00 532.86 532.86 1105/97 NP 824 0.00 532.86 532.86 0321/97 NP 8.84 0.00 532.36 532.86 047/97 NP 8.82 0.00 531.90 532.36 041/67 NP 8.82 0.00 531.87 531.50 0416/97 NP 9.70 0.00 531.50 531.50 0709/97 NP 9.81 0.00 531.25 531.50 08/12/97 NP 9.34 0.00 531.25 532.55 01009/97 NP 9.34 0.00 531.25 532.25 37-1 05/95 546.59 NP 8.95 0.00 532.25 37-1 05/95 546.59 0.00 532.25 0.00 532.25 37-1 05/95 546.50 0.00 532.25 <		03/96		N/P	1	0.00	I	Not located - flich mount well concerd with subw.
0606/6 N/P 8.94 0.00 53.137 1105/9 N/P 8.83 0.00 53.147 0371/97 N/P 8.82 0.00 53.147 0371/97 N/P 8.82 0.00 53.147 0371/97 N/P 8.82 0.00 53.147 05/16/97 N/P 8.82 0.00 531.50 05/16/97 N/P 9.70 0.00 531.50 05/07 N/P 9.70 0.00 531.46 07/03/7 N/P 9.74 0.00 531.46 07/03/7 N/P 9.34 0.00 531.46 07/03/7 N/P 9.34 0.00 531.46 07/03/7 N/P 9.34 0.00 531.66 07/03/7 N/P 9.34 0.00 531.66 07/03/7 N/P 9.34 0.00 535.61 07/03/7 N/P 9.35 0.00 536.67 07/04/6 N/P </td <td></td> <td>04/96</td> <td></td> <td>N/P</td> <td>8.40</td> <td>0.00</td> <td>532.80</td> <td></td>		04/96		N/P	8.40	0.00	532.80	
1105/6 NP 9.33 0.00 531.87 03/16/7 NP 8.84 0.00 531.87 04175/7 NP 8.62 0.00 531.87 04175/7 NP 8.62 0.00 531.87 0516/97 NP 9.70 0.00 531.39 0516/97 NP 9.81 0.00 531.30 0516/97 NP 9.70 0.00 531.49 0516/97 NP 9.81 0.00 531.64 0709/97 NP 9.81 0.00 531.64 09/12/97 NP 9.34 0.00 531.64 09/12/95 NP 9.34 0.00 531.64 09/12/95 NP 9.34 0.00 531.64 0109/97 NP 8.95 0.00 531.64 0109/97 NP 8.95 0.00 531.64 0104 / S537 014 / S537 014 / S537 014 / S537 0196 NP <td< td=""><td></td><td>06/06/96</td><td></td><td>N/P</td><td>8.94</td><td>0.00</td><td>532.26</td><td></td></td<>		06/06/96		N/P	8.94	0.00	532.26	
032197 N/P 884 0.00 53.36 03(1697 N/P 8.62 0.00 53.156 05(1697 N/P 8.62 0.00 531.56 05(1697 N/P 9.70 0.00 531.56 07(0997 N/P 9.81 0.00 531.56 07(0997 N/P 9.56 0.00 531.64 08/0797 N/P 9.34 0.00 531.64 08/0797 N/P 9.34 0.00 531.64 09/0797 N/P 9.34 0.00 531.64 09/1295 N/P 8.95 0.00 532.35 37.1 0595 546.39 N/P 8.95 0.00 37.10 0595 546.3 0.00 536.07 0.00 537.46 01/96 N/P 9.39 0.00 537.46 0.00 537.46 01/96 N/P 9.39 0.00 537.46 0.00 537.46 01006		11/05/96		N/P	9.33	0.00	531.87	
04/1797 NP 8c2 0.00 532.58 05/1697 NP 9.30 0.00 531.90 05/1697 NP 9.31 0.00 531.30 05/1697 NP 9.31 0.00 531.30 05/1697 NP 9.31 0.00 531.64 05/1597 NP 9.56 0.00 531.64 09/1297 NP 9.34 0.00 531.64 09/1297 NP 8.95 0.00 531.64 09/1297 NP 8.95 0.00 532.25 010/156 NP 8.95 0.00 532.61 019/2195 MP 10.32 0.00 536.07 019/2195 NP 10.32 0.00 536.07 019/2195 NP 9.36 0.00 536.07 019/2195 NP 9.36 0.00 536.07 019/2195 NP 9.36 0.00 536.07 019/2195 NP		03/21/97		N/P	8.84	0.00	532.36	
