Five-Year Review Report

Third Five-Year Review Report
for
US Army Garrison
Fort Wainwright, Alaska

September 2011

Prepared for

US Army Garrison Fort Wainwright, Alaska
Directorate of Public Works
ATTN: IMPC-FWA-PWE
1060 Gaffney Road #4500
Fort Wainwright, Alaska 99703-4500

UNITED STATES ARMY PROTECTIVENESS STATEMENT

Based on the Statutory Determinations set forth in the Record of Decision for Operable Units 1, 2, 3, 4 and 5 and the results of this Five-Year Review, the US Army Garrison Fort Wainwright, Alaska (USAG FWA) hereby finds that the remedies for Operable Units 1, 2 and 4 have been implemented and are protective of human health and the environment.

The remedy at Operable Unit 5 is currently protective; however, in order to remain protective in the long term, continued monitoring of the Remedial Area 1a fence will be conducted to ensure security and identify the need for repairs.

Remedies at Operable Unit 3 are currently protective of human health and the environment. In order for the Operable Unit 3 remedies to remain protective in the long-term, USAG FWA will initiate appropriate responses in cooperation with the Environmental Protection Agency and Alaska Department of Environmental Conservation, if future monitoring indicates there are significant changes of the contaminant plumes that would adversely affect human health and the environment. In the interim, the exposure pathways that could result in unacceptable risk are being controlled.

Approved by:

Ronald M. Johnson
Colonel, US Army
Commanding

8 NOV 11
Date

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON, ALASKA
1060 GAFFNEY ROAD #6000
FORT WAINWRIGHT, ALASKA 99703-6000

REPLY TO
ATTENTION OF:

Office of the Garrison Commander

Subject: Third Five-Year Review Report for the US Army Garrison Fort Wainwright, Alaska (USAG FWA)

Mr. Daniel D. Opalski,
US Environmental Protection Agency, Region 10
Director, Office of Environmental Clean-up
1200 Sixth Avenue
Seattle, WA 98101-3140

Dear Mr. Opalski,

Please find attached the "Protectiveness Statement" and formal signature page as required for the USAG FWA's submission of the Third Five-Year Review Report.

Development and review of the "Protectiveness Statement" and supporting documentation within the Third Five-Year Review Report document began with the submission of the draft document on May 24, 2011. USAG FWA incorporated comments from internal Army reviewers, the US Environmental Protection Agency (EPA), Alaska Department of Environmental Conservation (ADEC) and additional agency consultants throughout the summer of 2011. On September 27, 2011 USAG FWA received final comments via verbal communication from the EPA Region 10's Remedial Project Manager (RPM). The comments addressed perceived inaccuracies within the wording of the protectiveness determinations, the efficacy of certain follow up actions and a requirement to initiate a Technical Impracticability Waiver for Operable Unit 3.

USAG FWA's RPM promptly incorporated appropriate changes to the document and modified the "Protectiveness Statement". The approach to addressing the future protectiveness issues and related changes throughout the document were approved by the USAG FWA Garrison Commander and incorporated into the Five Year Review, then forwarded to the EPA and ADEC on September 29, 2011 in order to meet the submission deadline. The Garrison Commander withheld formal signature on these changes pending EPA's approval of the corrections. Formal acceptance of these changes was received via email on October 26, 2011.

The "Protectiveness Statement" was revised as follows:

a. Based on the Statutory Determinations set forth in the Record of Decision for Operable Units 1, 2, 3, 4 and 5, and the results of this Five-Year Review, the USAG

FWA hereby finds that the remedies for Operable Units 1, 2 and 4 have been implemented and are protective of human health and the environment.

b. The remedy at Operable Unit 5 is currently protective; however, in order to remain protective in the long term, continued monitoring of the Remedial Area 1a fence will be conducted to ensure security and identify the need for repairs.

c. Remedies at Operable Unit 3 are currently protective of human health and the environment. In order for the Operable Unit 3 remedies to remain protective in the long-term, USAG FWA will initiate appropriate responses in cooperation with the EPA and ADEC, if future monitoring indicates there are significant changes of the contaminant plumes that would adversely affect human health and the environment. In the interim, the exposure pathways that could result in unacceptable risk are being controlled.

Copies of this letter and the "Protectiveness Statement" will be furnished to USAEC, EPA Region 10 RPM's and ADEC RPM.

USAG FWA appreciates your support of our environmental programs and looks forward to working with you on future issues. If you have any questions or concerns regarding this correspondence, please contact Mr. Joseph Malen, USAG FWA RPM at (907) 361-4512 or email at joseph.s.malen.civ@mail.mil.

Sincerely,

Ronald M. Johnson
Colonel, US Army
Commanding

Enclosure

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

SEP 29 2011

OFFICE OF
ENVIRONMENTAL CLEANUP

Colonel Ronald M. Johnson
U. S. Army Commanding
Installation Management Command
Headquarters, U.S. Army Garrison, Fort Wainwright
1060 Gaffney Rd., #6000
Fort Wainwright, Alaska 99703-6000

RE: The EPA's Concurrence on Fort Wainwright 2011 Five-Year Remedy Review Report

Dear Colonel Johnson:

The U.S. Environmental Protection Agency Region 10 has reviewed the third Five-Year Review Report for Fort Wainwright, Alaska dated September, 2011, for technical adequacy, accuracy, and consistency with EPA guidance. The EPA also reviewed and commented on earlier drafts and most of the EPA's comments were addressed to our satisfaction. The EPA found that the Report generally follows the Guidance, is thorough, and accurately describes Site conditions. The EPA generally concurs with the Report however we continue to differ slightly on our view of the appropriate protectiveness determinations and certain of the necessary follow-up actions. The EPA's final remedy selection authority at Federal facility NPL sites requires that the EPA retain final authority to make protectiveness determinations, so this letter provides the EPA's protectiveness determinations for each Fort Wainwright Operable Unit and for the Site as a whole (since the Site has achieved Construction Completion status). The EPA's protectiveness statements will be reported to Congress as follows:

OU1 801 Drum Burial Site: The remedy at OU1 has been implemented and is protective of human health and the environment. The remedy is relying upon Monitored Natural Attenuation to achieve final cleanup goals in groundwater over time, and in the interim, exposure pathways that could result in unacceptable risks are being controlled and Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater.

OU2 801 Building 1168 Leach Well and DRMO Yard: The remedy at OU2 has been implemented and is protective of human health and the environment. The remedy is relying upon Monitored Natural Attenuation to achieve final cleanup goals in groundwater over time, and in the interim, exposure pathways that could result in unacceptable risks are being controlled and Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater.

OU3 Birch Hill Tank Farm; Remedial Area 2; and Remedial Area 3: The remedies at OU3 currently protect human health and the environment, however Site conditions at Area 1b (Birch Hill Tank Farm) and Area 3 (Milepost Sites), are such that the remedies will not be able to fully achieve the groundwater restoration Remedial Action Objective and ARARs. In order for the

remedies to remain protective in the long-term, the Army must evaluate the feasibility of additional response actions to fully achieve the RAOs and propose a plan for final action at OU3. If achieving these goals proves to be Technically Impracticable, the Army will need to seek to waive the ARARs. In the interim, exposure pathways that could result in unacceptable risks are being controlled and Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater.

OU4 Landfill and Coal Storage Yard: The remedy at OU4 has been implemented and is protective of human health and the environment. The remedy is relying upon Monitored Natural Attenuation to achieve final cleanup goals in groundwater over time, and in the interim, exposure pathways that could result in unacceptable risks are being controlled and Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater.

OU5 Quartermaster Fueling System, Birch Hill Tank Farm, Chena River, and Institutional Controls Program: The remedy at OU5 currently protects human health and the environment because Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater. However, in order for the remedy to fully comply with the selected remedy and remain protective for the long term, the Army needs to increase security and repair to the fence at the Birch Hill Tank Farm Remedial Area 1a.

Sitewide: The remedial actions at OUs 1, 2, and 4 have been implemented and are protective. The remedies at OUs 3 and 5 currently protect human health and the environment, but require the follow-up actions documented in the Report and this letter to ensure they remain protective in the long term. Because some of the OUs are currently protective, the Site is considered currently protective and the follow-up actions documented in the Report and this letter need to be performed to ensure they remain protective in the long term.

The EPA will be tracking all the issues and recommendations in the Report that could affect protectiveness and their associated due dates in its CERCLIS database. The EPA will also be tracking the Army's progress toward the recommendations to ensure the remedy at OU3 remains protective in the long term. The EPA will be entering a due date of March 31, 2016 for the Army to complete the analysis of feasible alternatives and to issue a proposed plan for either additional response actions or a waiver of ARARs based on Technical Impracticability needed for OU3.

Consistent with the EPA's August 1, 2011 memorandum "Program Priorities for Federal Facility Five-Year Reviews", the Five-Year Review Guidance Section 1.3.3 has been superseded and future Five Year Review due dates will be based on the planning date for this review (September 29, 2011). Therefore the next Five-Year Review will be due September 29, 2016, and the subsequent Review will be due September 29, 2021.

Finally, the August 1 Program Policies memorandum also calls for a summary of the EPA Superfund Sitewide Environmental Indicator Status for Sites undergoing Five-Year Reviews, which are as follows:

The Superfund Sitewide Human Exposure Environmental Indicator Status for the Site remains "Current Human Exposure Under Control" because of the remedies implemented to date, including engineering and institutional controls. To ensure this indicator remains "Under

Finally, the August 1, 2011 Program Priorities memorandum also calls for a summary of the EPA Superfund Sitewide Environmental Indicator Status for Sites undergoing Five-Year Reviews, which are as follows:

> The Superfund Sitewide Human Exposure Environmental Indicator Status for the Site remains "Current Human Exposure Under Control" because of the remedies implemented to date, including engineering and institutional controls. To ensure this indicator remains "Under Control" for the long term, the follow-up actions recommended in this review need to be completed."
>
> The Groundwater Migration Environmental Indicator Status for the Site is being updated to "Groundwater Migration Under Control" from "Insufficient Data" because groundwater investigations at the Former Communications Site have now shown that there is no uncontrolled migration of contaminated groundwater.

Thank you for the Army's hard work to complete this Third Five-Year Review in a timely manner. The EPA looks forward to continuing to work with the Army to complete all necessary follow-up actions and achieve all the remedial Action Objectives at Fort Wainwright.

If you have questions concerning this letter, please contact the site manager, Jacques Gusmano, at (907) 271-1271, or by email at gusmano.jacques@epa.gov.

Sincerely,

Daniel D. Opalski
Director

cc: Mr. Clifford A. Seibel
Chief, Environmental Division

Ms. Debra Caillouet
Environmental Program Specialist

Malen, Joseph Mr CIV US USA IMCOM

From: Gusmano.Jacques@epamail.epa.gov
Sent: Tuesday, October 25, 2011 10:43 AM
To: Caillouet, Debra J (DEC)
Cc: Hazlett, Bob C POA; Seibel, Clifford CIV US USA IMCOM; Birge, Gary Mr CIV USA IMCOM AEC; Malen, Joseph Mr CIV US USA IMCOM; Eldridge, Mark H Mr CIV USA IMCOM AEC; Meeks, Michael Mr CIV US USA IMCOM; Brock, Robert D POA; Carter, Tracy R Ms CIV US USA IMCOM
Subject: RE: Highlighted changes to FTW 5YR Review Docuent regarding protectiveness statements

It has just come to my attention today that the letter was never sent.
The original letter contained an error and will be corrected.
I will be working this week to send a letter, dated Sept. 29, signed by Dan Opalski, to the Colonel, Deb and Cliff.
This Concurrence letter will be used in place of the EPA Concurrence Signature Page, in the Final Report.

Malen, Joseph Mr CIV US USA IMCOM

From: Caillouet, Debra J (DEC) [deb.caillouet@alaska.gov]
Sent: Tuesday, October 25, 2011 10:25 AM
To: Malen, Joseph Mr CIV US USA IMCOM; Gusmano.Jacques@epamail.epa.gov
Cc: Brock, Robert D POA; Hazlett, Bob C POA; Meeks, Michael Mr CIV US USA IMCOM; Carter, Tracy R Ms CIV US USA IMCOM; Seibel, Clifford CIV US USA IMCOM; Eldridge, Mark H Mr CIV USA IMCOM AEC; Birge, Gary Mr CIV USA IMCOM AEC
Subject: RE: Highlighted changes to FTW 5YR Review Docuent regarding protectiveness statements
Attachments: Fort Wainwright Five Year Remedy Review Report 09292011.pdf

Before I do anything with this would someone tell me what happened to the letter that was signed by EPA. I have attached the letter.

Deb Caillouet
269-0298

-----Original Message-----
From: Malen, Joseph Mr CIV US USA IMCOM
[mailto:joseph.malen@us.army.mil]
Sent: Tuesday, October 25, 2011 10:21 AM
To: Caillouet, Debra J (DEC); Gusmano.Jacques@epamail.epa.gov
Cc: Brock, Robert D POA; Hazlett, Bob C POA; Meeks, Michael Mr CIV US USA IMCOM; Carter, Tracy R Ms CIV US USA IMCOM; Seibel, Clifford CIV US USA IMCOM; Eldridge, Mark H Mr CIV USA IMCOM AEC; Birge, Gary Mr CIV USA IMCOM AEC
Subject: FW: Highlighted changes to FTW 5YR Review Docuent regarding protectiveness statements

Deb/Jack et al,
These are the documents that the Army will send as the Final 5-Year Review.
They include the Army's response to the EPA letter that voice concerns about our statements of long-term protectiveness.
Please run thru one more time to ensure we can all live with these changes.
Thanks
Joe

-----Original Message-----
From: Craig Martin [mailto:CMartin@fesalaska.com]
Sent: Monday, October 24, 2011 5:07 PM
To: Malen, Joseph Mr CIV US USA IMCOM
Subject: FW: Highlighted changes to FTW 5YR Review Docuent regarding protectiveness statements

Joe - this was the last submittal regarding the EPA comments.

Let me know if you need anything further.

-----Original Message-----
From: Karol Johnson
Sent: Thursday, September 29, 2011 3:07 PM
To: Hazlett, Bob C POA; Gusmano.Jacques@epamail.epa.gov; Adams.Bill@epamail.epa.gov; Caillouet, Debra J (DEC); mark.h.eldridge@us.army.mil
Cc: Malen, Joseph Mr CIV US USA IMCOM; clifford.a.seibel@us.army.mil; Craig Martin; Dearborn, Karen D POA; (b) (6) tracy.r.carter@us.army.mil
Subject: Highlighted changes to FTW 5YR Review Docuent regarding protectiveness statements

Attached are changes to the Five Year Review Document that reflect EPA concerns regarding protectiveness. Changes to the document have been highlighted. Note: The Title & Signature doc and the Section 10 - 12 doc are not different from documents sent earlier today except that the changes have been highlighted.

Thank You,
Karol Johnson
Fairbanks Environmental Services

-----Original Message-----
From: Hazlett, Bob C POA [mailto:Bob.C.Hazlett@usace.army.mil]
Sent: Thursday, September 29, 2011 1:57 PM
To: Gusmano.Jacques@epamail.epa.gov; Adams.Bill@epamail.epa.gov; Caillouet, Debra J (DEC); mark.h.eldridge@us.army.mil
Cc: Malen, Joseph Mr CIV US USA IMCOM; clifford.a.seibel@us.army.mil; Karol Johnson; Craig Martin; Dearborn, Karen D POA; (b) (6)
Subject: FW: [Fwd: FW: Change to 5YR protectiveness statement (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: FOUO

Revisions to the Ft Wainwright 5-Yr Review attached. See Joe's email below.
If you have any questions or comments, please let us know.

Bob Hazlett
Environmental Scientist
Corps of Engineers - Alaska District
(907) 753-2623

-----Original Message-----
From: (b) (6)
Sent: Thursday, September 29, 2011 1:42 PM
To: Hazlett, Bob C POA; cmartin@fesalaska.com
Cc: clifford.a.seibel@us.army.mil
Subject: [Fwd: FW: Change to 5YR protectiveness statement (UNCLASSIFIED)]

Bob/Craig,
please forward these corrections to the EPA, ADEC, and AEC folks for their review.

Cliff, would you please send to Tracy to make sure all is well with these statements.

Jack, Bill, Deb, Mark,
I apologize to all for this method of dissemination. I am home with an injured knee on impressive pain meds and unable to send stuff the normal way.

If you would like to discuss this with me, please call me at home
(b) (6) or my cell phone.

Thanks

Joe Malen

---------- Original Message

Subject: FW: Change to 5YR protectiveness statement (UNCLASSIFIED)
From: "Seibel, Clifford CIV US USA IMCOM"
<clifford.a.seibel@us.army.mil>
Date: Thu, September 29, 2011 1:11 pm
To: (b) (6)

--

Classification: UNCLASSIFIED
Caveats: FOUO

-----Original Message-----
From: Karol Johnson [mailto:kjohnson@fesalaska.com]
Sent: Thursday, September 29, 2011 12:48 PM
To: Seibel, Clifford CIV US USA IMCOM
Cc: Hazlett, Bob C POA; Craig Martin; Malen, Joseph Mr CIV US USA IMCOM
Subject: FW: Change to 5YR protectiveness statement

From: Karol Johnson
Sent: Wednesday, September 28, 2011 5:22 PM
To: Malen, Joseph Mr CIV US USA IMCOM; 'Hazlett, Bob C POA'; Dearborn, Karen D POA
Cc: Craig Martin
Subject: Change to 5YR protectiveness statement

Attached are changes to the protectiveness statements based on this afternoon's conversation.

Classification: UNCLASSIFIED
Caveats: FOUO

Classification: UNCLASSIFIED
Caveats: FOUO

REGULATORY AGENCY CONCURRENCES

Signature sheet for the Third Five-Year Review of Record of Decision, US Army Garrison Fort Wainwright, Alaska

United States Environmental Protection Agency
"...to protect human health and to safeguard the natural environment..."

The U.S. Environmental Protection Agency's concurrence with the findings of this Five-Year Review is based on the information presented in the accompanying the *Five-Year Review Report, Third Five-Year Review Report for the US Army Garrison Fort Wainwright, Alaska.*

_____ _____

Dan Opalski, Director
Environmental Cleanup Office
U.S. Environmental Protection Agency, Region 10

Date

Alaska Department of Environmental Conservation

The Alaska Department of Environmental Conservation's concurrence with the findings of this Five-Year Review is based on the information presented in the accompanying *Five-Year Review Report, Third Five-Year Review Report for the US Army Garrison Fort Wainwright, Alaska.*

_____ _____

Jennifer Roberts, Section Manager
Alaska Department of Environmental Conservation
Contaminated Sites

Date

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LIST OF ACRONYMS

AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AEC	Army Environmental Center
AEDBR	Army Environmental Database Restoration
ARARs	Applicable or Relevant and Appropriate Requirements
AS	Air sparging
AS/SVE	Air Sparging and Soil Vapor Extraction
AST	Aboveground Storage Tank
AVGAS	aviation gasoline
AWQS	Alaska Water Quality Standard
bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, and Xylene(s)
CANOL	Canadian Oil Line
CCL	Contaminant Candidate List
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLOSES	Cleanup Operations and Site Exit Strategy
COC	Contaminant of Concern
CRAAP	Chena River Aquatic Assessment Program
CRP	Community Relations Plan
cy	cubic yards
CYS	Coal Storage Yard
DCA	1,2-Dichloroethane
DCE	Dichloroethene
DEW	Remote Distance Early Warning
DFs	dioxins / dibenzofurans
DOD	Department of Defense
DPW	Directorate of Public Works
DRMO	Defense Reutilization Maintenance Organization
DRO	Diesel Range (Petroleum Hydrocarbon) Organic Compounds
EBHTF	East Birch Hill Tank Farm
EDB	1,2-dibromoethane

LIST OF ACRONYMS

EOD	Explosive Ordnance Disposal
EPA	United States Environmental Protection Agency
EQFS	East Quartermaster's Fueling System
ESD	Explanation of Significant Differences
FAA	Federal Aviation Administration
FEP	Fairbanks-Eielson Pipeline
FFA	Federal Facility Agreement
FFT	Fairbanks Fuel Terminal
FS	Feasibility Study
ft-bgs	feet-below ground surface
FTP	Fire Training Pits
GAC	granular activated carbon
GIS	Geographic Information System
GRO	Gasoline Range (Petroleum Hydrocarbon) Organic Compounds
HWL	Horizontal Well
IC	Institutional Control
IRA	Interim Remedial Action
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
ITR	Independent Technical Review
LAAF	LADD Army Airfield
LAFB	LADD Air Force Base
LNAPL	light non-aqueous phase liquids
LTM	Long Term Monitoring
MCLs	Maximum Contaminant Levels
MCLG	Maximum Contaminant Level Goal
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
NCP	National Oil And Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NPDWR	National Primary Drinking Water Regulations
NPL	National Priorities List
OB/OD	Open Burning/Open Detonation

LIST OF ACRONYMS

O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
ORC	Oxygen Release Compound
OU	Operable Unit
PA	Preliminary Assessment
PAH	Polycyclic aromatic hydrocarbon
PCA	Tetrachloroethane
PCBs	polychlorinated biphenyls
PCE	Perchloroethylene
PDRAR	Preliminary Draft Remedial Action Report
PID	photoionization detector
POL	Petroleum, Oil And Lubricant
PQL	practical quantitation limit
PSE	Preliminary Site Evaluation
RA	Remedial Action
RAB	Restoration Advisory Board
RAGs	Remedial action goals
RAO	Remedial Action Objective
RAR	Remedial Action Report
RBC	Risk Based Concentrations
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROE	Right of Entry
ROLF	Railcar Off-Loading Facility
RPMs	Remedial Project Managers (USARAK, EPA, and ADEC are remedial program managers under the FFA and Two-Party Agreement)
RRO	Residual Range Organic
SA	Source Area
SARA	Superfund Amendments and Reauthorization Act of 1986

LIST OF ACRONYMS

SC	Sparge Curtain
SOP	Standard Operating Procedure
SVE	Soil Vapor Extraction
SVOC	Semivolatile Organic Compound
TAH	Total Aromatic Hydrocarbon
TAL	total analyte list
TAqH	Total Aqueous Hydrocarbon
TBC	To Be Considered (in addition to ARARs)
TCA	Trichloroethane
TCE	Trichloroethene
TCLP	toxicity characteristic leaching procedure
TFS	Truck Fill Stand
TMB	Trimethylbenzene
2-PTY	Two-Party Agreement
µg/L	micrograms per liter
USACE	Army Corps of Engineers Alaska District
USAF	United States Air Force
USAG-AK	United States Army Garrison Alaska
UST	Underground Storage Tank
UXO	unexploded ordnance
VOC	Volatile Organic Compound
WQFS	West Quartermaster's Fueling System

EXECUTIVE SUMMARY

The United States Army Garrison Fort Wainwright Alaska conducted the Third Five-Year Review of the remedial actions at the Fort Wainwright National Priorities List (NPL) site, Fairbanks, Alaska, from October 2006 through September 2011. This report presents the results of that review.

The purpose of this review is to ensure that remedial actions selected in the Records of Decision (RODs) for the Fort Wainwright Operable Units (OUs) are being implemented and that they continue to be protective of human health and the environment. To achieve this purpose, this review evaluates the status of implementation of the selected remedies, identifies significant variances from the RODs, and makes recommendations for reconciling variances and/or for improving performance of remedial actions.

This statutory review is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) since all of the RODs for this site were signed after the effective date of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and some of the remedial actions result in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unrestricted use and unlimited exposure.

The Fort Wainwright NPL site is comprised of six OUs. Twelve source areas have been identified within these six OUs. This Report reviews the five OUs that have completed the RI/FS process and RODs have been signed. Several of the eleven source areas within these five OUs have been further divided into sub-areas. The RODs specify environmental remedies for each of the eleven source areas.

The steps taken in conducting this Five-Year Review focused on answering the following questions:

- Is the remedy functioning as intended in the decision documents?
- Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?

The answers to these questions provided the basis for making conclusions regarding the continued protectiveness of the remedies specified in the ROD for each OU.

The conclusions of this Five-Year Review were that the remedies for Operable Units 1, 2, and 4 have been implemented and are protective of human health and the environment. The remedy at Operable Unit 5 is currently protective; however, in order to remain protective in the long term, continued monitoring of the Remedial Area 1a fence will be conducted to ensure security and identify the need for repairs. Remedies at OU3 are currently protective of human health and the environment. In order for the OU3 remedies to remain protective in the long-term, the Army will initiate appropriate responses, in cooperation with the EPA and State of Alaska, if future monitoring indicates there are significant changes of the contaminant plumes that would adversely affect human health and the environment. In the interim, the exposure pathways that could result in unacceptable risk are being controlled.

In February 2007, the FFA was amended to incorporate Operable Unit 6 (OU6), the recently discovered source area for the Former Communications Site (Taku gardens), and to provide the RPMs with authority to create additional OUs in the future to address additional new source areas that may be discovered. The modification ensures that the CERCLA requirements and milestones are captured for the short and long-term protectiveness of this site.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION

Site name (*from WasteLAN):* Fort Wainwright, Alaska

EPA ID (*from WasteLAN):* AK6210022426

Region: 10 **State:** AK **City/County:** Fairbanks, Fairbanks North Star Borough

SITE STATUS

NPL status: ☒ Final ☐ Deleted ☐Other (specify)_____

Remediation status (choose all that apply): ☐Under Construction ☒ Operating ☐ Complete

Multiple OUs?* ☒ YES ☐ NO **Construction completion date:** 2002

Has site been put into reuse? ☐ YES ☒ NO Active Army installation

REVIEW STATUS

Reviewing agency: ☒ EPA ☒ State ☐ Tribe☒ Other Federal Agency U.S. Army

Author name: U.S. Army Corps of Engineers, Alaska District

Review period:** 10/1/2006 to 9/30/2011

Date(s) of site inspection: 5/12/2011, 5/13/2011, and 5/14/2011

Type of review: ☒ Statutory

☐ Policy (☒ Post-SARA ☐Pre-SARA ☐ NPL-Removal only

☐ Non-NPL Remedial Action Site

☐ NPL State/Tribe-lead ☐ Regional Discretion)

Review number: ☐1(first) ☐2 (second) ☒ 3 (third) ☐ Other (specify) _____

Triggering action:

☐ Actual RAA Onsite Construction at OU #___ ☐Actual RA Start at OU #___

☐ Construction Completion ☒ Previous Five-Year Review Report

☐ Other (specify)_____

Triggering action date *(from WasteLAN):* 5/30/1996

Due date (five years after triggering action date): 9/30/2011

*"OU" refers to operable unit.

**Review period should correspond to the actual start and end dates of the five-year review in WasteLAN.

FIVE-YEAR REVIEW SUMMARY FORM

Variances:

- Variances are discussed in the "Five-Year Assessment" paragraphs devoted to answering the question "Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?" for each source area within the five OUs.
- No variances currently affecting protectiveness were identified during the five-year review.
- An explanation of significant differences (ESD) was prepared prior to the Second Five Year Review for OU3 to address increases in the extent and volume of contamination and other variances from the ROD that do not fundamentally alter the remedial approach at this OU.
- Several COCs now have State of Alaska groundwater cleanup levels, including aldrin, dieldrin, 1,1,2,2-tetrachoroethane, and bis(2-chloroethyl) ether.

Recommendations and Follow-Up Actions:

- Recommendations and Follow-Up Actions are also discussed in the "Five-Year Assessment" paragraphs devoted to answering the question "Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?" for each source area within the five OUs.
- A summary of recommendations and follow-up actions is included in Section 10 of this report.
- Most recommendations in this report are to continue with groundwater monitoring and evaluation of natural attenuation parameters.
- Several recommendations address decommissioning of AS/SVE treatment systems in areas where Remedial Area Objectives have been met.
- Preparation of the Proposed Plan and the Record of Decision is recommended for Operable Unit 6, Former Communications Site.
- Holes were discovered in the fence surrounding the aboveground tanks at Birch Hill; therefore, increased security and repairs to the fence were recommended for ICs to effectively prevent access to the contaminated soil areas.

Protectiveness Statement(s):

- Protectiveness statements were developed using the sequential process described in EPA guidance for conducting five-year reviews.
- Remedies at Operable Units 1, 2, and 4 have been implemented and are protective of human health and the environment. The remedy at Operable Unit 5 is currently protective; however, in order to remain protective in the long term, continued monitoring of the Remedial Area 1a fence will be conducted to ensure security and identify the need for repairs. Remedies at OU3 are currently protective of human health and the environment. In order for the OU3 remedies to remain protective in the long-term, the Army will initiate appropriate responses, in cooperation with the EPA and State of Alaska, if future monitoring indicates there are significant changes of the contaminant plumes that would adversely affect human health and the environment. In the interim, the exposure pathways that could result in unacceptable risk are being controlled.
- While the information at the new source area (Former Communications Site) could call into question the protectiveness at the site, it does not do so in the short term since workers are protected and occupancy has been prohibited, and in the long term those controls will be maintained as long as necessary to ensure protectiveness.
- Protectiveness statements are developed in Section 11 of this report.

1 INTRODUCTION

The United States Army Garrison Fort Wainwright Alaska has conducted the third Five-Year Review of the remedial actions at the Fort Wainwright National Priorities List (NPL) site, Fairbanks, Alaska, from February through September 2011. Work in support of this review was performed by the U.S. Army Corps of Engineers (USACE) Alaska District and its subcontractors. This report presents the results of that Five-Year Review.

1.1 Purpose

The purpose of this review is to ensure that remedial actions selected in the Records of Decision (RODs) for the Fort Wainwright Operable Units (OUs) are being implemented and that they continue to be protective of human health and the environment. To achieve this purpose, this review evaluates the status of implementation of the selected remedies, identifies significant variances from the RODs, and makes recommendations for reconciling variances and/or for improving performance of remedial actions. In addition, the review identifies any new information that becomes evident, documents any new contaminant sources or exposure pathways that were discovered, discusses any new OUs that were established, and describes any additional work performed that was not identified in the RODs.

1.2 Statutory Review

This statutory review is required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) since all of the RODs for this site were signed after the effective date of the Superfund Amendments and Reauthorization Act of 1986 (SARA) and some of the remedial actions result in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unrestricted use and unlimited exposure.

The Army must conduct Five-Year Reviews consistent with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121 (c), as amended, states:

> *"If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented."*

This requirement is interpreted further in the NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR), which specifies:

> *"If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unrestricted use and unlimited exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action."*

The Environmental Protection Agency (EPA) Five-Year Review guidance states that "the first five-year review generally should be completed and signed by the EPA Region within five years of the initial trigger date", and "for the purpose of a five-year review, a remedial action typically is initiated on the date of 'actual Remedial Action (RA) on-site construction' or the 'actual RA start' date for Federal facilities." The date of actual RA on-site construction generally corresponds to the date the contractor begins work at a site for the remedial action, typically the date of on-site

mobilization.[1] The first remedial action at the Fort Wainwright NPL site was for OU3, initiated on May 30, 1996.[2]

Five-year review guidelines state that "an entire site is subject to a statutory review if any one of its remedial actions is subject to a statutory review."[3] Therefore all five OUs that have undergone RA on-site construction at Fort Wainwright are included in this review.

1.3 Agency Oversight Agreements

1.3.1 Federal Facility Agreement

A Federal Facility Agreement (FFA) for Fort Wainwright was signed by the U.S. Environmental Protection Agency (EPA, Region 10), the Alaska Department of Environmental Conservation (ADEC), and the United States Department of the Army in March 1992. The FFA ensures that environmental impacts associated with past practices at Fort Wainwright are investigated and remedial actions are completed to protect human health and the environment. This agreement sets deadlines, objectives, responsibilities, and procedural framework for implementing the Installation Restoration Program (IRP) at Fort Wainwright.

The FFA establishes and describes the CERCLA process as applied to Fort Wainwright. It is in the FFA that the use of preliminary source evaluations (PSEs) was established to better define the scope of the Remedial Investigation / Feasibility Study (RI/FS) activities. The PSE approach was adopted to facilitate the use of information previously collected under the Army's IRP in order to identify additional areas of concern, to expedite interim remedial actions, and to screen the numerous sites of potential concern to identify those sites that warranted remedial investigation (RI). PSE reports were used as lead-in documents to OUs and the RI/FS process.

An additional goal of the FFA is to integrate the Army's CERCLA response obligations and Resource Conservation and Recovery Act (RCRA) corrective action obligations at this site. The FFA states that remedial actions implemented under this agreement will be protective of human health and the environment such that remediation of releases shall obviate the need for further corrective actions under RCRA (i.e., no further corrective action shall be required for source areas).

Each of the parties to the Fort Wainwright FFA is represented by a Remedial Project Manager (RPM).[4] These RPMs meet regularly to discuss the Army's progress regarding remedial actions selected in the RODs and to address related issues as they arise during the course of remedial action. The RPMs meet more frequently than quarterly when needed, and routinely make themselves available to each other for purposes of Fort Wainwright remediation (e.g., for technical reviews, modifying monitoring programs, etc.) and to meet the intent and commitments of the FFA.

In February 2007, the Federal Facility Agreement was amended: to incorporate the recently discovered source area known as the Communications Site (a/k/a Taku Gardens Housing Expansion Area), by creating a new operable unit, OU6, for the Communications Site; and to provide the remedial project managers with authority to create additional OUs in the future to address additional new source areas that may be discovered.

[1] The definition of the "actual RA start" varies as outlined in the Superfund/Oil Program Implementation Manual (SPIM). OSWER Directive 9200.3-14-1G-P.
[2] Source: EPA WasteLAN
[3] Source: Section 1.4.1 EPA Comprehensive Five-Year Review Guidance
[4] Source: Section 1.4.1 EPA Comprehensive Five-Year Review Guidance

1.3.2 Remedy Protectiveness, Optimization and Cost-Effectiveness

Optimization of remedy and assessment of cost effectiveness is an on-going process for the Fort Wainwright NPL site. Performance of remedies is evaluated at all FFA meetings and discussed by the RPMs more frequently, as needed. Upon approval of the RPMs, operation of treatment systems is modified as necessary to ensure efficacy and best use of resources. Such modifications have typically included adjusting periods of operation of air sparging (AS) and soil vapor extraction (SVE) systems, decisions to terminate operation, decisions to restart operation, decommissioning treatment systems, and moving treatment systems to new locations. Changes are presented in annual systems operations and/or monitoring reports. Groundwater monitoring programs are updated at least annually based on findings from the preceding year to ensure that well locations and sampling regimes are meeting the objectives of the RODs.

Fort Wainwright also negotiated a Two-Party Agreement (2-PTY) with ADEC in 1992. This Agreement sets the framework to cooperatively address petroleum, oil and lubricant (POL) contamination caused primarily by leaking underground storage tanks and surface spills at the post.

The 2-PTY acknowledged that all parties to the FFA, being negotiated at the time the 2-PTY was signed, agreed to allow the Army to initially address the clean-up of these areas of petroleum contamination in accordance with the state's statutes, regulations, and Interim Guidance, with a review by the RPMs at the time of the OU5 ROD to ensure that petroleum sites were being adequately addressed.

Appendix D to the OU5 ROD included the January 1998 "Recommended Action, Fort Wainwright Petroleum Strategy", signed by the parties to the FFA. This appendix verified the strategies developed by the Army and ADEC to address the known POL contaminated source areas on Fort Wainwright.

1.4 Public Involvement

1.4.1 Community Involvement at Fort Wainwright

Community involvement activities began at Fort Wainwright in 1992 when community interviews were conducted to support an area-wide Community Involvement Plan (CIP) for Fort Wainwright. The final version of the CIP was published in April 1993 and covered the status of investigations and cleanup activities for five OUs on Fort Wainwright. The CIP was last revised and updated in 1997.

Fort Wainwright published its first quarterly newsletter in July 1993. Quarterly newsletters, covering information about all OUs, 2-PTY agreement sites, and other restoration activities, were published quarterly and sent to interested community members.

Prior to the formation of the Restoration Advisory Board (RAB) Fort Wainwright conducted several informational public meetings. The first meeting was conducted in July 1993, which covered information about each of the five OUs. In addition, OU specific public meetings were held in conjunction with a public comment period for each of the associated Proposed Plans. The proposed plan public meetings presented investigative information and proposed cleanup plans for each of the OUs with a focus on receiving public comments on the proposed actions. The public was offered several different venues for providing public comments: written, verbal, and via a toll-free telephone comment line.

In 1994 an Information Repository for Fort Wainwright restoration activities was established at the Noel Wien Library in Fairbanks and the Fort Wainwright Post Library. The Administrative Record was established and is currently maintained at the Directorate of Public Works library, Building 3023, on Fort Wainwright. The Administrative Record has been updated as appropriate since its inception.

1.4.2 Restoration Advisory Board

A RAB was established for the Fort Wainwright NPL site in 1997, with the first meeting held in September of that year. RAB meetings were initially held quarterly with an excellent community turn out. In 2001, public interest in the RAB began to decline as major concerns at the site were addressed. Starting in 2002, meetings were held semi-annually. Attendance continued to dwindle with generally the community co-chair and one other community member (non-RAB member) in attendance. Finally in 2003, the community co-chair recommended adjournment. According to the Adjournment Report, the RAB was adjourned "because the installation has all remedies in place, the remedies are operating properly and successfully, and there is no longer sufficient, sustained community interest in the RAB." The last meeting was held on July 15, 2003.

The RAB included members of the Fairbanks business community, installation residents, local environmental groups, local residents, and a member of the Tanana Chiefs Conference (an Alaska Native organization). Government members include representatives of EPA Region 10 and ADEC.

When the RAB met, the Army would present technical briefings and members of the RAB would have the opportunity to share their concerns about the site and provide advice on remediation studies and remedial actions. Although the RAB was adjourned, the Army continues to look for opportunities to keep the community informed and involved in the remediation process.

The Army's IRP, the FFA, and the 2-PTY effectively ensure public involvement in and environmental agency oversight of the remediation process at Fort Wainwright. The active nature of military operations at Fort Wainwright ensures an ongoing federal presence and has contributed to the Army's ability to meet the commitments in the RODs.

1.4.3 Community Involvement During the Five-Year Review

The Five-Year Review is an important milestone for public involvement at an NPL site. The public was informed of the Fort Wainwright Five-Year Review as follows:

- A notice of the Five-Year Review *will be* published in the *Fairbanks Daily News Miner* on August 17, and August 24, 2011, A copy of this notice is provided on the following page.

- Following completion of the Five-Year Review, a notice of availability will be published in the *Fairbanks Daily News Miner* notifying the public of the availability of the review, and the Review Report will be added to the Administrative Record and placed at the Fort Wainwright NPL site public information repositories.

The following Five-Year Review Notice was published in the *Fairbanks Daily News Miner*

NOTICE OF FIVE-YEAR REVIEW

U.S. Army Alaska (USARAK) announces the beginning of the Five-Year Review of soil and groundwater remedies implemented at the Operable Units on Fort Wainwright, Alaska (FWA).

Section 121 (C) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan state "a remedial action that resulted in hazardous substances, pollutants, or contaminants remaining at the site shall be reviewed no less frequently than every five years." Thus, CERCLA requires a statutory Five-Year Review of the selected remedial actions at Fort Wainwright.

USARAK initiated the Five-Year Review process in February 2011 and it will be completed by September 2011.

The findings of the Five-Year Review will be available for public review after September 2011 at: Noel Wien Library in Fairbanks; Fort Wainwright Post Library; and Directorate of Public Works CERCLA Library, Building 3023, on Fort Wainwright. These three libraries contain detailed information concerning the selected remedies at Fort Wainwright and the contamination addressed by the remedies.

Information on the cleanup process is distributed to interested persons through the FWA Restoration Newsletter. If you are interested in receiving the newsletter or if you have any questions regarding the Five-Year Review process, questions may be directed to:

Joe Malen, U.S. Army Alaska Directorate of Public Works
ATTN: IMPA-FWA-PWE (J. Malen)

1060 Gaffney Rd., #4500, Ft Wainwright, AK 99703-4500

(907) 353-4512 – joseph.malen@us.army.mil

2 APPROACH

2.1 Report Organization

The Five-Year Review was performed in accordance with the *Interim Army Guidance for Conducting CERCLA Five-Year Reviews* (U.S. Army 2001) and *EPA Comprehensive Five-Year Review Guidance* (EPA 540-R-01-007, OSWER No. 9355.7-03B-P, June 2001).

The basic report structure is derived from the EPA guidance document, modified to accommodate the five Fort Wainwright RODs, the new OU6 (which does not yet have a signed ROD), and multiple source areas within OUs. To the extent possible, discussion related to all of the OUs appears at the beginning of the report and OU-specific discussion appears in the different OU sections of the report. Source areas are addressed separately within the OU sections, while discussion of sub-areas is presented under source area headings.

One of the goals of this report is to compile information from existing reports for all of the OUs into a single status document. To make best use of resources, this report has taken much discussion and information from the RODs, other reports, and Army summaries. Findings that were overseen, reported, reviewed, and accepted by the Fort Wainwright RPMs, have generally been included in the Five-Year Review report without further scrutiny.

The findings and recommendations sections of this report document ongoing issues and concerns, identify variances in the implementation of remedial actions, and suggest changes to ensure that remedial actions undertaken pursuant to the RODs are adequately protective of human health and the environment

2.2 Five-Year Review Team

This Five-Year Review was performed at the direction of the Army Environmental Center (AEC), with guidance by United States Army Garrison Fort Wainwright Alaska Directorate of Public Works (DPW) Environmental Office[1] (federal lead agency for this site), and with EPA Region 10 and ADEC oversight pursuant to the FFA and 2-PTY. This work was conducted by the USACE and its subcontractors.

2.3 Five-Year Review Tasks

The objectives of the Five-Year Review are to answer the following questions:

- Are the remedies functioning as intended by the decision document?
- Are the assumptions used at the time of remedy selection still valid?
- Has any other information come to light that could call into question the protectiveness of the remedy?
- Are human health and the environment being protected in the short and long-term?

[1] Referred to as “DPW” for the remainder of this report

The Five-Year Review has been accomplished by five major tasks:

- Review of relevant documents in the Administrative Record including but not limited to the RODs, Explanation of Significant Differences (ESD), Remedial Design/Remedial Action (RD/RA) Reports, Drawings and As-Builts to determine the initial effectiveness of the remedies
- Review of Operation and Maintenance (O&M) Reports, Monitoring Plans, and Annual Sampling Reports to determine the ongoing effectiveness and protectiveness of the chosen remedies
- Review of chemical, location, and action-specific Applicable or Relevant and Appropriate Requirements (ARARs) identified in the RODs for each OU to determine whether changes have occurred which might affect the protectiveness of the remedies
- Site inspections to observe visible elements of remedies
- Interviews of operation and maintenance personnel and remediation contractors

2.3.1 Document Review

Documents consulted in the course of this Five-Year Review include:

- *Comprehensive Five-Year Review Guidance*, OSWER Directive 9355.7-03B-P (EPA, June 2001)
- First Five-Year Review Report for Fort Wainwright (September 2001)
- Second Five-Year Review Report for Fort Wainwright (September 2006)
- RODs for OUs 1 through 5
- Remedial Designs (RDs) (including drawings and as-builts)
- Remedial Action Reports (RARs)
- OU3 Explanation of Significant Difference (ESD)
- OU6 Remedial Investigation
- O&M reports and manuals
- Groundwater sampling results
- Other sampling results, monitoring data, and summaries

A compilation of reports and documents available at the time of this review is provided in Appendix B. Key information sources used in this review are identified in this table.

2.3.2 ARARs and Numeric Cleanup Goal Review

As part of this five-year review, significant ARARs for each ROD were reviewed for changes or the promulgation of new laws since the ROD was signed that might be considered ARARs if the

RODs were to be written today.[2] As part of this review, remedial action objectives were reviewed, and contaminant-specific standards used to set numeric cleanup goals in each ROD were compared to present day values to assess continued protectiveness of the remedies. More specifically, current Maximum Contaminant Levels (MCLs) and toxicity and/or carcinogenicity values were compared to MCLs and toxicity/carcinogenicity values at the time of the RODs.

The OU specific Remedial Action Objectives (RAOs), ARARs, and cleanup goals are discussed in the OU sections of this report. A table showing the cleanup goals for each of the OUs is provided in the table in Appendix C.

2.3.3 Site Inspection

Site inspections were conducted on May 12, 13, and 14. Site inspection checklists for each site are provided in Appendix D of this report. Photographs taken during the site inspections are included in Appendix D as well. Because Fort Wainwright is a site with ongoing Army presence and agency oversight, it was possible to discuss project status with a variety of people familiar with site history and status of remediation.

The Fort Wainwright NPL site public information repositories were inspected to confirm availability of Administrative Record documents for public review. The findings and recommendations from the repository inspections are included in the Appendix E of this report.

2.3.4 Interviews

During the course of this Five-Year Review, written interviews were conducted with several parties involved with the site, including remedial project managers and technical or regulatory personnel. A list of those interviewed, as well as the Interview Record Form documenting the issues discussed are provided in Appendix F of this report.

The interview response was very positive. The interviewee indicated that they felt the work being done at the operable units was moving forward as planned and that the public had been kept informed of the progress being made.

[2] New laws that might be considered ARARs today need only be addressed for Fort Wainwright if essential to ensure protectiveness of the remedies (as specified in the “Comprehensive Five-Year Review Guidance”, EPA, 2001).

3 FORT WAINWRIGHT NPL SITE BACKGROUND

This section is an overview of the post wide Fort Wainwright NPL site. Background information on the individual OUs is presented in the OU specific sections of this document.

3.1 Post History

The United States Army Fort Wainwright has been used by the Department of Defense (DOD) for military operations continuously since 1938. Originally known as LADD Army Airfield (LAAF), the post was established for cold weather experimentation. During World War II, LAAF served as a transfer point in the lend-lease program. Between 1942 and 1945, almost 8,000 combat and transport aircraft were transferred to Soviet aircrews at LAAF. In 1947, the newly formed United States Air Force (USAF) assumed control of LAAF, which was redesignated as LADD Air Force Base (LAFB). LAFB served as a resupply and maintenance base for the Remote Distant Early Warning (DEW) sites and experimental ice stations in the Arctic Ocean. During the Korean conflict, LAFB served as part of the defense network, and was the site of the first Nike Hercules Missile launch from a tactical missile site in December 1959.

On January 1, 1961, the United States Army resumed control over LAFB. The Army renamed the installation Fort Wainwright, after General Jonathan M. Wainwright, the commander of the forces defending the Bataan Peninsula in the Philippines at the beginning of World War II.

Fort Wainwright has been home to several units, including the 171st Infantry Brigade (Mechanized), a Nike-Hercules Battalion, the 172nd Infantry Brigade, and the 6th Infantry Division (Light). In July 2001, the Army announced its intent to make the 172nd Infantry Brigade, located at Forts Wainwright and Richardson, into one of the next four interim brigade combat teams as part of its transformation to a more strategic and responsive force.

The 172nd Stryker Brigade Combat Team is currently the major unit at Fort Wainwright. Subordinate commands include the 2nd Battalion, 1st Infantry Regiment; 1st Battalion, 17th Infantry Regiment; 4th Battalion, 11th Field Artillery and 123rd Aviation Regiment; 172nd Brigade Support Battalion; and the 4th Squadron, 14th Cavalry Regiment. Fort Wainwright is also home to the Medical Activity-Alaska and Dental Activity-Alaska, and the Bassett Army Community Hospital. In the past decade, many new sets of family quarters have been built, as well as a PX/Commissary mall, physical fitness center, and maintenance facilities.

Fort Wainwright currently employs a large Department of the Army and DOD Civilian work force and serves a daily population of over 12,000 people, including soldiers, family members, civilian employees, contractors, and other tenants such as the Army's Cold Regions Test Center, and the Bureau of Land Management's Alaska Fire Service.

3.2 CERCLA History

Fort Wainwright was proposed for placement on the CERCLA NPL in July 1989, due to releases of hazardous substances, pollutants, and contaminants into the environment. The Army's investigation of contaminated sites at Fort Wainwright under the IRP began in 1989, and the post was added to the CERCLA National Priorities List in 1990. EPA Region 10 and the ADEC began working closely with the Army to better understand the nature and extent of contamination at Fort Wainwright and its threat to human health and the environment. The three parties negotiated the Fort Wainwright NPL Site FFA, which was signed in 1992, and the

Army and ADEC also entered into a 2-PTY Agreement to address POL sites in 1992. The FFA was updated in 2007 in order to include OU6.

As part of negotiating the original FFA, the RPMs initially identified source areas from the RCRA Facility Assessment, Westin Facility Assessment, and numerous interviews from past and present employees and community members. From this process, 51 potential CERCLA source areas and multiple petroleum areas were identified on Fort Wainwright. Attachment I to the FFA describes the investigation and restoration approach agreed upon by the RPMs.

As of the signing of the original FFA, the RPMs agreed that 32 of the originally identified CERCLA eligible source areas were placed into OUs. The remaining 19 source areas were evaluated by the RPMs as requiring no further action planned based on the screening criteria outlined by the RPMs. The NFA decision was made for each source area if: 1) the source area could not be identified or located in the investigation, 2) no known contamination existed or no visible sign of contamination was observed during the source area inspection, or 3) the site was taken care of under another program or was determined to be a non-site. In addition to CERCLA source areas, POL sources were identified through previous studies, reports, and interviews. Documents are located in the Administrative Record.

The FFA that was signed in 1992 identified the use of PSEs to better limit the scope of the RI/FS. PSEs were used as lead in documents to OUs and the RI/FS process. Each potential source area was placed in one of five OUs based on the following criteria: availability and sufficiency of data; similarities of source areas; complexity and size; and affected media, migration potential and exposure pathways. The following shows the original number of source areas in each of the original five OUs:

- OU1 PSE 1: 19 source areas
- OU2 PSE 2: 7 source areas
- OU3 RI/FS: 2 source areas
- OU4 RI/FS: 3 source areas
- OU5 RI/FS: 1 identified source area; plus petroleum sources not adequately addressed through other programs (none were named) and any newly discovered sources[1]

In February 2007, FFA was amended: to incorporate the following recently discovered source area for the Communications Site; and to provide the RPMs with authority to create additional OUs in the future to address additional new source areas that may be discovered. A copy of the amended FFA is provided in Appendix G.

- OU6 – RI/FS – 1 source area

The history of contamination and remediation of source areas are summarized in the OU-specific sections of this report. Table 1 in Appendix H identifies each of the source areas by OU and provides additional information about their current status.

In 1999, a U.S. Army Independent Technical Review (ITR) was conducted at Fort Wainwright, focusing on the three active sites associated with OU3 (FTWW-055, the Birch Hill Tank Farm;

[1] OU5 was originally the last scheduled RI/FS to be initiated at Fort Wainwright. The objective was to complete a comprehensive post-wide investigation. Any source areas that were not previously screened out or otherwise resolved as not constituting a threat to human health or the environment were covered under this RI/FS.

FTWW-083, the Railroad Off-Loading Facility; and FTWW-084, the Fairbanks-Eielson Pipeline Spills). This report indicated that the remedial actions underway were correct, adequate, and were protective of human health and the environment. The ITR team concluded that an ESD be developed. An ESD documents new information received or generated after signature of the ROD that could affect implementation of the original remedy selected. Specifically, an ESD was prepared in 2002 for OU3 to document increased volume and aerial extent of contamination, increase in remedial cost, discovery of additional source areas and changes in some components of the selected remedy. This did not fundamentally alter the overall remedial approach. Additional discussion of the ESD is included in Section 6.

A "Superfund Site Preliminary Closeout Report" for Fort Wainwright was issued and signed in 2002. This document stated that the "U.S. Army, under the oversight of the Environmental Protection Agency (EPA) and the Alaska Department of Environmental Conservation (ADEC), completed all construction activities for Fort Wainwright Army Post, Fairbanks, Alaska in accordance with Procedures for Completion and Deletion of National Priority Sites and Update (OSWER Directive 9320.2-09A-P)." The document went on to state that, because there are numerous long-term remedial systems operating at Fort Wainwright, a final closeout report will be prepared once the RAOs for the various OUs have been achieved.

3.3 Land and Resource Use

Fort Wainwright is located within the Fairbanks North Star Borough in interior Alaska and occupies 918,000 acres on the east side of Fairbanks. Fort Wainwright consists of a main post area, which is two miles east of Fairbanks between the Chena and Tanana Rivers and has a cantonment area, a small arms range complex, and a close in range complex. The main post was originally established as a cold-weather testing station. The Tanana Flats Training Area is across the Tanana River from the main post, and the Yukon Training Area is 16 miles east-southeast of Fairbanks, adjacent to Eielson Air Force Base. Figure 3-1 provides a map of Fort Wainwright and the surrounding area.

The Fairbanks North Star Borough is lightly populated with several scattered developments. The City of Fairbanks (population 35,000) is on the western boundary of Fort Wainwright.

Primary missions at Fort Wainwright include training infantry soldiers in the arctic environment, testing equipment in arctic conditions, preparing troops for defense of the Pacific Rim, and rapid deployment of troops worldwide. On-site industrial activities include operation, maintenance, and repair of fixed-wing aircraft, helicopters, tactical and non-tactical vehicles. On-site industrial activities include drinking water production, power generation, and steam heat production.

Groundwater is the only source of potable water used at Fort Wainwright and the Fairbanks area. Approximately 95% of Fort Wainwright's potable water is supplied through a single distribution system fed by two large-capacity wells located in Building 3559, near the Post Power Plant (see Figure 3-1). These wells are completed at a depth of approximately 80 feet below ground surface (bgs) and provide between 1.5 million and 2.5 million gallons of water per day to the Post Water Treatment Plant for processing and distribution. The other 5% of potable water comes from three individual wells, one class C well at DRMO and two wells at the Golf Course. Additionally, Golden Heart supplies water for Sitku Basin. In addition to the main drinking water supply wells, there are five emergency standby supply wells located around the cantonment area. These wells have been completed between 80 and 120 ft-bgs and are capable of pumping approximately 250,000 gallons per day per well.

Golden Heart Utilities has four developed wells located one and a quarter miles downgradient of the Post's boundaries, on the banks of the Chena River (see Figure 3-1). All municipal water users are currently supplied from the Golden Heart wells. At one time, College Utilities also supplied water from three water wells located along the Chena River, but these wells have not been used since 2002.

For purposes of CERCLA and 2-PTY remediation, groundwater use at, and potentially affected by, Fort Wainwright source areas is considered residential.

Fort Wainwright has established a Post-wide Institutional Control (IC) policy for all known or suspected contaminated sites. The Post-wide IC policy is outlined in greater detail in the OU5 ROD and US Army Garrison Fort Wainwright Policy #49 that was signed by Colonel Timothy A. Jones in December 2010. Details of the IC policy are discussed in Appendix A. A map depicting the boundaries of all sites on Fort Wainwright where IC's are in effect is also provided in Appendix A.

3.4 Physical Characteristics

Fort Wainwright is underlain by soil and unconsolidated sediment that consist of silt, sand, and gravel that ranges in thickness from 10 feet to more than 400 feet before encountering bedrock. A five-foot-thick surficial soil layer of fine-grained soil overlies the deeper alluvial deposits. Alluvial floodplain deposits underlay the surface soils and consist of varying proportions of sand and gravel which are commonly layered. Where present, permafrost forms discontinuous confining layers that influence groundwater movement and distribution. The depth to permafrost, when present, ranges from 2 to 40 ft-bgs. The greater depths are found on cleared and developed land surfaces, where thermal degradation of underlying permafrost occurs.

The Chena River flows through Fort Wainwright and the City of Fairbanks, and eventually into the Tanana River south of the Post. The Tanana River borders the south portion of Fort Wainwright. The main aquifer in the Fort Wainwright area is the Tanana Basin alluvial aquifer, a buried river valley. This aquifer ranges from a few feet thick at the base of Birch hill to at least 300 feet thick under the post's main cantonment area. The aquifer may reach a thickness of 700 feet in the Tanana River valley. Groundwater in the Tanana-Chena floodplain generally is considered to be unconfined in permafrost-free areas. A confined aquifer may develop seasonally where the depth to the water table is less than the depth of the seasonal frost penetration.

Groundwater movement between the Tanana and Chena Rivers generally follows a northwest regional direction, similar to flow direction of the rivers. Seasonal changes in groundwater flow directions of up to 180 degrees are not uncommon in the area due to the effects of changing river stages in the Tanana River and, to a lesser extent, the Chena River. Groundwater levels near the Chena River fluctuate greatly because of river stage and interactions with the Tanana River. Typically, groundwater levels rise during spring breakup and late summer runoff, and drop during fall and winter when rainfall decreases and precipitation becomes snow.

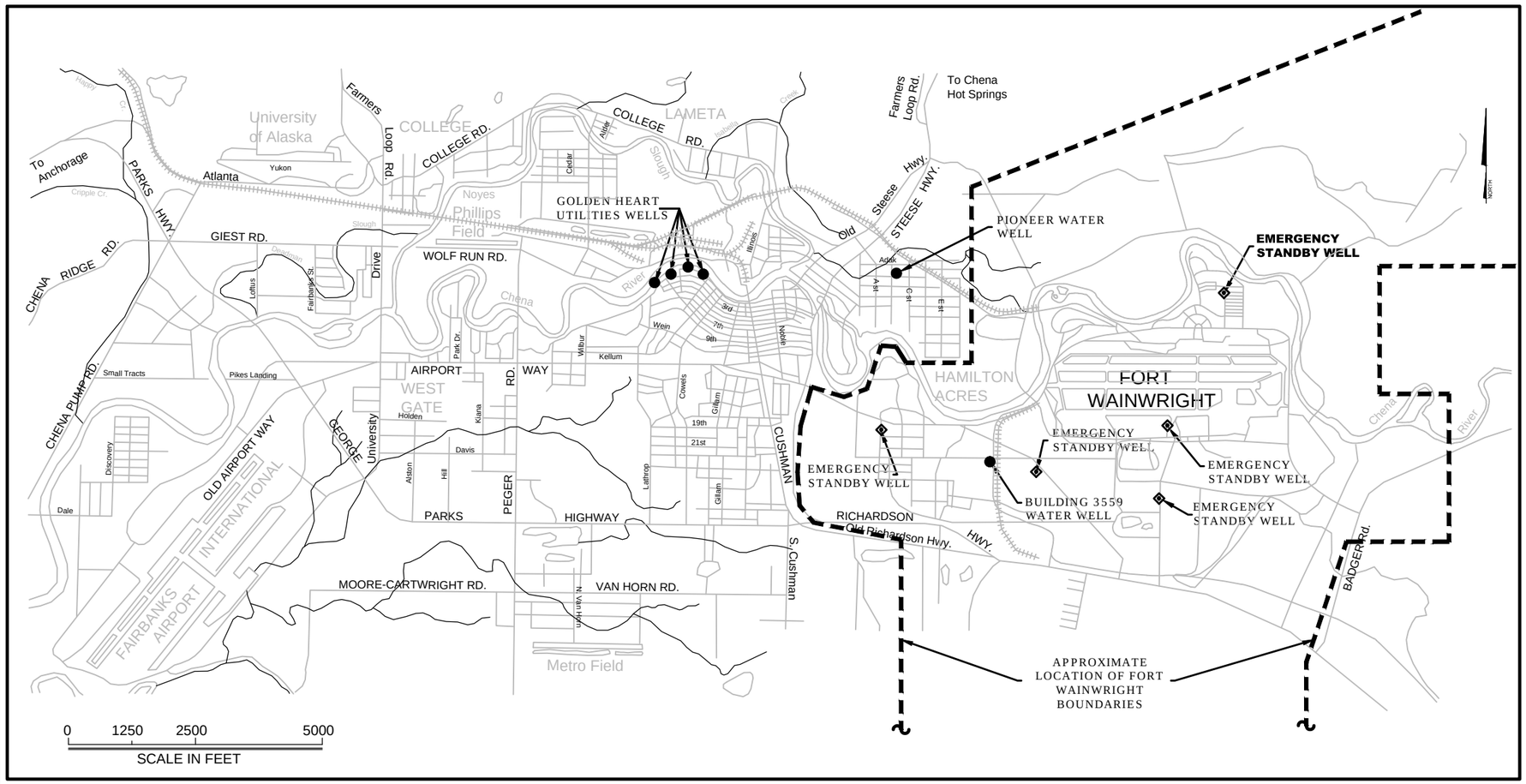
3.5 History of Contamination

Beginning in 1938, fuels, waste solvents, and pesticides were disposed of on the ground. Spills associated with fuel management, storage, transportation, and handling were common. In addition, waste oils, solvents, and contaminated fuels were incinerated at the post power plant and fire training areas, a practice which was discontinued in 1993. Waste oils commonly were

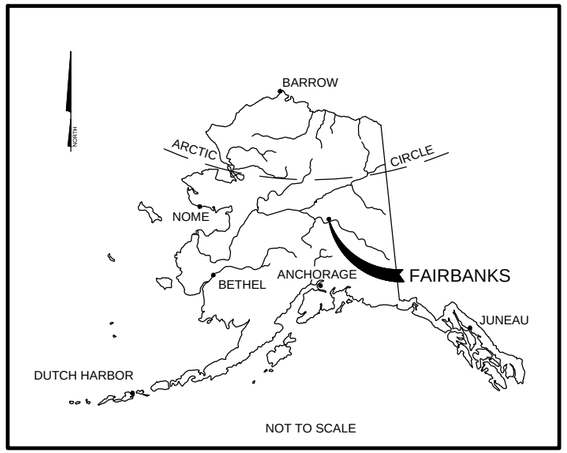
used for dust control. Underground storage tanks (USTs) for waste oil, fuel, lubricants, and solvents were installed at most maintenance facilities. A majority of these tanks eventually leaked and released contaminants to soil and groundwater. All existing USTs were removed and/or replaced with double walled, cathodically protected, tanks with leak detection systems.

Pesticides (insecticides, herbicides, fungicides, avicides and rodenticides) have been used over the years to maintain grounds and structures and to prevent pest-related health problems. Pesticides were reported to have been mixed on inadequate surfaces and/or stored in such a way to allow releases to the soil.

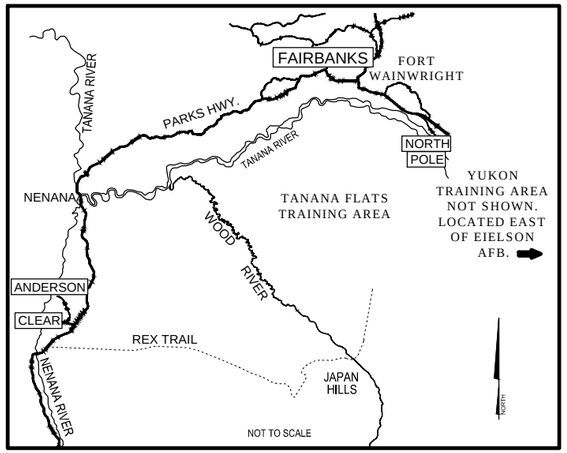
Current Army practices no longer include uncontrolled releases of pollutants to the environment.



Fairbanks and Fort Wainwright Site Map



Location Map



Vicinity Map

LEGEND

- DRINKING WATER WELL LOCATION
- EMERGENCY STANDY WELL LOCATION. USED PRIMARILY FOR FIRE SUPPRESSION

ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS ALASKA DISTRICT

Fort Wainwright and Surrounding Areas

Five Year Review
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, Second 5 Year Review	3-1	9/11

789AF

4 OPERABLE UNIT 1

4.1 OU1 Background

Operable Unit 1 (OU1) originally consisted of 19 potential source areas, but an additional three sites were added from OU2 in 1997 to make a total of 22 source areas. All but one of these sites, the 801 Drum Burial Site, have either been recommended for no further action (NFA) or transferred to other programs (such as the 2-PTY).

The list of OU1 source areas and their status is shown in Table 4-1 and in Appendix H.

Table 4-1. List of OU1 Source Areas and Their Current Status

Source Area	Current Status / Date of Action
Alaska Railroad Storage Yard	NFA / 6 Jan 1995
Beacon Tower Drum Site (Landfill)	NFA / 26 Jun 1992
Blair Lakes Drum Site	NFA / 25 Jul 1994
Birch Hill Radioactive Waste Site	NFA / 21 Mar 1993
Building 1128 Transformer Yard Drum Site	NFA / 26 Jun 1992
Building 1567	NFA / 10 Apr 1995
Building 1599	Referred to 2-PTY / ROD
Building 2077	Referred to 2-PTY / ROD
Building 2250	NFA (for pesticides) / 6 Jan 1995 (referred to 2-PTY for fuel products)
Building 3015	Referred to 2-PTY / 10 Apr 1995
Burial Site M	NFA / 26 Jun 1992
Chemical Agent Dump	NFA / ROD
Drum Site West of DRMO (Site N-4)	NFA / ROD
Former Explosives Ordnance Detonation (EOD) Range	Referred to OU5 / ROD
Motor Pool Buildings	Referred to OU5 / ROD
Runway Radioactive Waste Site	NFA / 26 Jun 1992
Trainor Gate Railroad Spur	NFA / 30 Sep 1992
Transformer Storage Yard East of 3019	NFA 25 Jul 1994
Utilidor Expansion Drum Site	NFA / 26 Jun 1992
Engineer Park Drum Site (moved from OU2)	NFA / 25 Jul 1994
Drum Site South of the Landfill (moved from OU2)	NFA / 25 Jul 1994
801 Drum Burial Site (moved from OU2)	Remedial Action (long-term monitoring) / ROD

NFA decisions were made for the majority of the sites based on 1) the physical location could not be identified, 2) no visible sign of contamination was observed during inspections, or 3) environmental sampling results showed that contamination was below the protective human health based levels. A description of these NFA decisions can be found in the OU1 ROD and the administrative record.

In 1995, an Interim Remedial Action (IRA) was conducted at one of these sites: the Chemical Agent Dump Site. The IRA indicated that chemical warfare materials were not present at this site and an NFA decision was recommended under this ROD. Information on this source can be found in the IRA ROD Chemical Agent Dump Site and the administrative record.

Two sites, the Motor Pool Buildings and the Former Explosive Ordnance Detonation Range, were transferred to and addressed under the OU5 decision process.

Four of these sites were carried through RI: Building 1599, Building 2077, Site N-4, and the 801 Drum Burial Site. Subsequent IRP management of these source areas was based on the results of the RI, which came to the following conclusions:

- Buildings 1599 and 2077 were referred to the 2-PTY, since the only contaminants of concern at these two locations consisted of petroleum hydrocarbons.
- Site N-4 was found to require NFA.
- The 801 Drum Burial Site was recommended for further action based on the potential risk to human health and the environment, under the OU1 ROD.

4.2 801 Drum Burial Site

4.2.1 Overview

The 801 Drum Burial Site (Figure 4-1) is located between the west bank of the Chena River and River Road and south of the Alaska railroad bridge. It covers an area of approximately 20 acres. The site was discovered during construction of a storm sewer in the summer of 1992, as part of the 801 contract housing construction project. Numerous drums were reportedly removed from the area during initial construction. In the fall of 1992 and in 1993, excavation and drum removal activities were undertaken. Sampling results showed elevated levels of POL, pesticides and solvents in soil and groundwater at this location. Additional drums and contaminated soil were found and removed during the 1995 RI and the 1996 follow up investigation. During the 1996 investigation, 850 cubic yards (cy) of contaminated soil were removed from the site and stockpiled for later use in a phytoremediation treatability study (see Sec 4.3). The ROD was signed in June 1997.

A total of 16 monitoring wells have been installed across the site to determine potential contamination migration. These wells have been included in a monitoring network; sampling was conducted annually from 1998 until 2005 when a 5-year sampling schedule was implemented. Starting in 2001, the annual sampling schedule was modified to include just two wells (AP-7163 and AP-7282) for the first two years, and all 16 wells would be sampled every third year. Using this schedule, a comprehensive sampling effort was conducted in 2003, and then again in 2005 (a year early). A cleanup operations and site exit strategy (CLOSES) evaluation was conducted in 2003/04 that recommended monitoring at the site on a 5-year schedule. Based on that recommendation, the current plan is to continue long-term monitoring at the site every 5 years, with sampling events occurring prior to five-year reviews. In support of the current five-year review, eight wells were sampled in July 2010. Additionally, six wells located west of the 801 Drum Burial Site near the Birchwood Housing area were also sampled. ICs are in place, and an informational sign was installed at this source area in 2001 to inform the public of restricted activities at this site; the sign was updated and repaired in 2004 and 2005.

EPA determined this remedy to be operational and functional as of May 30, 2001. The Operations and Maintenance Manual was submitted in December 2000, and the Interim Remedial Action Report was received in April 2001.

Periods of use and dates related to the history of the 801 Drum Burial Site source area contamination and remediation are summarized in Table 4-2.

Table 4-2. History of Regulatory Events at OU1 801 Drum Burial Site[a]

Event	Date
Drum storage and disposal activities	1950s & 1960s
Fort Wainwright added to NPL	August 1990
PSE conducted and 801 Drum Burial Site assigned to OU2 for RI/FS	1991
Buried drums discovered during construction of storm sewer. Geophysical survey conducted and two anomalies discovered.	1992
FFA signed	1992
2-PTY Agreement signed	1992
PSE2 conducted followed by excavation and removal of 92 drums from site, 18 containing some amount of product. Drilling, installation, and sampling of 6 groundwater monitoring wells and 18 microwells performed.	1992 & 1993
801 Drum Burial Site transferred from OU2 to OU1 and 3 additional monitoring wells installed. Geophysical survey conducted and four additional areas located for further investigation.	1994
Management Plan, OU1, Remedial Investigation/Feasibility Study issued	August 1995
Limited excavation conducted; 34 drums (8 containing some amount of product) removed. Two additional monitoring wells installed and sampled.	1995
Additional geophysical surveys conducted and 118 drums were subsequently removed, 46 containing some amount of product. 850 cy of pesticide-contaminated soil removed during excavation and stockpiled on site in two lined containment cells for later management[b]. Six additional monitoring wells installed and the first quarterly groundwater sampling performed.	September 1996
Proposed Plan for Remediation for OU1 issued	February 1997
Stockpiled soils removed from site for final disposition	1997
OU1 Record of Decision signed	June 1997
Additional excavations performed based on previous geophysical surveys but no additional drums discovered	October 1997
Final OM&M for 801 Drum Burial Site issued	December 2000
Interim Remedial Action Report issued	May 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete Received from the EPA	2002
CLOSES Evaluation for OU1 801 Drum Burial Site issued	April 2004
Second Fort Wainwright Five-Year Review Report finalized	September 2006

[a] Information in this table was obtained from the OU1 IAP; OU1 OM&M Plan; and the Five-Year Review Report Document Log.
[b] This soil was used in a treatibility study that tested phytoremediation technology (see Sec. 4.3).

4.2.2 Background

Physical Characteristics

The 801 Drum Burial Site is approximately 0.13 miles east of the 801 Military Housing Area on the east side of River Road and near the west bank of the Chena River. The area is in a small depression between River Road and the Chena River and is currently undeveloped and vegetated with grass, brush and trees. No endangered or threatened species reside in the area.

The depth to groundwater in the area of the 801 Drum Burial Site is shallow, varying from about 5 to 15 ft-bgs across the site. Monitoring of groundwater levels has shown groundwater flow direction to be generally consistent with the regionally west-northwesterly flow direction. However, because the site is located so close to the Chena River, the groundwater flow direction and gradient can fluctuate seasonally in response to the water level and flow of the river. During periods of high water and flow in the Chena River, the groundwater flow direction on site is generally to the west, away from the river. During low water and flow, usually in the winter and early spring, the groundwater flow direction is eastward, toward the river.

History of Contamination

The 801 Drum Burial Site formerly was used as a drum storage area and disposal area. Drums stored at this source area reportedly contained diesel fuel, gasoline, jet fuel, solvents, asphalt, pesticides, and lubricants. Aerial photographs from the 1950s and 1960s indicate that a pit was in the southwest corner of the storage area. Subsequent aerial photographs show that the pit was filled. During summer 1992, buried drums were found during construction of a storm sewer that runs west-east through the source area and outfalls in the Chena River. Numerous drums were removed during these construction activities.

Land and Resource Use

The 801 Drum Burial Site is across River Road from a military housing area; it is between the housing area and the Chena River. The ROD described land use at this source area as recreational. The land use is expected to remain recreational due to its location and the access it provides to the Chena River. River Road is elevated at this location, providing a physical barrier that prevents typical surface water runoff from reaching the housing area. The road directs local surface water runoff to the Chena River, which is directly adjacent to the source area.

Downgradient of the 801 Drum Burial Site, there are residential and commercial wells that provide residential and bottled drinking water respectively. Residents of the 801 Military Housing Area (currently designated as Birchwood Housing area) obtain their drinking water from the Golden Heart Utilities water system. Groundwater use is considered residential because water supply wells for the City of Fairbanks are located downgradient of the source area and in the same unconfined aquifer.

Pre-ROD Response

As part of the PSE process at the 801 Drum Removal Site from 1991 to 1993, numerous geophysical surveys were conducted. Ninety-two (92) drums were removed from this area during 1992-93, and another 34 were removed in 1995. Drum contents were sampled and found to contain aqueous liquid, organic solids, flammable organic liquid, and chlorinated organic liquid.

Based on the findings of the geophysical surveys, another removal action was conducted in 1996 and an additional 118 drums (some of which were found to contain fuels, solvents, pesticides, and lubricants) were removed. Approximately 850 cy of pesticide and diesel range organics (DRO) contaminated soil was removed and stockpiled for later use in a phytoremediation treatability study (see Sec. 4.3).

4.2.3 Remedy Selection

Nature of Contamination

Sampling conducted prior to and during the remedial investigation detected petroleum hydrocarbons, volatile organic compounds (VOCs), pesticides, and heavy metals in surface soil, subsurface soil, and groundwater; heavy metals in Chena River water samples; and VOCs, pesticides, and heavy metals in Chena River sediments. Of these, two organic compounds, two pesticides, and diesel range POL were reported in concentrations requiring remediation in the soil and groundwater at the site.

Preliminary data suggested that contaminant plumes in the groundwater were migrating from the known source areas; however, migration rates were undetermined due to the complexity of groundwater movement in the area. The results of the remedial investigation also suggested a high potential for the contaminants to migrate to the Chena River and affect downgradient groundwater users if not controlled.

Remedial Action Objectives

A baseline risk assessment indicated the need for remedial action at the 801 Drum Burial Site, and the following RAOs were established:

Groundwater

- Ensure that groundwater quality at the 801 Drum Burial Site meets federal and state standards.
- Minimize potential migration of contaminated groundwater to the Chena River and downgradient drinking water wells.
- Establish and maintain ICs to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies.

Soil

- Prevent further leaching of contaminants from soil to groundwater.
- Reduce risks associated with exposure to contaminated soil and drums.
- Prevent migration of soil contaminants to groundwater which could result in groundwater contamination and exceedances of federal MCLs and Alaska Water Quality Standards (AWQS) (18 Alaska Administrative Code [AAC] 70).

ARARs

The OU1 ROD cited the most significant ARARs for remedy selection at this source area to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- NCP off-site disposal rules. Applicable for disposal of drums and contaminated soil

Cleanup Goals

Cleanup goals were established in the ROD based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the source area.

Groundwater

Five chemicals of concern were established for groundwater in the ROD: aldrin, dieldrin, 1,1-dichloroethene (DCE), benzene, and vinyl chloride. When available, Federal and State of Alaska drinking water MCLs were adopted as the groundwater cleanup goals. At the time of the ROD, MCLs were available and used for 1,1-DCE, benzene, and vinyl chloride at the 801 Drum Burial Site; but there were no MCLs for aldrin or dieldrin. The cleanup levels for these two chemicals of concern were therefore based on risk-based concentrations equivalent to an excess lifetime cancer risks of $1x10^{-6}$ for residential exposure scenarios. However, since the ROD was finalized, groundwater cleanup levels for aldrin and dieldrin have been instituted. The MCLs for 1,1-DCE, benzene, and vinyl chloride have not changed, but the new MCLs for aldrin and dieldrin are an order of magnitude higher than the risk-based levels adopted in the ROD. In addition, the EPA has requested that cis-1,2-DCE be added to the list of compounds to track at the site.

Soil

Two chemicals of concern were established for soils in the ROD: aldrin and dieldrin. Since there were no cleanup levels for either contaminant at the time of the ROD, soil cleanup goals for these chemicals of concern were established based on calculated excess lifetime cancer risks of $1x10^{-4}$ for a residential exposure scenario. In the time since the ROD was finalized, soil cleanup levels for aldrin and dieldrin have been established. The new cleanup levels for aldrin and dieldrin are lower than the risk-based levels adopted in the ROD.

Remedial action goals from the ROD and current MCLs for all chemicals of concern at the 801 Drum Burial Site are shown in Table 4-3.

Table 4-3. Remedial Action Goals for Chemicals of Concern at OU1

Media	Chemical of Concern	ROD Cleanup Level	Basis	Current ADEC Cleanup Levels[a]
Groundwater	Aldrin	0.004 µg/L	$1x10^{-6}$ [b]	0.05 µg/L
	Dieldrin	0.004 µg/L	$1x10^{-6}$ [b]	0.05 µg/L
	Benzene	5 µg/L	MCL	5 µg/L
	1-1-DCE	7 µg/L	MCL	7 µg/L
	Vinyl Chloride	2 µg/L	MCL	2 µg/L
	cis-1,2-DCE[c]	NA	NA	70 µg/L
Surface Soils (direct contact)	Aldrin	3.8 mg/kg	$1x10^{-4}$ [d]	0.3 mg/kg
	Dieldrin	4.0 mg/kg	$1x10^{-4}$ [d]	0.32 mg/kg
Subsurface Soils (migration to groundwater)	Aldrin	3.8 mg/kg	$1x10^{-4}$ [d]	0.07 mg/kg
	Dieldrin	4.0 mg/kg	$1x10^{-4}$ [d]	0.008 mg/kg

[a] MCLs from National Primary Drinking Water Regulations (NPDWR) and 18 AAC 75 Table C for groundwater; cleanup levels for migration-to-groundwater in the under 40-inch zone from 18 AAC 75 Table B1 for soils.
[b] Risk for groundwater based on Federal or State drinking water MCLs or an excess lifetime cancer risk of $1x10^{-6}$ for residential exposure scenario.
[c] Cis-1,2-DCE is not a COC listed in the ROD for this site, but the EPA has formally requested that this compound be included in the list of compounds to track at the site (EPA Memorandum October 30, 2002).
[d] Risk for soil is based on a residential exposure scenario of an excess lifetime cancer risk of $1x10^{-4}$.
Notes: µg/L = micrograms per liter mg/kg = milligrams per kilogram NA Not applicable

Selected Remedy

The remedy selected in the ROD for the 801 Drum Burial Site consisted of:

- Natural attenuation of groundwater with long-term groundwater monitoring/evaluation.
- Locating potential buried drums and, if found, removing and disposing of drums and contaminated soils, while restricting access to the source area during this work.
- Establishing and maintaining ICs to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies. ICs include restrictions governing site access, construction and well development or placement as long as hazardous substances remain on site that preclude unrestricted use.
- A groundwater contingent remedy which includes an air sparging / soil vapor extraction (AS/SVE) system to specifically treat VOCs. This remedy will be implemented if the plume shows an increasing trend over any three consecutive sampling events, or if designated monitoring points indicate the plume is migrating.

4.2.4 Status of Remediation

Drum and Soil Removal

Three separate removal actions for drums and soil were conducted between 1992 and 1996. These actions were conducted under the Army's removal authority and were documented in Decision Documents, which have been placed in the Administrative Record. A total of at least 244 drums have been removed from the site (an unknown number of drums were removed during initial construction), along with 850 cy of contaminated soil. Based on the geophysical surveys conducted at this source area in 1992, 1994, 1996, and 1997, and the subsequent removal actions, all drums are believed to have been removed from the site. The contaminated soil excavated from the site was used in a phytoremediation treatability study and was disposed into a lined cell in the Fort Wainwright landfill in 2003 and 2004 (see Sec 4.3).

Groundwater Monitoring

Groundwater monitoring at this source area began after the signing of the ROD in September 1997 and is currently ongoing. The monitoring network included sixteen monitor wells constructed of 2-inch diameter PVC screened across the water table and varying in depth from 20 to 40 ft-bgs. Monitoring was initially done quarterly, for the first year, but the program has changed several times:

- In March 1998, the RPMs agreed that the groundwater monitoring frequency could be reduced from quarterly to annual sampling. This decision was based on results that demonstrated no new migration of contaminants and little or no change in contaminant concentrations at the wells. All 16 wells were sampled in March 1998.
- Based on the 1999 sampling results, the monitoring program was again modified: monitoring would still be done annually, but in odd-numbered years only two wells (AP-7163 and AP-7282) would be sampled for pesticides (limited sampling) and in even-numbered years all 16 wells would be sampled for pesticides and VOCs (comprehensive sampling).
- A comprehensive sampling effort was conducted in 2000. Based on the results, the monitoring program was reevaluated by the RPMs and the monitoring regime was again modified: the limited sampling program (two wells sampled for pesticides) would be

conducted for two years (starting in spring 2001), then the comprehensive sampling (all 16 wells sampled for pesticides, gasoline range organics [GRO], DRO and metals) would be conducted every third year (starting in 2003). During the comprehensive sampling, eleven of the wells would also be sampled for VOCs.

- The monitoring program designed in 2000 was followed through 2004, with limited sampling (2 wells) in 2001, 2002, and 2004, and a comprehensive sampling in 2003.

In 2003 and 2004, a CLOSES evaluation was conducted at the site. This study consisted of an assessment of all monitoring and other data from the site, and provided recommendations for future monitoring strategies. This evaluation recommended the following changes to the monitoring program: Eight of the existing monitoring wells would be sampled every 5 years, with wells being sampled for various constituents (1 well for DRO / GRO; 3 wells for VOCs; and 7 wells for pesticides). The RPMs made the decision to adopt this monitoring program. However, because it was time for the Five-Year Review, the decision was made to sample all 16 wells for pesticides (both total and filtered), GRO, DRO, and metals (samples from 11 of the wells were also analyzed for VOCs) in March 2005. After that, the recommendations of the CLOSES report would be followed, with the next monitoring effort to be conducted in 2010.

During the 2005 sampling event, both filtered and non filtered pesticide samples were collected to determine the form of the pesticide contamination in the groundwater, either in particulates or dissolved in the groundwater. The results showed there was very little difference between the total concentrations versus the filtered concentration, indicating that the detected pesticides are actually dissolved in the groundwater. This is the opposite of the expected result because dieldrin has a very low solubility and would not typically dissolve in the groundwater, but would prefer to remain bound in the soils. While this result is unexpected, it does not change the monitoring rationale at the site.

The most recent groundwater monitoring effort was conducted at the site in June and July of 2010. Groundwater samples were collected from eight monitoring wells in July and were submitted for laboratory analysis of organochlorine pesticides. One well was also submitted for analysis of VOCs, GRO, and DRO. Six supplemental wells were sampled in June west of the 801 Drum Burial site within the Birchwood Housing area, including one well that was sampled in July prior to it being decommissioned and replaced (with a well located just outside the housing area). Overall, the results of the eight wells sampled for the Five-Year review indicated little change since the 2000 sampling effort. Dieldrin is the primary contaminant of concern at the site, with exceedences of the ROD risk-based cleanup level in four of the wells sampled. Benzene and DRO were detected above the cleanup levels in the one well where analysis was conducted. Benzene has decreased during every sampling event since this well was first sampled in 1997. A decreasing DRO trend has been observed between 1993 and 2010. Cis-1,2-DCE is not a chemical of concern listed in the ROD for this site, but the EPA has formally requested that this compound be included in the list of compounds to track at the site (EPA Memorandum October 30, 2002). Target analyte concentrations in perimeter wells sampled during 2010 remained constant or were non-detect, indicating that contaminant migration is not occurring. Figure 4-2 summarizes the results of groundwater monitoring associated with this source area since 1997.

Aldrin, which is one of the chemicals of concern, was detected for the first time at the site in 2005; it was found in one well at a concentration below the ROD risk-based cleanup level. It may not have been detected previously due to the higher detection limits of previous analyses. Aldrin was not detected in 2010.

A sampling effort was performed supplemental to the Five-Year review in June 2010. Six wells located west of the 801 Drum Burial site were sampled. Four of the six wells (three monitoring

wells and one irrigation well), lie within the fenceline of the Birchwood Housing complex, and the other two wells are located downgradient to the northwest of the site. Groundwater samples were submitted for laboratory analysis of organochlorine pesticides, VOCs, SVOCs, GRO, and DRO. None of the samples collected exceeded ADEC cleanup levels.

Natural attenuation and long-term monitoring is the selected remedy at this source area, and as a result there is no system operations and maintenance *per se*. Monitoring wells are maintained as necessary, as is access to the wells. EPA has determined the remedy at the 801 Drum Burial Site to be operational and functional. An Operations, Maintenance and Monitoring (OM&M) Manual for the 801 Drum Burial Site, dated December 2000, provides specific procedures and protocol for ongoing maintenance and monitoring of the source area. The RPMs review the results of groundwater sampling and analysis as the data become available, and review the groundwater monitoring program for this OU on a regular basis.

Institutional Controls

Fort Wainwright has established a Post wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. A map depicting the boundaries of all sites on Fort Wainwright where ICs are in effect is also provided in Appendix A.

Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. Institutional controls ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in the ROD.

ICs at the 801 Drum Burial Site source area have been implemented. An informational sign describing these ICs was posted at the source area in 2001 and repaired and updated in 2004-05. Since there is no surface contamination at the 801 Drum Burial Site, access to the area for non-intrusive activities is unrestricted. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use.

Contingent Remedy

Based on groundwater monitoring results to date, the drum and contaminated soil removals appear to have successfully controlled what had been an ongoing source of groundwater contamination. As a result, it has not been necessary to implement the contingent remedy, and AS/SVE is not anticipated at this time.

Site Inspection

The 801 Drum Burial Site was inspected on May 13, 2011. One well had been decommissioned and replaced on July 9, 2010. All wells appeared to be in good condition. The community information sign was also in good condition.

4.2.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

The selected remedies for the 801 Drum Burial Site are operating as intended. Monitoring results to date at the 801 Drum Burial Site indicates that there have been no significant changes in contaminant concentration, which demonstrates that the removal actions have effectively removed the contaminant sources (drums and contaminated soils). Although aldrin was

detected in groundwater for the first time in 2005, the levels were well below the RAGs and it was likely detected due to improved detection limits rather than an increase in the concentration. Other chemicals of concern also showed no increases in concentrations during the monitoring program that would suggest on-going sources contributing to the contamination.

Concentrations of volatile organic compounds and pesticides in the identified plume are generally stable with some minor variation over the monitoring period. Groundwater monitoring results indicate that the identified plume has not migrated from the source area and that the concentrations reported in the 2010 sampling results indicate no significant changes in concentrations for the pesticide and VOC analytes. Dieldrin and benzene are the only chemicals of concern that remain above the RAGs. Cis-1,2-Dichloroethene has consistently exceeded RAGs in one well, but the well was not sampled for VOCs. DRO exceeds the ADEC cleanup level in one well. ICs are in effect and will continue to restrict groundwater use.

The most recent monitoring data for the 801 Drum Burial Site was collected in June and July of 2010 at 13 existing wells. Dieldrin exceeded the ROD risk-based cleanup level in four wells, while benzene and DRO exceeded their MCLs in one well each. Table 4-4 summarizes performance to date related to the RAOs for this source area.

Table 4-4. Performance to Date of Remedial Action Objectives at OU1

Remedial Action Objectives	Performance to Date
Ensure that groundwater at the 801 Drum Burial Site meets federal and State standards.	The contaminants dieldrin, benzene, and cis-1,2-DCE remain above the ROD cleanup levels in groundwater.
Minimize potential migration of contaminated groundwater to the Chena River and downgradient drinking water wells.	Perimeter wells indicate no migration of contaminants from the source area to the Chena River or to the 801 housing area. Monitoring records indicate stable concentrations of contaminants with little variation over the past 9 years.
Establish and maintain ICs to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in the ROD. ICs include restrictions governing source area access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. The Army shall ensure compliance with the ICs in place at this source area because noncompliance will violate a requirement of the ROD and therefore violate the Fort Wainwright Federal Facility Agreement between the Army, U.S. EPA, and ADEC.	ICs are in place. There have been no unauthorized activities at this site, and the ICs are accomplishing the intended purpose.
Prevent further leaching of contaminants from soil to groundwater.	Removal of drums and pesticide contaminated soil were effective in removing the source, thereby preventing further leaching of contaminants to groundwater.
Reduce risk associated with exposure to contaminated soil and drums.	Removal of drums and contaminated soil has reduced this risk.

Table 4-4. Performance to Date of Remedial Action Objectives at OU1

Remedial Action Objectives	Performance to Date
Prevent migration of soil contaminants to groundwater, which could result in groundwater contamination and exceedances of state and federal MCLs and AWQS.	Removal of drums and pesticide contaminated soil are believed to have been effective in removing the source and preventing further leaching of contaminants to groundwater. Ultimate effectiveness to be measured by achieving groundwater RAOs.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- The assumption that contamination in soil will not leach further into the groundwater appears to be valid based on groundwater monitoring results to date.
- The assumption that the groundwater contamination will not migrate off of the site is validated by the evaluations done in the CLOSES report (CH2M Hill 2004) and the groundwater monitoring results to date.
- The assumption that the contamination will naturally attenuate is still valid, although the attenuation rate is very slow and the point in time when groundwater cleanup goals will be achieved has not been estimated.
- The ICs currently in place are effectively restricting exposure to groundwater.
- There are no known changes in exposure pathways or populations at risk.
- There have been no changes in the MCLs for 1,1-DCE, benzene, or vinyl chloride.
- The State of Alaska established groundwater and soil cleanup goals for aldrin and dieldrin after the 2001 first Five-Year Review was finalized.
- Risk factors, associated with aldrin and dieldrin, have not changed since the ROD.[1]

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy. The remedy is protective in the short term and in the long term.

Variances from the ROD

No variances have been found since the 2006 second Five-Year Review was conducted.

Recommendations

Although the State of Alaska has established soil and groundwater cleanup goals for aldrin and dieldrin, there are still no federal MCLs for these chemicals. Because the risk-based levels established in the ROD are lower than the State of Alaska cleanup levels, the risk-based levels are still considered protective and there is no reason to change the ROD to adopt the State cleanup levels.

[1] A review of these chemicals in the EPA Integrated Risk Information System (IRIS) (www.epa.gov/IRIS/index.html) shows that there have been no significant revisions to their status since 1993.

Table 4-5. Recommendations and Follow-Up Actions for OU1

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Continue groundwater monitoring of eight wells every five years, prior to the Five Year Review, to ensure that no off-site migration of contaminants is occurring.	U.S. Army	EPA / ADEC	Ongoing	No

Response to Previous Recommendations

There were no recommendations or follow-up actions established for the 801 Drum Burial Site in the second Five-Year review in 2006.

4.3 Phytoremediation Treatability Study Soils

During the removal actions that took place at the 801 Drum Burial Site in 1996, approximately 850 cy of pesticide and DRO contaminated soil was removed and stockpiled. This soil was used in a treatability study to determine if phytoremediation may be a viable method for remediating pesticide contaminated soils. The soil was relocated to the south side of River Road, across from the landfill, for the treatability study.

4.3.1 Treatability Studies

A treatability study was designed and implemented to evaluate the performance of phytoremediation for reducing concentrations of pesticides (aldrin and dieldrin) in the soil removed from the 801 Drum Burial Site. Five treatment cells were constructed for the study. Several vegetation types were evaluated and both drained and saturated conditions were maintained. After 4 years of monitoring, overall results showed that the aldrin concentrations decreased significantly whereas dieldrin concentrations increased slightly. Results varied due to sample variability and different conditions. For example, in saturated (slightly anaerobic) conditions, dieldrin decreased significantly and aldrin decreased only slightly. The full study results can be found in the various Rhizosphere-Enhanced Phytoremediation Study Annual Progress Reports (ENSR, 1998, 1999, 2000, and 2001).

Additional studies were conducted by University of Alaska Fairbanks and Anchorage to evaluate the rhizosphere-enhancements, vegetation variations, chemical movement with radio-labeled compounds, and leachability of the chemicals.

4.3.2 Regulatory Status

While the soil used in the treatability study was still considered part of the CERCLA action for Fort Wainwright, it was no longer associated with OU1 for regulatory or management purposes. At the conclusion of the study, questions were raised regarding the disposition of the soils and disposal options. In a memorandum to the Army dated July 26, 2000, EPA addressed these questions. Most importantly, they concurred with the Army's conclusion that the soil was not a RCRA regulated hazardous waste. Once this determination had been made, several disposal options were available including: placing them into the Fort Wainwright Landfill; or, shipping them off-site and/or out of state for disposal in an appropriate facility.

4.3.3 Decommissioning and Soil Disposal

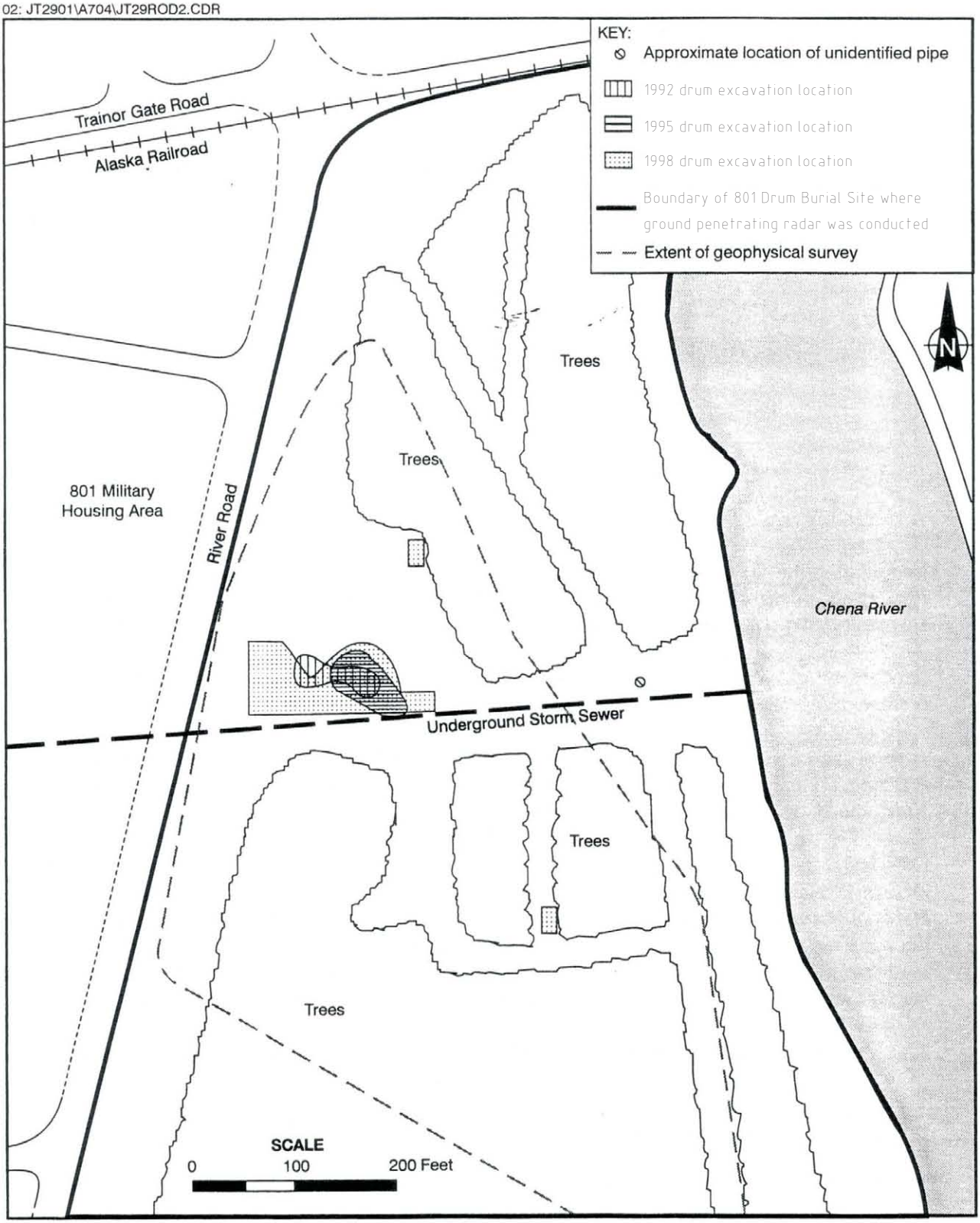
The Army decided that the most cost-effective alternative was to dispose of the treatability study soils at the Fort Wainwright Landfill. Plans were drawn for a specially designed containment cell that would be constructed in the landfill for disposal of the soils. The cell would be lined, capped, and sealed, in compliance with the State of Alaska Solid Waste Permit. The plans for the cell were approved by the ADEC. In 2003 and 2004, the cell was constructed in the landfill, the treatability study components were decommissioned, and the soils were transferred to the cell.

Confirmatory soil samples were collected from the area beneath the former study cells to confirm that no pesticides had contaminated the underlying soils. Dieldrin was detected in these soils at levels exceeding the Method 2 migration-to-groundwater cleanup levels. Based on these results, an additional 130 cy of soil were scraped to a depth of 12 to 18 inches from the former study site and placed into the containment cell. A second round of soil samples confirmed that the contaminated soils had been successfully removed and that the site was clean. The containment cell membrane was chemically sealed and capped with impermeable soils.

A report was prepared to document the decommissioning activities, including the construction of the storage cell within the landfill, the collection of confirmatory samples, and the restoration of the study site to its previous condition. This report was found to be acceptable by the ADEC and was finalized in September 2005.

In 2005, during an inspection of the cell, the soil cap was observed to have collapsed in two small areas (approximately 1 foot in diameter). The cell cap membrane could be seen in these two holes and appeared to be ballooning, apparently as a result of off-gassing due to microbial activity within the soils. In response to this, the Army has installed six vent wells that are able to vent any gases that build up within the cell. These vents are sealed to the cell cap membrane in order to maintain the integrity of the cell. They continue to be monitored on a regular basis. As of 2010, no additional holes have been identified and no additional ballooning has occurred.