05/1697 N/P 9.30 0.00 531.90 07(05)97 N/P 9.70 0.00 531.50 07(05)97 N/P 9.36 0.00 531.64 08/07/97 N/P 9.34 0.00 531.64 08/07/97 N/P 9.34 0.00 531.64 09/12/97 N/P 9.34 0.00 531.64 09/12/97 N/P 9.34 0.00 531.86 09/12/95 546.39 N/P 8.95 0.00 532.25 37-1 0595 546.39 N/P 10.52 0.00 536.07 01/96 N/P 10.32 0.00 536.01 0.00 536.01 01/96 N/P 9.03 0.00 536.01 0.00 536.01 01/96 N/P 9.13 0.00 536.01 0.00 536.01 01/96 N/P 9.33 0.00 536.01 0.00 537.46 01/97 N/P <t< td=""><td></td><td>04/17/97</td><td></td><td>N/P</td><td>8.62</td><td>0.00</td><td>532.58</td><td></td></t<>		04/17/97		N/P	8.62	0.00	532.58	
06/10/1 NP 9.70 0.00 531.50 07/09/7 NP 9.81 0.00 531.39 08/01/97 NP 9.34 0.00 531.39 08/01/97 NP 9.34 0.00 531.64 08/01/97 NP 8.95 0.00 531.64 09/01/97 NP 8.95 0.00 531.64 09/01/97 NP 8.95 0.00 531.64 01/097 NP 8.95 0.00 531.64 01/105 NP 8.95 0.00 532.65 0196 NP 10.52 0.00 536.07 0196 NP 9.13 0.00 536.95 0196 NP 9.13 0.00 537.46 0196 NP 9.13 0.00 537.46 0196 NP 9.13 0.00 537.46 0196 NP 10.83 0.00 537.46 01996 NP 10.83		05/16/97		N/P	9.30	0.00	531.90	1
0.0099/ 09/12/97 N/P 9.81 0.00 531.39 09/12/97 N/P 9.36 0.00 531.64 09/12/97 N/P 9.34 0.00 531.64 09/12/97 N/P 8.93 0.00 531.64 09/12/97 N/P 8.95 0.00 531.64 37-1 05/95 546.39 N/P 10.52 0.00 532.53 37-1 05/95 546.39 N/P 10.52 0.00 536.07 01/96 N/P 10.52 0.00 536.07 536.51 013/96 N/P 9.13 0.00 536.59 01966/96 N/P 9.13 0.00 537.20 01066/96 N/P 10.83 0.00 537.20		16/01/00		N/P	9.70	0.00	531.50	
37-1 0.000 531.64 10/09/97 N/P 9.34 0.00 531.64 10/09/97 N/P 9.34 0.00 531.64 37-1 05/95 546.39 N/P 8.95 0.00 532.25 37-1 05/95 546.39 N/P 10.32 0.00 532.67 071/95 N/P 10.32 0.00 536.07 536.07 01/96 N/P 10.08 0.00 536.07 01/96 N/P 9.13 0.00 536.51 01/96 N/P 9.60 0.00 536.09 01/96 N/P 9.13 0.00 535.59 01/96 N/P 9.13 0.00 537.46 01/96 N/P 9.33 0.00 537.20 01/95/96 N/P 10.39 0.00 537.20		16/60/10		N/P	9.81	0.00	531.39	
V/V 9.34 0.00 531.86 10/09/97 N/P 8.95 0.00 531.86 37-1 05/95 546.59 N/P 8.95 0.00 532.25 37-1 05/95 546.59 N/P 10.52 0.00 533.67 09/21/95 N/P 10.52 0.00 536.67 0.00 536.67 01/96 N/P 10.08 0.00 536.51 0.00 536.51 01/96 N/P 9.13 0.00 537.46 0.00 537.46 06/06/96 N/P 10.50 0.00 537.20 0.00 537.20 01/05/96 N/P 10.83 0.00 537.20 537.20		16/10/90		A/N A/N	9.56	0.00	531.64	
37-1 05/95 546.59 N/P 10.32 0.00 532.25 37-1 05/95 546.59 N/P 10.52 0.00 536.07 09/21/95 N/P 10.32 0.00 336.07 01/96 N/P 10.08 0.00 336.51 01/96 N/P 9.13 0.00 336.51 03/96 N/P 9.13 0.00 335.51 04/96 N/P 9.13 0.00 537.46 04/96 N/P 10.50 0.00 537.20 01/966 N/P 10.53 0.00 537.20	 ,	10/09/97		N/P	9.34	0.00	531.86	
OU4 / SS37 37-1 05/95 546.59 N/P 10.52 0.00 536.07 09/21/95 N/P 10.52 0.00 536.07 01/96 N/P 10.08 0.00 536.51 01/96 N/P 9.60 0.00 536.51 01/96 N/P 9.13 0.00 536.52 01/96 N/P 9.13 0.00 537.46 04/96 N/P 10.50 0.00 537.20 06/06/96 N/P 10.50 0.00 536.09 N/P 10.83 0.00 536.09				7/51	0.70	0.00	532.25	
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 0.00 536.51 01/96 N/P 9.60 0.00 536.51 01/96 N/P 9.13 0.00 536.59 03/96 N/P 9.13 0.00 537.46 04/96 N/P 10.50 0.00 537.20 06/06/96 N/P 10.50 0.00 536.09					0	U4 / SS37		