02: JT2901\A704\JT29ROD2.CDR



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801 Drum Burial Site

Five Year Review
Operable Unit 1
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
First 5-Year Review 9/2001	4-1	9/11

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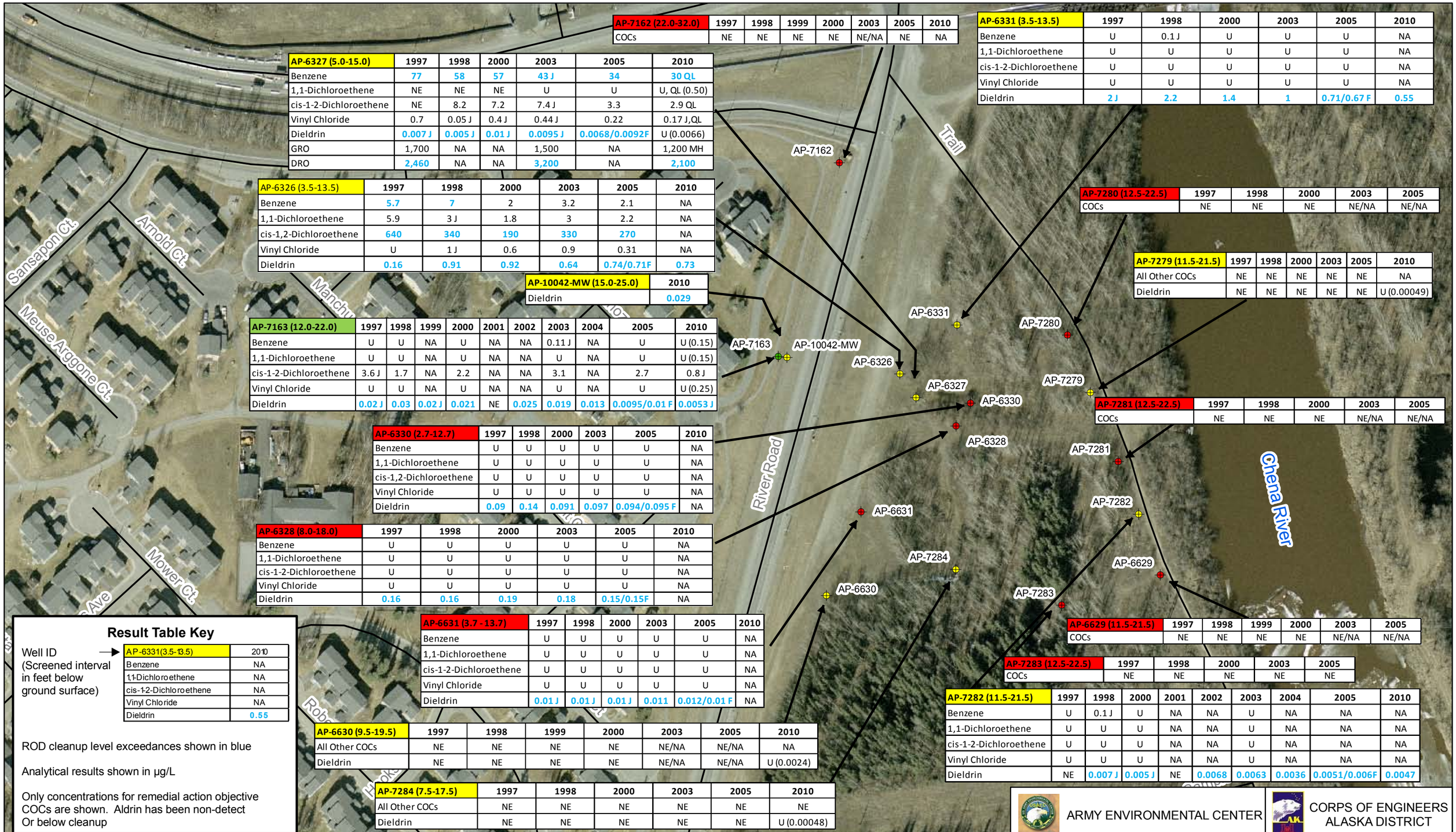

AP-7162 (22.0-32.0)	1997	1998	1999	2000	2003	2005	2010
COCs	NE	NE	NE	NE	NE/NA	NE	NA

AP-6331 (3.5-13.5)	1997	1998	2000	2003	2005	2010
Benzene	U	0.1 J	U	U	U	NA
1,1-Dichloroethene	U	U	U	U	U	NA
cis-1-2-Dichloroethene	U	U	U	U	U	NA
Vinyl Chloride	U	U	U	U	U	NA
Dieldrin	2 J	2.2	1.4	1	0.71/0.67 F	0.55

AP-6327 (5.0-15.0)	1997	1998	2000	2003	2005	2010
Benzene	77	58	57	43 J	34	30 QL
1,1-Dichloroethene	NE	NE	NE	U	U	U, QL (0.50)
cis-1-2-Dichloroethene	NE	8.2	7.2	7.4 J	3.3	2.9 QL
Vinyl Chloride	0.7	0.05 J	0.4 J	0.44 J	0.22	0.17 J,QL
Dieldrin	0.007 J	0.005 J	0.01 J	0.0095 J	0.0068/0.0092F	U (0.0066)
GRO	1,700	NA	NA	1,500	NA	1,200 MH
DRO	2,460	NA	NA	3,200	NA	2,100

AP-7280 (12.5-22.5)	1997	1998	2000	2003	2005
COCs	NE	NE	NE	NE/NA	NE/NA

AP-6326 (3.5-13.5)	1997	1998	2000	2003	2005	2010
Benzene	5.7	7	2	3.2	2.1	NA
1,1-Dichloroethene	5.9	3 J	1.8	3	2.2	NA
cis-1,2-Dichloroethene	640	340	190	330	270	NA
Vinyl Chloride	U	1 J	0.6	0.9	0.31	NA
Dieldrin	0.16	0.91	0.92	0.64	0.74/0.71F	0.73

AP-7279 (11.5-21.5)	1997	1998	2000	2003	2005	2010
All Other COCs	NE	NE	NE	NE	NE	NA
Dieldrin	NE	NE	NE	NE	NE	U (0.00049)

AP-10042-MW (15.0-25.0)	2010
Dieldrin	0.029

AP-7163 (12.0-22.0)	1997	1998	1999	2000	2001	2002	2003	2004	2005	2010
Benzene	U	U	NA	U	NA	NA	0.11 J	NA	U	U (0.15)
1,1-Dichloroethene	U	U	NA	U	NA	NA	U	NA	U	U (0.15)
cis-1-2-Dichloroethene	3.6 J	1.7	NA	2.2	NA	NA	3.1	NA	2.7	0.8 J
Vinyl Chloride	U	U	NA	U	NA	NA	U	NA	U	U (0.25)
Dieldrin	0.02 J	0.03	0.02 J	0.021	NE	0.025	0.019	0.013	0.0095/0.01 F	0.0053 J

AP-7281 (12.5-22.5)	1997	1998	2000	2003	2005
COCs	NE	NE	NE	NE/NA	NE/NA

AP-6330 (2.7-12.7)	1997	1998	2000	2003	2005	2010
Benzene	U	U	U	U	U	NA
1,1-Dichloroethene	U	U	U	U	U	NA
cis-1,2-Dichloroethene	U	U	U	U	U	NA
Vinyl Chloride	U	U	U	U	U	NA
Dieldrin	0.09	0.14	0.091	0.097	0.094/0.095 F	NA

AP-6328 (8.0-18.0)	1997	1998	2000	2003	2005	2010
Benzene	U	U	U	U	U	NA
1,1-Dichloroethene	U	U	U	U	U	NA
cis-1-2-Dichloroethene	U	U	U	U	U	NA
Vinyl Chloride	U	U	U	U	U	NA
Dieldrin	0.16	0.16	0.19	0.18	0.15/0.15F	NA

AP-6629 (11.5-21.5)	1997	1998	1999	2000	2003	2005
COCs	NE	NE	NE	NE	NE/NA	NE/NA

AP-6631 (3.7 -13.7)	1997	1998	2000	2003	2005	2010
Benzene	U	U	U	U	U	NA
1,1-Dichloroethene	U	U	U	U	U	NA
cis-1-2-Dichloroethene	U	U	U	U	U	NA
Vinyl Chloride	U	U	U	U	U	NA
Dieldrin	0.01 J	0.01 J	0.01 J	0.011	0.012/0.01 F	NA

AP-7283 (12.5-22.5)	1997	1998	2000	2003	2005
COCs	NE	NE	NE	NE	NE

AP-7282 (11.5-21.5)	1997	1998	2000	2001	2002	2003	2004	2005	2010
Benzene	U	0.1 J	U	NA	NA	U	NA	NA	NA
1,1-Dichloroethene	U	U	U	NA	NA	U	NA	NA	NA
cis-1-2-Dichloroethene	U	U	U	NA	NA	U	NA	NA	NA
Vinyl Chloride	U	U	U	NA	NA	U	NA	NA	NA
Dieldrin	NE	0.007 J	0.005 J	NE	0.0068	0.0063	0.0036	0.0051/0.006F	0.0047

AP-6630 (9.5-19.5)	1997	1998	1999	2000	2003	2005	2010
All Other COCs	NE	NE	NE	NE	NE/NA	NE/NA	NA
Dieldrin	NE	NE	NE	NE	NE/NA	NE/NA	U (0.0024)

AP-7284 (7.5-17.5)	1997	1998	2000	2003	2005	2010
All Other COCs	NE	NE	NE	NE	NE	NE
Dieldrin	NE	NE	NE	NE	NE	U (0.00048)

Result Table Key

Well ID (Screened interval in feet below ground surface) →

AP-6331(3.5-13.5)	2010
Benzene	NA
1,1-Dichloroethene	NA
cis-1-2-Dichloroethene	NA
Vinyl Chloride	NA
Dieldrin	0.55

ROD cleanup level exceedances shown in blue

Analytical results shown in µg/L

Only concentrations for remedial action objective COCs are shown. Aldrin has been non-detect Or below cleanup

N

* Aerial Photo Date - 2007

0 55 110 220 Feet

- Monitoring Well Decommissioned after the 2010 Jacobs Sampling Event
- Monitoring Wells Included in the 2010 Sampling Plan
- Monitoring Wells NOT Included in the 2010 Sampling Plan

F = Filtered Sample Result
J = Estimated value
U = Not detected above the method reporting limit
NE = No Exceedances
NA = Not Analyzed
MH = High Estimated Value
QL = Low Estimated Value

ROD Cleanup Level (µg/L)	
Benzene	5
1,1-Dichloroethene	7
cis-1,2-Dichloroethene	70
Vinyl Chloride	2
Dieldrin	0.004

ADEC Cleanup Level (µg/L)	
Dieldrin	0.05

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OU1 801 Drum Burial Site Groundwater Contamination Map

Five Year Review
Operable Unit 1
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2010 Annual Report	4-2	09/11

5 OPERABLE UNIT 2

5.1 OU2 Background

Operable Unit 2 (OU2) originally consisted of the following eight source areas: the North Post Site, the 801 Drum Burial Site, the Engineers Park Drum Site, the Drum Site South of the Landfill, Building 3477, four Tar Sites, the Defense Reutilization and Marketing Office (DRMO) Yard, and the former Building 1168 Leach Well. All OU2 source areas underwent PSEs, which included historical record reviews and, as necessary, limited field investigations. Subsequent IRP management of these source areas was based on the results of the RI as follows:

- The 801 Drum Burial Site, Engineers Park Drum Site and the Drum Site South of the Landfill were addressed by the OU1 ROD.
- North Post Site was addressed under the 2-PTY.
- Building 3477 and the Tar Sites were assigned NFA status.
- Former Building 1168 Leach Well and the DRMO Yard are the only two source areas recommended for further action under OU2, based on potential risk to human health and the environment (see Figure 5-1).

The list of OU2 source areas and their status is shown in Appendix H.

5.2 Former Building 1168 Leach Well

5.2.1 Overview

Building 1168 (Figure 5-2) was constructed in 1950 as a lubricant oil and vehicle storage facility and was converted to a POL laboratory around 1962. It was located near the western boundary of Fort Wainwright, adjacent to Trainor Gate Road. The primary source of contamination was from a former leach well connected to an oil/water separator system. Contaminants found at this site included POL, solvents and heavy metals. The decision to treat this source was influenced by its proximity to the Post boundary (500 feet) and a public school (1,000 feet). Remedial action was undertaken *for in-situ* treatment of contamination. Installation of the AS/SVE system was completed in November 1994[1], and active AS/SVE operations continued through 1998. The system was turned off after RAOs for non-POL contaminants were achieved and the AS/SVE system was decommissioned in 2003. Groundwater monitoring has indicated that some limited contaminant rebound of benzene and DRO has occurred in a single monitoring well.

[1] The Army has designated construction of this remedial action as complete for project tracking and accounting purposes.

5.2.2 Background

Periods of use and dates related to the history of former Building 1168 contamination and remediation are shown in Table 5-1.

Table 5-1. History of Regulatory Events at OU2 Former Building 1168[a]

Event	Date
Lube oil and vehicle storage facility operations	1949 to 1962
Converted into a petroleum test laboratory	1962
Groundwater survey conducted and EPA recommends further investigation	1990
Fort Wainwright listed on NPL	August 1990
FFA signed	1992
2-PTY signed	1992
PSE conducted	1992 and 1993
RI conducted	1994
Source area pilot-scale AS/SVE remediation system installed	November 1994
FS completed	1996
ROD signed	January 1997
Building 1168 Demolished	1997
Active AS/SVE treatment completed	1998
RAR completed	May 1999
Final OM&M issued	December 2000
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete concurrence received from the EPA	2002
AS/SVE System decommissioned	2003
Second Fort Wainwright Five-Year Review Report finalized	September 2006
ISCO Injection at the Former Building 1168 Three Party (Leach Well) Site	October 2010

[a] Information obtained from the OU2 ROD, Building 1168 RAR, Building 1168 OM&M Manual, and the Five-Year Review Report Document Log.

Physical Characteristics

The former Building 1168 source area is within the main post confines and located north of Trainor Gate Road, adjacent to the Trainor gate entrance. Trainor Gate Road is located along the southern edge of the site. A Fairbanks public school is within 1,000 feet northwest of this site, the Birchwood Estates housing area (formerly the 801 military housing area) is approximately 300 feet southwest/upgradient of the site, and the newly completed Siku Basin military housing area is located along the north side of the site. The nearest surface water body, the Chena River, is approximately 1,800 feet to the southeast. No surface water drainage pathways are evident. No endangered or threatened species reside in the area.

Subsurface soil at this site consists of unconsolidated lenses of interlayered silt, silty sand and poorly graded sand and gravel. Predominant groundwater flow is generally to the west-northwest following the trend of the Tanana River Valley, however seasonal changes in flow direction may occur due to the influences of water level changes in the Chena River located approximately 1,800 feet to the east and south.

Land and Resource Use

Building 1168 was demolished during the summer of 1997, and the former building site is now a flat, graded gravel lot. The area around the former Building 1168 site was used to stage construction materials for the Siku Basin military housing project. This project was started in 2006 and completed in 2008, and the former building area remains a flat gravel lot. Groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater contamination downgradient of the source area.

History of Contamination

Contamination at the former Building 1168 site originated from a leach well that received liquids collected in floor drains within Building 1168. From the 1950s to 1997, Building 1168 was used as a lubrication oil and vehicle storage/shop facility, and a POL laboratory. Floor drains in the building formerly discharged into an oil/water separator designed to allow POL to flow into a storage tank and wastewater to flow through a 4-inch diameter buried waste line to a leach well approximately 100 feet southwest of the former building. The oil/water separator system was decommissioned in 1993. Because of system malfunctions during the 40 years of service, some products entering the oil/water separator were inadvertently conveyed directly to the leach well, subsurface soil, and groundwater. Products suspected to have entered the leach well include oil from engines and transmissions, gasoline, diesel, jet fuel, and solvents.

Pre-ROD Response

The initial response to contamination identification at former Building 1168 Leach Well was to install a treatability study AS/SVE system in 1994.

5.2.3 Remedy Selection

Nature of Contamination

Contaminated soils associated with the leach well appears to be the source of contamination detected in the groundwater which is located approximately 12 to 17 ft-bgs. Initial site investigations discovered a zone of hydrocarbon contamination approximately four to five feet thick in subsurface soils near the groundwater interface and extending approximately 50 feet radially from the leach well. Contamination from these subsurface soils created commingling benzene and trichloroethene (TCE) plumes in the groundwater 20 to 50 ft-bgs. Initial chemicals of concern for remediation at this site included the following:

Groundwater

- RI results confirmed the presence of VOCs, benzene, TCE, vinyl chloride, 1,1-DCE, and cis-1,2-DCE in groundwater above RAGs.

Soil

- Subsurface soils were found to contain DRO, GRO and benzene, toluene, ethylbenzene, and xylenes (BTEX). The release mechanism precluded significant surface contamination at this site.

Remedial Action Objectives

RAOs for the former Building 1168 Leach Well source area and the DRMO Yard are identical and were based on federal and state ARARs. All groundwater RAOs were based on state and federal MCLs. Soil RAOs were based on State of Alaska cleanup levels for non-UST petroleum contamination.

The RAOs for groundwater at all OU2 source areas are:

- Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame through source control
- Reduce or prevent further migration of contaminated groundwater from the source areas
- Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act and State of Alaska Drinking Water Standard MCLs and Alaska Water Quality Standards
- Use natural attenuation to attain Alaska Water Quality Standards (18 AAC 70) after reaching state and federal MCLs

The RAO for soil at all OU2 source area is:

- Prevent migration of soil contaminants to groundwater, which could result in groundwater contamination and exceedances of state and federal MCLs and Alaska Water Quality Standards (18 AAC 70)

ARARs

The OU2 ROD cited the most significant ARARs for remedy selection at this site to be:

- State and Federal MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards – Applicable
- Alaska Oil Pollution Regulations – Applicable
- Alaska Guidelines for Non-UST Petroleum Contaminated Soil – To be considered

Cleanup Goals

Groundwater

Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, TCE, vinyl chloride, 1,1-DCE, and cis-1,2-DCE at the former Building 1168 Leach Well source area.

Soil

The ROD stated that "because soils contaminated with VOCs and petroleum-related compounds are acting as a continuing source of contamination to groundwater, the remedial action goal for *in-situ* soils is active remediation until contamination levels in groundwater are consistently below state and federal MCLs." The State of Alaska cleanup levels for non-UST petroleum-contaminated soil will be considered as a guideline for the treatment of *in-situ* soils at the former Building 1168 Leach Well source area. Table 7-2 of the ROD adopted ADEC soil cleanup matrix Level A cleanup goals for DRO, GRO, benzene, and (total) BTEX at this source area.

Numeric values for groundwater cleanup goals established in the ROD are summarized in Appendix C.

Selected Remedy

The goal of this remedial action is to restore groundwater to its beneficial use as a drinking water aquifer and to remediate soil to State of Alaska cleanup levels for non-UST petroleum-contaminated soil. To achieve the OU2 ROD objectives, the remedial action components specified for the former Building 1168 Leach Well Source Area included:

Soil Vapor Extraction and Air Sparging

- *In-situ* treatment of groundwater via air sparging to remove volatile organic compounds, thereby attaining state and federal drinking water standards.
- *In-situ* treatment of soil via soil vapor extraction to prevent contaminated soil from acting as an ongoing source of contamination to groundwater.
- Treatment system evaluation and modification as necessary to optimize effectiveness.
- Periodic monitoring and evaluation of air emissions from the soil vapor extraction/air sparging treatment system to meet air emission requirements.
- Periodic groundwater monitoring and off-gas measurements to determine attainment of RAOs.

Natural Attenuation and Groundwater Monitoring

- Achieve Alaska Water Quality Standards through natural attenuation after active treatment attains state and federal maximum contaminant levels.

Institutional Controls

- Maintain ICs, including restricted access and well development restrictions, as long as hazardous substances remain on site at levels that preclude unrestricted use.

5.2.4 Status of Remediation

Leach Well Area Remedial Activities

In 1994, a pilot scale remediation system was installed around the leach well to determine whether an *in-situ* treatment system was technically feasible in source area soil and groundwater. The system was modified and expanded in 1996 and 1997 to optimize the effectiveness based on monitoring data evaluation. The treatment system was designed to

operate in the summer months (May through October) only, and operated seasonally until December 1998 when the system was shut down following achievement of the remedial action objectives. The treatment system was decommissioned in 2003.

Evaluation of the groundwater data from 2004 through 2009 showed that limited natural attenuation was occurring at this site and contaminant migration was not evident. The LTMO analysis showed stable and decreasing trends for benzene and DRO in individual wells. However, the first-order attenuation rate analysis indicated that the benzene contamination would likely persist at the site for a significant period of time. Based on these results, treatment of the residual benzene contamination using in-situ chemical oxidation (ISCO) was conducted during October 2010, and additional groundwater monitoring was conducted in November to evaluate the results of the treatability study.

Groundwater Monitoring

Groundwater monitoring frequency was decreased from quarterly to annually following attainment of RAGs and system shut-down in 1998. However, some minor rebound in concentrations of contaminants has occurred since the treatment system was shut down, and, following review by the RPMs, groundwater monitoring frequency was increased to a semi-annual basis subject to reconsideration after the May 2002 sampling event. Groundwater sampling was conducted semi-annually at the site until a Long Term Monitoring Optimization (LTMO) analysis was completed in 2009 that recommended sampling should be conducted annually. Additional groundwater sampling was also completed in 2010 as part of the ISCO injection at the site.

In general, sample results indicate that groundwater contamination at the site has decreased since 1994. This has been attributed mainly to the operation of the treatment system from 1994 to 1998. Figure 5-3 summarizes the available results of source area groundwater monitoring data from 1994 to 2010 (see appendices section of report).

- GRO has not exceeded the groundwater cleanup levels since June 1998 and TCE has not exceeded the RAG since October of 1997.
- Benzene rebounded in one well, PS-23, since the discontinuation of active treatment. Benzene concentrations were above RAGs in this well during each sampling event from September 2004 through June 2010. Benzene was detected above the RAG in well PS-23, at a concentration of 15 µg/L, in June 2010. This was the highest detection since 2004, and as a result the RPMs decided to conduct ISCO treatment to stimulate natural attenuation of the benzene. Prior to the ISCO treatment, well PS-23 was replaced with a conventional PVC monitoring well in July 2010. Benzene concentrations from the replacement well (AP-10037) were less than the RAG in July, and again below the RAG in the baseline sampling event in September 2010. ISCO injection was conducted in October 2010 (as discussed above). Sampling results after one month following the injection (November 2010) again showed benzene concentrations below the RAG in this well. Benzene levels have remained below the cleanup levels in three additional wells sampled at the site.
- DRO concentrations exceeded the cleanup goal in only one well (AP-5751) during 2009 at a concentration of 3,800 µg/L. This well was not sampled during 2010. DRO concentrations were above the cleanup goal in AP-10037 prior to the injection in 2010, but DRO concentrations were less than the cleanup level following the injection. DRO concentrations have generally been variable in wells

PS-23 (AP-10037) and AP-6809, fluctuating between slightly below and slightly above the cleanup goal since treatment system shutdown.

The former Building 1168 site is located near the western boundary of Fort Wainwright and is monitored by picket wells along the boundary line. No contamination has been detected in any of these wells above the RAGs.

Institutional Controls

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. Appendix A also includes a map that shows the boundaries of all sites on Fort Wainwright where ICs are in effect.

Excavation in the site area is restricted and groundwater intrusion is restricted subject to approval by DPW Environmental. Sitku housing has been constructed directly adjacent to former Building 1168. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use.

Site Inspection

The site was visited on May 12, 2011. All wells were found to be in good condition. One well, PS-23 was replaced by AP-10037 during 2010.[2]. A fence has been installed at this site that surrounds the Sitku Basin Military Housing area. Three well along Trainor Gate Road are inside the fence line and one well is outside the fence line,

5.2.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

Remedial Action Performance

The selected remedies for Building 1168 are operating as intended. The remediation goals were met using AS/SVE in the contaminated area. The system was removed in 2003. Groundwater monitoring results indicate that the identified plume has not migrated from the site.

Sampling indicates that benzene rebounded above the RAGs in well PS-23 until 2010, but remains below RAGs in wells AP-5747, AP-5751, and AP-6809. However, after well PS-23 was replaced with well AP-10037, benzene concentrations were below the RAG during three sampling events in 2010. DRO concentrations remain above State of Alaska water quality standards and are being assessed for natural attenuation through evaluation of field parameters and monitoring results. Contamination has not been detected above RAGs in the picket wells along the post boundary. Current contaminant levels do not warrant re-installation of the treatment system.

Figure 5-3 summarizes the results of groundwater monitoring associated with this source area.

Implementation of Institutional Controls

ICs are in effect and will continue to restrict groundwater usage.

[2] The replacement well for PS-23 (AP-10037) was installed during 2010 approximately five feet from the former PS-23 location. The monitoring well was installed using a 2-inch pre-pack PVC well screen with 0.01 inch slots. The well was screened from 12-22 feet bgs, and completed as a stickup with a locking cap and protective steel overcasing.

System Operations/O&M

The AS/SVE treatment system was decommissioned in 2003. Groundwater monitoring will continue on an annual basis following completion of the ISCO evaluation.

Table 5-2 summarizes performance to date related to the RAOs for this source area.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- The assumption that the groundwater contamination will not migrate off of the site is validated by the groundwater monitoring results on site and at the boundary picket wells.
- Despite the relatively limited rebound in benzene, the assumption that the contamination will naturally attenuate is still correct, however, first-order attenuation rate analysis indicated that the contamination will likely persist at the site for a significant period of time. As a result, ISCO injection was completed at the site in 2010. ICs are in effect and will continue to restrict groundwater usage.
- There are no known changes in exposure pathways or populations at risk.
- The MCLs used to establish the groundwater cleanup goals for the former Building 1168 Leach Well source area have not changed since the ROD.

Table 5-2. Performance to Date of Remedial Action Objectives at OU2 Building 1168

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame through source control	Treatment initially reduced contaminant concentrations below RAGs, however rebound of the benzene concentration occurred in one well. Benzene was below the RAG in the sampling event before and following the ISCO injection. DRO consistently remains above the ADEC 18 AAC 75 groundwater cleanup level in one well, and is intermittently above the cleanup level in one well
Reduce or prevent further migration of contaminated groundwater from the source areas	Migration of contaminants from the source area to groundwater downgradient of the site is not occurring based on results from the groundwater monitoring program.
Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act and State of Alaska Drinking Water Standard MCLs and AWQS	ICs are in effect to restrict groundwater use.
Use natural attenuation to attain AWQS (18 AAC 70) after reaching state and federal MCLs	Natural attenuation is the primary remedial action since discontinuing the AS/SVE system operation. In-situ chemical oxidation was conducted at the site during 2010 to enhance treatment of benzene.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy. The remedy is protective in the short term and in the long term.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2006 second Five-Year Review are shown in Table 5-3. Groundwater monitoring is conducted at the site on a regular basis. Data from the groundwater monitoring program continues to be evaluated to assure no off-site migration of contaminants is occurring and to evaluate the progress of natural attenuation.

The actions taken in response to the recommendations from the 2006 second Five-Year Review are shown in Table 5-3.

Table 5-3. Response to Recommendations from 2006 Five-Year Review

Recommendation/ Follow-Up Action from 2006 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Monitoring should also continue to ensure that natural attenuation processes are treating residual contamination in the groundwater.	LTMO analysis in 2009 showed benzene contamination may persist above cleanup levels for a significant period of time in one monitoring well. As a result, an in-situ chemical oxidation was conducted in 2010.	U.S. Army	2009 and 2010	No

Recommendations and Follow-up Actions

The following actions presented in Table 5-4 are recommended based on the evaluation completed during the 2011 Five-Year Review.

Table 5-4. Recommendations and Follow-Up Actions for OU2 Former Building 1168

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
The current site model indicates that contamination does not appear to be migrating off-site, and continued groundwater monitoring should be sufficient to ensure protectiveness.	U.S. Army	EPA / ADEC	Ongoing	No
Continue evaluation of the ISCO treatability study and conduct additional injections if necessary.	U.S. Army	EPA / ADEC	Ongoing	No

5.3 OU2 – DRMO Yard

5.3.1 Overview

Contamination was originally identified at six sub-areas at the DRMO yard (Figure 5-4). Two sub-areas with petroleum and solvent contamination are part of OU2, and the others are addressed in the 2-PTY or were identified in the ROD as requiring NFA. Contaminants found at the DRMO Yard were solvents and petroleum in the soil and groundwater. The site is located along Badger Road, northwest of the intersection of Badger Road and the Old Richardson Highway, on the eastern boundary of Fort Wainwright. The salvage yard is located within a fenced compound covering approximately 25 acres. Spills occurred routinely at the DRMO Yard in the past. The RI/FS was completed in October 1994. The ROD was signed in April 1997, with the chosen alternative being air sparging/soil vapor extraction with groundwater monitoring. The AS/SVE system was installed during the summer of 1997, and new groundwater monitoring wells were installed outside the northwest fence line at Building 5010, and inside the south fence line. The monitoring wells outside the northwest fence line are picket wells to provide information related to off-site migration of contaminants from this source area towards Channel B, a man made trench constructed as part of the Chena River flood control project.

5.3.2 Background

The DRMO Yard source area was divided into six sub-areas for remedial investigation purposes. Of these six sub-areas, three (DRMO-2, DRMO-3, and DRMO-5) were found to have petroleum-related contamination without commingling with other contaminants of concern. These sites are addressed under the 2-PTY. Contamination in another of the sub-areas (DRMO-6) was determined to warrant no further action. Two of the sub-areas (DRMO-1 and DRMO-4) were carried through to remedial action under CERCLA.

Three remediation systems were installed and operated at the DRMO Yard: 1) the DRMO-1 design study treatment system for petroleum contamination; 2) the DRMO-5 design study treatment system, also for petroleum contamination; and 3) the OU2 ROD design study treatment system. The OU2 ROD treatment system located in DRMO-1 was operated under CERCLA; the DRMO-1 and DRMO-5 treatment systems were operated under the 2-PTY and will not be discussed further in this section. All of the systems were decommissioned in 2008.

Fuel spills associated with the storage and staging of equipment and vehicles on two recently constructed gravel pads in the DRMO Yard were investigated by Jacobs Engineering during 2010, and a soil excavation was completed.

Periods of use and dates related to the history of DRMO Yard contamination and remediation are shown in Table 5-5.

Physical Characteristics

The DRMO Yard is an approximately 25 acre, fenced compound located near the eastern end of the post on the west side of Badger Road. The yard is bordered by the Alaska Railroad tracks on the south and a channel of the Chena River Flood Control Project on the west. No endangered or threatened species reside in the area.

Groundwater flow is generally toward the northwest following the regional flow of the Tanana River Valley. At the western boundary of the DRMO Yard there may be some minor short term influences due to water level fluctuations in the man-made channel (Channel B).

Table 5-5. History of Regulatory Events at OU2 DRMO Yard[a]

Event	Date
Vehicle storage and vehicle maintenance shop activities	1945 to 1961
Site converted to salvage yard and drum storage	1961
Diesel spill near Building 5001	Early 80s
Removal of eight USTs (cleanup of associated soils are being addressed under the 2-PTY)	1988 to 1996
FFA signed	1992
2-PTY signed	1992
Installation and semiannual sampling of 14 monitoring wells at the DRMO yard as part of the Arctic Surplus site investigation	1990 to 1993
Fort Wainwright listed on NPL	August 1990
Soil and groundwater contamination discovered north of Building 5001 during investigation for construction of a building foundation	July 1992
PSE2, Phase 2, conducted at DRMO yard to assess extent of soil contamination	September 1992
Proposed Plan for Remediation made available to public	April 1996
OU2 RI and FS issued	1996
AS/SVE systems installed at sub-areas DRMO-1 and DRMO-5 as part of a petroleum hydrocarbon treatability study (performed under the 2-PTY)	Summer of 1996
OU2 Record of Decision signed	January 1997
ROD Design Study System in sub-area DRMO-1 is commissioned.	July 1997
OU2 RAR completed	August 1999
Final DRMO OM&M issued	December 2000
Final OU2 Design Study System OM&M issued	June 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete concurrence received from the EPA	2002
CLOSES Evaluation of DRMO Yard	March 2004
DRMO-1 Three-Party treatment system is shut down for contaminant rebound evaluation	November 2005
Second Fort Wainwright Five-Year Review Report finalized	September 2006
DRMO-1 Three-Party treatment system is decommissioned	October 2008
ISCR Injection at the DRMO-1 and DRMO-4 Three-Party Sites	August 2009
Supplemental ISCR Injection at the DRMO-1 Three-Party Site	August 2010

[a] Information obtained from OU2 ROD; August 1999 OU2 RAR; 1999 Monitoring Report, North Post, DRMO-1, and DRMO-5 Sites; Draft Comprehensive Annual Monitoring Report (February 2000); and the Five-Year Review Report Document Log.

Land and Resource Use

The DRMO Yard's function is to store obsolete, surplus, unserviceable equipment and supplies for transfer to another authorized user, for public auctions, or for destruction and disposal. The yard has contained numerous aisles of surplus appliances, tires, transformers, and wire. Additionally, it formerly served as the hazardous material transfer point for Fort Wainwright, Fort Greely, and Eielson Air Force Base and operates as a storage facility in accordance with the Fort Wainwright RCRA Part B Permit. A portion of the DRMO yard is presently used to store vehicles and equipment for troop mobilization, and connexes for left-behind equipment (LBE). The land use is currently designated "industrial" and is expected to retain that designation for the foreseeable future.

Two residential areas are located near the DRMO Yard. The first is approximately 1,400 feet to the north and the second is approximately 1,000 feet to the northeast, both subdivisions use groundwater as their drinking water source and their wells are located in the same unconfined aquifer as that associated with the DRMO Yard groundwater contamination. Groundwater in the area generally flows west to northwest, away from these residential areas; however, fluctuations in flow direction occur.

A Class C public drinking water well and fire suppression system exist on site, but their use has been restricted by ICs enacted under a State of Alaska Plan Approval to Construct. The ROD specified that, with the exception of emergencies, the fire suppression water tank not be refilled from the DRMO Yard water supply well until after RAGs are met. Groundwater use is considered to be residential.

History of Contamination

From 1945 to 1961, the DRMO Yard was used for vehicle storage and contained a vehicle maintenance shop. In 1961 the source area was converted into a salvage yard and was used to store drums of waste oil; pesticides; solvents; vehicle fluids such as antifreeze and hydraulic fluid; asphalt; and electrical transformers, some of which may have contained polychlorinated biphenyls (PCBs). Many drums reportedly leaked. Items such as mattresses, wood furniture and possibly plastics were incinerated routinely in a burn pit and it is likely that the drummed fluids were also disposed of by burning. Waste oil, which historically contained heavy metals, solvents, PCBs, and other contaminants, was used to control dust on roads in the DRMO Yard during the 1970s and early 1980s.

During the early 1980s, an estimated 3,000 gallons to 8,000 gallons of No. 1 diesel fuel were spilled near the former location of Building 5001. Cleanup activities of that spill included spreading the contaminated soil throughout the yard. Storage and destruction records were maintained by DRMO Yard personnel for three years and then were destroyed. Complete records of DRMO Yard activities are therefore unavailable.

The Directorate of Logistics has constructed two large gravel pads in the DRMO Yard for storage and staging of equipment and vehicles prior to deployment. A number of fuel spills were observed as a result of the activities on these new pads. The nature and extent of these spills were investigated by Jacobs Engineering during 2010, and a soil excavation was completed.

Pre-ROD Response

From 1988 to 1996, eight leaking underground petroleum storage tanks, ranging in size from 500 gallons to 10,000 gallons were removed from the DRMO Yard. Cleanup of the associated petroleum-contaminated soil and groundwater is being conducted under the 2-PTY.

5.3.3 Remedy Selection

Nature of Contamination

DRMO-1 (OU2 Three-Party Treatment System)

The DRMO-1 sub-area was the site of waste oil drum and transformer storage, but no discrete source was identified for the perchloroethylene (PCE), TCE, DRO, and GRO contamination at this location. A well defined plume of groundwater contaminated with PCE and TCE was delineated at DRMO-1 during 1995 RI activities.

In addition to the above contaminants, 1,1-DCE and cis-1,2-DCE are known breakdown products of PCE and TCE. Although not detected during the RI, these compounds were considered to be contaminants of potential concern in formulating the RAOs for the DRMO Yard. The location of the PCE or TCE release has been determined to be within the treatment area.

DRMO-4

Benzene and PCE contamination at the DRMO-4 source area appears to have resulted from miscellaneous releases associated with activities occurring along a railroad spur, resulting in a smaller groundwater contamination plume and lower contaminant concentrations than was evidenced in DRMO-1.

Remedial Action Objectives

RAOs for the DRMO Yard and the former Building 1168 Leach Well source area are identical and were described in Section 5.2.3.

ARARs

ARARs for the DRMO Yard and the former Building 1168 Leach Well source area are identical and were described in Section 5.2.3.

Cleanup Goals

Groundwater

Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, PCE, TCE, vinyl chloride, 1,1-DCE, and cis-1,2-DCE at the DRMO Yard source area.

Soil

ADEC soil cleanup matrix cleanup levels were adopted as preliminary remediation goals for DRO in the DRMO Yard source area.

Numeric values for the cleanup goals established in the RODs are summarized in Appendix C.

Selected Remedy

The goal of this remedial action is to restore groundwater to its beneficial use as a drinking water aquifer and to remediate soil to State of Alaska cleanup levels for non-UST petroleum-contaminated soil. To achieve the OU2 ROD objectives, the remedial action components specified for the DRMO source area included:

Soil Vapor Extraction and Air Sparging

- *In-situ* treatment of groundwater via AS to remove volatile organic compounds, thereby attaining RAOs
- *In-situ* treatment of soil via SVE to prevent contaminated soil from acting as an ongoing source of contamination to groundwater
- Treatment system evaluation and modification as necessary to optimize effectiveness
- Periodic monitoring and evaluation of air emissions from the soil vapor AS/SVE treatment system to meet air emission requirements
- Periodic groundwater monitoring and off-gas measurements to determine attainment of RAOs
- Natural Attenuation and Groundwater Monitoring
- Achieve AWQS through natural attenuation after active treatment attains state and federal maximum contaminant levels

Institutional Controls

Maintain ICs, including restricted access, well development restrictions and prohibition against refilling fire suppression water tank from the on-site well, as long as hazardous substances remain on site at levels that preclude unrestricted use.

5.3.4 Status of Remediation

In-Situ Treatment of Groundwater and Soil

DRMO-1(OU2 Three-Party Treatment System)

The OU2 AS/SVE Treatment System was installed at the DRMO-1 source area in the summer of 1997. The system was composed of a blower enclosure, 4 manifold boxes, and a well field. The AS and SVE blowers, electrical components, and soil gas vapor treatment equipment were housed in the enclosure. The AS well field consisted of 52 AS probes with screens 2 feet in length at an approximate depth of 32.5 ft-bgs. The SVE collection was through 16 horizontal screens, each 10 feet in length and buried to a depth of 5 ft-bgs within the AS well field.

This AS/SVE system was initially bisected by a soil stockpile. The stockpile was suspected of contributing to groundwater contamination, potentially limiting the effectiveness of remediation. After removal of the stockpile, a monitoring well was installed at that location. Sampling results for this well indicated that the AS/SVE system was effectively remediating the contaminated area. The AS/SVE system was designed to operate only in the summer months (May through October) and operated seasonally from 1997 to 2005. The AS system was operated

continuously in 2004 and 2005; in 2005 the sparge wells were rehabilitated to help improve air flow through the soil. However, PCE removal rates remained low in 2005. As a result of the declining PCE removal rates and the fact that operation of the system may reduce the effectiveness of anaerobic biodegradation of chlorinated compounds, the RPMs decided to shut down the AS/SVE system in 2005. Groundwater sampling between 2006 and 2008 showed contaminant concentrations slightly above the RAGs, but did not identify contaminant rebound following the shutdown of the treatment system, and the system was decommissioned in October 2008. A LTMO analysis was completed in 2008, and the results showed that the contaminant plumes are stable or decreasing, and reductions in the monitoring program would be appropriate. Sampling frequency was reduced from semiannual to annual and several wells were eliminated from the monitoring network in 2009.

Although the LTMO analysis identified stable and decreasing trends for the COCs, it also indicated that contaminants will likely persist for a significant time above the Remedial Action Goal (RAG). Based on these results, injection of an *in-situ* chemical reduction (ISCR) compound of zero valent iron with a fibrous organic material was conducted to stimulate reductive dechlorination and achieve remedial goals in a shorter timeframe. This injection was completed during 2009. Contaminant concentrations were observed to decrease to their lowest levels 10 months following the injection. However, the groundwater geochemistry after 10 months indicated that groundwater conditions were returning to pre-injection conditions. As a result, a second injection was completed at this site in 2010.

DRMO-4

PCE concentrations have remained above the RAO in several wells or probes in the DRMO-4 sub-area; therefore the decision was made to conduct a treatability study using ISCR in 2009. The primary focus of the ISCR injection was the PCE contamination above cleanup levels observed in PO5. The PCE concentrations immediately following the injection increased to their highest concentration since fall 2007. Following the initial PCE increase, concentrations were observed to decrease and remained below the cleanup level through the October 2010 sampling event. TCE has only been detected once above the cleanup level in PO5 at 5.5 μg/L in 2002.

Groundwater Monitoring

DRMO-1 (OU2 Three-Party Treatment System)

Groundwater monitoring at DRMO-1 is performed on an annual basis. However, groundwater samples were collected on a more frequent basis from selected wells in 2009 and 2010 as part of the ISCR evaluation. The groundwater monitoring component includes sampling and analysis of ten wells located in and adjacent to the DRMO Yard. DRMO picket wells located along the northwest boundary of the yard have also been used to evaluate potential downgradient migration of the PCE/TCE plume.

Four monitoring wells (AP-10015, AP-10016, AP-10017, and AP-10018) were installed in 2009 near AP-8914R (formerly well AP-6803 and AP-8914) to further delineate the DRMO1 PCE plume and evaluate effectiveness of ISCR injection. Prior to the ISCR injection in 2009, PCE was detected in the groundwater above the cleanup levels in only one monitoring well, AP-8914R. Following the 2009 injection, PCE was detected above the cleanup level in the four newly installed wells at the source area. The increase in the dissolved PCE plume above cleanup levels and the increase in PCE concentrations was likely a result of displacement of residual non-aqueous phase liquid (NAPL), and/or displacement of PCE in the pore space by the injected material. PCE concentrations again increased slightly following a 2010 injection,

but the increase was not as significant as the increase observed in 2009. This likely indicates that there was only a small amount of residual contamination remaining in the soils, and most of it may have been moved out of the soils during the 2009 injection event.

PCA and TCE are consistently detected in five downgradient wells within the DRMO-1 subarea; however, concentrations are below RAGs. PCE and TCE concentrations have never been detected above ROD cleanup goals in any of the Picket Wells, which are located farther downgradient along the northwest border of DRMO1. Currently, only one picket well, AP-7328, is sampled annually.

The overall decrease in contaminant levels seen in the area of the predicted plume is attributed to the operation of the OU2 treatment system.

DRO has been consistently detected above the ADEC cleanup level in one monitoring well, AP-7560. The highest DRO detection was 13,000 µg/L in June 2000, with typical detections between 5,000 µg/L and 10,000 µg/L. DRO was also detected in monitoring wells within the ISCR treatment area following the injections during 2010; however, it is suspected that the DRO detections are a result of the organic carbon material introduced during ISCR and not DRO contamination.

DRMO-4

Long term monitoring is being conducted at DRMO-4. In 2002, several groundwater probes were installed downgradient of the DRMO-4 source to further delineate groundwater contamination. LTMO analysis for this site also showed that the COCs have stable and decreasing concentration trends, and reductions in the monitoring program would be appropriate. As a result, the sampling frequency was reduced from semiannual to annual and one well was eliminated from the monitoring network in 2009. Groundwater data indicate that reductive dechlorination is occurring; however, the rate may be limited by the availability of carbon sources. First order attenuation rate analysis also showed the contaminants will likely remain above the RAG for a significant period of time. Injection of an ISCR compound was conducted at this site in 2009 to stimulate reductive dechlorination and achieve remedial goals in a shorter timeframe. PCE was reduced below the RAG following the injection as shown in the 2010 groundwater monitoring results. Figure 5-5 provides an overview of groundwater monitoring results from the DRMO Yard.

Institutional Controls

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. Appendix A also includes a map that shows the boundaries of all sites on Fort Wainwright where ICs are in effect.

ICs at the DRMO site have been implemented. Access to the site is restricted by a chain-link fence. In 2005, an additional chain-link fence was installed that separates the treatment areas from the storage areas at the DRMO-1 area. In 2008, a fence was installed within the DRMO yard near the DRMO-5 subarea to secure equipment for troop deployment. Controlled access on the east side of the site is maintained by the operators of the DRMO facility, and controlled access from the west side of the site is maintained by the LBE group.

Excavation in the site area is restricted and groundwater intrusion is restricted subject to approval by DPW Environmental. The on-site production well is restricted from filling the fire suppressant tank except in an emergency. The IC limits are within the fenced area of the DRMO Yard, since 2001 only wells within the fenced area have exceeded the RAG. ICs will

remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use.

Site Inspection

A site inspection was conducted on May 12, 2011. The AS/SVE treatment systems are no longer operating at this site and were decommissioned in 2008. The chain link fence that restricts access to the site is intact and uncompromised. All wells used for continued groundwater monitoring at the site are locked and in good condition.

5.3.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

Air Sparging and Soil Vapor Extraction

In 2005, the AS/SVE system was shut down because the remedy selected to address VOC contamination at the DRMO yard site was exhibiting diminishing effects at reducing the levels of contaminants in the soil, and would likely inhibit natural attenuation of the remaining contamination. This conclusion is supported by air effluent monitoring data that indicated decreasing amounts of VOCs removed at the site. Furthermore, groundwater data indicated that VOC levels remain relatively stable. Groundwater monitoring has been conducted at the site since 2005 to evaluate rebound effects and to determine the effectiveness of natural attenuation at the site.

Natural Attenuation with Groundwater Monitoring

Natural attenuation parameters have been monitored at the site since 2006. An evaluation of the results through 2008 showed that the influence of the treatment system operation lessened over time, but the oxidative state of the aquifer remained above the optimal range for reductive dechlorination to occur. As a result, the ISCR injection was recommended to treat the remaining PCE contamination above RAOs in the source area.

Geochemical conditions downgradient of the treatment area have generally remained sufficiently anaerobic to permit some degree of reductive dechlorination. However, VOCs above RAOs have not been detected in these wells.

Institutional Controls

ICs are in effect and will continue to restrict site access and groundwater usage. Details of the Post-wide ICs policy are provided in Appendix A.

Table 5-6 summarizes performance to date related to the RAOs for this source area.

Table 5-6. Performance to Date of Remedial Action Objectives at OU2 DRMO Yard

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame through source control	Groundwater monitoring data shows that the DRMO-1 Three-Party treatment system was effective in reducing COCs. However, because the influence of the treatment system diminished, it was shutdown in 2005. Groundwater data also show an apparent degradation of PCE to TCE in DRMO-4 since the ROD. LTMO analysis of the site indicated stable and decreasing trends for the COCs, but also indicated that the contaminants will likely persist. As a result, ISCR injection was initiated at the DRMO-1 and DRMO-4 sites in 2009 to enhance remediation of PCE and reduce monitoring timeframes. A second injection was also completed at the DRMO-1 site in 2010.
Reduce or prevent further migration of contaminated groundwater from the source areas	Groundwater monitoring since the ROD indicates that there has been no further migration of contamination from the source area.
Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act and State of Alaska Drinking Water Standard MCLs and AWQS	ICs restrict groundwater use in this area.
Use natural attenuation to attain AWQS (18 AAC 70) after reaching state and federal MCLs	Following attainment of RAGs natural attenuation will be evaluated by groundwater monitoring.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- The assumption that contamination in soil will not leach into the groundwater was validated by soil and groundwater sampling results from 2009 and 2010. PCE concentrations near the cleanup levels were observed in soils, and limited PCE rebound was observed following the 2009 injection at DRMO-4 and following the 2010 injection at DRMO-1. Groundwater contamination levels in downgradient wells have remained relatively constant below the RAOs over the past five years. Additionally, the potential for off-site contamination was investigated in 2006. The investigation included installation of soil borings and monitoring wells along the western boundary of the site, and PCE and TCE were not detected at concentrations that would indicate a contamination source in this area.
- The assumption that the groundwater contamination will not migrate off of the site is validated by the groundwater monitoring results on site and at the picket wells. The assumption that the contamination will naturally attenuate is still being investigated.
- ICs are in effect and will continue to restrict groundwater usage.
- There are no known changes in exposure pathways or populations at risk.
- The MCLs used to establish the groundwater cleanup goals for the DRMO Yard source area have not changed since the ROD.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy. The remedy is protective in the short term and in the long term.

Variances

There were no variances.

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2006 second Five-Year Review are shown in Table 5-7.

Table 5-7. Response to Recommendations from 2006 Five-Year Review

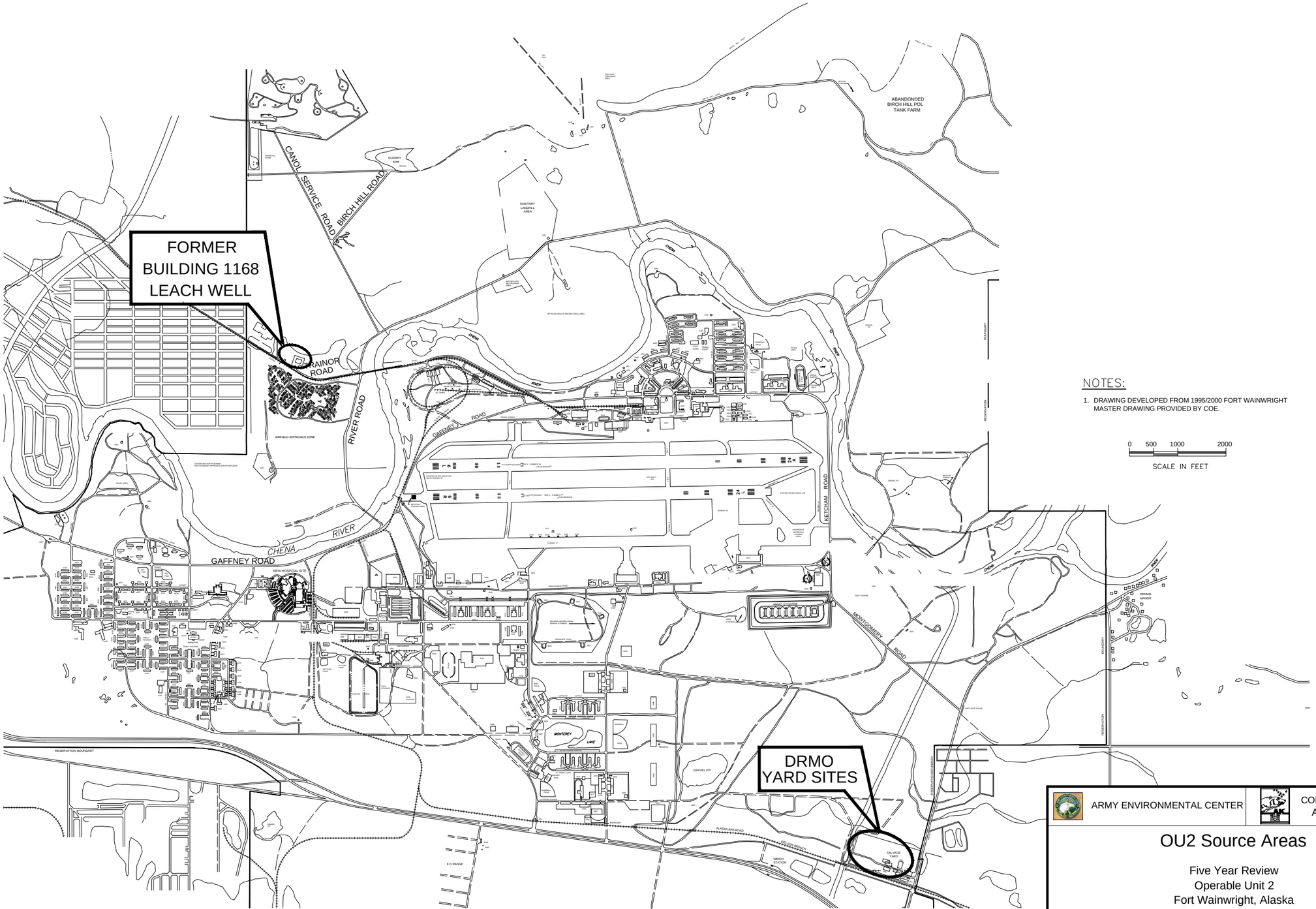
Recommendation/ Follow-Up Action from 2006 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Continue to evaluate sampling results and natural attenuation parameters to determine if the system should be turned back on.	Groundwater sampling of the DRMO1 (3-Party) area between 2006 and 2008 did not identify contaminant rebound following the shutdown of the treatment system, and the system was decommissioned in October 2008. ISCR injection was initiated in 2009 to enhance MNA of PCE.	U.S. Army	2008	No

Recommendations and Follow-up Actions

The following actions presented in Table 5-8 are recommended based on the evaluation completed during the 2011 Five-Year Review.

Table 5-8. Recommendations and Follow-Up Actions for OU2 DRMO Yard

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
The current site model indicates that contamination does not appear to be migrating off-site, and continued groundwater monitoring should be sufficient to ensure protectiveness.	U.S. Army	EPA / ADEC	Ongoing	No
Continue evaluation of the ISCR treatability study and conduct additional injections if necessary.	U.S. Army	EPA / ADEC	Ongoing	No



NOTES:

1. DRAWING DEVELOPED FROM 1995/2000 FORT WAINWRIGHT MASTER DRAWING PROVIDED BY COE.

0 500 1000 2000

SCALE IN FEET

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OU2 Source Areas

Five Year Review
Operable Unit 2
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2010 Annual Report	5-1	9/11

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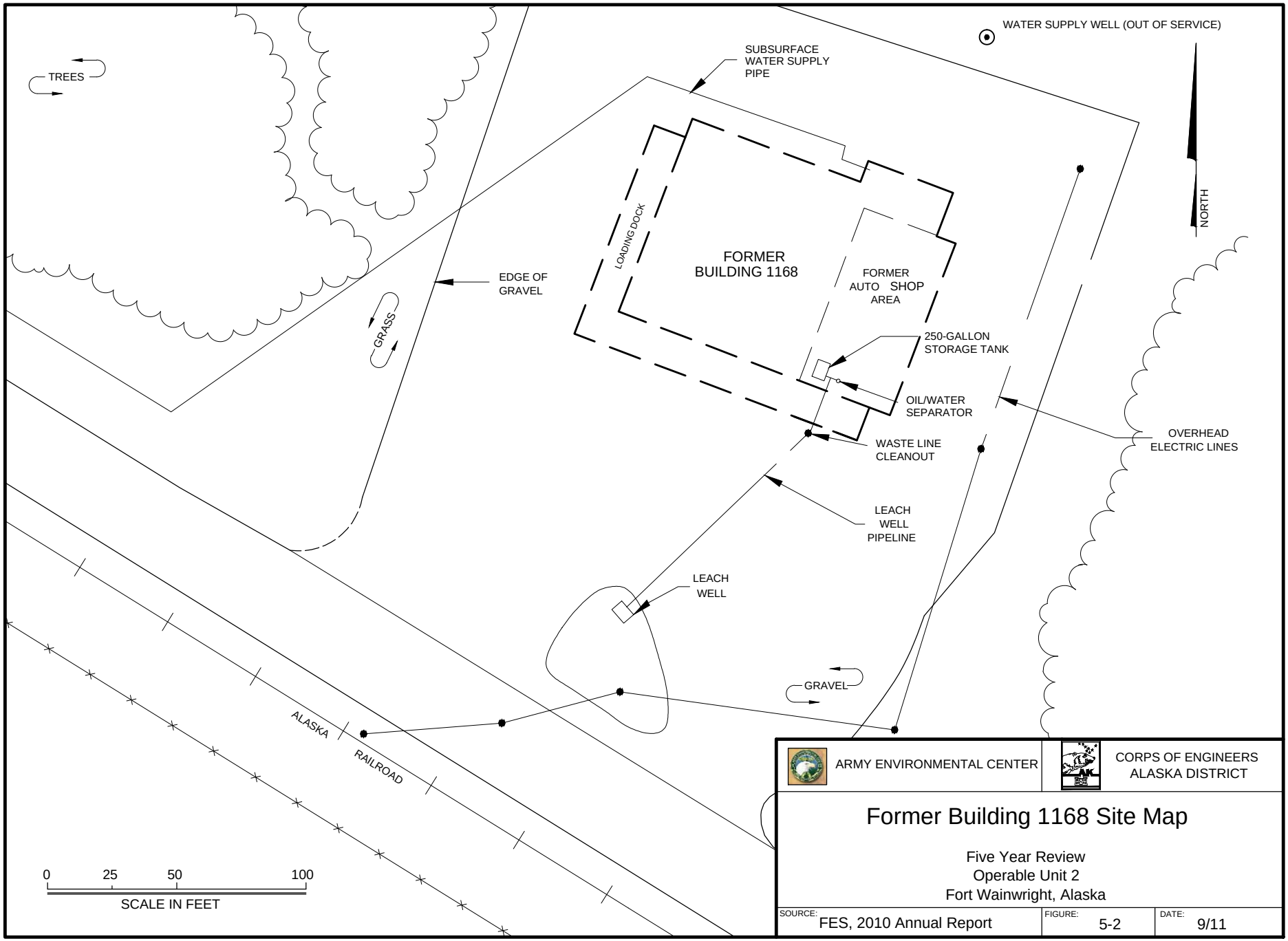

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Former Building 1168 Site Map

Five Year Review
Operable Unit 2
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2010 Annual Report	5-2	9/11

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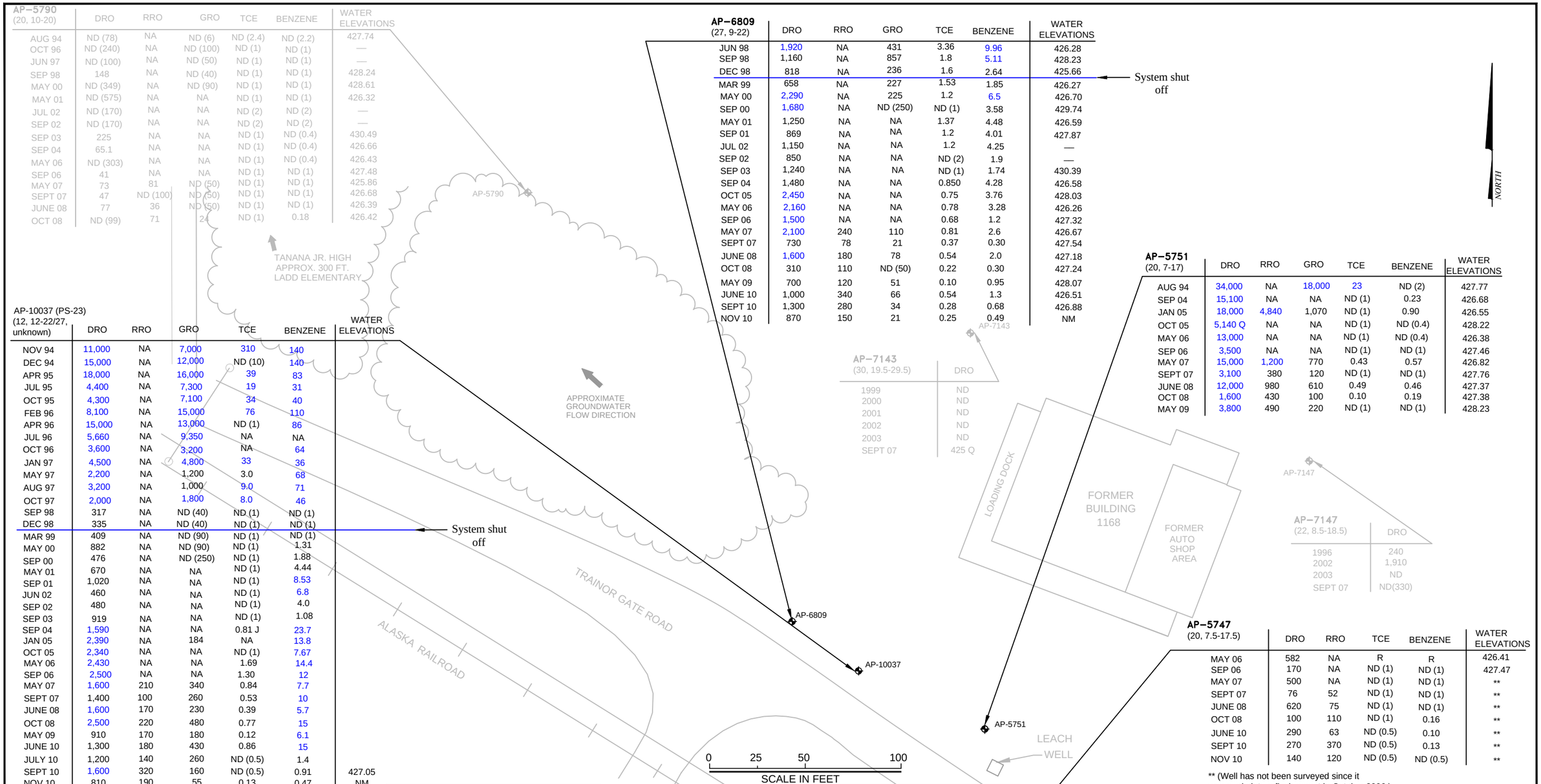

AP-5790 (20, 10-20)	DRO	RRO	GRO	TCE	BENZENE	WATER ELEVATIONS
AUG 94	ND (78)	NA	ND (6)	ND (2.4)	ND (2.2)	427.74
OCT 96	ND (240)	NA	ND (100)	ND (1)	ND (1)	—
JUN 97	ND (100)	NA	ND (50)	ND (1)	ND (1)	—
SEP 98	148	NA	ND (40)	ND (1)	ND (1)	428.24
MAY 00	ND (349)	NA	ND (90)	ND (1)	ND (1)	428.61
MAY 01	ND (575)	NA	NA	ND (1)	ND (1)	426.32
JUL 02	ND (170)	NA	NA	ND (2)	ND (2)	—
SEP 02	ND (170)	NA	NA	ND (2)	ND (2)	—
SEP 03	225	NA	NA	ND (1)	ND (0.4)	430.49
SEP 04	65.1	NA	NA	ND (1)	ND (0.4)	426.66
MAY 06	ND (303)	NA	NA	ND (1)	ND (0.4)	426.43
SEP 06	41	NA	NA	ND (1)	ND (1)	427.48
MAY 07	73	81	ND (50)	ND (1)	ND (1)	425.86
SEPT 07	47	ND (100)	ND (50)	ND (1)	ND (1)	426.68
JUNE 08	77	36	ND (50)	ND (1)	ND (1)	426.39
OCT 08	ND (99)	71	24	ND (1)	0.18	426.42

AP-10037 (PS-23) (12, 12-22/27, unknown)	DRO	RRO	GRO	TCE	BENZENE	WATER ELEVATIONS
NOV 94	11,000	NA	7,000	310	140	
DEC 94	15,000	NA	12,000	ND (10)	140	
APR 95	18,000	NA	16,000	39	83	
JUL 95	4,400	NA	7,300	19	31	
OCT 95	4,300	NA	7,100	34	40	
FEB 96	8,100	NA	15,000	76	110	
APR 96	15,000	NA	13,000	ND (1)	86	
JUL 96	5,660	NA	9,350	NA	NA	
OCT 96	3,600	NA	3,200	NA	64	
JAN 97	4,500	NA	4,800	33	36	
MAY 97	2,200	NA	1,200	3.0	68	
AUG 97	3,200	NA	1,000	9.0	71	
OCT 97	2,000	NA	1,800	8.0	46	
SEP 98	317	NA	ND (40)	ND (1)	ND (1)	
DEC 98	335	NA	ND (40)	ND (1)	ND (1)	
MAR 99	409	NA	ND (90)	ND (1)	ND (1)	
MAY 00	882	NA	ND (90)	ND (1)	1.31	
SEP 00	476	NA	ND (250)	ND (1)	1.88	
MAY 01	670	NA	NA	ND (1)	4.44	
SEP 01	1,020	NA	NA	ND (1)	8.53	
JUN 02	460	NA	NA	ND (1)	6.8	
SEP 02	480	NA	NA	ND (1)	4.0	
SEP 03	919	NA	NA	ND (1)	1.08	
SEP 04	1,590	NA	NA	0.81 J	23.7	
JAN 05	2,390	NA	184	NA	13.8	
OCT 05	2,340	NA	NA	ND (1)	7.67	
MAY 06	2,430	NA	NA	1.69	14.4	
SEP 06	2,500	NA	NA	1.30	12	
MAY 07	1,600	210	340	0.84	7.7	
SEPT 07	1,400	100	260	0.53	10	
JUNE 08	1,600	170	230	0.39	5.7	
OCT 08	2,500	220	480	0.77	15	
MAY 09	910	170	180	0.12	6.1	
JUNE 10	1,300	180	430	0.86	15	
JULY 10	1,200	140	260	ND (0.5)	1.4	
SEPT 10	1,600	320	160	ND (0.5)	0.91	427.05
NOV 10	810	190	55	0.13	0.47	NM

Water elevation data for PS-23 is not available because well has not been surveyed. Replacement well AP-10037 has been surveyed.

AP-6809 (27, 9-22)	DRO	RRO	GRO	TCE	BENZENE	WATER ELEVATIONS
JUN 98	1,920	NA	431	3.36	9.96	426.28
SEP 98	1,160	NA	857	1.8	5.11	428.23
DEC 98	818	NA	236	1.6	2.64	425.66
MAR 99	658	NA	227	1.53	1.85	426.27
MAY 00	2,290	NA	225	1.2	6.5	426.70
SEP 00	1,680	NA	ND (250)	ND (1)	3.58	429.74
MAY 01	1,250	NA	NA	1.37	4.48	426.59
SEP 01	869	NA	NA	1.2	4.01	427.87
JUL 02	1,150	NA	NA	1.2	4.25	—
SEP 02	850	NA	NA	ND (2)	1.9	—
SEP 03	1,240	NA	NA	ND (1)	1.74	430.39
SEP 04	1,480	NA	NA	0.850	4.28	426.58
OCT 05	2,450	NA	NA	0.75	3.76	428.03
MAY 06	2,160	NA	NA	0.78	3.28	426.26
SEP 06	1,500	NA	NA	0.68	1.2	427.32
MAY 07	2,100	240	110	0.81	2.6	426.67
SEPT 07	730	78	21	0.37	0.30	427.54
JUNE 08	1,600	180	78	0.54	2.0	427.18
OCT 08	310	110	ND (50)	0.22	0.30	427.24
MAY 09	700	120	51	0.10	0.95	428.07
JUNE 10	1,000	340	66	0.54	1.3	426.51
SEPT 10	1,300	280	34	0.28	0.68	426.88
NOV 10	870	150	21	0.25	0.49	NM

System shut off

AP-7143 (30, 19.5-29.5)	DRO
1999	ND
2000	ND
2001	ND
2002	ND
2003	ND
SEPT 07	425 Q

AP-5751 (20, 7-17)	DRO	RRO	GRO	TCE	BENZENE	WATER ELEVATIONS
AUG 94	34,000	NA	18,000	23	ND (2)	427.77
SEP 04	15,100	NA	NA	ND (1)	0.23	426.68
JAN 05	18,000	4,840	1,070	ND (1)	0.90	426.55
OCT 05	5,140 Q	NA	NA	ND (1)	ND (0.4)	428.22
MAY 06	13,000	NA	NA	ND (1)	ND (0.4)	426.38
SEP 06	3,500	NA	NA	ND (1)	ND (1)	427.46
MAY 07	15,000	1,200	770	0.43	0.57	426.82
SEPT 07	3,100	380	120	ND (1)	ND (1)	427.76
JUNE 08	12,000	980	610	0.49	0.46	427.37
OCT 08	1,600	430	100	0.10	0.19	427.38
MAY 09	3,800	490	220	ND (1)	ND (1)	428.23

AP-7147 (22, 8.5-18.5)	DRO
1996	240
2002	1,910
2003	ND
SEPT 07	ND(330)

AP-5747 (20, 7.5-17.5)	DRO	RRO	TCE	BENZENE	WATER ELEVATIONS
MAY 06	582	NA	R	R	426.41
SEP 06	170	NA	ND (1)	ND (1)	427.47
MAY 07	500	NA	ND (1)	ND (1)	**
SEPT 07	76	52	ND (1)	ND (1)	**
JUNE 08	620	75	ND (1)	ND (1)	**
OCT 08	100	110	ND (1)	0.16	**
JUNE 10	290	63	ND (0.5)	0.10	**
SEPT 10	270	370	ND (0.5)	0.13	**
NOV 10	140	120	ND (0.5)	ND (0.5)	**

** (Well has not been surveyed since it was made into a flush mount in October 2006.)

Notes:

1. Trainor gate road near former Building 1168 was repaved in the Fall of 2006. AP-5747 was within the altered road and converted into a flush mount. The well was converted post sampling event in September 2006.
2. ADEC Cleanup levels for GRO changed from 1,300 µg/L to 2,200 µg/L in October 2008.
3. AP-7143 and AP-7147 are associated with the 2-Party Site and have not been sampled since 2007.
4. AP-5790 is associated with the 3-Party Site and has not been sampled since 2008.
5. Regenesis RegenOx and ORC-A injection completed near PS-23R in October 2010.
6. PS-23 was replaced by AP-10037 in July 2010.

LEGEND

AP-6809	MONITORING WELL LOCATION AND NUMBER
DRO	DIESEL RANGE ORGANICS
RRO	RESIDUAL RANGE ORGANICS
GRO	GASOLINE RANGE ORGANICS
TCE	TRICHLOROETHENE
bgs	BELOW GROUND SURFACE
NA	ANALYSIS NOT PERFORMED
ND	NOT DETECTED (REPORTING LIMITS)
—	DATA NOT FOUND
NM	NOT MEASURED

KEY:

SAMPLING POINT

TOTAL DEPTH, SCREENED INTERVAL (bgs)

ANALYTES OF CONCERN

AP-5751 (20, 7-17)	DRO	GRO	TCE	BENZENE	WATER ELEVATIONS
AUG 94	34,000	18,000	23	ND (2)	427.77
SEP 04	15,100	NA	ND (1)	0.23	426.68
JAN 05	19,300	1,080	NA	0.9	426.55
OCT 05	5,140	NA	ND (1)	ND (0.4)	428.22

SAMPLE MONTH

CONCENTRATIONS EXCEEDING CLEANUP LEVELS

CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)

ELEVATIONS IN FEET MEAN SEA LEVEL

SEE LEGEND FOR ABBREVIATIONS.

CLEANUP LEVELS (µg/L)	
5.0	BENZENE
1,500	DRO
2,200	GRO
1,100	RRO
5.0	TCE

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Former Building 1168 Groundwater Monitoring Results

Five Year Review
Operable Unit 2
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
FES, 2010 Annual Report	5-3	9/11

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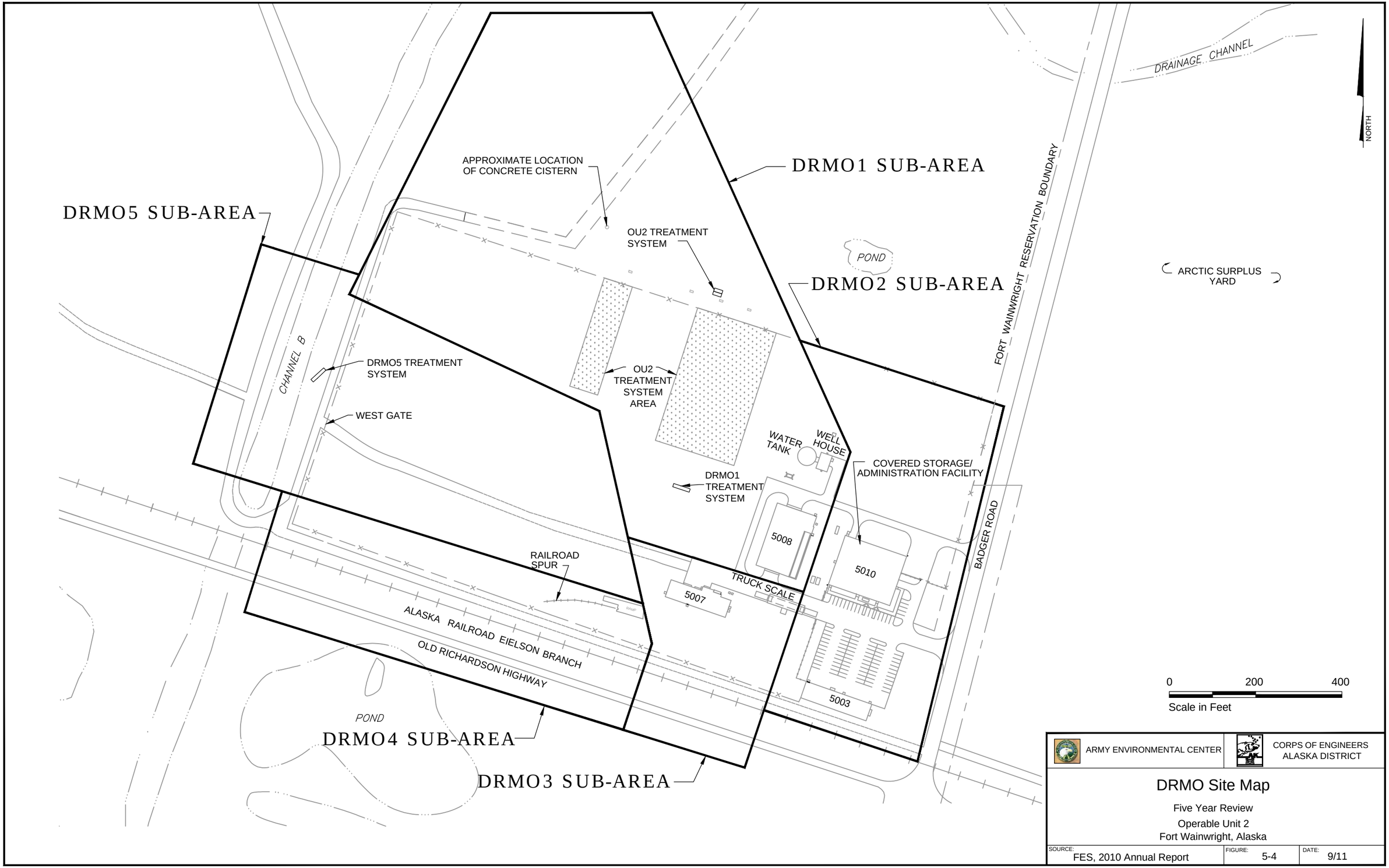
DRMO1 SUB-AREA
DRMO2 SUB-AREA
DRMO3 SUB-AREA
DRMO4 SUB-AREA
DRMO5 SUB-AREA
APPROXIMATE LOCATION OF CONCRETE CISTERN
OU2 TREATMENT SYSTEM
OU2 TREATMENT SYSTEM AREA
DRMO5 TREATMENT SYSTEM
DRMO1 TREATMENT SYSTEM
WEST GATE
RAILROAD SPUR
CHANNEL B
POND
POND
DRAINAGE CHANNEL
FORT WAINWRIGHT RESERVATION BOUNDARY
ARCTIC SURPLUS YARD
WATER TANK
WELL HOUSE
COVERED STORAGE/ ADMINISTRATION FACILITY
5008
5010
5007
5003
TRUCK SCALE
BADGER ROAD
ALASKA RAILROAD EIELSON BRANCH
OLD RICHARDSON HIGHWAY
NORTH
0
200
400
Scale in Feet
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
DRMO Site Map
Five Year Review
Operable Unit 2
Fort Wainwright, Alaska
SOURCE: FES, 2010 Annual Report
FIGURE: 5-4
DATE: 9/11
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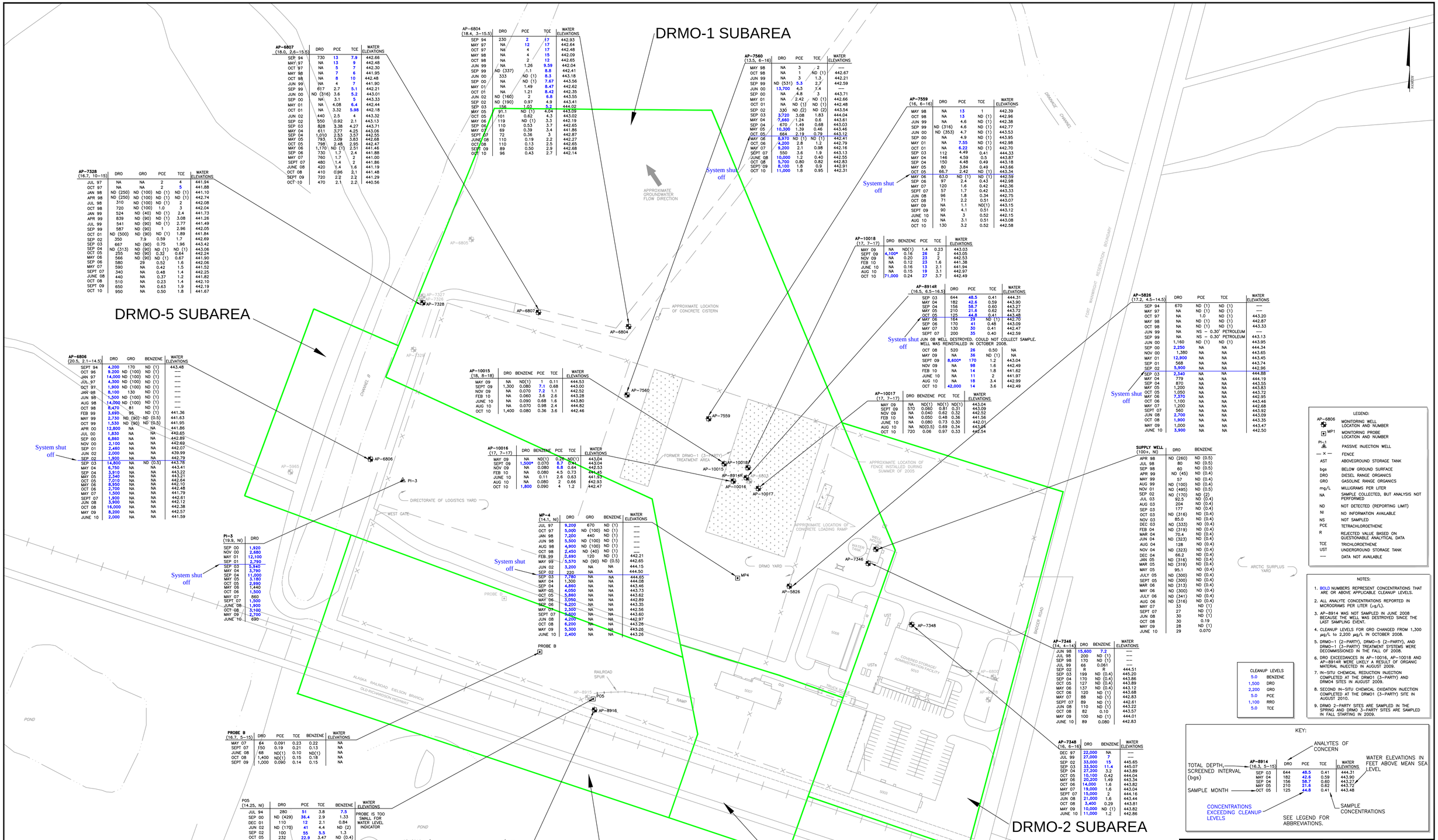

AP-6807 (18.0, 2.6–15.5)	DRO	PCE	TCE	WATER ELEVATIONS
SEP 94	730	13	7.9	442.66
MAY 97	NA	13	9	442.48
OCT 97	NA	5	7	442.30
MAY 98	NA	7	6	441.95
OCT 98	NA	8	10	442.48
JUN 99	NA	4	7	441.90
SEP 99	617	2.7	5.1	442.21
JUN 00	ND (316)	3.6	5.2	443.01
SEP 00	NA	3.1	5	443.33
MAY 01	NA	4.08	6.4	442.44
OCT 01	NA	3.32	5.98	442.18
JUN 02	440	2.5	4	443.32
SEP 02	550	0.92	2.1	443.13
SEP 03	828	3.38	4.27	443.71
MAY 04	611	3.77	4.25	443.06
SEP 04	1,010	2.53	3.57	442.55
MAY 05	793	3.09	3.83	442.68
OCT 05	798	2.48	2.95	442.47
MAY 06	1,170	ND (1)	2.51	441.46
SEP 06	730	1.7	2.4	441.88
MAY 07	760	1.7	2	441.00
SEPT 07	480	1.4	2	441.86
JUNE 08	420	1.4	1.6	441.19
OCT 08	410	0.96	2.1	441.48
SEPT 09	720	2.2	2.3	441.29
OCT 10	470	2.1	2.2	440.56

AP-6804 (18.4, 3–15.5)	DRO	PCE	TCE	WATER ELEVATIONS
SEP 94	230	2	17	442.93
MAY 97	NA	12	17	442.64
OCT 97	NA	4	17	442.48
MAY 98	NA	4	15	442.09
OCT 98	NA	2	12	442.65
JUN 99	NA	1.26	9.59	442.04
SEP 99	ND (337)	1.1	8.8	442.41
JUN 00	333	ND (1)	8.3	443.18
SEP 00	NA	ND (1)	7.67	443.56
MAY 01	NA	1.49	8.47	442.62
OCT 01	NA	1.21	8.42	442.35
JUN 02	ND (160)	2	6.8	443.55
SEP 02	ND (190)	0.97	4.9	443.41
SEP 03	156	1.03	5.2	444.02
MAY 05	91.1	ND (1)	4.04	443.09
OCT 05	101	0.62	4.3	443.02
MAY 06	119	ND (1)	3.3	442.19
SEP 06	110	0.53	3.7	442.65
MAY 07	69	0.39	3.4	441.86
SEPT 07	72	0.36	3	442.87
JUNE 08	110	0.19	2.2	442.27
OCT 08	110	0.13	2.5	442.65
SEPT 09	89	0.50	2.9	442.68
OCT 10	96	0.43	2.7	442.14

AP-7560 (13.5, 6–16)	DRO	PCE	TCE	WATER ELEVATIONS
MAY 98	NA	3	2	—
OCT 98	NA	1	ND (1)	442.67
JUN 99	NA	3	1.3	442.21
SEP 99	ND (531)	5.3	2.7	442.59
JUN 00	13,700	4.3	1.4	—
SEP 00	NA	4.8	3	443.71
MAY 01	NA	2.42	ND (1)	442.66
OCT 01	NA	ND (1)	ND (1)	442.48
SEP 02	330	ND (2)	ND (2)	443.54
SEP 03	3,720	3.08	1.83	444.04
MAY 04	7,660	1.24	0.6	443.61
SEP 04	670	1.49	0.68	443.03
MAY 05	10,300	1.39	0.46	443.46
OCT 05	664	2.19	0.79	443.12
MAY 06	8,970	ND (1)	ND (1)	442.41
OCT 06	4,200	2.8	1.2	442.79
MAY 07	9,200	2.1	0.98	442.16
SEPT 07	550	3.6	1.9	443.13
JUNE 08	10,000	1.2	0.40	442.55
OCT 08	5,700	0.80	0.82	442.83
SEPT 09	8,100	1.8	0.9	442.91
OCT 10	11,000	1.8	0.95	442.31

AP-7559 (16, 6–16)	DRO	PCE	TCE	WATER ELEVATIONS
MAY 98	NA	13	1	442.39
OCT 98	NA	13	ND (1)	442.96
JUN 99	NA	4.6	ND (1)	442.38
SEP 99	ND (316)	4.6	ND (1)	442.77
JUN 00	ND (353)	4.7	ND (1)	443.53
SEP 00	NA	4.9	ND (1)	443.95
MAY 01	NA	7.55	ND (1)	442.98
OCT 01	NA	6.22	ND (1)	442.70
SEP 03	112	4.49	0.41	444.33
MAY 04	146	4.59	0.5	443.87
SEP 04	150	4.48	0.49	443.18
MAY 05	80	3.84	0.49	443.66
OCT 05	66.7	2.42	ND (1)	443.34
MAY 06	63.0	ND (1)	ND (1)	442.59
SEP 06	97	2.4	0.43	442.98
MAY 07	120	1.6	0.42	442.36
SEPT 07	57	1.7	0.42	443.33
JUN 08	96	1.8	0.34	442.75
OCT 08	71	2.2	0.51	443.07
MAY 09	NA	1.1	ND(1)	443.15
SEPT 09	90	4.1	0.51	443.12
JUNE 10	NA	3	0.52	442.15
AUG 10	NA	3.1	0.51	443.08
OCT 10	130	3.2	0.52	442.58

System shut off

AP-7328 (16.7, 10–15)	DRO	GRO	PCE	TCE	WATER ELEVATIONS
JUL 97	NA	NA	2	4	441.94
OCT 97	NA	NA	2	5	441.88
JAN 98	ND (250)	ND (100)	ND (1)	ND (1)	441.10
APR 98	ND (250)	ND (100)	ND (1)	ND (1)	442.74
JUL 98	310	ND (100)	ND (1)	2	442.08
OCT 98	720	ND (100)	1.0	3	442.04
JAN 99	524	ND (40)	ND (1)	2.4	441.73
APR 99	839	ND (90)	ND (1)	3.08	441.26
JUL 99	541	ND (90)	ND (1)	2.77	441.49
SEP 99	587	ND (90)	1	2.96	442.05
OCT 01	ND (500)	ND (90)	ND (1)	1.89	441.84
SEP 02	350	7.9	0.59	1.7	442.69
SEP 03	667	ND (90)	0.75	1.96	443.42
SEP 04	ND (313)	ND (90)	ND (1)	ND (1)	443.06
OCT 05	255	ND (90)	0.32	0.64	442.24
MAY 06	566	ND (90)	ND (1)	0.67	441.90
SEP 06	580	29	0.52	1.6	442.06
MAY 07	590	NA	0.42	1.5	441.52
SEPT 07	340	NA	0.48	1.4	442.25
JUNE 08	440	NA	0.37	1.2	441.82
OCT 08	510	NA	0.23	1.4	442.10
SEPT 09	650	NA	0.63	1.9	442.19
OCT 10	950	NA	0.50	1.8	441.67

System shut off

AP-10018 (17, 7–17)	DRO	BENZENE	PCE	TCE	WATER ELEVATIONS
MAY 09	NA	ND(1)	1.4	0.23	443.03
SEPT 09	4,100*	0.16	26	2	443.05
NOV 09	NA	0.20	23	2	442.53
FEB 10	NA	0.12	23	1.6	441.36
JUNE 10	NA	0.16	13	2.1	441.94
AUG 10	NA	0.15	19	3.1	442.97
OCT 10	71,000	0.24	27	3.7	442.49

AP-8914R (16.5, 6.5–16.5)	DRO	PCE	TCE	WATER ELEVATIONS
SEP 03	644	48.5	0.41	444.31
MAY 04	182	42.6	0.59	443.90
SEP 04	156	58.7	0.60	443.27
MAY 05	210	21.6	0.62	443.72
OCT 05	125	44.8	0.41	443.48
MAY 06	164	29	ND (1)	442.76
SEP 06	170	41	0.48	443.09
MAY 07	130	30	0.41	442.47
SEPT 07	200	35	0.40	442.59
JUN 08 WELL DESTROYED. COULD NOT COLLECT SAMPLE. WELL WAS REINSTALLED IN OCTOBER 2008.				
OCT 08	520	26	0.50	NA
MAY 09	NA	36	ND (1)	NA
SEPT 09	8,600*	170	1.2	443.04
NOV 09	NA	98	1.6	442.49
FEB 10	NA	14	1.8	441.62
JUNE 10	NA	11	2	441.97
AUG 10	NA	18	3.4	442.99
OCT 10	42,000	14	3.6	442.49

System shut off

AP-5826 (17.2, 4.5–14.5)	DRO	PCE	TCE	WATER ELEVATIONS
SEP 94	670	ND (1)	ND (1)	—
MAY 97	NA	ND (1)	ND (1)	—
OCT 97	NA	1.0	ND (1)	443.20
MAY 98	NA	ND (1)	ND (1)	442.87
OCT 98	NA	ND (1)	ND (1)	443.33
JUN 99	NA	NS – 0.30" PETROLEUM		—
SEP 99	NA	NS – 0.30" PETROLEUM		443.13
JUN 00	1,160	ND (1)	ND (1)	443.95
SEP 00	2,250	NA	NA	444.34
NOV 00	1,380	NA	NA	443.65
MAY 01	12,900	NA	NA	443.45
SEP 01	568	NA	NA	443.74
SEP 02	5,900	NA	NA	442.96
SEP 03	2,540	NA	NA	444.88
MAY 04	779	NA	NA	444.19
SEP 04	870	NA	NA	443.55
MAY 05	1,200	NA	NA	443.83
OCT 05	1,050	NA	NA	443.72
MAY 06	7,370	NA	NA	442.95
OCT 06	1,100	NA	NA	443.46
MAY 07	1,200	NA	NA	442.68
SEPT 07	560	NA	NA	443.92
JUN 08	2,700	NA	NA	443.09
OCT 08	1,900	NA	NA	443.35
MAY 09	1,000	NA	NA	443.47
JUNE 10	3,900	NA	NA	442.50

System shut off

AP-6806 (20.5, 2.1–14.5)	DRO	GRO	BENZENE	WATER ELEVATIONS
SEPT 94	4,200	170	ND (1)	443.48
OCT 96	9,200	ND (100)	ND (1)	—
JAN 97	14,000	ND (100)	ND (1)	—
JUL 97	4,300	ND (100)	ND (1)	—
OCT 97	1,900	ND (100)	ND (1)	—
JAN 98	8,100	130	ND (1)	—
JUN 98	1,500	ND (100)	ND (1)	—
AUG 98	14,000	ND (100)	ND (1)	—
OCT 98	8,470	81	ND (1)	—
FEB 99	3,690	95	ND (1)	441.36
MAY 99	2,730	ND (90)	ND (0.5)	441.63
OCT 99	1,550	ND (90)	ND (0.5)	441.95
APR 00	12,800	NA	NA	441.86
JUL 00	1,830	NA	NA	442.65
SEP 00	6,860	NA	NA	442.89
NOV 00	2,100	NA	NA	442.69
SEP 01	2,460	NA	NA	442.07
JUN 02	2,000	NA	NA	439.99
SEP 02	1,900	NA	NA	442.79
SEP 03	14,800	NA	ND (0.5)	443.78
MAY 04	6,750	NA	NA	443.41
SEP 04	3,910	NA	NA	443.22
MAY 05	2,340	NA	NA	443.21
OCT 05	7,010	NA	NA	442.64
MAY 06	8,950	NA	NA	442.16
OCT 06	2,700	NA	NA	442.48
MAY 07	1,500	NA	NA	441.79
SEPT 07	1,900	NA	NA	442.61
JUN 08	3,900	NA	NA	442.12
OCT 08	16,000	NA	NA	442.38
MAY 09	8,200	NA	NA	442.57
JUNE 10	2,000	NA	NA	441.59

System shut off

AP-10015 (18, 8–18)	DRO	BENZENE	PCE	TCE	WATER ELEVATIONS
MAY 09	NA	ND(1)	1	0.11	444.53
SEPT 09	1,300	0.080	7.1	0.68	443.00
NOV 09	NA	0.070	7.2	1.1	442.52
FEB 10	NA	0.060	3.6	2.6	443.28
JUNE 10	NA	0.090	0.68	1.6	443.80
AUG 10	NA	0.070	0.98	2.4	444.82
OCT 10	1,400	0.080	0.36	3.6	442.46

AP-10017 (17, 7–17)	DRO	BENZENE	PCE	TCE	WATER ELEVATIONS
MAY 09	NA	ND(1)	ND(1)	ND(1)	443.04
SEPT 09	570	0.060	0.81	0.31	443.09
NOV 09	NA	0.040	0.62	0.32	442.52
FEB 10	NA	0.050	0.48	0.36	441.56
JUNE 10	NA	0.080	0.73	0.30	442.01
AUG 10	NA	ND(0.5)	0.69	0.34	443.01
OCT 10	720	0.06	0.97	0.33	442.54

AP-10016 (17, 7–17)	DRO	BENZENE	PCE	TCE	WATER ELEVATIONS
MAY 09	NA	ND(1)	0.29	ND(1)	443.04
SEPT 09	1,500*	0.070	8.7	0.46	443.04
NOV 09	NA	0.080	6.8	0.64	442.53
FEB 10	NA	0.080	4.5	0.73	441.45
JUNE 10	NA	0.11	2.6	0.63	441.91
AUG 10	NA	0.080	2	0.66	442.93
OCT 10	1,800	0.090	4	1.2	442.47

SUPPLY WELL (100+, NI)	DRO	BENZENE
APR 98	ND (260)	ND (0.5)
JUL 98	80	ND (0.5)
SEP 98	60	ND (0.5)
APR 99	ND (45)	ND (0.4)
MAY 99	57	ND (0.4)
AUG 99	ND (100)	ND (0.4)
NOV 01	ND (495)	ND (0.5)
SEP 02	ND (170)	ND (2)
JUL 03	92.5	ND (0.4)
AUG 03	204	ND (0.4)
SEP 03	177	ND (0.4)
OCT 03	ND (316)	ND (0.4)
NOV 03	85.0	ND (0.4)
DEC 03	ND (333)	ND (0.4)
FEB 04	ND (319)	ND (0.4)
MAR 04	70.4	ND (0.4)
JUN 04	ND (323)	ND (0.4)
AUG 04	128	ND (0.4)
NOV 04	ND (323)	ND (0.4)
DEC 04	66.2	ND (0.4)
JAN 05	ND (316)	ND (0.4)
MAR 05	ND (319)	ND (0.4)
MAY 05	95.1	ND (0.4)
JULY 05	ND (300)	ND (0.4)
SEPT 05	ND (300)	ND (0.4)
MAR 06	ND (313)	ND (0.4)
MAY 06	ND (300)	ND (0.4)
JULY 06	ND (341)	ND (0.4)
AUG 06	ND (316)	ND (0.4)
MAY 07	33	ND (1)
SEPT 07	27	ND (1)
JUN 08	30	ND (1)
OCT 08	30	0.19
MAY 09	28	ND (1)
JUNE 10	29	0.070

PI-3 (19.9, NI)	DRO
SEP 00	1,920
NOV 00	2,680
MAY 01	12,100
SEP 01	2,790
SEP 03	5,940
MAY 04	3,790
SEP 04	11,000
MAY 05	3,180
OCT 05	2,910
MAY 06	1,440
OCT 06	1,500
MAY 07	860
SEPT 07	1,500
JUNE 08	1,900
OCT 08	3,100
MAY 09	2,700
JUNE 10	690

System shut off

MP-4 (14.1, NI)	DRO	GRO	BENZENE	WATER ELEVATIONS
JUL 97	9,200	670	ND (1)	—
OCT 97	5,000	ND (100)	ND (1)	—
JAN 98	7,200	440	ND (1)	—
JUN 98	5,500	ND (100)	ND (1)	—
AUG 98	4,900	ND (100)	ND (1)	—
OCT 98	2,450	ND (40)	ND (1)	—
FEB 99	2,690	120	ND (1)	442.21
MAY 99	5,570	ND (90)	ND (0.5)	442.65
JUN 02	3,200	NA	NA	444.15
SEP 02	220	NA	NA	444.50
SEP 03	7,780	NA	NA	444.65
MAY 04	1,300	NA	NA	444.08
SEP 04	4,860	NA	NA	443.46
MAY 05	4,050	NA	NA	443.73
OCT 05	5,860	NA	NA	443.62
MAY 06	3,050	NA	NA	442.89
SEP 06	6,200	NA	NA	443.35
MAY 07	2,300	NA	NA	442.56
SEPT 07	5,600	NA	NA	443.60
JUN 08	4,200	NA	NA	442.97
OCT 08	6,200	NA	NA	443.26
MAY 09	5,300	NA	NA	443.26
JUNE 10	2,400	NA	NA	443.26

System shut off

AP-7346 (14, 4–14)	DRO	BENZENE	WATER ELEVATIONS
JUN 98	15,600	7.2	—
JUL 98	200	ND (1)	—
SEP 98	170	ND (1)	—
JUL 99	66	0.061	—
SEP 02	R	R	444.51
SEP 03	199	ND (0.4)	445.20
SEP 04	170	ND (0.4)	443.86
OCT 05	127	ND (0.4)	443.89
MAY 06	137	ND (0.4)	443.12
OCT 06	120	ND (1)	443.68
MAY 07	88	ND (1)	442.83
SEPT 07	89	ND (1)	442.61
JUN 08	110	ND (1)	443.22
OCT 08	82	0.10	443.57
MAY 09	100	ND (1)	444.01
JUNE 10	89	0.080	442.83

AP-7348 (16, 6–16)	DRO	BENZENE	WATER ELEVATIONS
DEC 97	22,000	NA	—
JUL 99	27,000	7	—
SEP 02	33,000	15	445.65
SEP 03	33,500	11.4	445.07
SEP 04	27,200	3.2	443.89
OCT 05	10,100	0.42	444.04
MAY 06	20,200	1.49	443.34
OCT 06	14,000	1.6	443.82
MAY 07	19,000	1.6	443.04
SEPT 07	15,000	2	444.16
JUN 08	21,000	1.6	443.44
OCT 08	3,400	0.29	443.81
MAY 09	10,000	ND (1)	443.82
JUNE 10	11,000	1.2	442.86

PROBE B (16.7, 5–15)	DRO	PCE	TCE	BENZENE	WATER ELEVATIONS
MAY 07	64	0.091	0.23	0.22	NA
SEPT 07	150	0.19	0.21	0.13	NA
JUNE 08	68	ND(1)	0.10	ND(1)	NA
OCT 08	1,400	ND(1)	0.15	0.18	NA
SEPT 09	1,000	0.090	0.14	0.15	NA

P05 (14.25, NI)	DRO	PCE	TCE	BENZENE	WATER ELEVATIONS
JUL 94	280	51	3.8	7.5	PROBE IS TOO SMALL FOR WATER LEVEL INDICATOR
SEP 00	ND (429)	36.4	2.9	1.33	
DEC 01	110	12	2.1	0.84	
JUN 02	ND (170)	41	4.4	ND (2)	
SEP 02	100	55	5.5	1.3	
OCT 05	232	22.9	3.47	ND (0.4)	
MAY 06	196	5.9	1.38	ND (0.4)	
OCT 06	170	22	3.9	0.13	
MAY 07	90	6.4	1.4	0.19	
SEPT 07	110	21	3.5	0.11	
JUNE 08	130	6.2	1.2	0.11	
OCT 08	240	8.6	4.0	0.30	
SEPT 09	220	14	2.5	0.22	
NOV 09	NA	5.3	3.5	0.32	
FEB 10	NA	1.6	1.2	0.32	
JUNE 10	NA	1	0.69	0.39	
OCT 10	140	4	3.1	0.28	

AP-8916 (16.6, 5–15)	DRO	PCE	TCE	BENZENE	WATER ELEVATIONS
SEP 03	1,360	25	1.62	ND (0.4)	444.42
MAY 04	422	10.6	0.75	0.28	444.00
SEP 04	551	10.6	ND (1)	ND (0.4)	443.45
MAY 05	474	14.5	0.860	ND (0.4)	443.70
OCT 05	594	8.03	1.74	0.22	443.57
MAY 06	651	2.32	ND (1)	ND (0.4)	442.82
OCT 06	1,200	4.7	0.81	ND (1)	443.26
MAY 07	300	2.6	ND (5)	ND (5)	442.48
SEPT 07	260	7.5	1.2	ND (1)	443.52
JUNE 08	1,400	4.1	0.80	ND (1)	442.87
OCT 08	790	3.3	1.6	ND (1)	443.14
SEPT 09	870	6.3	1.8	ND (1)	443.17
NOV 09	NA	1.7	ND(0.5)	ND (1)	442.66
FEB 10	NA	2	ND (0.86)	ND (0.5)	441.76
JUNE 10	NA	1.9	0.52	0.34	442.25
OCT 10	1,000	4	1.50	0.59	442.64

LEGEND:

AP-6806	MONITORING WELL LOCATION AND NUMBER
MP1	MONITORING PROBE LOCATION AND NUMBER
PI-1	PASSIVE INJECTION WELL
— x —	FENCE
AST	ABOVEGROUND STORAGE TANK
bgs	BELOW GROUND SURFACE
DRO	DIESEL RANGE ORGANICS
GRO	GASOLINE RANGE ORGANICS
mg/L	MILLIGRAMS PER LITER
NA	SAMPLE COLLECTED, BUT ANALYSIS NOT PERFORMED
ND	NOT DETECTED (REPORTING LIMIT)
NI	NO INFORMATION AVAILABLE
NS	NOT SAMPLED
PCE	TETRACHLOROETHENE
R	REJECTED VALUE BASED ON QUESTIONABLE ANALYTICAL DATA
TCE	TRICHLOROETHENE
UST	UNDERGROUND STORAGE TANK
—	DATA NOT AVAILABLE

NOTES:

1. BOLD NUMBERS REPRESENT CONCENTRATIONS THAT ARE OR ABOVE APPLICABLE CLEANUP LEVELS.
2. ALL ANALYTE CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER (µg/L).
3. AP–8914 WAS NOT SAMPLED IN JUNE 2008 BECAUSE WELL WAS DESTROYED SINCE THE LAST SAMPLING EVENT.
4. CLEANUP LEVELS FOR GRO CHANGED FROM 1,300 µg/L to 2,200 µg/L IN OCTOBER 2008.
5. DRMO–1 (2–PARTY), DRMO–5 (2–PARTY), AND DRMO–1 (3–PARTY) TREATMENT SYSTEMS WERE DECOMMISSIONED IN THE FALL OF 2008.
6. DRO EXCEEDANCES IN AP–10016, AP–10018 AND AP–8914R WERE LIKELY A RESULT OF ORGANIC MATERIAL INJECTED IN AUGUST 2009.
7. IN–SITU CHEMICAL REDUCTION INJECTION COMPLETED AT THE DRMO1 (3–PARTY) AND DRMO4 SITES IN AUGUST 2009.
8. SECOND IN–SITU CHEMICAL OXIDATION INJECTION COMPLETED AT THE DRMO1 (3–PARTY) SITE IN AUGUST 2010.
9. DRMO 2–PARTY SITES ARE SAMPLED IN THE SPRING AND DRMO 3–PARTY SITES ARE SAMPLED IN FALL STARTING IN 2009.

CLEANUP LEVELS	
5.0	BENZENE
1,500	DRO
2,200	GRO
5.0	PCE
1,100	RRO
5.0	TCE

KEY:

AP-8914 (16.3, 5–15)	DRO	PCE	TCE	WATER ELEVATIONS
SEP 03	644	48.5	0.41	444.31
MAY 04	182	42.6	0.59	443.90
SEP 04	156	58.7	0.60	443.27
MAY 05	210	21.6	0.62	443.72
OCT 05	125	44.8	0.41	443.48

ANALYTES OF CONCERN
TOTAL DEPTH, SCREENED INTERVAL (bgs)
SAMPLE MONTH
WATER ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL
CONCENTRATIONS EXCEEDING CLEANUP LEVELS
SEE LEGEND FOR ABBREVIATIONS.
SAMPLE CONCENTRATIONS

ARMY ENVIRONMENTAL CENTER

ALASKA DISTRICT
CORPS OF ENGINEERS
ANCHORAGE, ALASKA

Contaminants of Concern Detected in Groundwater Samples DRMO Yard

Five Year Review
Operable Unit 2
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
FES, 2010 Annual Report	5-5	9/11

1713AF

6 OPERABLE UNIT 3

6.1 OU3 Background

Operable Unit 3 (OU3) was the first Fort Wainwright OU to reach a final-action ROD. That ROD was signed in January 1996. It initially addressed four remedial areas, each of which had several sub-areas:

- Remedial Area 1a: Lead-contaminated soils near Birch Hill Tank Farm above-ground storage tanks (ASTs)
- Remedial Area 1b: Birch Hill Tank Farm and surrounding areas; includes six sub-areas:
    - Birch Hill Tank Farm Product Recovery System
    - CANOL Road Sub-Area
    - Former Building 1173 Sub-Area
    - Lazelle Road Sub-Area
    - Shannon Park Subdivision Sub-Area
    - Truck Fill Stand (TFS) Sub-Area
- Remedial Area 2: Railcar Off-loading Facility (ROLF) and surrounding areas; includes six sub-areas:
    - Valve Pit A
    - Valve Pit B
    - Valve Pit C
    - Central Header
    - Former Building 1144
    - Eight-Car Header
- Remedial Area 3: Along the Fairbanks-Eielson Pipeline (FEP); includes three source areas:
    - Milepost 2.7
    - Milepost 3.0
    - Milepost 15.75

As part of the ROD, the Army, EPA, and ADEC agreed to transfer Remedial Area 1a to OU5. This decision was made because more time was required to select an appropriate cleanup level and remediation goal for lead in soils. Remedial alternatives were determined for the remaining three areas in the OU3 ROD. The list of OU3 source areas and their status is shown in Appendix H.

6.2 OU3 Explanation of Significant Differences

The April 1996 ROD for OU3 at Fort Wainwright selected a remedy involving a combination of *in-situ* soil vapor extraction and air sparging of groundwater with natural attenuation to remove fuel-related contaminants in groundwater at the following source areas: the Birch Hill Tank Farm, a ROLF, and three milepost sites along the FEP (Mileposts 2.7, 3.0, and 15.75).

Implementation of the remedial actions in the ROD and additional historical research has provided a better understanding of the sources and volumes of contamination, groundwater movements, and geology of these sites than at the time of the RI/FS. The RI/FS, conducted in 1993, was limited in many areas and inadequate to determine the full extent of groundwater contamination. Post-ROD activities determined that the volume and lateral extent of contamination in OU3 is larger than previously identified. Based on this new information, a re-evaluation of the remedial actions in the ROD was conducted in 2002. The evaluation concluded that the remedies selected in the ROD would not fully achieve the RAOs without some significant changes.

An ESD for the OU3 ROD was prepared and finalized in 2002. This ESD was prepared in accordance with Section 117(c) of CERCLA and 40 CFR 300.435(c)(2)(I), and 300.825(a)(2) of the NCP. It documented significant differences to the selected remedies in the ROD, described the changes needed in some components of the selected remedy, and summarized the information that led to making the changes. These changes do not fundamentally alter the overall cleanup approach within OU3.

Detailed descriptions and discussions of the changes made in the ESD at each of the three OU3 remedial areas were provided in the above sections.

6.3 Remedial Area 1b –Birch Hill Tank Farm

6.3.1 Overview

Remedial Area 1b (Birch Hill Tank Farm) extends from Birch Hill south to the TFS and extends west toward Lazelle Road and east toward the Canadian Oil Pipeline (CANOL) service road. The Tank Farm, shown on Figure 6-1, is located north of the main cantonment area.

The Tank Farm and associated TFS was originally constructed as part of the 1943 CANOL Project. The CANOL Project was the construction of a 3-inch pipeline from Whitehorse, Canada, to Fairbanks. The Tank Farm originally consisted of fourteen 10,000-barrel capacity, bolted-steel above ground fuel tanks on top of Birch Hill which contained JP-4, mogas, and diesel fuels. The 14 tanks were connected by an 8-inch pipeline connected to the ROLF and the East Birch Hill UST Tank Farm. A post-ROD historical search indicated that a pump house with a slop tank was located at the base of Birch Hill. This is believed to be the major source associated with the Former Building 1173 Sub-area. The pump house was used until 1955 when the Haines to Fairbanks pipeline was constructed.

In 1955, as part of the new Haines Pipeline, two 25,000-barrel tanks, the TFS, and a new pump house and manifold building were erected. These new facilities were installed on Birch Hill, with the exception of the TFS that is located in the alluvial area south of the hill.

Contamination was initially discovered at this site during a soil-gas survey conducted in 1988. Further investigations identified petroleum contamination in subsurface soils and groundwater. In January 1994, the Tank Farm was permanently closed. A closure letter was submitted to ADEC stating that all tanks, facility piping, and fuel handling appurtenances were purged of fuel

and cleaned. The characterization of soil and groundwater contamination at the Tank Farm is complicated by permafrost, which initially led to underestimating the nature and extent of contamination in this area. Post-ROD studies led to a better understanding of the permafrost configuration and groundwater flow characteristics. Studies also indicated a three to four times greater aerial extent of contamination in the alluvial aquifer, including areas of free product (weathered AVGAS [aviation gasoline]) and elevated groundwater plume concentrations. Based on the decisions in the ROD, AS/SVE treatment systems were installed at the base of Birch Hill (Former Building 1173) and at the TFS in permafrost-free areas. These systems have been very successful in decreasing contaminant concentrations at the base of Birch Hill.

Post-ROD, contamination was found within the Birch Hill bedrock aquifer both as free product and in the dissolved phase in the groundwater. Both 1,2-dichloroethane (DCA) and 1,2-dibromoethane (EDB) were identified at elevated concentrations in the bedrock aquifer. Investigations indicated that dissolved contaminants measured off-post are likely migrating in groundwater that comes in contact with free product identified in the fractured bedrock on Birch Hill. A product recovery system was installed on Birch Hill in 2000 and modified in 2001 to recover product and reduce potential contamination in off-post wells. An ESD explaining these differences was signed in 2002.

Important dates and events related to the history of the Birch Hill Tank Farm contamination and remediation activities are shown in Table 6-1.

Table 6-1. History of Regulatory Events at the OU3 Birch Hill Tank Farm[a]

Event	Date
Soil-gas survey conducted	1988
Fort Wainwright NPL listed	August 1990
FFA signed	1992
2-PTY signed	1992
Picket wells installed	1992
RI fieldwork conducted	September/October 1994
RI and Risk Assessment Reports submitted to EPA	October 1994
FS submitted to EPA	April 1995
ROD signed	January 1996
AS/SVE systems installed at Former Building 1173 and Lazelle Road	1996
Lazelle Road system relocated to the TFS and the Former Building 1173 system expanded to cover Lazelle Road source area.	1997
Product recovery treatability studies initiated at the Birch Hill Tank Farm.	1998
Thaw Channel treatment system installed	1999
First Fort Wainwright Five-Year Review report finalized	September 2001
Explanation of Significant Differences signed	September 2002
Interim Remedial Action Report completed	September 2002
Fort Wainwright Construction Complete concurrence received from the EPA	2002
Second Fort Wainwright Five-Year Review report finalized	September 2006

[a] Information obtained from the OU3 ROD (U.S. Army 1996); Groundwater Extraction and Treatment Effectiveness Review (U.S. Army Oct. 2000); OU3 2005 Monitoring Report (FES, 2006f); and the OU3 ESD (U.S. Army 2002)).

6.3.2 Background

Physical Characteristics

Remedial Area 1b is located in the Chena River floodplain and is characterized by flat topography that gently slopes southward. The subsurface is typified by discontinuous permafrost and poorly drained soils covered by thick organic mats. Surface water ponding is common throughout the area from spring breakup until early to mid-summer. Wetlands are scattered throughout the area and shrub and forested wetlands border the southern portion. No endangered or threatened species reside in the area.

The Tank Farm Source Area has two distinct hydrogeologic areas: 1) the Birch Creek schist bedrock aquifer located from the top of the hill to the base of the hill, which includes the area beneath the ASTs on Birch Hill; and 2) the alluvial aquifer with discontinuous permafrost located south and west of the TFS, which includes private property, the Lazelle Estates property and church properties.

Birch Hill consists of loess overlaying Birch Creek schist and other bedrock units. Groundwater flow in the bedrock aquifer at the Tank Farm is expected to occur mainly in fractures and to flow to the southwest.

The presence, location, and extent of permafrost from the base of Birch Hill southward to the Chena River significantly affect the groundwater flow direction in this part of the Tank Farm source area. Groundwater occurs in two zones above and below the permafrost in the alluvial aquifer. The suprapermafrost groundwater zone is the saturated zone above permafrost. The subpermafrost groundwater zone is the saturated zone beneath the permafrost. Groundwater occurs at approximately 20 to 22 ft-bgs in the TFS area at the base of Birch Hill in the suprapermafrost groundwater zone. Groundwater in this area flows to the west. Shallow discontinuous permafrost in this area may channel groundwater into thawed corridors that occur in meander scars, and a hydraulic connection may exist between the suprapermafrost groundwater zone in the thawed areas and the subpermafrost groundwater zone.

Land and Resource Use

The current land use is considered light industrial in the immediate remedial area and light industrial, recreational, and residential in the surrounding areas. The groundwater below Remedial Area 1b is not currently a source of drinking water. The closest water supply wells to the Tank Farm source area are located at the Shannon Park Baptist Church and Steese Chapel on Lazelle Road, approximately 1/4 miles west of the Tank Farm. Neither of these wells are currently used for drinking water purposes.

The property adjacent to the Birch Hill Tank Farm source area was sold in early 2006. The 52 acre development property was purchased by a housing developer for a new housing subdivision, Lazelle Estates. The area was developed for 220 lots; however only 54 housing units were built in 2006 and an additional 37 units were installed in 2007. The development property shares a property line with Fort Wainwright; however, housing construction to date is concentrated along the Steese Highway, approximately 1,000 feet from the Post boundary. All of the housing units are on city water.

History of Contamination

A majority of the contamination within the bedrock is from receiving fuels from Haines Terminal, cleaning, and dewatering of ASTs and operational spills. At the TFS, the majority of contamination was due to spills during truck filling activities and operational spills. USTs located

at the base of the hill are thought to be a source of petroleum contamination through spills and overfilling or leaking.

The RI for Remedial Area 1b focused mainly on the base of Birch Hill; thus all monitoring wells were installed in alluvial material. At the time of the RI, no wells or deep borings were installed on Birch Hill, thus missing free product within the bedrock aquifer. Post-ROD activities, which identified the free product, have led to the addition of a sub-area known as the Birch Hill Product Recovery System. This was documented in the ESD, which was signed in 2002.

Two of the sub-areas investigated during the RI/FS indicated no remedial action was required. The Shannon Park Subdivision Sub-area and the CANOL Road Sub-area were both recommended for no further action in the OU3 ROD.

Pre-ROD Response

There were no pre-ROD responses for the Remedial Area 1b source area.

6.3.3 Remedy Selection

Nature of Contamination

The primary sources of contamination at Remedial Area 1b are associated with fuel and fuel additives storage, transfer, and handling activities and the Fairbanks Fuel Terminal and the TFS. Site investigations characterized contamination associated with Remedial Area 1b as follows:

Groundwater

Benzene, toluene, ethylbenzene, EDB, DCA, 1,2,4-trimethylbenzene (TMB), and 1,3,5-TMB were detected in groundwater at the base of Birch Hill and in the downgradient west transport pathway in concentrations exceeding federal drinking water MCLs and EPA risk-based concentrations used for screening potential contaminants of concern.

Soil

Petroleum hydrocarbons were identified and quantified as diesel in surface soil and Jet A in subsurface soil.

Remedial Action Objectives

The remedial action objectives are generic for all source areas in OU3.

Groundwater

- Restore groundwater to drinking water quality within a reasonable time frame
- Reduce further migration of contaminated groundwater
- Prevent use of groundwater with contaminants at levels above Safe Drinking Water Act levels

Soil

- For petroleum-contaminated soil, prevent migration of contaminants from soil into groundwater that would result in groundwater contamination and exceedance of Safe Drinking Water Act standards

ARARs

The OU3 ROD cited the most significant ARARs for remedy selection at Remedial Area 1b to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards – Applicable
- Alaska Oil Pollution regulations – Applicable
- Alaska regulations for leaking USTs – Relevant and appropriate

Cleanup Goals

Based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the site, contaminants of concern were identified for establishing numeric cleanup goals for OU3. There were no source specific cleanup goals for this source area. Numeric values for the cleanup goals established in the ROD and the OU3 ESD are summarized in Appendix C[1].

Groundwater

- Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, toluene, ethylbenzene, EDB, and DCA.
- The concentration corresponding to the EPA excess cancer risk (10^{-4}) based cleanup level was adopted as the cleanup goal for 1,2,4-TMB and 1,3,5-TMB, since there were no MCLs for these contaminants.

Soil

- The remedial action goal for *in-situ* soil contaminated with volatile organic and petroleum compounds is protection of groundwater. Because the soils are acting as a continuing source of contamination to the groundwater, active remediation of the soils will continue until Safe Drinking Water Act levels are consistently met. Natural attenuation will continue until AWQS achieved[2].
- Petroleum contaminated soils that are treated *ex-situ* will be treated to State of Alaska Matrix Level A standards[3] before they are returned to the source area.

Although the ROD did not identify specific groundwater cleanup goals for petroleum hydrocarbons, AWQS and other applicable Alaska environmental regulations are referenced as ARARs. The ROD stated that active remediation would be used to achieve Safe Drinking Water Act levels and that natural attenuation would be used to achieve AWQS. Natural attenuation will also be utilized to achieve other State of Alaska groundwater cleanup levels including diesel range organic (DRO) and gasoline range organic (GRO) concentrations.

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[1] Source-specific cleanup levels were not developed for OU3, therefore all three Remedial Areas in OU3 have the same chemicals of concern and cleanup levels.

[2] These standards can be found in 18 AAC 70 under (5) Petroleum Hydrocarbons, Oils and Grease, for Fresh Water Uses. The cleanup level for groundwater that is hydraulically connected to surface water in TAH 15 µg/L and TAqH 10 µg/L. Wells that are hydraulically connected to the river are only located at the ROLF.

[3] These standards are now calculated under Method One and can be found in Tables A1 and A2 in 18 AAC 75.

Selected Remedy

The selected remedy in the ROD was soil vapor extraction of petroleum-contaminated soil and air sparging of petroleum-contaminated groundwater in permafrost-free areas at known contaminant sources and at locations where RAGs were exceeded to achieve Safe Drinking Water Act levels. Additional remedies included ICs, restricting access to and development at the site as long as hazardous substances remain at concentrations above RAGs; long term groundwater monitoring; and natural attenuation to meet AWQS. During the summer and fall of 2000 a product recovery system was installed on Birch Hill. This sub-area was not a part of the OU3 ROD, but was established as part of the ESD. In addition, the ESD required the implementation of groundwater modeling.

AS/SVE

The pilot scale AS/SVE systems were installed at three sites (Lazelle Road, Former Building 1173, and the TFS) during the summer of 1996. The OU3 ROD specified that due to different site conditions, site specific design information would be collected in a pilot study. In addition, if during systems implementation or operations the remedy is determined not to be effective or contaminant levels cease to decline, the system performance and/or the remedy may be re-evaluated.

Institutional Controls

ICs have been established and are maintained to ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies. ICs include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use.

6.3.4 Status of Remediation

The Birch Hill Tank Farm remedial systems have been effective in the removal of free product and the reduction of both the magnitude and extent of groundwater contamination.

Status of Selected Remedy by Sub-area

Lazelle Road Sub-Area

An AS/SVE treatment system was installed in 1996 to remove VOCs and to prevent contaminated soils from acting as an ongoing source of contamination to groundwater. AS wells were placed in areas of highest contamination (hot spots). The Lazelle Road treatment system was removed in 1997 and the site was incorporated into the Former Building 1173 Sub-area system.

Former Building 1173 Sub-Area

An AS/VE treatment system was installed in 1996 at the Former Building 1173 Sub-Area to remove VOCs and to prevent contaminated soils from acting as an ongoing source of contamination to groundwater. In 1997 this system was expanded in size to treat additional contaminated areas, including the Lazelle Road Sub-area. In addition, thermal oxidizers were installed to reduce atmospheric emissions. The system was operated seasonally between 1996 and 2001. From 2002 through 2005, the AS system operated year round and the SVE system operated seasonally. The oxidizer was operated between September 1997 and June 2001. In 2005, the Former Building 1173 treatment system was shut down for a rebound study. Contaminant rebound has not been observed and the treatment system has remained off. The

treatment system removed 81,438 pounds of VOC prior to being shutdown. Groundwater monitoring is conducted annually each spring at this site.

Truck Fill Stand Sub-Area

An AS/VE system was installed in the area of the TFS in 1997 for the removal of VOCs in groundwater and to prevent contaminated soils from acting as an ongoing source of contamination to groundwater. Groundwater was successfully treated at the TFS; therefore, treatment system shut-down and rebound evaluation at the TFS began in January 2004. The rebound study has continued to be evaluated through 2010 and there has been only minor contaminant rebound. The treatment system removed 5,268 pounds of VOC prior to shutdown. Groundwater monitoring is conducted annually each spring at this site.

Thaw Channel

In 1999, an AS treatment system was installed as part of a treatability study to reduce contaminants migrating off-post through a permafrost thaw channel. This system has been effective and was retained as part of the remedy for this subarea. DCA concentrations have decreased in most Thaw Channel area wells since the treatment system became operational. However, since there were few monitoring wells in the area that had been sampled prior to the installation of the system, it is not known whether this trend began before or after the system installation. The treatment system was shut down on November 10, 2005, to conduct a contaminant rebound study. To remain protective of groundwater downgradient, the RPMs agreed that the Thaw Channel system would be restarted if there is an increasing trend of contaminant concentrations in wells located in the Thaw Channel on Post. To date, contaminant concentrations in these wells either continue to decrease or have stabilized at concentrations below the RAG.

Birch Hill Tank Farm Product Recovery System

Floating product was discovered in large amounts on the bedrock aquifer on Birch Hill during the 1997 field season. In 1998 active and passive skimmers were installed in various wells located on the hill. In 1999 a pilot scale recovery system was installed in newly installed wells. During the summer and fall of 2000 a product recovery system was installed on Birch Hill. A number of system modifications were made to improve the treatment system effectiveness and reliability. The system was operated in 2000, 2001, 2002, and seven months in 2003. The system was shut down and a rebound study was initiated during July 2003 because the system was not effective in recovering product during 2003 and off-post contaminant concentrations were below RAGs. The purpose of this study was to evaluate contaminant migration from Birch Hill to downgradient wells and to determine whether or not operation of the product recovery system is necessary and effective. Product thickness has not significantly increased in wells located in the area of the Product Recovery since the shutdown; therefore, to reduce energy costs and reduce equipment deterioration, the Product Recovery treatment system was placed into a cold storage condition within Bldg 1182 and all electrical power to the building was shut off in 2009. This sub-area was not a part of the OU3 ROD, but was established as part of the ESD.

Groundwater Monitoring

Figure 6-2 summarizes the results of groundwater monitoring in the alluvial aquifer associated with the Former Building 1173, TFS, Thaw Channel, and the off-post wells. Figure 6-3 summarizes the results of groundwater monitoring in bedrock wells associated with the Birch Hill Product Recovery source areas and bedrock wells at the base of Birch Hill.

Former Building 1173

There are currently seven wells sampled annually in the spring at Former Building 1173. Historically only benzene and DCA have exceeded RAGs in this area. Dissolved contaminant concentrations in the alluvial aquifer remained below RAGs through 2009; however, DCA concentrations have increased in several alluvial wells at the base of Birch Hill. During the annual sampling event in June 2010, DCA exceeded the RAG in one of the seven alluvial wells that were sampled, AP-7603. DCA has never previously exceeded the RAG in this well. DCA increases in alluvial wells are attributed to either the shutdown of the Building 1173 AS/SVE System (shutdown in 2004/2005) and/or the shutdown of the Product Recovery System (shutdown in 2003). Other ROD COC concentrations have remained below RAGs and are stable in the same alluvial wells. GRO has not been detected above the ADEC cleanup levels in any wells at this site. However, all wells, except the most downgradient well GWP-33, had DRO concentrations in excess of ADEC cleanup levels during the 2010 sampling event. The highest DRO concentration was detected in AP-7603 at 13,000 µg/L.

Truck Fill Stand

Currently, three wells are sampled annually during the spring at the TFS. No COC were detected above cleanup levels following shutdown through 2009; however, benzene has been detected consistently below the RAG in each of these wells since the system was shutdown. During the spring 2010 sampling event, benzene was detected slightly above the RAG (5.7 µg/L) in one well, GWP-100. EDB, which had been above the RAG in one well in 2005, has been below the RAG or at the detection limit since 2005. GRO has not been detected above the ADEC cleanup levels in any wells at this site. However, DRO concentrations have been detected in excess of ADEC cleanup levels in all three wells. The highest DRO concentration was detected during 2010 was 10,000 µg/L in GWP-145.

Thaw Channel

Groundwater sampling events are conducted annually during the spring at 10 Thaw Channel area wells located on-Post. Five of these wells are completed in the alluvial aquifer and five wells (including one multi-level well) are completed in the bedrock aquifer. The DCA RAG was not exceeded at any sampling location and no other ROD COC exceeded the RAG during the 2010 sampling event.

Although DCA has been detected consistently in most Thaw Channel wells, concentrations are stable and have not exceeded the RAG since January 2004 when it was detected in AP-7844 at a concentration of 5.06 µg/L. DCA was only detected in Ports 5 and 6 (the shallowest ports) of multi-ported well AP-8891 during the 2010 sampling event at concentrations below the RAG.

Benzene has not been detected above the RAG in any on-Post Thaw Channel wells. Benzene is detected intermittently in the Thaw Channel wells at concentrations near the detection limit. It was detected below the RAG in Ports 1, 2, 3 and 5 of multi-ported well AP-8891 during the 2010 sampling event.

Neither GRO nor DRO have been detected above ADEC cleanup levels in any of the Thaw Channel wells.

Birch Hill Product Recovery

Past product recovery efforts have resulted in a significant reduction in product thicknesses and groundwater contaminant concentrations. Consistent decreasing trends in benzene, DCA, and EDB concentrations were evident in many of the monitoring and extraction wells located within the influence of the treatment system when the treatment system was in operation. However,

contaminant concentrations generally remain several orders of magnitude above RAGs in most monitoring wells within the extraction area. However, the PRMs have determined that continued operation of the Product Recovery System would not provide a significant decrease in the current concentrations of COCs and have directed that the system be shut down.

The Product Recovery treatment system was shut down in 2003 and product thickness has not significantly increased in wells located in the area of the Product Recovery since the shutdown. Prior to product recovery efforts, the extent of product within the bedrock aquifer was estimated at 260,000 square feet (sq. ft.); however, for the past several years product has been detected in only two wells located on Birch Hill. Additionally, the dissolved benzene plume within the bedrock aquifer has been reduced from an estimated initial extent of 800,000 sq. ft. to 120,000 sq. ft. in 2010. To reduce energy costs and reduce equipment deterioration the Product Recovery system was placed into a cold storage condition in Bldg 1182 and all electrical power to the building was shut off in 2009.

Seventeen wells were sampled during the spring of 2010. Based on trend analysis conducted in 2009 using Monitoring and Remediation Optimization System (MAROS) software, the sampling frequency at this site was changed to annually and several wells were eliminated from the sampling network. One well, completed in bedrock on Birch Hill, was not able to be sampled during 2010 due to the presence of product. The following observations were made based on current groundwater sampling results:

Bedrock Aquifer

- Wells having benzene concentrations exceeding the RAG are limited to wells located within and surrounding the BHPR system, and two wells located at the base of Birch Hill. Consistent decreasing trends in benzene concentrations are evident in many of the monitoring and extraction wells located within the influence of the treatment system. However, benzene concentrations generally remain several orders of magnitude above RAG in most monitoring wells within the extraction area. Figure 6-3 shows the range of benzene concentrations in these wells.
- DCA concentrations in wells located on and at the base of Birch Hill have generally increased to pretreatment levels since the shutdown of the BHPR system. However, DCA concentrations within Thaw Channel and off-Post bedrock wells have either continued to decrease or have stabilized, and remain below the RAG.
- EDB concentrations have generally declined within the BHPR system area and at the base of Birch Hill. However, since the treatment system shutdown there has been an increase in EDB concentrations in some wells to the east of the BHPR system.

Alluvial Aquifer

- Free product has not been detected in alluvial wells in the Tank Farm area since 1997 and benzene has not exceeded the RAG in alluvial wells located within the Tank Farm since 2003.
- DCA was detected above the RAGs in a single well during 2010. AP-7603 which is located at the base of Birch Hill had a DCA concentration slightly above the RAG. DCA has not been detected above the RAG in alluvial wells since 2004.

Off-Post Monitoring Wells

As outlined in the ESD, routine monitoring and sampling of off-post wells was required. In early 2006, the property adjacent to the Birch Hill Tank Farm source area was sold. The former Bentley Trust Property was cleared for development and became the Lazelle Estates subdivision. Six of the fifteen wells in the Thaw Channel monitoring well network were removed by the new property owner. Four monitoring wells were installed during November 2008 within the Lazelle Estates development to replace the wells that had been removed during 2006. The wells were installed in two clusters of two nested wells consisting of a well completed in the alluvial aquifer screened directly above the bedrock interface, and a bedrock well screened directly below the alluvial interface.

The four off-post wells located in the Lazelle Estates subdivision were sampled quarterly in 2010. None of the wells have had contaminant concentrations above RAGs since they were installed in 2008. However, DCA concentrations are typically detected above reporting limits in all of the wells.

DCA was also detected below the RAG during 2010 in two alluvial wells located farther downgradient, UAF-ML7 and the Shannon Park Baptist Church well. DCA has never exceeded the RAG in UAF-ML7 and has not exceeded the RAG in the Shannon Park well since 1999. However, DCA concentrations are typically detected above reporting limits in these wells. Benzene is also frequently detected above the reporting limit in the Shannon Park well, but has only been detected above the RAG once in 2006 at a concentration of 5.25 µg/L.

Institutional Controls

Fort Wainwright has established a Post wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. A map depicting the boundaries of all sites on Fort Wainwright where ICs are in effect is also provided in Appendix A.

ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

Site Inspection

A site inspection was conducted on May 13, 2011. All wells currently used for groundwater monitoring of natural attenuation for Remedial Area 1b were located and found to be in good condition with locking caps. Photographs taken at the time of the site inspection are included in Appendix D of this report.

6.3.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

AS/SVE Systems

Two small scale AS/SVE treatment systems, Former Building 1173 and Lazelle Road Treatment Systems, were implemented in 1996. The Former Building 1173 treatment system

was expanded to include the Lazelle Road treatment area and the Lazelle Road treatment system equipment was relocated to the TFS area in 1997. These two AS/SVE systems (Former Building 1173 and TFS) were shut down after contaminant concentrations in groundwater treated by these systems were reduced to below RAGs for two or more consecutive years. Results from groundwater monitoring conducted in 2010 indicate concentrations of chemicals of concern in are stable or continuing to decrease. These three systems removed a total of 86,706 pounds of VOCs from the soil and groundwater.

An Air Sparge treatment system was originally installed at the Post boundary within the Thaw Channel during 1999 and modified in 2000. This system was also shut down after contaminant concentrations in groundwater treated by these systems were reduced to below RAGs.

Since RAOs have been met within the AS/SVE treatment system areas, the treatment systems and associated monitoring wells can be decommissioned per the ROD requirements.

Product Recovery System

In 1998 active and passive skimmers were installed in various wells located on Birch Hill. In 1999 a pilot scale recovery system was installed and during 2000 a full scale product recovery system was implemented. Product recovery efforts on Birch Hill have resulted in the recovery of approximately 5,500 gallons of weathered gasoline. Most of the product recovery occurred between 1998 and 2002. The product recovery system was shutdown in 2003 due to the diminishing return of product and a product rebound study was begun. Product thicknesses measured in wells from 2004 through 2010 have indicated that recoverable product is no longer feasible; therefore, the product recovery system has been placed into a cold storage condition and all electrical power has been shutdown. However, this system can be returned to an operational state if needed.

Institutional Controls

ICs are in place at Remedial Area 1b. Excavation on this site is restricted and can only be authorized by DPW Environmental. Groundwater intrusion is also restricted and can only be authorized by DPW Environmental.

The IC access restriction boundary does not extend to the area off-post on the Lazelle Estates Property where groundwater monitoring and natural attenuation is occurring, however the downgradient property owners are kept informed of the ongoing work. Bottled water was being supplied to the Steese Chapel, but the facility was not being used regularly and therefore the water was not being used. Because of this, Steese Chapel requested to have the bottled water delivery discontinued. The Army is currently filling a water holding tank at Shannon Park Baptist Church once a month.. The post-wide IC policy is described in greater detail in Appendix A.

Summary

Table 6-2 summarizes performance to date related to the RAOs for the Birch Hill Tank Farm.

Table 6-2. Performance to Date of Remedial Action Objectives at OU3 Birch Hill Tank Farm

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame	Contaminant concentrations have generally decreased to below RAGs in the alluvial aquifer at the Former Building 1173, TFS, and Thaw Channel sites. Slight exceedances within the Former Building 1173 and TFS treatment areas during 2010 will continue to be evaluated. Contaminant concentrations within the bedrock aquifer on Birch Hill remain well above the RAGs; however, downgradient bedrock wells do not contain contaminant concentrations above RAGs. Contaminant concentrations have remained stable at the base of Birch Hill since the Product Recovery System was shut down. The extent and thickness of free product in wells located on Birch Hill has been significantly reduced. Only two bedrock wells on Birch Hill have contained measurable free product in the past several years.
Reduce further migration of contaminated groundwater from the source areas	No additional growth of plume or increase in contaminant concentrations
Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS; 18 AAC 70)	ICs in effect and no violations of these controls have been identified
Use natural attenuation to attain AWQS (18 AAC 70)	Long term groundwater monitoring is being conducted and contaminant concentrations have been decreasing since signing of the ROD

Birch Hill Summary Report

A summary report was completed that documented the remedial investigations, monitoring, and actions that have been conducted at this source area. This report incorporated all available information about the Birch Hill source area and included: a summary of all the investigations and remedial actions that have been conducted; a description of the remedial systems and how they have functioned; and a detailed discussion of the conceptual site model and how it has changed and evolved based on the new information that has been obtained since the ROD.

The Summary Report concluded that remedial activities have been successful, to the extent practicable, at removing contaminant mass and diminishing dissolved contaminant concentrations at this site. Dissolved contaminant concentrations in the bedrock aquifer indicate a sufficient mass of LNAPL remains in the bedrock portion of the source area to sustain dissolved plume concentrations above RAGs on Birch Hill. At this time, technologies that are capable of removing a sufficient quantity of the residual LNAPL mass to restore groundwater quality to levels below the RAGs cannot be practically applied in the source area.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways. A new housing subdivision is being constructed in the area adjacent to and downgradient of Birch Hill. Since the subdivision is connected to the city water system, there is no added risk associated with the use of potentially contaminated groundwater.

- The remedial goals for 1,2,4-TMB and 1,3,5-TMB that were established in the ROD were base on RBCs, but were erroneously selected from the wrong column in the RBC tables. Appropriate goals for these chemicals were established in the ESD.
- There have been no other changes in RBCs used to establish OU3 cleanup goals.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

Following the removal of six of the off-Post monitoring wells on the Lazelle Estates property in April 2006, an evaluation was conducted to determine if the wells removed affected the off-Post monitoring program. Following this evaluation the monitoring program was modified to increase the frequency of monitoring at existing downgradient wells until new replacement wells could be installed. Four wells were installed on the Lazelle Estates property in November 2008 and were sampled quarterly in 2009 and 2010. The existing monitoring network provides adequate coverage to ensure that the remedy is protective.

No other information has arisen that would question the protectiveness of the current remedy.

Variances

No variances from the ROD were identified in the review of OU3 Birch Hill Tank Farm Source Area protectiveness and remediation process.

Recommendations

Recommendations and Follow-Up Actions for OU3 Birch Hill Tank Farm are shown in Table 6-3.

Table 6-3. Recommendations and Follow-Up Actions for OU3 Birch Hill Tank Farm

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Decommission AS/SVE treatment systems at Former Building 1173 and the Truck Fill Stand.	U.S. Army	EPA / ADEC	Ongoing	No
Continue annual monitoring of Birch Hill alluvial and bedrock wells to evaluate natural attenuation. Continue to optimize the sampling frequency, location and analysis required to achieve remedial goals by conducting LTMO analysis.	U.S. Army	EPA / ADEC	Ongoing	No

Response to Previous Recommendations

Recommendations from the second Five-Year Review were to be coordinated with recommendations agreed to in the Birch Hill Tank Farm Summary Report (BHSR). The actions taken in response to the recommendations from the 2006 second Five-Year Review are shown in Table 6-4.

Table 6-4. Response to Recommendations from 2006 Five-Year Review

Recommendation/Follow-Up Actions from 2006 Five-Year Review	Action Completed	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes / No)
Complete Birch Hill Tank Farm Summary Report	The Birch Hill Summary Report was completed	U.S. Army	EPA / ADEC	2007	No
Pursuant to authority granted by Section 104(e) of CERCLA, 42 U.S.C. § 9604(e), make every reasonable effort to obtain a signed access agreement for the Army, its contractors, agents, U.S. EPA, and ADEC to install and monitor new wells on Lazelle Estates (the former Bentley property). The access agreement should provide that no conveyance of title, easement, or other interest in the property shall be consummated without provisions for the continued operation of such wells.	Four replacement wells were installed on Lazelle Estates within the road right-of-way. A signed access agreement was not required to install these wells; however, the land owner would not agree to access for installing a fifth shallow alluvial well, near the post boundary. Since off-post contaminant concentrations are below remedial goals and current contaminant migration assessments do not indicate that concentrations are anticipated to increase, installation of additional off-post wells is not critical.	U.S. Army	EPA / ADEC	2008	No
Coordinate with recommendations agreed upon in the BHSR: The BHSR recommended pursuing the option of a Technical Impracticability (TI) Waiver for the bedrock aquifer on Birch Hill.	The option for pursuing a TI Waiver was considered. It was determined that continued monitoring was sufficient for monitoring bedrock contamination on Birch Hill; however, further evaluation of a TI Waiver would be considered if future conditions warranted.	U.S. Army	EPA / ADEC	Ongoing	No

6.4 Remedial Area 2 – Valve Pits and ROLF

6.4.1 Overview

Remedial Area 2 is located south of the Tank Farm Facility across the Chena River (except for Valve Pit A) and north of Gaffney Road. Valve Pit A is located on the west side of the Chena River; Valve Pits B and C are both located on the east side of the Chena River, and the headers are located in the central ROLF. Remedial Area 2 was subdivided into six sub-areas based on geographic location and differing physical characteristics. Figure 6-4 shows the six sub-areas: Valve Pit A, Valve Pit B, Valve Pit C, Central Header, Former Building 1144, and Eight-Car Header.

The ROLF was built in 1939 to receive fuel from tanks on railcars and to distribute the fuels to the airfield refueling points, quartermaster fuel system, and the Birch Hill AST Tank Farm. The facility covers an area of approximately 40 acres. As part of this distribution system, there were

six valve pits (three of which were specified as sub-areas) and the headers where the fuel was off-loaded from the tank cars. Fuel pipelines connect the ROLF to the Birch Hill AST Tank Farm (Remedial Area 1b) via the valve pits. Fuel was also stored in USTs within Remedial Area 2 until the tanks were removed in 1990. All known pipelines have been removed from the ROLF area and cleaned. However, in the case that any remaining pipelines are discovered, the Army has an ongoing project to identify and remove fuel from them.

Investigations at these sites began in 1988. Petroleum contamination was identified in subsurface soils and groundwater at Valve Pits A, B and C, and in surface and subsurface soils and groundwater in the Central ROLF area during preliminary investigations. In 1994, an RI/FS was conducted to further investigate and delineate contaminant sources and to recommend remedial alternatives. Based on the decisions in the ROD, AS/SVE treatment systems were installed at the three valve pit sites (Valve Pits A, B, and C), and at two sites within the Central ROLF (Central Header, and Former Building 1144) during the summer of 1996.

Through implementation of the remedial actions in the ROD, additional historical research, and subsequent sampling results, it was discovered that the sources and volumes of contamination, encompassed a larger area than originally identified. The systems were expanded in 1997 and 1998 to treat the larger area, including installation of a sixth system (Eight-Car Header). An ESD that documents the changes in some components of the selected remedy described in the ROD and summarizes the information that led to making the changes was signed in 2002.

These systems have been very successful in decreasing contaminant concentrations within the treatment area. In 2004 the three ROLF systems were expanded to include areas upgradient of the AS/SVE systems that were not being effectively treated. In 2005, the systems at Valve Pits B and C were decommissioned and a long term groundwater monitoring program was established to monitor groundwater contaminant concentrations that have been reduced to acceptable levels. ICs are in place, and informational signs have been installed at the ROLF to inform the public of restrictions and activities in this area.

Important dates and events related to the history of the ROLF contamination and remediation activities are shown in Table 6-5.

Table 6-5. History of Regulatory Events at the OU3 Valve Pits and ROLF[a]

Event	Date
Soil-gas survey conducted	1988
Monitoring wells installed	1989
Fort Wainwright listed on NPL	August 1990
FFA signed	1992
2-PTY signed	1992
RI fieldwork conducted	Sept. and Oct. 1994
RI and Risk Assessment Reports submitted to EPA	October 1994
FS submitted to EPA	April 1995
ROD signed	January 1996
Design Verification Study 35 Percent Design Analysis completed	April 1996

Table 6-5. History of Regulatory Events at the OU3 Valve Pits and ROLF[a]

Event	Date
AS/SVE treatment systems installed at Valve Pits A, B, & C; Central Header; and Former Building 1144 source areas	July and August 1996
Design Verification Study 65 Percent Design Analysis completed	May 1997
AS/SVE systems expanded	1997
AS/SVE treatment system installed at the Eight Car Header sub-source area; Central Header and Former Building 1144 treatment systems further expanded	1998
First Fort Wainwright Five-Year Review Report finalized	September 2001
Explanation of Significant Differences signed	September 2002
Interim Remedial Action Report completed	September 2002
Fort Wainwright Construction Complete concurrence received from the EPA	2002
AS/SVE treatment system at Eight-Car Header expanded to include upgradient area; Central Header and Former Building 1144 treatment systems also expanded	2004
AS/SVE systems at Valve Pits B and C decommissioned	2005
Second Fort Wainwright Five-Year Review Report finalized	September 2006
Valve Pit A In-situ Injection Treatability Study	October 2010

[a] Information obtained from the OU3 ROD (U.S. Army 1996); Groundwater Extraction and Treatment Effectiveness Review (U.S. Army Oct. 2000); OU3 2005 Monitoring Report (FES, 2006); and the OU3 ESD (U.S. Army 2002).

The main area of the ROLF is within the Chena River floodplain. A scrub-shrub wetland borders the northeast edge of the ROLF. No endangered or threatened species reside in the area.

Groundwater in the shallow aquifer zone generally flows northwest towards the Chena River. Flow direction and gradient is subject to seasonal variations. Depth to groundwater in the vicinity of the ROLF is approximately 10 to 20 ft-bgs.

6.4.2 Background

Physical Characteristics

The ROLF is located immediately north of the Fort Wainwright airstrip and is bounded on its north and west sides by the Chena River and Gaffney Road to the south (see Figure 6-4). Valve Pit A is approximately 0.25 miles east of the 801 Housing Subdivision on the north bank of the Chena River.

Land and Resource Use

The area around Remedial Area 2 is used heavily by residents and nonresidents involved in recreational sport fishing, boating and hiking. Groundwater use is residential. Numerous residential wells are located on the north bank of the Chena River, less than 0.5 mile downstream. The Golden Heart Utilities and College Utilities wells are located approximately three and five and a half miles from the source area, respectively. Four Fort Wainwright drinking water supply wells and the Pioneer Class A drinking water wells for the Hamilton Subdivision are located approximately one mile from the ROLF. Future land and groundwater use is considered to be residential and recreational.

History of Contamination

The primary sources of contamination at Remedial Area 2 are associated with fuel and fuel additives from storage, transfer, and handling activities at Valve Pit A, Valve Pit B, Valve Pit C, Central Header, Former Building 1144, and Eight-Car Header at the ROLF. Available records indicate that one 20-gallon fuel spill occurred at the ROLF between 1970 and 1987. It is also known that the tank car headers were prone to minor leaks, and at least one major spill of JP-4 occurred at one of the headers. Additionally, the USTs formerly at the central ROLF reportedly were overfilled on numerous occasions. In 1991, a pipeline from Valve Pit C to the airfield failed a hydrostatic pressure test and was taken out of service. Valve pits on both sides of the Chena River and at the ROLF had leaks.

In 1988 a soil-gas survey was conducted at the ROLF and associated valve pits. Samples collected revealed a contaminant plume centered on the railroad spur containing the 16-tank-car (Central Header) unloading headers and the former USTs. A monitoring well was installed at Valve Pit C in 1989 and contained free-floating product in most of the sampling events until commencement of remedial activities. During investigations in the summer of 1996 up to 1-½ feet of floating product was measured in monitoring wells. The findings from these investigations indicated subsurface contamination in hot spots throughout the area, especially in the vicinity of valve pits located along the pipeline system, which consisted of three 8-inch pipelines and four 3-inch pipelines. Petroleum contamination was identified in subsurface soils and groundwater surrounding Valve Pits A, B, and C, along Front Street, and in surface and subsurface soils and groundwater in the center of the site during the RI.

Pre-ROD Response

There were no pre-ROD responses for the Remedial Area 2 source area.

6.4.3 Remedy Selection

Nature of Contamination

The primary sources of contamination at Remedial Area 2 are associated with fuel additives and the storage, transfer, and handling of fuel at Valve Pits A, B, and C, Central Header, Eight-Car Header, and Former Building 1144 at the ROLF.

Site investigations characterized contamination associated with Remedial Area 2 as follows:

Groundwater

Benzene, toluene, ethylbenzene, EDB, DCA, 1,2,4-TMB, and 1,3,5-TMB were detected in groundwater at levels exceeding federal drinking water MCLs or EPA risk-based concentrations used for screening potential contaminants of concern.

Soil

Petroleum hydrocarbon were identified and quantified as diesel in surface soil and Jet-A in subsurface soil.

Remedial Action Objectives

The remedial action objectives are generic for all source areas in OU3.

Groundwater

- Restore groundwater to drinking water quality within a reasonable time frame
- Reduce further migration of contaminated groundwater
- Prevent use of groundwater with contaminants at levels above Safe Drinking Water Act levels

Soil

- For petroleum-contaminated soil, prevent migration of contaminants from soil into groundwater that would result in groundwater contamination and exceedance of Safe Drinking Water Act standards

ARARs

The OU3 ROD cited the most significant ARARs for remedy selection at Remedial Area 2 to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards – Applicable
- Alaska Oil Pollution regulations – Applicable
- Alaska regulations for leaking USTs – Relevant and appropriate

Cleanup Goals

Based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the site, contaminants of concern were identified for establishing numeric cleanup goals for OU3. There were no source specific cleanup goals for Remedial Area 2. Numeric values for the cleanup goals established in the ROD and the OU3 ESD are summarized in Appendix C[4].

Groundwater

- Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, toluene, ethylbenzene, EDB, and 1,2-DCA.
- In the ROD, the remedial goals for 1,2,4-TMB and 1,3,5-TMB were based on an RBC equivalent to a non-cancer hazard quotient of 1 using a residential groundwater exposure assumption, since there were no MCLs for these contaminants. However, the values established in the ROD were erroneously selected from the wrong column in the Region 3 RBC tables. The values listed in the ROD for these chemicals correspond to an inhalation pathway. The residential groundwater assumptions in the RI/FS correspond to a remedial goal of 1.85 mg/L for both compounds. This issue was discussed in the ESD.

Soil

- The remedial action goal for *in-situ* soil contaminated with volatile organic and petroleum compounds is protection of groundwater. Because the soils are acting as a continuing source of contamination to the groundwater, active remediation of the

[4] Source-specific cleanup levels were not developed for OU3, therefore all three Remedial Areas in OU3 have the same chemicals of concern and cleanup levels.

soils will continue until Safe Drinking Water Act levels are consistently met. Natural attenuation will continue until Alaska Water Quality Standards[5] are achieved.

- Petroleum contaminated soils that are treated *ex-situ* will meet State of Alaska Matrix Level A standards before they are returned to the source area.

Although the ROD did not identify specific groundwater cleanup goals for petroleum hydrocarbons, AWQS and other applicable Alaska environmental regulations are referenced as ARARs. The ROD stated that active remediation would be used to achieve Safe Drinking Water Act levels and that natural attenuation would be used to achieve AWQS. Natural attenuation will also be utilized to achieve other State of Alaska groundwater cleanup levels including diesel range organic (DRO) and gasoline range organic (GRO) concentrations.

Selected Remedy

The selected remedy in the ROD was soil vapor extraction of petroleum-contaminated soil and air sparging of petroleum-contaminated groundwater at known contaminant sources and at locations where RAGs were exceeded (i.e., hot spots) to achieve Safe Drinking Water Act levels. Additional remedies included ICs, restricting access to and development at the site as long as hazardous substances remain at concentrations above RAGs; groundwater monitoring; and natural attenuation to meet AWQS.

AS/SVE

The pilot scale AS/SVE systems were installed at five sites (Valve Pits A, B, and C, Central Header, and Former Building 1144) during the summer of 1996. The OU3 ROD specified that due to different site conditions, site specific design information would be collected in a pilot study. In addition, during implementation or operations of systems, if the remedy was not effective in achieving the performance standards, the system would be expanded and/or the remedy would be re-evaluated. The five systems were expanded and a sixth system (Eight-Car Header) was installed in 1997 and 1998.

Institutional Controls

ICs have been established and are maintained to ensure that the groundwater will not be used until federal and state MCLs are attained. ICs include restrictions governing site access, construction, and water supply well installation as long as hazardous substances remain on site at levels that preclude unrestricted use. Details of the Post-wide IC policy are included in Appendix A.

6.4.4 Status of Remediation

The ROLF remedial systems have been effective in the removal of free product and the reduction of both the magnitude and extent of groundwater contamination.

[5] These standards can be found in 18 AAC 70 under (5) Petroleum Hydrocarbons, Oils and Grease, for Fresh Water Uses. The cleanup level for groundwater that is hydraulically connected to surface water in TAH 15 µg/L and TAqH 10 µg/L. Wells that are hydraulically connected to the river are only located at the ROLF.

AS/SVE Treatment Systems

Valve Pit A

The AS/SVE system was initially installed in 1996, expanded in 1997, and further expanded to its current size, consisting of four treatment zones, in 2000. In 2004, two of the treatment zones (Zones 1 and 3) were shut down to conduct a rebound study because contaminant levels in the groundwater had dropped to below RAGs in those areas. In 2005, Zone 4 was also shut down for a rebound study. Contaminant rebound was not observed and Zone 4 was decommissioned in August 2009. In order to treat persistent benzene that remained above the RAG in Zone 2, select AS probes were again rehabilitated, and additional “hot-spot” AS probes were installed and operated throughout 2007 and 2008. Benzene was again decreased to below RAGs and Zone 2 was shut down for rebound study January 2009. Figure 6-5 shows the treatment system layout and the “hot spot” area installed in 2007. To date the treatment system has removed approximately 23,411 pounds of VOCs.

Valve Pit B

The AS/SVE system was initially installed in 1996 and expanded in 1997. The treatment system was operated seasonally. The benzene plume exceeding the ROD cleanup goal was eliminated in this treatment area by 2001. In 2003, the system was shut down for a rebound study. The system was decommissioned in 2005 after two years of system shut-down with no significant contaminant rebound occurring. A long-term groundwater monitoring program is currently being conducted at the site. Before it was shut down in 2003, the treatment system had removed a total of approximately 31,432 pounds of VOCs.

Valve Pit C

The AS/SVE system was initially installed in 1996 and expanded in 1997. The treatment system was operated seasonally. Between 1996 and 1998, benzene concentrations within the treatment area decreased by two orders of magnitude, to concentrations below the RAG. In 1998, the system was shut down for a rebound study. Following the initial system shut-down, benzene levels rebounded briefly in several wells but then dropped back down to below the RAG after restarting the system in 1999. However, benzene is detected consistently at a level slightly above the RAG at one downgradient location (VPC-MP6), which is believed to have been located just outside the treatment system influence. The system was shut down again in 2001 and groundwater was monitored for rebound. The system was decommissioned in 2005 after three years of system shut down with no significant contaminant rebound occurring. Before it was shut down, the treatment system had removed a total of approximately 10,450 pounds of VOCs.

Central Header

The AS/SVE system was initially installed in 1996, expanded in 1997, and further expanded to its current size of eight treatment zones, in 2000. The treatment system operated year round until 2010 when the last zone was shut down for a rebound study. Off-gas emissions were initially controlled by the use of a thermal oxidizer until February 2002 when the oxidizer was taken off-line because vapor concentrations had dropped and it was no longer necessary to control emissions at this system.

The extent of the benzene plume exceeding RAGs has been significantly decreased through AS/SVE treatment in this area. Contaminant concentrations within the treatment area have been decreased by two orders of magnitude or more. As contaminant concentrations have decreased and remained below RAGs, various zones within the system have been shut down for rebound studies. Zone 7 was the last zone to be operated at Central Header. In order to

address persistent COC above RAGs in this zone, AS probes were rehabilitated, and additional "hot-spot" AS probes were installed and operated between 2007 and 2009. As a result of these system enhancements, all COC were decreased to below RAGs in Zone 7 and this zone was shut down in January 2010 to begin a rebound study. Figure 6-6 shows the treatment system layout and the "hot spot" area installed in 2007 and identified dates that the zones were shut down. The treatment system had removed 289,411 pounds of VOCs by the time all the zones were shut down.

Former Building 1144

The AS/SVE system was initially installed in 1996 and expanded in 1997 to include six treatment zones. In 2004, two additional upgradient zones (7 and 8) were added to the system. The treatment system operated year round until 2009 when the last zone was shut down for a rebound study. A thermal oxidizer was initially used for off-gas emission control until May 2001 when the oxidizer was taken off-line because vapor concentrations decreased and it was no longer necessary to control emissions at this system.

Benzene concentrations within the treatment area have decreased by an order of magnitude, and the extent of the benzene plume exceeding the RAGs has decreased significantly. As contaminant concentrations have decreased and remained below RAGs, various zones within the system have been shut down for rebound studies. Currently there are no zones operating at the Former Building 1144 treatment system. Zone 1 was the last area of the treatment system to be operated. In order to address persistent benzene concentrations in Zone 1, AS probes were rehabilitated and additional "hot-spot" AS probes were installed and operated between 2007 and 2008. The "hot-spot" treatment was successful in reducing the benzene concentration and Zone 1 was shut down January 2009. Figure 6-7 shows the treatment system layout and the "hot spot" area installed in 2007 and identifies dates that individual zones were shut down. The treatment system had removed 248,840 pounds of VOC as of January 2009 when all zones of the Building 1144 treatment system were shut down.

Eight Car Header

The AS/SVE system was initially installed in 1997 as an expansion zone of the Former Building 1144 system, but was expanded as a separate system in 1998. Off-gas emissions were controlled by the use of an electric oxidizer. In 2002, a CLOSES evaluation was conducted at this site that recommended shutting down Zones 1 through 5 of the system for a rebound study. The system was shut down in October 2002. After benzene levels in some wells rebounded to unacceptable levels, Zones 1, 2, and 3 of the system were turned back on in April 2004. Zones 1, 2, and 3 operated until January 2005 when they were again shut down after cleanup goals were achieved.

The system was also expanded in 2004 to include two additional zones, which are located upgradient, south of the Alaska Railroad tracks. The two upgradient zones operated from 2004 until January 2008 when they were shut down for a rebound study. Figure 6-8 shows the treatment system layout. The treatment system removed 157,887 pounds of VOCs prior to being shut down in January 2008.

Groundwater Monitoring

The COC concentrations within the groundwater plumes of Remedial Area 2 have declined significantly since implementation of the AS/SVE treatment systems. Results of the groundwater monitoring show that the remedy is working. There has been no identified migration of the plume within the site or off of the site.

Groundwater sampling for lead began at all sites in 2002, as recommended in the 2001 first Five-Year Review Report and in the ROD. Although lead was detected in several wells, concentrations only exceeded the action level of 15 µg/L in wells at the Central Header and Former Building 1144 sites. Based on these results, the number of wells sampled for lead was reduced and currently includes four wells at the Central Header.

Figure 6-9 summarizes the results of groundwater monitoring associated with the Valve Pit A, Valve Pit B, and Valve Pit C source areas. Figure 6-10 summarizes the results of groundwater monitoring associated with the Central Header, Eight Car Header, and Former Building 1144.

Valve Pit A

There are currently seven wells sampled semi-annually (spring and fall) at Valve Pit A. Benzene exceeded the RAG in three wells (VPA-MP2, AP-6064, and AP-9042) during the 2010 sampling events. VPA-MP2 and AP-6064 are located in treatment Zone 2, just to the northeast and east of the valve pit. Well AP-9042 is located in Zone 4, downgradient of the valve pit. No other COCs exceeded cleanup levels in any of the four wells sampled. Benzene concentrations have decreased two orders of magnitude since 1996 in these three wells, but levels have fluctuated in the past few years and remain above the RAG. DRO was detected above ADEC cleanup levels in all of the wells sampled during 2010 except the most downgradient well. The highest DRO concentration was detected at 59,000 µg/L during July 2010 in VPA-MP2. GRO was above cleanup levels in two wells and was highest in VPA-MP3 at 22,000 µg/L in November 2010.

A treatability study was initiated at the Valve Pit A site during October 2010. The objective of the treatability study is to evaluate the effectiveness of chemical oxidization and bioaugmentation to treat benzene and DRO contamination in groundwater above cleanup levels in the hot spot treatment system area. The treatability study is ongoing at the time of this Five Year Review.

Valve Pit B

There are currently three wells sampled annually (in the spring) at Valve Pit B. During the July 2010 sampling event, no ROD COCs exceeded cleanup levels in any of the wells. Benzene was detected at concentrations well below its cleanup level of 5 µg/L in all three wells. Benzene has not been detected at concentrations exceeding cleanup levels in any wells at this site since 2000. Other COCs detected at the site include ethylbenzene, toluene, 1,2,4-TMB, and 1,3,5-TMB, but the concentrations of all these contaminants were at least two orders of magnitude below their cleanup levels. Neither EDB nor DCA have ever been detected at this site. DRO concentrations have been detected in excess of ADEC cleanup levels in all three wells. The highest DRO concentration detected during 2010 was 17,000 µg/L in VPB-MP3. GRO has not been detected above ADEC cleanup levels in any wells.

Valve Pit C

Currently, one monitor well (VPC-MP6) is being monitored annually (in the spring) at Valve Pit C. Benzene has not been detected above the RAG in VPC-MP6 since April 2005. Benzene concentrations in this well generally decreased between 1996 and 2001 when the treatment system was operated. Following the shutdown of the treatment system in 2001, benzene concentrations initially stabilized at concentrations slightly above the RAG, then decreased and have remained below the RAG since 2006. No other ROD COCs exceeded the RAGs in 2010.

Total aromatic hydrocarbons (TAH) and total aqueous hydrocarbons (TAqH)[6] both exceeded water quality standards in this well, although both have decreased by an order of magnitude since 2005. DRO was detected above the cleanup level in 2010 at a concentration of 3,100 µg/L. GRO has not been detected above the ADEC cleanup level in this well.

Central Header

Currently there are nine monitoring wells associated with the Central Header area that are sampled semi-annually (spring and fall). COC concentrations have decreased significantly within and downgradient of the treatment system in zones that have operated since remediation began in 1996. During 2009, for the first time since sampling began, no COC were detected above RAGs within the Central Header treatment area. COC concentrations within the treatment area remained below the RAGs during 2010 as well. Benzene exceeded its RAG of 5 µg/L in one downgradient well, AP-10028 (formerly GWP-80) in 2010, with a concentration of 10 µg/L in the spring and 8 µg/L in the fall. Concentrations of benzene have steadily decreased in this well and have decreased by three orders of magnitude since it was first sampled in 1997. DRO has been detected above ADEC cleanup levels in three wells within the treatment area and two downgradient wells. GRO has been detected above ADEC cleanup levels in four wells within the treatment area, one downgradient well and one upgradient well.

Well AP-10033 (formerly GWP-2001A) is located in Zone 7 of the treatment system, just to the west of the former truck fill stand (which was removed in 2007). Concentrations of benzene, ethylbenzene, toluene, and EDB all exceeded their RAGs by up to three orders of magnitude in this well between 2001 and 2008; however, following “hot spot” treatment, concentrations of all COC were reduced to below RAGs in 2009 and 2010.

Lead sampling was initially conducted at this site in 2002. Lead was detected in 12 of the 14 wells sampled, with 8 of the wells having concentrations of lead above its action level of 15 µg/L; the highest concentration was found in well CH-MP4, at 147 µg/L. The wells with the highest concentrations of lead were located in the area closest to the suspected source of fuel contamination. In 2003, the number of wells sampled for lead was reduced to the eight with the highest 2002 results. None of the wells sampled in 2003 had lead concentrations that exceeded the action level. In subsequent years, lead concentrations have remained below the RAG and in 2007, the number of wells sampled was again reduced to the four wells (three Central Header wells and one Bldg 1144 well) with the highest lead concentrations. Since 2007, lead has been detected above the action level only one time, in 2008, in one well (AP-10033) at a concentration of 75 µg/L. No lead concentrations have been higher than 5.1 µg/L in any of these wells since 2008.

Former Building 1144

A total of 10 monitoring wells are currently being sampled semi-annually (spring and fall) in the area of the Former Building 1144 treatment system. Dissolved contaminant concentrations have declined significantly within and downgradient of the treatment system in zones that have operated since remediation began in 1996. Benzene has been detected above the RAG at only one monitoring location between 2005 through 2009, AP-10027 (formerly 1144-MP4), located in Zone 1. Benzene concentrations in this well initially declined due to treatment system operation, but stabilized above the RAG in 2002 and began to increase between 2004 and 2006. Benzene has been below the RAG at this location since 2008, with the exception of one

[6] TAH and TAqH are calculated values established by ADEC to monitor surface water quality. TAH is equivalent to the sum total concentrations of all BTEX constituents in a given sample. TAqH is equivalent to the sum total concentration of all BTEX and PAH constituents in a given sample.

detection of 30 µg/L in the spring of 2009. DRO was detected above ADEC cleanup levels in all 10 wells sampled during 2010. The highest DRO concentration was detected in 1144-MP9 at 72,000 µg/L in June 2010. GRO has not been detected above ADEC cleanup levels at this site.

Lead analysis was conducted in all the wells sampled at this site in 2002. Lead was detected in two wells, but exceeded the action level in only one well, GWP-91, at a concentration of 58.4 µg/L. Based on these results, lead sampling was reduced to only two wells in subsequent years. Lead continued to exceed its action level in well GWP-91 through 2003, although the concentration dropped to 30.2 µg/L. GWP-91 was subsequently damaged and had to be removed. The lead concentration has not exceeded the action level in any other wells at this site; therefore, lead sampling has not been conducted since 2005.

Eight-Car Header

Currently, seven monitoring wells are sampled at the Eight-Car Header site annually during the spring. Benzene is the only COC that had historically been consistently detected above the RAG at this site. However, benzene has not been detected above the RAG in any wells at this site since 2005. DRO was detected above cleanup levels in all seven wells sampled in 2010. DRO was highest in GWP-2003B at a concentration of 72,000 µg/L. GRO was detected in two wells in the upgradient zones (GWP-110 and GWP-2003B) sampled in 2010 at a concentration of 2,200 µg/L in both wells

Lead analysis was conducted in all samples collected at the site in 2002, and was detected in three wells, but all at concentrations below the action level. Lead has not been sampled at this site since that time.

Institutional Controls

ICs for Remedial Area 2 are in effect, which include policies to limit excavation or well installation in potentially contaminated sites. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. A map depicting the boundaries of all sites on Fort Wainwright where ICs are in effect is also provided in Appendix A.

Site Inspection

A site inspection was conducted on May 12, 2011. AS/SVE treatment system equipment was observed to be in good condition; although, no longer in use at any of the ROLF sites. All wells currently used for groundwater monitoring of natural attenuation at the ROLF were located and with the exception of one well, found to be in good condition with locking caps. Well VPC-MP6 used for long term monitoring at Valve Pit C appears to be broken. This well is located in a slough that is seasonally flooded. The well should be either repaired, replaced, or an alternative sampling location should be identified. Photographs taken at the time of the site inspection are included in Appendix D of this report.

6.4.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

The selected remedies for Remedial Area 2 are operating as intended.

AS/SVE Systems

The Remedial Area 2 AS/SVE systems were installed in 1996. To date, these systems have removed a total of 761,431 pounds of VOCs from the soil and groundwater. Two of the systems, Valve Pit B and Valve Pit C have been shut down and decommissioned. The remaining four systems have also been shut down and remain in place. Three of these four systems, Central Header, Former Building 1144, and Eight Car Header, have met RAOs. Benzene concentrations have rebounded slightly at the Valve Pit A system and a treatability study is being conducted to evaluate the effectiveness of further reducing benzene concentrations through injection of in-situ remediation products. Lead concentrations in the groundwater have decreased and have not exceeded RAGs since 2008; although lead continued to exceed the action level in well GWP-91 through 2003, when it was damaged and had to be dropped from the sampling program. GWP-91 was subsequently damaged and had to be removed. Figures 6-9 and 6-10 summarize groundwater concentrations in monitoring wells over time.

Results of soil and groundwater sampling conducted through 2010 show that the ROLF treatment systems have been effective at achieving cleanup goals for the ROD COCs at the site. However, sampling results continue to show DRO contamination above cleanup levels. An evaluation of AS/SVE treatment system effectiveness showed that the AS/SVE system would not significantly reduce the expected time to achieve cleanup goals for DRO. Since much of the remaining DRO contamination is primarily associated with the smear zone and saturated zone, it has been determined that converting the current treatment system to a bioventing system would have limited effectiveness. As a result, non-operating ROLF treatment systems (Valve Pit A, Central Header, Former Building 1144, and Eight Car Header) should be decommissioned.

Implementation of Institutional Controls

ICs for Remedial Area 2 are in place. Excavation on this site is restricted and can only be authorized by DPW Environmental. Groundwater intrusion is also restricted and can only be authorized by DPW Environmental. Details of the Post-wide ICs policy are included in Appendix A.

Table 6-6 summarizes performance to date related to the RAOs for the OU3 ROLF source area.

Table 6-6. Performance to Date of Remedial Action Objectives at OU3 ROLF

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame	ROD COCs have met RAOs in five of the six OU3 ROLF treatment areas. An in-situ injection treatability study is being conducted at Valve Pit A to further remediate benzene remaining at this site. DRO and GRO remain above ADEC cleanup levels at the ROLF.
Reduce further migration of contaminated groundwater from the source areas	There has been no growth of the plume or increase in contaminant concentrations
Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS (18 AAC 70)	ICs are in effect
Use natural attenuation to attain AWQS (18 AAC 70)	Source Areas are being monitored

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways or populations at risk.
- The remedial goals for 1,2,4-TMB and 1,3,5-TMB that were established in the ROD were base on RBCs, but were erroneously selected from the wrong column in the RBC tables. Appropriate goals for these chemicals were established in the ESD.
- The MCLs used to establish groundwater cleanup goals for Remedial Area 2 have not changed since the ROD.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Variances from the ROD

No variances from the ROD were identified in the review of OU3 Remedial Area 2 Source Area protectiveness and remediation process.

Recommendations

Recommendations and Follow-Up Actions for OU3 ROLF sites are shown in Table 6-7.

Table 6-7. Recommendations and Follow-Up Actions at OU3 ROLF

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Decommission the ROLF AS/SVE treatment systems at Valve Pit A, Central Header, Former Building 1144 and Eight Car Header	U.S. Army	EPA / ADEC	Ongoing	No
Continue groundwater monitoring of wells at all of the ROLF source areas to evaluate natural attenuation.	U.S. Army	EPA / ADEC	Ongoing	No
Continue to evaluate the in-situ injection treatability study at Valve Pit A.	U.S. Army	EPA / ADEC	Ongoing	No

Response to Previous Recommendations

No recommendations were made for the ROLF sites in the 2006 Second Five-Year Review.

6.5 Remedial Area 3 – Mileposts 2.7, 3.0, and 15.75

6.5.1 Overview

Remedial Area 3 consists of three source areas located along the FEP: Milepost 2.7, Milepost 3.0, and Milepost 15.75. The Milepost 2.7 and 3.0 sites are located in the East Birch Hill Tank Farm (EBHTF) area, as shown on Figure 6-11, and Milepost 15.75 is located near the city of North Pole (Figure 6-12). The Milepost designations represent miles from the Fairbanks Fuel Terminal (FFT); thus, Milepost 3.0 is approximately 3.0 miles east of the FFT.

Fort Wainwright historically had two distinct pipelines that provided fuel to Ladd Army Airfield. The first pipeline was the CANOL line. The CANOL line supplied fuel to the EBHTF, FFT and fuel facilities on Fort Wainwright from approximately 1940 to 1955. The second pipeline, the Haines to Fairbanks Pipeline, was built in 1955 and operated until 1971, when the Haines-Eielson portion of the pipeline was closed and it became the FEP until 1990. The Fairbanks-Eielson pipeline route was from the Mapco refinery in the city of North Pole directly to the FFT where fuel was distributed. The section of the pipeline between Fort Wainwright and the Mapco refinery was decommissioned in 1992.

The EBHTF was constructed in 1940 to store three types of fuel for cold weather testing of aircraft and for supporting the lend-lease program. The facility consisted of 34 50,000-gallon USTs, underground piping, valve pits, and truck fill stands. High-octane gasoline, jet fuels, and diesel fuel were stored in the 12-foot-diameter, 66-foot-long steel USTs. The EBHTF consisted of three truck fill stands, three truck unloading ramps, nine main valve pits, several water separator pits, and over 30 concrete valve pits, one at each UST. Use of the facility was terminated upon construction of the Haines-Fairbanks Pipeline in 1955. All known pipelines have been removed from the Mileposts 2.7 and 3.0 areas and cleaned. However, in the case that any remaining pipelines are discovered, the Army has an ongoing project to identify and remove fuel from them.

A soil gas study conducted in 1989 detected elevated levels of BTEX at Milepost 2.6 (located just to the northwest of Milepost 2.7) and subsequent investigations found contamination at Milepost 3.0. At the time of the RI and ROD, the exact cause of the contamination at these two sites was unknown. The Proposed Plan and ROD listed potential sources as breaks in the FEP, and truck fill stands, oil / water separator pits, valve pits, and pipelines associated with the abandoned EBHTF. However, an assessment of these sites was done in 2002 that determined the source of the contamination was the EBHTF and not from breaks in the FEP. This conclusion was confirmed in the ESD.

In response to remedial actions outlined in the ROD, a treatability study was initiated at Mileposts 2.7 and 3.0, which included AS/SVE and Oxygen-Releasing Compound (ORC). It was determined that this method was not effective due to low permeability of the soils in the area. A new treatability study was completed to determine the effectiveness of aboveground AS/SVE with soils removed from the Mileposts. This treatment was determined to be effective, and soils at the Milepost 2.7 and Milepost 3.0 sites were removed for *ex-situ* treatment. *In-situ* long-term groundwater monitoring continues at the actual milepost sites. The OU3 ESD documented these changes in treatment for petroleum contaminated soil and the associated increased costs.

The contamination at source area Milepost 15.75 (at the intersection of Laurance Road and Robyn Drive) was the result of a spill that occurred in August 1989, when a portion of the Fairbanks-Eielson Pipeline was ruptured during road construction. An AS/SVE system was installed and operated, and accomplished remediation of this site. This system was removed and relocated to Remedial Area1b. Monitoring results showed that the treatment system was effective in reducing the contamination at the site and that the remaining contamination has naturally

attenuated such that it is no longer a threat to human health or the environment. Additional monitoring has not been conducted since 2005 and the site was recommended for NFA in the 2nd Five-Year Review.

Important dates and events related to the history of the FEP Milepost sites contamination and remediation are shown in Table 6-8.

Table 6-8. History of Regulatory Events at the OU3 FEP Milepost Sites[a]

Event	Date
Soil-gas survey conducted along FEP	1989
Pipeline rupture causes spill near Milepost 15.75 of FEP	August 1989
Fort Wainwright listed on NPL	August 1990
Monitoring wells installed	1991
FFA signed	1992
2-PTY signed	1992
Release Investigation at EBHTF / Milepost 3.0 added to OU3	1992
RI fieldwork conducted	Sept and Oct 1994
RI and Risk Assessment Reports submitted to EPA	October 1994
FS submitted to EPA	April 1995
ROD signed	January 1996
Air sparging treatability study conducted at Milepost 2.7 source area	1996
AS/SVE treatment system installed and begins operation at Milepost 15.75 source area	November 1996
ROD cleanup goals achieved at Milepost 15.75 source area; AS/SVE treatment system shut-down and connex removed	May 1997
ORC treatability study conducted at Milepost 3.0 source area	1997
Approximately 1,500 cy of soil removed from the Milepost 2.7 source area for *ex-situ* remediation treatability study	1998
Approximately 6,000 cy of soil removed from the Milepost 3.0 source area for *ex-situ* remediation treatability study	2000
Remainder of treatment system removed from Milepost 15.75 source area	October 2000
First Fort Wainwright Five-Year Review Report finalized	September 2001
Assessment of Milepost 2.7 and 3.0 source areas conducted	2002
Explanation of Significant Differences signed	September 2002
Interim Remedial Action Report submitted	September 2002
Fort Wainwright Construction Complete received from the EPA	2002
Milepost 2.7 and 3.0 *ex-situ* soil treatment systems decommissioned	2003
CLOSES evaluation conducted at Mileposts 2.7 and 3.0 source areas	2004
Second Fort Wainwright Five-Year Review Report finalized	September 2006
Recommendation for NFA of MP 15.75 Site accepted	September 2006
In-situ Treatability Studies began at Mileposts 2.7 and 3.0	October 2009

[a] Information obtained from the OU3 ROD (1996); Groundwater Extraction and Treatment Effectiveness Review (Oct. 2000); OU3 ESD (2002); OU3 Interim Remedial Action Report (2002)

6.5.2 Background

Physical Characteristics

Milepost 2.7 and Milepost 3.0 Source Areas are similar in physical characteristics. Both have a moderate to steep south-facing slope to the north and a shallow, south-facing slope to the south. They are located downgradient of the EBHTF. Soils are poorly drained and ponded surface water is common from spring breakup until mid-summer. Discontinuous permafrost is typical in the areas' subsurface soil. A black spruce-scrub-shrub wetland borders the south side of the source areas while the rest of the surrounding area is densely vegetated. No endangered or threatened species reside in the area. Groundwater is encountered at depths from 3 to 12 ft-bgs and groundwater flows to the southwest.

The Milepost 15.75 Source Area is located on an off-post military fuel pipeline right-of-way within a residential area approximately 1 mile south of North Pole. The Chena River is to the north and east and the Tanana River is to the west. The site is flat except for drainage ditches that parallel Laurance Road. The drainage ditch on the south side of Laurance Road usually contains water. Soils in the area are sandy with little gravel and generally are moderately well-drained. The surrounding area is forested with trees and shrubs. Groundwater is encountered at depths from 3 to 7 ft-bgs and groundwater flows to the north.

Land and Resource Use

The Milepost 2.7 and 3.0 Source Areas are located within a military training area approximately one mile from the nearest residential development. Both areas are used recreationally. The nearest well to both source areas is located approximately one mile away at the Birch Hill Ski area. The well is not hydraulically connected to the alluvial aquifer below both source areas. The Milepost 15.75 source area is located within a residential area and wetlands occur within 0.25 miles. Future land and/or groundwater use at all three source areas are residential and recreational.

History of Contamination

The source areas at Milepost 2.7 and 3.0 were discovered as part of a 1989 soil gas survey along the active section of the FEP. Sampling locations were spaced one mile apart, and the investigation spanned 27 miles from the Fairbanks Terminal to Eielson Air Force Base. Elevated levels of BTEX were noted at Milepost 2.6 (located just to the northwest of Milepost 2.7). This investigation concluded that the contamination at Milepost 2.6 was downgradient of a truck fill stand associated with the abandoned Birch Hill USTs. Subsequent investigations of the East Birch Hill USTs encountered contamination along the base of Birch Hill near Milepost 2.7 and 3.0. The source of contamination is attributed to the EBHTF. The Birch Hill tank farm was built as part of the CANOL pipeline and stored high-octane aviation gasoline, jet fuel, and diesel fuel. There were three truck fill stands associated with the tank farm, two of them (TFS-2 and TFS-3) located adjacent to the contamination at Milepost 2.7 and 3.0 (see Figure 6-13). Numerous investigations were conducted to close out the USTs under the State of Alaska UST regulations. The State of Alaska closed the USTs, but due to extensive groundwater contamination associated with these tanks, investigation and remediation of the groundwater was added to OU3.

During the RI, surface and subsurface petroleum hydrocarbon soil contamination was identified at Milepost 2.7. Surface soil contamination was estimated to extend 120 feet south of the pipeline into adjacent wetlands and subsurface soil contamination was estimated to extend underneath Birch Hill Road adjacent to two truck fill stands. Petroleum hydrocarbons (quantified as gasoline) were detected in groundwater during the RI, and benzene was detected above the RAG.

During the RI, petroleum contamination in subsurface soils at Milepost 3.0 was found to be concentrated along Birch Hill Road. The subsurface contamination was estimated to extend northwest toward Milepost 2.7, approximately 250 feet southeast of the source area, and approximately 200 feet south of the source area under adjacent wetlands. Petroleum hydrocarbons (quantified as gasoline) were also detected in groundwater during the RI, and benzene, ethylbenzene, toluene, and EDB were each detected above the RAG.

Contamination at the Milepost 15.75 source area occurred in August 1989, when the FEP was ruptured while a contractor was upgrading Laurance Road and establishing a subgrade level for Robyn Drive, near Milepost 15.75. The pipeline was closed at nearby valves and an earthen berm was constructed to contain the spill. Approximately 2,400 gallons of the estimated 4,200 gallons of spilled fuel was recovered. Contaminated soils were removed from the spill area immediately following the recovery of liquid fuel. Elevated benzene concentrations were detected at this source area in 1992 and subsequent installation of monitoring wells revealed elevated levels of petroleum products at this area.

Pre-ROD Response

There were no pre-ROD responses for the Remedial Area 3 source areas.

6.5.3 Remedy Selection

Nature of Contamination

The primary sources of contamination at Remedial Area 3 are associated with fuel storage, transfer, and handling activities at the East Birch Hill Underground Storage Tank Facility and the FEP.

Investigations prior to and during the RI and post-ROD sampling characterized contamination associated with Remedial Area 3 as follows:

Groundwater

Benzene, toluene, ethylbenzene, EDB, DCA, 1,2,4-TMB, and 1,3,5-TMB were detected in groundwater exceeding federal drinking water MCLs and EPA risk based concentrations used for screening potential contaminants of concern.

Soil

GRO, DRO and benzene are the contaminants found in soil at the Remedial Area 3 source areas.

Remedial Action Objectives

The remedial action objectives are the same for all source areas in OU3.

Groundwater

- Restore groundwater to drinking water quality within a reasonable time frame
- Reduce further migration of contaminated groundwater
- Prevent use of groundwater with contaminants at levels above Safe Drinking Water Act levels

Soil

- For petroleum-contaminated soil, prevent migration of contaminants from soil into groundwater that would result in groundwater contamination and exceedance of Safe Drinking Water Act standards

ARARs

The OU3 ROD cited the most significant ARARs for remedy selection at Remedial Area 3 to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards -- Applicable
- Alaska Oil Pollution regulations – Applicable
- Alaska regulations for leaking USTs – Relevant and appropriate

Cleanup Goals

Based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the site, contaminants of concern were identified for establishing numeric cleanup goals for OU3. There were no source specific cleanup goals for Remedial Area 3. The ROD described the point of compliance for achieving the RAOs as wells downgradient of Remedial Area 3. Numeric values for the cleanup goals established in the ROD and the OU3 ESD are summarized in Appendix C[7].

Groundwater

- Federal and State of Alaska drinking water MCLs were adopted as groundwater cleanup goals for benzene, toluene, ethylbenzene, 1,2-dibromoethane, and 1,2-DCA.
- In the ROD, the remedial goals for 1,2,4-TMB and 1,3,5-TMB were based on an RBC equivalent to a non-cancer hazard quotient of 1 using a residential groundwater exposure assumption, since there were no MCLs for these contaminants. However, the values established in the ROD were erroneously selected from the wrong column in the Region 3 RBC tables. The values listed in the ROD for these chemicals correspond to an inhalation pathway. The residential groundwater assumptions in the RI/FS correspond to a remedial goal of 1.85 mg/L for both compounds. This issue was discussed in the ESD.

Soil

- The remedial action goal for *in-situ* soil contaminated with volatile organic and petroleum compounds is protection of groundwater. Because the soils are acting as a continuing source of contamination to the groundwater, active remediation of the soils will continue until Safe Drinking Water Act levels are consistently met. Natural attenuation will continue until AWQS are achieved.
- Petroleum contaminated soils that are treated *ex-situ* will be treated to State of Alaska Matrix Level A standards before they are returned to the source area.

[7] Source-specific cleanup levels were not developed for OU3, therefore all three Remedial Areas in OU3 have the same chemicals of concern and cleanup levels.

Remedy Selected in the ROD

The remedy selected in the ROD for Milepost 2.7, 3.0, and 15.75 in Remedial Area 3 was soil vapor extraction and air sparging of groundwater in permafrost-free areas. This alternative was chosen because it had been proven effective with similar petroleum contamination in soil and groundwater on Fort Wainwright. The ROD also specified that long-term groundwater monitoring would be conducted at the three sites to ensure that contaminant concentrations were reduced in nearby wetlands. In addition, ICs would be maintained to restrict access to and development at the sites as long as hazardous substances remain onsite at levels that precluded unrestricted use.

6.5.4 Re-Evaluation of the ROD Remedies

Through implementation of the remedial actions in the ROD and additional historical research, the sources and volumes of contamination, groundwater movements, and geology are now better understood at the OU3 sites than they were at the time of the RI/FS and ROD. Based on this new information, a re-evaluation of the remedial actions in the ROD was conducted in 2002. The evaluation concluded that the remedies selected in the ROD for two of the sites at Remedial Area 3, Milepost 2.7 and 3.0, would not fully achieve the RAOs without significant changes to the remedial method; the selected remedy for Milepost 15.75 was determined to be suitable. An ESD document was completed in 2002 that discussed and described the recommended changes.

Basis for the Significant Differences

At the time of the ROD it was thought that the soil conditions at Remedial Area 3 would be conducive to soil vapor extraction, based on the limited information provided in the RI concerning grain size and soil moisture. However, the ROD indicated that site-specific design information would be collected in a pilot study. Based on additional sampling conducted post-ROD, it was found that the soils in both locations contained high fractions of silt and clay and were tightly bonded, thus limiting the movement of air within the vadose zone, which is necessary for effective contaminant reduction. Therefore, the selected remedial action in the ROD for this area, AS/SVE *in-situ* treatment, could not be effectively implemented. However, pilot studies conducted after the ROD showed *ex-situ* treatment of soil to be effective in meeting soil cleanup goals.

An additional finding became apparent based on evaluations of post-ROD investigations related to the sources of contamination at the Milepost sites. The OU3 RI and ROD did not specifically identify the source of petroleum contamination. During post ROD excavation at Milepost 3.0, two out of seven samples collected from excavated soil exceeded the toxicity characteristic leaching procedure (TCLP) action level for benzene. These results could be interpreted such that a release of a hazardous waste had occurred which would be subject to regulation under RCRA. The Army evaluated existing data, conducted additional historical research for this area, and concluded that the majority of the contamination at the Milepost 2.7 and 3.0 sites is most likely upgradient of the FEP and thus is associated with the former EBHTF (FES, 2002a). Therefore, these soils fall under the exclusion allowed under 40 CFR 261.4(b)(10) and the handling of these soils is subject to the corrective action requirements of 40 CFR Part 280 for underground storage tanks. These requirements are being met through implementation of the CERCLA remedy and the ESD.

Description of Significant Differences for Remedial Area 3

The following actions/changes that were not anticipated at the time of the ROD were implemented in the ESD for Remedial Area 3 (some of these actions were completed prior to development of the ESD):

- Excavation of contaminated soils from Milepost 2.7 (1,500 cy) and Milepost 3.0 (6,000 cy) for *ex-situ* AS/SVE treatment in the vicinity of the TFS and Former Building 1173 treatment systems
- Treatment of contaminated soil from Milepost sites 2.7 and 3.0 in the treatment cells to achieve ADEC Level A cleanup levels and soil disposal criteria required for placement in Fort Wainwright's on-Post solid waste landfill or to achieve applicable off-Post soil disposal criteria, as determined appropriate by the Army
- Monitoring of soil and groundwater contamination remaining in the vicinity of Remedial Area 3, for as long as required until RAOs have been achieved, as determined by concurrence of the project managers
- Installation of additional monitoring wells and site characterization at Milepost 2.7 and 3.0 to gain a better understanding of local hydrology, impacts of permafrost, and contaminant migration

6.5.5 Status of Remediation

Soil Treatment

Milepost 2.7

An air sparging treatability study was conducted at Milepost 2.7 in 1996. The same year, a study involving ORC injected into the groundwater was evaluated. Neither of these *in-situ* technologies was considered viable for the site due to lack of electrical power and low soil permeability. Based on these studies, and pursuant to the ESD, excavation and *ex-situ* soil treatment and long-term groundwater monitoring were determined to be the most effective remedy. In 1998, approximately 1,500 cy of contaminated soil was excavated from the site. The soil was mixed with gravel (increasing the total volume to approximately 1,650 cy) and placed in a soil vapor extraction treatment cell constructed adjacent to the TFS at Remedial Area 1b (see Figure 6-14). The Remedial Area 1b TFS AS/SVE blowers were utilized to treat the petroleum-contaminated soil *ex-situ*. The system was operated seasonally from 1998 to 2002. Soil samples were collected from multiple locations and depths throughout the cell during the operational years. Sampling results showed that operation of the treatment cells effectively reduced soil contamination concentrations to below cleanup goals throughout the majority of the cell.

In 2003, the Milepost 2.7 soil treatment cell was decommissioned. The decommissioning was conducted in two phases. Phase I involved removing soil from the cell in areas where contaminant concentrations were known to be below cleanup standards, based on the previous soil sampling results. During this phase, 970 cy of soil were removed from the top and sides of the treatment cell and disposed at the Fort Wainwright landfill. During Phase II of the decommissioning, soils were screened and segregated using a photoionization detector (PID): soil with PID readings above 200 ppmV were considered to still be POL-contaminated and were stockpiled on site for later disposal; soils with PID readings below 200 ppmV were

considered to be below cleanup goals and were disposed at the post landfill.[8] Of the total 1,650 cy of soil in the treatment cell, 560 cy of contaminated soil were temporarily stockpiled at the site and later hauled off-post for thermal treatment.

The Birch Hill Road was upgraded in fall 2009 to accommodate an expanded military training area. The expansion of the road installation required excavation of low water crossings and culverts; therefore, it was suggested that remediation products be added to the open excavations as a treatability study. The remediation products used were an oxygen-releasing compound and a bioaugmentation/surfactant remediation compound. Application of these products was completed during October 2009, and groundwater sampling was completed during June and August 2010 to evaluate the progress of the treatability study. The results of the sampling event did not show significant changes in contaminant concentrations. Annual groundwater sampling will resume in 2011 for evaluation of in-situ remediation progress. After the 2011 sampling event, groundwater monitoring at the Milepost 2.7 site will be conducted every five years.

Milepost 3.0

A pilot study was conducted at Milepost 3.0 in 1996 involving the use of ORC injected as a slurry below the water table. Groundwater sampling results indicated injection of the ORC slurry was not effective. Based upon the results of the Milepost 2.7 treatability study for excavation and *ex-situ* treatment of soils, it was not clear if the same technology would be effective for Milepost 3.0 due to potential differences in soil or contaminant concentrations between the two sites. Therefore, in April 2000 a pilot study involving excavation and subsequent *ex-situ* soil treatment was performed at Milepost 3.0. This involved the excavation of approximately 6,000 cy of petroleum-contaminated soil. These soils were mixed with gravel and placed in an 8,000 cy treatment cell constructed at the base of Birch Hill (see Figure 6-14). The Former Building 1173 AS/SVE blowers were utilized to treat the petroleum-contaminated soil *ex-situ*. This treatment cell was operated for two field seasons, from 2000 to 2002. The main contaminants in the soils were GRO and benzene. As at the Milepost 2.7 treatment cell, soil samples were collected from multiple locations and depths throughout the cell during the operational years. Sampling results showed that operation of the treatment cells effectively reduced soil contamination concentrations to below cleanup goals throughout the majority of the cell.

The Milepost 3.0 treatment cell was decommissioned in 2003 at the same time as the Milepost 2.7 treatment cell. Due to the larger volume of soil and lower anticipated contaminant concentrations, as compared to the Milepost 2.7 treatment cell, the excavation of the Milepost 3.0 cell was conducted in a single phase. Soil was screened and segregated using a PID, but a threshold level of 100 ppmV was used to segregate the POL-contaminated soil from the soil considered to be below cleanup levels[7]. Of the total 8,000 cy of soil in the treatment cell, 1,220 cy of contaminated soil were temporarily stockpiled at the site and later hauled off-post for thermal treatment.

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[8] A correlation study was conducted for the “Milepost 2.7 and 3.0 Treatment Cell Decommissioning and Sampling Plan” (FES, 2003) that compared historical soil sampling results with the corresponding PID readings. Over 300 sample results and PID readings were compared, and a strong positive correlation was found. Two different PID responses (100 ppmv and 200 ppmv) were used for the two different treatment cells because the soils were contaminated with different types of fuel. The Milepost 3.0 soils were primarily contaminated with gasoline, while the Milepost 2.7 soils were primarily contaminated with heavier fuel types (such as diesel). Therefore, a PID response of 100 ppmv reasonably represented the soil cleanup level for the Milepost 3.0 treatment cell, while a PID response of 200 ppmv correlated better to the cleanup levels for the Milepost 2.7 treatment cell.

The Birch Hill Road was expanded in fall 2009 to accommodate an expanded military training area. The expansion of the road installation required excavation of low water crossings and culverts; therefore, it was suggested that remediation products be added to the open excavations as a treatability study. The remediation products used were an oxygen-releasing compound and a bioaugmentation/surfactant remediation compound. Application of these products was completed during October 2009, and groundwater sampling was completed during June and August 2010 to evaluate the progress of the treatability study. The results of the sampling event did not show significant changes in contaminant concentrations. Annual groundwater sampling will resume in 2011 for evaluation of in-situ remediation progress.

Groundwater Monitoring

Milepost 2.7

Groundwater monitoring is conducted annually at Milepost 2.7 to evaluate the progress towards achieving RAOs. The sampling program currently includes seven monitor wells that are sampled annually, in the fall. Sampling was conducted semi-annually until 2005 when the decision was made to change the frequency to the current annual sampling program. Figure 6-15 summarizes the results of groundwater monitoring associated with the Milepost 2.7 source area.

The results of the 2010 sampling event indicated that benzene is the primary contaminant of concern in the groundwater at this site. Benzene exceeded cleanup levels in all seven of the wells sampled, with levels ranging from 12 µg/L (in well AP-5651, upgradient of the site) to 2,800 µg/L (in well AP-9084, just downgradient). Benzene concentrations appear to be stable. Other COCs detected above RAGs during 2010 included toluene and EDB in one well, AP-9084 (which replaced AP-7818 in 2003). Concentrations of both of these COC have remained stable in this well since sampling begin in 1999. DCA was not detected in any of the wells. GRO was detected above the ADEC cleanup level in four of the seven wells sampled with the highest concentration being 75,000 µg/L in AP-9084. DRO was not detected above ADEC cleanup levels at this site.

Significant decreases in benzene concentrations have been observed within and downgradient of the 1998 excavation area, indicating that source removal was effective in reducing groundwater contamination. However, contaminant concentrations in groundwater beneath the site appear to have rebounded in some wells, but have generally stabilized. Although there is an apparent seasonal fluctuation in concentrations in some wells, this is likely due to the seasonal nature of the aquifer[9]. Groundwater flow at this site is also complicated due to the presence of permafrost, varying soil permeability, and the steep topography of the hill. A geophysical study conducted in 2005 indicated that massive permafrost is present to an unknown depth in the areas directly downgradient of the site. Both the presence of permafrost and the low permeability of the native soil in the area are assumed to inhibit groundwater flow and the migration of contaminants away from the site. Additional geophysical investigations are on-going to better define the locations and depths of permafrost at the site in order to better understand possible routes of contaminant migration.

Milepost 3.0

The sampling program at Milepost 3.0 currently includes 11 monitor wells that are sampled annually during the fall, at the same time as the Milepost 2.7 monitoring. Additionally, three

[9] Groundwater flow in this area is significantly affected by freezing in the winter, resulting in lower recharge to the aquifer, and thawing in the spring resulting in higher recharge to the aquifer.

wells were installed in 2009 and sampled twice in 2009 and once in 2010 to evaluate in-situ remediation for a treatability study. Sampling had been conducted semi-annually until 2005 when the decision was made to change the frequency to the current annual sampling program. Figure 6-15 summarizes the results of groundwater monitoring associated with the Milepost 3.0 source area.

Benzene, DCA and EDB were the only COCs found exceeding cleanup levels at this site during 2010. Benzene exceeded cleanup levels in 12 of the 14 wells that were sampled in 2010, with the highest concentration of 14,000 µg/L detected in newly installed well AP-10034, located at the southern edge of the excavation. EDB exceeded cleanup levels in four of the wells, with the highest concentration (7.3 µg/L) in well AP-8711, located cross-gradient from the excavation. DCA was also detected in one of the newly installed wells, AP-10036, at a concentration of 19 µg/L. DCA was not detected at any other sampling location during 2010. GRO was detected above the ADEC cleanup level in four of the 14 wells sampled with the highest concentration being 16,000 µg/L in AP-9077. DRO was not detected above ADEC cleanup levels at this site.

Benzene has not been detected in either of the two farthest downgradient wells (AP-9078 and AP-9079), but EDB exceeded its cleanup level in AP-9079, the farthest downgradient well during 2005 and 2009, and in AP-9078 in 2010. Overall, benzene levels decreased significantly in the wells around the excavation following the soil removal in 2000, but have been increasing in these wells in subsequent years.

Hydrogeologic conditions at Milepost 3.0 are very similar to Milepost 2.7. Groundwater flow is complicated by the presence of permafrost and low permeability native soils. These conditions both tend to moderate groundwater flow and inhibit the migration of contaminants from the site.

LTMO Analysis using MAAROS at Milepost 2.7 and 3.0

The long-term monitoring optimization (LTMO) analysis has been conducted for the MP 2.7 and MP 3.0 using the Monitoring and Remediation Optimization System (MAROS) software.

The results from the MAROS analysis for the Milepost 2.7 site were primarily based on benzene. Benzene above cleanup levels was detected in seven out of eight wells, although only one well had an increasing trend. The plume results showed an increasing trend of the dissolved mass of benzene, but no trend for the plume length and width. This indicates that the plume is stable, which is consistent with the conceptual site model that shows the groundwater contamination is bounded by permafrost. The monitoring well network evaluation showed no changes to the number of wells sampled were recommended, and annual or less frequent sampling would be appropriate for this site.

The results from the MAROS analysis for the Milepost 3.0 site were based on EDB and benzene. EDB was detected above the cleanup level in three wells, and benzene was detected above cleanup levels in eight of 11 wells sampled in 2010. The trend results showed EDB concentrations were increasing in one well, and benzene concentrations were increasing in two wells above cleanup levels. The plume evaluation showed increasing dissolved mass of EDB and benzene, but there was no trend for the plume length and width. Similar to the Milepost 2.7 site, the groundwater contamination is bounded by permafrost, and the MAROS results indicated that although COCs are above the cleanup levels in many wells, there is no off-site contaminant migration. The monitoring well network evaluation showed no changes to the number of wells sampled were recommended, and annual or less frequent sampling would be appropriate for this site.

Institutional Controls

ICs for the Milepost 2.7 and Milepost 3.0 are in effect at Remedial Area 3 and include policies to limit excavation or well installation in potentially contaminated sites. There have been no violations of the ICs to date. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental.

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. A map depicting the boundaries of all sites on Fort Wainwright where IC's are in effect is also provided in Appendix A.

Site Inspection

A site inspection of the MP 2.7 and 3.0 sites was conducted on May 13, 2011. The Birch Hill Road was expanded in fall 2009 to accommodate an expanded military training area for IEDD training. All monitoring wells were observed and found to be in good condition with locking caps and where necessary, protected by barriers in areas where new construction has occurred. Frost-jacking continues to be observed at several wells at both sites. Photographs from the site visit are provided in Appendix D.

6.5.6 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

Milepost 2.7

A treatability study conducted at the Milepost 2.7 source area during 1996 showed that air sparging was not a viable alternative for this source area. A second treatability study initiated in 1998 at Milepost 2.7 showed that it was feasible to use *ex-situ* soil treatment to achieve remedial objectives in petroleum soils.