09/21/95 N/P 10.08 0.00 536.51 01/96 N/P 10.08 0.00 536.99 03/96 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	37-1	05/95	546.59	ďN	10 \$2	000	F0.263	
01/96 N/P 9.60 0.00 536.51 03/96 N/P 9.13 0.00 536.99 04/96 N/P 9.13 0.00 537.46 06/06/96 N/P 10.50 0.00 536.09 11/05/96 N/P 10.83 0.00 536.09		09/21/95		a/N	10.00	0.00	10.000	
03/96 N/P 9.13 0.00 537.46 0.4/96 N/P 9.13 0.00 537.20 0.00 537.20 0.00 536.09 11/05/96 N/P 10.50 0.00 536.09 0.00 536.09		01/96		N/P	0 60	0.00	536.51 527 55	
04/96 N/P 9.39 0.00 537.46 0.00 037.46 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0		03/96		a/N	2.00	0.00	230.99	
06/06/96 N/P 10.50 0.00 536.09 11/05/96 N/P 10.83 0.00 535.72		04/96		A/N	020	0.00	537.46	
11/05/96 N/P 10.83 0.00 536.09		06/00/96		d/N	05.01	0.00	07.150	
		11/05/96		N/P	10.83	0.00	536.09	

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						Corrected	
Well		*Casing	Depth to	Depth to	HSA	Water	
.00	Date	Elevation	HSH	Water	Thickness	Elevation	Comments
			1	0U4	/ SS37 (cont.)		
37-1 (cont.)	03/21/97		N/P	06.6	000	07 YE S	
	04/17/97		N/P	10.16	0.00	536.43	r-
	05/19/97		N/P	10.48	0.00	536.11	7
	06/16/97		N/P	10.77	0.00	535.82	
	76/60/10		A/P	10.89	0.00	535.70	
	09/12/97		q/N q/N	10.67	0.00	535.92	
	10/09/97		N/P	10.54	0.00	536.05	Г
							1
				0	U4 / SS39		
39M04	05/95	\$37.06	N/P	11.12	0.00	575 04	
	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 02/02/02		d'N	10.75	0.00	526.31	
	11/04/06		A/N	11.46	0.00	525.60	
	03/24/97		q/N d/N	11.74	0.00	525.32	
	04/17/97		a/N	11 44	0.00	85.020	Г
	05/20/97		d/N	11 40	0.00	525.62	
	06/19/97		d/N	11.83	0.00	525.57	
	07/08/97		N/P	11.90	0.00	67.676 91.868	
	08/08/97		N/P	11.59	0.00	525.47	
	10/00/01		d/N	11.64	0.00	525.42	ſ
			14/1	11.09	0.00	525.37	
				ō	U3 / 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	
	96/60		NP	11.22	0.00	527.31	
	04/96 02/02/02		A/N	10.97	0.00	527.56	
	06/00/00		N/P	11.60	0.00	526.93	
	03/24/97		N/P N/P	12.06	0.00	526.47	
	04/16/97		NP	11.31	000	61.020	F
	05/16/97		N/P	11.57	0.00	576 96	-
	06/19/97		N/P	12,11	0.00	526.42	
	07/08/97		N/P	12.16	0.00	526.37	

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ALL DATA IN FEET - OUTLINED DATA PRESENTED IN FIGURES 2-1 AND 2-2 Corrected Cround

Well		*Casing	Denth to	Danth to	пэq	Cround	
No.	Date	Elevation	PSH	Water	Thickness	w ater Elevation	Comments
				003	/ DP44 (cont.)		Cattabaran o
44M01 (cont.)	08/07/97		QIN	00 11			
~	<i>L6/60/60</i>		JVI A/N	11.60	0.00	526.73	
	10/09/97		N/P	11.74	0.00	526.79	F
							T
44MU4	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		I	I	1	1	Not located - fluch mount well convered with mount
	03/96		1	I	ł		Not forested - finch month well covered with show,
	04/96		N/P	ł	1		Not located - Illusin mouth well covered with show.