Although concentrations of benzene remain high, the results of the 2010 Comprehensive Monitoring Report indicate that there have been no significant changes in groundwater concentrations for the past few years. Flow of groundwater at this site is complicated by several hydrogeologic factors that appear to be inhibiting the migration of contaminants away from the site. A site survey conducted in 2004 found that there is no indication that groundwater contamination is having a negative impact on any surface water or vegetation downslope or downgradient of the site.

Because of the complex hydrogeology, and based on the observed contaminant trends, it is unlikely that groundwater cleanup goals can be achieved for this area within a reasonable period of time.

Milepost 3.0

A treatability study conducted at the Milepost 2.7 source area during 1996 showed that air sparging was not a viable alternative for the Milepost 2.7 source area. Since the soils at Milepost 3.0 are similar to those at Milepost 2.7, *in-situ* air sparging was determined to be ineffective at the Milepost 3.0 site as well. A second treatability study initiated in 1998 at Milepost 2.7 showed that it was feasible to use *ex-situ* soil treatment to achieve remedial objectives.

Benzene concentrations remain high at this site and have shown some increase in areas near the 2000 excavation. However concentrations in downgradient wells have been relatively stable, and appear to decrease with distance from the excavated area.

As at Milepost 2.7, flow of groundwater at this site is complicated by several hydrogeologic factors that appear to be inhibiting the migration of contaminants away from the site. A site survey conducted in 2004 found that there is no indication that groundwater contamination is having a negative impact on any surface water or vegetation downslope or downgradient of the site.

Because of the complex hydrogeology, and based on the observed contaminant trends, it is unlikely that groundwater cleanup goals can be achieved for this area within a reasonable period of time.

Milepost 15.75

No COCs have been detected at the Milepost 15.75 site since 2001. Benzene is the only COC that has been historically identified above ROD remediation goals or AWQS at this site. Benzene concentrations have decreased across the site from a high of 300 μg/L in 1996, to non-detect in any wells since 2001. These results show that the treatment system was effective in reducing the contamination at the site and that the remaining contamination has naturally attenuated such that it is no longer a threat to human health or the environment. Additional monitoring is not necessary at this site and the site was recommended for NFA during the second Five-Year Review.

Implementation of Institutional Controls

ICs for Milepost 2.7 and 3.0 at Remedial Area 3 are in place. Excavation in the active area is restricted and requires authorization by DPW Environmental. Groundwater intrusion is restricted, subject to authorization by DPW Environmental.

Table 6-9 summarizes performance to date related to the RAOs for the OU3 FEP Milepost source areas.

Table 6-9. Performance to Date of Remedial Action Objectives at OU3 FEP Milepost Sites

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame	Contaminant concentrations are relatively constant at Milepost 2.7 and 3.0 Concentrations have all decreased to below detection limits at Milepost 15.75 and this site has been accepted for No Further Action.
Reduce further migration of contaminated groundwater from the source areas	Contaminants do not appear to be migrating off site at Milepost 2.7 and 3.0 Concentrations have all decreased to below detection limits at Milepost 15.75
Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS (18 AAC 70)	ICs are in effect. No violations of ICs.
Use natural attenuation to attain AWQS (18 AAC 70)	Contaminant concentrations are relatively constant at Milepost 2.7 and 3.0, and do not appear to be migrating from the site All COC concentrations have decreased to below detection limits at Milepost 15.75

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways or populations at risk.
- The remedial goals for 1,2,4-TMB and 1,3,5-TMB were established in the ROD based on RBCs, but were erroneously selected from the wrong column in the RBC tables. Appropriate goals for these chemicals were established in the ESD.
- The MCLs used to establish groundwater cleanup goals for Remedial Area 3 have not substantively changed since the ROD.
- *In-situ* AS/SVE was determined not to be feasible at Milepost 2.7 and 3.0.

The selected remedy of *in-situ* soil remediation at Milepost 2.7 and Milepost 3.0, as outlined in the original ROD, was modified in the ESD. The remedy proposed in the ESD was excavation of contaminated soil for *ex-situ* AS/SVE treatment. Treatability studies conducted at each of these sites found *ex-situ* AS/SVE treatment to be successful in treating the excavated soils. Groundwater monitoring determined that excavation and *ex-situ* treatment of contaminated soils was initially successful in decreasing contaminant concentrations in the groundwater at the two sites. Although concentrations have since rebounded, they have generally stabilized, and the current site model indicates that no migration of contaminants off-site is occurring.

The ESD also recommended expanding the groundwater monitoring network at each site and conducting additional investigations to construct a more comprehensive site model; both of these actions were completed.

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Variances

Variances with the ROD for OU3 Remedial Area 3 were described and discussed in the ESD. No variances have been identified for the OU3 Remedial Area 3 source area protectiveness and remediation process since the ESD.

Recommendations and Follow-up Actions

Table 6-10. Recommendations and Follow-Up Actions for OU3 FEP Milepost Sites

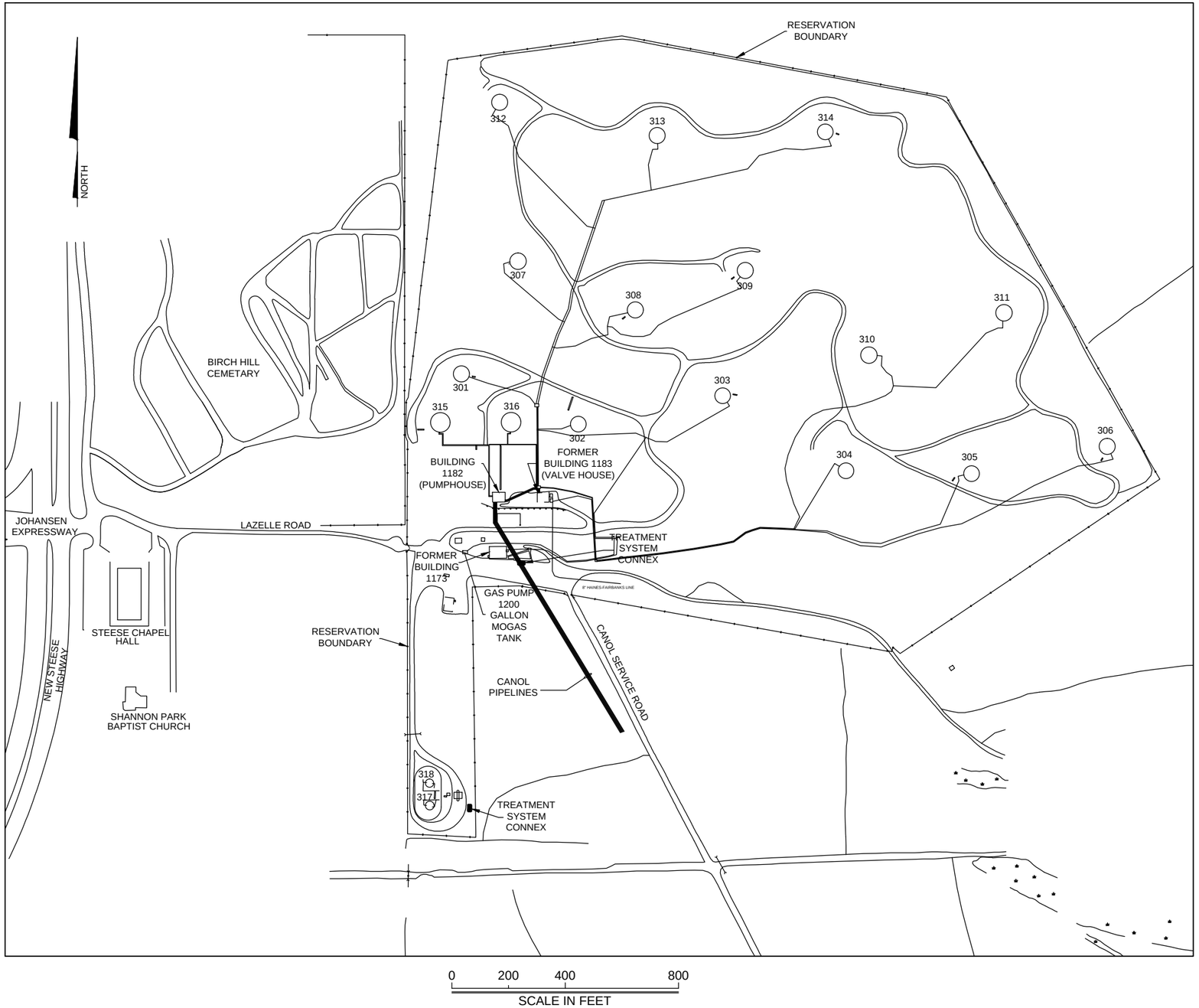
Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
The current site model indicates that contamination does not appear to be migrating off-site, and continued groundwater monitoring should be sufficient to ensure protectiveness. After the 2011 sampling event, groundwater monitoring at both the Milepost 2.7 and Milepost 3.0 sites should be conducted every five years	U.S. Army	EPA / ADEC	Ongoing	No

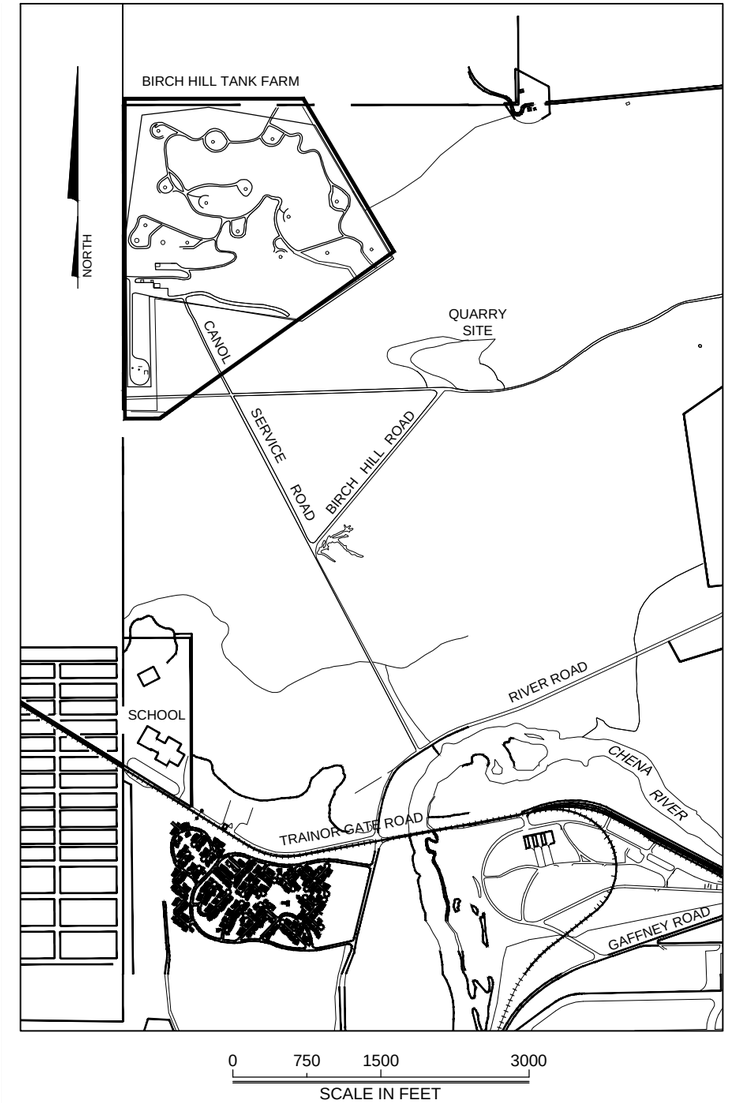
Response to Previous Recommendations

The actions taken in response to the recommendations from the 2006 second Five-Year Review are shown in Table 6-11.

Table 6-11. Response to Recommendations from 2006 Five-Year Review

Recommendation/Follow-Up Actions from 2006 Five-Year Review	Action Completed	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes / No)
Soil treatment was successful at the Milepost 15.75 site and the ROD RAOs have been met. Groundwater monitoring is no longer necessary and this site should be closed.	DPW will provide a letter to ADEC requesting closure for this site.	U.S. Army	EPA / ADEC	2011	No





ARMY ENVIRONMENTAL CENTER

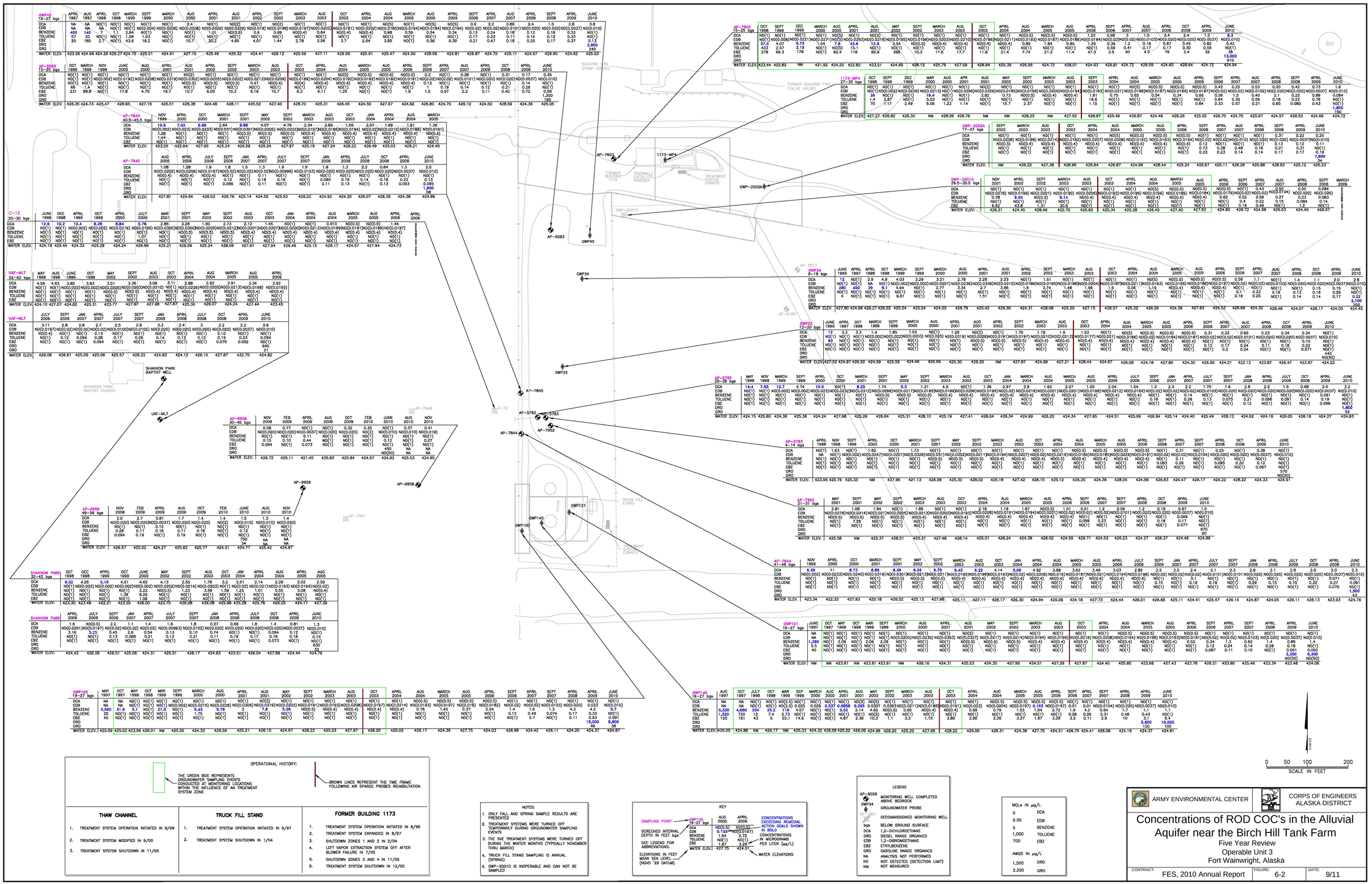
CORPS OF ENGINEERS
ALASKA DISTRICT

Birch Hill Tank Farm Site Map

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2006 5 Year	6-1	9/11

761AF



AP-845 19–27 bgs	APRIL 1997	AUG 1997	APRIL 1998	OCT 1998	MARCH 1999	SEPT 1999	MARCH 2000	AUG 2000	APRIL 2001	AUG 2001	APRIL 2002	SEPT 2002	MARCH 2003	AUG 2003	OCT 2003	APRIL 2004	AUG 2004	MARCH 2005	AUG 2005	APRIL 2006	SEPT 2006	APRIL 2007	AUG 2007	APRIL 2008	SEPT 2008	APRIL 2009	JUNE 2010
DCA	NA	NA	ND(1)	ND(1)	ND(1)	ND(1)	2.4	ND(1)	ND(2)	ND(1)	ND(2)	ND(1)	ND(1)		ND(1)	ND(1)	ND(5)	ND(1)	ND(5)	ND(5)	0.9	2.2	0.86	2.4	1.5	2.8	3.8
EDB	NA	NA	NA	ND(1)	ND(1)	ND(1)	ND(0.2208)	ND(0.0529)	ND(0.0529)	ND(0.0529)	ND(0.0199)	ND(0.0197)	ND(0.0202)	ND(0.0181)	ND(0.0202)	ND(0.0185)	ND(0.0194)	ND(0.0184)	ND(0.0194)	ND(0.02)	ND(0.020)	ND(0.0101)	ND(0.020)	ND(0.020)	ND(0.0337)	ND(0.010)	
BENZENE	400	140	7	1.1	2.84	ND(1)	ND(1)	1.01	ND(0.5)	0.9	0.68	ND(0.4)	0.64	ND(0.4)	0.98	0.59	0.54	0.34	0.13	0.24	0.18	0.12	0.18	0.12	0.33	ND(1)	
TOLUENE	57	20	ND(1)	ND(1)	1.08	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.17	0.23	0.11	0.14	0.12	0.33	ND(1)
EBZ	20	185	2.7	ND(1)	43.6	18.2	ND(1)	10.7	20.2	4.95	4.01	1.44	2.78	2.56	3.7	2.64	3.95	ND(1)	0.58	0.39	0.21	0.47	0.18	0.25	0.17	0.37	0.13
DRO																											2,800
GRO																											240
WATER ELEV.	423.26	424.98	424.29	428.27	424.75	425.51	424.81	427.15	425.49	426.32	424.41	428.12	425.56	427.11	429.06	425.81	426.47	424.50	428.06	424.81	426.87	424.75	426.11	424.57	429.60	424.62	425.03

AP-7803 15–25 bgs	OCT 1998	SEPT 1999	DEC 1999	MARCH 2000	AUG 2000	APRIL 2001	AUG 2001	MAY 2002	SEPT 2002	MARCH 2003	AUG 2003	OCT 2003	APRIL 2004	AUG 2004	MARCH 2005	AUG 2005	APRIL 2006	SEPT 2006	APRIL 2007	AUG 2007	APRIL 2008	OCT 2008	APRIL 2009	JUNE 2010
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	1.22	0.98	1.5	3.4	2.4	1.2	6.3	
EDB	ND(1)	ND(0.008)	ND(0.0221)	ND(0.0271)	ND(1)	ND(0.0293)	ND(0.0319)	ND(0.0195)	ND(0.0198)	ND(0.0203)	ND(0.0210)	ND(0.0186)	ND(0.0211)	ND(0.0163)	ND(0.0187)	ND(0.0188)	ND(0.0184)	0.02	ND(0.02)	ND(0.0103)	ND(0.020)	ND(0.020)	ND(0.0037)	ND(0.010)		
BENZENE	37.2	4.07	5.73	1.04	7.9	43.6	12.8	3.54	ND(0.5)	ND(0.4)	ND(0.4)	ND(0.4)	0.89	1.84	0.85	1.29	0.39	1.2	0.16	0.87	0.45	0.82	0.42	
TOLUENE	433	2.57	2.19	ND(1)	ND(5)	15.1	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	0.59	0.41	0.17	0.17	0.30	0.56	ND(1)	
EBZ	278	69.3	178	ND(1)	92.4	118	82.9	368	10.3	11.6	17.7	11.8	21.4	7.74	21.3	11.4	47.3	3.5	40	4.5	76	2.4	32	38
DRO																								13,000
GRO																								610
WATER ELEV.	423.44	422.82	NM	421.92	424.20	422.82	423.51	424.69	428.12	425.79	427.59	428.84	425.39	426.56	424.72	428.01	424.93	426.81	424.72	426.09	424.60	428.64	424.72	424.94

AP-5583 15–25 bgs	OCT 1998	MARCH 1999	NOV 1999	JUNE 2000	AUG 2000	APRIL 2001	AUG 2001	APRIL 2002	AUG 2002	MARCH 2003	AUG 2003	OCT 2003	APRIL 2004	AUG 2004	MARCH 2005	AUG 2005	APRIL 2006	SEPT 2006	APRIL 2007	AUG 2007	APRIL 2008	APRIL 2009	JUNE 2010
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.17	0.35	
EDB	ND(1)	ND(1)	ND(0.002)	ND(0.0192)	ND(0.0208)	ND(0.0319)	ND(0.0302)	ND(0.0205)	ND(0.0221)	ND(0.0213)	ND(0.0209)	ND(0.0189)	ND(0.0204)	ND(0.0192)	ND(0.0192)	ND(0.0191)	ND(0.02)	ND(0.020)	ND(0.020)	ND(0.0101)	ND(0.020)	ND(0.0037)	ND(0.010)	
BENZENE	ND(1)	ND(1)	ND(0.5)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	0.47	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	0.13	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.14	
TOLUENE	68	1.4	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	1	0.19	0.14	0.12	0.21	0.28	ND(1)	
EBZ	231	88.8	ND(1)	17.8	4.75	16.7	10.7	6.05	10.3	6.19	10.7	8.3	6.11	1.25	ND(1)	ND(1)	ND(1)	ND(1)	1.8	1.5	0.57	2.2	0.11	0.40	0.72	0.56
DRO																										1,300
GRO																										190
WATER ELEV.	426.35	424.73	425.47	428.95	427.16	425.51	426.38	424.48	428.11	425.52	427.40	428.70	425.31	428.45	424.50	427.97	424.82	426.80	424.70	426.12	424.50	428.59	424.36	425.05

1173-MP4 27–35 bgs	OCT 1998	SEPT 1999	DEC 1999	MAR 2000	AUG 2000	APR 2001	AUG 2001	MAY 2002	SEPT 2002	MARCH 2003	AUG 2003	SEPT 2004	APRIL 2005	AUG 2005	APRIL 2006	AUG 2006	APRIL 2007	AUG 2007	APRIL 2008	AUG 2008	APRIL 2009	APRIL 2010	JUNE 2010
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(5)	ND(5)	ND(0.5)	ND(0.5)	0.42	0.25	0.53	0.20	0.42	0.73	1.6
EDB	ND(1)	ND(0.002)	ND(0.0229)	ND(0.013)	ND(1)	ND(0.0295)	ND(0.0329)	ND(0.015)	ND(0.0185)	ND(0.0199)	ND(0.0209)	ND(0.0187)	ND(0.0195)	ND(0.0162)	ND(0.0187)	ND(0.0183)	ND(0.021)	ND(0.0101)	ND(0.0102)	ND(0.020)	ND(0.020)	ND(0.0037)	ND(0.010)
BENZENE	39	ND(1)	ND(1)	19.4	ND(1)	ND(0.4)	ND(0.4)	2.82	0.73	ND(0.5)	ND(0.4)	1.61	0.75	0.65	0.54	0.34	0.98	0.56	1.5	0.40	2.1	0.22	0.89
TOLUENE	1.4	2.87	ND(1)	1	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.64	0.39	0.59	0.18	0.22	0.76	ND(1)
EBZ	70	1.17	2.49	6.06	1.23	1.14	ND(1)	15.7	2.37	ND(1)	ND(1)	1.15	ND(1)	ND(1)	ND(1)	ND(1)	0.84	0.33	0.67	0.21	0.65	0.085	0.43
DRO																							ND(1)
GRO																							1,600
WATER ELEV.	427.27	426.82	426.30	NM	428.06	426.76	NM	NM	428.25	NM	427.52	428.87	425.49	426.87	424.49	428.25	425.02	426.70	424.75	425.97	424.57	428.53	424.66	424.72

AP-7845 40.5–45.5 bgs	NOV 1999	APRIL 2000	OCT 2000	MARCH 2001	SEPT 2001	MAY 2002	SEPT 2002	MARCH 2003	AUG 2003	OCT 2003	JAN 2004	APRIL 2004	AUG 2004	MARCH 2005
DCA	10.8	7.02	8.68	2.64	6.88	4.07	4.76	2.34	2.85	1.55	2.07	1.69	1.61	1.36
EDB	ND(0.002)	ND(0.023)	ND(0.0233)	ND(0.031)	ND(0.0301)	ND(0.0205)	ND(0.0202)	ND(0.0197)	ND(0.0185)	ND(0.0194)	ND(0.02)	ND(0.0215)	ND(0.0188)	ND(0.0181)
BENZENE	1.28	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
TOLUENE	1.44	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EBZ	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
WATER ELEV.	423.55	424.64	427.95	425.24	428.59	425.44	427.97	425.19	427.24	428.22	426.49	425.03	428.21	424.45

AP-7845	AUG 2005	APRIL 2006	JULY 2006	SEPT 2006	JAN 2007	APRIL 2007	JULY 2007	SEPT 2007	JAN 2008	APRIL 2008	JULY 2008	OCT 2008	APRIL 2009	JUNE 2010
DCA	1.08	1.28	1.9	1.8	1.5	1.3	1.6	1.9	1.8	1.3	2.2	0.84	1.3	2.5
EDB	ND(0.0202)	ND(0.0206)	ND(0.0197)	ND(0.022)	ND(0.023)	ND(0.022)	ND(0.02996)	ND(0.0103)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.0037)	ND(0.010)
BENZENE	ND(0.4)	ND(0.4)	ND(0.4)	ND(1)	0.11	0.11	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
TOLUENE	ND(1)	ND(1)	ND(1)	0.12	0.14	0.18	0.18	0.080	0.19	0.14	0.18	0.13	0.22	0.13
EBZ	ND(1)	ND(1)	ND(1)	0.086	ND(1)	0.11	ND(1)	0.11	0.13	ND(1)	ND(1)	0.13	0.093	0.095
DRO														1,900
GRO														56
WATER ELEV.	427.81	424.84	426.03	426.76	425.14	424.55	425.53	426.22	424.92	424.20	426.07	428.36	424.38	424.89

GWP-2002A 17–27 bgs	SEPT 2002	MARCH 2003	AUG 2003	OCT 2003	APRIL 2004	AUG 2004	APRIL 2005	AUG 2005	APRIL 2006	AUG 2006	APRIL 2007	AUG 2007	APRIL 2008	APRIL 2009	APRIL 2010
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(5)	ND(5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	0.31	0.22	0.25
EDB	ND(0.0208)	ND(0.0185)	ND(0.0214)	ND(0.0187)	ND(0.0195)	ND(0.0208)	ND(0.0162)	ND(0.0183)	ND(0.0187)	ND(0.0184)	ND(0.021)	ND(0.0101)	ND(0.0102)	ND(0.020)	ND(0.020)
BENZENE	ND(0.5)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(1)	ND(1)	0.13	0.12	0.11
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.21	0.31	ND(1)
EBZ	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.23	0.23	0.14
DRO															7,900
GRO															54
WATER ELEV.	NM	426.22	427.38	428.96	426.64	426.87	424.96	428.44	425.24	426.97	425.11	428.26	425.88	428.83	425.12

GWP-20010 26.5–35.5 bgs	NOV 2001	APRIL 2002	SEPT 2002	MARCH 2003	AUG 2003	OCT 2003	APRIL 2004	AUG 2004	APRIL 2005	AUG 2005	APRIL 2006	AUG 2006	APRIL 2007	AUG 2007	APRIL 2008	AUG 2008	MARCH 2009
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	0.41	0.50	0.084
EDB	ND(0.0278)	ND(0.0198)	ND(0.0201)	ND(0.0190)	ND(0.0206)	ND(0.0183)	ND(0.0196)	ND(0.0188)	ND(0.0189)	ND(0.0184)	ND(0.021)	ND(0.02)	ND(0.0204)	ND(0.020)	ND(0.020)
BENZENE	0.78	9.55	ND(0.5)	9.14	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(1)	ND(1)	0.62	0.52	0.59
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.22	0.15	0.084
EBZ	8.62	33.8	1.31	30.6	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.18	0.48
WATER ELEV.	426.31	424.45	428.46	425.70	426.60	425.34	425.28	426.45	427.40	427.92	424.80	426.72	424.66	426.03	424.45

C-12 25–30 bgs	JUNE 1998	DEC 1998	APRIL 1999	OCT 1999	APRIL 2000	JULY 2000	MAR 2001	SEPT 2001	MAY 2002	SEPT 2002	AUG 2003	OCT 2003	JAN 2004	APRIL 2004	AUG 2005	MARCH 2006	AUG 2006	APRIL 2007	APRIL 2008
DCA	12.6	10.2	10.4	8.28	8.84	5.76	2.85	3.28	1.50	2.73	2.12	1.45	ND(1)	ND(1)	0.610	ND(0.5)	ND(0.5)	1.44	
EDB	ND(1)	ND(1)	ND(0.002)	ND(0.002)	ND(0.0218)	ND(0.0199)	ND(0.0300)	ND(0.0305)	ND(0.0205)	ND(0.0212)	ND(0.0201)	ND(0.0207)	ND(0.0200)	ND(0.0213)	ND(0.0189)	ND(0.0181)	ND(0.0189)	ND(0.0197)	
BENZENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	1.07	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	
EBZ	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	
WATER ELEV.	424.19	425.44	424.33	425.29	424.24	426.96	425.21	426.59	425.24	428.09	427.67	427.94	426.46	425.15	428.17	424.57	427.94	424.73	

UAF-ML7 52–62 bgs	MAY 1998	AUG 1998	JUNE 1999	OCT 1999	MAY 2002	SEPT 2002	AUG 2003	OCT 2003	APRIL 2004	AUG 2004	MARCH 2005	AUG 2005	APRIL 2006
DCA	4.56	4.63	3.85	3.93	3.51	3.36	3.08	3.11	2.88	2.82	2.91	3.34	2.92
EDB	ND(1)	ND(1)	ND(0.002)	ND(0.002)	ND(0.0205)	ND(0.0203)	ND(0.0210)	ND(1)	ND(0.0229)	ND(0.0205)	ND(0.0213)	ND(0.0198)	ND(0.0195)
BENZENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EBZ	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
WATER ELEV.	424.10	427.07	424.82	425.31	423.77	427.97	427.68	427.87	425.30	428.07	424.24	427.44	423.45

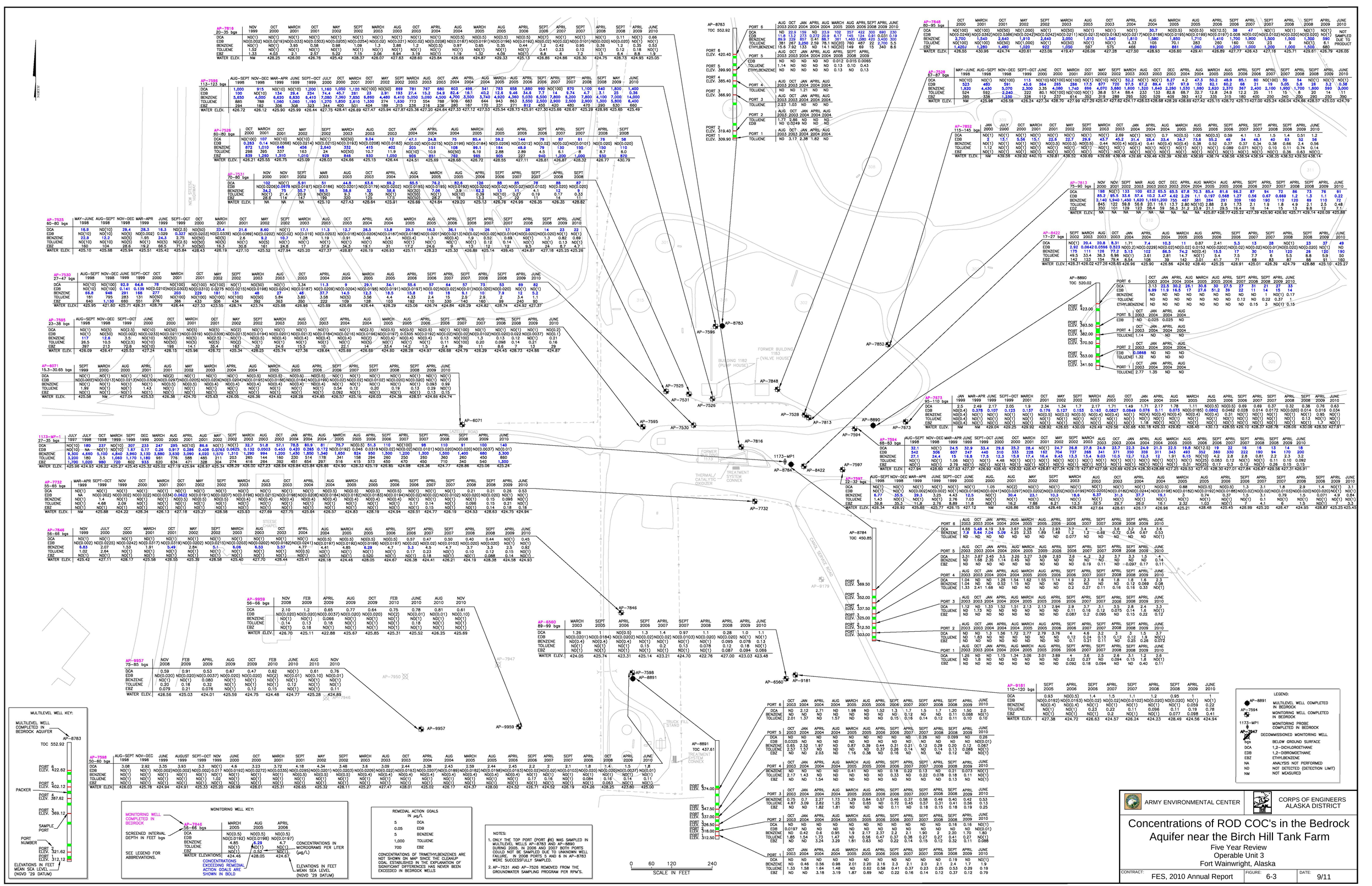
UAF-ML7	JULY 2006	SEPT 2006	JAN 2007	APRIL 2007	JULY 2007	SEPT 2007	JAN 2008	APRIL 2008	JULY 2008	OCT 2008	APRIL 2009	JUNE 2010
DCA	3.11	2.8	2.8	2.7	2.5	2.8	3.3	2.4	3	2.2	2.2	2.6
EDB	ND(0.0197)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0100)	ND(0.0102)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.0037)	ND(0.010)
BENZENE	ND(0.4)	ND(1)	ND(1)	0.13	ND(1)	ND(1)	ND(1)	0.10	ND(1)	0.10	ND(1)	
TOLUENE	ND(1)	0.12	0.094	0.28	0.17	0.28	0.14	0.12	0.19	0.23	0.094	
EBZ	ND(1)	ND(1)	ND(1)	0.094	ND(1)	ND(1)	ND(1)	ND(1)	0.070	0.062	ND(1)	
DRO											640	
GRO											21	
WATER ELEV.	426.08	426.61	425.06	425.06	425.57	426.22	424.83	424.12	426.10	427.87	432.70	424.82

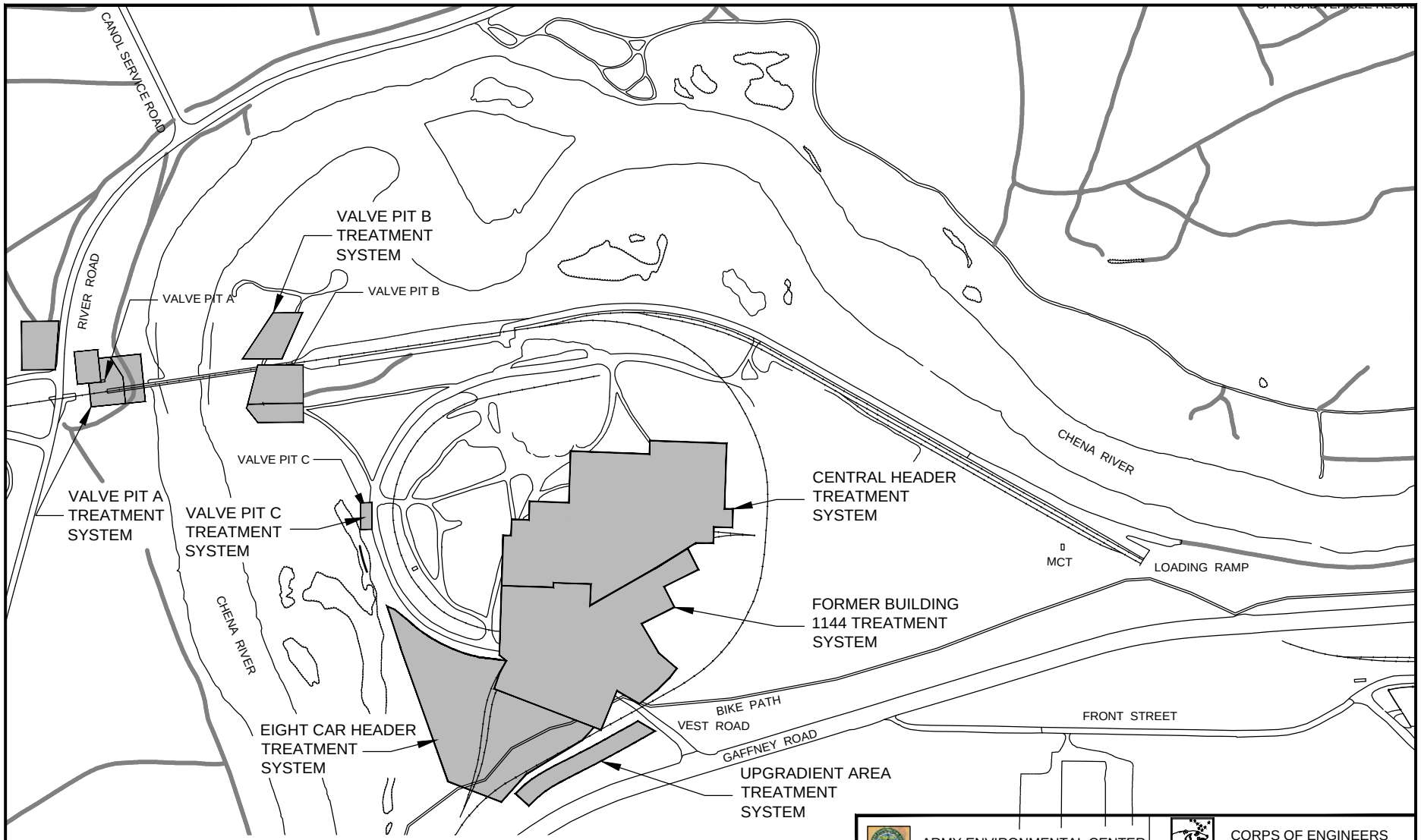
GWP34 8–18 bgs	JUNE 1998	APRIL 1997	APRIL 1998	OCT 1998	MARCH 1999	SEPT 1999	MARCH 2000	AUG 2000	APRIL 2001	AUG 2001	APRIL 2002	AUG 2002	APRIL 2003	AUG 2003	OCT 2003	APRIL 2004	AUG 2004	MARCH 2005	AUG 2005	APRIL 2006	AUG 2006	APRIL 2007	AUG 2007	APRIL 2008	AUG 2008	APRIL 2009	JUNE 2010
DCA	12	ND(1)	2.9	4.9	4.03	3.29	3.21	2.78	2.28	2.23	ND(1)	1.61	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	1.1	ND(1)	1.4	1.1	2.0	2.8
EDB	ND(1)	ND(1)	NA	NA	0.74	ND(0.002)	ND(0.022)	ND(0.0201)	ND(0.0239)	ND(0.0338)	ND(0.0310)	ND(0.0189)	ND(0.0185)	ND(0.0198)	ND(0.0204)	ND(0.0187)	ND(0.0211)	ND(0.0183)	ND(0.0196)	ND(0.0188)	ND(0.0187)	ND(0.02)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.0037)	ND(0.010)
BENZENE	206	450	29	8.1	4.94	ND(1)	2.77	3.34	2.7	3.86	1.6	2.74	1.48	1.66	1.9	0.56	1.19	ND(0.4)	ND(0.4)	ND(0.4)	ND(1)	0.15	ND(1)	ND(1)	0.15	ND(1)	ND(1)
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.1	0.22	0.16	0.13	0.16	0.29	ND(1)	ND(1)	ND(1)
EBZ	4	ND(1)	ND(1)	ND(1)	9.81	ND(1)	ND(1)	1.51	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.16	0.25	ND(1)	0.14	0.14	0.17	0.22	2,100	
DRO																										200	
GRO																										2,100	
WATER ELEV.	427.80	424.99	428.27	426.55	425.54	425.54	424.55	426.79	425.42	426.30	424.31	428.08	425.50	427.15	428.57	425.32	426.29	424.39	427.93	424.53	426.66	424.32	428.48	424.07	428.17	424.05	424.45

GWP33 12–20 bgs	JUNE 1995	APRIL 1997	OCT 1998	MARCH 1999	SEPT 1999	MARCH 2000	AUG 2000	APRIL 2001	AUG 2001	APRIL 2002	AUG 2002	APRIL 2003	AUG 2003	OCT 2003	APRIL 2004	AUG 2004	MARCH 2005	AUG 2005	APRIL 2006	AUG 2006	APRIL 2007	AUG 2007	APRIL 2008	OCT 2008	APRIL 2009	JUNE 2010
DCA	12	3.3	3.3	1.4	1.85	1.53	ND(2)	1.29	ND(2)	1.78	1.18	1.6	1.6	1.53	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EDB	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.002)	ND(0.0203)	ND(0.0205)	ND(0.0319)	ND(0.0329)	ND(0.0191)	ND(0.0197)	ND(0.0210)	ND(0.0221)	ND(0.0216)	ND(0.0185)	ND(0.0229)	ND(0.0191)	ND(0.02)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.0037)	ND(0.010)		
BENZENE	63	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(1)	ND(1)	ND(1)	ND(1)	0.10	ND(1)	
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.18	0.22	0.18	0.22	
EBZ	140	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.2	0.24	ND(1)	0.12	0.071	ND(1)		
DRO																								440		
GRO																								ND(50)		
WATER ELEV.	427.52	424.97	426.50	424.59	425.56	424.46	426.69	425.30	428.20	NM	427.87	424.69	427.21	428.44	424.97	426.08	424.18	427.80	424.30	426.50	424.21	422.12	423.87	426.47	423.87	424.22

AP-5782 28–38 bgs	MAY 1998	NOV 1998	MARCH 1999	SEPT 1999	APRIL 2000	OCT 2000	MARCH 2001	SEPT 2001	MAY 2002	SEPT 2002	MARCH 2003	AUG 2003	OCT 2003	JAN 2004	MARCH 2004	AUG 2004	MARCH 2005	AUG 2005	APRIL 2006	JULY 2006	SEPT 2006	JAN 2007	APRIL 2007	JULY 2007	SEPT 2007	JAN 2008	APRIL 2008	JULY 2008	OCT 2008	APRIL 2009	JUNE 2010
DCA	14.4	7.63	12.7	4.74	10.6	8.25	1.74	5.3	1.21	4.6	ND(1)	1.36	2.97	2.9	1.93	2.07	1.05	2.04	1.54	1.3	2.3	1.70	1.6	2.0	2.0	2.2	2.0	2.2	2.0	2.2	2.0
EDB	ND(1)	ND(1)	ND(0.002)	ND(0.002)	ND(0.023)	ND(0.0232)	ND(0.0312)	ND(0.0296)	ND(0.0217)	ND(0.0185)	ND(0.0189)	ND(0.0206)	ND(0.0196)	ND(0.02)	ND(0.0219)	ND(0.0201)	ND(0.0201)	ND(0.0188)	ND(0.0212)	ND(0.0184)	ND(0.02)	ND(0.02)	ND(0.02)	ND(0.0103)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.0037)	ND(0.010)
BENZENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(1)	ND(1)	0.14	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.061	ND(1)	
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.18	ND(1)	0.24	0.13	0.075	0.21	0.066	0.281	0.14	0.19	ND(1)	0.27	0.091
EBZ	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.12	ND(1)	ND(1)	ND(1)	0.098		ND(1)	ND(1)
DRO																														1,800	1,800
GRO																														150	
WATER ELEV.	424.15	425.80	424.36	425.38	424.24	427.98	425.29	426.64	425.31	428.10	425.19	427.41	428.04	426.34	424.99	428.20	424.34	427.95	424.51	425.99	426.64	425.14	424.40	425.49	426.12	424.92	424.16	428.05	428.16	424.27	424.83

| AP-5783 4–14 bgs | APRIL 1998 | NOV 1998 | SEPT 1999 | APRIL 2000 | OCT 2000 | MARCH 2001 | SEPT 2001 | MAY 2002 | SEPT 2002 | MARCH 2003 | AUG 2003 | OCT 2003 | JAN 2


AP-7816
20–35 bgs
AP-7596
113–123 bgs
AP-7528
80–90 bgs
AP-7531
70–80 bgs
AP-7525
60–80 bgs
AP-7530
27–47 bgs
AP-7595
23–38 bgs
AP-6071
15.3–30.65 bgs
1173-MP-1
27–35 bgs
AP-7732
55–65 bgs
AP-7846
56–66 bgs
AP-9959
56–66 bgs
AP-9957
75–85 bgs
AP-7598
50–60 bgs
AP-8560
89–99 bgs
AP-7848
67–87 bgs
AP-7852
115–145 bgs
AP-7813
75–90 bgs
AP-8422
17–27 bgs
AP-8890
TOC 520.02
AP-7594
95–110 bgs
AP-7573
95–110 bgs
AP-7597
22–32 bgs
AP-8784
TOC 450.85
AP-9181
110–120 bgs
AP-8891
TOC 437.61
AP-8783
TOC 552.92
AP-8783
TOC 552.92
MULTILEVEL WELL KEY:
MULTILEVEL WELL COMPLETED IN BEDROCK AQUIFER
PACKER
PORT NUMBER
SAMPLE PORT
ELEVATIONS IN FEET MEAN SEA LEVEL (NGVD '29 DATUM)
MONITORING WELL KEY:
MONITORING WELL COMPLETED IN BEDROCK
SCREENED INTERVAL DEPTH IN FEET bgs
SEE LEGEND FOR ABBREVIATIONS.
CONCENTRATIONS EXCEEDING REMEDIAL ACTION GOALS ARE SHOWN IN BOLD
CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)
ELEVATIONS IN FEET MEAN SEA LEVEL (NGVD '29 DATUM)
REMEDIAL ACTION GOALS IN µg/L
5 DCA
0.05 EDB
5 BENZENE
1,000 TOLUENE
700 EBZ
CONCENTRATIONS OF TRIMETHYLBENZENES ARE NOT SHOWN ON MAP SINCE THE CLEANUP GOAL ESTABLISHED IN THE EXPLANATION OF SIGNIFICANT DIFFERENCES HAS NEVER BEEN EXCEEDED IN BEDROCK WELLS
NOTES:
1. ONLY THE TOP PORT (PORT #6) WAS SAMPLED IN MULTILEVEL WELLS AP-8783 AND AP-8890 DURING 2005. IN 2006 AND 2007 BOTH PORTS COULD NOT BE SAMPLED DUE TO UNKNOWN WELL FAILURE. IN 2008 PORTS 5 AND 6 IN AP-8783 WERE SUCCESSFULLY SAMPLED.
2. AP-7531 AND AP-7526 REMOVED FROM THE GROUNDWATER SAMPLING PROGRAM PER RPM'S.
LEGEND:
MULTILEVEL WELL COMPLETED IN BEDROCK
MONITORING WELL COMPLETED IN BEDROCK
MONITORING PROBE COMPLETED IN BEDROCK
DECOMMISSIONED MONITORING WELL
bgs BELOW GROUND SURFACE
DCA 1,2–DICHLOROETHANE
EDB 1,2–DIBROMOETHANE
EBZ ETHYLBENZENE
NA ANALYSIS NOT PERFORMED
ND NOT DETECTED (DETECTION LIMIT)
NM NOT MEASURED
0 60 120 240
SCALE IN FEET
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
Concentrations of ROD COC's in the Bedrock Aquifer near the Birch Hill Tank Farm
Five Year Review
Operable Unit 3
Fort Wainwright, Alaska
CONTRACT: FES, 2010 Annual Report
FIGURE: 6-3
DATE: 9/11
1718AF



Horizontal datum is Alaska State Plane, Zone 3, NAD83 in meters.
Vertical datum is NAVD88 in meters.
This map conforms to National Map Accuracy Standards as related to the project photo control for scales of 1:1000 or smaller.
Contours in vegetated areas may be less accurate.
Photography Date: 5-16-1997

0 250 500 1000
SCALE IN FEET

LEGEND

APPROXIMATE AREAS OF REMEDIATION TREATMENT SYSTEMS

ARMY ENVIRONMENTAL CENTER

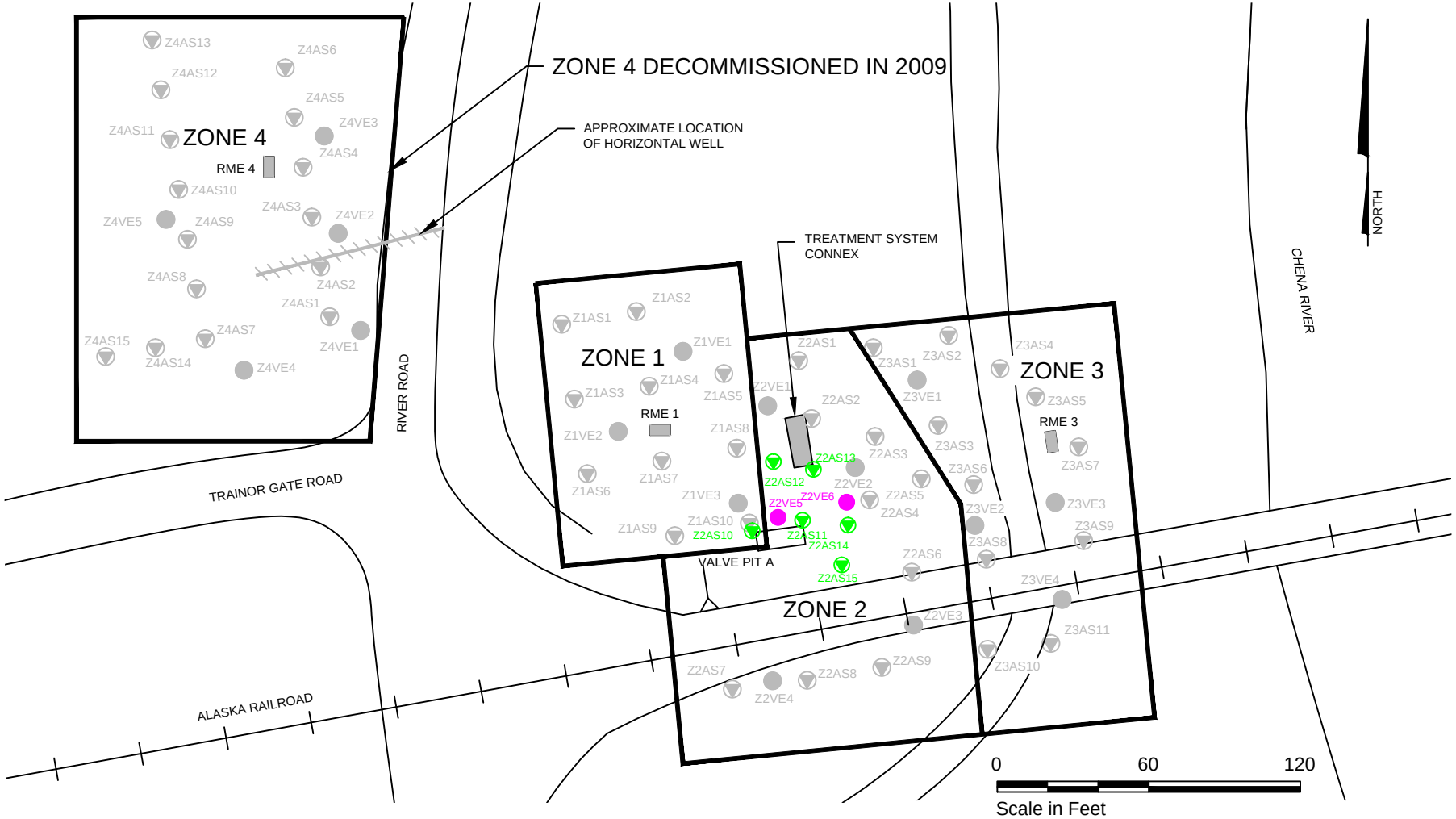
CORPS OF ENGINEERS
ALASKA DISTRICT

ROLF Site Map

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
DPW, 2004 Base Map	6-4	9/11

731AF



LEGEND

Z2AS10	HOT-SPOT AIR SPARGE PROBE INSTALLED IN 2007, SHUTDOWN IN JANUARY 2009 FOR A REBOUND STUDY
Z2VE5	HOT-SPOT VAPOR EXTRACTION PROBE INSTALLED IN 2007, SHUTDOWN IN JANUARY 2009 FOR A REBOUND STUDY
Z1AS9	AIR SPARGE PROBE OFF FOR REBOUND STUDY
Z1VE1	VAPOR EXTRACTION PROBE OFF FOR REBOUND STUDY
RME	REMOTE MONITORING ENCLOSURE

NOTES:

1. TREATMENT SYSTEM OPERATION INITIATED 8/96
2. ZONE 4 AND HORIZONTAL WELL INSTALLED IN 9/00
3. SHUTDOWN ZONES 1 AND 3 IN 2/04 TO CONDUCT A REBOUND STUDY
4. SHUTDOWN ZONE 4 AND HORIZONTAL WELL IN 11/05 TO CONDUCT A REBOUND STUDY
5. HOT SPOT OPERATION BEGAN IN 8/07
6. SHUTDOWN ZONE 2 AND HOT SPOT IN 1/09 TO CONDUCT A REBOUND STUDY
7. ZONE 4 DECOMMISSIONED IN 2009

ARMY ENVIRONMENTAL CENTER

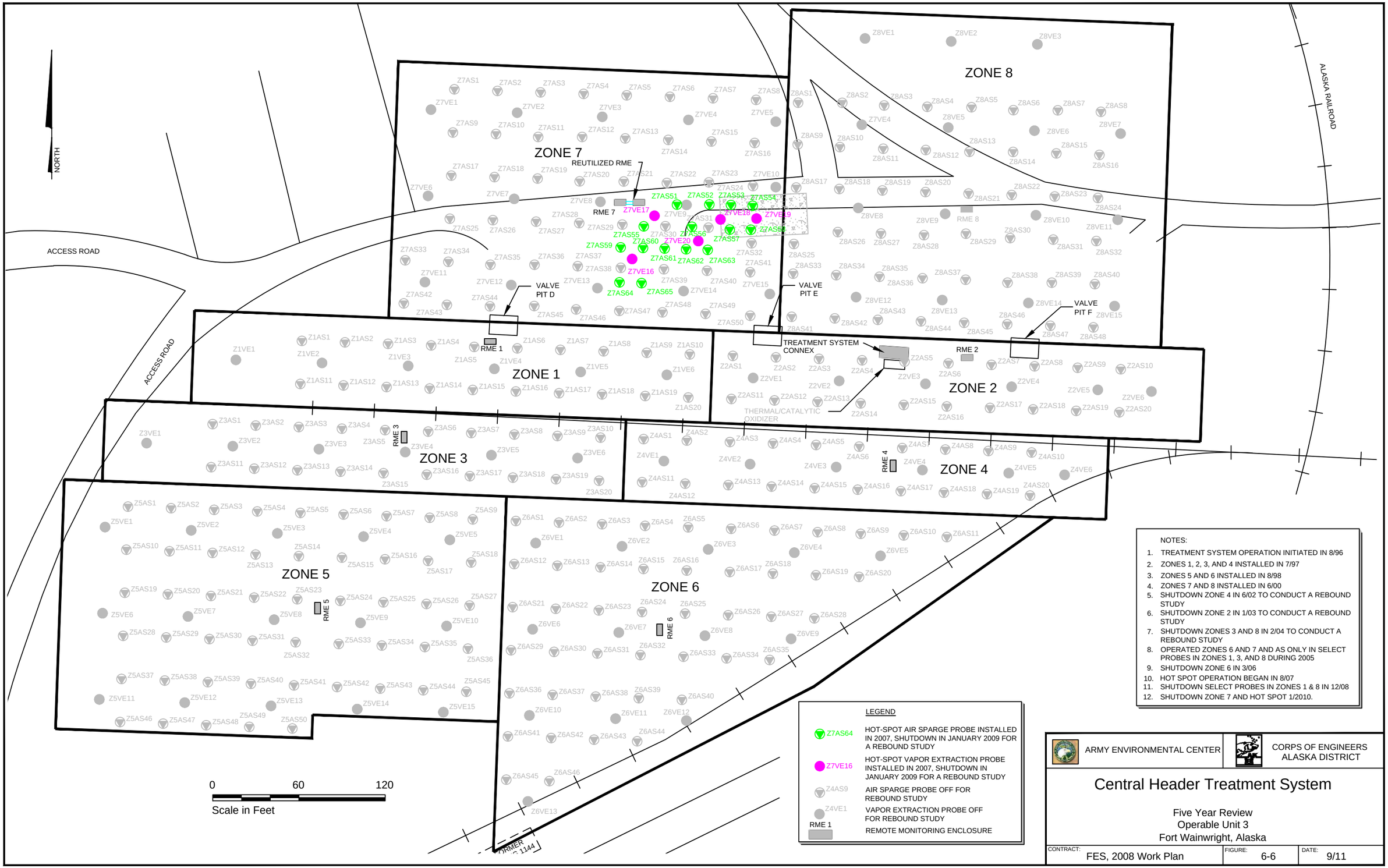
CORPS OF ENGINEERS
ALASKA DISTRICT

Valve Pit A Treatment System

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
FES, 2008 Work Plan	6-5	9/11

1715AF



NOTES:

1. TREATMENT SYSTEM OPERATION INITIATED IN 8/96
2. ZONES 1, 2, 3, AND 4 INSTALLED IN 7/97
3. ZONES 5 AND 6 INSTALLED IN 8/98
4. ZONES 7 AND 8 INSTALLED IN 6/00
5. SHUTDOWN ZONE 4 IN 6/02 TO CONDUCT A REBOUND STUDY
6. SHUTDOWN ZONE 2 IN 1/03 TO CONDUCT A REBOUND STUDY
7. SHUTDOWN ZONES 3 AND 8 IN 2/04 TO CONDUCT A REBOUND STUDY
8. OPERATED ZONES 6 AND 7 AND AS ONLY IN SELECT PROBES IN ZONES 1, 3, AND 8 DURING 2005
9. SHUTDOWN ZONE 6 IN 3/06
10. HOT SPOT OPERATION BEGAN IN 8/07
11. SHUTDOWN SELECT PROBES IN ZONES 1 & 8 IN 12/08
12. SHUTDOWN ZONE 7 AND HOT SPOT 1/2010.

LEGEND

Z7AS64	HOT-SPOT AIR SPARGE PROBE INSTALLED IN 2007, SHUTDOWN IN JANUARY 2009 FOR A REBOUND STUDY
Z7VE16	HOT-SPOT VAPOR EXTRACTION PROBE INSTALLED IN 2007, SHUTDOWN IN JANUARY 2009 FOR A REBOUND STUDY
Z4AS9	AIR SPARGE PROBE OFF FOR REBOUND STUDY
Z4VE1	VAPOR EXTRACTION PROBE OFF FOR REBOUND STUDY
RME 1	REMOTE MONITORING ENCLOSURE

ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS
ALASKA DISTRICT

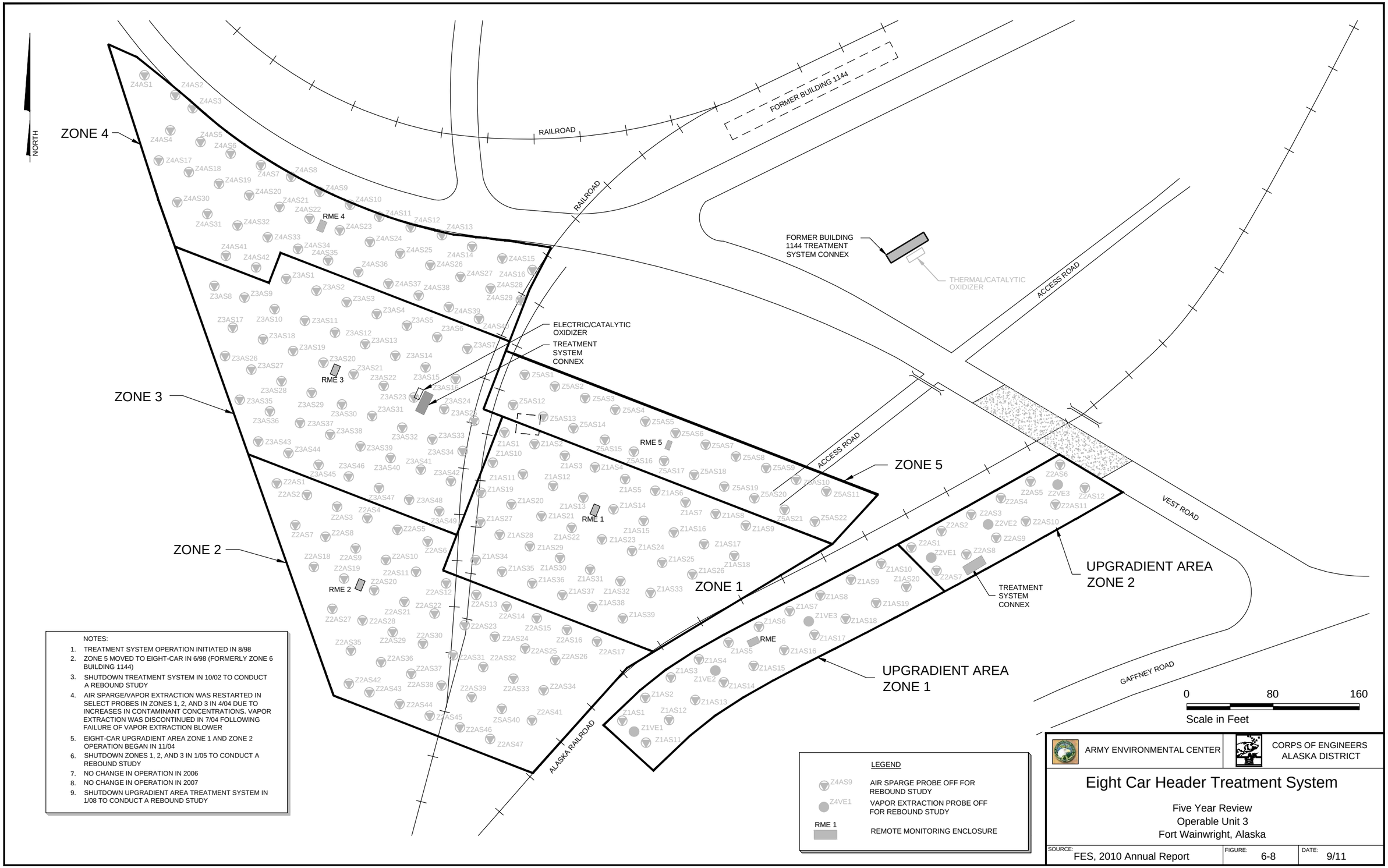
Central Header Treatment System

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
FES, 2008 Work Plan	6-6	9/11

1716AF

NORTH
ZONE 1
ZONE 2
ZONE 3
ZONE 4
ZONE 5
ZONE 6
ZONE 7
ZONE 8
RME 1
RME 2
RME 4
RME 5
RME 6
RME 7
RME 8
REUTILIZED RME
FORMER BUILDING 1144
RAILROAD
ACCESS ROAD
VEST ROAD
ALASKA RAILROAD
TREATMENT SYSTEM CONNEX
THERMAL/ CATALYTIC OXIDIZER
0
60
120
Scale in Feet
NOTES:
1. TREATMENT SYSTEM OPERATION INITIATED IN 8/96
2. SYSTEM EXPANSION, ZONE 1, 2, 3, AND 4 INSTALLED IN 6/97
3. ZONES 5 AND 6 INSTALLED IN 9/97
4. ZONE 6 RELOCATED TO EIGHT CAR HEADER TREATMENT SYSTEM IN 6/98 (FORMERLY ZONE 6 BUILDING 1144)
5. SHUTDOWN ZONE 5 IN 1/03 TO CONDUCT A REBOUND STUDY
6. SHUTDOWN ZONE 2 IN 5/03 TO CONDUCT A REBOUND STUDY
7. SHUTDOWN ZONE 3 IN 2/04 TO CONDUCT A REBOUND STUDY
8. ZONE 7 AND 8 EXPANSION BEGAN OPERATION IN 11/04
9. NO CHANGE IN OPERATION FOR 2005
10. SHUTDOWN ZONE 6 IN 1/06
11. SHUTDOWN ZONES 4, 7, & 8 IN 1/07. HOT SPOT OPERATION BEGAN IN 8/07.
12. SHUTDOWN ZONE 1 AND HOT SPOT AREA IN 1/09 TO CONDUCT A REBOUND STUDY.
LEGEND
Z1AS31 HOT-SPOT AIR SPARGE PROBE INSTALLED IN 2007, SHUTDOWN IN JANUARY 2009 FOR A REBOUND STUDY
Z1VE9 HOT-SPOT VAPOR EXTRACTION PROBE INSTALLED IN 2007, SHUTDOWN IN JANUARY 2009 FOR A REBOUND STUDY
Z3AS9 AIR SPARGE PROBE OFF FOR REBOUND STUDY
Z3VE1 VAPOR EXTRACTION PROBE OFF FOR REBOUND STUDY
RME 1 REMOTE MONITORING ENCLOSURE
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
Former Building 1144 Treatment System
Five Year Review
Operable Unit 3
Fort Wainwright, Alaska
CONTRACT: FES, 2008 Work Plan
FIGURE: 6-7
DATE: 9/11
1717AF


NORTH
ZONE 4
ZONE 3
ZONE 2
ZONE 1
ZONE 5
RAILROAD
RAILROAD
FORMER BUILDING 1144
FORMER BUILDING 1144 TREATMENT SYSTEM CONNEX
THERMAL/CATALYTIC OXIDIZER
ACCESS ROAD
ACCESS ROAD
ELECTRIC/CATALYTIC OXIDIZER
TREATMENT SYSTEM CONNEX
RME 1
RME 2
RME 3
RME 4
RME 5
RME
TREATMENT SYSTEM CONNEX
UPGRADIENT AREA ZONE 2
UPGRADIENT AREA ZONE 1
VEST ROAD
GAFFNEY ROAD
ALASKA RAILROAD
0
80
160
Scale in Feet
NOTES:
1. TREATMENT SYSTEM OPERATION INITIATED IN 8/98
2. ZONE 5 MOVED TO EIGHT-CAR IN 6/98 (FORMERLY ZONE 6 BUILDING 1144)
3. SHUTDOWN TREATMENT SYSTEM IN 10/02 TO CONDUCT A REBOUND STUDY
4. AIR SPARGE/VAPOR EXTRACTION WAS RESTARTED IN SELECT PROBES IN ZONES 1, 2, AND 3 IN 4/04 DUE TO INCREASES IN CONTAMINANT CONCENTRATIONS. VAPOR EXTRACTION WAS DISCONTINUED IN 7/04 FOLLOWING FAILURE OF VAPOR EXTRACTION BLOWER
5. EIGHT-CAR UPGRADIENT AREA ZONE 1 AND ZONE 2 OPERATION BEGAN IN 11/04
6. SHUTDOWN ZONES 1, 2, AND 3 IN 1/05 TO CONDUCT A REBOUND STUDY
7. NO CHANGE IN OPERATION IN 2006
8. NO CHANGE IN OPERATION IN 2007
9. SHUTDOWN UPGRADIENT AREA TREATMENT SYSTEM IN 1/08 TO CONDUCT A REBOUND STUDY
LEGEND
Z4AS9 AIR SPARGE PROBE OFF FOR REBOUND STUDY
Z4VE1 VAPOR EXTRACTION PROBE OFF FOR REBOUND STUDY
RME 1 REMOTE MONITORING ENCLOSURE
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
Eight Car Header Treatment System
Five Year Review
Operable Unit 3
Fort Wainwright, Alaska
SOURCE: FES, 2010 Annual Report
FIGURE: 6-8
DATE: 9/11

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VPA-MP1 12–20 bgs	AUG 1996	JULY 1998	OCT 1998	MARCH 1999	AUG 1999	FEB 2000	MAY 2000	MAY 2001	AUG 2001	MAR 2002	SEPT 2002	APRIL 2003	OCT 2003	DEC 2003	MAR 2004	SEPT 2004	APRIL 2005	SEPT 2005	APRIL 2006	SEPT 2006	APRIL 2007	AUG 2007	APRIL 2008	AUG 2008	APRIL 2009	SEPT 2009	JULY 2010	SEPT 2010	NOV 2010
DCA	3	ND(1)	NA	ND(20)	ND(10)	ND(100)	ND(1)	ND(10)	ND(2)	ND(1)	ND(1)	ND(1)	ND(5)	ND(1)	ND(10)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(10)
EDB	ND(1)	NA	NA	ND(20)	ND(0.020)	ND(100)	ND(1)	ND(1)	ND(5)	ND(1)	ND(1)	ND(1)	ND(5)	ND(1)	ND(10)	ND(1)	ND(1)	ND(1)	ND(1)	ND(5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(20)
BENZENE	6,200	3,900	1,080	1,250	330	366	7.04	ND(1)	0.58	ND(0.5)	ND(0.5)	ND(0.4)	ND(0.2)	ND(0.4)	ND(0.4)	ND(0.4)	0.99	0.71	0.3	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.42	0.15	0.79	ND(1.3)	ND(10)
TOLUENE	16,000	25,800	12,500	16,100	4,720	12,600	148	3.4	7.5	24.2	2.31	ND(1)	50.7	65.8	129	2.11	ND(1)	0.92	1.92	2.3	0.28	0.22	0.19	0.087	1.2	ND(1)	1.7	ND(2.5)	ND(10)
EBZ	ND(1)	1,250	423	573	257	320	4.23	1.04	ND(5)	ND(1)	ND(1)	ND(1)	ND(5)	3.43	ND(10)	ND(1)	ND(1)	ND(1)	0.91	0.28	0.21	0.13	0.12	0.18	0.43	0.13	0.53	ND(1)	ND(10)
DRO																									12,000	NA	54,000	6,600	8,400
GRO																									920	NA	1,100	1,000	670
WATER ELEV.	427.13	426.06	427.27	425.52	427.02	NM	NM	427.26	NM	NM	427.12	426.05	427.13	427.72	427.06	425.88	427.35	426.52	425.78	426.81	425.44	427.38	426.26	429.16	425.01	427.54	426.12	426.60	425.43

VPA-MP5 21–23 bgs	AUG 2007	MAY 2008	AUG 2008	APRIL 2009	SEPT 2009	JULY 2010	SEPT 2010	NOV 2010
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(10)
EDB	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(20)
BENZENE	0.36	21	ND(1)	0.92	2.1	2.5	2.1	2.1
TOLUENE	0.46	310	0.14	0.56	0.75	3.1	1.5	6.8
EBZ	2.6	0.12	0.21	0.31	1	1.7	4.4	4.2
DRO				5,600	NA	31,000	6,300	25,000
GRO				230	NA	430	720	22,000
WATER ELEV.	434.17	432.89	435.30	431.27	428.88*	427.20	427.69	426.50

VPA-MP2 12–20 bgs	OCT 1996	OCT 1997	JULY 1998	OCT 1998	MAR 1999	AUG 1999	MAY 2000	AUG 2000	MAY 2001	AUG 2001	MAR 2002	SEPT 2002	APRIL 2003	OCT 2003	DEC 2003	MAR 2004	SEPT 2004	APRIL 2005	SEPT 2005	APRIL 2006	SEPT 2006	APRIL 2007	AUG 2007	MAY 2008	AUG 2008	APRIL 2009	SEPT 2009	JULY 2010	SEPT 2010	NOV 2010
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(10)
EDB	ND(1)	NA	ND(1)	ND(1)	ND(0.010)	ND(1)	ND(1)	ND(1)	ND(1)	ND(5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(20)
BENZENE	4,300	200	379	180	35.5	5.9	33.1	56.8	35.7	19.7	59.1	ND(0.5)	13.7	ND(0.4)	0.9	2.2	93.5	1.65	40.5	11.4	3.7	ND(1)	0.42	0.24	0.13	7.4	2.7	37	2.4	40
TOLUENE	13,000	1,400	1,695	1,285	372	104	135	237	210	109	254	40.6	289	ND(1)	62.8	206	412	598	11.7	14.3	3.1	0.61	0.52	26	9.0	160	5.1	28	35	190
EBZ	620	45	ND(1)	45	17.6	14	9.57	31.0	19	13.4	11.1	3.04	15.9	ND(1)	6.29	13.2	45.8	74.3	11.8	19.3	1.8	0.49	0.93	5.2	2.7	22	1.9	7.4	7.4	13
DRO																										10,000	NA	59,000	16,000	12,000
GRO																										4,500	NA	1,600	830	2,500
WATER ELEV.	427.29	NM	427.07	428.23	426.44	428.02	428.54	427.83	427.09	428.99	426.46	428.89	428.97	429.09	427.77	427.18	426.74	426.74	427.50	426.74	427.86	427.39	429.01	427.32	430.16	426.17	428.60	427.19	427.66	426.49

AP-6064 6.5–22 bgs	JUNE 1996	OCT 1996	APR 1997	OCT 1997	APR 1998	OCT 1998	MAR 1999	AUG 1999	MAY 2000	AUG 2000	MAY 2001	AUG 2001	MAR 2002	SEPT 2002	APRIL 2003	OCT 2003	DEC 2003	MAR 2004	SEPT 2004	APRIL 2005	SEPT 2005	APRIL 2006	SEPT 2006	APRIL 2007	AUG 2007	MAY 2008	AUG 2008	APRIL 2009	SEPT 2009	JULY 2010	SEPT 2010	NOV 2010
DCA	ND(20)	ND(1)	ND(1)	ND(17)	NA	NA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(2)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(10)
EDB	ND(20)	ND(1)	ND(1)	NA	NA	NA	ND(1)	ND(0.010)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(20)
BENZENE	1,300	26	180	2	57.4	ND(1)	21.7	ND(1)	28.8	2.95	184	61.1	14.7	ND(0.5)	ND(0.4)	ND(0.4)	2.27	29.8	176	5.9	65	1.5	0.71	0.3	0.12	2.3	14	11	7.5	36	36
TOLUENE	3,400	600	280	3	17.5	ND(1)	1.46	2.89	9.23	1.12	149	3.27	1.47	ND(1)	ND(1)	ND(1)	ND(1)	0.33	39.5	0.83	7.6	0.071	0.13	0.13	0.31	ND(1)	0.91	0.71	75	75
EBZ	480	60	26	16	22.6	4	9.52	3.42	14.7	2.77	9.74	10.3	2.2	ND(1)	ND(1)	3.14	ND(1)	ND(1)	ND(1)	0.45	19.9	1.2	8	ND(1)	ND(1)	0.17	2.1	0.54	10	2.5	17	
DRO																											980	NA	3,200	680	3,500	
GRO																											56	NA	270	120	980	
WATER ELEV.	428.53	427.28	426.43	427.03	NM	429.54	426.56	427.98	NM	427.84	427.07	429.02	426.46	428.88	426.95	428.22	427.77	427.08	426.95	426.65	427.76	426.62	427.76	428.38	428.62	427.30	429.55	426.18	428.61	427.15	427.85	426.50

VPB-MP1 10–18 bgs	JUNE 1996	OCT 1997	APRIL 1998	OCT 1998	MAR 1999	AUG 1999	FEB 2000	MAY 2000	AUG 2000	APRIL 2001	AUG 2001	MAR 2002	SEPT 2002	APRIL 2003	OCT 2003	MAR 2004	SEPT 2004	APRIL 2005	APRIL 2006	APRIL 2007	APRIL 2008	APRIL 2009	JULY 2010
DCA	ND(10)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	NM	ND(1)
EDB	ND(10)	ND(1)	ND(1)	ND(1)	ND(0.020)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	NM	ND(1)
BENZENE	570	1	2.3	ND(1)	ND(1)	ND(1)	1.89	ND(1)	1.17	ND(1)	ND(0.50)	ND(0.5)	ND(0.5)	ND(0.4)	0.4	0.61	0.59	ND(0.4)	1.03	1	1.2	NM	0.39
TOLUENE	3,400	12	23.5	ND(1)	ND(1)	ND(1)	7.98	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.97	0.94	1.3	NM	0.28
EBZ	400	15	10	ND(1)	ND(1)	ND(1)	1.24	ND(1)	10.7	2.03	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	1.29	ND(1)	ND(1)	1.07	1.1	1.2	NM	0.54
DRO																						6,500	12,000
GRO																						450	180
WATER ELEV.	428.15	427.92	426.23	NM	426.51	428.03	NM	429.19	428.26	427.14	429.35	426.97	428.69	427.11	NM	NM	NM	NM	NM	NM	NM	NM	NM

VPB-MP3 10–18 bgs	JUNE 1996	OCT 1997	JULY 1998	OCT 1998	JULY 1999	NOV 1999	MAR 2000	MAY 2000	AUG 2000	APRIL 2003	OCT 2003	MAR 2004	SEPT 2004	APRIL 2005	APRIL 2006	APRIL 2007	APRIL 2008	APRIL 2009	JULY 2010
DCA	ND(20)	ND(1)	NA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	NM	ND(1)
EDB	ND(20)	ND(1)	NA	ND(1)	ND(0.008)	ND(0.0196)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	NM	ND(1)
BENZENE	1,800	2	3	ND(1)	ND(1)	1.5	2.08	2.08	ND(1)	0.46	1.03	1.77	2.04	1.95	2.97	3.1	2.8	NM	2.3
TOLUENE	9,400	6	10.4	ND(1)	1.69	2.14	ND(1)	ND(1)	ND(1)		ND(1)	ND(1)	1.69	2.47	0.67	0.61	1.1	NM	0.27
EBZ	1,200	19	18	8.9	ND(1)	14.6	2.09	17.4	ND(1)	2.89	4.21	7.14	5.15	5.94	7.69	7.1	9.1	NM	8.2
DRO																		5,500	17,000
GRO																		530	580
WATER ELEV.	428.08	427.22	427.25	428.48	428.48	427.06	426.69	428.54	427.85	427.02	429.59	427.07	426.95	426.78	425.79	427.59	427.10	426.24	427.24

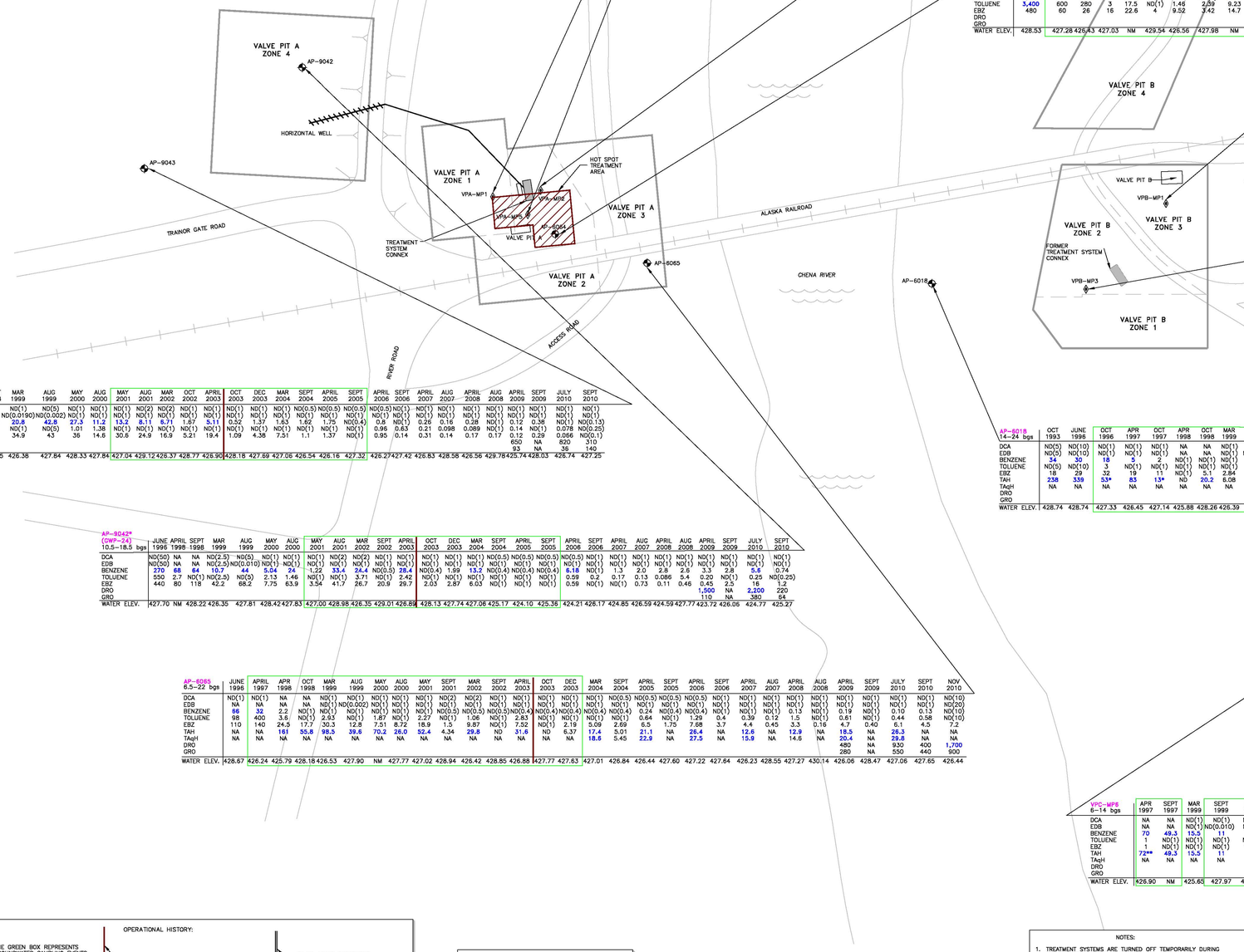
AP-9043* (DWP-565) 8.5–18.5 bgs	JULY 1996	OCT 1997	OCT 1998	APRIL 1998	SEPT 1998	MAR 1999	AUG 1999	MAY 2000	AUG 2000	MAY 2001	AUG 2001	MAR 2002	OCT 2002	APRIL 2003	OCT 2003	DEC 2003	MAR 2004	SEPT 2004	APRIL 2005	SEPT 2005	APRIL 2006	SEPT 2006	APRIL 2007	AUG 2007	APRIL 2008	AUG 2008	APRIL 2009	SEPT 2009	JULY 2010	SEPT 2010
DCA	ND(1)	NA	NA	NA	ND(1)	ND(1)	ND(5)	ND(1)	ND(1)	ND(1)	ND(2)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EDB	NA	NA	NA	NA	ND(0.0190)	ND(0.0002)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
BENZENE	34	86.5	77	86.5	20.8	42.8	27.3	11.2	13.2	8.11	5.71	1.67	5.11	0.52	1.37	1.63	1.62	1.75	ND(0.4)	0.8	ND(1)	0.26	0.16	0.28	ND(1)	0.12	0.38	ND(1)	ND(1)	ND(0.13)
TOLUENE	3	4.5	1.3	4.5	ND(1)	ND(5)	1.01	1.38	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.96	0.63	0.21	0.098	0.089	ND(1)	0.14	ND(1)	0.078	ND(0.25)
EBZ	26	62	60	30	34.9	43	36	14.6	30.6	24.9	16.9	5.21	19.4	1.09	4.38	7.51	1.1	1.37	ND(1)	0.95	0.14	0.31	0.14	0.17	0.17	0.12	0.29	0.066	ND(0.1)
DRO																										650	NA	820	310
GRO																										93	NA	36	140
WATER ELEV.	427.78	427.07	427.04	428.25	426.38	427.84	428.33	427.84	427.04	429.12	426.37	428.77	426.90	428.18	427.69	427.06	426.54	426.16	427.32	426.27	427.42	426.83	428.58	426.56	429.78	425.74	428.03	426.74	427.25

AP-8018 14–24 bgs	OCT 1993	JUNE 1996	OCT 1996	APR 1997	OCT 1997	APR 1998	OCT 1998	MAR 1999	AUG 1999	MAR 2000	AUG 2000	APRIL 2001	AUG 2001	MAR 2002	SEPT 2002	APRIL 2003	OCT 2003	MAR 2004	SEPT 2004	APRIL 2005	APRIL 2006	APRIL 2007	APRIL 2008	APRIL 2009	JULY 2010
DCA	ND(5)	ND(10)	ND(1)	ND(1)	ND(1)	NA	NA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(2)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	NM	ND(1)
EDB	ND(5)	ND(10)	ND(1)	ND(1)	ND(1)	NA	NA	ND(1)	ND(0.002)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	NM	ND(1)
BENZENE	34	30	18	5	2	ND(1)	ND(1)	ND(1)	ND(1)	2.22	2.38	ND(0.50)	ND(0.5)	ND(0.5)	0.49	2.08	2.9	1.98	ND(0.4)	0.37	ND(1)	ND(1)	ND(1)	NM	1.5
TOLUENE	ND(5)	ND(10)	3	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	1.18	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.4	0.099	0.33	NM	0.21
EBZ	18	29	32	19	11	ND(1)	5.1	2.84	1.47	1.34	2.94	2.61	2.23	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.87	0.095	0.12	NM	1.1
TAH	238	339	53*	83	13*	ND	20.2	6.08	4.49	4.37	12.5	13.6	8.51	ND	ND	0.49	4.34	2.9	6.62	ND	3	1.79	1.16	NM	6.21
TAqH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5.32	3.92	8.49	0.362	3.96	5.50	2.73	NM	7.93
DRO																								730	4,100
GRO																								230	500
WATER ELEV.	428.74	428.74	427.33	426.45	427.14	425.88	428.26	426.39	427.55	426.63	427.69	427.16	429.45	426.97	428.86	426.93	429.37	427.00	428.87	426.63	426.66	427.44	427.20	426.22	427.12

AP-9042* (DWP-24) 10.5–18.5 bgs	JUNE 1996	APRIL 1998	SEPT 1998	MAR 1999	AUG 1999	MAY 2000	AUG 2000	MAY 2001	AUG 2001	MAR 2002	SEPT 2002	APRIL 2003	OCT 2003	DEC 2003	MAR 2004	SEPT 2004	APRIL 2005	SEPT 2005	APRIL 2006	SEPT 2006	APRIL 2007	AUG 2007	APRIL 2008	AUG 2008	APRIL 2009	SEPT 2009	JULY 2010	SEPT 2010
DCA	ND(50)	NA	NA	ND(2.5)	ND(5)	ND(1)	ND(1)	ND(1)	ND(2)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EDB	ND(50)	NA	NA	ND(2.5)	ND(0.010)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
BENZENE	270	68	64	10.7	44	5.04	24	1.22	33.4	24.4	ND(0.5)	28.4	ND(0.4)	1.89	13.2	ND(0.4)	ND(0.4)	6.18	ND(1)	1.3	2.0	2.8	2.6	3.3	2.8	5.8	0.74	
TOLUENE	550	2.7	ND(1)	ND(2.5)	ND(5)	2.13	1.46	ND(1)	ND(1)	3.71	ND(1)	2.42	ND(1)	ND(1)	ND(1)	ND(1)	0.59	0.2	0.17	0.13	0.086	5.4	0.20	ND(1)	0.25	ND(0.25)		
EBZ	440	80	118	42.2	68.2	7.75	63.9	3.54	41.7	26.7	20.9	29.7	2.03	2.87	6.03	ND(1)	ND(1)	ND(1)	0.59	ND(1)	ND(1)	0.73	0.11	0.46	0.45	2.3	16	1.2
DRO																									1,500	NA	2,200	220
GRO																									110	NA	380	54
WATER ELEV.	427.70	NM	428.22	426.35	427.81	428.42	427.83	427.00	428.98	426.35	429.01	426.89	428.13	427.74	427.06	425.17	424.10	425.36	424.21	426.17	424.85	426.59	424.59	427.77	423.72	426.06	424.77	425.27

AP-6063 6.5–22 bgs	JUNE 1996	APRIL 1997	APR 1998	OCT 1998	MAR 1999	AUG 1999	MAY 2000	AUG 2000	MAY 2001	SEPT 2001	MAR 2002	SEPT 2002	APRIL 2003	OCT 2003	DEC 2003	MAR 2004	SEPT 2004	APRIL 2005	SEPT 2005	APRIL 2006	SEPT 2006	APRIL 2007	AUG 2007	APRIL 2008	AUG 2008	APRIL 2009	SEPT 2009	JULY 2010	SEPT 2010	NOV 2010
DCA	ND(1)	ND(1)	NA	NA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(2)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(10)
EDB	NA	NA	NA	NA	ND(1)	ND(0.002)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(20)
BENZENE	86	32	2.2	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	0.24	ND(0.4)	ND(0.4)	ND(0.4)	ND(1)	ND(1)	0.19	ND(1)	0.10	0.13	ND(1)	ND(1)	ND(10)
TOLUENE	98	400	3.6	ND(1)	2.63	ND(1)	1.87	ND(1)	2.27	ND(1)	1.06	ND(1)	2.83	ND(1)	ND(1)	ND(1)	ND(1)	0.64	1.29	0.4	0.39	0.12	1.5	ND(1)	0.61	ND(1)	0.44	0.58	ND(10)	
EBZ	110	140	24.5	17.7	30.3	12.8	7.51	8.72	18.9	1.5	9.87	ND(1)	7.52	ND(1)	2.19	5.09	2.69	6.5	1.75	7.68	3.7	4.4	0.45	3.3	0.16	4.7	0.40	6.1	4.5	7.2
TAH	NA	NA	161	55.8	98.5	39.6	70.2	26.0	52.4	4.34	29.8	ND	31.6	ND	6.37	17.4	5.01	21.1	NA	26.4	NA	12.6	NA	12.9	NA	18.5	NA	26.3	NA	NA
TAqH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	18.6	5.45	22.9	NA	27.5	NA	15.9	NA	14.6	NA	20.4	NA	29.8	NA	NA
DRO																										480	NA	930	400	1,700
GRO																										280	NA	550	440	900
WATER ELEV.	428.67	426.24	425.79	428.18	426.53	427.90	NM	427.77	427.02	428.94	426.42	428.85	426.88	427.77	427.63	427.01	426.84	426.44	427.60	427.22	427.64	426.23	428.55	427.27	430.14	426.06	428.47	427.06	427.65	426.44

VPC-MP6 6–14 bgs	APR 1997	SEPT 1997	MAR 1999	SEPT 1999	MAR 2000	JUNE 2000	APRIL 2001	OCT 2001	APRIL 2002	OCT 2002	APRIL 2003	OCT 2003	MAR 2004	SEPT 2004	APRIL 2005	MAY 2005	APRIL 2006	APRIL 2007	APRIL 2008	APRIL 2009	JULY 2010
DCA	NA	NA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	NM	ND(1)
EDB	NA	NA	ND(1)	ND(0.010)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	NM	ND(1)
BENZENE	70	49.3	15.5	11	19.1	1.46	ND(1)	7.03	7.28	0.61	15.5	ND(0.4)	7.37	7.62	5.67	3.71	2.7	3.1	NM	0.25
TOLUENE	1	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.14	0.46	NM	0.13
EBZ	1	ND(1)	ND(1)	ND(1)	1.95	ND(1)	ND(1)	ND(1)	ND(1)	6.05	ND(1)	39.8	ND(1)	30.9	20.9	19.7	7.45	7.6	14	NM	0.37
TAH	72**	49.3	15.5	11	21	1.46	11.7	9.07	13.3	0.61	154	ND	108.9	136.5	84.1	20.9	54.6	92.1	NM	36.0
TAqH	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	0.775	111.4	141.6	86.5	22.1	57.6	97.0	NM	38.7
DRO																			4,800	3,100
GRO																			1,200	400
WATER ELEV.	426.90	NM	425.65	427.97	426.84	427.46	426.54	427.38	425.66	427.93	426.15	428.43	425.85	428.07	427.45	428.21	428.19	427.65	426.48	427.52	



THE GREEN BOX REPRESENTS GROUNDWATER SAMPLING EVENTS CONDUCTED WHEN THE TREATMENT SYSTEM ZONE WAS OPERATING

OPERATIONAL HISTORY:

BROWN LINES REPRESENT THE TIME FRAME FOLLOWING AIR SPARGE PROBES REHABILITATION

BLACK LINES REPRESENT WHEN THE HOT SPOT TREATMENT BEGAN

VALVE PIT A

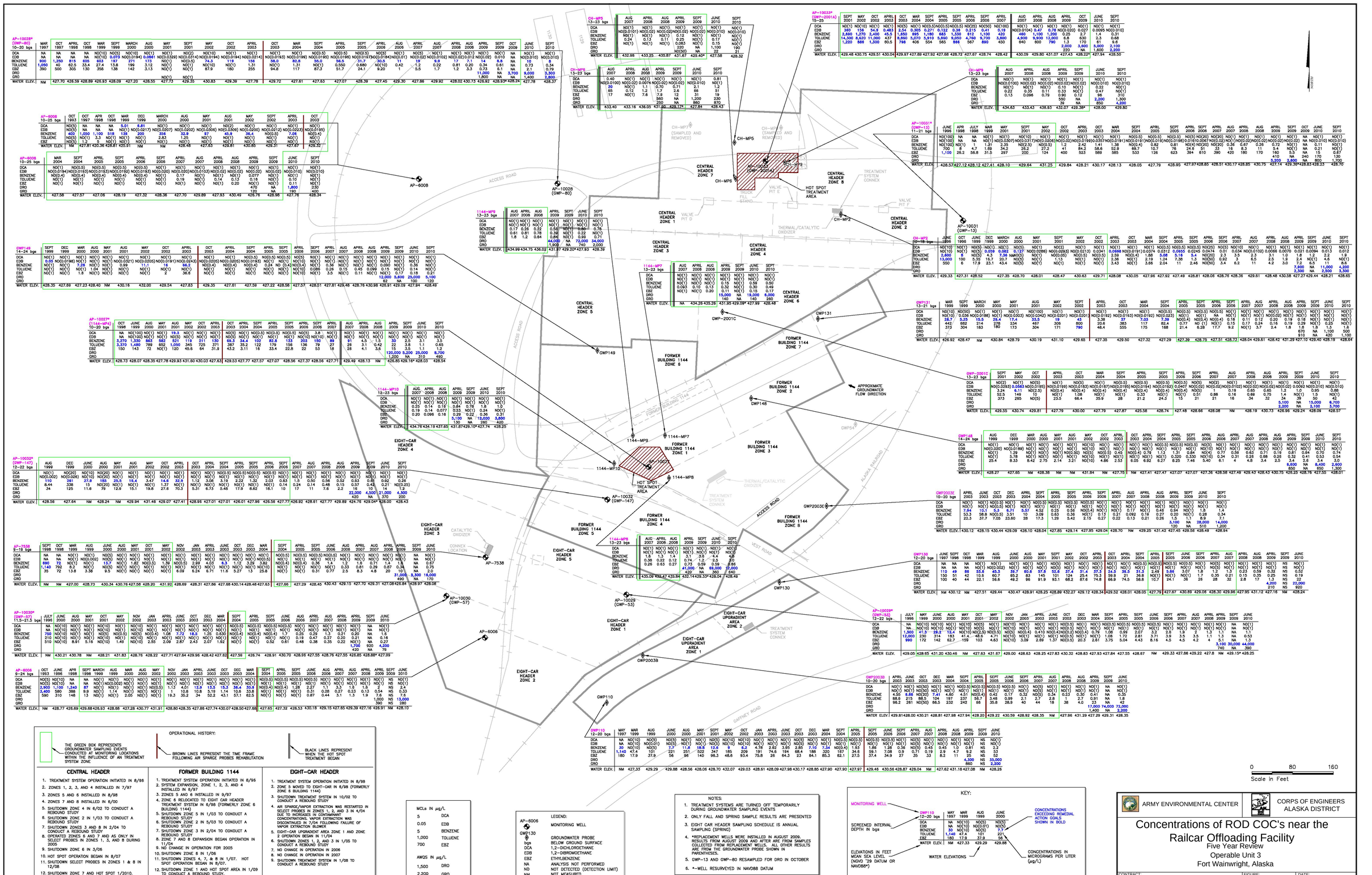
1. TREATMENT SYSTEM OPERATION INITIATED 8/96
2. ZONE 4 AND HORIZONTAL WELL INSTALLED IN 9/00
3. SHUTDOWN ZONES 1 AND 3 IN 2/04 TO CONDUCT A REBOUND STUDY
4. SHUTDOWN ZONE 4 AND HORIZONTAL WELL IN 11/05 TO CONDUCT A REBOUND STUDY
5. HOT SPOT OPERATION BEGAN IN 8/07
6. SHUTDOWN ZONE 2 AND HOT SPOT IN 1/09 TO CONDUCT A REBOUND STUDY

VALVE PIT B

1. TREATMENT SYSTEM OPERATION INITIATED 7/96
2. SHUTDOWN ZONE 1 IN 1/03 TO CONDUCT A REBOUND STUDY
3. SHUTDOWN TREATMENT SYSTEM IN 4/03 TO CONDUCT A REBOUND STUDY
4. DECOMMISSIONED TREATMENT SYSTEM IN 7/05

VALVE PIT C

1. TREATMENT SYSTEM OPERATION INITIATED 7/96
2. SHUTDOWN TREATMENT SYSTEM IN 8/98 TO CONDUCT A REBOUND STUDY
3. SYSTEM WAS RESTARTED IN 6/99 DUE TO REBOUNDING CONT



OPERATIONAL HISTORY:

THE GREEN BOX REPRESENTS GROUNDWATER SAMPLING EVENTS CONDUCTED AT MONITORING LOCATIONS WITHIN THE INFLUENCE OF AN TREATMENT SYSTEM ZONE

BROWN LINES REPRESENT THE TIME FRAME FOLLOWING AIR SPARGE PROBES REHABILITATION

BLACK LINES REPRESENT WHEN THE HOT SPOT TREATMENT BEGAN

CENTRAL HEADER

1. TREATMENT SYSTEM OPERATION INITIATED IN 8/96
2. ZONES 1, 2, 3, AND 4 INSTALLED IN 7/97
3. ZONES 5 AND 6 INSTALLED IN 8/98
4. ZONES 7 AND 8 INSTALLED IN 6/00
5. SHUTDOWN ZONE 4 IN 6/02 TO CONDUCT A REBOUND STUDY
6. SHUTDOWN ZONE 2 IN 1/03 TO CONDUCT A REBOUND STUDY
7. SHUTDOWN ZONES 3 AND 8 IN 2/04 TO CONDUCT A REBOUND STUDY
8. OPERATED ZONES 6 AND 7 AND AS ONLY IN SELECT PROBES IN ZONES 1, 3, AND 8 DURING 2005
9. SHUTDOWN ZONE 6 IN 3/06
10. HOT SPOT OPERATION BEGAN IN 8/07
11. SHUTDOWN SELECT PROBES IN ZONES 1 & 8 IN 12/08
12. SHUTDOWN ZONE 7 AND HOT SPOT 1/2010.