	06/06/96		N/P	6.84	0.00		
	11/07/96		I			1	Uroundwater trozen at tune of gauging;
	03/24/97		I	I		-	Not located - flush mount well covered with snow.
	04/16/97		1				Not located - flush mount well covered with snow.
	05/19/97		an M	110	1	1	
	06/19/97			8.14 9.55	0.00	527.27	
	07/08/97			6.5 2	0.00	526.86	
	T0/T0/80		NP NP	8.60	0.00	526.81	
	16/10/00 L0/C1/00		N/P	8.33	0.00	527.08	
	10/00/02		N/P	8.20	0.00	527.21	
_	16/60/01		A/P	8.20	0.00	527.21	
44M00	76/06		1				1
COTATAL		236.75	N/P	3.74	0.00	ł	Groundwater frozen at time of gauging:
	C6/17/60		N/P	9.98	0.00	526.77	
	01/96		N/P	1	0.00	I	Not located - flush mount well covered with enough
	03/96		NP	1	0.00	I	Not located - fluch mount well worked with mount
	04/96		N/P	9.73	0.00	527.02	
	06/09/96		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	
	79/01/c0		A/P	10.39	0.00	526.36	1
	16/61/00		N/P	10.80	0.00	525.95	
	16/20//0		N/P	10.85	0.00	525.90	
	08/01/91		N/P	10.53	0.00	526.22	
<u> </u>	1 6/60/60		N/P	10.56	0.00	526.19	
	16/60/01		N/P	10.47	0.00	526.28	
				JO	J3 / WP45		
45M04	05/95	539.55	NP	9.28	000	20.27	
	09/21/95		N/P	9.05	0.0	12.050	
	01/96		N/P	9.30	0.00	530.25	
						14:22	

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ALL DATA IN FEFT - OUT

				14117TAN- 199) DALA YKEDEN LED	Corrected	ND 2-2
Well No.	Date	*Casing Elevation	Depth to PSH	Depth to Water	PSH Thickness	Ground Water Elevation	Comments
				0U3	/ WP45 (cont.)		Chiran we a a
45MI04 (cont.)	03/96		NP	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	Ţ
	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	
							1
					SS46		
46M01	05/95	528 04	a/N	60 5			
-	20/10/00			0.03	0.00	521.21	
	20/17/60		η/Ν Έξ	7.04	0.00	521.00	
	06/10		N/P	6.20	0.00	521.84	
	06/60		A/N	5.69	0.00	522.35	
	04/96		NP	6.12	0.00	521.92	
	06/06/96		NP	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		A/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	
				Õ	U1 / ST48		
LUXOF	30, 20		1				
CULVIO+	26/20 20/10/00	544.51	N/P	15.65	0.00	528.86	
	CE/17/60		N/P	14.52	0.00	529.99	
	06/IN		A/N	14.88	0.00	529.63	
	96/60		N/P	14.61	0.00	529.90	
	06/40		I	1	I	I	Well Destroyed

					U DALA FRESENTE	D IN FIGURES 2-1 Corrected	Z-2 (10)	
Well No.	Date	*Casing Flevation	Depth to PSH	Depth to	PSH	Ground Water	ţ	
					JUJI / ST49	LIEVALION	Comments	
49M01	\$6/\$U	10.013						
TOTAL		17.640	N/P	8.41	0.00	540.80		
	C6/17/60		N/P	8.56	0.00	540.65		
	96/10		NP	8.38	0.00	540.83		
	03/96		A/P	7.82	0.00	541.39		