FORMER BUILDING 1144

1. TREATMENT SYSTEM OPERATION INITIATED IN 8/96
2. SYSTEM EXPANSION, ZONE 1, 2, 3, AND 4 INSTALLED IN 6/97
3. ZONES 5 AND 6 INSTALLED IN 9/97
4. ZONE 6 RELOCATED TO EIGHT CAR HEADER TREATMENT SYSTEM IN 6/98 (FORMERLY ZONE 6 BUILDING 1144)
5. SHUTDOWN ZONE 5 IN 1/03 TO CONDUCT A REBOUND STUDY
6. SHUTDOWN ZONE 2 IN 5/03 TO CONDUCT A REBOUND STUDY
7. SHUTDOWN ZONE 3 IN 2/04 TO CONDUCT A REBOUND STUDY
8. ZONE 7 AND 8 EXPANSION BEGAN OPERATION IN 11/04
9. NO CHANGE IN OPERATION FOR 2005
10. SHUTDOWN ZONE 6 IN 1/06
11. SHUTDOWN ZONES 4, 7, & 8 IN 1/07. HOT SPOT OPERATION BEGAN IN 8/07.
12. SHUTDOWN ZONE 1 AND HOT SPOT AREA IN 1/09 TO CONDUCT A REBOUND STUDY.

EIGHT-CAR HEADER

1. TREATMENT SYSTEM OPERATION INITIATED IN 8/98
2. ZONE 5 MOVED TO EIGHT-CAR IN 6/98 (FORMERLY ZONE 6 BUILDING 1144)
3. SHUTDOWN TREATMENT SYSTEM IN 10/02 TO CONDUCT A REBOUND STUDY
4. AIR SPARGE/VAPOR EXTRACTION WAS RESTARTED IN SELECT PROBES IN ZONES 1, 2, AND 3 IN 4/04 DUE TO INCREASE IN CONTAMINANT CONCENTRATIONS. VAPOR EXTRACTION WAS DISCONTINUED IN 7/04 FOLLOWING FAILURE OF VAPOR EXTRACTION BLOWER
5. EIGHT-CAR UPGRADIENT AREA ZONE 1 AND ZONE 2 OPERATION BEGAN IN 11/04
6. SHUTDOWN ZONES 1, 2, AND 3 IN 1/05 TO CONDUCT A REBOUND STUDY
7. NO CHANGE IN OPERATION IN 2006
8. NO CHANGE IN OPERATION IN 2007
9. SHUTDOWN TREATMENT SYSTEM IN 1/08 TO CONDUCT A REBOUND STUDY

MCLs in µg/L

5	DCA
0.05	EDB
5	BENZENE
1,000	TOLUENE
700	EBZ

AWQS in µg/L

1,500	DRO
2,200	GRO

LEGEND:

◆	MONITORING WELL
AP-6006 ◆ GWP130	GROUNDWATER PROBE
bgs	BELOW GROUND SURFACE
DCA	1,2-DICHLOROETHANE
EDB	1,2-DIBROMOETHANE
EBZ	ETHYLBENZENE
NA	ANALYSIS NOT PERFORMED
ND	NOT DETECTED (DETECTION LIMIT)
NM	NOT MEASURED

NOTES:

1. TREATMENT SYSTEMS ARE TURNED OFF TEMPORARILY DURING GROUNDWATER SAMPLING EVENTS
2. ONLY FALL AND SPRING SAMPLE RESULTS ARE PRESENTED
3. EIGHT CAR HEADER SAMPLING SCHEDULE IS ANNUAL SAMPLING (SPRING)
4. *REPLACEMENT WELLS WERE INSTALLED IN AUGUST 2009. RESULTS FROM AUGUST 2009 AND AFTER ARE FROM SAMPLES COLLECTED FROM REPLACEMENT WELLS. ALL OTHER RESULTS ARE FROM THE GROUNDWATER PROBE SHOWN IN PARENTHESES.
5. GWP-13 AND GWP-80 RESAMPLED FOR DRO IN OCTOBER
6. *--WELL RESURVEYED IN NAVD88 DATUM

KEY:

MONITORING WELL

SCREENED INTERVAL DEPTH IN bgs

ELEVATIONS IN FEET MEAN SEA LEVEL (NOVO '29 DATUM OR NAVD88*)

WATER ELEVATIONS

CONCENTRATIONS EXCEEDING REMEDIAL ACTION GOALS SHOWN IN BOLD

CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L)

GWP110 12–20 bgs	MAY 1997	MAR 1999	MAY 2000	JUNE 2000
DCA	NA	ND(10)	ND(5)	NS
EDB	NA	ND(10)	ND(0.01)	NS
BENZENE	39	ND(10)	ND(5)	7.7
TOLUENE	1,140	47.4	101	221
EBZ	180	17.9	37.9	56
WATER ELEV.	NM	427.35	429.29	429.88

0 80 160
Scale in Feet

ARMY ENVIRONMENTAL CENTER

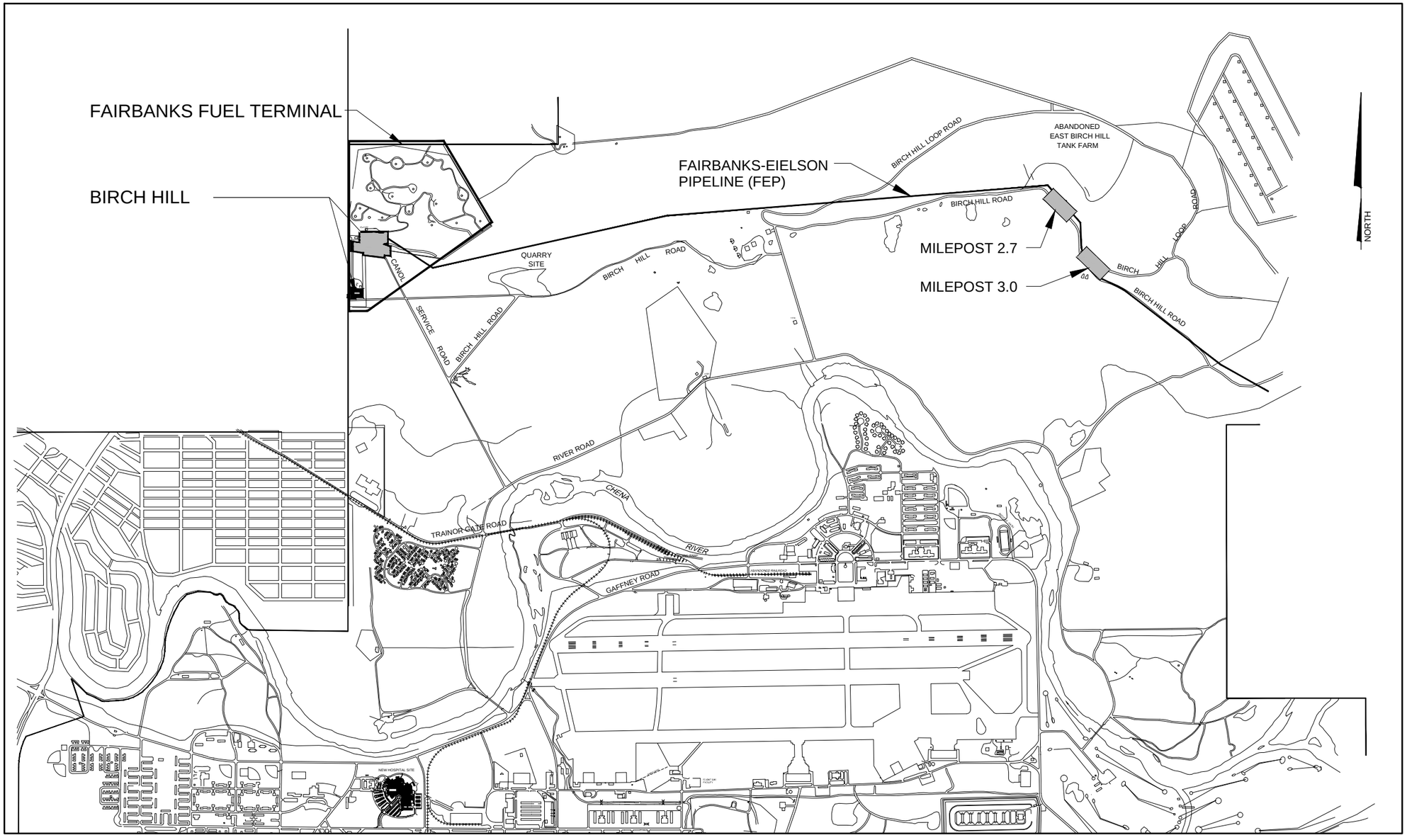
CORPS OF ENGINEERS ALASKA DISTRICT

Concentrations of ROD COC's near the Railcar Offloading Facility

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

CONTRACT: FES, 2010 Annual Report | FIGURE: 6-10 | DATE: 9/11

1732AF



0 1000 2000 4000

SCALE IN FEET

ARMY ENVIRONMENTAL CENTER

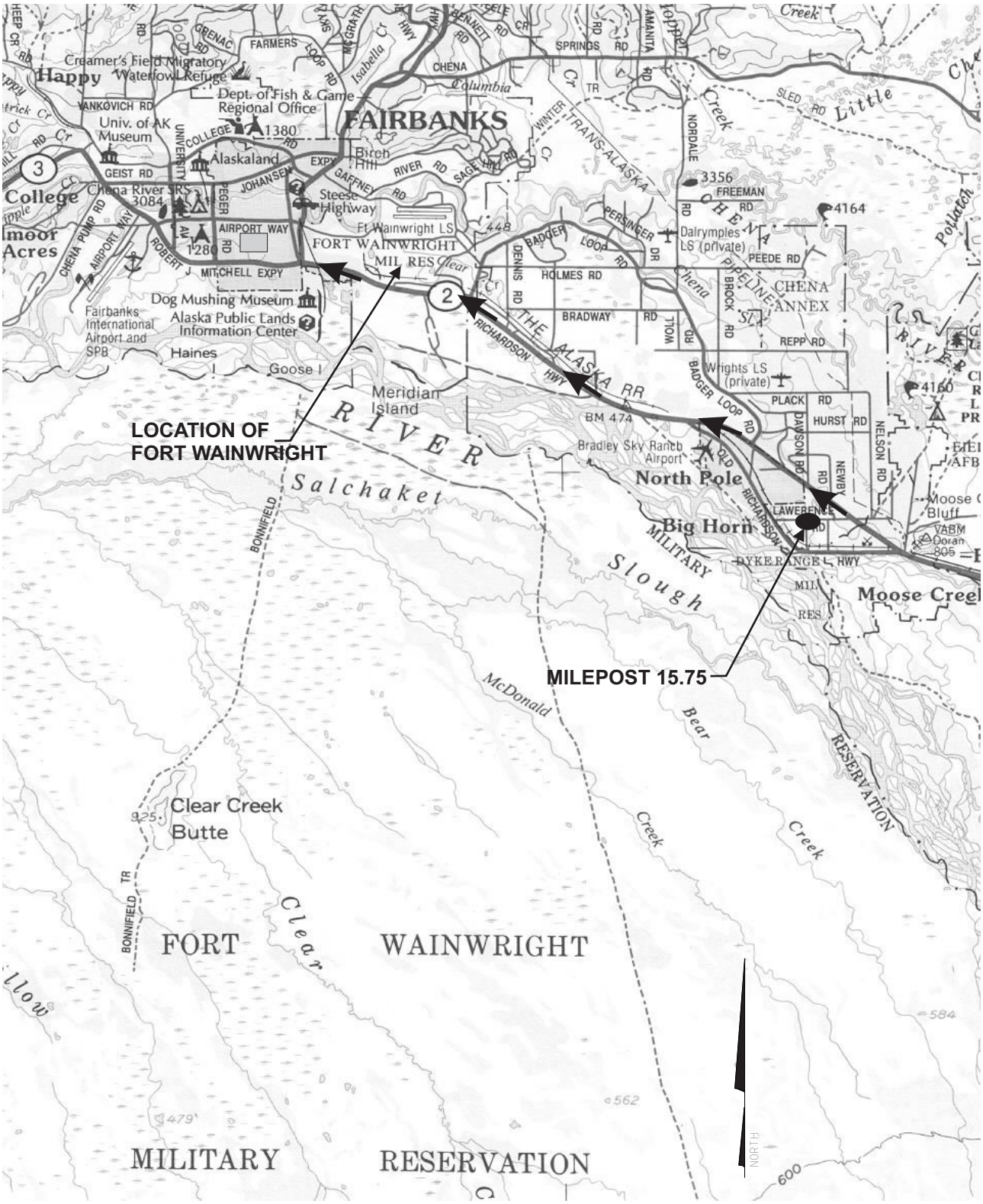
CORPS OF ENGINEERS
ALASKA DISTRICT

Milepost 2.7 and 3.0 Site Map

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2002 MP Assessement	6-11	9/11

737AF



0 4000 8000

APPROXIMATE SCALE IN FEET

SOURCE: ALASKA ATLAS AND GAZETTER, 1992

ARMY ENVIRONMENTAL CENTER

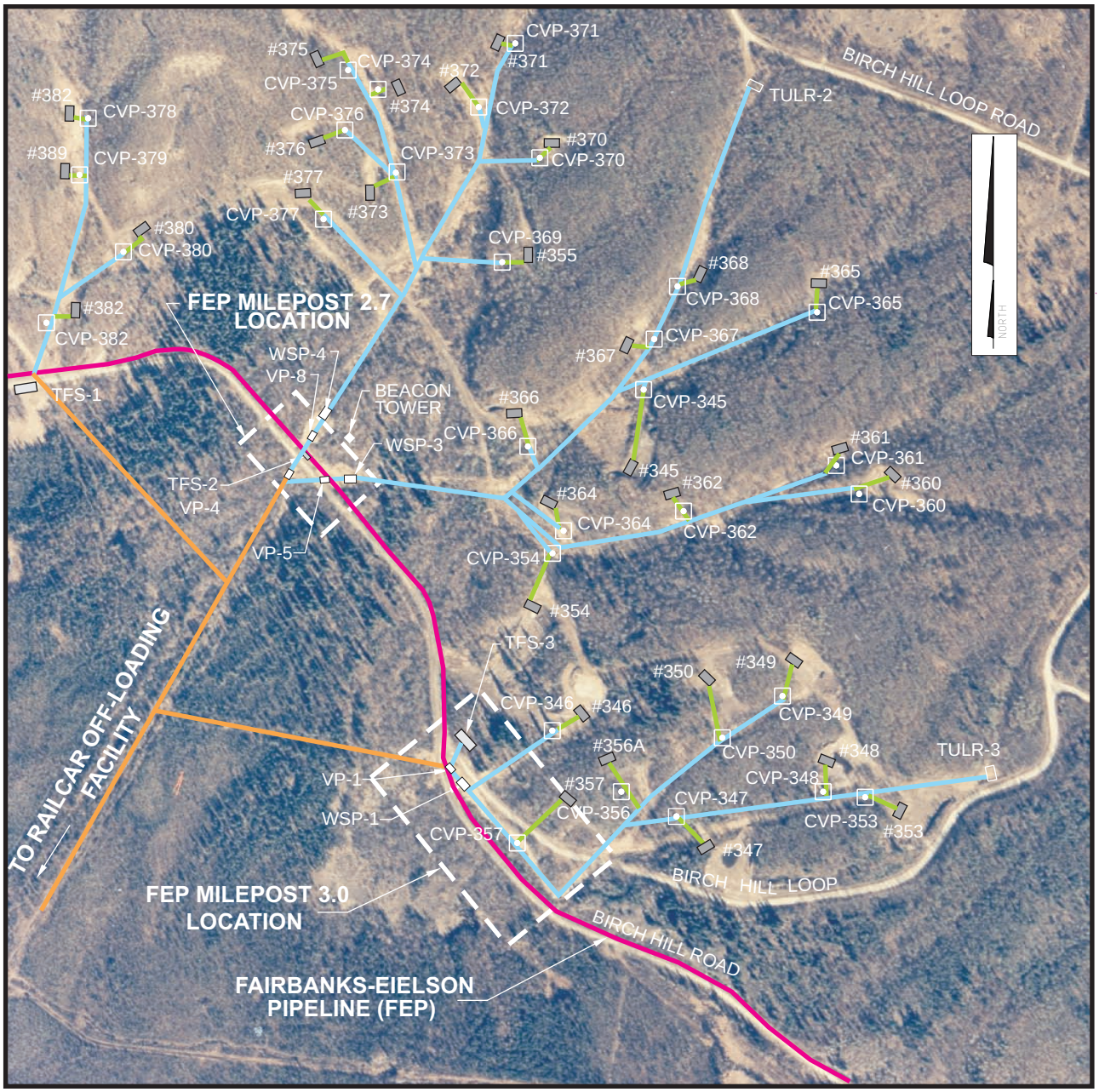
CORPS OF ENGINEERS
ALASKA DISTRICT

Milepost 15.75 Location Map

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2005 Work Plan	6-12	9/11

202C



0 500 1000

APPROXIMATE SCALE IN FEET

SOURCES: 1. ECOLOGY AND ENVIRONMENT, 1996
2. R&M CONSULTANTS, 1993 SURVEY

LEGEND

CVP-350	CONTROL VALVE PIT
#350	UNDERGROUND STORAGE TANK
TFS-2	TRUCK FILL STAND
TULR-3	TRUCK UNLOADING RACKS
VP	VALVE PIT
WSP	WATER SEPARATOR PIT
	8-INCH FUEL LINE
	6-INCH FUEL LINE
	4-INCH FUEL LINE

ARMY ENVIRONMENTAL CENTER

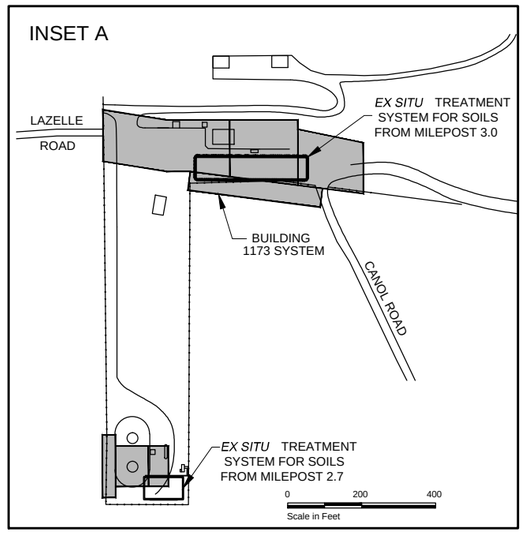
CORPS OF ENGINEERS ALASKA DISTRICT

East Birch Hill Tank Farm and Associated Piping

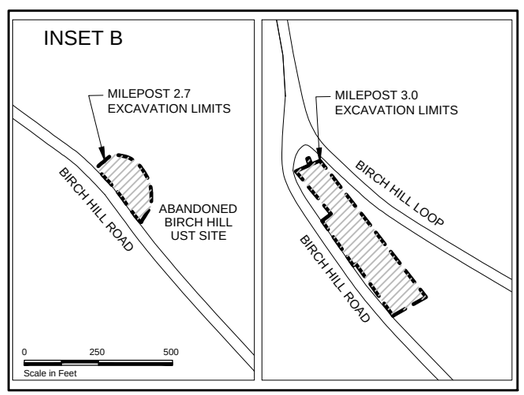
Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2002 MP Assessment	6-13	9/11

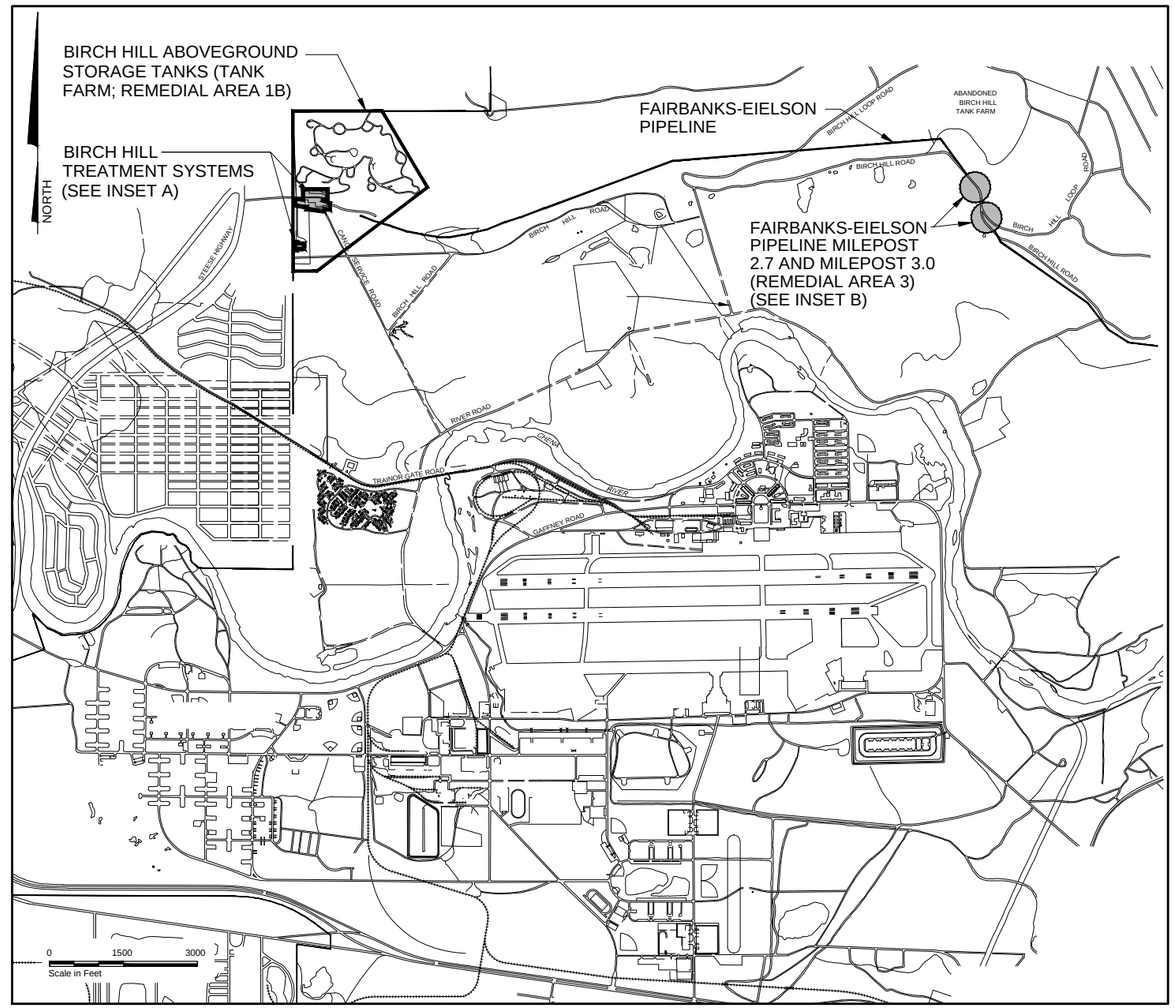
201C



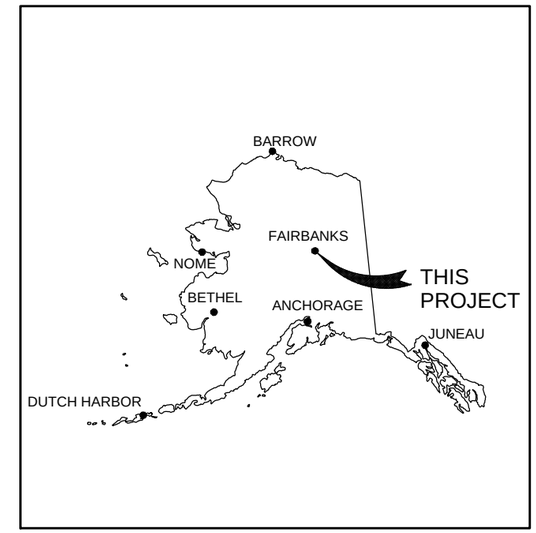
REMEDIAL AREA 1B BIRCH HILL TANK FARM
TREATMENT SYSTEMS



REMEDIAL AREA 3 FAIRBANKS-EIELSON
PIPELINE MILEPOST 2.7 AND 3.0



SITE VICINITY MAP



PROJECT LOCATION MAP

ARMY ENVIRONMENTAL CENTER

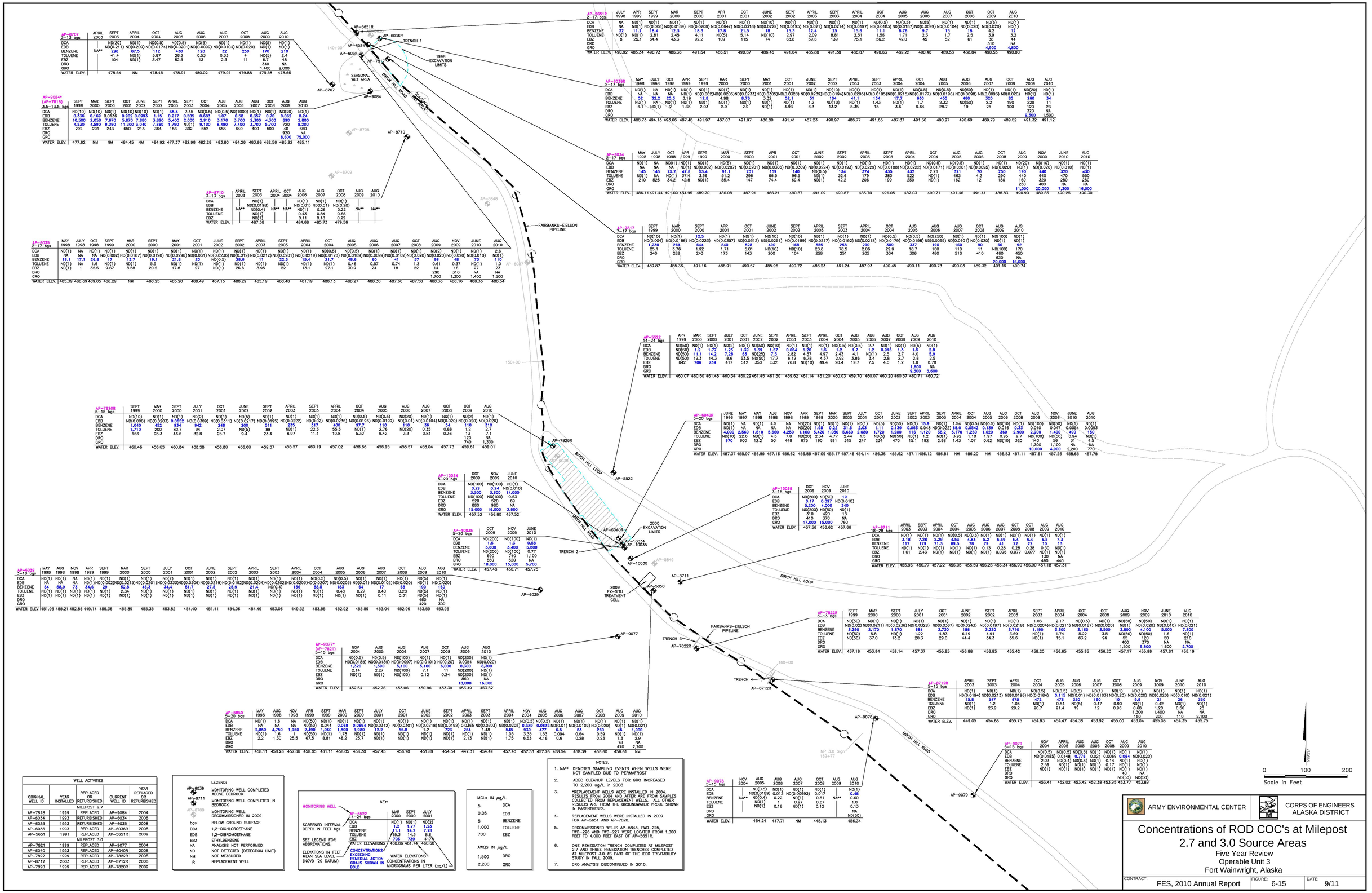
CORPS OF ENGINEERS
ALASKA DISTRICT

Milepost 2.7 and 3.0 Excavation Area and
Treatment Cell Locations

Five Year Review
Operable Unit 3
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2005 Decommissioning	6-14	9/11

738AF



AP-7707 3-13 bgs	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	AUG 2009	AUG 2010
DCA		ND(20)	ND(1)	ND(0.5)	ND(0.5)	ND(5)	ND(1)	ND(1)	ND(5)	ND(1)
EDB		ND(0.211)	ND(0.209)	ND(0.0174)	ND(0.0201)	ND(0.0099)	ND(0.0104)	ND(0.020)	ND(1)	ND(1)
BENZENE	NA**	298	87.5	112	438	120	32	250	170	210
TOLUENE		41.4	ND(1)	5.87	26.2	0.53	0.33	4	ND(5)	2.4
EBZ		104	ND(1)	3.47	82.5	13	2.3	11	6.7	48
DRO									340	NA
GRO									1,400	2,000
WATER ELEV.		478.54	NM	478.45	478.91	480.02	479.91	479.88	479.58	478.68

AP-9084* (AP-7818) 3.5-13.5 bgs	SEPT 1999	MAR 2000	SEPT 2000	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	AUG 2009	AUG 2010
DCA	ND(10)	ND(10)	ND(1)	ND(10)	ND(10)	ND(1)	38.4	3.45	ND(0.5)	ND(0.5)	ND(1000)	ND(1)	ND(1)	ND(20)	ND(1)
EDB	0.338	0.189	0.0136	0.902	0.0983	1.15	0.217	0.505	0.883	1.07	0.58	0.337	0.70	0.062	0.24
BENZENE	10,500	2,050	7,670	5,870	7,880	3,820	5,400	2,000	2,910	3,170	3,700	2,300	4,300	690	2,800
TOLUENE	4,530	4,590	9,090	11,200	5,040	7,880	1,790	ND(1)	9,100	8,480	7,400	3,700	5,700	720	8,200
EBZ	292	291	243	650	213	384	153	302	652	658	640	400	500	40	660
DRO														920	NA
GRO														8,600	75,000
WATER ELEV.	477.82	NM	NM	484.45	NM	484.92	477.37	482.96	482.28	483.80	484.26	483.98	482.56	485.22	485.11

AP-8710 3-13 bgs	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2006	AUG 2007	OCT 2008	AUG 2009	AUG 2010
DCA		ND(1)			ND(1)	ND(1)	ND(1)		
EDB		ND(0.0198)			ND(0.01)	ND(0.01)	ND(0.20)		
BENZENE	NA**	ND(0.4)	NA**	NA**	0.28	0.22	NA**	NA**	
TOLUENE		ND(1)			0.43	0.84	0.65		
EBZ		ND(1)			0.11	0.18	0.22		
WATER ELEV.		487.38			484.68	485.73	479.56		

AP-6035 2-17 bgs	MAY 1998	JULY 1998	OCT 1998	SEPT 1999	MAR 2000	SEPT 2000	MAY 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	AUG 2009	NOV 2009	JUNE 2010	AUG 2010
DCA	ND(1)	NA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	2.6
EDB	NA	NA	NA	ND(0.002)	ND(0.0187)	ND(0.0198)	ND(0.0296)	ND(0.031)	ND(0.0236)	ND(0.019)	ND(0.0212)	ND(0.0201)	ND(0.0178)	ND(0.0189)	ND(0.0099)	ND(0.0102)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.020)	ND(0.010)	ND(1)
BENZENE	19.1	17.1	26.8	17	13.7	19.1	21.8	20	ND(0.5)	38.6	11	22.3	15.4	21.7	48.6	60	41	57	99	48	23	110
TOLUENE	ND(1)	NA	1.6	ND(1)	ND(1)	5.9	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.46	0.57	0.74	1.3	0.61	0.37	ND(1)	1.0	1.0
EBZ	ND(1)	1	32.5	9.67	8.58	20.2	17.8	27	ND(1)	26.6	8.95	22	13.1	27.1	30.9	24	18	22	14	16	27	23
DRO																			290	310	NA	NA
GRO																			1,700	1,300	1,400	1,500
WATER ELEV.	485.39	488.69	489.05	488.29	NM	488.25	485.20	488.49	487.15	488.29	485.19	488.48	481.19	488.13	488.27	488.30	487.60	487.58	488.36	488.16	488.36	488.54

AP-5651R 2-17 bgs	JULY 1998	APR 1999	SEPT 1999	MAR 2000	SEPT 2000	APR 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	OCT 2009	AUG 2010
DCA	NA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(10)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(5)	ND(1)	ND(1)	ND(5)	ND(1)
EDB	NA	ND(1)	ND(0.008)	ND(0.0189)	ND(0.0208)	ND(0.0847)	ND(0.0318)	ND(0.0229)	ND(0.0195)	ND(0.021)	ND(0.0214)	ND(0.0197)	ND(0.0183)	ND(0.0187)	ND(0.0099)	ND(0.0104)	ND(0.020)	ND(0.020)	ND(1)
BENZENE	32	11.2	18.4	12.5	18.3	17.8	21.5	8	15.3	12.4	25	15.6	11.1	8.76	9.7	15	18	4.2	12
TOLUENE	ND(1)	ND(1)	2.81	2.45	4.11	ND(5)	5.14	ND(10)	2.97	2.09	8.81	2.51	1.26	1.71	2.3	1.7	2.5	3.9	3.2
EBZ	8	25.1	64.4	43.3	92.2	109	115	74	63.8	59.6	139	75.1	56.2	42.0	45	52	61	38	44
DRO																		310	NA
GRO																		4,900	4,800
WATER ELEV.	490.92	485.34	490.73	485.36	491.54	486.51	490.87	486.46	491.04	485.88	491.38	486.87	490.63	489.22	490.46	489.58	488.84	490.55	490.00

AP-8088 2-17 bgs	MAY 1998	JULY 1998	OCT 1998	APR 1999	SEPT 1999	MAR 2000	SEPT 2000	MAY 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	AUG 2009	AUG 2010
DCA	ND(1)	NA	NA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(10)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(50)	ND(1)	ND(1)	ND(20)	ND(1)
EDB	NA	NA	NA	ND(1)	ND(0.002)	ND(0.0203)	ND(0.0233)	ND(0.0305)	ND(0.0328)	ND(0.0239)	ND(0.0194)	ND(0.0203)	ND(0.0195)	ND(0.0215)	ND(0.0177)	ND(0.0196)	ND(0.0098)	ND(0.0093)	ND(0.020)	ND(1)	ND(1)
BENZENE	52	32.2	25.3	3.19	12.8	4.98	8.76	3.32	52.1	51	104	41.1	134	17.7	630	455	460	320	85	280	34
TOLUENE	ND(1)	NA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	1.2	ND(10)	ND(1)	1.43	ND(1)	1.7	2.32	ND(50)	2.2	190	220	11
EBZ	6.1	ND(1)	2	1.38	2.03	2.9	2.9	2.9	ND(1)	6.3	13.2	5.35	15	3.8	9.64	28.7	19	25	100	120	23
DRO																				320	NA
GRO																				9,500	1,500
WATER ELEV.	488.73	494.13	493.66	487.48	491.97	487.07	491.97	486.80	491.41	487.23	490.97	486.77	491.63	487.37	491.30	490.97	490.69	489.79	489.52	491.32	491.12

AP-8034 2-17 bgs	MAY 1998	JULY 1998	OCT 1998	APR 1999	SEPT 1999	MAR 2000	SEPT 2000	APR 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	OCT 2008	AUG 2009	NOV 2009	JUNE 2010	AUG 2010
DCA	ND(1)	NA	ND(1)	ND(1)	ND(1)	ND(5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(1)	ND(20)	ND(10)	ND(1)	ND(1)
EDB	NA	NA	NA	ND(1)	ND(0.002)	ND(0.0207)	ND(0.0201)	ND(0.0306)	ND(0.0309)	ND(0.0224)	ND(0.0193)	ND(0.0229)	ND(0.0188)	ND(0.0222)	ND(0.0171)	ND(0.0221)	ND(0.0095)	ND(0.020)	ND(1)	ND(0.020)	ND(0.010)	ND(1)
BENZENE	145	143	25.2	47.6	53.4	91.1	201	159	140	ND(0.5)	1.14	374	435	432	2.28	321	70	250	190	440	320	430
TOLUENE	ND(1)	NA	ND(1)	37.4	3.96	51.2	295	66.5	96.5	ND(1)	32.6	179	380	522	ND(1)	463	4.2	290	440	640	470	550
EBZ	210	525	34.2	42.8	ND(1)	55.4	147	74.4	69.4	ND(1)	42.2	206	199	259	ND(1)	162	12	180	160	320	280	280
DRO																			250	400	NA	NA
GRO																			11,000	20,000	7,300	16,000
WATER ELEV.	486.11	491.44	491.09	484.95	489.70	486.08	487.91	486.21	490.87	491.09	490.87	485.70	491.05	487.03	490.71	491.46	491.41	488.83	490.90	489.85	490.25	490.30

AP-7817 2-17 bgs	SEPT 1999	MAR 2000	SEPT 2000	APR 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	AUG 2009	AUG 2010
DCA	ND(10)	ND(1)	12.5	ND(1)	ND(1)	ND(10)	ND(10)	ND(10)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(250)	ND(1)	ND(1)	ND(100)	ND(1)
EDB	ND(0.004)	ND(0.0186)	ND(0.0223)	ND(0.0357)	ND(0.0312)	ND(0.0251)	ND(0.0189)	ND(0.0217)	ND(0.0192)	ND(0.0218)	ND(0.0179)	ND(0.0198)	ND(0.0089)	ND(0.0101)	ND(0.020)	ND(1)	ND(1)
BENZENE	1,230	264	844	240	528	490	168	555	258	290	309	337	190	160	90	98	92
TOLUENE	25.1	3.76	1.92	1.71	5.01	ND(10)	ND(10)	28.8	78.5	2.06	29.9	18.7	160	110	11	ND(100)	170
EBZ	240	282	243	173	143	200	104	258	251	205	304	306	480	510	410	460	450
DRO																830	NA
GRO																20,000	16,000
WATER ELEV.	489.87	485.36	491.16	486.91	490.57	485.96	490.72	486.23	491.24	487.93	490.45	490.11	490.73	490.03	489.32	491.19	490.74

AP-5522 14-24 bgs	APR 1999	MAR 2000	SEPT 2000	JULY 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	AUG 2008	AUG 2009	AUG 2010
DCA	ND(50)	ND(1)	ND(1)	ND(2)	ND(1)	ND(50)	ND(10)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	2.7	ND(1)	ND(1)	ND(5)	ND(1)
EDB	ND(50)	1.2	1.77	1.23	1.39	1.59	1.87	0.664	1.28	1.5	1.2	1.7	1.2	0.916	1.3	1.5	2.8
BENZENE	ND(50)	11.1	14.2	7.28	63	ND(25)	7.5	2.82	4.57	4.97	2.43	4.1	ND(1)	2.5	2.7	4.0	5.8
TOLUENE	ND(50)	19.3	14.3	8.6	53.5	ND(50)	17.7	6.12	6.78	4.37	2.92	3.86	3.4	2.8	2.7	2.8	2.5
EBZ	642	706	739	417	512	350	532	76.8	ND(10)	49.4	20.4	19.7	7.5	4.0	1.2	1.8	0.78
DRO																1,600	NA
GRO																9,500	5,600
WATER ELEV.	460.07	460.60	461.48	460.34	460.29	461.45	461.50	459.82	461.14	461.20	460.03	459.70	460.07	460.20	460.57	460.71	460.72

AP-7820R 5-15 bgs	SEPT 1999	MAR 2000	SEPT 2000	JULY 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	OCT 2009	AUG 2010
DCA	ND(10)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EDB	ND(0.008)	ND(0.0203)	0.0652	ND(0.0309)	ND(0.0311)	ND(0.0217)	ND(0.0195)	ND(0.0222)	ND(0.02)	ND(0.0236)	ND(0.0196)	ND(0.0199)	ND(0.0199)	ND(0.0101)	ND(0.0104)	ND(0.020)	ND(0.020)
BENZENE	1,040	452	934	942	248	200	511	235	317	400	97.7	110	110	36	54	110	310
TOLUENE	1,710	200	80.7	94	2.07	ND(5)	88	ND(1)	22.3	55.5	ND(1)	2.78	ND(20)	0.35	0.88	1.2	2.7
EBZ	166	98.3	46.6	32.8	25.7	9.4	23.4	8.97	11.1	10.8	5.32	9.42	3.3	0.81	0.36	13	7.1
DRO																120	NA
GRO																740	1,300
WATER ELEV.	460.46	456.05	460.84	458.58	458.80	456.60	459.57	455.57	460.19	457.02	458.66	456.95	458.57	458.04	457.73	459.81	459.01

AP-8040R 5-20 bgs	JUNE 1996	MAY 1997	MAY 1998	AUG 1998	NOV 1998	APR 1999	SEPT 1999	MAR 2000	SEPT 2000	JULY 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	AUG 2009	NOV 2009	JUNE 2010	AUG 2010
DCA	ND(1)	NA	ND(1)	4.5	NA	ND(20)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(1)	1.54	ND(0.5)	ND(0.5)	ND(10)	ND(100)	ND(50)	ND(1)
EDB	ND(1)	NA	NA	NA	NA	ND(20)	1.95	0.22	31.5	2.03	1.11	0.139	0.063	0.048	ND(0.022)	68.0	0.0542	0.139	0.016	0.33	0.040	0.047	0.0054	0.0093
BENZENE	4,000	2,560	1,810	5,480	4,250	1,100	5,420	1,030	5,680	2,080	1,720	1,200	118	1,120	38.2	5,170	1,280	1,430	590	2,900	2,300	1,400	490	150
TOLUENE	ND(10)	22.6	ND(1)	4.5	7.8	ND(20)	2.34	4.77	2.44	1.5	ND(5)	ND(50)	ND(1)	1.2	ND(1)	3.92	1.18	1.97	0.95	9.7	ND(100)	ND(50)	0.94	ND(1)
EBZ	970	600	12.2	50	448	675	190	691	315	247	234	470	15.1	192	2.98	1.43	1.07	0.62	ND(10)	320	140	36	31	4.5
DRO																					1,300	1,100	NA	NA
GRO																					10,000	4,900	2,200	770
WATER ELEV.	457.37	455.97	456.99	457.16	456.62	456.85	457.09	455.17	457.46	454.14	456.36	455.62	457.11	456.12	458.81	NM	456.20	NM	458.83	457.11	457.61	457.26	458.65	457.75

AP-10034 5-20 bgs	OCT 2009	NOV 2009	JUNE 2010
DCA	ND(100)	ND(100)	ND(1)
EDB	0.29	0.24	ND(0.010)
BENZENE	3,500	3,600	14,000
TOLUENE	ND(100)	ND(100)	0.63
EBZ	520	520	69
DRO	880	980	NA
GRO	15,000	16,000	2,800
WATER ELEV.	457.52	456.80	457.52

AP-10035 5-20 bgs	OCT 2009	NOV 2009	JUNE 2010
DCA	ND(200)	ND(100)	ND(1)
EDB	1.0	1.3	0.58
BENZENE	3,600	3,400	5,800
TOLUENE	ND(200)	ND(100)	0.77
EBZ	690	740	1,100
DRO	550	520	NA
GRO	18,000	15,000	5,700
WATER ELEV.	457.48	456.71	457.75

AP-10036 3-18 bgs	OCT 2009	NOV 2009	JUNE 2010
DCA	ND(200)	ND(50)	19
EDB	0.17	0.097	ND(0.010)
BENZENE	5,200	4,000	340
TOLUENE	ND(200)	ND(50)	ND(1)
EBZ	310	420	18
DRO	410	370	NA
GRO	17,000	15,000	760
WATER ELEV.	457.56	456.62	457.66

AP-8711 18-28 bgs	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	OCT 2008	AUG 2009	AUG 2010
DCA	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EDB	3.18	7.28	2.28	4.53	4.83	5.2	6.39	6.4	6.4	5.3	7.3
BENZENE	117	179	71.3	89.3	78	79	41	22	22	10	15
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.13	0.28	0.28	0.30	0.30	ND(1)
EBZ	1.01	2.43	ND(1)	ND(1)	ND(1)	ND(1)	0.096	0.077	0.077	ND(1)	ND(1)
DRO										130	NA
GRO										490	440
WATER ELEV.	455.96	456.77	457.22	456.05	455.59	456.28	456.34	456.90	456.90	457.18	457.31

AP-6039 5-18 bgs	MAY 1998	AUG 1998	NOV 1998	APR 1999	SEPT 1999	MAR 2000	SEPT 2000	JULY 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	AUG 2009	AUG 2010
DCA	ND(1)	ND(1)	NA	ND(1)	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(5)	ND(1)
EDB	NA	NA	NA	ND(1)	ND(0.002)	ND(0.0215)	ND(0.0201)	ND(0.0333)	ND(0.0306)	ND(0.0219)	ND(0.0192)	ND(0.0204)	ND(0.0202)	ND(0.0203)	ND(0.0207)	ND(0.0203)	ND(0.01)	ND(0.0102)	ND(0.020)	ND(1)	ND(0.020)
BENZENE	84	58.9	73	34.6	29	52.8	48.3	34.4	51.7	27.5	25.8	21.4	ND(0.4)	156	88.5	183	64	17	88	160	160
TOLUENE	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	2.84	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.48	0.27	0.40	0.28	ND(5)	ND(1)
EBZ	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.11	0.31	ND(5)	ND(1)
DRO																				460	NA
GRO																				420	300
WATER ELEV.	451.95	455.21	452.86	449.14	455.38	455.89	455.35	453.82	454.40	451.41	454.06	454.49	453.06	449.32	453.55	452.92	453.59	453.04	452.99	453.59	453.95

AP-9077* (AP-7821) 5-15 bgs	NOV 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	AUG 2009	AUG 2010
DCA	ND(0.5)	ND(0.5)	ND(100)	ND(1)	ND(1)	ND(200)	ND(1)
EDB	ND(0.0185)	ND(0.0189)	ND(0.0097)	ND(0.0101)	ND(0.20)	0.0054	ND(0.020)
BENZENE	1,370	1,580	5,100	5,100	6,000	8,300	8,300
TOLUENE	2.14	2.27	ND(100)	7.1	11	ND(200)	ND(1)
EBZ	ND(1)	ND(1)	ND(100)	0.12	0.24	ND(200)	ND(1)
DRO						860	NA
GRO						18,000	16,000
WATER ELEV.	452.54	452.76	453.06	450.96	453.30	453.49	453.62

AP-7822R 3-13 bgs	SEPT 1999	MAR 2000	SEPT 2000	JULY 2001	OCT 2001	JUNE 2002	SEPT 2002	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	OCT 2008	AUG 2009	NOV 2009	JUNE 2010	AUG 2010
DCA	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(1)	ND(50)	ND(50)	ND(50)	ND(1)	ND(1)
EDB	ND(0.02)	ND(0.0211)	ND(0.0236)	ND(0.0328)	ND(0.0367)	ND(0.0243)	ND(0.0197)	ND(0.0218)	ND(0.0204)	ND(0.0211)	ND(0.0187)	ND(0.020)	ND(1)	ND(0.020)	ND(0.020)	ND(0.010)	ND(0.021)
BENZENE	3,290	2,170	1,870	694	2,730	186	3,220	3,710	1,180	3,300	3,160	3,550	3,800	4,100	5,000	7,800	1,600
TOLUENE	ND(50)	5.8	ND(1)	1.22	4.83	6.19	4.94	3.69	ND(1)	1.74	3.22	3.5	ND(50)	ND(50)	1.6	ND(1)	ND(1)
EBZ	ND(50)	37.0	13.2	20.3	29.0	44.4	34.3	35.6	ND(1)	15.1	63.2	94	55	120	50	210	ND(1)
DRO													400	370	NA	NA	NA
GRO													1,500	9,800	1,600	2,700	
WATER ELEV.	457.19	453.94	459.14	457.37	455.85	458.88	456.85	455.42	458.20	456.65	453.95	456.20	457.17	455.99	457.61	458.19	

AP-8712R 5-15 bgs	APRIL 2003	SEPT 2003	APRIL 2004	OCT 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2008	AUG 2009	NOV 2009	JUNE 2010	AUG 2010
DCA	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EDB	ND(0.0194)	ND(0.0213)	ND(0.0196)	ND(0.0184)	0.115	ND(0.01)	ND(0.0103)	ND(0.20)	ND(0.020)	ND(0.020)	ND(0.010)	ND(0.021)
BENZENE	15.8	547	675	472	478	330	190	10	9.8	21	28	330
TOLUENE	ND(1)	1.2	1.04	ND(1)	0.54	ND(5)	0.47	0.90	ND(1)	0.42	ND(1)	ND(1)
EBZ	ND(1)	23.9	29.2	20.7	21.4	19	12	0.96	0.68	1.20	0.56	28
DRO									1,300	1,400	NA	NA
GRO									150	200	110	2,100
WATER ELEV.	449.05	454.68	455.75	454.93	454.47	454.38	453.92	455.00	453.04	455.08	454.35	455.75

AP-9078 5-15 bgs	NOV 2004	AUG 2005	AUG 2006	AUG 2007	OCT 2007	AUG 2008	AUG 2009	AUG 2010
DCA		ND(0.5)	ND(1)	ND(1)	ND(1)		ND(1)	
EDB		ND(0.0189)	0.013	ND(0.00993)	0.017		0.48	
BENZENE	NA**	ND(0.4)	0.22	ND(1)	0.51	NA**	0.60	
TOLUENE		ND(1)	1	0.27	0.87		1.0	
EBZ		ND(1)	0.16	ND(1)	0.12		0.13	
DRO							NA	
GRO							ND(50)	
WATER ELEV.		454.24	447.71	NM	448.13		456.34	

AP-9079 5-15 bgs	NOV 2004	APRIL 2005	AUG 2005	AUG 2006	OCT 2006	AUG 2008	AUG 2009	AUG 2010
DCA	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)
EDB	ND(0.0185)	0.0146	0.0778	0.021	0.0069	0.084	ND(0.020)	
BENZENE	2.03	ND(0.4)	ND(0.4)	ND(1)	0.14	ND(1)	ND(1)	
TOLUENE	2.59	ND(1)	ND(1)	ND(1)	0.17	ND(1)	ND(1)	
EBZ	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	
DRO						40	NA	
GRO						ND(50)	ND(50)	
WATER ELEV.	453.41	452.02	453.42	452.38	453.95	453.77	453.89	

WELL ACTIVITIES				
ORIGINAL WELL ID	YEAR INSTALLED	REPLACED OR

7 OPERABLE UNIT 4

7.1 OU4 Background

Operable Unit 4 (OU4) was the second Fort Wainwright OU to reach a final-action ROD. That ROD was signed in August 1996 and initially addressed three source areas: the Landfill, the Coal Storage Yard (CSY) and the Fire Training Pits (FTPs). The list of OU4 source areas and their status is shown in Appendix H. The ROD specified remedial actions subject to Five-Year Review at two of these areas: the Landfill and the CSY.

The OU4 ROD found that removal of contaminated soils at the FTPs would adequately protect human health and the environment from potential risk associated with those source areas. Contamination of concern at the FTPs was limited to localized petroleum hydrocarbon "hot spots" in surface and shallow subsurface soils, and there was no reported contamination above action levels in groundwater at the FTPs. The ROD anticipated that the soil removal action would constitute final action for the FTPs. As such, no analysis of remedial alternatives was included in the OU4 ROD, and no additional remedial actions were indicated. The Army decision document for soil removal at the FTPs was included in the ROD as Appendix A and stated "Because this remedy will not result in hazardous substances remaining on-site above levels that allow for unrestricted use and unlimited exposure, the Five-Year Review will not apply to this action." The Army completed soil removal at the FTPs in September 1996.[1]

The CSY was recommended for No Further Action in the Second Fort Wainwright Five-Year Review, although institutional controls are still in place to ensure the protectiveness of the site.

7.2 OU4 – Landfill

7.2.1 Overview

The Landfill source area (the inactive portion of the landfill) covers approximately 14 acres and is located immediately to the south of Fort Wainwright's active landfill, north of River Road (Figure 7-1). Gravel excavation began in this area as early as 1944, and landfill operations reportedly began in the 1950s.[2] Unsegregated waste was disposed in the gravel pits and then burned. After the pits were filled with burned debris, they were covered. The OU4 ROD, signed in September 1996, specified a phased approach to remediation of the Landfill source area:

- Capping the inactive portion of the Landfill, along with natural attenuation, monitoring of groundwater, and ICs; the cap was completed in September 1997 and is inspected for integrity at least once a year.
- Evaluation of potential groundwater treatment, if levels of contamination in groundwater were found to increase; this has not been shown, to date.

[1] Site Assessment Report, Remove Soil at Burn Pits, Fort Wainwright, Alaska, Rockwell Environmental Services, January 21, 1997.
[2] There are no historical records documenting the starting date of landfill operations.

Early site investigations confirmed groundwater contamination at the Landfill, which was one of two contaminated sites that resulted in Fort Wainwright being placed on the NPL.

Periods of use and dates related to the history of the Landfill source area contamination and remediation are summarized in Table 7-1.

Table 7-1. History of Regulatory Events at OU4 Landfill[a]

Event	Date
Landfill activities begin	Early 1950s
Soil and groundwater study conducted	1990
Fort Wainwright NPL listed	August 1990
Groundwater monitoring performed	1991 and 1992
FFA signed	1992
2-PTY signed	1992
RI conducted	1993 and 1994
ROD signed	August 1996
Landfill Project Site Plan completed	July 1997
Cap constructed over inactive portion of landfill	1997
RAR finalized	March 1999
OM&M issued	January 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete Received from the EPA	2002
Second Fort Wainwright Five-Year Review Report finalized	September 2006

[a] Information compiled from the OU4 ROD; OU4 Landfill OM&M; and the Five-Year Review Report Document Log.

7.2.2 Background

Physical Characteristics

The Landfill is located north of the Chena River at the base of Birch Hill. It encompasses 60 acres, approximately 40 acres north of River Road and a 20-acre area immediately south of River Road (the former trench area). Wetlands border the Landfill to the north and east, and black spruce forest borders the remainder of the source area except in areas cleared for access to the Landfill along River Road. The source area is in a 500-year floodplain. No endangered or threatened species reside in the area.

The Landfill is surrounded by discontinuous permafrost and is a part of a complex hydraulic regime, although the Landfill itself is believed to be in a permafrost-free “thaw bulb”. In the vicinity of the Landfill, groundwater in the shallow aquifer zone generally flows southwest towards the Chena River, while groundwater in the deep aquifer zone generally flows in the west-southwesterly direction. However, flow direction and gradient is subject to seasonal variations and may be interrupted or redirected by permafrost in some locations. Depth to groundwater in the vicinity of the landfill is approximately 15 to 20 ft-bgs.

Land and Resource Use

The older southwest portion of the Landfill and the former trench area are inactive. The remaining portion of the Landfill in the cleared area north of River Road is currently an active inert waste landfill, accepting only construction and demolition debris. The previous landfill permit allowed the disposal of domestic and commercial refuse, ash, asbestos, incinerator residue, bagged human waste, and construction or demolition waste.

The active portion of the landfill currently operates under ADEC Solid Waste Permit No. SW1A003-11, a renewal of the previous permit number 0131-BA003. The current permit was issued in September 2006, and incorporates state and federal solid waste regulations. Under this permit, the Fort Wainwright landfill is an unlined Class I Solid Waste Facility. This permit expires on September 1, 2011.

A landfill permit renewal is planned that will provide an additional five years of operation for the landfill. After that time, use of the landfill and the decision of whether or not to close it will be evaluated based on future operations at Fort Wainwright.

At the time of the ROD signature, there was concern that groundwater contaminated by the landfill could enter the Chena River (located approximately 1,500 feet from the landfill) or threaten downgradient users, including residents of the City of Fairbanks (the base boundary is slightly over 1 mile downgradient of the landfill). However, monitoring data does not indicate off-site migration of groundwater contaminants from the landfill source area. Future land use is industrial. Groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater contamination downgradient of the source area.

History of Contamination

Landfill activities began in the early 1950s. Based on historical aerial photographs, waste was initially dumped into gravel pits, burned, and covered. The Landfill began receiving most wastes generated at the Post in the 1950s. In the early 1960s, trenching and burning ceased and wastes were spread, compacted by bulldozer, and covered with coal ash generated from the Fort Wainwright power plant. Wastes that may have been disposed of at the Landfill in the 1950s include human waste, household refuse, waste POLs, hazardous waste, solvents, pesticides, asbestos, construction debris, and inert munitions. Historically, the quantity and type of waste disposed of at the Landfill were not documented.

Previous investigations have identified other suspected wastes that may have been disposed at the landfill as: dry-cleaning waste and filters (reportedly redistilled prior to disposal to remove PCE); vehicular paint; asbestos; small arms and explosives; triple-rinsed punctured and crushed pesticide cans, rags, and soil from small pesticide spills of less than one gallon; empty drums; and paint debris.

Pre-ROD Response

A well-defined area of petroleum hydrocarbon and lead contaminated surface soil in the inactive portion of the Landfill was permanently covered with approximately 8 feet of construction debris and native soils prior to the OU4 ROD. The covering of the spill eliminated the dermal exposure pathway for the lead.

7.2.3 Remedy Selection

Nature of Contamination

The primary sources of contamination at the Landfill are wastes that were placed in the Landfill and coal ash from the power plant that was used as a cover material at the landfill. Initial investigations confirmed that transport of Landfill contaminants, including coal ash, through surface runoff from the Landfill to downgradient surface water was insignificant. Groundwater contamination was caused by the creation of leachate, through percolation and infiltration of surface water (i.e., rainwater or snowmelt) through Landfill waste.

Investigations prior to and during the RI characterized contamination associated with the Landfill.

Groundwater

Volatile and semivolatile organic compounds were detected in groundwater under the Landfill and in the downgradient southwest transport pathway in concentrations exceeding federal drinking water MCLs and EPA RBCs used for screening potential contaminants of concern.

Concentrations of two metals (lead and chromium) exceeded MCLs or RBCs but were less than background levels. Concentrations of two other metals (arsenic and manganese) exceeded MCLs or RBCs and background levels for the site but were judged to fall within the range of naturally occurring concentrations for the area.

Soil

Petroleum hydrocarbons and lead, from a spill, were reported at one surface soil location of the inactive landfill. That area was permanently covered prior to the ROD.

Remedial Action Objectives

All of the RAOs for the Landfill source area pertain to groundwater quality:

Groundwater

- Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame
- Reduce further migration of contaminated groundwater from the source areas
- Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS (18 AAC 70)
- Use natural attenuation to attain AWQS (18 AAC 70)

ARARs

The OU4 ROD cited the most significant ARARs for remedy selection at both the Landfill and the CSY to be:

- Federal and State of Alaska MCLs – Relevant and appropriate for groundwater
- Alaska Water Quality Standards – Applicable
- Alaska Oil Pollution regulations – Applicable
- Alaska regulations for leaking USTs – Relevant and appropriate

Cleanup Goals

Based on the results of the baseline risk assessment for current (at the time of the ROD) and projected land use at the site, COCs were identified for establishing numeric cleanup goals for the Landfill as discussed below. Numeric values for the cleanup goals established in the ROD are summarized in Appendix C.

Groundwater

Seven chemicals of concern were established for groundwater in the ROD: benzene, cis-1,2-DCE, 1,1,2,2-tetrachloroethane (PCA), 1,1,2-trichloroethane (TCA), TCE, vinyl chloride, and bis(2-ethylhexyl)phthalate. When available, Federal and State of Alaska drinking water MCLs were adopted as the groundwater cleanup goals. At the time of the ROD, MCLs were available and used for all but one of the COCs: 1,1,2,2-PCA. Since there were no MCLs for this chemical, the cleanup level in the ROD was based on the EPA Region 3 RBC. However, since the ROD was finalized, a groundwater cleanup level for 1,1,2,2-PCA has been instituted by the ADEC. The MCLs for benzene, cis-1,2-DCE, 1,1,2,2-PCA, 1,1,2-TCA, TCE, vinyl chloride, and bis(2-ethylhexyl) phthalate have not changed, while the new MCL for 1,1,2,2-PCA is slightly lower than the risk-based levels adopted in the ROD.

Soil

No numeric cleanup levels were established for soil at the Landfill source area in the ROD.

Selected Remedy

The goal of this remedial action is to restore groundwater to its beneficial use as a drinking water aquifer. The ROD describes the point of compliance for achieving the RAOs as wells downgradient of the Landfill.

Landfill Cap

- Cap the approximately 8-acre inactive portion of the landfill[3] with a minimum of 2 feet of native soil, compacting to achieve a permeability no greater than 10^{-5} cm/sec
- Vegetate the cap with native plants
- Promote drainage to prevent ponding and erosion

Natural Attenuation and Groundwater Monitoring

- Achieve the RAOs for this source area through natural attenuation. Site modeling estimated that natural attenuation would take 70 years in order to achieve RAOs.
- Monitor groundwater downgradient of the Landfill and evaluate results to determine the effectiveness of the capping and natural attenuation with respect to cleanup goals.

[3] The ROD initially determined that 8 acres would need to be capped, but during the design phase of the project, the area to be capped was determined to be 14 acres.

Contingent Remedy

- A methane gas collection system was not anticipated, but the ROD specified that the need for a gas collection system would be considered during remedial design. The landfill cap remedial design did not include a methane gas collection system.
- The ROD specified that natural attenuation of groundwater did not progress as projected, or did not result in a significant reduction in leachate, an active groundwater treatment system would be considered.

Institutional Controls

Maintaining ICs restricting access to and development at the site as long as hazardous substances remain onsite at levels that precluded unrestricted use.

7.2.4 Status of Remediation

Landfill Cap

In 1996, the U.S. Army Corps of Engineers contracted design of the cap system for the inactive portion of the Landfill. The cap was constructed in 1997. The landfill cap was constructed over the inactive portion of the landfill north of River Road. This area encompasses approximately 14 acres. The trench area south of River Road was not included in the capping project because no contaminants were found in soils at levels that posed an unacceptable risk to human health or the environment in this location.

The landfill cap is an earthen cap design that includes multiple layers of soil. The layers within the cap include:

- Unclassified subgrade material (6-inches thick) which provided a uniform base for the remainder of the cap. Unclassified material is defined as any inorganic soil, free of trash, peat, debris, or frozen clods which is capable of being compacted as required by the design plans.
- Low permeability soil layer (18-inches thick) which limits infiltration through the cap. The low permeability material is defined as a silt or clay (100 percent passing the No. 4 screen and 80 percent passing the No. 200 screen) which can be compacted to achieve a maximum permeability of $5x10^{-5}$ cm/sec.
- Drainage layer (6-inches thick) intended to minimize ponding of water on the surface of the low permeability soil layer. The drainage layer material is a sand (100 percent passing the No. 4 screen and 5 percent passing the No. 200 screen).
- A woven geotextile between the topsoil and drainage layer to minimize migration of fines between the two layers.
- Top soil that is at least 6-inches thick.
- Surface vegetation -- The cap was seeded with a mixture of grass and wildflower.

An engineering inspection and evaluation was conducted in 2009 for the closed cell of the Landfill. The entire facility was determined to be in good condition, apart from a soil stockpile that had been placed on the cell, and a small amount of drainage that was pooling on the east

side of the soil stockpile access road, near the entrance gate. It was noted that although limited areas of the geotextile structural fabric are exposed, the existing vegetative mat is well established and appears to be providing sufficient protection against erosion. It was also determined that minor damage to the landfill liner from tree roots and other vegetation would not cause any adverse impacts to the facility as a whole. The limited tree growth that has occurred has been relatively minimal due to the geotextile liner, and moose graze. No evidence of erosion from recreational vehicles was noted within the facility.

The landfill cap is a passive remedial alternative intended to reduce surface water infiltration into the landfill and consequently reduce leachate migration to groundwater. The system has no active operational requirements. Monitoring and maintenance of the landfill cap includes:

- Semi-annual groundwater monitoring (spring and fall)
- Annual inspection of the cap integrity

Groundwater Monitoring

Ten monitoring wells were sampled semi-annually in 2007 and 2008. The number of wells sampled semi-annually (spring and fall) was changed to nine in 2009 when AP-9076 was removed from the monitoring network. It was determined that this well was installed in perched groundwater above permafrost and not connected to the groundwater flow from the landfill. A few of the wells in the monitoring network have been replaced over the years; however, the replacement wells were installed in the same general locations and at the same depth as the original wells, so the continuity of the monitoring network has remained intact. Because of the presence of discontinuous permafrost in this area, wells have been screened at various depths to monitor the shallow aquifer (above the permafrost, or supra-permafrost), the intermediate aquifer, and the deep aquifer (below the permafrost, or sub-permafrost). Four wells are considered to be shallow and screened above the permafrost (AP-5588, AP-6132, AP-8061, and FW-LF4); three wells monitor the intermediate zone (AP-5589, AP-6136, and AP-6138); and, two wells are screened below the permafrost (AP-8063 and DH-6534). Although there are no stratigraphic confining layers separating these zones, discontinuous permafrost in the monitored area blocks horizontal flow in some areas and complicates flow patterns.

Groundwater flow directions and gradients are difficult to determine with accuracy in this area due to the influences of the permafrost, the different zones of the aquifer, and because there are only a few wells screened in each zone. Water level measurements have indicated that groundwater flow in the shallow and intermediate aquifer zones is generally to the west, although the gradient is quite flat. During a recent update of the Fort Wainwright monitoring well database, a number of existing monitoring wells were identified in the area west of the Landfill. During 2010, in addition to the nine wells that have been sampled as part of the Landfill monitoring network, groundwater elevations were also measured in 19 of these existing wells. Results of the groundwater elevation survey indicated that flow direction in shallow, intermediate, and deep groundwater wells was to the west/southwest. It was also discovered during the well survey that the well that had previously been referred to as DH-6534 is actually AP-6532.[4]

[4] During an initial site visit in 2004, well AP-6532 was identified as DH-6534 and this same location has been sampled during each sampling event since then. However, based on historical research of boring logs and geophysical surveys conducted in this area, it was determined that the well identified as DH-6534 is actually AP-6532. Although it has been referred to in past monitoring reports as DH-6534, this well is currently and in future reports will be identified as AP-6532.

Five COCs (benzene, cis-1,2-DCE, 1,1,2,2-PCA, 1,1,2,-TCA, and TCE) have consistently been detected above their RAGs in one or more wells located downgradient of the Landfill. COC concentrations have generally remained stable in these wells for the past several years.

Figure 7-3 shows the groundwater concentrations for all the wells since monitoring began in 1997.

Concentrations of four COCs have historically been highest in the shallow wells closest to the Landfill, and decrease with distance from the landfill: cis-1,2-DCE; 1,1,2,2-PCA; 1,1,2,-TCA; and TCE. The well with the highest concentrations of all four COCs, AP-5588, is located immediately downgradient of the Landfill. COC concentrations in this well have shown some minor fluctuations from year to year, but have generally been stable over the length of the monitoring program. Other wells in which one or more of these four COCs have been detected at concentrations exceeding RAGs include AP-5589, AP-8061 and AP-8063. COC concentrations have been stable in these wells at concentrations often an order of magnitude lower than in AP-5588.

Benzene has consistently been detected in several wells, but at concentrations below the RAG of 5 µg/L. Benzene has exceeded its RAG in only two wells at the site, AP-8061 (which replaced well AP-6137) and AP-6532 (formerly referred to as DH-6534), the farthest downgradient deep well. Benzene concentrations in AP-8061 have been relatively stable and have shown a distinct seasonal fluctuation, between 4.4 and 5.8 µg/L, in the past 5 years. In well AP-6532, the concentration of benzene was below the RAG in all sampling events between 1997 and 2004. Benzene increased to 8.1 µg/L during the spring 2004 sampling event and has remained above the RAG each year, with the exception of both sampling events during 2009. Based on benzene concentrations above the RAG in the most downgradient well AP-6532, it was decided in 2010 to sample three additional deep wells (screened below permafrost), located farther downgradient from AP-6532. Benzene was detected in each of these wells; however, concentrations were all below the RAG. Additionally, one deep and one shallow well located immediately downgradient of the active portion of the landfill were sampled in 2010. Benzene was also detected below the RAG in both of these wells.

The other two COCs, bis-(2ethylhexyl)phthalate and vinyl chloride, have been detected less consistently at this site. Vinyl chloride has not exceeded its RAG since 2007, when it was detected in well AP-8063 at 2.08 µg/L which is just above the RAG of 2 µg/L. Bis(2-ethylhexyl)phthalate has been detected in several wells, but concentrations have tended to be quite variable and have often been qualified by the laboratory as being estimated and/or questionable due to the analyte having been detected in the blank as well as in the sample. Neither of these contaminants exceeded RAGs in any samples from fall 2010.

Only one COC, bis(2-ethylhexyl)phthalate has been detected above its RAG in a well located upgradient of the landfill. Bis(2-ethylhexyl)phthalate exceeded it RAG twice in well FWLF-4, but has not been detected since 2003. Benzene and cis-1,2-DCE are also consistently detected in this well, but at levels below their RAG. A permafrost investigation conducted in 2010 determined that massive shallow permafrost exists between the most upgradient well AP-6132 and the landfill. Because this permafrost body disconnects groundwater flow between AP-6132 and the landfill, AP-6132 will be removed from the sampling network.

In general, the groundwater results indicate that contaminants migrating from the landfill are being naturally attenuated. Although benzene has been detected above the RAG in deep downgradient well AP-6532, concentrations appear to be stable, and benzene was below the RAG in additional deep downgradient wells sampled in 2010.

Institutional Controls

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. A map depicting the boundaries of all sites on Fort Wainwright where ICs are in effect is also provided in Appendix A.

Site specific ICs are in place at the Landfill source area. An industrial-grade security fence with appropriate entry gates has been placed around the inactive portion of the Landfill and is monitored at least on an annual basis for breaches or overgrowth. An informational sign was installed. Excavation is restricted and can only be authorized by DPW Environmental. Groundwater intrusion is also restricted and can only be authorized by DPW Environmental through the Dig Permit process. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use.

Site Inspection

A site inspection was conducted on May 13, 2011. The landfill cap and fence were observed to be in good condition. The informational sign was also in good condition. All groundwater monitoring wells sampled to evaluate natural attenuation were found to be in good condition with locking caps. Photographs taken at the time of the site inspection are included Appendix D of this report.

7.2.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

Landfill Cap

The Landfill cap was constructed in 1997 and is maintained as necessary and inspected annually. An engineering inspection and survey conducted in 2009 determined that the cap was in good condition. Groundwater monitoring results indicate that the contaminant plume is not migrating away from the site area. Results from the fall 2010 sampling event indicate no significant increases in concentrations for the target analytes in the past five years. During ROD preparation, the possibility was anticipated that capping the landfill may not significantly decrease contaminant concentrations in groundwater and capping the entire landfill might be necessary. Although contaminant concentrations have not decreased in the past five years, neither have they significantly increased but appear to be stable, and ICs remain protective of human health and the environment.

Figure 7-3 summarizes the results of groundwater monitoring associated with this source area.

Implementation of Institutional Controls

ICs for the Landfill are in place. Excavation in the active area is restricted and requires authorization by DPW Environmental. Absolutely no excavations are allowed in the inactive landfill area. Groundwater intrusion is restricted, subject to authorization by DPW Environmental. A soil stockpile was placed on a section of the closed landfill cell in 2008. This soil was part of the Taku Garden Housing demolition project on Fort Wainwright and had been screened as clean. The overall volume of the stockpile was estimated at approximately 10,500 cubic yards (cy), and the volume of the road corridor prism to the stockpile was estimated at 1,300 cy. The original intent had been to use the soil to repair any problems with the landfill cap, but after the 2009 engineering inspection determined the cap to be in good condition (as discussed below), the soil and access road prism were removed and placed in the active landfill.

Prior to transport to the landfill cell, the soil was sampled and found not to contain contaminants exceeding regulatory limits. The area of the soil pile and road were reseeded.

System Operations / O&M

An engineering inspection and evaluation was conducted in April 2009 for the closed cell of the Landfill. Overall, the entire facility was determined to be in good condition; however, the evaluation identified the following areas of concern and recommendations:

- The landfill cap is in good condition and does not need additional soil. In fact, placing additional soil over the cap would have been detrimental because the existing vegetative cover is well established and would have to be completely regrown, and the added soil would block stormwater from entering the sand drainage layer.
- Willows and trees within 5 feet of either side of the fence line should be removed as part of regular maintenance of the fence. This recommendation was completed during the summer 2010 when all trees and underbrush within 10 feet of either side of the fence line surrounding the inactive landfill were cleared.
- The limited area of exposed fabric should be covered with soil (by hand, or in a manner that would not create erosion) on the established cap and hydroseeded where repaired, and the soil surrounding the exposed fabric should be “re-graded” to maintain a minimum 6-inch layer over the exposed fabric.
- The man-gate should be removed and replaced with chain link fencing to reduce the potential for unauthorized access to the facility. This activity was completed in 2010.

Table 7-2 summarizes the performance to date related to the RAOs for the OU4 Landfill source area.

Table 7-2. Performance to Date of Remedial Action Objectives at OU4 Landfill

Remedial Action Objective	Performance to Date
Restore groundwater to its beneficial use of drinking water quality within a reasonable time frame	Contaminant concentrations have stabilized in the years since the cap was constructed.
Reduce further migration of contaminated groundwater from the source areas	No growth of plume, contaminant concentrations remain stable
Prevent use of groundwater containing contaminants at levels above federal MCLs and AWQS (18 AAC 70)	ICs in effect
Use natural attenuation to attain AWQS (18 AAC 70)	Contaminant concentrations have stabilized in the years since cap constructed

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- The model of permafrost distribution and groundwater flow in the area around the Landfill has been refined since the last Five-Year Review. Based on revisions to

the permafrost model, two wells that are not connected to groundwater flow associated with the landfill have been removed from the monitoring network.

- It was assumed that the active portion of the Landfill may affect downgradient concentrations of contaminants and significant decreases in contaminant concentrations may not occur until the entire Landfill is closed and capped. Groundwater monitoring data to date support this assumption.
- There are no known changes in exposure pathways or populations at risk.
- There have been no changes in the MCLs for benzene, bis(2-ethylhexyl)phthalate, cis-1,2-DCE, 1,1,2,-TCA, TCE, or vinyl chloride.
- The State of Alaska has established groundwater cleanup goals for 1,1,2,2-PCA, although there is still no federal MCL (this chemical is on the federal Drinking Water Contaminant Candidate List).

Has any Other Information Come to Light That Could Call Into Question the Protectiveness of the Remedy?

No other information has arisen that would question the protectiveness of the current remedy.

Variances

No significant variances from the ROD have been noted since the second Five Year Review.

Recommendations and Follow-up Actions

No landfill cap design changes are recommended at this time.

Recommendations and Follow-Up Actions for OU4 Landfill are shown in Table 7-3.

Table 7-3. Recommendations and Follow-Up Actions for OU4 Landfill

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Continue semi-annual monitoring of Landfill wells to evaluate natural attenuation.	U.S. Army	EPA / ADEC	Ongoing	No

Response to Previous Recommendations

No landfill cap design or operational changes were recommended during the second Five Year Review.

7.3 Incorporation of Building 1191 Site into OU4

In a letter dated 17 August 2011 entitled *Incorporation of Building 1191, Landfill CAT Shed - Underground Injection Control Program Investigation Site into Operable Unit 4 Investigations*. The Army stated that “In response to the US Environmental Protection Agency, Region 10 Underground Injection Control Program Consent Agreement and Final Order which includes the

Landfill CAT Shed on Fort Wainwright, U.S. Army Garrison Fort Wainwright has committed to adding additional investigations related to the subject injection well to the normal Operable Unit 4 investigations currently in progress at the Fort Wainwright Landfill.

This injection well consisted of a septic tank and leach pit that previously served a bathroom and a floor drain in the vehicle storage shed. On November 12, 2010, a groundwater sample from the shed contained a concentration of benzene of 5.58 micrograms per cubic liter, a concentration above the SDWA Act MCL of 5 micrograms per cubic liter. The area of contamination will be monitored.

Completion of this action will meet EPA's objectives to ensure the injection well at issue is in compliance with Safe Drinking Water Act Regulations.

7.4 OU4 – Coal Storage Yard

7.4.1 Overview

The CSY is located south of the Fort Wainwright power plant and east of the power plant cooling pond (Figure 7-4). The area of concern was located within an area approximately 800-ft by 300-ft between the cooling pond and an embankment. Historically, coal was stored directly on the ground without a liner, and waste petroleum products and chlorinated solvents were sprayed over the coal pile to increase the energy output of the plant, a practice which has been discontinued. Two 10,000-gallon USTs were installed in the 1980s to contain waste oil for the practice of spraying to increase thermal output. Before these tanks were installed, waste oil was placed in drums adjacent to the coal pile. The two 10,000-gallon USTs were removed in July of 1995.

The chosen alternative in the ROD, signed September 1996, was *in-situ* treatment of soils and groundwater by enhanced soil vapor extraction/air sparging. The treatment system was installed and began operation during the summer of 1997. It was operated on a seasonal basis (May to October) until October 2000 when it was shut down to evaluate rebound.

Soil sampling was conducted at the site between 1999 and 2002, and groundwater sampling was conducted semi-annually (in the spring and fall) until 2003 when it was determined the ROAs had been achieved. The treatment system was decommissioned in 2004. The site was recommended for No Further Action in the second Fort Wainwright Five-Year Review.

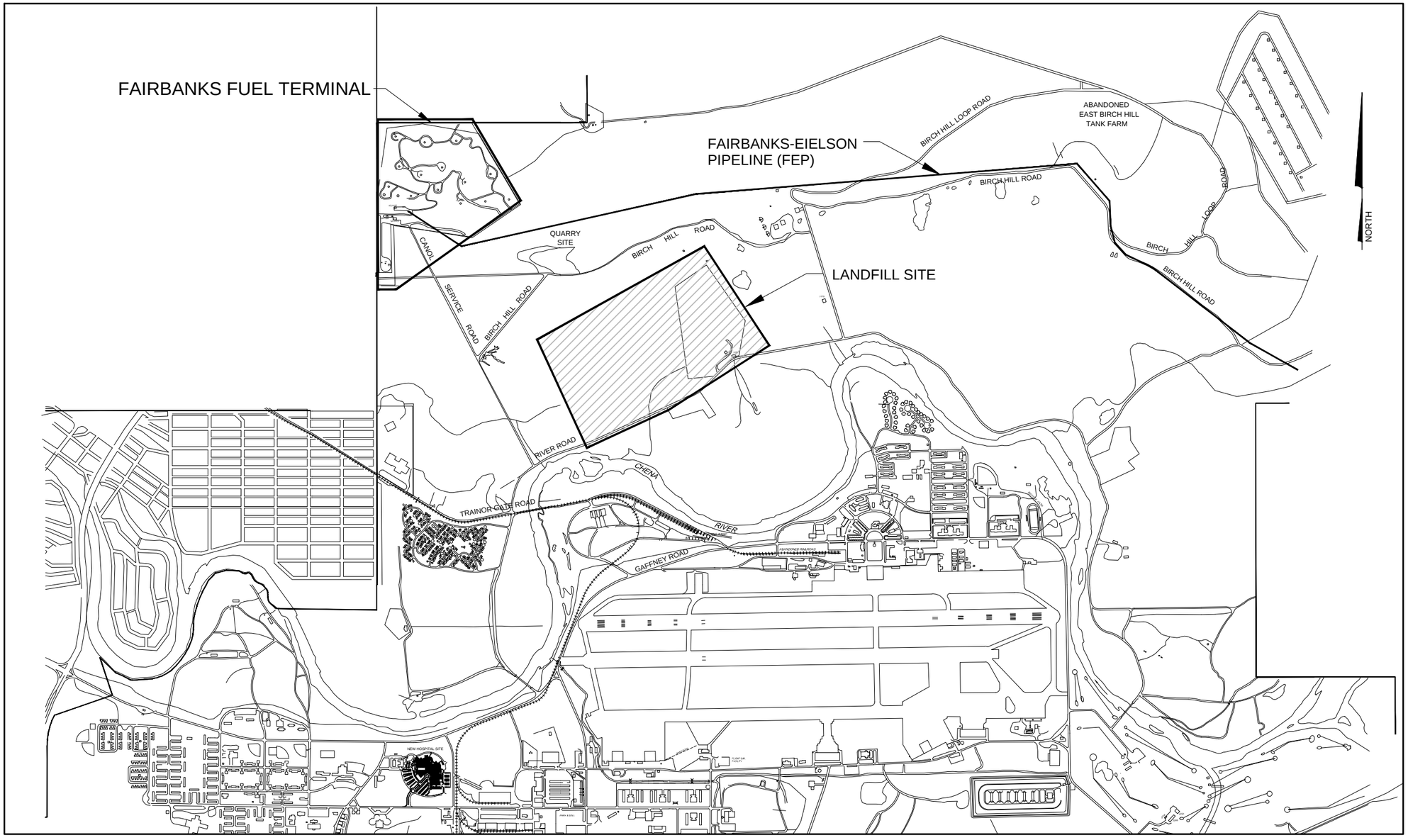
7.4.2 Institutional Controls

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. A map depicting the boundaries of all sites on Fort Wainwright where ICs are in effect is also provided in Appendix A.

ICs are still in effect at the CSY. Excavation on this site is restricted and may only be authorized by DPW Environmental. Groundwater intrusion is also restricted and may only be authorized by DPW Environmental.

7.4.3 Recommendations and Follow-up Actions

ICs are still in place for the area around the CSY. These precautions will ensure the protectiveness of the site. No additional recommendations or follow-up actions are necessary.



0 1000 2000 4000

SCALE IN FEET

ARMY ENVIRONMENTAL CENTER

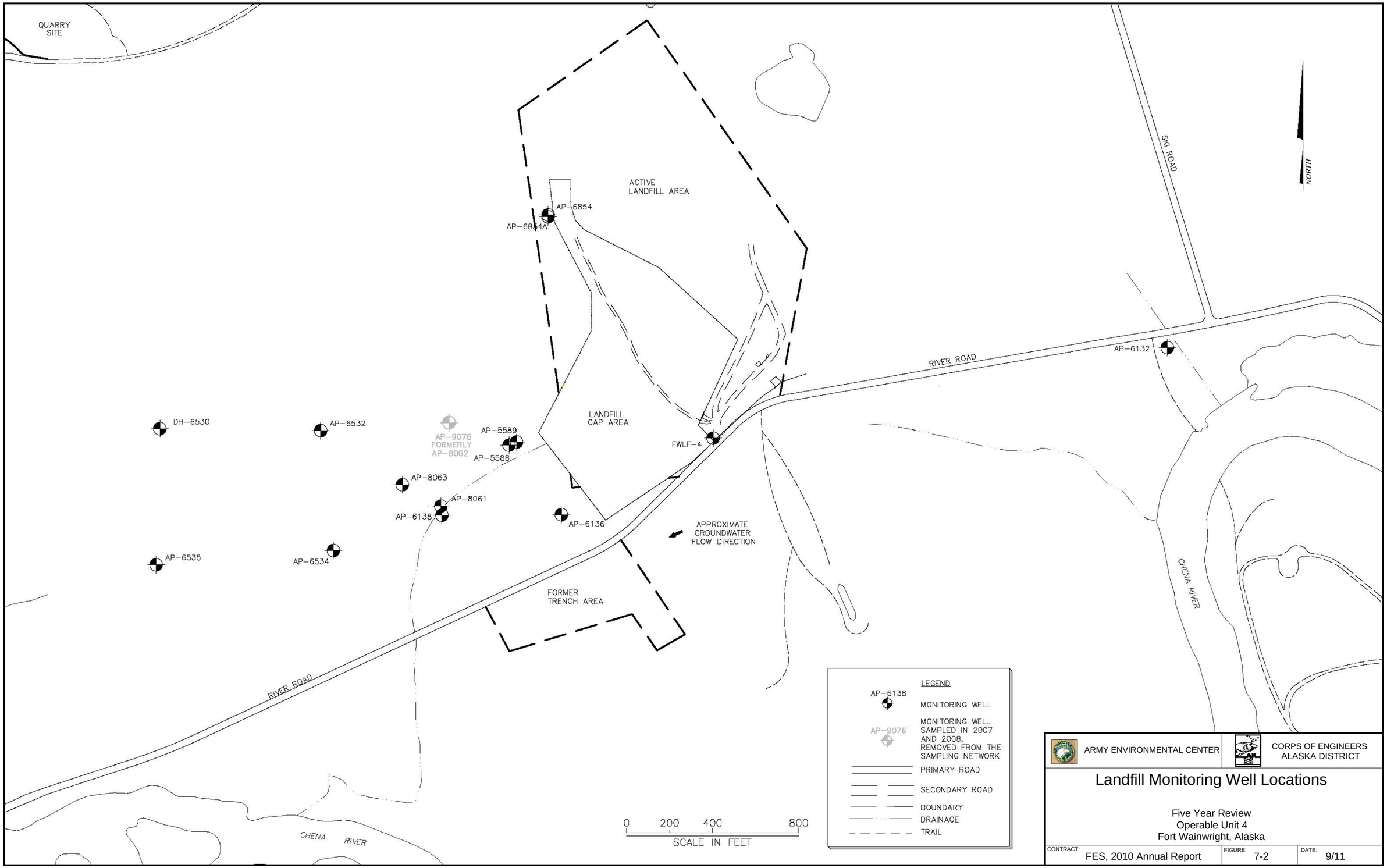
CORPS OF ENGINEERS
ALASKA DISTRICT

Landfill Site Map

Five Year Review
Operable Unit 4
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2011 Five Year Review	7-1	9/11

1751AF


QUARRY SITE
ACTIVE LANDFILL AREA
AP-6854
AP-6854A
SKI ROAD
NORTH
RIVER ROAD
AP-6132
LANDFILL CAP AREA
DH-6530
AP-6532
AP-9076 FORMERLY AP-8062
AP-5589
AP-5588
FWLF-4
AP-8063
AP-8061
AP-6138
AP-6136
APPROXIMATE GROUNDWATER FLOW DIRECTION
AP-6535
AP-6534
FORMER TRENCH AREA
CHENA RIVER
RIVER ROAD
CHENA RIVER
0 200 400 800
SCALE IN FEET
LEGEND
AP-6138
MONITORING WELL
AP-9076
MONITORING WELL SAMPLED IN 2007 AND 2008, REMOVED FROM THE SAMPLING NETWORK
PRIMARY ROAD
SECONDARY ROAD
BOUNDARY
DRAINAGE
TRAIL
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS ALASKA DISTRICT
Landfill Monitoring Well Locations
Five Year Review
Operable Unit 4
Fort Wainwright, Alaska
CONTRACT: FES, 2010 Annual Report
FIGURE: 7-2
DATE: 9/11

1734AF

NORTH

WELL AP-6854A
Top of PVC 450.06
Total Well Depth (ft) 64.8

	OCT 10
Groundwater Elevation (feet)	434.26
Benzene	0.45
cis-1,2-Dichloroethene	ND (1.0)
1,1,2,2-Tetrachloroethane	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)
Trichloroethene	ND (1.0)
Vinyl Chloride	0.95
bis (2-ethylhexyl)phthalate	ND (4.8)
Methane	14,000

WELL AP-6854
Top of PVC 449.17
Total Well Depth (ft) 100

	OCT 10
Groundwater Elevation (feet)	434.27
Benzene	0.44
cis-1,2-Dichloroethene	ND (1.0)
1,1,2,2-Tetrachloroethane	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)
Trichloroethene	ND (1.0)
Vinyl Chloride	ND (1.0)
bis (2-ethylhexyl)phthalate	ND (4.8)
Methane	14,000

WELL AP-5589
Top of PVC 452.30
Total Well Depth (ft) 56.2

	JUL 97	DEC 98	MAR 99	JUN 99	AUG 99	MAR 00	AUG 00	MAR 01	SEP 01	JUN 02	OCT 02	MAY 03	SEP 03	JUN 04	OCT 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07	OCT 07	MAY 08	SEPT 08	JUNE 09	NOV 09	MAY 10	OCT 10
Groundwater Elevation (feet)	420.63	428.84	427.82	428.64	429.19	428.07	429.37	433.99	434.64	435.56	436.03	434.45	437.85	435.73	433.41	435.63	434.73	434.99	434.59	434.07	434.40	435.35	436.23	434.72	434.70	433.82	433.83
Benzene	4.00	4.03	4.00	4.01	4.28	3.87	3.86	4.10	4.10	3.54	3.32	3.47	4.25	3.95	3.38	3.58	3.43	3.98	3.40	3.20	2.54	3.30	3.60	3.00	3.40	2.80	3.50
cis-1,2-Dichloroethene	13.0	9.83	9.00	10.7	11.1	9.44	8.58	9.00	14.0	7.37	8.19	8.39	9.28	10.2	11.0	10.9	10.5	12.0	14.0	11.1	13.4	14.0	15.0	13.0	14.0	13.0	17.0
1,1,2,2-Tetrachloroethane	ND (1.0)	ND (1.0)	2.00	1.16	ND (1.0)	ND (1.0)	ND (1.0)	1.30	ND (5.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.40	2.08	0.67	8.42	6.34	5.60	24.5	ND (0.5)	0.23	0.22	0.63	5.6	4.9	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.094 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	4.00	3.47	4.00	3.73	3.96	3.74	3.52	3.90	4.50	3.05	3.49	3.01	3.19	3.42	3.95	3.01	3.33	3.84	3.90	5.04	3.83	3.10	3.80	3.90	5.10	4.10	4.90
Vinyl Chloride	ND (1.0)	1.19	ND (1.0)	1.24	1.44	1.50	1.40	1.70	2.60	ND (1.0)	1.41	1.33	1.07	1.64	2.10	1.39	1.55	2.64	1.20	1.32	1.61	1.10	1.10	ND (1)	1.00	ND (1.0)	0.97
bis (2-ethylhexyl)phthalate	1.00	ND (11)	9.30	NA	ND (11)	ND (10)	ND (10)	2.80	ND (5.0)	ND (20)	ND (20)	R	ND (16)	ND (9.3)	ND (10)	ND (10)	ND (10)	ND (10)	ND (16)	ND (10.4)	ND (10.7)	4.00	ND (15)	ND (15)	ND (9.6)	ND (9.6)	1.6
Methane																									6,200	2,400	1,400

WELL AP-5588
Top of PVC 451.28
Total Well Depth (ft) 29.03

	JUL 97	DEC 98	MAR 99	JUN 99	AUG 99	MAR 00	AUG 00	MAR 01	SEP 01	JUN 02	OCT 02	MAY 03	SEP 03	JUN 04	OCT 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07*	OCT 07	MAY 08	SEPT 08	JUNE 09	NOV 09	MAY 10	OCT 10
Groundwater Elevation (feet)	430.90	428.32	427.80	428.72	429.31	428.12	429.45	434.03	434.66	435.70	435.9	434.42	436.37	435.15	432.64	435.61	434.97	434.98	434.57	434.11	434.36	435.31	436.20	434.73	434.63	433.82	433.83
Benzene	2.00	2.27	2.00	2.42	3.07	2.26	2.29	2.50	2.10	1.64	2.37	1.93	ND (4.0)	2.25	2.09	2.49	2.42	2.52	2.10	1.12	0.34	2.60	2.30	2.20	ND (50)	2.20	ND (50)
cis-1,2-Dichloroethene	160	170	190	184	176	173	168	160	220	117	127	162	121	183	168	133	160	169	200	ND (25)	148	150	150	170	190	180	190
1,1,2,2-Tetrachloroethane	1,700	2,020	2,400	1,920	1,570	2,130	2,180	2,000	1,300	934	1,260	1,990	1,820	2,590	2,990	1,600	2,820	2,870	2,600	378	2,840	1,200	1,600	2,300	2,600	2,800	2,400
1,1,2-Trichloroethane	8.00	10.2	11.0	9.92	9.41	10.1	9.71	10.0	7.70	5.46	7.10	9.52	9.53	11.8	13.2	7.58	12.4	13.8	13	13.9	10.4	6.00	7.40	9.20	ND (50)	ND (1)	ND (50)
Trichloroethene	280	196	320	243	252	271	257	440	240	168	193	248	203	314	295	205	279	305	320	31.0	290	170	180	310	310	260	360
Vinyl Chloride	ND (1.0)	ND (1.0)	ND (1.0)	1.11	1.37	1.17	1.31	1.10	1.30	ND (1.0)	1.33	0.88	ND (10)	1.21	1.45	1.49	1.52	2.42	ND (10)	1.42	1.06	1.30	1.10	1.20	ND (50)	0.51	ND (50)
bis (2-ethylhexyl)phthalate	ND (11)	ND (11)	0.60	NA	ND (11)	ND (10)	ND (11)	3.40	ND (5.1)	ND (21)	ND (20)	7.30	ND (16)	ND (9.3)	ND (10)	ND (10)	ND (10)	ND (9.7)	ND (17)	ND (3.23)	ND (11.8)	7.20	0.74	ND (0.15)	ND (9.6)	0.63	ND (4.8)
Methane																									3,800	1,200	1,100

AP-9076 (FORMERLY WELL AP-8062)
Top of PVC 451.78
Total Well Depth (ft) 19.92

	SEP 01	JUN 02	SEP 02	MAY 03	SEP 03	JUN 04	NOV 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07	OCT 07	MAY 08	SEPT 08
Groundwater Elevation (feet)	442.37	NS	446.52	NS	447.30	NS*	440.79	439.33	444.36	438.48	442.67	438.91	441.91	438.55	446.88
Benzene	ND (2.0)	NS	ND (0.5)	NS	ND (0.4)	NS*	0.26	0.87	ND(0.4)	ND (0.4)	ND (1.0)	ND (0.4)	ND (0.4)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (2.0)	NS	ND (1.0)	NS	ND (1.0)	NS*	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2,2-Tetrachloroethane	ND (2.0)	NS	ND (1.0)	NS	ND (1.0)	NS*	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)
1,1,2-Trichloroethane	ND (2.0)	NS	ND (1.0)	NS	ND (1.0)	NS*	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ND (2.0)	NS	ND (1.0)	NS	ND (1.0)	NS*	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.14
Vinyl Chloride	ND (2.0)	NS	ND (1.0)	NS	ND (1.0)	NS*	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
bis (2-ethylhexyl)phthalate	ND (5.0)	NS	ND (22)	NS	ND (17)	NS*	ND (10)	16.0	ND(11)	ND (9.7)	ND (15)	ND (10.4)	ND (10.5)	3.60	ND (15)

NS = NO SAMPLE COLLECTED BECAUSE WELL WAS FROZEN DURING SAMPLING EVENT.
NS* = NO SAMPLE COLLECTED BECAUSE WELL IS BROKEN.
REPLACEMENT WELL INSTALLED NOVEMBER 2004

WELL DH-6530
Top of PVC 450.06
Total Well Depth (ft) 142.2

	OCT 10
Groundwater Elevation (feet)	432.96
Benzene	0.69
cis-1,2-Dichloroethene	ND (1.0)
1,1,2,2-Tetrachloroethane	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)
Trichloroethene	ND (1.0)
Vinyl Chloride	ND (1.0)
bis (2-ethylhexyl)phthalate	ND (52)
Methane	290

WELL AP-6534
Top of PVC 450.15
Total Well Depth (ft) 196

	OCT 10
Groundwater Elevation (feet)	433.50
Benzene	1.9
cis-1,2-Dichloroethene	ND (1.0)
1,1,2,2-Tetrachloroethane	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)
Trichloroethene	ND (1.0)
Vinyl Chloride	ND (1.0)
bis (2-ethylhexyl)phthalate	ND (5.2)
Methane	140

WELL AP-6535
Top of PVC 448.09
Total Well Depth (ft) 93.1

	OCT 10
Groundwater Elevation (feet)	431.7
Benzene	3.6
cis-1,2-Dichloroethene	ND (1.0)
1,1,2,2-Tetrachloroethane	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)
Trichloroethene	0.65
Vinyl Chloride	0.9
bis (2-ethylhexyl)phthalate	1.4
Methane	1,000

WELL AP-6532
Top of PVC 451.38
Total Well Depth (ft) 177.3

	JUL 97	DEC 98	MAR 99	JUN 99	AUG 99	MAR 00	AUG 00	MAR 01	SEP 01	JUN 02	SEP 02	MAY 03	SEP 03	JUN 04	NOV 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07	OCT 07	MAY 08	SEPT 08	JUNE 09	NOV 09	MAY 10	OCT 10
Groundwater Elevation (feet)	*	428.08	426.35	428.11	428.73	426.98	428.83	432.57	433.02	432.83	434.43	433.92	436.37	433.23	432.25	434.13	433.32	434.58	434.11	432.51	433.12	435.06	435.49	434.68	434.23	433.47	433.42
Benzene	2.00	1.79	2.00	1.77	1.52	1.81	1.80	2.40	2.00	1.64	2.17	1.75	2.00	8.09	0.86	8.43	8.30	9.62	8.80	9.35	7.96	9.60	10.0	3.40	1.00	11.0	12.0
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	3.82	ND (1.0)	3.82	3.74	3.74	4.10	3.21	2.74	3.30	3.70	11.0	0.62	3.4	3.4
1,1,2,2-Tetrachloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.95	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.31	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
bis (2-ethylhexyl)phthalate	6.00	ND (12)	8.90	NA	29.1	75.0	ND (10)	ND (5.1)	ND (5.7)	ND (22)	ND (23)	6.80	ND (17)	ND (10)	ND (10)	ND (10)	ND (10)	ND (9.6)	0.47	ND (11.2)	ND (10.6)	0.82	ND (15)	ND (15)	7.8	ND (9.6)	1.4
Methane																									1,400	5,300	5,200

* NO ELEVATION GIVEN FOR TOP OF CASING.