	04/96		NP	7.82	0.00	541.39		
	06/00/90		N/P	9.13	0.00	540.08		
	96/CD/11		A/N	9.63	0.00	539.58		
	03/21/97		Ν/Ρ	8.91	0.00	540.30		
	04/17/97		ЧЛ	8.80	0.00	540.41		
	05/19/97		N/P	8.94	0.00	540.27	1	
	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		ΝP	9.17	0.00	540.04		
	10/09/97		NP	9.15	0.00	540.06		
53M05	05/95	549.26	N/P	8 84	000	54 0F3		
	09/21/95		N/P	40 6	000	240.42		
	01/96		N/P	06.8	0.00	270.26		
	03/96		N/P	8.37	000	00.042		
	04/96		N/P	8.36	0.00	540 90		
	06/00/90		A/P	9.64	0.00	63 953		
	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		A/P	9.37	0.00	539.89		
	05/19/97		N/P	9.47	0.00	539.79	1	
	06/16/97		A/P	9.82	0.00	539.44		
	16/80/10		ΝΡ	9.93	0.00	539.33		
	00/16/02/07		a'n	9.59	0.00	539.67		
	10/00/01		A/N	9.79	0.00	539.47	ſ	
	16/60/01		A/P	9.73	0.00	539.53		
				ō	U2 / WP60			
50Nf01	05/95	539.04	q/N	10 48		, i ocj		
	09/21/95		d/N	10.12	000	04.020		
	01/96		d/N	10.72	0.00	26.820		
	03/96		a'n	10.12	0.00	528.32		
	04/96		N/P	10.14	0.00	528.62		
	96/90/90		d/N	10.65	000	06.820 628.20		
			TAT	C0.01	0.00	528.39		

					DATA FASSALED	Corrected	AND 2-2
Well		*Casing	Depth to	Denth to	HSd	Ground	
No.	Date	Elevation	HSA	Water	Thickness	Elevation	Comments
				0U2/	WP60 (cont.)		
60M01 (cont.)	03/24/97		N/P	10.76	0.00	\$78 78	
	04/16/97		N/P	10.33	0.00	528.71	ſ
	05/19/97		N/P	10.99	0.00	528.05	Ţ
	06/16/97		N/P	11.34	0.00	527.70	
	16/60/20		N/P	11.39	0.00	527.65	
	08/08/97		N/P	11.06	0.00	527.98	
	16/08/01		N/P N/P	10.85 10.91	0.00	528.19 528.13	Г
50M03	05/05	6 30.00					1
	09/21/95	80.650	a'n a'n	10.72	0.00	528.36	
	96/10		N/P	10.71	0.00	528.87	
	03/96		N/P	10.49	0.00	15.820	
	04/96		N/P	10.21	0.00	528.87	
	06/00/96		N/P	10.65	0.00	528.43	
	11/07/96		Π/Ρ	11.05	0.00	528.03	
	16/47/20		N/P	10.78	0.00	528.30	
	04/10/97		d/N	10.43	0.00	528.65	
	16/61/00		N/P	11.06	0.00	528.02	1
	16/01/00		A/N	11.36	0.00	527.72	
	16/60/10		N/P	11.42	0.00	527.66	
	09/15/97		N/P	11.11	0.00	527.97	
	10/08/97		NP	10.97	000	528.20	Г
					0.0	01.070	-
0N104	05/95	539.52	N/P	11.36	0.00	528.16	
	C6/17/60		N/P	10.96	0.00	528.56	
	06/10		N/P	11.57	0.00	527.95	
	02/CD 04/96		q/N	11.31	0.00	528.21	
	0K/0K/9K			11.02	0.00	528.50	
	11/07/96		N/P	11.40	0.00	528.12	
	03/24/97			11.78	0.00	527.74	
	04/16/97		N/L	80.11	0.00	527.94	ſ
	05/19/97		N/P	11.21	0.00	528.31	
	06/16/97			C/.11	0.00	527.77	
	70/00/20			12.05	0.00	527.47	
	08/08/97			12.09	0.00	527.43	
	09/15/97		A/N A/N	11.83	0.00	527.69	
	10/08/97		N/P	11.60	0.00	527.91	ſ
							-