WELL AP-8063
Top of PVC 451.36
Total Well Depth (ft) 120.55

	SEP 01	JUN 02	OCT 02	JUN 03	SEP 03	JUN 04	NOV 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07	OCT 07	MAY 08	SEPT 08	JUNE 09	NOV 09	MAY 10	OCT 10
Groundwater Elevation (feet)	434.34	NS	435.03	434.21	436.79	434.56	433.17	435.85	434.59	434.65	434.44	433.75	434.36	435.18	435.77	434.68	434.36	433.64	433.59
Benzene	4.50	NS	3.39	3.44	3.46	3.01	0.73	2.65	3.46	3.56	2.80	2.92	2.65	2.60	2.90	2.30	0.15	2.80	3.0
cis-1,2-Dichloroethene	72.0	NS	43.5	74.8	70.5	69.6	5.10	46.6	87.7	82.5	82.0	58.8	57.1	94.0	91.0	75.0	6.00	110	110
1,1,2,2-Tetrachloroethane	51.0	NS	49.6	33.6	77.4	9.60	0.94	11.3	1.59	3.06	1.60	1.26	2.95	11.0	11.0	20.0	0.99	29.0	37.0
1,1,2-Trichloroethane	0.85	NS	0.84	0.64	0.97	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (10)	ND (1.0)	ND (1.0)	0.36	0.50	0.28	ND (1.0)	0.66	0.83
Trichloroethene	24.0	NS	16.5	22.5	28.2	17.3	1.23	16.7	21.6	22.9	18.0	22.0	21.0	17.0	16.0	15.0	1.10	21.0	24.0
Vinyl Chloride	2.10	NS	1.10	1.48	1.91	1.58	ND (1.0)	1.30	1.64	2.22	ND (10)	1.76	2.08	1.50	1.40	1.10	ND (1)	0.76	1.2
bis (2-ethylhexyl)phthalate	ND (5.3)	NS	ND (20)	41.0	ND (16)	ND (10)	ND (10)	ND (10)	11.0	7.40	ND (17)	ND (10.5)	ND (10.9)	0.39	ND (15)	ND (15)	3.8	1.1	ND (5.2)
Methane																	440	3,000	1,300

NS = NO SAMPLE COLLECTED BECAUSE WELL WAS FROZEN DURING SAMPLING EVENT.

WELL FW-LF-4
Top of PVC 452.26
Total Well Depth (ft) 25.1

	DEC 98	MAR 99	JUN 99	AUG 99	MAR 00	AUG 00	MAR 01	SEP 01	JUN 02	OCT 02	MAY 03	SEP 03	JUN 04	OCT 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07	OCT 07	MAY 08	SEPT 08	JUNE 09	NOV 09	MAY 10	OCT 10
Groundwater Elevation (feet)	429.35	428.27	429.25	429.60	428.50	429.95	433.89	434.64	435.54	435.87	434.91	437.13	436.20	433.39	435.17	434.97	435.04	434.63	434.00	434.47	435.36	436.48	434.66	434.74	433.82	434.0
Benzene	1.97	2.00	1.67	1.58	1.53	1.31	1.40	1.40	0.91	1.26	1.32	1.34	1.43	1.80	1.87	1.57	1.49	1.50	1.27	ND (0.4)	1.10	0.90	1.2	1.4	1.2	1.1
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.41	0.36	0.41	0.36	0.44	0.50	ND(1.0)	0.45	0.52	ND (1.0)	0.95	0.41	0.38	0.40	0.47	ND (1.0)	0.50
1,1,2,2-Tetrachloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
bis (2-ethylhexyl)phthalate	15.3	2.20	NA	ND (11)	ND (10)	ND (10)	ND (5.0)	4.30	ND (22)	ND (22)	6.7	ND (16)	ND (9.3)	ND (10)	ND (10)	ND (10)	ND (9.7)	ND (16)	ND (10.8)	ND (11.1)	1.80	ND (15)	ND (15)	ND (9.6)	5.4	ND (4.8)
Methane																								120	29	36

WELL AP-6132
Top of PVC 456.06
Total Well Depth (ft) 23.7

	AUG 99	MAR 00	AUG 00	MAR 01	SEP 01	JUN 02	OCT 02	MAY 03	SEP 03	JUN 04	OCT 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07	OCT 07	MAY 08	SEPT 08	JUNE 09	NOV 09	MAY 10	OCT 10
Groundwater Elevation (feet)	429.97	429.80	430.85	435.75	436.13	436.77	438.29	435.91	439.08	436.97	434.11	436.6	436.58	435.75	435.61	435.04	435.39	435.87	438.84	435.45	435.42	434.35	434.76
Benzene	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (0.5)	ND (0.5)	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.4)	ND (0.5)	ND (0.4)	ND (1.0)	ND (0.4)	ND (0.4)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2,2-Tetrachloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	0.96	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.89	ND (1.0)	ND (1.0)	0.31	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
bis (2-ethylhexyl)phthalate	ND (11)	ND (9.9)	ND (10)	2.10	1.50	ND (22)	ND (20)	5.90	ND (17)	ND (9.3)	ND (10)	ND (10)	ND (10)	ND (9.8)	ND (16)	ND (10.5)	ND (11.6)	2.50	0.34	ND (1.0)	ND (9.5)	3.2	1.2
Methane																					130	32	99

ACTIVE LANDFILL AREA

LANDFILL CAP AREA

FORMER TRENCH AREA

RIVER ROAD

QUARRY SITE

SKI ROAD

CHENA RIVER

A.R.R.

AP-6854 AP-6854A AP-5589 AP-5588 AP-9076 FORMERLY AP-8062 FWLF-4 AP-6132 DH-6530 AP-6532 AP-8063 REPLACEMENT AP-8061 AP-6137 AP-6138 AP-6136 AP-6535 AP-6534

WELL AP-6136
Top of PVC 454.14
Total Well Depth (ft) 96.1

	JUL 97	DEC 98	MAR 99	JUN 99	AUG 99	MAR 00	AUG 00	MAR 01	SEP 01	JUN 02	OCT 02	MAY 03	SEP 03	JUN 04	OCT 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07	OCT 07	MAY 08	SEPT 08	JUNE 09	NOV 09	MAY 10	OCT 10
Groundwater Elevation (feet)	428.08	428.93	427.84	427.84	429.11	428.13	429.43	434.01	434.71	435.59	435.99	434.50	436.98	436.00	429.65	435.61	435.04	435.07	434.68	434.11	434.45	435.54	436.29	434.84	434.83	433.90	433.91
Benzene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (0.5)	0.42	0.28	0.26	0.34	0.43	ND (0.4)	ND (0.4)	0.35	0.32	0.26	ND (0.4)	0.19	0.27	0.43	0.35	0.29	0.35
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.091	0.10	ND (1.0)	0.11	ND (1.0)	ND (1.0)
1,1,2,2-Tetrachloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.5)	ND (0.5)	ND (0.5)	0.55	ND (0.5)	ND (1.0)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (2.0)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
bis (2-ethylhexyl)phthalate	22 .0	24.8	13.0	NA	32.3	36.8	ND (10)	33.0	ND (5.0)	ND (22)	ND (22)	5.30	ND (17)	4.20	13.0	8.90	ND(10)	ND (9.9)	0.43	ND (10.5)	ND (10.9)	2.40	ND (15)	ND (15)	1.2	2.6	2.6
Methane																									110	51	28

WELL AP-8061
Top of PVC 444.30
Total Well Depth (ft) 25.2

	SEP 01	JUN 02	SEP 02	MAY 03	SEP 03	JUN 04	OCT 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07	OCT 07	MAY 08	SEPT 08	JUNE 09	NOV 09	MAY 10	OCT 10
Groundwater Elevation (feet)	434.57	435.44	435.84	434.33	436.61	435.76	433.29	435.53	434.88	434.94	434.48	433.91	434.28	435.28	436.10	434.63	434.57	433.73	433.71
Benzene	5.00	2.46	4.84	3.39	5.80	3.34	5.77	3.09	5.07	5.74	5.50	5.08	5.00	4.40	5.5	4.40	5.2	4.7	5.8
cis-1,2-Dichloroethene	31.0	15.6	26.5	20.6	28.8	22.9	22.4	17.7	18.9	24.3	20.0	20.9	16.0	17.0	20.0	18.0	14.0	10	13
1,1,2,2-Tetrachloroethane	ND (2.0)	1.50	3.85	2.92	3.05	1.05	ND (0.5)	ND (0.5)	ND (0.5)	0.24	ND (1.0)	ND (0.5)	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.9	ND (1.0)
1,1,2-Trichloroethane	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	11.0	7.86	12.9	11.0	13.0	12.3	12.3	8.74	9.20	12.7	9.60	12.7	8.11	6.8	7.6	8.9	6.6	4.8	6.2
Vinyl Chloride	ND (2.0)	ND (1.0)	ND (1.0)	0.33	0.47	0.53	0.65	0.43	0.59	1.25	0.49	ND (1.0)	0.66	0.40	0.56	ND (1.0)	0.30	ND (1.0)	0.24
bis (2-ethylhexyl)phthalate	ND (5.0)	ND (22)	ND (23)	6.00	ND (17)	5.00	ND (10)	ND (10)	ND (11)	ND (9.5)	ND (16)	ND (10.4)	ND (10.5)	4.00	ND (15)	ND (15)	ND (9.7)	ND (15)	1.3
Methane																	960	280	610

WELL AP-6137
Top of PVC 444.73
Total Well Depth (ft) 12.9

	JUL 97	DEC 98	MAR 99	JUN 99	AUG 99	MAR 00	AUG 00	MAR 01	SEP 01
Groundwater Elevation (feet)	427.43	427.55	426.81	427.85	428.17	415.15	NS	NS	DECOMMISSIONED
Benzene	ND (1.0)	3.61	4	3.96	4.29	5.99	NS	NS	
cis-1,2-Dichloroethene	14	24	24	30.7	26.7	26.1	NS	NS	
1,1,2,2-Tetrachloroethane	4	ND (1.0)	ND (1.0)	ND (1.0)	1.05	ND (1.0)	NS	NS	
1,1,2-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NS	NS	
Trichloroethene	6	8.77	10	10.5	9.56	10.4	NS	NS	
Vinyl Chloride	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NS	NS	
bis (2-ethylhexyl)phthalate	1 JB	ND (11)	0.8 J	NA	ND (11)	10.9	NS	NS	

NS = WELL NOT SAMPLED, NO WATER IN WELL, WELL STRUCTURE LIKELY COMPROMISED DUE TO HEAVING.

WELL AP-6138
Top of PVC 444.92
Total Well Depth (ft) 85.91

	JUL 97	DEC 98	MAR 99	JUN 99	AUG 99	MAR 00	AUG 00	MAR 01	SEP 01	JUN 02	SEP 02	MAY 03	SEP 03	JUN 04	NOV 04	MAY 05	OCT 05	JUNE 06	OCT 06	MAY 07	OCT 07	MAY 08	SEPT 08	JUNE 09	NOV 09	MAY 10	OCT 10
Groundwater Elevation (feet)	428.10	*	427.62	428.70	428.45	427.91	429.10	NS	437.39	438.24	438.68	434.37	NE	435.96	433.52	435.77	435.15	435.02	434.62	434.17	434.48	435.19	436.12	434.65	434.56	433.72	433.68
Benzene	3.00	3.07	3.00	3.28	2.83	3.53	2.82	NS	2.00	3.29	2.86	3.15	3.04	4.14	4.24	3.90	3.66	3.80	3.70	3.71	2.22	3.10	3.30	2.90	3.30	3.40	4.70
cis-1,2-Dichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NS	ND (2.0)	ND (0.5)	0.36	ND (1.0)	0.59	0.45	0.44	0.57	ND(1.0)	0.34	0.36	ND (1.0)	0.96	0.36	0.41	0.24	0.44	0.55	0.52
1,1,2,2-Tetrachloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NS	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (1.0)	ND (0.5)	0.95	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.5	ND (1.0)
1,1,2-Trichloroethane	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NS	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Trichloroethene	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NS	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.47	ND(1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.42	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	0.33	ND (1.0)
Vinyl Chloride	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	NS	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
bis (2-ethylhexyl)phthalate	1.00	35.5	3.10	NA	19.1	ND (10)	ND (10)	NS	ND (5.3)	ND (22)	ND (22)	5.6 0	ND (16)	ND (9.4)	ND (10)	ND (11)	ND (11)	ND (10)	11.0	ND (11.5)	ND (10.8)	2.10	ND (15)	ND (15)	ND (9.6)	ND (9.6)	2.4
Methane																									160	56	110

* MEASUREMENT NOT TAKEN.
NS = WELL NOT SAMPLED, WELL STRUCTURE COMPROMISED.
NE = REPLACE TOP 10 FEET OF PVC WITH STAINLESS STEEL CASING, THEREFORE CHANGING TOC ELEVATION.

LEGEND

AP-6138 MONITORING WELL
PRIMARY ROAD
SECONDARY ROAD
BOUNDARY
DRAINAGE
TRAIL
ND INDICATES THAT THE ANALYTE WAS NOT DETECTED, THE PRACTICAL QUANTITATION LIMIT IS STATED IN PARENTHESES.

RAOs IN μg/L

5 Benzene
70 cis-1,2-Dichloroethene
5.2 1,1,2,2-Tetrachloroethane
5 1,1,2-Trichloroethane
5 Trichloroethene
2 Vinyl Chloride
6 bis (2-ethylhexyl)phthalate
NA Methane

KEY:

MONITORING WELL

WELL AP-8063
TOP OF PVC 451.13
Total Well Depth (ft) 121.3

	SEP 01	JUN 02	OCT 02	JUN 03	SEP 03	JUN 04
Groundwater Elevation (feet)	434.34	NS	435.03	434.21	436.79	434.79
Benzene	4.5	NS	3.39	3.44	3.46	3.01
cis-1,2-Dichloroethene	72	NS	43.5	74.8	70.5	69.6
1,1,2,2-Tetrachloroethane	51	NS	49.6	33.6	77.4	9.60
1,1,2-Trichloroethane	0.85 J	NS	0.84 J	0.64 J	0.97 J	ND (1.0)
Trichloroethene	24	NS	16.5	22.5	28.2	17.3
Vinyl Chloride	2.1	NS	1.1	1.48	1.91 J	1.58
Bis (2-ethylhexyl)phthalate	ND (5.3)	NS	ND (20)	41 B	ND (16)	ND (10)

CONCENTRATIONS EXCEEDING REMEDIAL ACTION GOALS SHOWN IN BOLD

CONCENTRATIONS IN MICROGRAMS PER LITER (μg/L)

NS = NO SAMPLE COLLECTED BECAUSE WELL WAS FROZEN DURING SAMPLING EVENT.

0 125 250 500
SCALE IN FEET

ARMY ENVIRONMENTAL CENTER

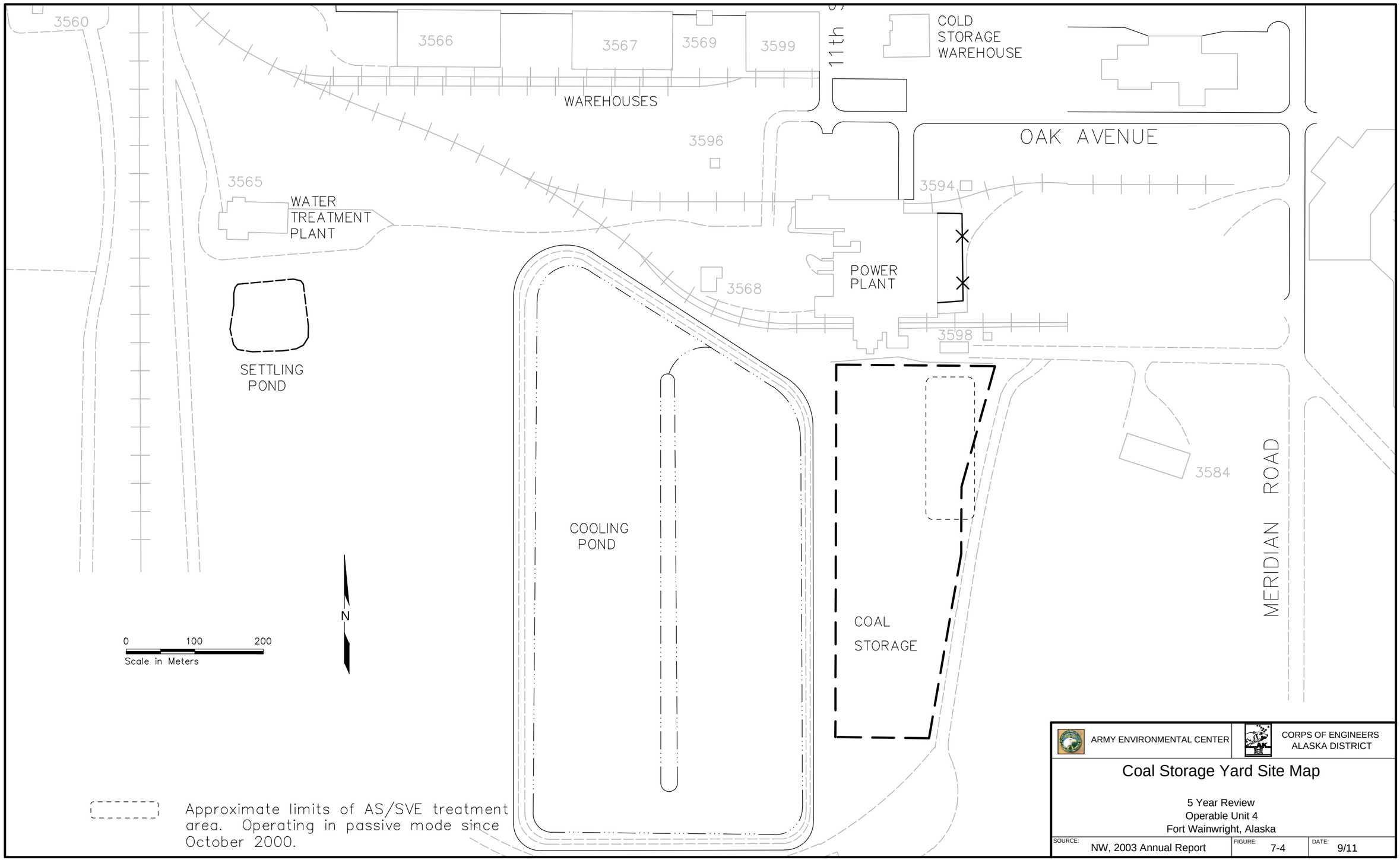
CORPS OF ENGINEERS ALASKA DISTRICT

Concentrations of Analytes in Groundwater at the Landfill Source Area

Five Year Review
Operable Unit 4
Fort Wainwright, Alaska

CONTRACT: FES, 2010 Annual Report | FIGURE: 7-3 | DATE: 9/11

17330AF



ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS
ALASKA DISTRICT

Coal Storage Yard Site Map

5 Year Review
Operable Unit 4
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
NW, 2003 Annual Report	7-4	9/11

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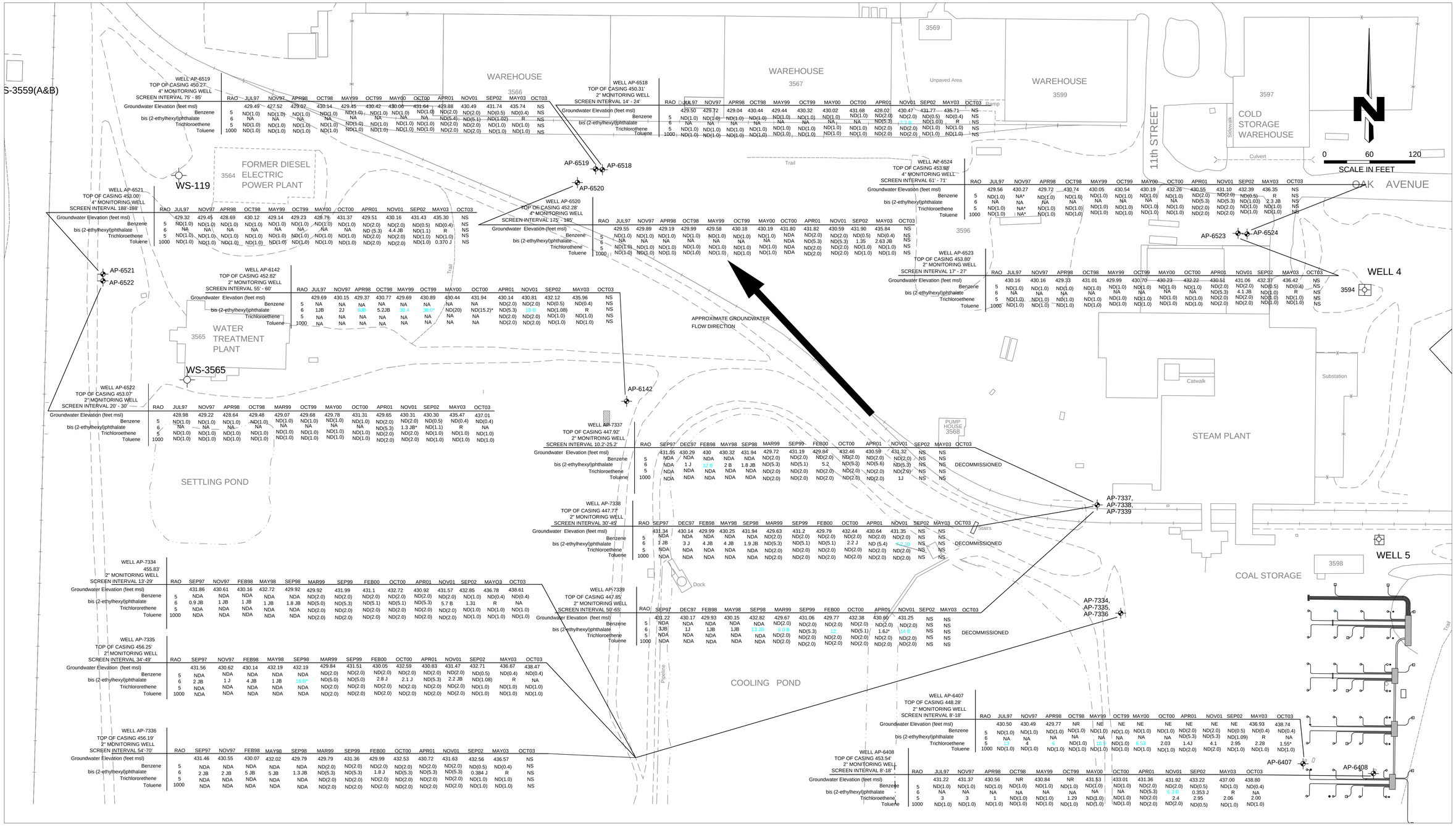


WELL AP-6519
TOP OF CASING 450.27'
4" MONITORING WELL
SCREEN INTERVAL 75' - 85'

	RAO	JUL97	NOV97	APR98	OCT98	MAY99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		429.49	427.52	429.07	430.14	429.15	430.42	430.06	431.64	429.88	430.49	431.74	435.74	NS
Benzene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	NS
bis (2-ethylhexyl)phthalate	6	NA	NA	NA	NA	NA	NA	NA	NA	ND(5.4)	ND(5.1)	ND(1.02)	R	NS
Trichloroethene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS
Toluene	1000	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS

WELL AP-6518
TOP OF CASING 450.31'
2" MONITORING WELL
SCREEN INTERVAL 14' - 24'

	RAO	JUL97	NOV97	APR98	OCT98	MAY99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		429.50	429.72	429.04	430.44	429.44	430.32	430.02	431.68	428.02	430.47	431.77	435.71	NS
Benzene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	NS
bis (2-ethylhexyl)phthalate	6	NA	NA	NA	NA	NA	NA	NA	NA	ND(5.3)	4.4 B	ND(1.03)	R	NS
Trichloroethene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS
Toluene	1000	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS

WELL AP-6524
TOP OF CASING 453.88'
4" MONITORING WELL
SCREEN INTERVAL 61' - 71'

	RAO	JUL97	NOV97	APR98	OCT98	MAY99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		429.56	430.27	429.72	430.74	430.05	430.54	430.19	432.26	430.55	431.10	432.39	436.35	NS
Benzene	5	ND(1.0)	NA*	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(0.5)	R	NS
bis (2-ethylhexyl)phthalate	6	NA	NA	NA	NA	NA	NA	NA	NA	ND(5.3)	ND(5.3)	ND(1.03)	2.3 JB	NS
Trichloroethene	5	ND(1.0)	NA*	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS
Toluene	1000	ND(1.0)	NA*	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS

WELL AP-6521
TOP OF CASING 453.00'
4" MONITORING,WELL
SCREEN INTERVAL 188'-198'

	RAO	JUL97	NOV97	APR98	OCT98	MAY99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		429.32	429.45	428.69	430.12	429.14	429.23	428.79	431.37	429.51	430.16	431.43	435.30	NS
Benzene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	NS
bis (2-ethylhexyl)phthalate	6	NA	NA	NA	NA	NA	NA	NA	NA	ND (5.3)	4.4 JB	ND(1.1)	R	NS
Trichloroethene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS
Toluene	1000	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	0.370 J	NS

WELL AP-6520
TOP OF CASING 452.28'
4" MONITORING WELL
SCREEN INTERVAL 175' - 185'

	RAO	JUL97	NOV97	APR98	OCT98	MAY99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		429.55	429.89	429.19	429.99	429.58	430.18	430.19	431.80	431.82	430.59	431.90	435.84	NS
Benzene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	NDA	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	NS
bis (2-ethylhexyl)phthalate	6	NA	NA	NA	NA	NA	NA	NA	NDA	ND(5.3)	ND(5.3)	1.35	2.63 JB	NS
Trichlorothene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	NDA	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS
Toluene	1000	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	NDA	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS

WELL AP-6523
TOP OF CASING 453.80'
2" MONITORING WELL
SCREEN INTERVAL 17' - 27'

	RAO	JUL97	NOV97	APR98	OCT98	MAY99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		430.16	430.16	429.33	431.01	429.99	430.70	430.23	432.22	430.51	431.06	432.37	436.42	NS
Benzene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	NS
bis (2-ethylhexyl)phthalate	6	NA	NA	NA	NA	NA	NA	NA	NA	ND(5.3)	4.1 JB	ND(1.0)	R	NS
Trichloroethene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS
Toluene	1000	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS

WELL AP-6142
TOP OF CASING 452.82'
2" MONITORING WELL
SCREEN INTERVAL 55' - 60'

	RAO	JUL97	NOV97	APR98	OCT98	MAY99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		429.69	430.15	429.37	430.77	429.69	430.89	430.44	431.94	430.14	430.81	432.12	435.96	NS
Benzene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	NS
bis (2-ethylhexyl)phthalate	6	1JB	2J	6JB	5.2JB	36.4	38.0*	ND(20)	ND(15.2)*	ND(5.3)	10 B	ND(1.08)	R	NS
Trichloroethene	5	NA	NA	NA	NA	NA	NA	NA	NA	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS
Toluene	1000	NA	NA	NA	NA	NA	NA	NA	NA	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS

WELL AP-6522
TOP OF CASING 453.07'
2" MONITORING WELL
SCREEN INTERVAL 20' - 30'

	RAO	JUL97	NOV97	APR98	OCT98	MAR99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		428.98	429.22	428.64	429.48	429.07	429.68	429.78	431.31	429.65	430.31	430.30	435.47	437.01
Benzene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	ND(0.4)
bis (2-ethylhexyl)phthalate	6	NA	NA	NA	NA	NA	NA	NA	NA	ND(5.3)	1.3 JB*	ND(1.1)	R	NA
Trichloroethene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)
Toluene	1000	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)

WELL AP-7337
TOP OF CASING 447.92'
2" MONITROING WELL
SCREEN INTERVAL 10.2'-25.2'

	RAO	SEP97	DEC97	FEB98	MAY98	SEP98	MAR99	SEP99	FEB00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		431.55	430.29	430	430.32	431.94	429.72	431.19	429.84	432.46	430.59	431.32	NS	NS	
Benzene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	NS	NS	
bis (2-ethylhexyl)phthalate	6	NDA	1 J	12 B	2 B	1.8 JB	ND(5.3)	ND(5.1)	5.2	ND(5.3)	ND(5.6)	ND(5.3)	NS	NS	DECOMMISSIONED
Trichloroethene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	NS	NS	
Toluene	1000	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	1J	NS	NS	

WELL AP-7338
TOP OF CASING 447.77'
2" MONITORING WELL
SCREEN INTERVAL 30'-45'

	RAO	SEP97	DEC97	FEB98	MAY98	SEP98	MAR99	SEP99	FEB00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		431.34	430.14	429.99	430.25	431.94	429.63	431.2	429.79	432.44	430.64	431.35	NS	NS	
Benzene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	NS	NS	
bis (2-ethylhexyl)phthalate	6	1 JB	3 J	4 JB	4 JB	1.9 JB	ND(5.3)	ND(5.1)	ND(5.1)	2.2 J	ND (5.4)	4.2 JB	NS	NS	DECOMMISSIONED
Trichloroethene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	NS	NS	
Toluene	1000	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	NS	NS	

WELL AP-7334
455.83'
2" MONITORING WELL
SCREEN INTERVAL 13'-29'

	RAO	SEP97	NOV97	FEB98	MAY98	SEP98	MAR99	SEP99	FEB00	OCT00	APR01	NOV01	SEP02	MAYO3	OCT03
Groundwater Elevation (feet msl)		431.86	430.61	430.16	432.72	429.92	429.92	431.99	431.1	432.72	430.92	431.57	432.85	436.78	438.61
Benzene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(0.4)	ND(0.4)
bis (2-ethylhexyl)phthalate	6	0.9 JB	1 JB	1 JB	1 JB	1.8 JB	ND(5.0)	ND(5.3)	ND(5.1)	ND(5.1)	ND(5.3)	5.7 B	1.31	R	NA
Trichlororethene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)
Toluene	1000	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)

WELL AP-7339
TOP OF CASING 447.85'
2" MONITORING WELL
SCREEN INTERVAL 50'-65'

	RAO	SEP97	DEC97	FEB98	MAY98	SEP98	MAR99	SEP99	FEB00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		431.22	430.17	429.93	430.15	432.82	429.67	431.06	429.77	432.38	430.60	431.25	NS	NS	
Benzene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	NS	NS	
bis (2-ethylhexyl)phthalate	6	3JB	1J	1JB	1JB	13 JB	6.1 B	ND(5.3)	12	ND(5.1)	1.6J*	10.8	NS	NS	DECOMMISSIONED
Trichloroethene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	NS	NS	
Toluene	1000	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	NS	NS	

WELL AP-7335
TOP OF CASING 456.25'
2' MONITORING WELL
SCREEN INTERVAL 34'-49'

	RAO	SEP97	NOV97	FEB98	MAY98	SEP98	MAR99	SEP99	FEB00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		431.56	430.62	430.14	432.19	432.19	429.84	431.51	430.05	432.59	430.83	431.47	432.71	436.67	438.47
Benzene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	ND(0.4)
bis (2-ethylhexyl)phthalate	6	2 JB	1 J	4 JB	1 JB	18.6*	ND(5.0)	ND(5.0)	2.8 J	2.1 J	ND(5.3)	2.2 JB	ND(1.08)	R	NA
Trichlororethene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)
Toluene	1000	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)

WELL AP-7336
TOP OF CASING 456.19'
2" MONITORING WELL
SCREEN INTERVAL 54'-70'

	RAO	SEP97	NOV97	FEB98	MAY98	SEP98	MAR99	SEP99	FEB00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		431.46	430.55	430.07	432.02	429.79	429.79	431.36	429.99	432.53	430.72	431.63	432.56	436.57	NS
Benzene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	NS
bis (2-ethylhexyl)phthalate	6	2 JB	2 JB	5 JB	5 JB	1.3 JB	ND(5.3)	ND(5.3)	1.8 J	ND(5.3)	ND(5.3)	ND(5.3)	0.384 J	R	NS
Trichloroethene	5	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS
Toluene	1000	NDA	NDA	NDA	NDA	NDA	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	NS

WELL AP-6407
TOP OF CASING 448.28'
2" MONITORING WELL
SCREEN INTERVAL 8'-18'

	RAO	JUL97	NOV97	APR98	OCT98	MAY99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		430.50	430.49	429.77	NR	NE	NE	NE	NE	NE	NE	NE	436.93	438.74
Benzene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(0.4)	ND(0.4)
bis (2-ethylhexyl)phthalate	6	NA	NA	NA	NA	NA	NA	NA	NA	ND(5.3)	ND(5.3)	ND(1.09)	R	NA
Trichloroethene	5	ND(1.0)	4	9	ND(1.0)	10.9	ND(1.0)	8.93	2.03	1.4J	4.1	2.95	2.28	1.55*
Toluene	1000	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(1.0)	ND(1.0)	ND(1.0)

WELL AP-6408
TOP OF CASING 453.54'
2" MONITORING WELL
SCREEN INTERVAL 8'-18'

	RAO	JUL97	NOV97	APR98	OCT98	MAY99	OCT99	MAY00	OCT00	APR01	NOV01	SEP02	MAY03	OCT03
Groundwater Elevation (feet msl)		431.22	431.37	430.56	NR	430.84	NR	431.53	433.01	431.36	431.92	433.22	437.00	438.80
Benzene	5	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(1.0)	ND(0.4)
bis (2-ethylhexyl)phthalate	6	NA	NA	NA	NA	NA	NA	NA	NA	ND(5.3)	4.9 B	0.353 J	R	NA
Trichloroethene	5	3	3	1	ND(1.0)	ND(1.0)	1.29	ND(1.0)	ND(1.0)	ND(2.0)	2.4	2.95	2.06	2.00
Toluene	1000	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(1.0)	ND(2.0)	ND(2.0)	ND(0.5)	ND(1.0)	ND(1.0)

LEGEND

- Monitoring Well Location
- Potable Water Source Location
- Metering Enclosure

NOTES

Well AP-6407 was cut down to flushmount between the April 1998 and May 1999 sampling episodes. No survey data was found for the elevation of the new top of casing.

Survey coordinates are in Alaska State Plane Coordinates (ASPC), Zone 3 (Z3). Datum is North American Vertical Datum (NAVD) '83.

Survey coordinates for May and October 2003 are expressed in NAVD '88.

TABLE LEGEND

Well No — Maximum Contaminant Level — Sampling Date

Top of Casing (feet above msl) → WELL AP- 451.25'
Well Diameter (inches) → 2"
Screened Interval (feet bgs) → 54'-70'
Groundwater Elevation (feet above msl) → GW Elev (msl)
Detected Analytes

	RAO	SEP97	NOV97	FEB98	MAY98	SEP98	MAR99	SEP99	FEB00	OCT00	APR01	NOV01
GW Elev (msl)		431.46	430.55	430.07	430.35	432.02	429.79	431.36	429.99	432.53	430.72	431.57
Benzene	5	2JB	2JB	5JB	5JB	1.3JB	ND	ND	1.8J	ND(1.5)	ND(5.3)	12B
bis(2-Ethylhexyl)phthalate	6	NS	NS	NS	NS	ND(10)	0.85JB	2.6JB*	ND(5)	ND(0.60)	ND(5.3)	ND(5.3)
Trichloroethene	5	NS	NS	NS	NS	NA	14	ND(2.0)	ND(2.0)	ND(0.13)	ND(2.0)	ND(2.0)
Toluene	1000	NS	NS	NS	NS	ND(5.0)	3.1JB	0.45J*	0.42J	ND(1.2)	ND(5.0)	ND(5.0)

Sample data in italics analyte concentration exceeds remedial action objective (RAO) taken from the Record of Decision for OU4 dated August 1996.

TABLE NOTES

B	Indicates that the compound was also detected in the method blank.
J	Indicates an estimated value below the PQL, but is greater than the Method Dectection Limit (MDL).
R	Indicates data rejected.
NS	Indicates that a groundwater sample was not collected because the well was either damaged. or removed from the monitoring program.
NA	Indicates that the compound was not analyzed.
NA*	Indicates that the compound was not analyzed because sample container broke.
ND	Indicates that the analyte was not detected, the PQL follows parenthetically.
NE	Not Established.
NR	Not Recorded.
*	Indicates that a primary and duplicate sample were taken, and that the reported number is the higher of the two results.

Units used in wells are measured in micrograms per liter (ug/L).

ARMY ENVIRONMENTAL CENTER | CORPS OF ENGINEERS ALASKA DISTRICT

Concentrations of Analytes in Groundwater at the Coal Storage Yard

Five Year Review
Operable Unit 4
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
NW, 2003 Annual Report	7-5	9/11

763AF

8 OPERABLE UNIT 5

8.1 OU5 Background

Operable Unit 5 (OU5) includes six source areas. Four source areas were identified for action in the ROD and are shown in Figure 8-1:

- Four sub-areas of the West Quartermaster's Fueling System (WQFS)
- East Quartermaster's Fueling System (EQFS)
- Remedial Area 1A, also called the Birch Hill Above-ground Storage Tanks
- Open Burning/Open Detonation (OB/OD)

Two source areas were recommended for no further action under the CERCLA:

- Former EOD Range (Blair Lakes Alpha Impact Area)
- Motor Pool Buildings

In addition, several petroleum-contaminated sites, including one WQFS subarea, have been and are being addressed in accordance with the 2-PTY. The list of OU5 source areas and their status is shown in Appendix H.

The ROD addresses remediation of WQFS subareas 1 through 4, the EQFS (Figure 8-1), and Remedial Area 1a (Figure 6-1). In addition, the OU5 ROD describes the Army's commitments to the Chena River Aquatic Assessment Program (CRAAP) and to ICs at all five OUs and commits to an IC program that includes a Standard Operating Procedure (SOP) for ensuring compliance with the ICs. The ROD also describes the status of the OB/OD area, which was determined to require no further action under CERCLA. However, since this site is located within the active small-arms impact range on Fort Wainwright, closure of this site was delayed. As described in the ROD, final closure will occur under the 1991 Federal Facility Compliance Agreement (FFCA) and RCRA, but evaluation of the decision to delay closure will be reviewed during each Five Year Review.

The OU5 Five-Year Review is thus organized into the following sections: WQFS, EQFS, Remedial Area 1A, Other ROD Requirements (Including the OB/OD range and CRAAP), and ICs.

8.2 WQFS

8.2.1 Overview

The WQFS area covers approximately 50 acres. The WQFS was divided into four subareas: WQFS1, WQFS2, WQFS3, and WQFS4 (Figure 8-2). Soils within WQFS4 are being addressed under the 2-PTY so were not included in remedial actions under OU5; however the groundwater beneath WQFS4 is being addressed in OU5.

The WQFS is located between Front Street and Gaffney Road. The area includes from the southeast boundary of the taxiway to the Chena River on the northern boundary. Groundwater sampling results prior to the RI in 1995 indicate DRO, GRO, chlorinated solvents, and benzene contamination. Soil investigations in 1994 identified contamination by fuels and chlorinated solvents related to past activities at the site. Sources of contamination included ASTs, USTs, and fuel pipelines. Most of the fuel tanks were removed in the 1980s and an 8-inch diameter pipeline was abandoned in place. Abandoned pipelines were cleaned and purged in 2000.

A fuel leak into the Chena River occurred near WQFS in 1980. The source was unknown, but the 8-inch pipeline along the north side of Gaffney Road was suspected. The Army dug a trench between Gaffney Road and the river (in the area of the current Sparge Curtain treatment system) to capture the spill, and installed sheet-metal retaining structure to prevent fuel migration to the river. However, sheens had been observed in the river below the retaining structure. In April 1998, about 700 cy of contaminated soil and the retaining structure were removed. The removal resulted in source reduction (soil and sediment) of free-product release to the Chena River.

A RI was completed at the WQFS in 1995. A treatability study was conducted from 1996 to 1998, which attempted to use ORC to enhance the rate of reduction of VOCs, but had limited success. An additional treatability study, using radio frequency and six-phase heating to heat soil and enhance biodegradation and volatilization was completed in 1999 with mixed success. Bench-scale tracer and biodegradation studies were also conducted to better understand the persistence of the contamination.

The OU5 ROD, signed in April 1999, identified the remedial actions for the WQFS as AS/SVE, potential *in-situ* soil heating in hot spots, operation of a downgradient air sparging curtain, groundwater monitoring, and monitored natural attenuation (MNA).

Subsurface soil samples were collected from the WQFS over the period of 1997 to 2002. The intent of these soil samples was to document the extent of the contaminants within the vadose zone of OU5 as part of earlier site studies. Subsurface soil samples were also collected from the Source Area (SA)and Horizontal Well (HWL) in WQFS1, and the Sparge Curtain (SC) in WQFS2, between 1997 and 2002 to document the efficacy of the three remediation systems installed at these sites. In 2009, soil investigation was completed using the UltraViolet Optical Screening Tool (UVOST) and collection of soil samples. The goal of the investigation was to delineate the horizontal and vertical extent of soil contamination remaining in the SA, HWL, and SC source areas.

8.2.2 Background

Periods of use and dates related to the history of WQFS contamination and remediation activities are included in Table 8-1.

Physical Characteristics

The WQFS is bordered to the north by a south trending meander of the Chena River, to the west by the ROLF, to the south by Taxiway 18, and to the east by the EQFS. The terrain is open tussock flats as the buildings have all been removed from the site. The WQFS is located within the 500-year floodplain of the Chena River. No endangered or threatened species reside in the area.

History of Contamination

Activities within the WQFS included vehicle and aircraft maintenance operations and the associated use and disposal of solvents and other cleaning and maintenance compounds. The WQFS also included USTs and ASTs, a pump house and fueling islands. Drains within the WQFS were connected to a wood-stave pipe that drained to the river. The underground fuel pipelines and a network of aboveground and buried fuel piping were abandoned in place. All pipelines were reported to be cleaned before they were abandoned. The primary sources of contaminants in groundwater at WQFS were from surface disposal of solvents, petroleum spills and leaks, and other past disposal practices.

Table 8-1. History of Regulatory Events at OU5 WQFS[a]

Event	Date
Industrial use including maintenance activities involving the use of solvents, POLs, pesticides, and other hazardous materials	1930s to 1960s
A leak of approximately 30,000 gallons of diesel fuel	1971
16,000 gallons of gasoline spilled	1971
Fuel leak of unknown origin into the Chena River	1980
Fort Wainwright NPL listed	August 1990
FFA signed	1992
2-PTY signed	1992
North Airfield groundwater investigation	1994
RI completed	1996
Initiation of WQFS1 Horizontal Well AS/SVE with Treatability Study	Spring 1997
Initial CRAAP investigations conducted	1997 / 1998
FS completed	1998
Proposed Plan for Remedial Action at OU5 finalized	June 1998
OU5 bench-scale column study initiated	January 1998
Initiation of soil heating AS/SVE Treatability Study at WQFS1	Spring 1998
Initiation of WQFS1 source area AS/SVE Treatability Study	Aug and Sept 1998
WQFS2 Sparge Curtain Treatability Study initiated	August 1998
OU5 ROD finalized	May 1999
WQFS3 AS/SVE Treatability Study initiated	August 2000
Draft 2000 Preliminary Draft Remedial Action Report (PDRAR) finalized	April 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Additional CRAAP investigation conducted	2002
Fort Wainwright Construction Complete Received from the EPA	2002
WQFS2 SVE and catalytic oxidizer shut down	January 2004
CRAAP investigations terminated by RPMs	2005
WQFS1, 3, and 4 AS/SVE systems shut down	November 2005
Rebound Study Performed on WQFS presently on-going	On-going
Second Fort Wainwright Five-Year Review Report finalized	September 2006

[a] Information compiled from the OU5 ROD; Draft OU5 PDRAR; and the Five-Year Review Report Document Log.

Land and Resource Use

Current land use for the WQFS is light industrial; current and future groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater. The closest residences to WQFS are about one mile

west. The residential area includes a school. Currently access to WQFS is unrestricted, and the area is used for recreational purposes and includes a bicycle trail. Access to the Chena River is unrestricted.

Pre-ROD Response

Removal or treatability studies completed prior to the ROD include the following:

- In WQFS3 several leaking drums of tarry substance exposed along the Chena River were removed in 1995; nine nearby buried drums and approximately 3 cy of contaminated soil were excavated in 1996
- In 1998 approximately 700 cy of contaminated soil and a sheet metal retaining structure was removed from WQFS2; an air sparging curtain was installed in this area to minimize contaminant movement into the Chena River
- Several treatability studies were initiated in the WQFS prior to the signing of the ROD for OU5, with the intent that effective technologies would be considered for incorporation into WQFS and EQFS remediation plan
- AS/SVE with Horizontal Wells - WQFS1
- Source Area AS/SVE - WQFS1
- *In-Situ* Soil Heating - WQFS1
- *In-Situ* ORC - WQFS2
- Bench-scale Column Study of Factors Limiting Bioremediation Rate

8.2.3 Remedy Selection

Nature of Contamination

Groundwater

Prior to the installation of the remediation system at the WQFS, groundwater contamination extended approximately 70 ft-bgs or 60 feet below the water table and the approximate extent of groundwater contamination was 43 acres. Initial investigations conducted at the WQFS revealed four groundwater plumes. Two free-product plumes (mostly jet fuel and diesel fuel) existed within the source area. The larger plume was about 4-1/2 acres and encompassed the area where the majority of fuel pumps, dispenser islands, and storage tanks were located. The smaller free-product plume extended about 600 feet southwest of Building 1599 and coincided with a bermed area around a possible fuel containment structure. A benzene plume covered about 25 acres. A plume of 1,2-DCA extended from the north of Front Street to the Chena River, overlapping the free-product and benzene plumes and extended to a depth of approximately 20 ft-bgs. DRO and GRO were also detected, but their extent was not defined.

Prior to the remediation systems being installed, light non-aqueous phase liquids (LNAPL) existed on the water table in the area influenced by releases from the WQFS. Contaminants reported in the groundwater at the WQFS included benzene, 1,2-DCA, toluene, and TCE in concentrations exceeding MCLs.

EDB had been detected in concentrations exceeding MCLs in groundwater samples from two locations in WQFS1. EDB had not been reported in the WQFS at the time of the ROD. EDB was subsequently included as a groundwater contaminant of concern.

Soil

Contaminants of concern at the WQFS affected approximately 150,600 cy of soil. Soil contamination in WQFS subareas is thought to be due to the following historical practices: in WQFS1 vehicle maintenance at former Building 1599 and leaks from former fuel storage and handling; in WQFS2 former ASTs and an eight-inch fuel pipeline that parallels Gaffney Road; and in WQFS3 a 6-inch wood-stave pipe through which diesel and gasoline were channeled during fuel releases in 1971 as well as possible drum storage or road-maintenance activities.

Soils in the WQFS contained BTEX, semi-volatile compounds (SVOCs), and petroleum hydrocarbons in concentrations greater than State and Federal cleanup guidelines.

Remedial Action Objectives

The ROD identified the following objectives for remediation of OU5:

Groundwater

- Restore groundwater to its beneficial uses within a reasonable time frame. Reduce or prevent further migration of contaminated groundwater from the source areas to the downgradient aquifer or surface water bodies that are closely hydrologically connected by achieving MCLs (where there are no nonzero maximum contaminant level goals [MCLGs]) and AWQS. For groundwater that is hydrologically connected to surface water, Alaska Water Quality Standards will apply for the following Fresh Water Uses: (I)(A) Water Supply; (I)(B) Water Recreation; and (I)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife.

- Ensure there is no risk to aquatic receptors through control of contaminant movement through the groundwater into the Chena River.

- Remove LNAPL to the extent practicable to eliminate film or sheen from groundwater.

- Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act MCLs, non-zero MCLGs, or the following AWQS for Fresh Water Uses: (I)(A) Water Supply; (I)(B) Water Recreation; and (I)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife.

Soil

- Prevent the migration to groundwater of soil contaminants that could result in groundwater contamination and exceedances of federal MCLs and nonzero maximum contaminant level goals (MCLGs) and to groundwater that is closely hydrogeologically connected to surface water (such as the Chena River) that could result in exceedances of AWQS in surface water.

Chena River Sediments

- Reduce sources of contaminant releases to the Chena River

Chena River Surface Water

- Meet Alaska Water Quality Standards for the following Fresh Water Uses: (1)(A) Water "J Supply; (1)(B) Water Recreation; and (1)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife
- Continue aquatic assessment

ARARs

The OU5 ROD cited the most significant ARARs for remedy selection at this site to be:

- Federal and state MCLs are relevant and appropriate for groundwater that is a potential drinking water source (40 CFR 141 and 18 AAC 80). These ARARs set the active remediation goals for groundwater; Alaska Water Quality Standards (18 AAC 70) are also applicable to surface water, sediment, and groundwater that is closely hydrologically connected to surface water
- Alaska oil pollution regulations (18 AAC 75) are applicable and require the cleanup of oil or hazardous material releases

Cleanup Goals

Based on the baseline risk assessment for projected land and resource use at the WQFS, the ROD adopted the following cleanup goals: Numeric values for the cleanup goals established in the RODs are summarized in Appendix C.

Groundwater

- Federal and state MCLs for 1,2-DCA, benzene, and toluene, and State of Alaska (18 AAC 75) cleanup levels for GRO, DRO, and residual range organics (RRO) were adopted as numeric cleanup goals for the WQFS. In addition, the ROD identified elimination of any sheen caused by floating petroleum product as a cleanup goal.
- The cleanup level for GRO in groundwater as presented in Table C of ADEC 18 AAC 75 changed in 2008 from 1,300 µg/L (as it was in 1999 at the time the ROD was signed) to 2,200 µg/L.
- The cleanup goals for groundwater hydraulically connected to the Chena River are the Alaska Water Quality Standards for total aromatic hydrocarbon (TAH) and total aqueous hydrocarbon (TaqH)

Soil

- The cleanup goal for soil in the WQFS is active remediation of soils until contaminant levels in groundwater are consistently below state and federal cleanup levels.

Chena River Sediments

- No concentrations of toxic substances or petroleum hydrocarbons and other contaminants in bottom sediments that cause deleterious effects to aquatic life, to be determined by benthic macroinvertebrate assessment
- Benthic macroinvertebrate assessment to establish baseline and to monitor aquatic biotic integrity through time

Chena River Surface Water

- TAH and TaqH.
- Eliminate petroleum hydrocarbon sheen
- Benthic macroinvertebrate assessment to establish baseline and to monitor aquatic biotic integrity over time
- Groundwater monitoring to assess reduction of contaminant releases to the Chena River

Selected Remedy

The ROD identified different remedial actions for the different subareas of the WQFS as described below.

WQFS1

- Operating an AS/SVE system to address solvent and petroleum contamination in the source-area soil and groundwater and the floating-product contamination. The source area AS/SVE system had been used to strip VOCs from groundwater and soil and to enhance biological degradation of contaminants in saturated- and vadose-zone soils. The SVE system included a catalytic oxidizer for off-gas treatment.
- Potential *in-situ* heating at hot spots was proposed as a method to increase the rate of remediation in comparison to source-area treatment without heating. In the event that AS was ineffective in achieving progressive reduction of the VOC and petroleum hydrocarbon concentrations in soils, *in-situ* soil heating had been proposed as a means to increase the movement of VOCs and make them easier to extract. Treatability studies involving radio-frequency soil heating and six-phase soil heating were initiated in WQFS1 to evaluate the potential to enhance performance of AS and SVE. However, after the ROD was signed it was determined that soil heating was not cost-effective for OU5.
- Establishing and maintaining ICs to ensure that until federal and state MCLs are attained, the groundwater will not be used as a potable water source. ICs include restrictions governing site access, onsite construction, and well development or placement. They will be necessary as long as hazardous substances remain onsite at levels that preclude unrestricted use. Current and future land use is industrial; current and future groundwater use is designated for residential use. Groundwater and land-use restrictions have been incorporated into the Fort Wainwright Master Plan.
- Monitoring of the natural attenuation of COCs in groundwater to track decreases in concentrations to below ARARs and achievement of MCLs. The possible

rebound of contaminant concentrations after operation of remediation technologies has ceased will also be monitored.

- Monitoring the performance of remedial treatment systems, as described above, to optimize treatment system effectiveness and efficiency through system modifications and/or enhancements as appropriate.
- Monitoring and evaluation of the selected remedy, including natural attenuation, to determine achievement of MCLs.
- Monitored natural attenuation for deep groundwater and areas not being actively treated within WQFS1.

WQFS2

- Installing an AS/SVE system to address solvent- and petroleum-contaminated hot spots in the soil and groundwater and floating-product contamination. The hot-spot AS/SVE system has been used to strip VOCs from groundwater and soil and to enhance biological degradation of contaminants in saturated- and vadose-zone soils. The SVE system included the use of a catalytic oxidizer for off-gas treatment.
- Continuing to operate a downgradient sparge curtain to intercept and remove dissolved-phase contaminants from the groundwater, thus minimizing potential impacts to the Chena River.
- Conducting groundwater monitoring to determine whether cleanup levels are achieved and maintained downgradient of the sparge curtain.
- Establishing and maintaining ICs to ensure that until federal and state MCLs are attained, the groundwater will not be used, except for activities undertaken to initiate the selected remedies detailed in this ROD. ICs include restrictions governing site access, onsite construction, and well development or placement. They will be necessary as long as hazardous substances remain onsite at levels that preclude unrestricted use. Current and future land use is industrial; current and future groundwater use is designated for residential use. Groundwater- and land-use restrictions will be incorporated into the Fort Wainwright Master Plan.
- Monitoring of the natural attenuation of COCs in groundwater to track decreases in concentrations to below ARARs and achievement of MCLs. The possible rebound of contaminant concentrations after operation of remediation technologies has ceased will also be monitored.
- Monitoring performance and optimized remedial treatment system effectiveness and efficiency through modifications and/or enhancements as appropriate.
- Monitoring and evaluation of the selected remedy, including natural attenuation, to determine achievement of MCLs.
- Monitoring natural attenuation for deep groundwater and areas not being actively treated within WQFS2.
- Installing a harbor boom downgradient of the sparge curtain to control contaminant releases into the Chena River.
- Conducting a pilot-scale ORC system.

WQFS3

- Installing AS/SVE wells to address solvent- and petroleum-contaminated hot spots in the soil and groundwater and floating-product contamination. The hot-spot AS/SVE system has been used to strip VOCs from groundwater and soil and to enhance biological degradation of contaminants in saturated- and vadose-zone soils. The SVE system included a catalytic oxidizer for off-gas treatment. AS and SVE wells were located in the contaminant hot spot.
- Establishing and maintaining ICs to ensure that until federal and state MCLs are attained, the groundwater will not be used, except for activities undertaken to initiate the selected remedies detailed in this ROD. ICs include restrictions governing site access, onsite construction, and well development or placement. They will be necessary as long as hazardous substances remain onsite at levels that preclude unrestricted use. Current and future land use is industrial; current and future groundwater use is designated for residential use. Groundwater- and land-use restrictions will be incorporated into the Fort Wainwright Master Plan.
- Monitoring of the natural attenuation of COCs in groundwater to track decreases in concentrations to below ARARs and achievement of MCLs. The possible rebound of contaminant concentrations after operation of remediation technologies has ceased will also be monitored.
- Monitoring the performance of remedial treatment systems as described above, to optimize treatment system effectiveness and efficiency through system modifications and/or enhancements as appropriate.
- Monitoring and evaluation of the selected remedy, including natural attenuation, to determine achievement of MCLs.
- Monitored natural attenuation for deep groundwater and areas not being actively treated within WQFS3.

8.2.4 Status of Remediation

The following description of the status of the WQFS remediation systems is based on the OU5 Annual Reports and Federal Facility Agreement Meeting minutes, which details the status of remediation systems at the WQFS.

Treatment Systems

Three remediation systems operated at the WQFS. The systems include: the Sparge Curtain (SC), Source Area (SA), and the Horizontal Well (HWL). All three systems consisted of AS/SVE with catalytic oxidation. A brief operational history of these three systems is presented herein describing the status of each system.

WQFS1

Horizontal Well AS/SVE System - The HWL AS/SVE system was selected as the remedial action for this site. The AS/SVE system, including a thermal/catalytic heater for off-gas treatment was installed in the spring of 1997 as a treatability study and was expanded by installing vertical AS probes and SVE probes in the summer of 1998. In 2001 the system was again expanded to 170 AS wells and 47 SVE wells (Figure 8-3). From startup in 1997 to November 2005, the HWL system removed approximately 275,000 pounds, or 137.5 tons, of petroleum hydrocarbons. Groundwater sampling results indicated a decreasing trend in

concentrations for COCs in the treatment zones, and VOC removal significantly declined in 2005. As a result, the HWL system was shut down in November 2005 to conduct a contaminant rebound study. An evaluation of soil contamination remaining in the HWL source area was completed using the UVOST and soil sampling in 2009. Several comparative borings were also completed. The investigation showed that the extent of soil contamination was similar to the extent identified during the RI, and that the primary COC remaining in the soil was DRO. The investigation also showed that a majority of the remaining soil contamination was associated with the smear zone and saturated zone.

Source Area AS/SVE - In the SA AS/SVE was selected as a remedial action. The SA field-scale system was installed in October 1998. The system consisted of nine SVE wells, four AS wells, and four passive vent wells. In 2001 the system was expanded to 123 AS wells and 21 SVE wells in three zones with a catalytic oxidizer. The treatment system removed approximately 162,000 pounds of VOCs from system startup in 1998 through September 2005. Similar to HWL, groundwater sampling results indicated a decreasing trend in concentrations for COCs in the treatment zones, and VOC removal significantly declined in 2005. As a result, the SA system was shut down in November 2005 to conduct a contaminant rebound study. An evaluation of soil contamination remaining in the SA source area was completed using the UVOST and soil sampling in 2009. Several comparative borings were also completed. The investigation showed that the extent of soil contamination was similar to the extent identified during the RI, and that the primary COC remaining in the soil was DRO. The investigation also showed that a majority of the remaining soil contamination was associated with the smear zone and saturated zone.

WQFS2

The Sparge Curtain (SC) system was installed in June 1998 and became operational that fall. The curtain intercepts and treats groundwater contaminants prior to migration into the Chena River. The SC consisted of four treatment zones (Figure 8-3). The SC system has operated continuously since startup in 2000, with some minor down times for system maintenance and electrical upgrades on Post. An ORC treatability study was evaluated in 1998 and determined not to be effective for this source area. The ORC wells were later decommissioned in 2001. The AS/SVE was augmented during the 2001 construction season to improve system performance and expand the area of treatment. In October 2002 the SC along the Chena River was redeveloped to increase sparging efficiency. In January 2004, due to diminishing contaminant recoveries, the SVE and catalytic oxidizer were shut down. Since that time, the only system running at the WQFS has been the AS associated with the SC along the river; however, the AS system was not operated for the last six months of 2010 because power was cut off to the system. However, because a boom was in place in the Chena River during part of the shutdown, because no rebound of contaminants was observed during the fall 2010 sampling event, because no violations of the water quality standards were observed, and because ICs are being implemented at this site the system is expected to still be protective.

A harbor boom was also installed in 1998 downgradient of the SC to control contaminant releases into the Chena. This boom has been effective and is currently still deployed during ice-free months between May and September. It was chosen as a component for the remedial action for this sub-area.

A UVOST investigation was completed during June 2009 in the SC source area to evaluate the nature and extent of soil contamination remaining at the site. The results of the investigation showed that soil contamination extended from the bank of the Chena River south towards Gaffney Road. The depth of the contamination corresponded with the previous excavation that was completed at the site. Soil contamination depths ranged from the smear zone and

saturated zone along the bank of the Chena River within the former excavation area, to some vadoze zone and smear zone/saturated zone contamination south of the excavation area.

WQFS3

An additional AS/SVE treatment zone was installed at WQFS3 in the latter half of 2000 and operation began in January 2001. The wells were connected to the WQFS2 blowers and off-gas treatment system, which was modified to operate in the catalytic mode prior to WQFS3 system start-up. The system was shut down in 2003 when benzene, the COC present, was reduced to below MCLs.

All WQFS Sub-Areas

Abandoned buried fuel lines in the WQFS were pigged, inerted, and capped in 2000. Several hundred feet of fuel lines were also excavated and removed in 2004 and 2005. All known pipelines have been removed and cleaned. However, in the case that any remaining pipelines are discovered, the Army has an ongoing project to identify and remove fuel from them.

Groundwater Monitoring and Natural Attenuation Evaluation

WQFS1

Semi-annual groundwater sampling was performed at the WQFS between 1999 and 2009 to monitor impacts to groundwater. In 2001 - 2002 sampling was completed from a groundwater network of 22 monitoring wells. In 2002 the number of wells sampled was increased to 43 wells. In 2003 and 2004, 27 monitoring wells were sampled as part of the groundwater monitoring program. Long-term monitoring optimization (LTMO) was completed for the WQFS1 sub-area using MAROS software in 2009. The LTMO analysis showed that the primary COC remaining above cleanup levels was DRO, and the dissolved DRO plume was stable. Based on these results, the number of wells sampled as part of the monitoring program was reduced to 17, and the frequency of sampling was reduced from semi-annual to annual for wells within the source area. Semi-annual sampling frequency was retained for wells along the Chena River. Data from groundwater sampling events through 2010 are summarized on Figure 8-4.

Groundwater monitoring between 2006 and 2010 following shutdown of the HWL and SA treatment systems showed limited rebound of EDB, benzene and GRO above cleanup levels. Between 2006 and 2009, EDB has been detected intermittently above the cleanup level in two wells, and GRO has been detected intermittently above the cleanup level in one well. Benzene has been consistently detected above the cleanup level in one well, but does not appear to be increasing. No other VOCs were measured above cleanup levels since the treatment system was shut down. DRO concentrations were above the cleanup level in most wells prior to treatment system shutdown, and although some increasing concentrations were observed between 2006 and 2007, DRO concentrations generally stabilized between 2007 and 2010. DRO is the primary COC remaining in groundwater above cleanup levels in the HWL and SA source areas.

As part of the natural attenuation and groundwater monitoring program, groundwater modeling was performed to compare the effects of treatment to what would be projected from natural attenuation and to estimate contaminant loading to the Chena River. This modeling assisted in

development of a Time to Cleanup Estimate[1] and in placement and sizing of "hot spot" treatment systems.

WQFS2

Semi-annual groundwater sampling is conducted in the WQFS2 sub-area to evaluate contaminant trends in the SC treatment system area. All wells sampled at the SC treatment area had GRO and benzene concentrations below RAGs during 2010 with the exception of benzene in one well that slightly exceeded RAG. TAH and TAqH concentrations in well AP-7729, located adjacent to the Chena River, indicate that groundwater downgradient of the SC treatment area meets Alaska Surface Water Criteria for petroleum hydrocarbons. Although DRO concentrations still exceed the cleanup goal in the two wells located furthest from the Chena River, the groundwater monitoring results in AP-6946 and AP-7662 demonstrate that contaminants have been significantly reduced in the SC area. DCA is the only other contaminant that has been detected above cleanup goals in SC wells; however, DCA has not been detected above cleanup levels since 1999. Data from groundwater sampling events through 2010 are summarized on Figure 8-4.

WQFS3

During the 2010 sampling event, DRO was detected at the cleanup level in AP-6882 for the first time since 2003. This well is outside of the zone of influence of the SC treatment system.

Institutional Controls

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. Appendix A also includes a map that shows the boundaries of all sites on Fort Wainwright where IC's are in effect.

No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit. Groundwater intrusion at this source area is also restricted subject to approval by DPW Environmental. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. There have been no violations of the IC policy to date

Site Inspection

A site inspection was conducted on May 13, 2011. The Sparge Curtain treatment system was operating and in good condition. All wells used for continued groundwater monitoring at the site are locked and in good condition. Photographs taken during the site inspection are included in Appendix D.

[1]The Time to Cleanup Estimate is a tool that uses a group of spreadsheets that predicts the effect of treatment and estimates the time required for the remediation of selected petroleum hydrocarbon factions (CH2M Hill 2000).

8.2.5 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

- Based on the status of remedial actions at the WQFS as reported in the Interim Remedial Action Report, the treatment systems have effectively removed VOCs from the soil, hot spots, and contaminated groundwater at the WQFS.
- Figure 8-4 summarizes the results of groundwater monitoring associated with these sites.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

- There are no known changes in exposure pathways or populations at risk.

Has Any other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

There is no other information calling the protectiveness of the remedy into question at this time.

Variances

Soil and groundwater sampling results through 2010 show that the SA and HWL treatment systems have been effective at achieving cleanup goals for the volatile COCs (GRO and VOCs) at the site. Sampling results show DRO contamination above cleanup levels remains in the groundwater. UVOST results and soil sampling results also show DRO contamination associated with the smear zone and saturated zone across the site.

The ROD specifies that active remediation of soils should continue until contaminant levels in groundwater are below state and federal MCLs. Much of the remaining DRO contamination is associated with the smear zone and saturated zone; therefore, conducting AS/SVE or bioventing is expected to have limited effectiveness on the DRO. Based on these results, non-operating WQFS treatment systems (Source Area and Horizontal Well) should be decommissioned.

The OU5 treatment systems were designed to operate year round. However, the Sparge Curtain treatment system only operated between January and the end of July 2010 due to power pole upgrades in the vicinity of the site. However, because a boom was in place in the Chena River during part of the shutdown, because no rebound of contaminants was observed during the fall 2010 sampling event, because no violations of the water quality standards were observed, and because ICs are being implemented at this site the system is expected to still be protective.

Recommendations and Follow-Up Actions

Recommendations and follow-up actions for the OU5 WQFS are shown in Table 8-2.

Table 8-2. Recommendations and Follow-Up Actions for OU5 WQFS

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Continue the operation of the sparge curtain and seasonal use of the boom along the Chena River.	U.S. Army	EPA, ADEC	On-going	No
Continue sampling monitoring wells within the HWL and SA source area annually, and wells associated with the Sparge Curtain and along the bank of the Chena River semi-annually.	U.S. Army	EPA, ADEC	On-going	No
Continue LTMO analysis on an annual basis.	U.S. Army	EPA, ADEC	On-going	No
Decommission the HWL and SA treatment systems	U.S. Army	EPA, ADEC	On-going	No
Complete additional soil and groundwater investigation to evaluate the extent of benzene remaining above cleanup levels in the HWL source area	U.S. Army	EPA, ADEC	On-going	No
Conduct additional evaluation of SC treatment system performance and potential contaminant migration into the Chena River	U.S. Army	EPA, ADEC	On-going	No
Notify EPA and DEC in a timely manner when systems are not operating	U.S. Army	EPA, ADEC	On-going	No

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2006 Five-Year Review for the WQFS are shown in Table 8-3.

Table 8-3. Response to Recommendations from 2006 Five-Year Review for OU5 WQFS

Recommendation/ Follow-Up Action from 2006 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Continue the operation of the sparge curtain and seasonal use of the boom along the Chena River.	The SC system continues to be operated year-round (with the exception of a six month shutdown in 2010); the Chena River boom is installed each summer when the river is free of ice.	U.S. Army	On-going	No
Continue sampling groundwater semi-annually. Wells within and downgradient of the HWL and SA treatment system will be sampled as part of a contaminant rebound / natural attenuation monitoring program.	Groundwater monitoring continues to be conducted at all WQFS sites; rebound studies have been conducted at both the SA and HWL sites.	U.S. Army	On-going	No

8.3 EQFS

8.3.1 Overview

The EQFS is located between Front Street and Gaffney Road (Figure 8-2). A benzene plume covered approximately 40 acres and may have extended under the Chena River in the past. The fueling system was supplied by an 8-inch diameter pipeline that connected the Birch Hill Tank Farm and the ROLF and was a suspected source of contamination. POL source removal was performed in 2000 and the pipeline was capped. This pipeline was pigged and cleaned and recapped in 2008. During an UST Release Investigation gasoline and diesel fuel groundwater contamination was encountered. Monitoring wells and microwells were installed surrounding this plume. In 1989 and 1992, an investigation showed both petroleum and solvent contamination in the soil and groundwater. In 1994, a comprehensive evaluation of the EQFS was conducted, which included installing groundwater probes, soil borings, and monitoring wells. The groundwater data identified several plumes (fuels and solvents), and the soil data identified solvent contamination, which was believed to have originated from surface disposal and undocumented spills. The RI/FS was conducted in 1995 and a report issued in 1996. Chosen alternatives for remedial action at the EQFS included operation of the AS/SVE, groundwater monitoring, and monitored natural attenuation.

As a result of the RI an AS/SVE system was installed and operated east of Building 1060 (1060E) as part of treatability study. This system was shut down when contaminant concentrations achieved cleanup goals. The system was refurbished and relocated to the west side of Building 1060 to reduce fuel contamination in that area. The system became operational at Building 1060 West (1060W) in late 2000. The AS/SVE system only operated for 72 hours before the granular activated carbon (GAC) used to treat the SVE off-gases became loaded with contaminants and the system was shut down. The SVE system was later equipped with an electric catalytic oxidizer to treat off-gases and operations resumed mid-October 2001 and continued until October 2005 when the system was shut down due to diminishing contaminant removal.

Natural attenuation and intrinsic remediation treatability studies are on-going at the EQFS. As stated for the WQFS, ICs are in place for all of OU5.

Background

Periods of use and dates related to the history of EQFS contamination and remediation are included in Table 8-4.

Table 8-4. History of Regulatory Events at OU5 EQFS[a]

Event	Date
Area used for vehicle storage and maintenance, dry cleaning, fuels testing, refueling, pesticide storage and mixing, and waste storage.	1970s
FFA signed	1992
2-PTY signed	1992
Building 1054 (one of Motor Pool buildings) transferred from OU1 to EQFS area of OU5	June 1994
Natural Attenuation Treatability Study initiated	September 1997
AS/SVE Treatability Study initiated at Building 1060 East	June 1994
OU5 ROD finalized	May 1999

Table 8-4. History of Regulatory Events at OU5 EQFS[a]

Event	Date
AS/SVE Treatability Study at Building 1060 East completed	September 2000
AS/SVE system installed at Building 1060 West site	August to December 2000
Final Intrinsic Remediation Evaluation report submitted	November 2000
Draft 2000 PDRAR finalized	April 2001
First Fort Wainwright Five-Year Review Report finalized	September 2001
Fort Wainwright Construction Complete Received from the EPA	2002
Building 1060 West AS/SVE system shut down	October 2005
Contaminant Rebound Study for the Building 1060 West AS/SVE system	On-going
Second Fort Wainwright Five-Year Review Report finalized	September 2006
Building 1060 West AS/SVE system decommissioned	August 2009

[a] Information compiled from the OU5 ROD; Draft OU5 PDRAR; and the Five-Year Review Report Document Log.

Physical Characteristics

The EQFS area covers approximately 40 acres between Taxiway 18 and the Chena River, and between Building 1579 to the southwest and Building 1054 to the northwest. The EQFS is located within the 500-year floodplain of the Chena River. No endangered or threatened species reside in the area.

History of Contamination

The EQFS has been used for vehicle storage and maintenance, dry cleaning, fuels testing, refueling, pesticide storage and mixing, and waste storage (for example, PCB containing transformers, chemicals, paints, oils, brake fluid, and solvents). The EQFS included USTs, ASTs, a pump house, fueling islands, and an eight-inch diameter fuel pipeline which was abandoned, but still in place. In addition, drains were connected to a wooden pipe that drained to the river. Solvents, pesticides, and petroleum contamination were found in groundwater beneath the EQFS. Suspected sources include spills and leaks from pipelines, fueling stations and undocumented spills.

Land and Resource Use

Current land use for EQFS is light industrial and the groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater contamination downgradient of the EQFS. The closest residences to EQFS are approximately ¼-mile northeast. Each residential area includes a school. Currently access to EQFS is unrestricted, and the area is used for recreational purposes and includes a bicycle trail. Access to the Chena River is unrestricted.

Pre-ROD Response

Two treatability studies were initiated at the EQFS prior to the signing of the ROD for OU5, with the intent that effective technologies would be considered for incorporation into remedial actions:

- AS/SVE at Building 1060 East
- Natural Attenuation Study

8.3.2 Remedy Selection

Nature of Contamination

Groundwater

The remedial investigation identified two groundwater contaminant plumes, one upgradient and one downgradient of Building 1565 containing benzene, EDB, 1,1,1-TCA, and TCE in concentrations exceeding MCLs; and bis(2-chloroethyl)ether in concentrations exceeding the concentration limit corresponding to 10^{-6} risk for residential use.

Floating petroleum hydrocarbon product was been observed on the water table in the area influenced by releases from the EQFS.

Soil

Soil contamination in this area has extended to the groundwater table and GRO was found in a localized area of smear zone soil. Free product, likely to be weathered gasoline, was also found at the EQFS south of Building 1060.

Remedial investigations found DRO, GRO, and xylenes exceeding ADEC cleanup guidelines in soils at the EQFS.

Remedial Action Objectives

The ROD identified the following objectives for remediation of OU5:

Groundwater

- Restore groundwater to its beneficial uses within a reasonable time frame. Reduce or prevent further migration of contaminated groundwater from the source areas to the downgradient aquifer or surface water bodies that are closely hydrologically connected by achieving MCLs (where there are no nonzero MCLGs) and AWQS. For groundwater that is hydrologically connected to surface water, AWQS will apply for the following Fresh Water Uses: (I)(A) Water Supply; (I)(B) Water Recreation; and (I)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife.
- Ensure there is no risk to aquatic receptors through control of contaminant movement through the groundwater into the Chena River.
- Remove LNAPL to the extent practicable to eliminate film or sheen from groundwater.
- Prevent use of groundwater containing contaminants at levels above Safe Drinking Water Act MCLs, nonzero MCLGs, or the following AWQS for Fresh Water Uses: (I)(A) Water Supply; (I)(B) Water Recreation; and (I)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife.

Soil

- Prevent the migration to groundwater of soil contaminants that could result in groundwater contamination and exceedances of federal MCLs and nonzero MCLGs and to groundwater that is closely hydrogeologically connected to surface water (such as the Chena River) that could result in exceedances of AWQS in surface water (EQFS and WQFS).

Chena River Sediments

- Reduce sources of contaminant releases to the Chena River

Chena River Surface Water

- Meet AWQS for the following Fresh Water Uses: (1)(A) Water "J Supply; (1)(B) Water Recreation; and (1)(C) Growth and Propagation of Fish, Shellfish, Other Aquatic Life, and Wildlife
- Continue aquatic assessment

ARARs

The OU5 ROD cited the most significant ARARs for remedy selection at this site to be:

- Federal and state MCLs are relevant and appropriate for groundwater that is a potential drinking water source (40 CFR 141 and 18 AAC 80). These ARARs set the active remediation goals for groundwater. AWQS (18 AAC 70) are also applicable to surface water, sediment, and groundwater that is closely hydrologically connected to surface water.
- Alaska oil pollution regulations (18 AAC 75) are applicable and require the cleanup of oil or hazardous material releases.

Cleanup Goals

Numeric values for the cleanup goals established in the RODs are summarized in Appendix C. Based on the baseline risk assessment for projected land and resource use at the WQFS, the ROD adopted the following cleanup goals:

Groundwater

Federal and state MCLs for 1,2-DCA, toluene, TCE, EDB; the 10^{-6} residential risk value for bis(2-chloroethyl)ether; and State of Alaska (18 AAC 75) cleanup levels for DRO, and RRO were adopted as numeric cleanup goals for the EQFS. In addition, the ROD identified elimination of any sheen caused by floating petroleum product as a cleanup goal for EQFS groundwater.

Soil

The cleanup goal for soil in the EQFS is active remediation until contaminant levels in groundwater are consistently below state and federal MCLs.

Chena River Sediments

- No concentrations of toxic substances or petroleum hydrocarbons and other contaminants in bottom sediments that cause deleterious effects to aquatic life, to be determined by benthic macroinvertebrate assessment
- Benthic macroinvertebrate assessment to establish baseline and to monitor aquatic biotic integrity through time

Chena River Surface Water

- TAH and TAqH
- Eliminate petroleum hydrocarbon sheen
- Benthic macroinvertebrate assessment to establish baseline and to monitor aquatic biotic integrity over time
- Groundwater monitoring to assess reduction of contaminant releases to the Chena River

Selected Remedy

- Continuing to operate the AS and SVE wells of the Building 1060 AS/SVE treatability study system to address solvent- and petroleum-contaminated hot spots in the soil and groundwater and floating-product contamination. The SVE system includes off-gas treatment.
- Long term monitoring of the natural attenuation of COCs in groundwater to track decreases in concentrations to below ARARs and achievement of MCLs. The possible rebound of contaminant concentrations after operation of remediation technologies has ceased is being monitored.
- Establishing and maintaining ICs to ensure that, until federal and state MCLs are attained, the groundwater will not be used, except for activities undertaken to initiate the selected remedies detailed in this ROD. ICs include restrictions governing site access, onsite construction, and well development or placement. They will be necessary as long as hazardous substances remain onsite at levels that preclude unrestricted use. Current and future land use is industrial; current and future groundwater use is designated for residential use. Land-use restrictions include limiting future land use to operations currently being conducted at the source area. Groundwater and land-use restrictions will be incorporated into the Fort Wainwright Master Plan.
- Monitoring and evaluation of the selected remedy, including natural attenuation, to determine achievement of MCLs
- Monitored natural attenuation for deep groundwater and areas were not actively treated within the EQFS.

8.3.3 Status of Remediation

Treatment Systems

An AS/SVE system operated on the east side of Building 1060 from 1994 to 2000, and groundwater MCLs have been achieved. This included a small TCE hot spot at the northeast corner of Building 1060 that was successfully treated by AS/SVE. AS/SVE was discontinued at the east side of Building 1060 in September 2000.

Groundwater contamination on the west side of Building 1060 was initially monitored for natural attenuation. An AS/SVE system with GAC off-gas treatment was installed to treat this source area and operation began in December 2000. The system operated for 72 hours before the GAC used to treat the SVE off-gases became loaded with contaminants. The system was shut down and equipped with an electric catalytic oxidizer. Operations resumed mid-October 2001 and ran until October 2005 when the system was shut down due to diminishing contaminant

removal. Initially, contaminant concentrations exceeded MCLs for benzene, DRO, EDB, and GRO in groundwater at this source area. At the time of treatment system shutdown in 2005 benzene, GRO and EDB were all below the MCLs in the four wells sampled. DRO concentrations remained variable, exceeding MCLs in 2 of 4 wells monitored in 2005. After the treatment system was shut down, a contaminant rebound study was initiated, including sampling for geochemical parameters to evaluate biodegradation.

Groundwater Monitoring and Natural Attenuation Studies

A natural attenuation treatability study for remediation of hot spots was started in September 1997. Sampling results identified groundwater contaminant concentrations to be below MCLs at the Building 1565 fueling operations hot spot and the 1,1,1-TCA spill area west of Building 1565, and greater than MCLs at the Avgas Pipeline hot spot.

The scope of the natural attenuation study, which became the selected remedy once the ROD signature was achieved, was for the deep groundwater and areas not actively treated within the EQFS. This monitoring included sampling in the few remaining flow paths (Flowpath A, Flowpath B, Flowpath C, Flowpath D, and the Apple Street Hot Spot). Groundwater monitoring frequency was reduced to a five-year cycle, and was most recently completed during 2010.

The results of the 2010 sampling event showed that COCs have been reduced below cleanup levels in Flowpath A, Flowpath B, Flowpath C, and the Apple Street Hot Spot. DRO above cleanup levels was detected in one well in Flowpath D. Contaminated soil was encountered during a paving project on the south side of Building 1565, and as a result, three wells were sampled in this area. The only COC identified above cleanup levels was DRO, and the exceedance was observed in one well.

Results of the contaminant rebound study conducted in the wells associated with the Building 1060 West treatment system showed that GRO and all VOCs have remained below cleanup levels since treatment system shutdown. DRO was detected above cleanup levels in one sample from one well in 2007, and in one sample from one well in 2010. This indicates that that contaminants were successfully treated to levels below the RAGs and that significant contaminant rebound has not occurred. Results of geochemical parameters indicate that there is sufficient electron acceptor capacity available to treat residual contamination.

Groundwater monitoring results from the EQFS flowpaths (Flowpath A, Flowpaths B and C, Flowpath D, and the Apple Street Hot Spot) are shown on Figures 8-5, 8-6, 8-7, and 8-8 respectively.

Institutional Controls

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. Appendix A also includes a map that shows the boundaries of all sites on Fort Wainwright where IC's are in effect.

No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit. Groundwater intrusion at this source area is also restricted subject to approval by DPW Environmental. ICs will remain in place as long as hazardous substances remain on site at levels that preclude unrestricted use. There have been no violations of the IC policy to date

Site Inspection

A site inspection was conducted on May 13, 2011. All wells used for continued groundwater monitoring at the site are locked and in good condition. The informational sign describing ICs was also in good condition. Photographs taken during the site inspection are included in Appendix D.

8.3.4 Five-Year Assessment

Are the Remedies Functioning as Intended by the Decision Document?

Remedies are generally functioning as intended.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

There are no known changes in exposure pathways or populations at risk.

Has Any other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

There is no other information calling the protectiveness of the remedy into question at this time.

Variances

No significant variances from the ROD have been noted to date.

Recommendations and Follow-Up Actions

Recommendations and follow-up actions for the OU5 EQFS are shown in Table 8-5.

Table 8-5. Recommendations and Follow-Up Actions for OU5 EQFS

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Discontinue groundwater sampling in Flowpath A, Flowpath B, Flowpath C, and the Apple Street Hot Spot wells and decommission wells.	U.S. Army	EPA, ADEC	2011	No
Continue groundwater sampling in specific wells associated with contamination found at Building 1565.	U.S. Army	EPA, ADEC	2011	No
Continue groundwater sampling in Flowpath D on a five-year frequency	U.S. Army	EPA, ADEC	2015	No

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2006 Five-Year Review for the EQFS are shown in Table 8-6.

Table 8-6. Response to Recommendations from 2006 Five-Year Review for OU5 EQFS

Recommendation/ Follow-Up Action from 2006 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
The AS/SVE remediation system installed at Bldg 1060 has functioned as intended and COC concentrations in the groundwater have decreased. Groundwater sampling will continue biannually.	Groundwater monitoring indicates that the AS/SVE system at Bldg 1060W was successful in remediating the groundwater contamination at the site. The system was decommissioned in 2009.	U.S. Army	2009	No

8.4 Remedial Area 1A – Birch Hill Above Ground Storage Tanks

8.4.1 Overview

This source area, referred to as Remedial Area 1a, is located on Birch Hill in the northwest corner of Fort Wainwright (Figure 6-1). As part of the OU3 ROD, the Birch Hill Tank Farm area was divided into two areas: Remedial Area 1a, which dealt with the lead-contaminated soils surrounding the ASTs on Birch Hill; and Remedial Areas 1b, which dealt with the fuel contamination from the tanks, as well as several other sub-areas in the Birch Hill area. In order to provide more time to select appropriate cleanup goals and remedies for the lead-contaminated soils, Remedial Area 1a was transferred to OU5. -

Remedial Area 1a covers an area of approximately 110 acres. There are sixteen ASTs on Birch Hill and the associated underground pipeline system. The chosen alternative in the ROD, signed in April 1999, consists of ICs. The entire area is fenced and signs are in place; the fence is inspected annually to ensure its integrity.

8.4.2 Background

Remedial Area 1a, also known as the Birch Hill Tank Farm, is located in the northwest corner of Fort Wainwright. The tank farm was constructed in 1943 beginning with the installation of fourteen 10,000 barrel bolted steel ASTs (301 through 314). In 1957 two 25,000 barrel and two 2,250 barrel welded steel ASTs (315 through 318) were installed. The ASTs are surrounded by containment berms constructed of compacted glacial sands and gravels with a berm drain on the down slope side. In January 1994, the Tank Farm was permanently closed. A closure letter was submitted to ADEC stating that all tanks, facility piping, and fuel handling appurtenances were purged of fuel and cleaned. It also states that the piping was disconnected and flanged off from the tanks and filled with nitrogen.

Periods of use and dates related to the history of the Birch Hill Tank Farm contamination and remediation are included in Table 8-7.

Table 8-7. History of Regulatory Events at Birch Hill Tank Farm[a]

Event	Date
Fort Wainwright NPL listed	August 1990
FFA signed	March 1992
Remedial Investigation and Risk Assessment Reports submitted	October 1994
Feasibility Study submitted	April 1995
Proposed Plan submitted	April 1995
Record of Decision signed	January 1996, Revised April 1996
Remedial Design/Remedial Action Scope of Work submitted	February 1996
Design Analysis 35 percent Design submitted	April 1996
AS/SVE remediation systems installed at Building 1173 and Lazelle Road	Summer 1996
Design Analysis 60 percent Design submitted	May 1997
Lazelle Road system relocated to the Truck Fill Stand and the Building 1173 system expanded to cover Lazelle Road source area.	1997
Product recovery treatability studies initiated at the Birch Hill Tank Farm.	1998
Remedial Action Work Plan submitted	October 1998
Thaw Channel treatment system installed	1999
Product Recovery treatment system installed	2000
Preliminary Draft Remedial Action Report submitted	May 2001
First Five-Year Review signed	September 2001
Explanation of Significant Differences signed	September 2002
Interim Remedial Action Report submitted	September 2002
Fort Wainwright Construction Complete Received from the EPA	2002
Second Five-Year Review signed	September 2006

[a] Information obtained from the OU5 ROD; Groundwater Extraction and Treatment Effectiveness Review (Oct. 2000); OU5, 1999 Monitoring Report

Physical Characteristics

The ground in the vicinity of the ASTs is almost entirely covered with vegetation. The elevation of Birch Hill ranges from 441 feet to 748 feet above mean sea level. No permanent surface water bodies are located on Birch Hill, but snow and ice melt water accumulate in the depressions and in the diked areas around the ASTs. No endangered or threatened species reside in the area.

History of Contamination

The soil surrounding the tanks is contaminated with lead, petroleum, and related constituents. Surface soil lead contamination may be the result of several historical tank maintenance activities, including tank bolt removal and replacement, cleaning sludge from the tank bottoms, and tank painting and stripping. Historically, bolts removed from the tanks during routine maintenance were cleaned with solvent to remove red lead pipe dope. The solvent, which contained lead from the pipe dope, was spread on the ground in areas surrounding the tanks.

Since the majority of tanks were built as bolted tanks, numerous bolts are present. Sludge removed from the fuel tanks was buried or spread in the areas surrounding the tanks and may have also contributed to lead contamination in the surface soil. Painting and stripping of the tanks may have resulted in lead-contaminated paint chips in the nearby soil. Additionally, spills of fuels containing lead may have occurred throughout the tank farm's history, because the bolted steel tanks were subject to leaks.

Land and Resource Use

Land use at Remedial Area 1a is light industrial. The site is fenced to prevent entry and subsequent exposure to soils within the source area. Groundwater use is considered residential because water supply wells for the City of Fairbanks are located in the same unconfined aquifer as groundwater contamination downgradient of the source area.

8.4.3 Remedy Selection

Nature of Contamination

Soil

Remedial investigations in this area found lead and petroleum hydrocarbons in surface and subsurface soils, with the most significant levels within the bermed areas around the ASTs, decreasing with depth and distance from the tanks. Petroleum hydrocarbons (quantified as Jet A fuel) were detected in surface and subsurface soil at a maximum concentration of 5,500 mg/kg. Low levels of VOCs also were detected.

Lead was detected in all soil samples that were collected. The lead concentrations ranged from 6.81 mg/kg to 14,500 mg/kg with an arithmetic mean concentration of 2,600 mg/kg. The highest lead concentrations were detected in surface soils near the base of the older tanks, and generally decreased at increasing distances away from the base of the tanks. No correlation was found between the sample direction (north, south, east or west) within the tank berm and the lead contamination. Lead was not detected above the cleanup levels at any of the new tank locations. Lead was also not detected above the cleanup levels at any of the subsurface locations. Lead concentrations exceeded the residential and industrial cleanup levels in the surface soil at each of the older tank locations. Nearly all of the surface soil samples collected from the 2, 5, and 10-foot radii distance locations at the older tank exceeded 1,000 mg/kg. Approximately 43 percent of the older tank surface samples from the 15-foot radius distance exceeded 1,000 mg/kg, and 60 percent exceeded 400 mg/kg. None of the samples from the 20-foot radius distance locations exceeded the cleanup levels. Lead was the only inorganic analyte above screening levels and was determined to be the only COC for Remedial Area 1a under OU5.

Remedial Action Objectives

The RAOs for Remedial Area 1a are the same as those for the WQFS plus an additional objective for soil:

- Limit human health and terrestrial receptor exposure to lead-contaminated soil

ARARs

- There are no specific ARARs for the Remedial Area 1a
- To Be Considered (TBC) information for Remedial Area 1a addressing interim lead soil guidance and preliminary remediation goals is included in the ROD on Page 111

Cleanup Goals

Soil

- No direct contact for total lead concentration greater than 1,000 mg/kg

Selected Remedy

Institutional Controls

The selected remedy for this site is ICs, which include land use restrictions, signage, and maintaining the existing fence. This remedy controls exposure and eliminates potential risk to human health and the environment.

8.4.4 Status of Remediation

Institutional Controls

Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. Details of the IC policy are discussed in Appendix A. Appendix A also includes a map that shows the boundaries of all sites on Fort Wainwright where IC's are in effect.

An investigation was conducted in 2005. Soil samples were collected from around the tanks and compared to cleanup criteria. The results indicated that no changes to the ICs or remedy are required.

Land use restrictions have been incorporated into the Fort Wainwright master plan and GIS. Repairs are required to the fence surrounding the Birch Hill Tank Farm in order to fully comply with ICs at this site.

Site Inspection

A site inspection was conducted on May 14, 2011. FES employees walked the perimeter of the Birch Hill Tank Farm fence line. "No trespassing" signs were observed at intervals along the fence line. Several areas where the fence had been breached were also observed. In at least three areas, the fence had been cut or pulled back to create an opening large enough for people, and in one area, ATVs, to enter the site. Graffiti was also observed on one of the warning signs and on two tanks within the tank farm. Photographs taken during the site inspection are included in Appendix D.

8.4.5 Five-Year Assessment

The OU5 ROD specified that sites that have waste left in place are subject to additional requirements under the five-year review. These requirements were identified as specifically applicable to Remedial Area 1a where natural attenuation is not projected to occur. These requirements are as follows:

- Collection and evaluation of all new lead-risk information and risk-assessment approaches for evaluating lead risks recommended by the state, EPA, or Army. This new information may result in a human health risk assessment for lead exposure being conducted for Remedial Area 1a.
- Collection and evaluation of current Army, EPA, and state regulations and policies on remediation of lead in soils, keeping in mind that total lead values at Remedial Area 1a reflect commingling of releases from numerous lead sources.

- Any other new information, draft or otherwise, or considerations relevant to an assessment of protectiveness for Remedial Area 1a.

The Army has collected and evaluated information, regulations and policies regarding lead in industrial soils published since the OU5 ROD signature. No new information that would affect human health or ecological decisions for Remedial Area 1a has been identified.

Are the Remedies Functioning as Intended by the Decision Document?

Yes – However, continued security and repairs to the fence are required for ICs to effectively prevent access to the contaminated soil areas.

Are the Assumptions Used at the Time of Remedy Selection Still Valid?

There are no known changes in exposure pathways or populations at risk.

Has Any other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

There is no other information calling the protectiveness of the remedy into question at this time.

An investigation was conducted in 2005. Soil samples were collected from around the tanks and compared to cleanup criteria. The results indicated that no changes to the ICs or remedy are required. Additionally, the remedy for lead in soils remains protective even though the cleanup level has changed from 1,000 mg/kg to 800 mg/kg.

Variances

There are no known variances affecting the protectiveness of the remedy at this location.

Recommendations and Follow-Up Actions

Recommendations and follow-up actions for Remedial Area 1A are shown in Table 8-8.

Table 8-8. Recommendations and Follow-Up Actions for Remedial Area 1A

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Increase security and repair the Birch Hill Tank Farm Fence.	U.S. Army	EPA, ADEC	2011	Possibly

8.5 Other OU5 ROD Requirements

8.5.1 OB/OD Evaluation

The ROD specified that no less often than during the CERCLA five-year reviews, the Army will evaluate the OB/OD area. This evaluation will include review of the active range and any unexploded ordnance (UXO) within the OB/OD area and range, to determine whether ICs to restrict land use and protect human health and the environment are sufficient. The Army also

will evaluate the status of RCRA rules and regulations for military munitions ranges and UXO to determine whether additional RCRA requirements must be met.

The Army's evaluation indicates that ICs for the OB/OD area remain protective. No new RCRA or munitions' rules have been promulgated specific to post-closure procedures for former OB/OD areas. The Army has evaluated whether delay of closure affects the OB/OD area and has determined it has not, because the range has not been closed and Fort Wainwright remains an active installation. Therefore the selected remedy remains protective.

8.5.2 Chena River Aquatic Assessment Program (CRAAP)

The CRAAP is a component of the selected remedies for OU5 source areas, and is not considered a source area in and of itself. As such, general response actions were not included in the OU5 ROD for Chena River sediment or surface water. Through the source area remedial investigation process, the Chena River was identified as the area most likely to be affected by multiple source area releases at Fort Wainwright, with the greatest potential for impact from the WQFS and EQFS.

The CRAAP was established to determine if impacts to the river had occurred from Fort Wainwright releases and to measure anticipated improvements in water and sediment quality over time, based on the effectiveness of selected remedies for the EQFS and WQFS areas. This program has provided information for optimizing treatment system operation. The program to date has consisted of sampling and analysis of surface water, sediments, and detritus (organic leaf litter); benthic macro-invertebrate toxicological studies and bioassays; and calculating reductions in contaminant load into the Chena River. The original aquatic assessment was performed in 1997 and 1998 and in earlier sampling where PAHs were found at concentrations exceeding sediment quality benchmarks downstream from the Former Retaining Structure. Additional study was performed in the 2002 CRAAP.

Major components of the assessment program were described as:

- Spring and fall collection of water, sediment, and detritus samples and analysis for contaminants of concern and water chemistry.
- Benthic macroinvertebrate study, including bioassay and toxicological analysis.
- Data collection (water quality, contaminant concentrations, contaminant loading and ecological conditions) and study of changes in aquatic organisms as a function of reduction in contaminant load into the river.
- Consider possible remedial actions if further evaluation of impacts to the river shows unacceptable risks to aquatic organisms.

The RPMs determined in the second Five Year Review that this program is no longer required and by signature of that document the program was discontinued.

8.6 Institutional Controls

ICs are a component of the selected remedy for WQFS, EQFS, and Remedial Area 1a. In addition, the OU5 ROD established a comprehensive site wide approach to ICs at the Fort Wainwright NPL site for all source areas where the respective RODs specified ICs as an element of remediation. A detailed discussion of the Fort Wainwright ICs policy is provided in Appendix A including:

- IC commitments in OU5 ROD
- Status and updates to the IC program
- Current IC policy (updated in 2010)
- Current IC Standard Operation Procedures (SOPs)
- A discussion of instances confirming the effectiveness of the IC policy *(will be included in the Final Five Year Review Report)*
- Maps showing the boundaries of all sites on Fort Wainwright where IC's are in effect

Recommendations and Follow-Up Actions

Recommendations and follow-up actions for the IC program are shown in Table 8-9 (and Table A-3 in Appendix A).

Table 8-9. Recommendations and Follow-Up Actions

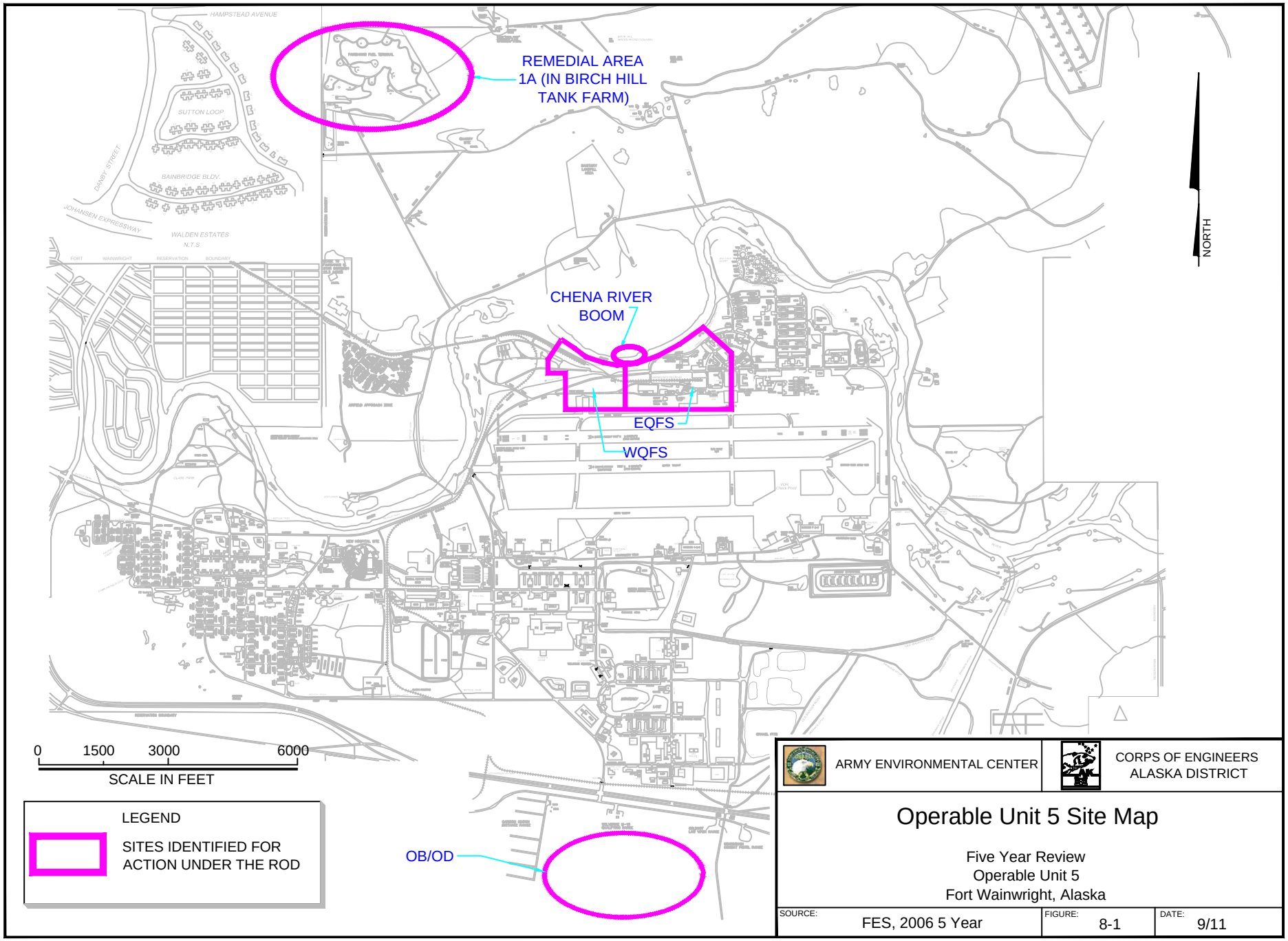
Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Perform post-wide IC inspection and evaluate protectiveness. Update restricted use boundaries in GIS as new information becomes available.	U.S. Army	EPA, ADEC	Ongoing	No
Develop the parameters for Annual Reporting of IC effectiveness and corrective actions taken.	U.S. Army	EPA, ADEC	Spring 2012	No

Response to Previous Recommendations

The actions taken in response to the recommendations from the 2006 Five-Year Review for the ICs are shown in Table 8-10.

Table 8-10. Response to Recommendations from 2006 Five-Year Review for IC Program

Recommendation/ Follow-Up Action from 2006 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
Perform post-wide IC inspection and evaluate protectiveness. Update restricted use boundaries in GIS as new information becomes available.	IC inspections are conducted on an on-going basis. The IC database was updated in May 2011 and may be accessed through the DPW GIS system.	U.S. Army	On-going	No
Make SOP coverage more inclusive (i.e., apply to tenants)	USARAK IC SOPs were updated in 2009. Army Garrison Policy #49 provides specific procedures applicable to Fort Wainwright. Additional information is provided in Appendix A .	U.S. Army	On-going	No
Update IC Policy	IC Policy was updated December 2010.	U.S. Army	2010	No


REMEDIAL AREA
1A (IN BIRCH HILL
TANK FARM)
CHENA RIVER
BOOM
EQFS
WQFS
OB/OD
NORTH
0
1500
3000
6000
SCALE IN FEET
LEGEND
SITES IDENTIFIED FOR
ACTION UNDER THE ROD
ARMY ENVIRONMENTAL CENTER
CORPS OF ENGINEERS
ALASKA DISTRICT
Operable Unit 5 Site Map
Five Year Review
Operable Unit 5
Fort Wainwright, Alaska
SOURCE:
FES, 2006 5 Year
FIGURE:
8-1
DATE:
9/11

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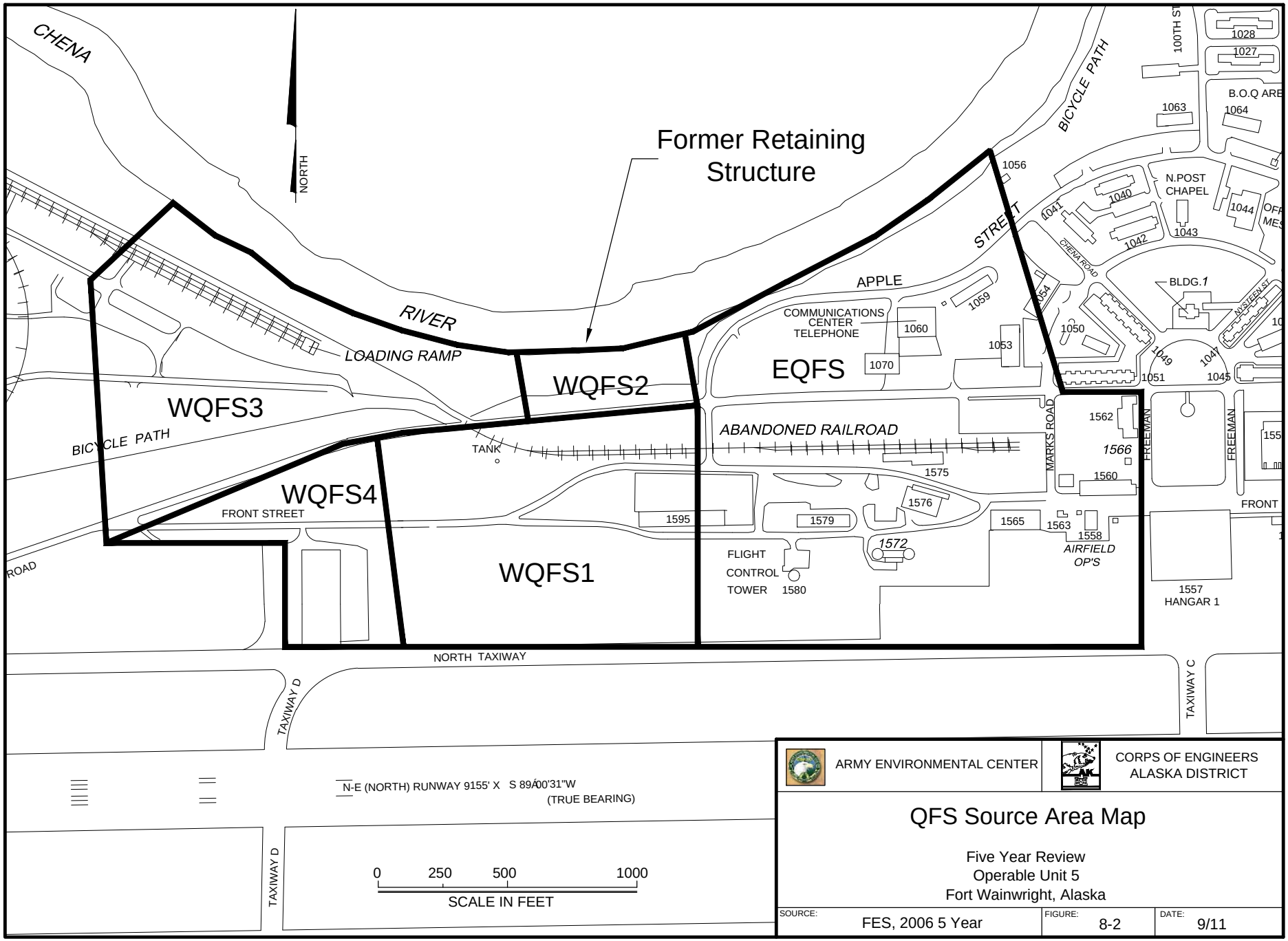

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ALASKA DISTRICT

QFS Source Area Map

Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
FES, 2006 5 Year	8-2	9/11

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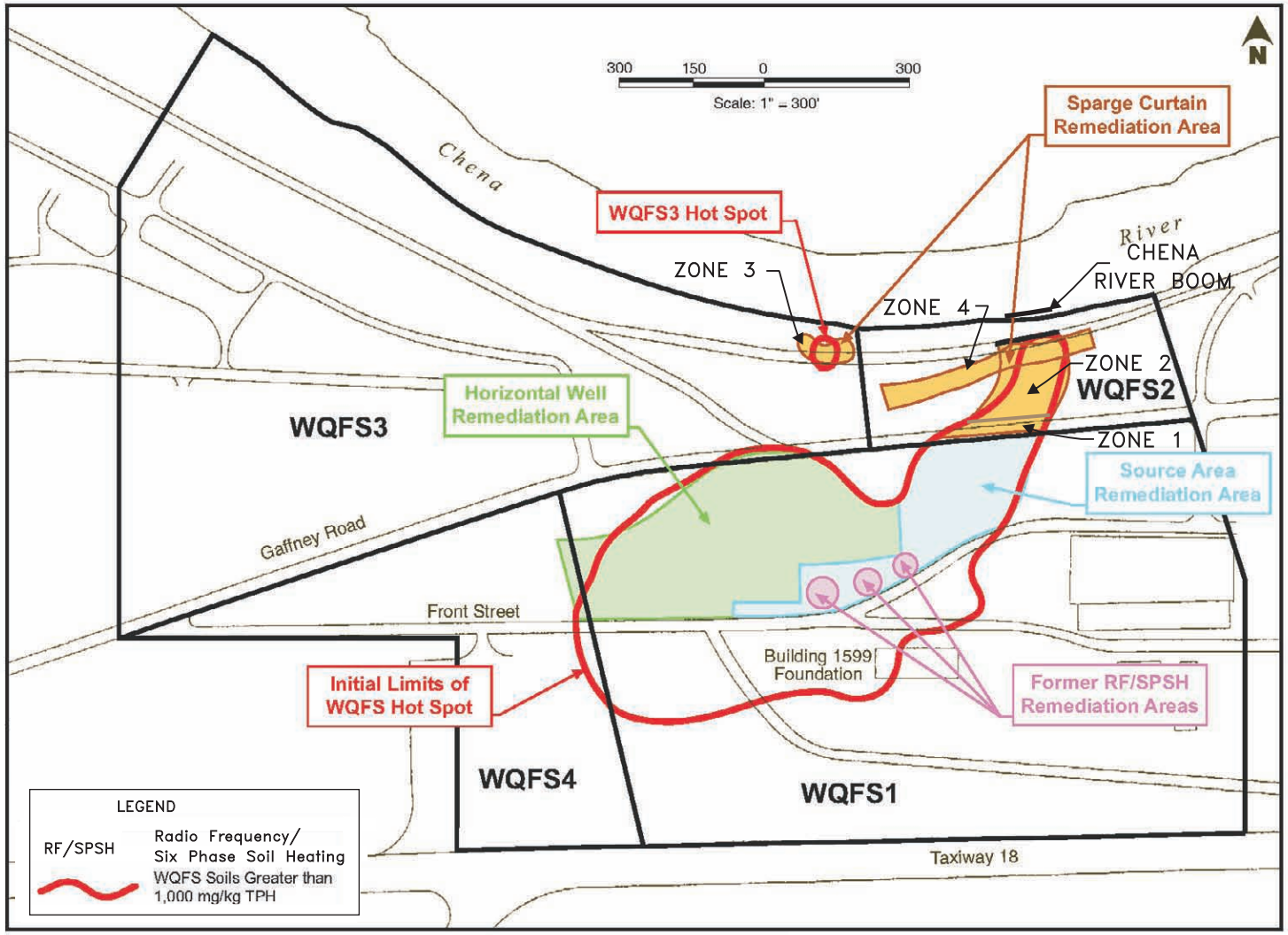

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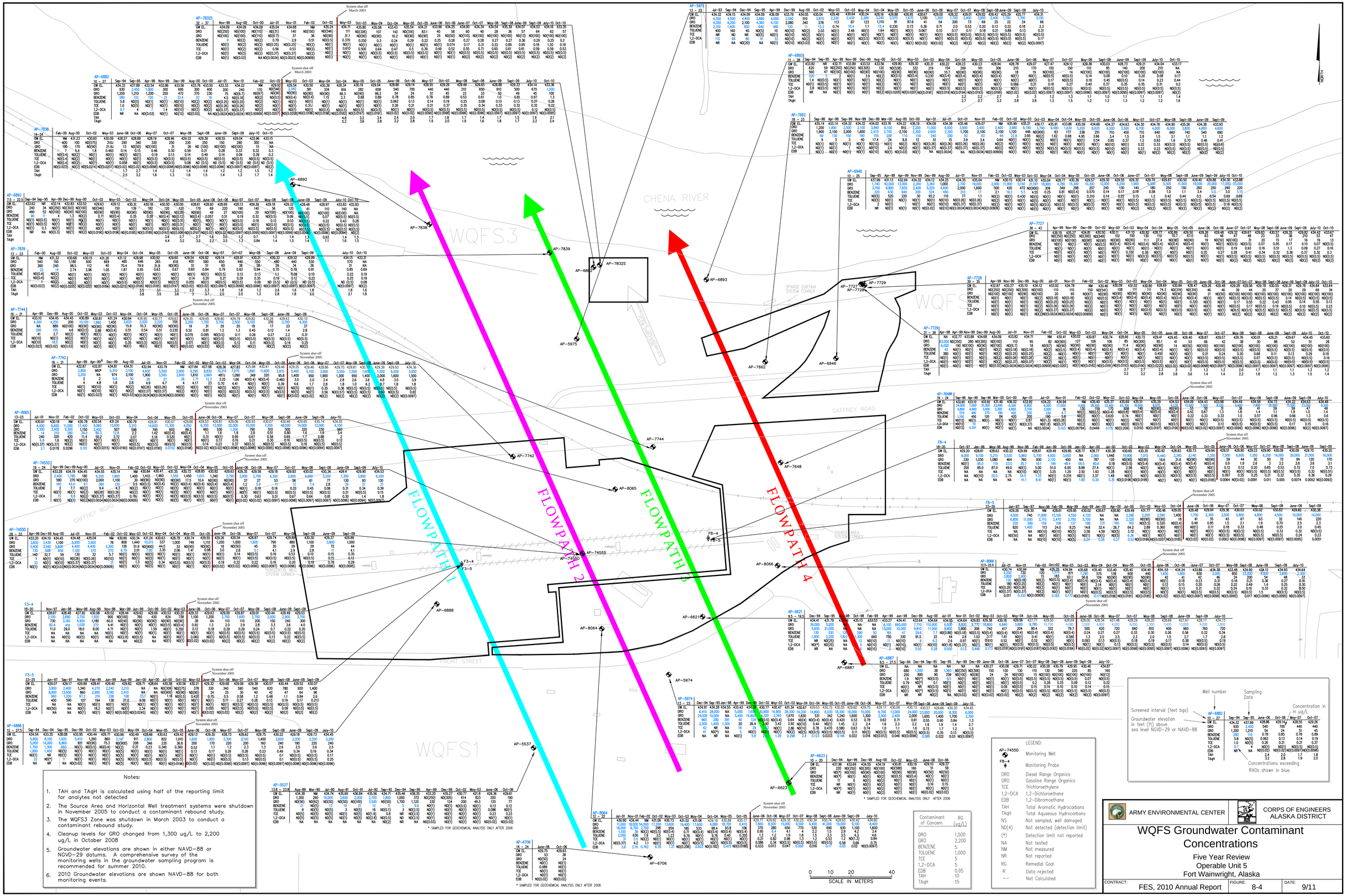
OU5 Remediation Systems

Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

SOURCE:	FIGURE:	DATE:
CH2MHILL, 2003 CLOSES	8-3	9/11

203C



Notes:

1. TAH and TAqH is calculated using half of the reporting limit for analytes not detected
2. The Source Area and Horizontal Well treatment systems were shutdown in November 2005 to conduct a contaminant rebound study.
3. The WQFS3 Zone was shutdown in March 2003 to conduct a contaminant rebound study.
4. Cleanup levels for GRO changed from 1,300 ug/L to 2,200 ug/L in October 2008
5. Groundwater elevations are shown in either NAVD-88 or NGVD-29 datums. A comprehensive survey of the monitoring wells in the groundwater sampling program is recommended for summer 2010.
6. 2010 Groundwater elevations are shown NAVD-88 for both monitoring events.

Well number — AP-6882

Sampling Date — 10 - 27

Screened interval (feet bgs)

Groundwater elevation in feet (ft) above sea level NGVD-29 or NAVD-88

Concentration in ug/L

	AP-6882
GW EL.	434.32
DRO	930
GRO	1,200
BENZENE	25
TOLUENE	5.8
TCE	1.0
1,2-DCA	0.7
EDB	NR
TAH	2.4
TAqH	2.5

Concentrations exceeding RAOs shown in blue.

LEGEND:

AP-7455D — Monitoring Well

F8-4 — Monitoring Probe

DRO — Diesel Range Organics
GRO — Gasoline Range Organics
TCE — Trichloroethylene
1,2-DCA — 1,2-Dichloroethane
EDB — 1,2-Dibromoethane
TAH — Total Aromatic Hydrocarbons
TAqH — Total Aqueous Hydrocarbons
NS — Not sampled, well damaged
ND(4) — Not detected (detection limit)
(*) — Detection limit not reported
NA — Not tested
NM — Not measured
NR — Not reported
RG — Remedial Goal
R — Data rejected
-- — Not Calculated

* SAMPLED FOR GEOCHEMICAL ANALYSIS ONLY AFTER 2006

Contaminant of Concern	RG (ug/L)
DRO	1,500
GRO	2,200
BENZENE	5
TOLUENE	1,000
TCE	5
1,2-DCA	5
EDB	0.05
TAH	10
TAqH	15

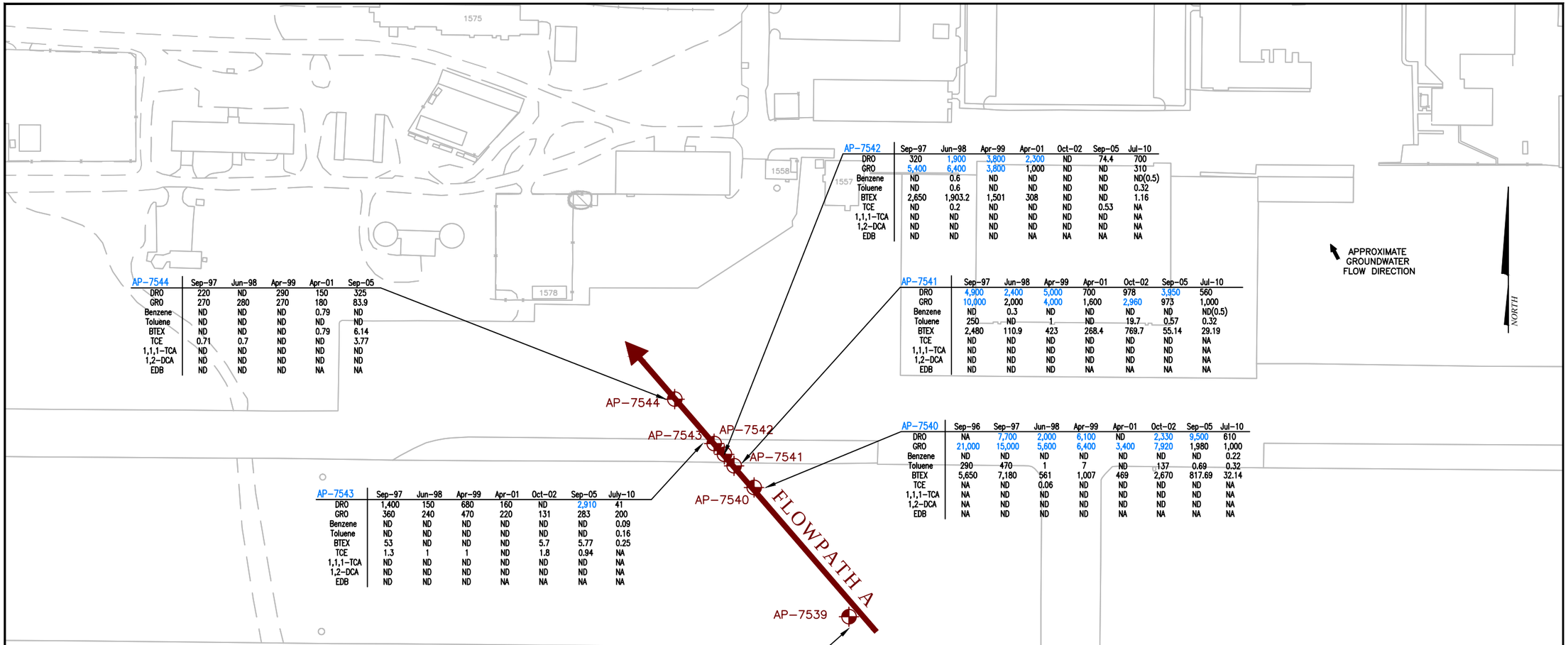
ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS ALASKA DISTRICT

WQFS Groundwater Contaminant Concentrations

Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
FES, 2010 Annual Report	8-4	9/11



AP-7542	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	Jul-10
DRO	320	1,900	3,800	2,300	ND	74.4	700
GRO	5,400	6,400	3,800	1,000	ND	ND	310
Benzene	ND	0.6	ND	ND	ND	ND	ND(0.5)
Toluene	ND	0.6	ND	ND	ND	ND	0.32
BTEX	2,650	1,903.2	1,501	308	ND	ND	1.16
TCE	ND	0.2	ND	ND	ND	0.53	NA
1,1,1-TCA	ND	ND	ND	ND	ND	ND	NA
1,2-DCA	ND	ND	ND	ND	ND	ND	NA
EDB	ND	ND	ND	NA	NA	NA	NA

AP-7544	Sep-97	Jun-98	Apr-99	Apr-01	Sep-05
DRO	220	ND	290	150	325
GRO	270	280	270	180	83.9
Benzene	ND	ND	ND	0.79	ND
Toluene	ND	ND	ND	ND	ND
BTEX	ND	ND	ND	0.79	6.14
TCE	0.71	0.7	ND	ND	3.77
1,1,1-TCA	ND	ND	ND	ND	ND
1,2-DCA	ND	ND	ND	ND	ND
EDB	ND	ND	ND	NA	NA

AP-7541	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	Jul-10
DRO	4,900	2,400	5,000	700	978	3,950	560
GRO	10,000	2,000	4,000	1,600	2,960	973	1,000
Benzene	ND	0.3	ND	ND	ND	ND	ND(0.5)
Toluene	250	ND	1	ND	19.7	0.57	0.32
BTEX	2,480	110.9	423	268.4	769.7	55.14	29.19
TCE	ND	ND	ND	ND	ND	ND	NA
1,1,1-TCA	ND	ND	ND	ND	ND	ND	NA
1,2-DCA	ND	ND	ND	ND	ND	ND	NA
EDB	ND	ND	ND	NA	NA	NA	NA

AP-7540	Sep-96	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	Jul-10
DRO	NA	7,700	2,000	6,100	ND	2,330	9,500	610
GRO	21,000	15,000	5,600	6,400	3,400	7,920	1,980	1,000
Benzene	ND	ND	ND	ND	ND	ND	ND	0.22
Toluene	290	470	1	7	ND	137	0.69	0.32
BTEX	5,650	7,180	561	1,007	469	2,670	817.69	32.14
TCE	NA	ND	0.06	ND	ND	ND	ND	NA
1,1,1-TCA	NA	ND	ND	ND	ND	ND	ND	NA
1,2-DCA	NA	ND	ND	ND	ND	ND	ND	NA
EDB	NA	ND	ND	ND	NA	NA	NA	NA

AP-7543	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	July-10
DRO	1,400	150	680	160	ND	2,910	41
GRO	360	240	470	220	131	283	200
Benzene	ND	ND	ND	ND	ND	ND	0.09
Toluene	ND	ND	ND	ND	ND	ND	0.16
BTEX	53	ND	ND	ND	5.7	5.77	0.25
TCE	1.3	1	1	ND	1.8	0.94	NA
1,1,1-TCA	ND	ND	ND	ND	ND	ND	NA
1,2-DCA	ND	ND	ND	ND	ND	ND	NA
EDB	ND	ND	ND	NA	NA	NA	NA

AP-7539	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	Jul-10
DRO	120	ND	ND	ND	ND	77.9	40
GRO	ND	ND	ND	ND	ND	ND	ND(100)
Benzene	ND	ND	ND	ND	ND	ND	ND(0.5)
Toluene	ND	ND	ND	ND	ND	ND	0.19
BTEX	ND	ND	ND	ND	ND	1.03	0.19
TCE	ND	0.2	ND	ND	ND	ND	NA
1,1,1-TCA	ND	ND	ND	ND	ND	ND	NA
1,2-DCA	ND	ND	ND	ND	ND	ND	NA
EDB	ND	ND	ND	NA	NA	NA	NA

LEGEND:

AP-7544	Monitoring Well
BTEX	Benzene, toluene, ethylbenzene, xylenes
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
TCE	Trichloroethylene
1,1,1-TCA	1,1,1-Trichloroethane
1,2-DCA	1,2-Dichloroethane
EDB	1,2-Dibromoethane
NA	Not analyzed
ND(0.5)	Not detected (detection limit)
µg/L	Micrograms per Liter
--	Not Calculated

NOTES:

Cleanup levels for GRO changed from 1,300 µg/L to 2,200 µg/L in October 2008.

Contaminant of Concern	RAO ug/L
DRO	1,500
GRO	2,200
BENZENE	5
TOLUENE	1,000
TCE	5
1,2-DCA	5
1,1,1-TCA	200
EDB	0.05

KEY:

Well number

Sampling Date

AP-7540	Sep-96	Sep-97	Jun-98
DRO	NA	7,700	2,000
GRO	21,000	15,000	5,600
Benzene	ND	ND	ND
Toluene	290	470	1
BTEX	5,650	7,180	561
TCE	NA	ND	0.06
1,1,1-TCA	NA	ND	ND
1,2-DCA	NA	ND	ND
EDB	NA	ND	ND

Concentration in ug/L

Concentrations exceeding RAOs shown in blue.

0 25 50 100

SCALE IN METERS

ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS ALASKA DISTRICT

EQFS Flowpath A Groundwater Contaminant Concentrations

Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
FES, 2010 Annual Report	8-5	9/11

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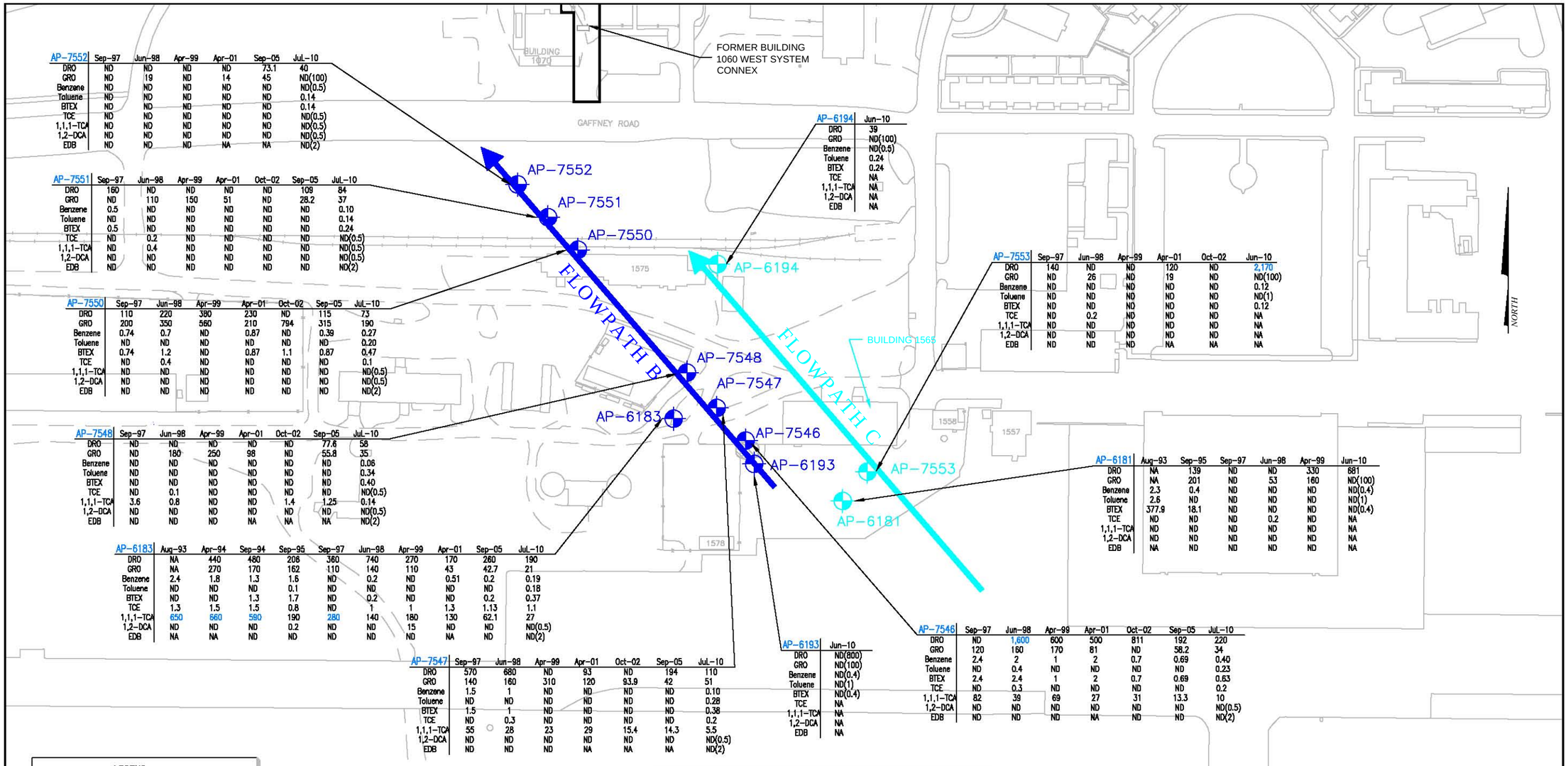

AP-7552	Sep-97	Jun-98	Apr-99	Apr-01	Sep-05	Jul-10
DRO	ND	ND	ND	ND	73.1	40
GRO	ND	19	ND	14	45	ND(100)
Benzene	ND	ND	ND	ND	ND	ND(0.5)
Toluene	ND	ND	ND	ND	ND	0.14
BTEX	ND	ND	ND	ND	ND	0.14
TCE	ND	ND	ND	ND	ND	ND(0.5)
1,1,1-TCA	ND	ND	ND	ND	ND	ND(0.5)
1,2-DCA	ND	ND	ND	ND	ND	ND(0.5)
EDB	ND	ND	ND	NA	NA	ND(2)

AP-7551	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	Jul-10
DRO	160	ND	ND	ND	ND	109	84
GRO	ND	110	150	51	ND	28.2	37
Benzene	0.5	ND	ND	ND	ND	ND	0.10
Toluene	ND	ND	ND	ND	ND	ND	0.14
BTEX	0.5	ND	ND	ND	ND	ND	0.24
TCE	ND	0.2	ND	ND	ND	ND	ND(0.5)
1,1,1-TCA	ND	0.4	ND	ND	ND	ND	ND(0.5)
1,2-DCA	ND	ND	ND	ND	ND	ND	ND(0.5)
EDB	ND	ND	ND	ND	ND	ND	ND(2)

AP-7550	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	Jul-10
DRO	110	220	380	230	ND	115	73
GRO	200	350	560	210	794	315	190
Benzene	0.74	0.7	ND	0.87	ND	0.39	0.27
Toluene	ND	ND	ND	ND	ND	ND	0.20
BTEX	0.74	1.2	ND	0.87	1.1	0.87	0.47
TCE	ND	0.4	ND	ND	ND	ND	0.1
1,1,1-TCA	ND	ND	ND	ND	ND	ND	ND(0.5)
1,2-DCA	ND	ND	ND	ND	ND	ND	ND(0.5)
EDB	ND	ND	ND	ND	ND	ND	ND(2)

AP-7548	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	Jul-10
DRO	ND	ND	ND	ND	ND	77.6	58
GRO	ND	180	250	98	ND	55.8	35
Benzene	ND	ND	ND	ND	ND	ND	0.06
Toluene	ND	ND	ND	ND	ND	ND	0.34
BTEX	ND	ND	ND	ND	ND	ND	0.40
TCE	ND	0.1	ND	ND	ND	ND	ND(0.5)
1,1,1-TCA	3.6	0.8	ND	ND	1.4	1.25	0.14
1,2-DCA	ND	ND	ND	ND	ND	ND	ND(0.5)
EDB	ND	ND	ND	NA	NA	NA	ND(2)

AP-6183	Aug-93	Apr-94	Sep-94	Sep-95	Sep-97	Jun-98	Apr-99	Apr-01	Sep-05	Jul-10
DRO	NA	440	480	206	360	740	270	170	260	190
GRO	NA	270	170	162	110	140	110	43	42.7	21
Benzene	2.4	1.8	1.3	1.6	ND	0.2	ND	0.51	0.2	0.19
Toluene	ND	ND	ND	0.1	ND	ND	ND	ND	ND	0.18
BTEX	ND	ND	1.3	1.7	ND	0.2	ND	ND	0.2	0.37
TCE	1.3	1.5	1.5	0.8	ND	1	1	1.3	1.13	1.1
1,1,1-TCA	650	660	590	190	280	140	180	130	62.1	27
1,2-DCA	ND	ND	ND	0.2	ND	ND	15	ND	ND	ND(0.5)
EDB	NA	NA	ND	ND	ND	ND	ND	NA	ND	ND(2)

AP-7547	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	Jul-10
DRO	570	680	ND	93	ND	194	110
GRO	140	160	310	120	93.9	42	51
Benzene	1.5	1	ND	ND	ND	ND	0.10
Toluene	ND	ND	ND	ND	ND	ND	0.28
BTEX	1.5	1	ND	ND	ND	ND	0.38
TCE	ND	0.3	ND	ND	ND	ND	0.2
1,1,1-TCA	55	28	23	29	15.4	14.3	5.5
1,2-DCA	ND	ND	ND	ND	ND	ND	ND(0.5)
EDB	ND	ND	ND	NA	NA	NA	ND(2)

AP-6194	Jun-10
DRO	39
GRO	ND(100)
Benzene	ND(0.5)
Toluene	0.24
BTEX	0.24
TCE	NA
1,1,1-TCA	NA
1,2-DCA	NA
EDB	NA

AP-6193	Jun-10
DRO	ND(800)
GRO	ND(100)
Benzene	ND(0.4)
Toluene	ND(1)
BTEX	ND(0.4)
TCE	NA
1,1,1-TCA	NA
1,2-DCA	NA
EDB	NA

AP-7553	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Jun-10
DRO	140	ND	ND	120	ND	2,170
GRO	ND	26	ND	19	ND	ND(100)
Benzene	ND	ND	ND	ND	ND	0.12
Toluene	ND	ND	ND	ND	ND	ND(1)
BTEX	ND	ND	ND	ND	ND	0.12
TCE	ND	0.2	ND	ND	ND	NA
1,1,1-TCA	ND	ND	ND	ND	ND	NA
1,2-DCA	ND	ND	ND	ND	ND	NA
EDB	ND	ND	ND	NA	NA	NA

AP-6181	Aug-93	Sep-95	Sep-97	Jun-98	Apr-99	Jun-10
DRO	NA	139	ND	ND	330	681
GRO	NA	201	ND	53	160	ND(100)
Benzene	2.3	0.4	ND	ND	ND	ND(0.4)
Toluene	2.6	ND	ND	ND	ND	ND(1)
BTEX	377.9	18.1	ND	ND	ND	ND(0.4)
TCE	ND	ND	ND	0.2	ND	NA
1,1,1-TCA	ND	ND	ND	ND	ND	NA
1,2-DCA	ND	ND	ND	ND	ND	NA
EDB	NA	ND	ND	ND	ND	NA

AP-7546	Sep-97	Jun-98	Apr-99	Apr-01	Oct-02	Sep-05	Jul-10
DRO	ND	1,600	600	500	811	192	220
GRO	120	160	170	81	ND	58.2	34
Benzene	2.4	2	1	2	0.7	0.69	0.40
Toluene	ND	0.4	ND	ND	ND	ND	0.23
BTEX	2.4	2.4	1	2	0.7	0.69	0.63
TCE	ND	0.3	ND	ND	ND	ND	0.2
1,1,1-TCA	82	39	69	27	31	13.3	10
1,2-DCA	ND	ND	ND	ND	ND	ND	ND(0.5)
EDB	ND	ND	ND	NA	ND	ND	ND(2)

LEGEND:

AP-7544	Monitoring Well
BTEX	Benzene, toluene, ethylbenzene, xylenes
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
TCE	Trichloroethylene
1,1,1-TCA	1,1,1-Trichloroethane
1,2-DCA	1,2-Dichloroethane
EDB	1,2-Dibromoethane
NA	Not analyzed
ND(0.5)	Not detected (detection limit)
µg/L	Micrograms per Liter
--	Not Calculated

NOTES:

Cleanup levels for GRO changed from 1,300 µg/L to 2,200 µg/L in October 2008.

Contaminant of Concern	RAO ug/L
DRO	1,500
GRO	2,200
BENZENE	5
TOLUENE	1,000
TCE	5
1,2-DCA	5
1,1,1-TCA	200
EDB	0.05

KEY:

Well number

Sampling Date

AP-6183	Aug-93	Apr-94	Sep-94
DRO	NA	440	480
GRO	NA	270	170
Benzene	2.4	1.8	1.3
Toluene	ND	ND	ND
BTEX	ND	ND	1.3
TCE	1.3	1.5	1.5
1,1,1-TCA	650	660	590
1,2-DCA	ND	ND	ND
EDB	NA	NA	ND

Concentration in ug/L

Concentrations exceeding RAOs shown in blue.

ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS ALASKA DISTRICT

EQFS Flowpaths B and C Groundwater Contaminant Concentrations

Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
FES, 2010 Annual Report	8-6	9/11

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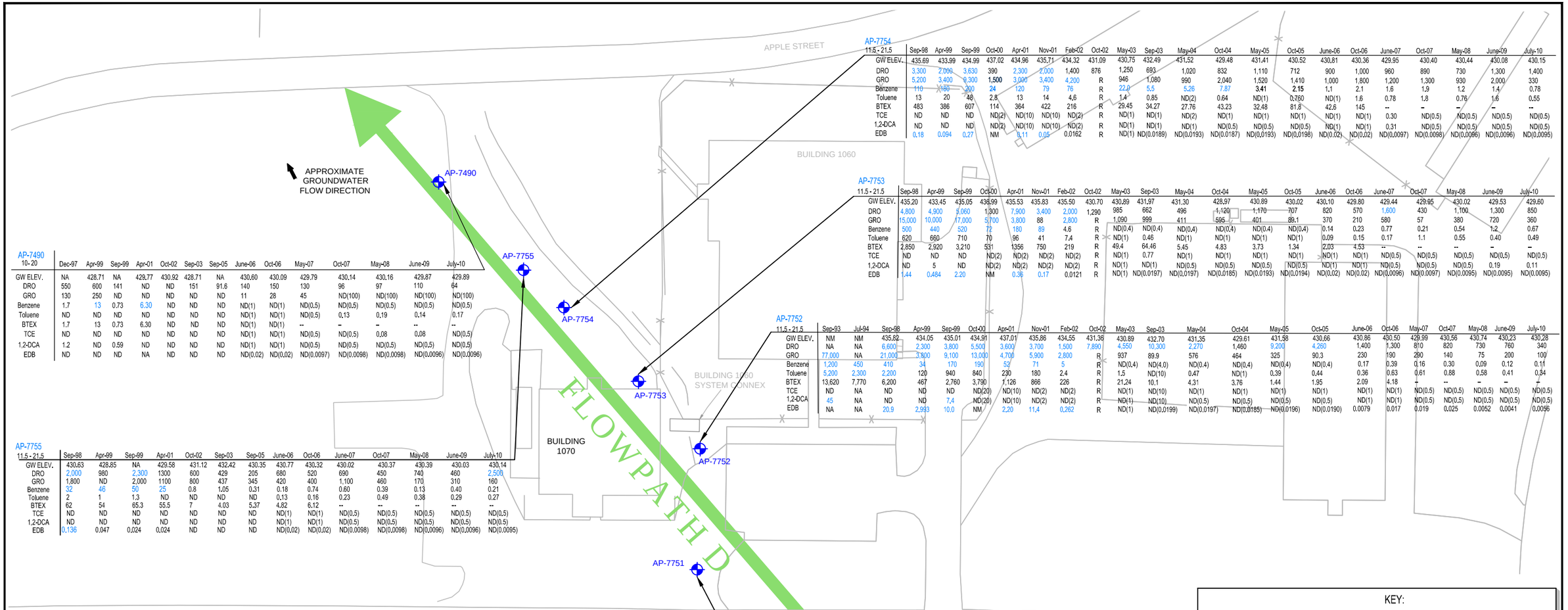

AP-7754

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05	June-06	Oct-06	June-07	Oct-07	May-08	June-09	July-10
GW ELEV.	435.69	433.99	434.99	437.02	434.96	435.71	434.32	431.09	430.75	432.49	431.52	429.48	431.41	430.52	430.81	430.36	429.95	430.40	430.44	430.08	430.15
DRO	3,300	2,000	3,630	390	2,300	2,000	1,400	876	1,250	693	1,020	832	1,110	712	900	1,000	960	890	730	1,300	1,400
GRO	5,200	3,400	9,300	1,500	3,000	3,400	4,200	R	946	1,080	990	2,040	1,520	1,410	1,000	1,800	1,200	1,300	930	2,000	330
Benzene	110	180	200	24	120	79	76	R	22.0	5.5	5.26	7.87	3.41	2.15	1.1	2.1	1.6	1.9	1.2	1.4	0.78
Toluene	13	20	48	2.8	13	14	4.6	R	1.4	0.85	ND(2)	0.64	ND(1)	0.760	ND(1)	1.6	0.78	1.8	0.76	1.6	0.55
BTEX	483	386	607	114	364	422	216	R	29.45	34.27	27.76	43.23	32.48	81.8	42.6	145	--	--	--	--	--
TCE	ND	ND	ND	ND(2)	ND(10)	ND(10)	ND(2)	R	ND(1)	ND(1)	ND(2)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.30	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
1,2-DCA	ND	ND	ND	ND(2)	ND(10)	ND(10)	ND(2)	R	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	0.31	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
EDB	0.18	0.094	0.27	NM	0.11	0.05	0.0162	R	ND(1)	ND(0.0189)	ND(0.0193)	ND(0.0187)	ND(0.0193)	ND(0.0198)	ND(0.02)	ND(0.02)	ND(0.0097)	ND(0.0098)	ND(0.0096)	ND(0.0096)	ND(0.0095)

AP-7753

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05	June-06	Oct-06	June-07	Oct-07	May-08	June-09	July-10
GW ELEV.	435.20	433.45	435.05	436.99	435.53	435.83	435.50	430.70	430.89	431.97	431.30	428.97	430.89	430.02	430.10	429.80	429.44	429.95	430.02	429.53	429.60
DRO	4,800	4,900	5,060	1,300	7,900	3,400	2,000	1,290	985	662	496	1,120	1,170	707	820	570	1,600	430	1,100	1,300	850
GRO	15,000	10,000	17,000	5,700	3,800	88	2,800	R	1,090	999	411	595	401	89.1	370	210	580	57	380	720	360
Benzene	500	440	520	72	180	89	4.6	R	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	0.14	0.23	0.77	0.21	0.54	1.2	0.67
Toluene	620	660	710	70	96	41	7.4	R	ND(1)	0.46	ND(1)	ND(1)	ND(1)	ND(1)	0.09	0.15	0.17	1.1	0.55	0.40	0.49
BTEX	2,850	2,920	3,210	531	1356	750	219	R	49.4	64.46	5.45	4.83	3.73	1.34	2.03	4.53	--	--	--	--	--
TCE	ND	ND	ND	ND(2)	ND(2)	ND(2)	ND(2)	R	ND(1)	0.77	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
1,2-DCA	ND	5	ND	ND(2)	ND(2)	ND(2)	ND(2)	R	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	0.19	0.11
EDB	1.44	0.484	2.20	NM	0.36	0.17	0.0121	R	ND(1)	ND(0.0197)	ND(0.0197)	ND(0.0185)	ND(0.0193)	ND(0.0194)	ND(0.02)	ND(0.02)	ND(0.0096)	ND(0.0097)	ND(0.0095)	ND(0.0095)	ND(0.0095)

AP-7752

11.5 - 21.5	Sep-93	Jul-94	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05	June-06	Oct-06	May-07	Oct-07	May-08	June-09	July-10
GW ELEV.	NM	NM	435.82	434.05	435.01	434.91	437.01	435.86	434.55	431.36	430.89	432.70	431.35	429.61	431.58	430.66	430.86	430.50	429.99	430.56	430.74	430.23	430.28
DRO	NA	NA	6,600	2,300	3,800	5,500	3,600	3,700	1,500	7,890	4,550	10,300	2,270	1,460	9,200	4,260	1,400	1,300	810	820	730	760	340
GRO	77,000	NA	21,000	3,800	9,100	13,000	4,700	5,900	2,800	R	937	89.9	576	464	325	90.3	230	190	290	140	75	200	100
Benzene	1,200	450	410	34	170	190	52	71	5	R	ND(0.4)	ND(4.0)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	0.17	0.39	0.16	0.30	0.09	0.12	0.11
Toluene	5,200	2,300	2,200	120	940	840	230	180	2.4	R	1.5	ND(10)	0.47	ND(1)	0.39	0.44	0.36	0.63	0.61	0.88	0.58	0.41	0.34
BTEX	13,620	7,770	6,200	467	2,760	3,790	1,126	866	226	R	21.24	10.1	4.31	3.76	1.44	1.95	2.09	4.18	+	--	--	--	+
TCE	ND	NA	ND	ND	ND	ND(20)	ND(10)	ND(2)	ND(2)	R	ND(1)	ND(10)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
1,2-DCA	45	NA	ND	ND	7.4	ND(20)	ND(10)	ND(2)	ND(2)	R	ND(1)	ND(10)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
EDB	NA	NA	20.9	2.993	10.0	NM	2.20	11.4	0.262	R	ND(1)	ND(0.0199)	ND(0.0197)	ND(0.0185)	ND(0.0196)	ND(0.0190)	0.0079	0.017	0.019	0.025	0.0052	0.0041	0.0056

AP-7490

10- 20	Dec-97	Apr-99	Sep-99	Apr-01	Oct-02	Sep-03	Sep-05	June-06	Oct-06	May-07	Oct-07	May-08	June-09	July-10
GW ELEV.	NA	428.71	NA	429.77	430.92	428.71	NA	430.60	430.09	429.79	430.14	430.16	429.87	429.89
DRO	550	600	141	ND	ND	151	91.6	140	150	130	96	97	110	64
GRO	130	250	ND	ND	ND	ND	ND	11	28	45	ND(100)	ND(100)	ND(100)	ND(100)
Benzene	1.7	13	0.73	6.30	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
Toluene	ND	ND	ND	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	0.13	0.19	0.14	0.17
BTEX	1.7	13	0.73	6.30	ND	ND	ND	ND(1)	ND(1)	--	--	--	--	--
TCE	ND	ND	ND	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	0.08	0.08	ND(0.5)
1,2-DCA	1.2	ND	0.59	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
EDB	ND	ND	ND	NA	ND	ND	ND	ND(0.02)	ND(0.02)	ND(0.0097)	ND(0.0098)	ND(0.0098)	ND(0.0096)	ND(0.0096)

AP-7755

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Apr-01	Oct-02	Sep-03	Sep-05	June-06	Oct-06	June-07	Oct-07	May-08	June-09	July-10
GW ELEV.	430.63	428.85	NA	429.58	431.12	432.42	430.35	430.77	430.32	430.02	430.37	430.39	430.03	430.14
DRO	2,000	980	2,300	1300	600	429	205	680	520	690	450	740	460	2,500
GRO	1,800	ND	2,000	1100	800	437	345	420	400	1,100	460	170	310	160
Benzene	32	46	50	25	0.8	1.05	0.31	0.18	0.74	0.60	0.39	0.13	0.40	0.21
Toluene	2	1	1.3	ND	ND	ND	ND	0.13	0.16	0.23	0.49	0.38	0.29	0.27
BTEX	62	54	65.3	55.5	7	4.03	5.37	4.82	6.12	--	--	--	--	--
TCE	ND	ND	ND	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
1,2-DCA	ND	ND	ND	ND	ND	ND	ND	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
EDB	0.136	0.047	0.024	0.024	ND	ND	ND	ND(0.02)	ND(0.02)	ND(0.0098)	ND(0.0098)	ND(0.0096)	ND(0.0096)	ND(0.0095)

AP-7751

11.5 - 21.5	Sep-98	Apr-99	Sep-99	Oct-00	Apr-01	Nov-01	Feb-02	Oct-02	May-03	Sep-03	May-04	Oct-04	May-05	Oct-05	June-06	Oct-06	May-07	Oct-07	May-08	June-09	July-10
GW ELEV.	NM	NM	NM	14.31**	16.15**	15.35**	16.54**	14.80**	15.29**	13.59**	14.55**	16.56**	14.63**	15.53**	15.37**	15.69**	16.18**	15.59**	15.60**	15.95**	15.95**
DRO	ND	1,400	650	4,600	1,700	1,300	550	ND(602)	197	200	201	256	1,030	678	500	810	330	300	210	440	120
GRO	7,100	2,600	3,600	4,400	600	530	420	R	53.3	55.4	89	26.9	ND(90)	ND(90)	85	68B	180	190	20	310	50
Benzene	33	13	7.2	12	2.6	0.74	0.72	R	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	ND(0.4)	0.12	0.25	0.14	0.20	ND(0.5)	0.22	0.09
Toluene	880	150	110	140	11	64	6.1	R	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.11	0.12	0.13	0.51	0.47	0.37	0.35
BTEX	2,695	516	576.2	1,109	117.7	28.54	63	R	ND(0.4)	0.86	7.85	0.8	2.09	ND(1)	3.65	3.63	--	--	--	--	--
TCE	ND	ND	ND	ND(10)	ND(2)	ND(2)	ND(2)	R	ND(1)	ND(1)	ND(1)	ND(1)	ND(1)	0.640	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
1,2-DCA	ND	ND	ND	ND(10)	ND(2)	0.672	ND(2)	R	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(1)	ND(1)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
EDB	4.89	2.56	3.60	NM	0.80	0.67	0.251	R	ND(1)	ND(0.0188)	ND(0.0197)	ND(0.0186)	ND(0.0198)	ND(0.0192)	0.0081J	ND(0.02)	0.0097	0.019	0.0067	0.0042	ND(0.0042)

** Indicates Depth To Groundwater, AP- 7751 Well Casing Elevation Not Available

AP-7823

12- 22	Sep-99	Apr-01	Oct-02	Sep-03	Sep-05	June-06	Oct-06
GW ELEV.	NA	429.48	430.41	438.07	435.99	436.21	435.90
DRO	339	ND	ND	187	103	88	110
GRO	610	130	130	ND	43.4	65	64
Benzene	ND	ND	ND	ND	ND	ND(1)	ND(1)
Toluene	ND	ND	ND	ND	ND	ND(1)	ND(1)
BTEX	ND	ND	ND	ND	ND	ND(1)	ND(3)
TCE	ND	ND	ND	ND	ND	ND(1)	ND(1)
1,2-DCA	ND	ND	ND	ND	ND	ND(1)	ND(1)
EDB	NA	NA	ND	ND	ND	ND(0.02)	ND(0.02)

* SAMPLED FOR GEOCHEMICAL ANALYSIS ONLY AFTER 2006

NOTES:

1. Cleanup levels for GRO changed from 1,300 µg/L to 2,200 µg/L in October 2008.

LEGEND:

AP-7751	Monitoring Well
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
TCE	Trichloroethylene
1,2-DCA	1,2-Dichloroethane
EDB	1,2-Dibromoethane
ND(0.5)	Not detected (detection limit)
RAO	Remedial Action Objective
R	Data rejected
µg/L	Micrograms per Liter
--	Not Calculated

Contaminant of Concern (µg/L)	RAO
DRO	1,500
GRO	2,200
BENZENE	5
TOLUENE	1,000
TCE	5
1,2-DCA	5

KEY:

Well number

Sampling Date

Screened interval (feet bgs)

Groundwater elevation in feet (ft) above sea level NAVD-88

Concentration in in ug/L

Concentrations exceeding RAOs shown in blue.

AP-7490 10- 20	Dec-97	Apr-99	June-06	Oct-06
GW ELEV.	NA	428.71	430.60	430.09
DRO	550	600	140	150
GRO	130	250	11	28
Benzene	1.7	13	ND(1)	ND(1)
Toluene	ND	ND	ND(1)	ND(1)
BTEX	1.7	13	ND(1)	ND(1)
TCE	ND	ND	ND(1)	ND(1)
1,2-DCA	1.2	ND	ND(1)	ND(1)
EDB	ND	ND	ND(0.02)	ND(0.02)

ARMY ENVIRONMENTAL CENTER

CORPS OF ENGINEERS ALASKA DISTRICT

EQFS Flowpath D Groundwater Contaminant Concentrations

Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
FES, 2010 Annual Report	8-7	9/11

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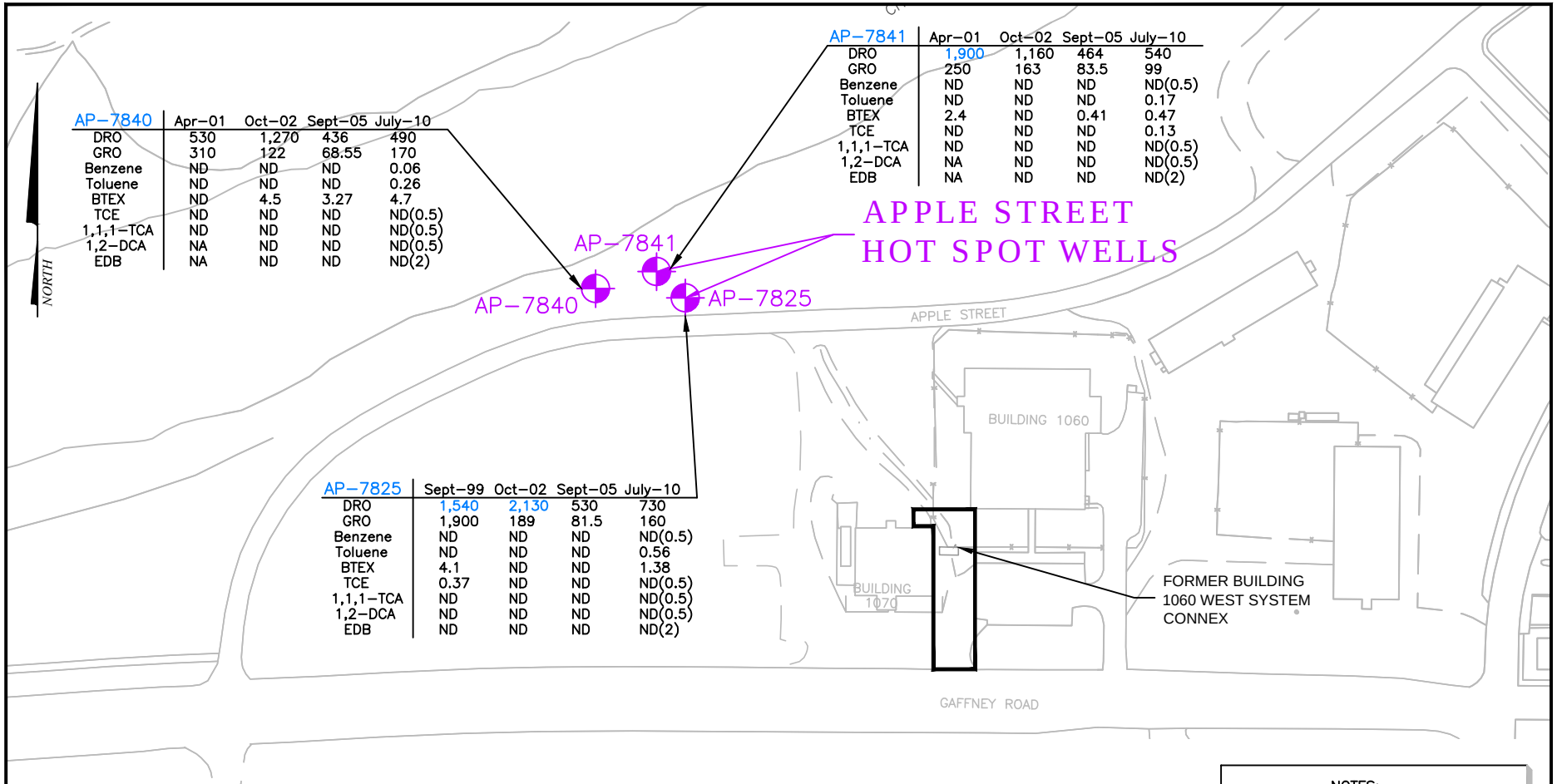

AP-7840	Apr-01	Oct-02	Sept-05	July-10
DRO	530	1,270	436	490
GRO	310	122	68.55	170
Benzene	ND	ND	ND	0.06
Toluene	ND	ND	ND	0.26
BTEX	ND	4.5	3.27	4.7
TCE	ND	ND	ND	ND(0.5)
1,1,1-TCA	ND	ND	ND	ND(0.5)
1,2-DCA	NA	ND	ND	ND(0.5)
EDB	NA	ND	ND	ND(2)

AP-7841	Apr-01	Oct-02	Sept-05	July-10
DRO	1,900	1,160	464	540
GRO	250	163	83.5	99
Benzene	ND	ND	ND	ND(0.5)
Toluene	ND	ND	ND	0.17
BTEX	2.4	ND	0.41	0.47
TCE	ND	ND	ND	0.13
1,1,1-TCA	ND	ND	ND	ND(0.5)
1,2-DCA	NA	ND	ND	ND(0.5)
EDB	NA	ND	ND	ND(2)

AP-7825	Sept-99	Oct-02	Sept-05	July-10
DRO	1,540	2,130	530	730
GRO	1,900	189	81.5	160
Benzene	ND	ND	ND	ND(0.5)
Toluene	ND	ND	ND	0.56
BTEX	4.1	ND	ND	1.38
TCE	0.37	ND	ND	ND(0.5)
1,1,1-TCA	ND	ND	ND	ND(0.5)
1,2-DCA	ND	ND	ND	ND(0.5)
EDB	ND	ND	ND	ND(2)

LEGEND:

AP-7544	Monitoring Well
BTEX	Benzene, toluene, ethylbenzene, xylenes
DRO	Diesel Range Organics
GRO	Gasoline Range Organics
TCE	Trichloroethylene
1,1,1-TCA	1,1,1-Trichloroethane
1,2-DCA	1,2-Dichloroethane
EDB	1,2-Dibromoethane
NA	Not analyzed
ND(0.5)	Not detected (detection limit)
µg/L	Micrograms per Liter

Contaminant of Concern	RAO ug/L
DRO	1,500
GRO	2,200
BENZENE	5
TOLUENE	1,000
TCE	5
1,2-DCA	5
1,1,1-TCA	200
EDB	0.05

0 25 50 100

SCALE IN METERS

KEY:

Well number — Sampling Date

Concentration in ug/L

Concentrations exceeding RAOs shown in blue.

AP-7825	Sept-99	Oct-02
DRO	1,540	2,130
GRO	1,900	189
Benzene	ND	ND
Toluene	ND	ND
BTEX	4.1	ND
TCE	0.37	ND
1,1,1-TCA	ND	ND
1,2-DCA	ND	ND
EDB	ND	ND

NOTES:

Cleanup levels for GRO changed from 1,300 µg/L to 2,200 µg/L in October 2008.

ARMY ENVIRONMENTAL CENTER

ALASKA DISTRICT CORPS OF ENGINEERS

EQFS Apple Street Groundwater Contaminant Concentrations

Five Year Review
Operable Unit 5
Fort Wainwright, Alaska

CONTRACT:	FIGURE:	DATE:
FES, 2010 Annual Report	8-8	9/11

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9 OPERABLE UNIT 6

9.1 New Source Area, FTWW-102, Communications Site (Taku Gardens)

9.1.1 Overview

The U.S. military has occupied the general area of the Former Communication Site (FCS) for over 60 years. Historical photographs and record reviews indicate that during this time a wide variety of land uses occurred in various areas of the site. The entire site encompasses approximately 54 acres.

The site was selected for future military family housing in 2002-2003. Pre-construction environmental samples were taken in late 2003 and again in 2004 and 2005 indicating low-level polychlorinated biphenyl (PCB) contamination. Geophysical testing was also done during this time frame; results indicated several large areas of buried metal debris.

The combined remedial investigation efforts of 2007, 2008 and 2009 covered nearly 8 acres. Environmental concerns removed include 1,058 drums, 2,923 munitions-related items, 4,813 cubic yards of contaminated soil and 386 tons of debris. Following the extensive investigation, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process was initiated and a Remedial Investigation, Human Health Risk Assessment and Draft Feasibility Study have been published.

9.1.2 Background

Between the late 1940s and late 1950s the site consisted of troop billets, battalion, and wing level operations. Base disposal and salvage occurred in a portion of the site, some of which is likely to be associated with dumping into a historic river channel associated with the site. Military items associated with both the U.S. Army and the U.S. Air Force are likely to have been deposited during this period. Troop billets built for the arrival of the 3rd Battalion, 4th Infantry Regiment, also occupied a portion of the site from 1951 to 1956. A motor pool associated with the regiment was located onsite during this period. Historical drawings indicate power and lighting was in place in 1958. A separate operation, the former communications site, was located in the southwestern corner of the area. The former communications site (southwestern corner) was developed into personal use garden plots, and the remaining area allowed to return to its natural state.

A detailed chronology of the various phases of work undertaken since the FCS was first selected for future military housing in 2002-2003 is presented in both the Preliminary Site Evaluation (PSE) I Report and the PSE II Report (USAED 2007a, 2007b) and in the Corp of Engineers Geotechnical and Chemical Findings Report (USAED 2004). An initial Electro Magnetic (EM) 31 geophysical survey was performed by Cold Regions Research and Engineering Laboratory in 2003 for the U.S. Army Garrison Alaska. Data were collected in the upper northeast corner of the site, south of the Post Exchange (PX) gas station, and from areas identified on historical photos that contained debris piles. The objective of this survey was to confirm buried metal and provide a map (but no report) of the area.

Several phases of investigation have occurred at the FCS since July 2005, when concern was initially raised following detection of an odor during excavation for foundations in the southwest corner of the site near Building 52. Once construction and excavation activities ceased in this area, environmental sampling indicated elevated levels of PCB contamination as high as 119,000 milligrams per kilogram (mg/kg). On 8 August 2005, Environmental Protection Agency (EPA) and Alaska Department of Environmental Conservation (ADEC) were notified of the findings and have been actively involved with the FCS site ever since.

In winter 2005-2006, a review of construction field notes, photographs, and historical site use led to a determination by the Army, EPA, and ADEC that a site-wide investigation was required to fully determine the nature and extent of contamination. In 2005, the Army commissioned a PSE I (existing data evaluation) and PSE II (limited field investigation), and in June 2006, North Wind Inc. initiated site investigation and characterization activities in support of the PSE II (USAED 2007b).

Activities undertaken as part of the PSE II included investigation of debris, soil, soil vapor, and groundwater. During the debris investigation, 30 test pits and 22 stockpiles (created during construction activities) were investigated, and a total volume of 3,600 cubic yards of material was inspected. Eight items from this debris were classified as munitions-related items and disposed of accordingly. These items included an M1A1 20-pound Frag Bomb, four empty M47-Series bombs, a T-85 3.5" rocket, and two M106 8-inch projectiles with inert filler as described in Table 2.4-4 of the 2007 Draft PSE II Report (USAED 2007b). A number of ruptured and punctured drums, some containing a tar-like substance, were discovered in Test Pit 14, located adjacent to Building 49. The full extent of these drums was not delineated during this investigation, and the possibility that the drums extended under Building 49 was considered.

In addition to the PCB-contaminated area found during excavation of Building 52, other potential areas of PCB contamination were identified based on historical uses and mainly centered around the the southwest section of the site (Area E). This led to an additional investigation conducted in an area identified as the Transformer Service Area (TSA), and in the vicinity of the Sound Berm east of Buildings 20 and 26.

Soil samples recovered from approximately 150 borings advanced to a maximum of 12 feet bgs were primarily analyzed using field screening methods (i.e., HACH Immunoassay PCB Test Kits) although some were submitted for laboratory analysis as a quality check. Field test kits were able to distinguish areas of soil contamination containing greater than the ADEC Method Two residential cleanup level of 1 mg/kg for PCBs. Of the 226 soil samples analyzed using field test kits, 32 yielded positive detects for PCB contamination (greater than 1 mg/kg), indicating a large area of contamination around the footprint of Building 52, with several other isolated locations of contamination in the exclusion zone and the Transformer Service Area (TSA). Contamination generally appeared to be confined to the upper 5 feet of the soil column.

Several wells were installed in areas identified as having significant POL contamination, and a passive gas sampler (GORE^{TM} sorber) was used to detect soil-gas vapor compounds. The classes of analytes detected in the soil-gas vapor were petroleum-related compounds, chlorinated solvents, chlorofluorocarbons, and some tentatively identified compounds. Further details are presented in the PSE II Report (USAED 2007b).

The final PSE II activity was a groundwater investigation to determine groundwater flow and direction and to identify contaminants of concern (COC) within the groundwater. Shallow groundwater beneath the construction site was determined to have been impacted by contamination in select areas.

In 2007, USACE Cold Regions Research Environmental Laboratory (CRREL) performed a geophysical survey to delineate the extent of buried debris, including drums and scrap metal, identified in the PSE I and PSE II Reports. This survey was conducted with an EM61 (1 meter by 1 meter coils) and an EM61-MK2 (1 meter by 0.5 meter coils). The towed array method was chosen for efficiency in this reconnaissance survey. This was not intended as an unexploded ordnance (UXO) detection survey. The survey began in March 2007 using a snowmobile to tow the equipment. In July 2007, an all terrain vehicle was used to tow two EM61 MK2 systems. The entire site was surveyed by July 2007 except for the existing metal and soil piles.

Response to Date

2007-2009 Activities

The Fort Wainwright FCS drum, debris, and PCB Investigation was accomplished over the course of three field seasons, from August 2007 to November 2009. The objectives of the Investigation were to determine if COC were emanating from buried drums and debris identified as anomalies in an EM61 geophysical survey and to provide information and data for the risk assessment being prepared by CH2M Hill. The geophysical investigation focused on identifying drums and debris near Buildings 49, 48, 15/17, and 22/24 and in Area D. Other geophysical investigations included locating hot spots identified on the EM61 survey with results exceeding 75 millivolts (mV) and a quality control check of the hot spots identified on the EM61 survey with results below 75 mV. The combined investigation efforts of 2007, 2008 and 2009 covered nearly 8 acres. Environmental concerns removed include 1,058 drums, 2,923 munitions-related items, 4,813 cubic yards of contaminated soil and 386 tons of debris.

PCB investigation activities in 2007 and 2008 occurred mainly in Area E around the foundation footprint of Building 52. Additional areas of investigation included the TSA to the east of the site and several other smaller hot spots adjacent to Building 52. In 2009, all nine building foundations within Area E were removed and sampled for PCB contamination. All sample results were below site screening criteria. Buried munitions-related items including discarded military munitions, range-related debris, and munitions debris were a concern at the site. In addition to the munitions-related items, COCs such as fuels, solvents, and Resource Conservation and Recovery Act (RCRA) metals were a concern in soil. All activities were conducted in accordance with the approved *Munitions and Explosives of Concern Support, Former Communications Site Drum and Debris Remedial Investigation (RI) Work Plans* (USAED 2008a and 2008b), and applicable Technical Memorandums prepared for specific activities in 2009.

A total of 1,168 tons of Toxic Substances Control Act-regulated PCB-contaminated soil (concentration greater than 50 mg/kg) and 691 tons of nonregulated PCB-contaminated soil (concentrations greater than 10 mg/kg and less than 50 mg/kg) was removed and shipped to Arlington, Oregon, for disposal in 2007. In 2007 through 2009, approximately 1,900 cubic yards of PCB-contaminated soil with concentrations less than 10 mg/kg were removed and disposed of in the Fort Wainwright Landfill in accordance with the disposal permit 2007 through 2009. In addition to the PCB-contaminated soil, soil with concentrations of dichlorodiphenyltrichloroethane (DDT) and petroleum, oil, and lubricants (POL) above the project screening levels were also removed from the FCS. Stockpiles associated with construction and previous investigations were also removed during the 2007, 2008, and 2009 field seasons. Tables 8-9, 8-10, and 8-11 present a summary of the materials removed from the FCS during the 2007, 2008, and 2009 field seasons, respectively.

Table 9-1. Summary of Materials Removed During the 2007 Investigation

Investigation Area	Area of Investigation (square feet)	Drums	Contaminated Soil (cubic yards)	Contaminant in Soil	Other Materials Removed	Munitions Related Items
Building 49	4,500	186	24	Tar and Paint	Paint, concrete	-
Building 48	32,000	159	150	120 cy – Solvent 30 cy – Lead	Lead-acid batteries, degraded xylene drum, asphalt tar	17 MD 3 RRD
Building 15/17	9,400	75	3	Lead	Asbestos, transformer material, lead-acid batteries, charcoal (contained in gas masks)	230 MD 5 DMM 27 RRD
PCB Removal	12,527	-	972.5 (> 50 mg/kg TSCA) 575 (10-50 mg/kg non-TSCA)	PCB	-	-
Other Areas of Investigation for MEC support including well clearance	-	-	-	-	-	520 RRD 20 MD
Totals	**58,427**	**420**	**1,724.5**	**-**	**-**	**822**

Notes:

MD – munitions debris; RRD – range related debris; DMM – discarded military munitions

Table 9-2 - Summary of Materials Removed During the 2008 Investigation

Investigation Area	Area of Investigation (square feet)	Drums	Contaminated Soil (cubic yards)	Contaminant in Soil	Other Materials Removed	Munitions Related Items
Building 1	6,161	1	-	-	Concrete, misc. scrap metal	-
Building 9	60	-	3	POL	POL-impacted soil	-
Building 11	4,449	10	15	DDT	Misc. scrap metal, pesticide-impacted soil	-
Building 12	3,563	4	24	Creosote	Misc. scrap metal	-
Building 15/17	75,579	115	238	210 cy – POL 8 cy – Solvent 20 cy - Lead	Lead-impacted soil, POL-impacted soil, paint/thinner impacted soil, drums with residual POL, hydraulic cylinder	503 MD 1 DMM 35 RRD
Buildings 16 and 21	5,262	-	-	-	Misc. scrap metal	-
Building 22/24	66,190	39	34	30 cy – POL 4 cy - Paint	Lead-impacted soil, POL-impacted soil, misc. air tanks, paint-impacted soil	1,147 MD 405 RRD
Building 26	5,587	1	7	Lead	Metals-impacted soil	-
Building 29	3,236	-	-	-	-	-
Building28/31	1,497	-	60	POL	POL-impacted soil	6 MD 1 DMM
Building 38	1,488	-	-	-	Soil/small metal debris	-
Building 40	170	-	60	POL	POL-impacted soil	-
Building 43	1,401	-	-	-	-	-

Table 9-2 - Summary of Materials Removed During the 2008 Investigation

Investigation Area	Area of Investigation (square feet)	Drums	Contaminated Soil (cubic yards)	Contaminant in Soil	Other Materials Removed	Munitions Related Items
Building 45	60	-	3	POL	POL-impacted soil	-
Building 49	4,748	-	-	-	-	-
Area D	25,876	415	2	Paint	Drums with residual POL, paint-impacted soil	3 MD
PCB Area E	970	-	1,720 (1-10 mg/kg)[1]	PCB	None	-
Totals	**201,549**	**585**	**2,166**	**-**	**-**	**2,101**

Notes:

[1]1688 cubic yards of this soil was stockpiled in 2007 for removal in 2008. The remaining 32 cubic yards was excavated and removed in 2008.

Table 9-3 - Summary of Materials Removed During the 2009 Investigation

Investigation Area	Area of Investigation (square feet)	Drums	Contaminated Soil (cubic yards)	Contaminant in Soil	Other Materials Removed	Munitions Related Items
Building 9	4,905	-	920	POL	Concrete, misc. scrap metal	-
Building 11	10,575	8	-	-	Misc. scrap metal	-
Building 35	432	-	-	-	Misc. scrap metal	-
Area E Foundation Demolition	30,000	-	-	-	Concrete and rebar	-
Building 15/17	22,050	-	-	-	Misc. scrap metal	-
Building 49	2,500	45	3	POL	Misc. scrap metal	-
Totals	**70,462**	**53**	**923**	**-**	**-**	**-**

2010 Activities

2010 Activities included confirmation samples taken from a side wall of a test pit which identified an isolated area containing low levels of pesticides in the soil. The area was thoroughly investigated and fifty cubic yards of pesticide contaminated soil was disposed of. Other activities in 2010 included: groundwater sampling, soil gas sampling, and indoor air sampling, and disposal of the remaining investigation derived waste, and site control.

Workplans and Reports Prepared to Date

Workplans and Reports prepared for field work activities up to and including 2006:

- Draft Preliminary Source Evaluation Narrative Report, August 2006 (Oasis)
- Field Sampling Plan, Revision 3, August 2006 (North Wind)
- Final Revision, Delineation and Remediation of Contaminated Soil, Groundwater and Debris at Stryker Brigade Cantonment Areas, Accident Prevention Plan, August 2006 (North Wind)
- FWA-102 Former Communication Site (Taku Gardens) Work Plan Addendum, Spring 2006 (North Wind)
- FWA-102 Former Communication Site (Taku Gardens), Field Data Report February 2006 (North Wind)
- Draft Revision 1, Site Characterization and Remediation Work Plan, Fort Wainwright, Alaska, June 2005 (North Wind)

Work plans prepared in 2007 to support the project objectives:

- Long-Term Soil Stockpile Plan (USAED 2007c)
- Communications Plan (USAED 2007d)
- Site Safety and Health Plan (SSHP) (USAED 2007e)
- Munitions and Explosives of Concern Support Work Plan (USAED 2007g)
- 2007 Work Plan, Former Communications Site Drum and Debris Investigation (USAED 2007h)
- 2007 Work Plan, Former Communications Site PCB Removal Action (USAED 2007i)

Three of these plans were updated for the 2008 and 2009 field seasons:

- Munitions and Explosives of Concern Support Work Plan (USAED 2008a)
- 2008 Work Plan, Former Communications Site Drum and Debris Remedial Investigation (USAED 2008b)
- Site Safety and Health Plan (USAED 2008c)

In addition to the work plans the following technical memorandums were also prepared to support specific portions of 2009 field work:

- 2009 Taku Gardens: Investigation of 1,2,3 TCP Contamination Plume (USAED 2009a)
- 2009 Taku Gardens EM61 Hotspot Excavation (USAED 2009b)
- 2009 Taku Gardens: Delineation of Northern Groundwater Plumes (USAED 2009c)
- 2009 Taku Gardens PCB Area Foundation Demolition (USAED 2009d)
- 2009 Taku Building 49 Drum and Debris Removal (USAED 2009e)
- 2009 Taku Gardens Installation of Monitoring Wells North of the Site (USAED 2009f)
- 2009 Taku Gardens Sound Berm Additional Sampling Locations (USAED 2009g)
- 2009 Taku Gardens Sampling of Contaminated Soil Pile (USAED 2009h)

All work plans and technical memorandums were developed to support the overall RI/FS Management Plan (USAED 2007j).. The summary report for 2007-2009 work is the *2007/2008/2009 Former Communications Site Drum and Debris and PCB Investigation Report, Final Revision 1* (USAED 2011a).

CERCLA Documents prepared for the FCS to date include:

- 2010 Remedial Investigation (USAED 2011b)
- 2010 Human Health Risk Assessment (USAED 2011c)
- 2010 Draft Feasibility Study (USAED 2011d)

9.1.3 Status of Site

The FCS is at the Final Feasibility Study stage of the CERCLA process. When the Feasibility Study is finalized, a proposed plan will be prepared to share the proposed alternative with the public. After public input is solicited the selected remedy will be chosen and a Record of Decision will be prepared.

9.1.4 Protectiveness

In addition to the CERCLA process, all the Stakeholders have agreed to a 5 year monitoring plan to assure that the environmental conditions remain protective of human health and the environment after the Decision Document is final.

9.1.5 Recommendations and Follow-up Actions

Recommendations for this site are shown in Table 9-12.

Table 9-4. Recommendations and Follow-Up Actions for Communications Site

Recommendation/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Prepare Proposed Plan	U.S. Army	EPA / ADEC	November 2011	No
Hold Public Meeting to Solicit Community Input on the Proposed Plan	U.S. Army	EPA / ADEC	Winter 2011 -2012	No
Finish construction with completion of roads, sidewalks, and landscaping	U.S. Army	EPA / ADEC	Summer 2012	No
Prepare Record of Decision	U.S. Army	EPA / ADEC	Summer 2012	No

10 SITE-WIDE SUMMARY AND RECOMMENDATIONS

10.1 General

10.1.1 ROD Commitments are Being Met

Management of Fort Wainwright NPL site remediation under the FFA has been very effective. This effectiveness translates into a good rate of progress implementing the remedial actions specified in the RODs and is in the best interest of the public and the environment.

10.1.2 Public Information Repositories

The three Fort Wainwright public information repositories were visited on May 11, 2011. The visits found the repositories to be generally meeting CERCLA requirements and public needs. Recommendations included providing the Administrative Record exclusively on CDs for Public use and updating the record at the Noel Wein library and the Post library with the ESD and the Five Year Reviews. A status report on the five-year review site visits is included in Appendix C of this report.

10.1.3 Institutional Controls

All five Fort Wainwright RODs specify ICs to ensure protection of human health and the environment. Standard Operating Procedures for institutional controls were adopted by USARAK at the close of the OU5 ROD in 1999 with input from EPA and ADEC. In the fall of 2001, the Institutional Control Memorandum signed by Major General Cash dated February 1999, was updated to require a Work Authorization Permit for all groundwater and soils on USAG-AK lands. This revised memorandum, signed by the Commanding General, includes a section on areas with ICs mandated by a Record of Decision, and a section on areas where contamination is not suspected. Currently, all contracts that include intrusive activities require a Work Authorization Permit. The Permit was updated in May 2011 to clearly alert the user about procedures to follow when potential contamination is encountered. The USARAK SOP was updated 19 September 2010 and currently outlines Garrison Fort Wainwright by reference.

A US Army Garrison Fort Wainwright Policy #49 was completed and signed on 28 December 2010 to update and disseminate the Land Use Controls/Institutional Controls Policy for US Army Garrison, Fort Wainwright. This policy, signed by Colonel Timothy A. Jones further identifies institutional control policy on Fort Wainwright. A copy of the IC policy is in Appendix A.

Implementation of ICs involving access and use limitations requires maintaining institutional boundaries in the USAG-AK GIS database. These boundaries are not specified in the RODs and are subject to routine review and revision to ensure continued protectiveness of the ICs. A map depicting the boundaries of all sites on Fort Wainwright where IC's are in effect is also provided in Appendix A.

A detailed discussion of the Fort Wainwright ICs policy is provided in Appendix A.

10.1.4 Groundwater Monitoring

Data from the groundwater monitoring program at each source area should be evaluated as it is reported to assure no off-site migration of contaminants and to evaluate the progress of natural attenuation. Where appropriate, it is recommended that the groundwater contours at each source area be plotted and evaluated during each monitoring event to ensure that the assumptions used in assessing the groundwater monitoring data reflects where the monitoring wells are located relative to the source area. This will enable changes in flow patterns to be recognized and appropriate actions taken.

10.2 Operable Unit and Source Area Specific

Table 10-1 summarizes the response to recommendations made in the 2006 Five-Year Review, and Table 10-2 summarizes the recommendations and follow-up actions from OU and source area sections of this report.

Table 10-1. Response to Recommendations from 2006 Five-Year Review

Operable Unit	Source Area	Recommendations / Follow-Up Actions from 2006 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
1	801 Drum Storage Area	No operational changes were recommended				
2	Building 1168 Leach Well	Monitoring should also continue to ensure that natural attenuation processes are treating residual contamination in the groundwater.	LTMO analysis in 2009 showed benzene contamination may persist above cleanup levels for a significant period of time in one monitoring well. As a result, an in-situ chemical oxidation was conducted in 2010.	U.S. Army	2009 and 2010	No
	DRMO Yard	Continue to evaluate sampling results and natural attenuation parameters to determine if the system should be turned back on.	Groundwater sampling of the DRMO1 (3-Party) area between 2006 and 2008 did not identify contaminant rebound following the shutdown of the treatment system, and the system was decommissioned in October 2008. ISCR injection was initiated in 2009 to enhance MNA of PCE.	U.S. Army	2008	No
3	Birch Hill Tank Farm (Remedial Area 1b)	Pursuant to authority granted by Section 104(e) of CERCLA, 42 U.S.C. § 9604(e), make every reasonable effort to obtain a signed access agreement for the Army, its contractors, agents, U.S. EPA, and ADEC to install and monitor new wells on Lazelle Estates (the former Bentley property). The access agreement should provide that no conveyance of title, easement, or other interest in the property shall be consummated without provisions for the continued operation of such wells.	Four replacement wells were installed on Lazelle Estates within the road right-of-way. A signed access agreement was not required to install these wells; however, the land owner would not agree to access for installing a fifth shallow alluvial well, near the post boundary. Since off-post contaminant concentrations are below remedial goals and current contaminant migration assessments do not indicate that concentrations are anticipated to increase, installation of additional off-post wells is not critical.	U.S. Army	2007	No
		Complete Birch Hill Tank Farm Summary Report	The Birch Hill Summary Report was completed	U.S. Army	2008	No

Table 10-1. Response to Recommendations from 2006 Five-Year Review

Operable Unit	Source Area	Recommendations / Follow-Up Actions from 2006 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
3	Birch Hill Tank Farm (Remedial Area 1b)	Coordinate with recommendations agreed upon in the BHSR: The BHSR recommended pursuing the option of a Technical Impracticability (TI) Waiver for the bedrock aquifer on Birch Hill.	The option for pursuing a TI Waiver was previously considered prior to the 2006 Five Year Review. The Army in agreement with EPA and ADEC determined that continued monitoring was sufficient for monitoring bedrock contamination on Birch Hill; however, further evaluation of a TI Waiver would be considered if future conditions warranted.	U.S. Army	Ongoing	No
	ROLF & Valve Pits (Remedial Area 2)	No operational changes were recommended				
	FEP Mileposts 2.7, 3.0, & 15.75 (Remedial Area 3)	Soil treatment was successful at the Milepost 15.75 site and the ROD RAOs have been met. Groundwater monitoring is no longer necessary and this site should be closed.	DPW will provide a letter to ADEC requesting closure for this site.	U.S. Army	2011	No
4	Landfill	No operational changes were recommended				
	Coal Storage Yard	No changes in the remedial management of the Coal Storage Yard were recommended.				
5	WQFS	Continue the operation of the sparge curtain and seasonal use of the boom along the Chena River.	The SC system continues to be operated year-round (with the exception of a six month shutdown in 2010); the Chena River boom is installed each summer when the river is free of ice.	U.S. Army	Ongoing	No
		Continue sampling groundwater semi-annually. Wells within and downgradient of the HWL and SA treatment system will be sampled as part of a contaminant rebound / natural attenuation monitoring program.	Groundwater monitoring continues to be conducted at all WQFS sites; rebound studies have been conducted at both the SA and HWL sites.	U.S. Army	Ongoing	No

Table 10-1. Response to Recommendations from 2006 Five-Year Review

Operable Unit	Source Area	Recommendations / Follow-Up Actions from 2006 Five-Year Review	Action Completed	Party Responsible	Date Completed	Affects Protectiveness (Yes/No)
5	EQFS	The AS/SVE remediation system installed at Bldg 1060 has functioned as intended and COC concentrations in the groundwater have decreased. Groundwater sampling will continue biannually.	Groundwater monitoring indicates that the AS/SVE system at Bldg 1060W was successful in remediating the groundwater contamination at the site. The system was decommissioned in 2009.	U.S. Army	2009	No
	Birch Hill ASTs (Remedial Area 1a)	No operational changes were recommended				
	OB/OD	No operational changes were recommended				
	Chena River Surface Water & Sediments	The RPMs determined in the second Five Year Review that this program is no longer required and by signature of that document the program was discontinued.				
	ICs Program	Perform post-wide IC inspection and evaluate protectiveness. Update restricted use boundaries in GIS as new information becomes available.	IC inspections are conducted on an on-going basis. The IC database was updated in May 2011 and may be accessed through the DPW GIS system.	U.S. Army	Ongoing	No
		Make SOP coverage more inclusive (i.e., apply to tenants)	USARAK IC SOPs were updated in 2009. Army Garrison Policy #49 provides specific procedures applicable to Fort Wainwright.	U.S. Army	Ongoing	No
		Update IC Policy	The IC Policy was updated December 2010	U.S. Army	2010	No
	New Source Area FTWW-102 (Communications Site)	Preclude occupancy of houses until the site is fully investigated and deemed safe for residential use and the site access restrictions are lifted by the RPMs	Houses remain unoccupied.	U.S. Army	Ongoing	No
		Conduct an RI/FS for the site, if the RPMs decide that it is necessary based on the results of the PSE2	An RI has been conducted. The site is in the Final Feasibility Study stage of the CERCLA process.	U.S. Army	Ongoing	No
		Modify or supplement the FFA to add the Communications Site source area as a new OU	The FFA was modified in 2007 to add this source area as a new OU.	U.S. Army	2007	No

Table 10-2. Current Recommendations and Follow-up Actions at All Operable Units

Operable Unit	Source Area	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
1	801 Drum Storage Area	Continue groundwater monitoring of eight wells every five years, prior to the Five Year Review, to ensure that no off-site migration of contaminants is occurring.	U.S. Army	EPA / ADEC	Ongoing	No
2	Building 1168 Leach Well	The current site model indicates that contamination does not appear to be migrating off-site, and continued groundwater monitoring should be sufficient to ensure protectiveness.	U.S. Army	EPA / ADEC	Ongoing	No
		Continue evaluation of the ISCO treatability study and conduct additional injections if necessary.	U.S. Army	EPA / ADEC	Ongoing	No
	DRMO Yard	The current site model indicates that contamination does not appear to be migrating off-site, and continued groundwater monitoring should be sufficient to ensure protectiveness.	U.S. Army	EPA / ADEC	On-going	No
		Continue evaluation of the ISCR treatability study and conduct additional injections if necessary.	U.S. Army	EPA / ADEC	Ongoing	No
3	Birch Hill Tank Farm (Remedial Area 1b)	Decommission AS/SVE treatment systems at Former Building 1173 and the Truck Fill Stand.	U.S. Army	EPA / ADEC	Ongoing	No
		Continue annual monitoring of Birch Hill alluvial and bedrock wells to evaluate natural attenuation. Continue to optimize the sampling frequency, location and analysis required to achieve remedial goals by conducting LTMO analysis	U.S. Army	EPA / ADEC	Ongoing	No

Table 10-2. Current Recommendations and Follow-up Actions at All Operable Units

Operable Unit	Source Area	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
3	ROLF & Valve Pits (Remedial Area 2)	Decommission the ROLF AS/SVE treatment systems at Valve Pit A, Central Header, Former Building 1144 and Eight Car Header	U.S. Army	EPA / ADEC	Ongoing	No
		Continue groundwater monitoring of wells at all of the ROLF source areas to evaluate natural attenuation.	U.S. Army	EPA / ADEC	Ongoing	No
		Continue to evaluate the in-situ injection treatability study at Valve Pit A.	U.S. Army	EPA / ADEC	Ongoing	No
	FEP Mileposts 2.7 and 3.0, (Remedial Area 3)	The current site model indicates that contamination does not appear to be migrating off-site, and continued groundwater monitoring should be sufficient to ensure protectiveness. After the 2011 sampling event, groundwater monitoring at both the Milepost 2.7 and Milepost 3.0 sites should be conducted every five years	U.S. Army	EPA / ADEC	Ongoing	No
4	Landfill	Continue semi-annual monitoring of Landfill wells to evaluate natural attenuation.	U.S. Army	EPA / ADEC	Ongoing	No
	Coal Storage Yard	No changes in the remedial management of the Coal Storage Yard are recommended at this time.				
5	WQFS	Continue the operation of the sparge curtain and seasonal use of the boom along the Chena River.	U.S. Army	EPA, ADEC	On-going	No
		Continue sampling monitoring wells within the HWL and SA source area annually, and wells associated with the Sparge Curtain and along the bank of the Chena River semi-annually.	U.S. Army	EPA, ADEC	On-going	No

Table 10-2. Current Recommendations and Follow-up Actions at All Operable Units

Operable Unit	Source Area	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
5	WQFS	Continue LTMO analysis on an annual basis.	U.S. Army	EPA, ADEC	On-going	No
		Decommission the HWL and SA treatment systems	U.S. Army	EPA, ADEC	On-going	No
		Complete additional soil and groundwater investigation to evaluate the extent of benzene remaining above cleanup levels in the HWL source area	U.S. Army	EPA, ADEC	On-going	No
		Conduct additional evaluation of SC treatment system performance and potential contaminant migration into the Chena River	U.S. Army	EPA, ADEC	On-going	No
		Notify EPA and DEC in a timely manner when systems are not operating	U.S. Army	EPA, ADEC	On-going	No
	EQFS	Discontinue groundwater sampling in Flowpath A, Flowpath B, Flowpath C, and the Apple Street Hot Spot wells and decommission wells.	U.S. Army	EPA, ADEC	On-going	No
		Continue groundwater sampling in Flowpath D on a five-year frequency	U.S. Army	EPA, ADEC	On-going	No
		Continue groundwater sampling in specific wells associated with contamination found at Building 1565.	U.S. Army	EPA, ADEC	On-going	No
	Birch Hill ASTs (Remedial Area 1a)	Increase security and repair the Birch Hill Tank Farm Fence.	U.S. Army	EPA, ADEC	2011	Possibly
	OB/OD	No changes in the remedial management of the OB/OD are recommended at this time.				
	ICs Program	Perform post-wide IC inspection and evaluate protectiveness. Update restricted use boundaries in GIS as new information becomes available.	U.S. Army	EPA, ADEC	Ongoing	No
		Develop the parameters for an Annual Report of IC effectiveness and corrective actions taken.	U.S. Army	EPA, ADEC	Spring 2012	No
		Update the database of the LUC/IC Summary Documents (Attachment 5 of Appendix A).	U.S. Army	EPA, ADEC	October 2013	No

Table 10-2. Current Recommendations and Follow-up Actions at All Operable Units

Operable Unit	Source Area	Recommendations/ Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
6	New Source Area FTWW-102 (Communications Site)	Prepare Proposed Plan	U.S. Army	EPA, ADEC	November 2011	No
		Hold Public Meeting to Solicit Community Input on the Proposed Plan	U.S. Army	EPA, ADEC	Winter 2011/2012	No
		Finish construction with completion of roads, sidewalks, and landscaping	U.S. Army	EPA, ADEC	Summer 2012	No
		Prepare Record of Decision	U.S. Army	EPA, ADEC	Summer 2012	No

11 PROTECTIVENESS STATEMENTS

Table 11-1, on the following page, summarizes OU and source area information from the preceding sections, used to formulate protectiveness statements[1].

OU1 801 Drum Burial Site

The remedy at OU1 has been implemented and is protective of human health and the environment. The remedy is relying upon Monitored Natural Attenuation (MNA) to achieve final cleanup goals in groundwater over time, and in the interim, exposure pathways that could result in unacceptable risks are being controlled and Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater.

OU2 Building 1168 Leach Well and DRMO Yard

The remedy at OU2 has been implemented and is protective of human health and the environment. The remedy is relying upon Monitored Natural Attenuation (MNA) to achieve final cleanup goals in groundwater over time, and in the interim, exposure pathways that could result in unacceptable risks are being controlled and Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater.

OU3 Birch Hill Tank Farm (Remedial Area 1b); ROLF (Remedial Area 2); and FEP Mileposts 2.7, 3.0, and 15.75 (Remedial Area 3)

Remedies at OU3 are currently protective of human health and the environment; however, in order for the remedies to remain protective in the long-term, the Army will initiate appropriate responses in cooperation with the EPA and State of Alaska if future monitoring indicate significant changes from the current status of the contaminant plumes that would adversely affect human health and the environment. In the interim, exposure pathways that could result in unacceptable risks are being controlled and Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater.

OU4 Landfill and Coal Storage Yard

The remedy at OU4 has been implemented and is protective of human health and the environment. The remedy is relying upon Monitored Natural Attenuation to achieve final cleanup goals in groundwater over time, and in the interim, exposure pathways that could result in unacceptable risks are being controlled and Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater.

OU5 Quartermaster Fueling System, Birch Hill Tank Farm (Remedial Area 1a), Chena River, and Institutional Controls Program

The remedy at OU5 currently protects human health and the environment because Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater. However in order for the remedy to remain protective for the long term, continued monitoring of the Remedial Area 1a fence will be conducted to ensure security and identify the need for repairs.

[1] Comprehensive Five-Year Review Guidance (EPA 2001).

Table 11-1. Protectiveness Statement Basis

Operable Unit	Source Area	Question A Is the remedy functioning as intended in the decision documents?	Question B Are the Assumptions Used at the Time of Remedy Selection Still Valid?	Question C Has any other information come to light that could call into question the protectiveness of the remedy?	Is the remedy protective in the short term?	Is the remedy protective in the long term?
1	801 Drum Burial Site	Yes. No significant increases in contaminant concentration have occurred to date, demonstrating that contaminant sources (drums and contaminated soils) have been effectively removed. Perimeter wells indicate no migration of contaminants from the source area. ICs are in place.	Yes	No	Yes	Yes
2	Building 1168 Leach Well	Yes. The remediation goals for ROD COCs were met using AS/SVE in the contaminated area. The system was removed in 2003. Groundwater monitoring results indicate that the identified plume has not migrated from the site. ICs are in place.	Yes	No	Yes	Yes
	DRMO Yard	Yes. AS/SVE was shut down in 2005 due to diminishing effectiveness in reducing ROD COC. LTMO has indicated stable and decreasing trends for the COCs. ISCR injection was initiated in 2009 to enhance MNA. ICs are in place. ROD goals are expected to be achieved for OU2 in 2012.	Yes	No	Yes	Yes
3	Birch Hill Tank Farm (Remedial Area 1b)	Yes. Groundwater contaminant concentrations at the base of Birch Hill and off-post locations are generally at or below remedial goals. Since the shut-down of the Birch Hill Product Recovery System in 2003, significant free-product thickness has not been observed. Contamination underlying Birch Hill is continuing to be evaluated. No growth of plume or increase in COC has been observed. ICs are in place.	Yes	No	Yes	Expected

Table 11-1. Protectiveness Statement Basis

Operable Unit	Source Area	Question A Is the remedy functioning as intended in the decision documents?	Question B Are the Assumptions Used at the Time of Remedy Selection Still Valid?	Question C Has any other information come to light that could call into question the protectiveness of the remedy?	Is the remedy protective in the short term?	Is the remedy protective in the long term?
3	ROLF & Valve Pits (Remedial Area 2)	Yes. ROD COCs have met RAOs in five of the six ROLF treatment areas. An in-situ injection treatability study is being conducted at Valve Pit A to enhance MNA of remaining benzene at this site. ICs are in effect. ROD goals should be achieved at the ROLF and Valve Pits within the next five years.	Yes	No	Yes	Yes
	FEP Mileposts 2.7, 3.0, & 15.75 (Remedial Area 3)	Yes. COCs at the Milepost 2.7 and 3.0 sites are stable and do not appear to be moving off-site. ICs are in effect.	Yes	No	Yes	Expected
4	Landfill	Yes. COC have stabilized in the years since the cap was constructed and ICs remain protective of human health and the environment.	Yes	No	Yes	Yes
	Coal Storage Yard	Yes. It was determined that the RAOs had been achieved in 2003. The treatment system was decommissioned in 2004. The site was recommended for No Further Action in the second Five-Year Review.	Yes	No	Yes	Yes
5	WQFS	Yes. The Source Area and Horizontal Well systems have been effective at achieving cleanup goals for the volatile COCs at the site. Because the remaining DRO is concentrated in the smear zone and saturated zone, the systems will be decommissioned. The Sparge Curtain system only operated between Jan and July 2010 due to power pole upgrades. However, because a boom was in place in the Chena River during the shutdown, no rebound of COC was observed, and because ICs are being implemented at this site the system is expected to still be protective.	Yes	No	Yes	Yes

Table 11-1. Protectiveness Statement Basis

Operable Unit	Source Area	Question A Is the remedy functioning as intended in the decision documents?	Question B Are the Assumptions Used at the Time of Remedy Selection Still Valid?	Question C Has any other information come to light that could call into question the protectiveness of the remedy?	Is the remedy protective in the short term?	Is the remedy protective in the long term?
5	EQFS	Yes. An AS/SVE system operated on the east side of Building 1060 from 1994 to 2000, and groundwater MCLs have been achieved. An AS/SVE system was operated on the west side of Building 1060 from 2001 through 2005 when cleanup goals for the volatile COCs were achieved. Rebound monitoring is being conducted and results of monitoring geochemical parameters indicate that there is sufficient electron acceptor capacity available to treat residual DRO. ROD goals (with the exception of DRO) should be achieved at OU5 within the next five years.	Yes	No	Yes	Yes
	Birch Hill ASTs (Remedial Area 1a)	Yes. ICs at the OU5 Remedial Area 1a have been implemented. A fence is in place around the perimeter of the Birch Hill Tank Farm. Although fence penetrations have been discovered, the Army has implemented ICs by following up with fence repairs each time a breach was discovered. Additionally, in order to address recurrent penetrations of the Birch Hill Tank Farm fence, a contractor field office was established at the base of Birch Hill, within the fence line, in 2010. No perimeter breaches have been observed since they arrived. It should also be noted that there is no risk of contact with lead contaminated soil during the winter months.	Yes	No	Yes	Expected

12 NEXT REVIEW

The next Fort Wainwright Five-Review will be conducted in 2016.

13 REFERENCES

This five-year review focused on understanding commitments made in the RODs, the status of remedial actions undertaken in response to the RODs, and the continued protectiveness of the remedial actions specified in the RODs. The individual RODs were the starting points for the reviews of compliance with the RODs, remediation progress to date, and protectiveness. To the extent possible, the review made use of the most recent summary documents available, augmenting the information in those summaries with information from earlier reports and, in some cases, with knowledge or information not yet included in reports. Much of the review focused on post-ROD reports, though pre-ROD documents were also consulted as needed to understand the history of contamination and remediation at the source areas. Appendix B provides a listing of the RODs and related documents and post-ROD reports available at the time of this five-year review. Significant references that were used in the text of the report are provided in the listing below.

Alaska Department of Environmental Conservation (ADEC), 2003. Additional Cleanup Values, Technical Memorandum 01-007, November 24, 2003.

ADEC, 2008. 18 AAC 75. Oil and Other Hazardous Substances Pollution Control, as amended through October 9, 2008

ADEC, 2008. 18 AAC 70. Alaska Water Quality Standards, as amended through July 2008.

ADEC, 2011. 18 AAC 80. Drinking Water, as amended of May 2011.

Environmental Protection Agency (EPA), 2000. Procedures for Completion and Deletion of National Priority Sites and Update, OSWER Directive 9320.2-09A-P, January.

EPA, 2001. Comprehensive Five-Year Review Guidance, EPA 540-R-01-007, OSWER No. 9355.7-03B-P, June 2001.

EPA, 2002. 40 CFR 141. National Primary Drinking Water Regulations, revised as of July 1, 2002.

Fairbanks Environmental Services (FES), 2011. 2010 Annual Groundwater Monitoring Report 801 Drum Burial Site, Operable Unit 1, Fort Wainwright, Alaska, March

FES, 2011. 2010 Monitoring Report, Operable Unit 2, Fort Wainwright, Alaska, April.

FES, 2011. 2010 Monitoring Report, Operable Unit 3, Fort Wainwright, Alaska, May.

FES, 2011. 2010 Monitoring Report, Operable Unit 5, Fort Wainwright, Alaska, May.

FES, 2011. 2010 Annual Sampling Report, Operable Unit 4, Fort Wainwright, Alaska, May.

U.S. Army, 1996. Record of Decision for Operable Unit 3, Fort Wainwright, Alaska, April.

U.S. Army, 2000. Groundwater Extraction and Treatment Effectiveness Review, Fort Wainwright, Alaska, October.

U.S. Army, 2001. Interim Army Guidance for Conducting CERCLA Five-Year Reviews.

U.S. Army, 2002. Explanation of Significant Differences, Operable Unit 3, Fort Wainwright, Alaska, November.

USAED. (U.S. Army Engineer District, Alaska). 2011a. USAED. 2007/2008/2009 Former Communications Site Drum and Debris and PCB Investigation Report, Final Revision 1

USAED.. 2011b. Remedial Investigation, FWA 102 Former Communications Site, Fort Wainwright, Alaska.Prepared by CH2M Hill.

USAED. 2011c. Human Health Risk Assessment. Prepared by CH2M Hill.

USAED. 2011d. Draft Feasibility Study. Prepared by CH2M Hill.

USAED. 2009a. Taku Gardens: Investigation of 1,2,3 TCP Contamination Plume. Prepared by Jacobs Engineering Group Inc.

USAED. 2009b. Taku Gardens EM61 Hotspot Excavation Tech Memo. Prepared by Jacobs Engineering Group Inc.

USAED. 2009c. Taku Gardens: Delineation of Northern Groundwater Plumes. Prepared by Jacobs Engineering Group Inc.

USAED. 2009d. Taku Gardens PCB Area Foundation Demolition Technical Memorandum. Prepared by Jacobs Engineering Group Inc.

USAED. 2009e. Taku Building 49 Drum and Debris Removal. Prepared by Jacobs Engineering Group Inc.

USAED. 2009f. Taku Gardens Installation of Monitoring Wells North of the Site. Prepared by Jacobs Engineering Group Inc.

USAED. 2009g. Taku Gardens Sound Berm Additional Sampling Locations. Prepared by Jacobs Engineering Group Inc.

USAED. 2009h. Taku Gardens Sampling of Contaminated Soil Pile. Prepared by Jacobs Engineering Group Inc.

USAED. 2008a (August). Munitions and Explosives of Concern Support Work Plan, Former Communications Site RI/FS, Fort Wainwright, Alaska. Final. Prepared by Jacobs Engineering Group Inc.

USAED. 2008b (August). 2008 Work Plan, Former Communications Site Drum and Debris Remedial Investigation. Final. Prepared by Jacobs Engineering Group Inc.

USAED. 2008c (May). Site Safety and Health Plan, Former Communications Site Drum and Debris Remedial Investigation. Final. Prepared by Jacobs Engineering Group Inc.

USAED. 2007a (March). Preliminary Source Evaluation I Report, Taku Gardens, Fort Wainwright, Alaska. Prepared by Oasis Environmental Inc.

USAED. 2007b (May). Preliminary Source Evaluation II Report, Taku Gardens, Fort Wainwright, Alaska. Prepared by North Wind Inc.

USAED. 2007c (August). Long-Term Soil Stockpile Plan, Former Communications Site Remedial Investigation/Feasibility Study, Fort Wainwright, Alaska, Final. Prepared by Jacobs Engineering Group Inc.

USAED. 2007d (August). Communications Plan, Former Communications Site RI/FS, Fort Wainwright, Alaska. Final. Prepared by Jacobs Engineering Group Inc.

USAED. 2007e (August). Site Safety and Health Plan, Former Communications Site RI/FS, Fort Wainwright, Alaska. Final. Prepared by Jacobs Engineering Group Inc.

USAED. 2007g (September). Munitions and Explosives of Concern Support Work Plan, Former Communications Site RI/FS, Fort Wainwright, Alaska. Final. Prepared by Jacobs Engineering Group Inc.

USAED. 2007i (October). 2007 Work Plan, Former Communications Site PCB Removal Action, Final– Revision 1. Prepared by Jacobs Engineering Group Inc.

USAED. 2004. Geotechnical and Chemical findings Report. Prepared by the Corps of Engineers.

Appendix A

Institutional Controls

The OU5 ROD established a comprehensive site wide approach to ICs at the Fort Wainwright NPL site for all source areas where the respective RODs specified ICs as an element of remediation. Table A-1 describes the institutional control commitments of the OU5 ROD. The IC policy applies to all USAG-AK units and activities, Military and Civilian Support Activities, Tenants Organizations and agencies and Government and Civilian Contractors. Site specific ICs are discussed in individual OU sections of the Report and in Table A-2.

Major commitments to a site-wide IC program included the following:

Table A-1 Institutional Control Commitments in OU5 ROD

IC Commitment	Status of IC Program
Developing SOPs to identify the objectives to be met by the restrictions, to identify all land areas under restriction, and to specify the particular restrictions, controls, and mechanisms to be used.	SOPs have been developed that meet the identified objectives and ensure the land and use restrictions are enforced. A copy of these SOPs is included in this Appendix.
Create and maintain a database and tracking mechanism to identify restricted land areas, objectives to be met by the restrictions, and the specific restrictions, controls, and mechanisms.	The Army has developed a GIS layer for tracking LUC/ICs on Fort Wainwright. The GIS includes spatial extents, contaminants of concern, and a summary of the restrictions for each LUC/IC on Fort Wainwright. Additional details regarding LUC/ICs are maintained in a Word document. This document provides a table for each site that describes in greater detail the ICs, the objectives to be met by the restrictions and any specific restrictions, controls, and mechanisms. The GIS database and Word document are continually updated and additional information is added where applicable.
Monitoring of SOP compliance at quarterly scheduled FFA meetings.	Compliance with Institutional Controls is discussed at FFA meetings. Based on an agreement by all RPMs, the frequency of the FFA meetings has been reduced to twice a year instead of quarterly.
As part of the O&M report for each OU, assess the condition of areas at Fort Wainwright subject to ICs. These inspections will determine the effectiveness and protectiveness of all ICs and designated land uses, and will ascertain whether the current land and groundwater uses in the area are consistent with the ICs and all MCLs outlined in the relevant decision document governing that site or OU.	The IC system has been incorporated into the post wide Master Plan. A section will be added to the Annual Monitoring Reports that specifically discusses the current effectiveness and protectiveness of ICs at each of the OUs. Additionally, the Army is developing the information that will be included in an Annual Institutional Control Report for Fort Wainwright beginning in 2011.

Table A-1 Institutional Control Commitments in OU5 ROD

IC Commitment	Status of IC Program
Results of any field inspection will be documented in the annual O&M report submitted for the OU pursuant to the remedial action report.	Inspections conducted at the OU sites will be discussed in Annual Monitoring Reports beginning in 2011.
USAG-AK will notify the EPA and ADEC immediately upon discovery of any unauthorized activity that is inconsistent with the IC SOPs. The USAG-AK will issue a stop work or stop activity notice on discovery of any unauthorized work. The stop work or stop activity notice will remain effective until the EPA, ADEC, and USAG-AK determine a plan of action to resolve the unauthorized change.	USAG-AK has notified the EPA and ADEC immediately upon discovery of any unauthorized activity inconsistent with the IC SOPs and will continue to do as well as stopping unauthorized work activity if the circumstance arises.
USAG-AK will notify the EPA and ADEC at least 6 months in advance about any transfer, by sale or lease, of areas of Fort Wainwright that are subject to ICs, to ensure adoption of such additional measures as may be needed to assure continued compliance with ICs on such transferred property. Before actual transfer of land management responsibilities to the Bureau of Land Management or another federal agency or department or to a private party, the Army will provide such transferee a written copy of installation master-planning documentation that identifies all ICs remaining in force.	No land transfers have occurred in the last five years. USAG-AK will notify the EPA and ADEC in advance in the event that a transfer, by sale or lease, of areas of Fort Wainwright that are subject to ICs is being considered,
SOPs are a component of the five-year review process.	A copy of the Fort Wainwright Land Use Controls/Intuitional Controls Garrison Policy #49 that includes standard operating procedures is included as Attachment 1 of this Appendix. SOPs that were adopted by USARAK at the close of the OU5 ROD with input from EPA and ADEC and updated 19 September 2009 are included as Attachment 2 of this Appendix.

Table A-2 Site Specific Institutional Controls

Operable Unit	Site Specific ICs	IC Status
Operable Unit 1[1] – 801 Drum Site	Institutional controls include restrictions governing site access, construction, and well development or placement as long as hazardous substances remain on site at levels that preclude unrestricted use. Institutional controls ensure that the groundwater will not be used until federal and state MCLs are attained, except for activities undertaken to initiate the selected remedies detailed in the ROD.	ICs are in place, and an informational sign was installed at this source area in 2001 to inform the public of restricted activities at this site; the sign was updated and repaired in 2004 and 2005. Since there is no surface contamination at the 801 Drum Burial Site, access to the area for non-intrusive activities is unrestricted. Excavation and groundwater intrusion at this source area is restricted subject to approval by DPW Environmental. No wells have been installed in the last five years.
Operable Unit 2[2] – DRMO Yard and Building 1168 Leach Well	Institutional controls at both of the OU2 source areas include restrictions on groundwater well installations, site access restrictions, and maintenance of fencing at the DRMO Yard until state and federal MCLs are met. Access is unrestricted at OU2 source areas except at DRMO. Additional ICs, include a limitation on refilling the DRMO Yard fire suppression water tank from the existing potable water supply well, until state and federal MCLs are met (except in emergency situations).	ICs at the DRMO site have been implemented. Access to the site is restricted by a chain-link fence. In 2005, an additional chain-link fence was installed that separates the treatment areas from the storage areas at the DRMO-1 area. In 2008, a fence was installed within the DRMO yard near the DRMO-5 subarea to secure equipment for troop deployment. Controlled access on the east side of the site is maintained by the operators of the DRMO facility, and controlled access from the west side of the site is maintained by the LBE group. ICs at the former Building 1168 site have been implemented. Excavation and groundwater intrusion is restricted subject to approval by DPW Environmental. Sitku housing has been constructed directly adjacent to former Building 1168.
Operable Unit 3 – Remedial Area 1b, Birch Hill Tank Farm; Remedial Area 2, Railcar Off Loading Facility; and Remedial Area 3, Mile Post Sites	No site specific institutional controls were established in the OU3 ROD for any of the OU3 source areas. However ICs were clarified in the ESD (Section 2.3), stating that a facility-wide institutional control policy was established in the OU5 ROD for Fort Wainwright that documents the general requirements the Army will undertake at Fort Wainwright to ensure effective institutional controls for OU3	Fort Wainwright has established a Post-wide IC policy for all known or suspected contaminated sites. ICs are in place at the OU3 source areas. Excavation on these sites is restricted and can only be authorized by DPW Environmental. Groundwater intrusion is also restricted and can only be authorized by DPW Environmental through the Dig Permit process.

Table A-2 Site Specific Institutional Controls

Operable Unit 4[3] – Landfill and Coal Storage Yard	ICs for the Landfill source area include access restrictions (i.e., posted signs, fencing around the inactive portion of the Landfill, 6-foot industrial-grade security fence with appropriate entry gates, deed restrictions on future land use, restrictions on groundwater well installation, restrictions on the use of wells, and well use advisories). ICs for the Coal Storage Yard source area include access restrictions (i.e., posted signs, deed restrictions on future land use, restrictions on groundwater well installation, restrictions on the use of wells, and well use advisories).	Site specific ICs are in place at the Landfill source area. An industrial-grade security fence with appropriate entry gates has been placed around the inactive portion of the Landfill and is monitored at least on an annual basis for breaches or overgrowth. An informational sign was installed. Excavation on these sites is restricted and can only be authorized by DPW Environmental. Groundwater intrusion is also restricted and can only be authorized by DPW Environmental through the Dig Permit process. ICs are still in effect at the CSY. Excavation on this site is restricted and may only be authorized by DPW Environmental. Groundwater intrusion is also restricted and may only be authorized by DPW Environmental.
Operable Unit 5[4]– Subareas WQFS1, WQFS2, WQFS3, EQFS, Remedial Area 1a, and OB/OD	Institutional controls for the WQFS1, WQFS2, WQFS3, EQFS source areas include restrictions governing site access, onsite construction, and well development or placement. The groundwater will not be used as a potable water source. ICs at Remedial Area 1a restrict residential development and access and include engineering and safety controls, such as maintaining fences around the source-area perimeter to restrict access by humans and terrestrial animals and signs to warn the public of the contamination and restrict human access. Because of concerns about potential human exposure to unexploded ordnance, the Army has institutional controls that provide monitoring and control of access to the OB/OD site.	ICs at the OU5 WQFS and EQFS areas have been implemented. No soil excavation can take place without prior briefings on potential concerns at the source area, knowledge of the procedures for handling contaminated soils on Fort Wainwright, and possession of a valid site-specific Fort Wainwright Excavation Permit. Groundwater intrusion at this source area is also restricted subject to approval by DPW Environmental through the Dig Permit process.. An informational sign was installed for these sites. ICs at the OU5 Remedial Area 1a have been implemented. A fence is in place around the perimeter of the Birch Hill Tank Farm. Although fence penetrations have been discovered, the Army has implemented ICs by following up with fence repairs each time a breach was discovered. Additionally, in order to address recurrent penetrations of the Birch Hill Tank Farm fence, a contractor field office has been established at the base of Birch Hill, within the fence line. No perimeter breaches have been observed since they arrived. Contractors have also reported increased MP surveillance in this area. It should also be noted that there is no risk of contact with lead contaminated soil during the winter months. The Army maintains ICs for the OB/OD by restricting access within the active range.

Table A-2 Site Specific Institutional Controls

Operable Unit 6 - Communications Site (Taku Gardens)	Interim land use controls on the site. The land use controls prohibit residential use and occupancy of the newly constructed housing units until all investigation and cleanup required under CERCLA is complete and coordination has been undertaken with requisite federal and state regulators. Land use restrictions prohibiting residential occupation of the site until all investigation and cleanup required under CERCLA to protect human health and the environment is complete and regulator coordination has been undertaken. Fencing and warning signs will be maintained around the perimeter of the site to restrict access. Groundwater restrictions prohibiting the drilling and use of water wells for potable water, fire suppression, irrigation or other consumptive purposes Land use restrictions prohibiting soil disturbing activities associated with construction or renovation of new or existing facilities to include residential and commercial construction, road repair and realignment, utility work, digging, trenching, excavation, paving or drilling of soil borings, except when such activities are carried out in accordance with an Excavation Clearance Request approved by the Army in consultation with EPA and ADEC.	ICs at the TAKU site have been implemented. The housing has not been occupied. Investigations are ongoing, access is restricted by fencing, and warning signs are in place. Excavation on these sites is restricted and can only be authorized by DEC/EPA/DPW. Groundwater intrusion is also restricted and can only be authorized by DEC/EPA/DPW.

[1] The following suspected source areas were recommended for no further action under the OU1 ROD: the Utilidor Expansion Drum Site, the Beacon Tower Landfill, the Blair Lakes Drum Site, Building 3015, Burial Site M, the Building 1128 Transformer Storage Yard, the Trainor Gate Railroad Spur, the Runway Radioactive Waste Site, the Birch Hill Radioactive Waste Site, Building 1567, Site N4, the Transformer Storage Yard East of Building 3019, the Alaska Railroad Storage Yard, Building 2250 (pesticide storage area), the Drum Site South of the Landfill, and the Engineers Park Drum Site. These area are currently covered under *the Land Use Controls/Institutional Controls Garrison Policy #49*, dated 28 December 2010. There are no specific ICs for these sites.

[2] Engineer Park Drum Site south of the Landfill and Building 3477 were determined to need NFA with no specific ICs. Tar Sites are to be managed under the solid waste program.

[3] The Fire Training Pit site was NFA with no specific ICs.

[4] Two source areas investigated in Operable Unit (OU) 5 were identified for no further action. These NFA source areas are were the Former Explosive Ordnance Disposal (EOD) Range (Blair Lakes Alpha Impact Area) and nine Motor Pool Buildings

Status of Institutional Control Program

Standard Operating Procedures were adopted by USARAK at the close of the OU5 ROD in 1999 with input from EPA and ADEC. In the fall of 2001, the Institutional Control Memorandum signed by Major General Cash dated February 1999, was updated to require a Work Authorization Permit for all groundwater and soils on USAG-AK lands. This revised memorandum, signed by the Commanding General, includes a section on areas with ICs mandated by a Record of Decision, and a section on areas where contamination is not suspected. Currently, all contracts that include intrusive activities require a Work Authorization Permit. The Permit was updated in May 2011 to clearly alert the user about procedures to follow when potential contamination is encountered. The USARAK SOP was updated 19

September 2009 (included as Attachment 2) and currently outlines Garrison Fort Wainwright by reference.

A US Army Garrison Fort Wainwright Policy #49 was completed and signed on 28 December 2010 to update and disseminate the Land Use Controls/Institutional Controls Policy for US Army Garrison Fort Wainwright. This policy, signed by Colonel Timothy A. Jones further identifies institutional control policy on Fort Wainwright. A copy of the IC policy is included as Attachment 1. There have been no changes in IC boundaries or additional ICs since the Second Five Year Review. A map depicting the boundaries of all sites on Fort Wainwright where IC's are in effect is also provided in this Appendix.

Implementation of the Institutional Control Policy

A flow chart was developed that further clarifies the implementation of the Institutional Control Policy on Fort Wainwright. The flow chart is included as Attachment 3 and described below

Planning

Many projects that are planned on Fort Wainwright are never completed due to funding, mission, or other factors. At DPW Environmental, projects to be completed are compared against established institutional controls and historical knowledge. The following are four types of projects that go through the planning process:

- MILCON Projects go through a needs analysis. This process is defined by an Army directive titled *Real Property Project Siting, Re-Siting and Land-Use Changes Approval Process* dated 23 July 2007. Based on land use requests and needs, projects are evaluated with a PES (Preconstruction Environmental Survey.) The PES categorizes the site based on institutional controls and historical information concerning potential contamination at the site.
- Projects submitted to Director of Public Works go through a Facilities Engineering Work Request pathway that includes information from DPW Environmental about potential intuitional controls or other contaminant history information that would affect the proposed project.
- Projects submitted by tenants on Fort Wainwright, such as Doyon Utilities for public utilities or RCI for housing, are required to go through the work request process.
- Environmental Contract work such as activities associated with remediation and monitoring at Operable Unit sites goes through RPMs for approval of work in contaminated areas.

When a project is scheduled for design and there are significant environmental concerns, these concerns are discussed with RPMS. Future scoping may involve literature or photographic search or a work plan for investigations.

Design

The design phase of a project goes through an evaluation to determine if a Dig Clearance will be required based on planned ground disturbing activities. The Dig Clearance (or Excavation Clearance Request) is a form that releases permission from various Army departments and describes any potential conflicts associated with planned projects. DPW Environmental provides any additional site specific institutional controls that exist on the property that have been described in a Record of Decision or other decision document. In addition, direction from the DPW Environmental Signer instructs contractor to "stop work and contact DPW if contamination

is found". No project on post that involves digging more than six inches can proceed without a dig clearance. Only DPW Environmental Restoration employees are authorized to sign the Dig Clearance for environmental concerns. Information about institutional controls in contaminated areas on post is maintained in the Fort Wainwright Administrative Library.

A GIS database system is being developed that will streamline the process of controlling and disseminating institutional control information. Elements of that system include a map identifying source areas with ICs and a database that describes each source area with institutional controls and land use controls.

If regulatory IC/LUC issues are identified during the dig permit and IC review process, then these concerns are discussed with RPMS.

Once the Excavation Clearance Request is signed, it will inform contractor about historic activities at the project location. This information is valuable in developing site specific health and safety plans and site specific information.

Construction

Workers are directed to follow standard operating procedures outlined in the *Land Use Controls/Intuitional Controls Garrison Policy #49* when conducting project activities on Fort Wainwright, keeping in mind that they are working on a historic military base that is a CERCLA site listed fence to fence. If unexpected soil or groundwater contamination is encountered, contractors are directed to "Stop work and contact DPW". DPW then contacts DEC/EPA to discuss and report further action.

GIS Database

The U.S. Army Garrison Fort Wainwright Land Use Controls (LUC)/Institutional Controls (IC) have been added to the GIS. The GIS includes the boundaries of each LUC/IC as well as a summary of the contaminants of concern and restrictions present at each site. In addition, a detailed description of each LUC/IC has been summarized in a word document. The word document includes:

- Source Area Name
- AEDBR Number - Army Identification Number
- FFA Designation – CERCLA Operable Unit, 2-Party Site, etc
- Source Area Status – Active, NFA, Closed, etc
- Media of Concern – soil, groundwater, etc
- Contaminant(s) of Concern –DCA, TCE, BTEX, etc.
- Soil LUC/IC – Either specific ICs outlined in a decision document, or general ICs outlined on the FTW policy #49 and objectives to be met by the restrictions
- Water LUC/IC - – Either specific ICs outlined in a decision document, or general ICs outlined on the FTW policy #49 and objectives to be met by the restrictions
- Source Area Description – Includes historical informal information about the site
- Reference Documents – Where information about the site can be accessed.

An example of records that are entered into the GIS is provided as Attachment 4 and an example of the information included in the word document is provided as Attachment 5. The GIS and the word document provide a tracking mechanism for sites that have land area restrictions. The GIS and word document continue to be reviewed and updated to ensure the LUCs/ICs are complete and the restrictions are enforced across the installation. Current updates to the GIS should be accomplished by winter 2012.

Institutional Controls Effectiveness

During the past few years, there have been numerous instances confirming the effectiveness of the Institutional Control policy at Fort Wainwright. One example is proposed realignment of the railroad through Fort Wainwright. In January 2007, the Alaska Railroad (AKRR) contacted the US Army at Fort Wainwright with a proposal to realign the railroad on a different route through Fort Wainwright. The purpose of the realignment was to decrease the AKRR time through the FWA Post to North Pole, minimize rail travel in the cantonment area, and to provide for enhanced strategic mobility for the Stryker Brigade Combat Team.

Through FWA Master Planning and DPW Environmental, this proposal was compared against various maps and information available regarding the proposed route the AK Railroad wished to take. The route would interfere with Institutional Controls at Bldg 1168, the Landfill Cap, and access across contaminated soils at DRMO. Communication was coordinated with RPMs to determine how this project could proceed given the institutional controls in place.

Ultimately this project was modified to be completed off post, partly due to the proposed routes going through contaminated areas controlled by institutional controls and the cost associated with remediation in those areas.

The IC policy has also been effectively applied to construction projects on post. For example, a construction project was planned for a paving project at the historic Post motor pool at Bldg 3485. The IC policy was implemented starting with information the contractor about previous work completed at Bldg 3485 as part of a CERCLA investigation for a motor pool. (A LUST tank #321 was removed and closed at this site. The building was determined to be a no further action site based on closure activities for tank #321). This was the only historic record of a tank at this site.

Additional standup pipes were visible during a walk through at this site indicating that additional tanks may be present. The dig clearance report requested that any contamination discovered during construction be reported so DPW environmental can respond appropriately. Three petroleum tanks were discovered at this site. In order to comply with regulatory and IC policies, construction activities were halted until the LUST issues could be dealt with appropriately.

Response actions were coordinated with ADEC and included removal of the tanks and associated piping in accordance with LUST requirements, removal and treatment of 804 cubic yards of contaminated soil, confirmation soil sampling and installation of monitoring wells with additional site evaluation to determine the extent to contamination.

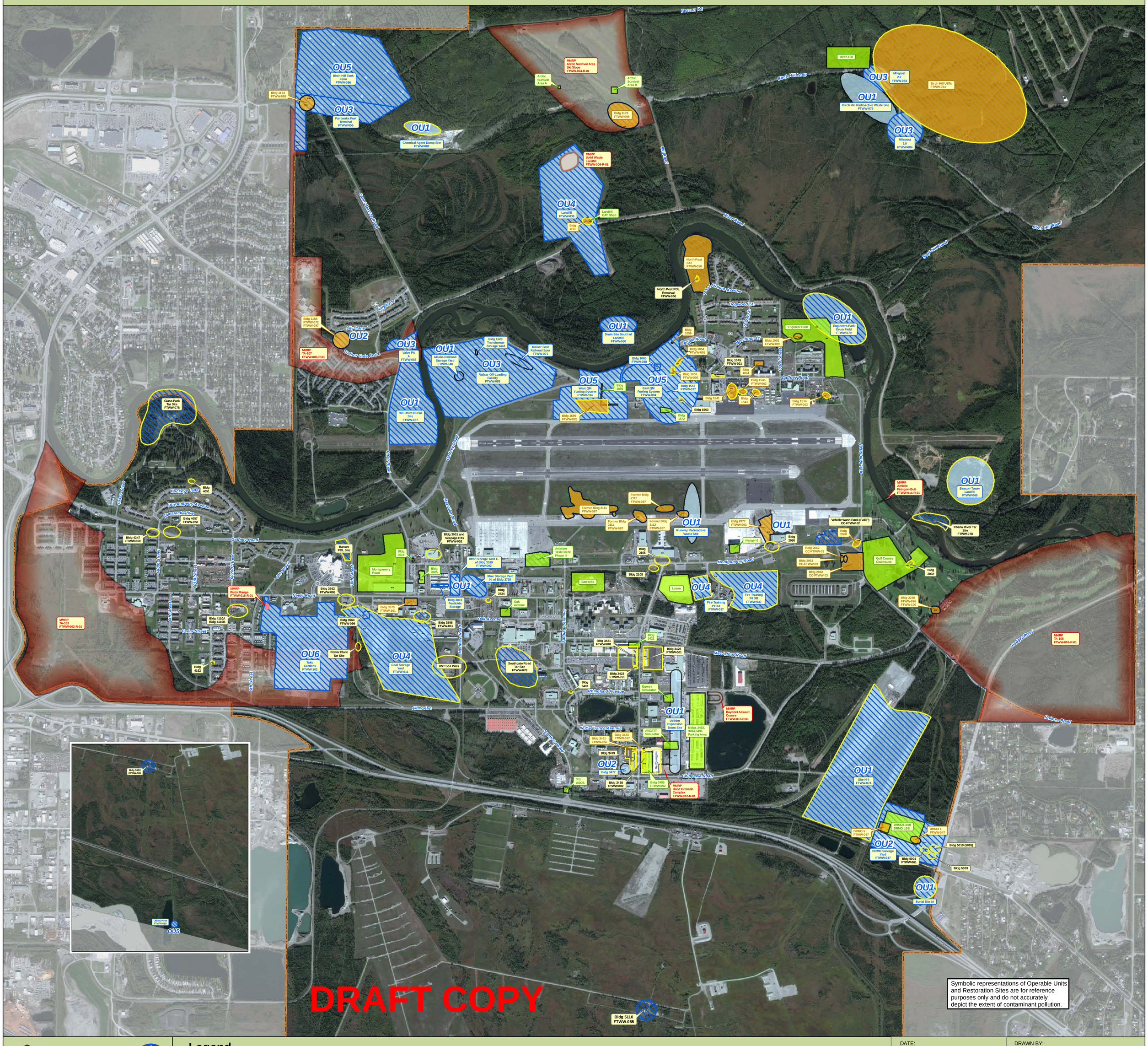
Recommendations and Follow-Up Actions

Recommendations and follow-up actions for the IC program are shown in Table A-3.

Table A-3 Recommendations and Follow-Up Actions for IC Program

Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Yes/No)
Perform post-wide IC inspection and evaluate protectiveness. Update restricted use boundaries in GIS as new information becomes available.	U.S. Army	EPA, ADEC	Update GIS - Ongoing	No
Develop the parameters for a Annual Report of IC effectiveness and corrective actions taken.	U.S. Army	EPA, ADEC	Spring 2012	No
Update the database of the LUC/IC Summary Documents (Attachment 5 of Appendix A) needs to be. A target completion of two years would satisfy DEC.	U.S. Army	EPA, ADEC	October 2013	No

Restoration Sites On Fort Wainwright, AK



USAGFWA GIS
Fort Wainwright, Alaska.

This data provided for reference use only.
For information on current USAGFWA data and maps, please contact USAGFWA ENV GIS at 907-361-4184

Legend

- Operable Units
- CERCLA Land Use Controls in Place
- 2-Party Sites
- Sites Under Investigation
- No Further Action Sites
- MMRP Sites

N

0 500 1,000 Meters

0 0.25 0.5 Miles

DATE: 8/24/11	DRAWN BY: S.STASKA
FILE NAME: JN 06071101 Restoration Sites Map.mxd	
FILE PATH: O:\Environmental\GIS_ENV_DERA\GIS_PROJECTS\2011\JN 06071101 Restoration Sites Map Update\Maps\	

Attachment 1

Land Use Controls/Institutional Controls
LUC/IC Garrison Policy #49, Fort Wainwright

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON FORT WAINWRIGHT
1060 GAFFNEY ROAD #6000
FORT WAINWRIGHT, ALASKA 99703-6000

REPLY TO
ATTENTION OF:

IMPC-FWA-PWE

28 December 2010

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Land Use Controls/ Institutional Controls (Garrison Policy #49)

1. References:

a. AR 600-20, Army Command Policy, 27 April 2010.

b. AR 200-1, Environmental Protection and Enhancement, 13 December 2007.

c. Memorandum: DUSD (ES/CL), Policy on Land Use Controls Associated with Environmental Restoration Activities, 17 January 2001.

d. Executive Order 12580, Implementation of Superfund, 23 January 1987, as amended by Executive Order 13308, 20 June 2003, Further Amendment to Executive Order 12580, as Amended, Superfund Implementation.

e. 40 CFR 300, National Oil and Hazardous Substances Pollution Contingency Plan.

f. 42 USC 9601 et seq. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as Amended by the Superfund Amendment and Reauthorization Act of 1986.

g. 10 USC 2710(b) Military Munitions Response Program, Inventory of UXO, DMM, and MC Defense Sites other than operational ranges.

h. US Army Garrison Fort Wainwright (USAG FWA) Federal Facility Agreement as amended under CERCLA Section 120, Administrative Docket Number: 1092-04-10-120 April 2007.

i. USAG FWA Land Use Controls/ Institutional Controls Standing Operating Procedures (SOP).

j. USAG FWA Land Use Controls/ Institutional Controls Potential Source Area List w/ Status.

2. Purpose: To update and disseminate the Land Use Controls/ Institutional Controls (LUC/IC) Policy for USAG FWA.

3. Applicability:

a. This policy applies to all individuals, units, directorates, activities, organizations, partners and tenants which includes the U.S Army Corps of Engineers in its entirety, all Prime and Sub-Contractors, and Consultants; all personnel working for contractor owned, contractor operated facilities and operations; Government Owned, Contractor Operated facilities and operations; and personnel living, working, or conducting other authorized activities on USAG FWA controlled lands and are therefore responsible for complying with all established LUC/ICs identified in this document.

b. These LUC/ICs cover all contiguous and non-contiguous properties under the control of USAG FWA.

c. Specific land use restrictions cited in this policy, the USAG FWA Land Use Controls/Institutional Controls (LUC/IC) Standard Operating Procedures (SOP), the USAG FWA Land Use Controls/

Institutional Controls Potential Source Area List w/ Status, as well as those established in the Comprehensive Environmental Response Compensation and Liability Act Record of Decisions, shall be incorporated into all lease agreements, Memoranda of Agreement, and contract documents, as necessary, to reduce the potential for exposure to environmental hazards.

d. In addition to these LUC/ICs, all units or personnel entering USAG FWA Ranges and Training Areas shall also comply with the directives of the Range Control Officer and the Range Control SOP.

e. Penalties for violating this policy include the full range of statutory and regulatory sanctions for military and civilian personnel according to the following citations:

(1) For military personnel, the Uniform Code of Military Justice (UCMJ) Article 92(1), violation of a lawful general regulation, and service-specific regulations.

(2) For civilian personnel, Army Regulation (AR) 690-700, Chapter 751; and the Code of Federal Regulation, Title 5, Chapter 1, Part 752. Commanders should contact their servicing civilian personnel activity for assistance concerning punitive actions for civilian personnel.

4. Procedures: The Directorate of Public Works (DPW) shall ensure that the following standard operating procedures are in place to comply with this policy:

a. All construction, maintenance, repairs, and authorized training activities conducted anywhere within active ranges and training areas that involve soil disturbing activities impacting soils six inches or more below the ground surface in known contaminated areas, shall comply with LUC/ICs requirements in addition to Range Control directives and SOPs.

b. All soil disturbing activities impacting soils six inches or more below the ground surface anywhere on the installation must have a DPW approved DA Form 4283 (Work Order) or DPW approved Service Order, a signed and approved Excavation Clearance Request (ECR) from DPW Customer Service Desk and a completed and signed Project Checklist for Environmental Concerns. During this process, DPW Environmental personnel will identify applicable LUC/ICs, identify known or suspected contamination, and other pertinent information and requirements. This process shall be followed for the listed activities which include but are not limited to the following:

(1) Installation, maintenance, and removal of facilities, infrastructure, landscaping, and private fence/gates in North Haven Communities and Army Family Housing.

(2) Installation, maintenance, and repair of facilities, infrastructure or utilities by DPW workers, service contractors, privatized utility or privatized housing partners, organizations, tenants, Soldiers, units and Family Housing residents.

(3) Military Construction Army (MCA) contracts for facilities, utilities, ranges or other infrastructure.

(4) Landscaping, erosion control, Storm Water Pollution Prevention mitigations or similar activities anywhere on the installation.

(5) Installation of investigative test pits, soil borings, remediation systems, dewatering wells, monitoring wells, or potable water wells for whatever reason. Submission of the request for installation and justification for dewatering or potable water wells shall be coordinated through the DPW Environmental Office no less than 365 days prior to installation of the wells.

c. If any of the above listed activities occurs in an area of known or suspected contamination, the Work Order shall be accompanied by a US Army, EPA and ADEC approved Work Plan that is written and submitted by the proponent of the work that addresses the following:

(1) The nature of the contaminants of concern.

(2) How the construction workers will deal with the contaminated media.

(3) Protection of existing ground water monitoring wells.

(4) Decommissioning of existing ground water monitoring wells that must be removed to facilitate the construction of new facilities or infrastructure.

(5) Installation of new or replacement ground water monitoring wells

(6) Construction and maintenance requirements for long-term contaminated soil stockpiles.

(7) Final disposition of the exhumed contaminated material.

(8) How the remaining/residual contaminated media will be mitigated to prevent future accidental exposure to contaminants of concern.

d. The discovery of readily identified or potentially hazardous waste, buried waste containers, discarded military munitions, unexploded ordnance, munitions debris, "unusual debris" or other forms of contamination in surface soil, sub-surface soil, ground water, or indoor/outdoor air within the cantonment area shall comply with the following process:

(1) Immediately cease all work or training, move away from the area and notify the DPW Environmental Division at 361-9686 and await further guidance before proceeding with any other soil disturbing activity.

(2) If DPW cannot be reached, call the emergency responders (911 on post) or 353-9170 if calling from a cell phone or Family Housing Area.

(3) If these items are found within an active training area or range, immediately move away from the area and notify Range Control via radio or call 353-1244.

(4) Tenant's or contractor's signature on an ECR acknowledges their understanding of Army Reporting Requirements regarding new contaminant finds. Failure to report this contamination constitutes a violation of US Code and Army Regulations.

e. Newly identified contaminated areas that cannot be immediately remediated shall be added to the LUC/IC list within 90 calendar days of final investigation report on the area being received and approved by the Army, the EPA, and the ADEC.

f. DPW shall maintain all information and an electronic map of all Installation Restoration Program sites and Military Munitions Response Program Sites. The map shall be updated as soon as practicable but, within 90 calendar days of final investigation report on the area being received and approved by the Army, the EPA, and the ADEC.

g. Groundwater restrictions prohibit the drilling of water wells for potable water, fire suppression, irrigation or other purposes anywhere on the installation without written consent of the Garrison Commander or approved representative. Coordination for these activities must begin no less than 365 calendar days prior to the date required. DPW Environmental will provide the necessary coordination with the EPA and ADEC.

h. DPW shall sample and analyze ground water monitoring wells up-gradient from the Installation Drinking Water Supply wells to ensure no contaminants of concern are migrating towards these wells from adjacent contaminated sites. DPW shall ensure that the analytical test methods used are capable of detecting the contaminants of concern at levels that are protective of human health.

i. Construction on known or potentially contaminated areas will not proceed until the site has been properly evaluated for its intended use as follows:

(1) If Family Housing is planned for an area, investigative results will compare soil and groundwater results against unrestricted use scenarios. Occupants will be protected against exposure to hazardous levels of contaminants.

(2) If new or upgraded infrastructure or unoccupied industrial facilities are planned, engineering controls will be incorporated into the design to ensure construction workers are not exposed to contaminant levels exceeding the OSHA PEL.

(3) If volatile organic compounds or other hazardous materials are left in the soil or ground water under occupied building foundations, facility designs shall incorporate protective measures to prevent vapor intrusion into the breathing zone of the facility and prevent exposure to hazardous levels of sub-slab contaminants by occupants during normal activities.

j. DPW shall monitor sub-slab soil gas for all buildings in the Taku Gardens Family Housing area at each change of occupancy, but not less than every three years or until the US Army, EPA and ADEC agree the monitoring is no longer required.

k. DPW shall ensure the disposal of contaminated soil or groundwater approved for removal from the work site must be containerized and disposed of per IAW USARAK Pamphlet 200-1, Hazardous Materials and Regulated Waste Management.

l. Implementation details shall be updated in the USAG FWA Land Use Controls/Institutional Controls Standard Operating Procedures.

5. Modification or Revocation: Future modification or revocation of this policy shall be conducted in consultation with the EPA (Region 10) and the ADEC (Military Contaminated Sites Program).

6. The Point of Contact for this policy is Mr. Clifford A. Seibel, Directorate of Public Works, Environmental Division Chief at 361-6220 or email clifford.a.seibel@us.army.mil.

TIMOTHY A. JONES
COL, AV
Commanding

IMPC-FWA-PWE
SUBJECT: Land Use Controls/ Institutional Controls (Garrison Policy #49)

DISTRIBUTION:
DIST A (FWA)
CDR, 1/25TH SBCT
CDR, 16TH CAB
DIR, DPW
DIR, DPTMS
DIR, DOL
DIR, DFMWR
DIR, DHR
OIC, SJA
C, Garrison Public Affairs
C, Garrison Safety Office
OIC, Preventive Medicine

Attachment 2

USARAK

September 2009 LUC/IC Standard Operating Procedures

US Army Alaska Institutional Controls
Standard Operating Procedures

1. Purpose: These Standard Operating Procedures establish the responsibilities, policies and procedures for complying with Department of Defense (DOD), Department of the Army (DA), and US Army, Alaska (USARAK) regulations as well as Federal and State Laws for instituting, maintaining, and enforcing Institutional Controls (IC) on Federal Facilities.

IC's are established when contamination remains in soil or groundwater and a decision is made to restrict land use and access. IC's include Excavation Clearance Requests (ECR) aka dig permits, signage, fences, and monitoring. IC areas are designated on the installation master plan and are regularly updated.

These controls have been established to implement the selected final and interim remedial actions agreed upon by the US Army (Army), the US Environmental Protection Agency (EPA), and the Alaska Department of Environmental Conservation (ADEC) in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act as amended by the Superfund Amendment Reauthorization Act. The details of these agreements may be found in the Decision Documents (DD) and Records of Decision (RODs) which are maintained in the Directorate of Public Works, Environmental Office. These agreements have been executed in accordance with the authority cited in Section 4 of this document.

These controls also apply to remedial actions agreed upon under Two-Party Compliance Agreements. These agreements are concluded between USARAK and ADEC and apply to petroleum/oil/lubricants- (POL) contaminated sites.

IC's are legal or administrative actions designed to minimize the risk of human exposure to a hazardous substance. The establishment of IC's substantially reduces the costs of cleanup while maintaining essential health and safety requirements. Violation of IC's may significantly increase the costs of site maintenance and cleanup. IC's, including limitations and restrictions to human access, water use, and property transfer restrictions will supplement engineering controls as appropriate for short and long term management to prevent or limit exposure to hazardous substances.

These controls have been established to prohibit and or limit access to or use of the land, surface water, ground water, and are applicable to all known or suspected contaminated sites. The following are examples of the restrictions agreed upon in Decision Documents and RODs:

a. Prohibitions or limitations on the construction or renovation of new or existing facilities to include residential area new construction, road repair and realignment, utility work, digging, trenching, excavation, paving, or drilling of soil borings and wells.
b. Recreational use of natural resources i.e., camping, fishing, hunting etc. and training activities i.e., bivouac, combat maneuvers, land navigation, construction of fighting positions, etc. can be prohibited or limited depending on the type of contaminant present.
c. Groundwater restrictions prohibit the drilling of water wells for potable water, fire suppression, irrigation or other purposes.

These restrictions remain in place until EPA, ADEC and the Army mutually decides the contamination has been reduced through cleanup activities or natural attenuation to levels protective of human health and the environment. In making their decision, EPA, ADEC, and the Army will consider levels specified in a ROD or other decision document. If no decision document exists, EPA, ADEC, and the Army will consider the application of maximum contaminant levels (MCLs) for potable groundwater or risk based concentrations for soil, sediment, surface water and other uses of groundwater.

2. Scope: These Standard Operating Procedures apply to all USARAK units and activities. They also apply to Military and Civilian Support Activities, Tenant Organizations and agencies, and Government and Civilian Contractors that occupy, use, build, repair, or maintain facilities on USARAK controlled lands.

3. Responsibilities:

a. The Garrison Commander or his designee shall approve all Decision Documents and Records of Decision regarding remedial actions and Institutional Controls on USARAK controlled lands in accordance with DA guidance. Garrison Commander shall also require compliance with these Decision Documents and Records of Decision.

b. Directorate of Public Works shall execute all aspects of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) in accordance with the Defense Environmental Restoration Program and as agreed upon in the Federal Facility Agreements and the Defense-State Memorandum of Agreement. Directorate of Public Works shall also:

1. Establish, maintain, and routinely update complete records of all known or suspected sites, restoration actions and IC's.
2. Maintain a database and Geographic Information System (GIS) based tracking mechanism to identify restricted land areas, objectives to be met by the restrictions, and the specific restrictions, controls, and mechanisms.

3. Ensure that all affected tenants and contractor organizations are informed of:
   a. Known soil and ground water contamination in their areas of operation.
   b. IC's associated with remedial activities.
   c. Potential human health risks and environmental impacts associated with violating the controls.
   d. Potential fines, penalties, and criminal implications resulting from violations of the IC's.
4. Provide oversight and review of all Excavation Clearance Requests (ECRs) to ensure that all activities that involve disturbance of soil or use of groundwater comply with current IC's.
5. Conduct on-site inspections as necessary of projects for which IC's are indicated or specified on an approved ECR. The inspections will determine compliance with IC's and with monitoring, reporting, notification, and stop work requirements specified in the ECR or its attachments.
6. Ensure all affected, contracting mechanisms (i.e., job order, contract, military construction, in-house projects, etc.) include the appropriate environmental information to prevent violation of IC's policies and prevent potential fines, penalties, and criminal implications resulting from violations of the IC's.

c. **Directorate of Logistics** shall determine the necessary protocols and language to be incorporated into applicable contract mechanisms to inform potential contractors of the environmental status of USARAK Installations regarding contamination. Such language or protocols will emphasize:

   1. Establish, maintain, and routinely update complete records of all known or suspected sites, restoration actions and IC's.
   2. The need for contractors to coordinate with DPW Environmental personnel prior to conducting any soil disturbing activities or gaining access to fenced or restricted areas associated with IC's anywhere on USARAK controlled lands.
   3. Potential fines, penalties, and criminal implications resulting from violations of the IC's.
   4. Contractor familiarity with and adherence to the requirements of USARAK 200-1 Pamphlet, Hazardous Materials and Regulated Waste Management.

d. **Directorate of Contracting** shall determine the necessary protocols and language to be incorporated into applicable contract mechanisms to inform potential contractors of the environmental status of USARAK Installations regarding contamination. Such language or protocols will emphasize:

1. The need for contractors to coordinate with DPW Environmental personnel prior to conducting any soil disturbing activities or gaining access to fenced or restricted areas associated with IC's anywhere on USARAK controlled lands.
2. Potential fines, penalties, and criminal implications resulting from violations of the IC's.
3. Contractor familiarity with and adherence to the requirements of USARAK 200-1 Pamphlet, Hazardous Materials and Regulated Waste Management.

e. **Directorate of Plans, Training, Security, and Mobilization (DPTSM)** shall:

1. Provide all troop units utilizing the training areas information regarding known and potential sources of contamination in the training areas;
2. Provide information regarding IC's and the potential fines, penalties, and Criminal implications resulting from violations of the IC's.
3. Provide (through the Integrated Training Area Management (ITAM) program) maps and related information regarding USARAK sites with ICs.
4. Attend IC's status update meetings as required by the Installation Commander.

f. **US Army Corps of Engineers, Alaska District** shall ensure that all contract mechanisms incorporate a complete section that provides a detailed explanation of the following information:

1. The environmental status of the installation in question and the existence of IC's and the potential fines, penalties, and criminal implications resulting from violations of the ICs;
2. The requirements for obtaining an ECR prior to performing any type of excavation, trenching, or disturbance of soil;
3. Immediate notification to the DPW Environmental office in accordance with this SOP and the IC Memorandum upon encountering any previously unknown contamination, drums, and debris including spills. In addition, a report shall be provided within 60 days of notification which will include response taken, analytical results, and key findings to include final disposition of hazardous and non-regulated wastes, contaminated soil and groundwater.
4. How to dispose of hazardous and non-hazardous wastes, contaminated soil and ground water, etc. from USARAK controlled lands in compliance with the requirements of USARAK 200-1

Pamphlet, Hazardous Materials and Regulated Waste Management.

g. **All DOD Personnel** responsible for initiating DA Form 4283, Work Request, are required to become familiar with the IC's within the immediate work area. All work involving the disturbance of soil anywhere on USARAK-controlled lands shall coordinate with the Directorate of Public Works and obtain proper authorization prior to the commencement of work.

1. Specific procedures and instructions will be provided by DPW Environmental office to personnel working in areas where IC's are in place. An after-action report is required as specified in the ECR within 30 days of job completion
2. If IC's are not specified on the ECR and contamination is found, the following apply:
   a. If contaminated soils, drums, unexploded ordnance, or unusual debris are found on or around any work site, the organization conducting the work shall stop work immediately and notify the DPW Environmental office at (907) 353-6489 or the Fire Department at "911" for on-post land lines or (907) 353-7470 for off-post land lines and cell phones in accordance with FWA Garrison Policy #22 and USARAK Pamphlet 200-1, *Hazardous Materials and Regulated Waste Management*. Work at the site is suspended until the area is cleared by the DPW Environment office. Site clearance by Range Control is required if any military munitions material is discovered.
   b. Contaminated soil or groundwater approved for removal from the work site must meet container type, sampling and analysis for potential contamination, marking and labeling, and moving and storage requirements specified in Pamphlet 200-1 (above) or as otherwise specified by DPW Environment office. Soil and groundwater shall not be removed from any part of the installation without written authorization from an authorized Army representative. All operations involving hazardous waste will be accomplished in accordance with USARAK Regulation 200-4, Environmental Quality: Hazardous Waste, Used Oil and Hazardous Materials Management and USARAK Pamphlet 200-1, Hazardous Materials and Regulated Waste Management.

h. **Civilian Tenant Organizations** shall coordinate all work involving the disturbance of soil or installation of a well anywhere on USARAK controlled lands with the Directorate of Public Works and obtain proper authorization prior to the commencement of work at which time they will be given the following:

1. Specific procedures and instructions will be provided by DPW Environmental office to personnel working in areas where IC's are in place. An after-action report is required as specified in the ECR within 30 days of job completion
2. If IC's are not specified on the ECR and contamination is found, the following apply:

   a. If contaminated soils, drums, unexploded ordnance, or unusual debris are found on or around any work site, the organization conducting the work shall stop work immediately and notify the DPW Environmental office at (907) 353-6489 or the Fire Department at "911" for on-post land lines or (907) 353-7470 for off-post land lines and cell phones in accordance with FWA Garrison Policy #22 and USARAK Pamphlet 200-1, *Hazardous Materials and Regulated Waste Management*. Work at the site is suspended until the area is cleared by the DPW Environment office. Site clearance by Range Control is required if any military munitions material is discovered.

   b. Contaminated soil or groundwater approved for removal from the work site must meet container type, sampling and analysis for potential contamination, marking, labeling, moving, and storage requirements specified in Pamphlet 200-1 (above) or as otherwise specified by DPW Environment office. Soil and groundwater shall not be removed from any part of the installation without written authorization from an authorized Army representative. All operations involving hazardous waste will be accomplished in accordance with USARAK Regulation 200-4, Environmental Quality: Hazardous Waste, Used Oil and Hazardous Materials Management and USARAK Pamphlet 200-1, Hazardous Materials and Regulated Waste Management.

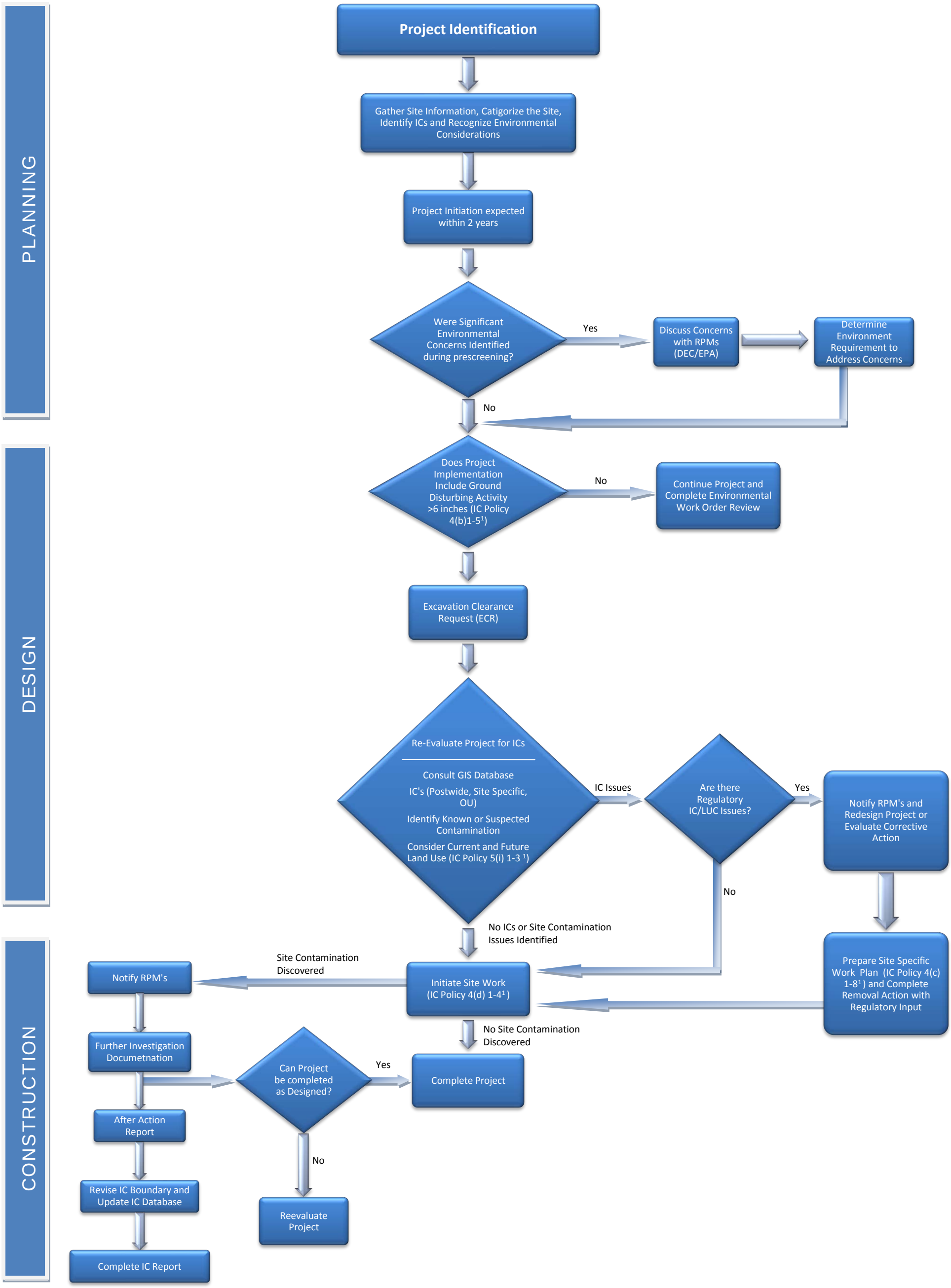
4. References:

a. FWA Garrison Policy #22 – Spill Reporting Requirements for All Units/Organizations and Activities on Fort Wainwright.
b. AR 200-1, Environmental Protection and Enhancement.
c. AR 200-2, Army Institutional Control Program Enforcement.
d. Interim Army Management Plan for Land Use Controls Associated with Environmental Restoration Activities: Memorandum, Dept. of the Army, USAEC 17 Aug 01.
e. USARAK Pamphlet 200-1, Hazardous Materials and Regulated Waste Management.
f. AR 210-20, Army Installation Master Planning.
g. 40CFR300, National Oil and Hazardous Substances Pollution Contingency Plan.
h. 42USC1901 et seq. Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as Amended by the Superfund Amendment and Reauthorization Act of 1986.
i. Federal Facility Agreements for Forts Richardson and Wainwright.
j. Defense-State Memorandum of Agreement.
k. Operable Unit Records of Decision and/or other decision documents as appropriate.

Attachment 3

Flow Chart Implementation of the Institutional Control Policy on Fort Wainwright

IMPLEMENTATION OF THE INSTITUTIONAL CONTROL POLICY
FORT WAINWRIGHT, ALASKA



[1] **Referenced section from Garrison Policy #49 *Land Use Controls/Institutional Controls***

Attachment 4

GIS Records Entry Example

ATTACHMENT 4

GIS Entry Record

Identify

Identify from: <Top-most layer>

land_use_area2
68

Location: 469,719.259 7,190,943.334 Meters

Field	Value
OBJECTID	68
Shape	Polygon
landuse_id	<null>
map_id	<null>
meta_id	<null>
media_id	Ground water, soil
coord_id	WGS84 UTM ZONE 6N
use_typ_d	<null>
use_name	<null>
use_desc	<null>
area_size	86.34966
area_u_d	Acres – 43,560 sq. feet.
perim	2409.169966
perim_u_d	Meters - 1.093614 yards or 39.3701 inches.
user_flag	Open, with ICs
instln_id	2871
facil_id	<null>
grid_value	<null>
coord_x	469637.222504
coord_y	7190968.667244
coord_z	<null>
garea_size	<null>
grant_name	<null>
class_d	<null>
year_coll	<null>
lscale	<null>
use_dis_d	<null>
duration	<null>
status_d	<null>
Shape_Length	2409.170335
Shape_Area	349444.771551
hazsite_id	FTWW-083
site_name	Railroad Off-Loading Facility
narrative	Tanks
oucode	OU3
ouname	<null>
subst_name	POL
restrict_soil	Excavation on this site is restricted and shall be authorized by DPW Environmental
restrict_gw	Groundwater intrusion on this site is restricted and shall be authorized by DPW Environmental
rem_sys	Several remediation systems (AS/SVE) are in place.
sitirp_id	2871-100
site_details	
site_type	
user_flag2	IC
report_title	Railroad Off-Loading Facility

Identified 1 feature

Attachment 5

LUC/IC Summary Document Example

Source Area Name	DRMO Salvage Yard
AEDBR Number	FTWW-047, FTWW-091
FFA Designation	CERCLA and 2 Party Agreement
Source Area Status	Active Operable Unit 2 and 2 Party Agreement
Media of Concern	Soil and Groundwater
Contaminant(s) of Concern	Benzene, TCE, Benzo(a)pyrene, Chlorinated Solvents, Pesticides, Vinly Chloride, 1,1,DCE, cis 1,2,DCE
Soil LUC/IC	Excavation on this site is restricted and must be authorized by DPW Environmental by approval of the excavation permit. Access is restricted with a chain link fence. Area is used to store mission critical connexes for deployments.
Water LUC/IC	Groundwater intrusion is restricted at this site. There are well development restrictions at this site. There is a prohibition against refilling the fire supression tank from the existing on-site well. Potable water supply on site must be tested on a regular basis for contaminants of concern.
Source Area Description	DRMO covers approximately 25 acres. It is located approximately 200 feet west of the Arctic Surplus Salvage Yard. Spills and improper storage and/or disposal are likely the source of contamination at this site though there may have been contributing historical operations. This site is made up of six subareas. Three subareas with petroleum and solvent contamination are part of Operable Unit 2. The other subareas are being remediated in an agreement with the State of Alaska (2 Party Agreement). The remedial investigation/baseline risk assessment was completed in 1994 and a Record of Decision was signed in April 1997. Active Air Sparge/Soil Vapor Extraction treatment occurred during the summer of 1997. Significant quantities of petroleum and smaller amounts of chlorinated solvents exist in the groundwater at this site. A potable water well is on site upgradient of the chlorinated source area and at a deeper depth than contamination. Potable water use is restricted and tested on a regular basis. Surface water in the form of a slough channel between the Chena River and the Tanana River lies along the back side of the DRMO yard. In 2002 institutional control limits were redrawn to include areas north of AP-6804 and AP-6807.
Reference Documents	Operable Unit Two Remedial Investigation/Baseline Risk Assessment and Record of Decision. Remedial Action design documents. Annual treatment, operation, and monitoring workplans and reports. CLOSES document completed for this site.

Appendix B

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
All	x	Draft OSWER Directive 9355.5-03B-P Comprehensive Five-Year Review Guidance			Draft
All	x	Interim Army Guidance for Conducting Five-Year Reviews	(No date on document)		
All		U.S. Army Restoration Program, Groundwater Monitoring Network, USACE	1991		
All	x	Federal Facilities Agreement	Mar-92	Once	Updated February 2007
All		IRP FY99, 1st Quarter Update	Jan-99	Quarterly	
All		IRP FY01, 2nd Quarter Update	Apr-01	Quarterly	
All	x	Installation Action Plan, 2001	Spring 2001	Annual	
All		Draft Minutes RAB FWA	Jun-00		
All		Community Relations Activities to Support Areawide Community Relations Plan	Jul-00		
All		Draft SOP for Mgmt of IDW FWA AK Sep 00	Sep-00		
All		SOP for Mgmt of IDW at FWA March 2001	Mar-01		
All		Geohydrologic Network Status Report 1998-2000 TM: FWA April 2001	Apr-01		
All		Five-Year review kick-off meeting summary dated Apr 01	Apr-01		
All		Mid Year Report VOC Emission Tracking Program for Treatability Study Systems at Fort Wainwright, AK	Jul-01		
All	x	Five Year Review Report for Fort Wainwright, Wood-Canyon, Sep-01	Sep-01		
All		Ft Wainwright post wide groundwater Monitoring Well Database	Dec-01		
All		Post-wide Groundwater Monitoring Well Database, update , Northwind, 2001			
All		CD: FWA Postwide G/W monitoring well database, 2001 update			
All		Final Monitoring Well Replacement Report Ft. Wainwright AK/ENSR Int.	Jan-02		
All		Semi Annual Report VOC Emission Tracking Program for IRP Treatment Systems	Jul-02		
All		FINAL Areawide Community Involvement Plan, January 2003	Jan-03		
All		Final Areawide Community Involvement Plan	Jan-03		
All		Spill Prevention Control and Countermeasure Plan, FWA dated May 2003	May-03		
All		Semi-Annual Report VOC Emission Tracking Program for 2003 IRP Treatment Programs	Jul-03		
All		Draft Decommissioning Monitoring Wells at FWA and FRA Work Plan dated September 2003	Sep-03		
All		Final Management Plan, Decommissioning Monitoring Wells FWA, FRA dated October 2003	Oct-03		
All		Fort Wainwright Groundwater Monitoring Program 2003 Report dated October 2003	Oct-03		
All		Community Relations Activities to Support Areawide Community Relations Plan	Nov-03		
All		Annual Report: VOC Emission Tracking Program for 2003 IRP Treatment Systems FWA dated Jan 2004	Jan-04		
All		Draft Fort Wainwright EPCRA Tier II Report: January 1 - December 31, 2003 dated March 2004	Mar-04		
All		Draft Investigative-Derived Waste Management Area 2003 Annual Report dated March 2004	Mar-04		
All		Draft Investigative Derived Waste Management Area 2003 Annual Report	Mar-04		
All		SemiAnnual Report 2003, VOC Emission Tracking program for IRP Treatment systems, dated July 2004	Jul-04		
All		Semi-Annual Report VOC Emission Tracking Program for 2004 IRP Treatment Programs	Jul-04		
All		Postwide Well Survey Grid Drawings and Postwide Survey Database FWA June 2005	Jun-05		
All		Fort Wainwright Geohyrologic Network Status Report 1998 through 2002	Jan-06		
All		Draft 2005 Annual Report IDW Management Area, FWA	Feb-06		
All		Groundwater Monitoring, Picket Wells Report (June 96)	Jun-06		
1	x	OU1 ROD	Jun-97	One time plus amendments	
1		Remedial Design		Once	
		Records Search, Preliminary Source Evaluation, HLA	Feb-92		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		801 Drum Burial Site, Preliminary Source Evaluation 2, HLA	Apr-94		
1		Management Plan, OU1, Remedial Investigation/Feasibility Study, ENSR	Aug-95		
	x	Remedial Investigation Report, ENSR	Sep-96		
	x	801 Drum Burial Site Supplemental 1996 Investigation , ENSR	Jan-97		
	x	Proposed Plan for Remedial Action at Operable Unit 1, Final RI/FS, ENSR	Feb-97		
		Feasibility Study, OU1, ENSR	Feb-97		
		Rhizoshpere Enhanced Phytoremediation Work Plan, ENSR	May-97		
		Final RA Work Plan	Apr-98		
		Work Plan FWA036 Phytoremediation Study Site Closure Confirmation Soil Sampling	Jan-03		
		Site Safety and Health Plan 801 Drum Burial Site Groundwater Monitoring	Mar-03		
		Final QA Project Plan 801 Drum Burial	Mar-03		
		Phytoremediation Study Site Decommissioning Work Plan	Aug-03		
		Phytoremediation Work Plan	Sep-03		
	x	Memo from Dianne Soderlund to Cristal Fosbrook RE: 801 Rhizosphere-Enhanced Phytoremediation Treatability Study Soils	July 26 2000		
		Release Investigation Report/Corrective Action Plan, Abandoned Birch Hill Underground Storage Tank Farm Sites, OU1, Ecology and Environment, Inc.			
1		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		Operations Final Report for Drummed Waste Removal, OHM	Feb-93		
		Remedial Action Report, ENSR	Jan-99		
		1999 anl phyto progress rpt (3rd annual progr rpt) ou1 fwa apr 00	Apr-00		
		Revised Preliminary Draft Remedial Action Report, OU1, ENSR Consulting and Engineering, Aug-00	Aug-00		
		Draft annual progres repot 2000 for rhizosphere-ehnaced phyto study fwa apr 01	Apr-01		
	x	2001 Interim Remedial Action Report, ENSR	May-01		
		Fourth and Final Annual Progress Report 2000 for Rhizosphere Enhanced Phytoremediation Study, OU1, ENSR Consulting and Engineering, Aug-01	Aug-01		
		Draft Phytoremediation Study Site Closure	Jan-03		
		Final Removal Action Report, Phytoremediation Study Site Decom.	Sep-05		
1		Drawings/ as-builts		See RD and RARs	
1		O&M Manuals and Reports		Once	
		Draft Bldg 1168 O&M Manual OU2 FWA	Jan-00		
		Draft Final O&MM Manual 801 Drum Burial Site, FWA Sep 00	Sep-00		
		Final Operations, Maintenance and Monitoring for Operable Unit 1, 801 Drum Burial Site treatment system, ENSR Consulting and Engineering, Dec-00	Dec-00		
1		GW, SW, and air monitoring plans & reports		Annual	
		Third Annual Progress Report Rhizosphere Enhanced Phytoremediation Treatability Study	Apr-00		
		Mar 2000 G/W Sampling-801 Drum Burial Site, Jun 2000	Jun-00		
		OU1 CY-2000 Annual Groundwater Monitoring Report	Apr-01		
		Annual Monitoring Report for 801 Drum Burial Site at Fort Wainwright, OU1, ENSR Consulting and Engineering, Apr-01	Apr-01		
		Final 2002 801 Drum Burial Site Groundwater Monitoring Report FWA AK May 02	May-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
1		Draft QA Plan 801 Drum Burial Site	Dec-02		
		Final Site Safety and Health Plan 801 Drum Burial Site	Mar-03		
		Final SSHP & QAPP for 801 Drum Burial Site GW Monitoring, FWA	May-03		
		Final CLOSES Evaluation 801 Drum Site, FWA dated April 2004	Apr-04		
		Final 2003 Annual Groundwater Monitoring, 801 Drum Burial Site	Jun-04		
		2005 Quality Assurance Project Plan Addendum, OU1 Drum Burial Site	Mar-05		
		Draft 2005 Annual Groundwater Monitoring Report 801 Drum Burial Site dated June 2005	Jun-05		
		RA Phytoremediation Study Site Decommissioning	Sep-05		
		Final 2004 annual Report for the 801 Drum Burial Site Groundwater Monitoring	Mar-06		
		2010 Work Plan Operable Unit 1	Jul-10		
		2010 Monitoring Report 801 Drum Burial Site Operable Unit 1	Mar-11		
1		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		December 1996 Quarterly Well Sampling 801 Drum Burial Site, ENSR	Apr-97		
		March 1997 Quarterly Well Sampling, 801 Drum Burial Site, ENSR	Jul-97		
		June 1997 Quarterly Well Sampling, 801 Drum Burial Site, ENSR	Oct-97		
		Letter Report: Sept. 97 Quarterly Well Sampling 801 DBS, ENSR	Jan-98		
		Interim Progress Rpt., Rhizo-Enhanced Phyto Treatability Study, ENSR	Jan-98		
		Letter Report: March 98 Groundwater Sampling 801 DBS, ENSR	Jun-98		
		2nd Annual Progress Report, Rhizo-Enhanced Phtyo Treatability Study, ENSR	Mar-99		
		March 1999 Annual Well Sampling, 801 Drum Burial Site, ENSR	Apr-99		
		1999 Annual Phytoremediation Progress Report (3rd Annual), ENSR	Apr-00		
		March 2000 Groundwater Sampling, 801 Drum Burial Site, ENSR	Jun-00		
		March 2001 Annual Well Sampling, 801 Drum Burial Site, ENSR	Apr-01		
		2001 Annual Groundwater Monitoring-801 Drum Burial Site letter report	Apr-01		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2000	Jul-01		
	x	Fourth Annual Progress Report - Rhizosphere-Enhanced Phytoremediation, ENSR	Aug-01		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2002	May-02		
		Trip Report Phytoremediation Study Site Decommissioning 9/26,10/1, 10/7, 11/20	Dec-03		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2003	Apr-04		
		CLOSES Evaluation 801 Drum Burial Site Ft. Wainwright, AK	Apr-04		
		Memorandum Rport of Chemical Findings, Phytoremediation Study Site Decommissioning Postexcavation Confirmation Soil Sampling	Nov-04		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2004	Feb-06		
		801 Drum Burial Site Annual Groundwater Monitoring Report 2005	Mar-06		
2	x	OU2 ROD	Mar-97	One-time plus amendments	
2		Remedial Design		Once	
		OU2 Final Preliminary Source Evaluation 2, Phase 2, DRMO, HLA	Jul-93		
		North Post Site, Soil Pile Remediation, Project Report, Laidlaw Env. Svs.	Apr-94		
		OU2 Final Remedial Investigation/Feasibility Study Management Plan, HLA	Apr-94		
	x	OU2 Final Remedial Investigation Report, HLA	Jan-96		
	x	Proposed Plan for Remedial Action at Operable Unit 2, Army	Apr-96		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Work Plan Record of Decision, Design Study, OU 2, Hart Crowser	Jan-97		
2	x	Remedial System Design Report, ROD Design Study, OU2, Hart Crowser	Feb-97		
		Final Remedial Design/Remedial Action Plan, OU2, Bldg 1168 Source Area, HLA	Dec-97		
		Record of Decision, Design Study, OU 2, Hart Crowser	Feb-99		
		Draft Work Plan ADDENdum, DRMO Treatment System OU2, May 2001	May-01		
		Draft OU2 tmt & mon operations work plan SSHP & Schedule Oct 2001	Oct-01		
		Technical Memorandum Level Survey of Soil and Groundwater Monitoring Points at the DRMO Yard	Mar-02		
		Technical Memorandum Picket Well Analysis DRMO Yard	May-02		
		DRMO5 Treatment System Modification 35% Design Technical Memorandum	Jun-02		
		DRMO1 Tretament System Modification 35% Design Technical Memorandum	Jun-02		
		Technical Memorandum Recommended Soil Boring Locations West of DRMO Yard	Jun-02		
		Technical Memorandum Soil Vapor Extraction Well Sampling 3 Part AS/SVE Treatment System DRMO Yard	Sep-02		
		Technical Memorandum Groundwater Probe Sampling and Analysis DRMO-4 Subarea	Sep-02		
		Treatment and Monitoring Operations Work Plan, QA Project Plan and Site Health and Safey Plan	May-03		
		DRMO-1 Historical Data Review Technical Memorandum	Jul-03		
		Final 2003 Treatment and Monitoring Operations Work Plan OU2	Aug-03		
		Final Work Plan Addendum for Decommissioning of the Bldg 1168 (3Party) Site dated September 2003	Sep-03		
		Draft 2004 Treatment and Monitoring Operations Work Plan	Oct-03		
		Final 2004 Treatment and Operations Work Plan OU2 Ft. Wainwright AK	Mar-04		
		Draft 3 Part System Augmentation Work Plan OU2	Sep-04		
		2005 Work Plan OU2	May-05		
		Draft Revision 1 Site Characterization and Remediation Work Plan	Jun-05		
		Natural Attenuation Monitoring Work Plan	Mar-06		
		Final Monitoring Well and Soil Boring Installation Work Plan	Mar-06		
		Draft Work Plan, ROD Design Study			
		2004 Draft Project Schedule, OU2, Treatment and Monitoring Operations			
2		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		Remedial Action Report, North Post Source Removal Action, OHM Rem. Svs.	May-97		
	x	Remedial Action Report, Bldg. 1168, Hart Crowser	May-99		
		Monitoring Report Aug 1998 - April 1999 North Post DRMO1 and DRMO5 sites	Jun-99		
		Remedial Action Report, DRMO, Final Revision 01, ENSR	Aug-99		
		Remedial Action Report OU2	Aug-99		
		RAR, DRMO yard & Bldg 1168, OU2, FWA, Final	Jan-00		
		Final 1999 Comprehensive Annual Monitoring Report, DRMO, OU2, Hart Crowser, Nov-00	Nov-00		
		Draft 2000 Annual Monitoring Report, Bldg 1168 site TS, OU2, Jan 01	Jan-01		
		2000 Remediation System Operations Report, DRMO, Hart Crowser	Mar-01		
		Rem Sys Ops Draft Rpt at FWA Apr 01 (ROD DS)	Apr-01		
		Draft Comprehensive Annual Monitoring Report at FWA May 2001	May-01		
		Draft 01 Field season mon report ou2 bldg 1168 tx, fwa jan 02	Jan-02		
		OU2 DRMO 2001 Comprehensive Report, FWA AK May 2002	May-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Tech Memo: DRMO-1 Treatment System Expansion 35%, OU2, Northwind, Jun-02	Jun-02		
		Tech Memo: DRMO-5 Treatment System Expansion 35%, OU2, Northwind, Jun-02	Jun-02		
2		Tech Memo: Probe Sampling & Analysis DRMO-4 Sub Area, OU2, Northwind, Sep-02	Sep-02		
		Tech Memo: Soil Vapor Extraction Well Sampling 3-Party AS/SVE Treatment System DRMO Yard, OU2, Northwind, Sep-02	Sep-02		
		Annual Report Addendum, Operable Unit 2, dated May 27, 2003	May-03		
		Tech Memo: DRMO-1 Historical Data Review, OU2, Northwind, Jul-03	Jul-03		
		Final 2002 Annual Report, Operable Unit 2 dated October 2003	Oct-03		
		Final Tech Memo - Flow Meter Replacement DRMO 3-Party AS/SVE Treatment System, Dec 31, 2003	Dec-03		
		Draft Technical Memorandum DRMO Yard Groundwater Trichloroethene/Tetrachloroethene Concentration Trend Analysis	Jan-04		
		Final CLOSES Evaluation Bldg 1168 Site, FWA dated January 2004	Jan-04		
		Final CLOSES Evaluation DRMO Yard, FWA dated March 2004	Mar-04		
		Technical Memorandum: Soil Gas Screening Survey Results, DRMO-1 & DRMO-4 Subareas, dated August 2004	Aug-04		
		Final 2003 Annual Report OU2 dated December 2004	Dec-04		
		Final 2004 DRMO Annual Report, OU2, FWA	Dec-05		
		2005 Monitioring Report OU2	Mar-06		
		Biodegradation/Volatilization Bench Scale Treatability Study Results for TPH Contaminated Soils Located at North Post, OU2, Laidlaw Env. Svcs.			
		Final Remedial Action Report, DRMO Yard and Bldg 1168, OU2, ENSR, 2000			
		DRMO Soil Sample Results, Bldg 5001			
2		Drawing/ as-builts		See RD and RARs	
2		O&M Manuals and Reports		Once	
		1997 Remediation System Operation Report, ROD Design Study, Hart Crowser	May-98		
	x	Remediation System Operations Report, DRMO, Hart Crowser	Mar-00		
		Final OM&M DRMO, Vol I & II, Hart Crowser	Dec-00		
		OM&M Manual, OU2 ROD, Design Study Treatment System, Vol I, Hart Crowser	Jun-01		
		Final Operations, Maintenance and Monitoring Manual, OU2, Hart Crowser, Jun-01	Jun-01		
		Final Operations, Maintenance, Monitoring Report, Bldg 1168, OU2, Hart Crowser, Dec-00	Dec-02		
		Final Work Plan Addendum Decommissioning and Removal of Treatment System, Building 1168 3 Party Ft. Wainwright Ak	Sep-03		
		Final 2002 Annual Report OU2 Ft. Wainwright AK	Oct-03		
		Technical Memorandum Soil Gas Screening Survey Results DRMO1 and 4 Subareas OU2	Aug-04		
		Final 2003 Annual Report	Dec-04		
		Draft Final O&M Manual RODDesg Study Trmt Study FWA AK			
2		GW, SW, and air monitoring plans & reports		Annual	
		Technical Memorandum North Post and DRMO Yard TS, Harding Lawson	Jun-97		
		1996 Annual Report, Bldg 1168 Treatability Study, Harding Lawson	Aug-97		
		1997 Annual Report, Bldg 1168, Treatability Study, Hart Crowser	Sep-98		
		Chemical Data Report, Spring 2000, Groundwater Monitoring, DRMO Picket Wells., OU2, Corps of Engineers, Alaska District, Sep-00	Sep-00		
		DRMO Final 1999 Comprehensive Annual Monitoring Report, Hart Crowser	Nov-00		

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OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Building 1168 2000 Annual Monitoring Report, Hart Crowser	Jan-01		
		DRMO 2000 Comprehensive Annual Monitoring Report, Hart Crowser	Jul-01		
2		Tech Memo Groundwater Probe Sampling and Analysis, DRMO-4 Subarea Sept 2002	Sep-02		
		tech Memo SVE Well Sampling, 3-Party AS/SVE System, September 2002	Sep-02		
		Draft Tech Memo: DRMO Yard GW Trichloroethene/Tetrachloroethene Concentration Trend Analysis Dec 2003	Dec-03		
		Sampling Data Report Spring 2004 Groundwater Monitoring Event	Aug-04		
		Sampling Data Report, OU2 Fall 2004 Groundwater Monitoring Report, November 2004	Nov-04		
		Natural Attenuation Monitoring Work Plan Operable Unit 2	Mar-06		
		2006 DRMO and Former Building 1168 Final Report	Jan-08		
		TECHNICAL MEMORANDUM 2007 Work Plan Amendment Operable Unit 2	May-07		
		2007 DRMO and Former Building 1168 Comprehensive Report Operable Unit 2	May-08		
		TECHNICAL MEMORANDUM 2008 Work Plan Amendment Operable Unit 2	May-08		
		2008 Monitoring Report Operable Unit 2	Sep-09		
		FINAL 2009 Work Plan Amendment Operable Unit 2	May-09		
		2009 Monitoring Report Operable Unit 2	Jun-10		
		TECHNICAL MEMORANDUM Decommissioning of DRMO Yard Treatment Systems and Installation of AP-8914 Replacement Well Operable Unit 2	Jan-09		
	x	2010 Work Plan Operable Unit 2	May-11		
2		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		Technical Memorandum, Oct 1996, Quarterly Monitoring Results, Building 1168, Harding Lawson	Feb-97		
		Technical Memorandum, Apr 97, Quarterly Monitoring Results, Building 1168 TS, Harding Lawson	Sep-97		
		Picket Well Installation, DRMO, Hart Crowser	Nov-97		
		Technical Memorandum, July & Oct 97 Quarterly Monitoring Results Bldg 1168, Harding Lawson	Jan-98		
		Former Building 1168 Release Investigation, Hart Crowser	May-98		
		Quarterly Monitoring Report, Nov 97-Apr 98, Bldg 1168 TS, Hart Crowser	Jun-98		
		Quarterly Monitoring Report, Building 1168, Treatability Study, Hart Crowser	Aug-98		
		Monitoring Report, Aug-Nov 1998, Bldg 1168, Hart Crowser	Jan-99		
		Picket Well Sampling Report, Apr 99, Sampling Event, OU 2 DRMO	May-99		
		Picket Well Sampling Report, Oct 99, Sampling Event, OU 2 DRMO	Oct-99		
		March 30, 2000, Groundwater Sample Results, Bldg 1168, OU2, Hart Crowser, Aug-00	Aug-00		
		Chemical Data Report, Groundwater Monitoring, DRMO Picket Wells, COE	Sep-00		
		Final 1999 Comprehensive Monitoring Report, Hart Crowser	Nov-00		
		Picket Well Sampling and Three Party Treatment Systems Operation Technical Memorada, OU2, Fairbanks Environmental Services, Oct-01	Oct-01		
		OU2 Oct 01 Picket well sampling&3P tmt systm op TMs, Nov 2001	Nov-01		
		OU2 DRMO Picket Well Sampling Results Tech Memo FWA AK May 2002	May-02		
		Tech Memo: Level Survey of Soil & G/W monitoring points at DRMO Yard, OU2, Northwind, Mar-03	Mar-03		
3	x	OU3 ROD	Apr-96	One-time plus amendments	
3		ESD	Sep-02	One-time	

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
3		Remedial Design		Once	
		Pilot Study Plan Underground Storage Tank Release Investigation	Jan-96		
		OU 3, Remedial Design/Remedial Action Statement of Work, COE	Apr-96		
3		Final Work Plan Design Verification Study, Hart Crowser	Sep-96		
		60 % Design, Drawings, Cost Estimate, Construction Specifications, Design Verification Study, HC	May-97		
		1998 Field Season Work Plan	Mar-98		
		Site Investigation and treatabilty Study Work Plan MP 2.7 and 3.0	Aug-98		
		1998 Monitoring Report Design Verification Study	May-99		
		Final Design Submittal POL Source Removal	Aug-99		
		Fairbanks-Eielson Pipeline MP3.0 Soil Excavation and Ex-situ Treatment plan	Apr-00		
		2000 Work Plan, Swaim-Hart Crowser	May-00		
		1999 Monitoring Report Design Verification Study	May-00		
		Valve Pit A Draft Operations and Maintenance Plan	Jun-00		
		Draft Operations, Maintenance and Monitoring Plans, Valve Pit A and the Eight Car Header, OU3, Hart Crowser, Sep-00	Sep-00		
		Oxidizer Cost/Benefit Analysis Report for OU3, OU5 and other areas at Ft. Wainwright Ak	Apr-01		also in OU5
		2000 Monitoring Report Design Verification Study	May-01		
		Work Plan, SAP, QAPP, and HSP, Fairbanks Environmental Services, OU3, Nov-01	Nov-01		
		Assessment of MP 2.7&3.0 source areas, OU3, FWA, Dec 2001	Dec-01		
		2002 Work Plan Summary OU3 Operation and Maintenance	Apr-02		
		OU3 Draft Waste Management Plan, FWA AK April 2002	Apr-02		
		Air Sparge Probe Rehabilitation Work Plan	Jun-02		
		MP 2.7 and 3.0 Treatment Cell Closure Plan	Nov-02		
		MP 2.7 and 3.0 Treatment Cell Decommissioning and Sampling Plan Jan 2003	Jan-03		
		2003 Work Plan, Operable Unit 3, Fort Wainwright, Alaska dated June 2003	Jun-03		
		Final 2004 Work Plan OU3, FWA, FES, Mar-04	Mar-04		
		Final CLOSES Evaluation MP 2.7 dated June 2004	Jun-04		
		Final CLOSES Evaluation MP 3.0 dated June 2004	Jun-04		
		2005 Work Plan Operable Unit 3 Fort Wainwright AK	Mar-05		
		2006 Work Plan Draft	Feb-06		
		Design Verification Study, Draft 96 Modeling Reports			
3		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		1996 Monitoring Report, Design Verification Study, Hart Crowser	Mar-97		
		Field Status Report, OU 3, Swaim-Hart Crowser	Nov-99		
		Implementation and Operations Plan, Hart Crowser	Dec-99		
		Bedrock & Structure Char & Blt TF: TFS Birch Hill Fuel	May-00		
		99 Monitoring Report, DVS, OU3, FWA May 00	May-00		
		1999 Monitoring Report, North Post/DRMO 1 & 5, Hart Crowser, Jun-00	Jun-00		
		OU3 Preliminary Draft Remedial Action Report at FWA May 2001	May-01		
		2000 Comprehensive Monitoring Report, OU3, Hart Crowser, May-01	May-01		
		2001 Monitoring Report Operable Unit 3 Fort Wainwright AK	Mar-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Assessment of MP 2.7 and 3.0 Source Areas, OU3 FWA AK May 2002	May-02		
		Explanation of Significant Differences	Sep-02		
		Interim Remedial Action Report	Sep-02		
		Former Buildings 1128, 1129, 1130 Investigation	Nov-02		
		Final 2003 OU3 Annual Monitoring Report dated March 2004	Mar-04		
		CLOSES Evaluation MP 3.0 Ft. Wainwright AK	Jun-04		
		Draft Report, CLOSES Evaluation, Birch Hill Tank Farm, FWA, dates September 2004	Sep-04		
		Technical Memorandum MP 2.7 and MP 3.0 Site Survey	Sep-04		
		2004 Monitoring Report Operable Unit 3 Fort Wainwright AK	Mar-05		
		Technical Memorandum Decommisssioning of Valve Pit B and Valve Pit C Treatment Systems	Jul-05		
		MP2.7 and 3.0 Treatment Cells Decommissioning Report Operable unit 3 Fort Wainwright, Alaska	Sep-05		
		2005 Monitoring Report Operable Unit 3 Fort Wainwright AK	Mar-06		
		Sampling Data Report, OU3 Spring Sampling Event 2004, COE-FES			
3		Drawing/ as-builts		See RD and RARs	
		95% Design Analysis OU3, Area 1A Birch Hill TF, and Drawings, Ecology and Environment	Mar-97		
3		O&M Manuals and Reports		Once	
		Draft OM&M Manual, Valve Pit A & Eight Car Header, OU 3, Hart Crowser	Sep-00		Remaining OM&M Plans on hold pending EPA and DEC comments
		Remedial Systems Operations Report (ROD DS), Hart Crowser, Apr-01	Apr-01		
		Treatment Systems Operations, Maintenance, Monitoring Manuals, OU3, Hart Crowser, Jun-01	Jun-01		
		OM&M Manual, Birch Hill Tank Farm Product Recovery System (addendum to 2001) dated Nov 2002	Nov-02		
		Operation, Maintenance and Monitoring Manual Birch Hill Tank Farm Product Recovery Treatment System	Jan-03		
		2003 Revisions to OM&M Slipsheets, OU3, FWA, dated August 2004	Aug-04		
3		GW, SW, and air monitoring plans & reports		Annual	
		Birch Hill Tank Farm, Groundwater Investigation, Hart Crowser	Jul-98		
	x	Hydrological Evaluation of Remedial Area 1B	Dec-98		
		Monitoring Report, Design Verification Study, Hart Crowser	May-99		
		ROLF Groundwater Modeling	Oct-99		
		Summary of Hydrogeologic Investigation at Birch Hill Tank Farm, CRREL	Dec-99		
	x	Monitoring Report, Design Verification Study, Hart Crowser	May-00		
		Chemical Data Quality Assessment Report for Aug-Sep 00, Groundwater Monitoring at Mileposts 2.7, 3.0 & 15.75, OU3, Corps of Engineers, AK Dist., Feb-01	Feb-01		
		Birch Hill Tank Farm Monitoring Well Installation & Sampling, OU3, Corps of Engineers, AK Dist.	Feb-01		
		G/W Flow Meas w/in OU3 fwa from Aug 95-Dec 00, March 2001	Mar-01		
		Birch Hill Tank Farm Monitoring Well Installation and Sampling Technical Memorandum	Mar-01		
		Groundwater monitoring Report for the Railroad Off Loading Facility	Apr-01		
	x	2000 Comprehensive monitoring report	May-01		
		Groundwater Modeling Report for RA1B, OU3, CH2M Hill, Jun-01	Jun-01		
		Birch Hill Tank Farm Aquifer Test	Jan-03		
		Birch Hill Tank Farm Tracer Test	Jan-03		
		2003 Technical Memorandum Spring Groundwater Sampling Event	Jun-03		

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OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Documentation of Operable Unit 3 FEFLOW Model	Feb-04		
		2004 Technical Memorandum Spring Groundwater Sampling Event	Jun-04		
		2006 Work Plan Operable Unit 3	Feb-06		
		2006 Monitoring Report Operable Unit 3	Mar-07		
3		TECHNICAL MEMORANDUM Birch Hill Fence Repairs Birch Hill Tank Farm Operable Unit 3	Aug-07		
		TECHNICAL MEMORANDUM Proposed 2008 Tracer Test Birch Hill Tank Farm Operable Unit 3	Feb-08		
		TECHNICAL MEMORANDUM Request for Conditional Closure Valve Pit B Operable Unit 3	Feb-08		
		TECHNICAL MEMORANDUM Soil Sampling Results of Remaining Soil Stockpile Milepost 2.7 Treatment Cell	Oct-07		
		TECHNICAL MEMORANDUM Decommissioning of Monitoring Wells at Milepost 15.75 Operable Unit 3	Oct-07		
		Recommendation for No Further Action and Well Decommissioning Milepost 15.75 Operable Unit 3	Dec-06		
		2007 Hot-Spot Treatment Work Plan Addendum Operable Unit 3 Operation and Maintenance	Jun-07		
		2008 Monitoring Report Operable Unit 3	Apr-08		
		2008 Work Plan Operable Unit 3	Mar-08		
		TECHNICAL MEMORANDUM Baseline Tracer Study Technical Memo Birch Hill Tank Farm	Aug-08		
		Statement Of Work, Replacement of Monitor Wells at Milepost 2.7 and 3.0 Sites, Operable Unit 3	Mar-08		
		Geophysical Survey at Central Header - Fort Wainwright, Alaska	Nov-08		
		2009 OU3 Work Plan Operable Unit 3 Operation and Maintenance	Feb-08		
		2009 Monitoring Report Operable Unit 3	Jul-10		
		TECHNICAL MEMORANDUM Decommissioning of Valve Pit Treatment System Zone 4 Operable Unit 3	Mar-10		
		2009 Decommissioning Work Plan Addendum, Birch Hill Product Recovery and Valve Pit A Zone 4 Treatment System, Operable Unit 3 Operation and Maintenance	Jul-09		
		TECHNICAL MEMORANDUM Bioaugmentation Treatability Study Milepost 2.7 and Milepost 3.0 Sites	Sep-09		
		TECHNICAL MEMORANDUM Replacement Wells Railcar Offloading Facility Operable Unit 3	Aug-09		
		2010 Work Plan Operable Unit 3	Aug-10		
3		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		Quarterly Monitoring Report, MP 15.75, Treatability Study, Hart Crowser	Feb-97		
		1996 Monitoring Report, Design Verification Study, Hart Crowser	Mar-97		
		Quarterly Monitoring Report, MP 15.75, Treatability Study, Hart Crowser	Jun-97		
		Quarterly Monitoring Report, MP 15.75, Treatability Study, COE	Nov-97		
		Quarterly Monitoring Report, MP 15.75, Treatability Study, Hart Crowser	Feb-98		
		1998 Monitoring Report, DVS	May-99		
	x	1999 Comprehensive monitoring report, Hart Crowser	May-00		
		Groundwater Flow Measurements within OU 3, Aug 95-Dec 00, CRREL	Dec-00		
		Chemical Data QAR for Aug-Sep 00, Groundwater Monitoring at MP2.7, 3 and 15.75, COE	Feb-01		
		Groundwater Flow Measurements from Aug 95-Dec 00, Mar 01., OU3, CRREL, Mar-01	Mar-01		
		Bentley Trust Well Logs, OU3, Corps of Engineers, AK Dist., Jun-01	Jun-01		
		Tech Memo: Fall 2003 Sampling Data Report, OU3 dated January 2003	Jan-03		
		CD ONLY: 2003 Fall Groundwater Sampling Event, EDF corrected files dated Jan 15, 2003	Jan-03		
		Sampling Data Report: Spring 2003 Gw, dated June 23, 2003	Jun-03		
		Tech Memo: Documentation of OU3 FEFLOW Model, FWA dated February 2004	Feb-04		
		Technical Memorandum: FEFLOW Groundwater Modeling Analysis, OU3, dated September 2004	Sep-04		
		Geologic Setting of the Birch Hill Tank Farm OU3 dated January 2005	Jan-05		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Sampling Data Report for Ft. Wainwright, OU3 Fall Sampling Event 2004	Fall 2004		
		Operable Unit 3 Spring 2003 EDF, EDCC files, tech memo, sampling results, chain of custody forms	Spring 2003		
		Sampling Data Report, OU3 Spring Sampling Event 2004	Spring 2004		
		Sampling Data Report for FWA Spring Sampling Event 2005	Spring 2005		
		Technical Memorandum, Summer 2003 Sampling Data Report, OU3	Summer 2003		
		Tech Memo: Sampling Data Report OU3 2004 Winter Groundwater Sampling Event	Winter 2004		
		Tech Memo: Sampling Data Report OU3 2004 Winter Groundwater Sampling Event EDF and Draft EDMS	Winter 2004		
		CD: Birch Hill Groundwater Model (FEFLOW/PEST) Input and Output files (5 separate runs)			
		EDF and draft EDMS deliverables: Sampling Data Report, OU3 Spring Sampling Event 2004			
		2003 Fall Groundwater Sampling Event OU3 EDF files, EDMS files			
		Birch Hill Tank Farm Monitoring Well Installation and Sampling, COE			Confirm date of issuance
4	x	OU4 ROD	Sep-96	One-time plus amendments	
4		Remedial Design		Once	
		Remedial Investigation Report OU4	Nov-94		
		Risk Assessment Report OU4	Aug-95		
		Draft SSHP Groundwater Monitoring Landfill Feb 2001	Feb-01		
		OU4 landfill draft g/w monitoring work plan at FWA Feb 2001	Feb-01		
		Draft work plan for monitoring well replacement fwa Aug 2001	Aug-01		
		OU4 Site Specific Safety and Health Plan	Jun-02		
		Final Work Plan for Groundwater Monitoring and Data Analysis at Landfill October 2002	Oct-02		
		Work Plan for GWMonitoring and Data Analysis at the CSY October 2002	Oct-02		
		Draft Groundwater Monitoring and Data Analysis at the Landfill Source Area Work Plan	May-03		
		Final Investigative Derived Waste management Area Operation and Maintenance Plan	Aug-03		
		Final Work Plan Groundwater Monitoring and Data Analysis at the Coal Storage Yard Source Area	Aug-03		
		Final Work Plan Groundwater Monitoring and Data Analysis at the Landfill Source Area	Aug-03		
		Final Coal Storage Yard Remediation System Decommissioning Work Plan	Apr-04		
		Final 2004 Work Plan, Groundwater Monitoring and Data Analysis at the Landfill Source Area, Sept 2004	Sep-04		
		2005 Work Plan Groundwater Monitoring and Data Analysis at the Landfill Source Area dated May 2005	May-05		
		Final 1999 Design Verification Study Report, CSY, DOWL/Ogden			Confirm date of issuance
		Landfill RA Final, Work Plan			
		Draft 2003 Work Plan for GW Monitoring and Data Analysis at the CSY Source Area			
		Draft 2003 Work Plan for GW Monitoring and Data Analysis at the Landfill Source Area			
		Draft 2004 Landfill Work Plan, SAP, QAPP, HSP			
4		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		Landfill Remedial Action Final Work Plan	Dec-98		
		Final Remedial Action Report, Landfill, DOWL/Ogden	Mar-99		
		Final Remedial Action Report, Coal Storage Yard (CSY), DOWL/Ogden	Apr-99		
		Sep 99 Landfill Cap inspection report	Sep-99		
		final 1999 DVS rpt CSY ou4 FWA Sep 00	Sep-00		
		Final 1999 Design Verification Study Report, Coal Storage yard, OU4, Dowl/Ogden Joint Venture, Sep-00 OU4, Dowl/Ogden Joint Venture, Dec-00	Dec-00		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Draft 00 System Mon Rpt, TS, CSY, FTWA, Jan 01	Jan-01		
		Oxidizer cost/benefit analysi rpt for ou3/ou5 & FWA Apr 01	Apr-01		
		Final monitoring report CSY 2000 dated Oct 2001	Oct-01		
		Landfill, Final Monitoring Well Report, OU4, ENSR, Jan-02	Jan-02		
		Draft Landfill 2001 Annual Report FWA AK May 2002	May-02		
		Investigated Derived Waste Report OU4 Coal Storage Yard September 2002	Sep-02		
		Investigated Derived Waste Report OU4 Landfill September-October 2002	Oct-02		
		Soil Boring Installation Action Report for Coal Storage Yard, November 2002	Nov-02		
		Investigated Derived Waste Report OU4 Landfill September-October 2002, OU4, North Wind, January-03	Jan-03		
		Final 2002 Annual Report Coal Storage Yard	Jul-03		
		Final 2002 Annual Report Landfill	Jul-03		
		Investigative Derived Waste Report for the OU4 CSY June 2003 groundwater monitoring dated August 2003	Aug-03		
		Investigative Derived Waste Report for the OU4 Landfill May-June 2003 groundwater monitoring dated August 2003	Aug-03		
		Investigative-Derived Waste Report for the OU4 CSY Sept-Oct 2003 Well Decom and GW event dated 21 Nov 03	Nov-03		
		Investigative-Derived Waste Report for the OU4 Landfill, September 2003 GW event dated 21 November 2003	Nov-03		
		Technical Memorandum Coal Storage Yard Remediation System Decommissioning	Aug-04		
		Final 2003 Annual Report Coal Storage Yard	Sep-04		
		Final 2003 Annual Report Landfill	Sep-04		
		Site Assessment Report-Soil removal at FTP Fire Burn Pits			
		Draft 1999 DVS Report, CSY, OU4, FWA AK			
4		Drawing/ as-builts		See RD and RARs	
		Site Plan Landfill Cap Project, DOWL/Ogden	Jun-97		
4		O&M Manuals and Reports		As-needed	
		Final Operations, Maintenance & Monitoring Manual, Coal Storage Yard, Vol. I and II, OU4, Hart Crowser, Jan-01	Jan-01		
		Final Operations, Maintenance and Monitoring Report, Landfill, OU4, Hart Crowser, Jan-01	Jan-01		
4		GW, SW, and air monitoring plans & reports		Annual	
		Final 1997 System Monitoring Report, Treatment System, CSY, DOWL/Ogden	Jul-97		
		Rev Final 98 Sep & Dec Landfill G/W Samp Report, OU4 FWA	Dec-98		
		Final Groundwate Sampling Report	May-99		
		Draft Aug G/W Sampling Report Landfill OU4 Jan 00	Jan-00		
		Groundwater Sampling Report, Draft, Landfill Monitoring Wells, OU4, Dowl/Ogden Joint Venture, Mar-00	Mar-00		
		Aug 99 G/w Sampling Report Final OU4Aug 2000	Aug-00		
		Final 1999 System Monitoring Report Treatment System Coal Storage Yard	Sep-00		
		Draft 2000 System Monitoring Report Treatment System Coal Storage Yard	Jan-01		
		Draft Groundwater Protection Report Coal Storage yard	Apr-01		
		Final Aug 00 Groundwater Sampling Report, OU4, Dowl/Ogden Joint Venture, Sep-01	Sep-01		
		Final 2000 System Monitoring Report Treatment System Coal Storage Shed	Oct-01		
		Final Mon well replace report fwa jan 2002	Jan-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		OU4 CSY Draft Groundwater Protection Report, FWA AK, April 2002	Apr-02		
		Final 2004 Fall Sampling Report Groundwater Monitoring and Data Analysis at the Landfill Source Area dated May 2004	May-04		
		Draft 2004 Spring Sampling Report, Groundwater Monitoring and Data Analysis at the Landfill Source Area dated Sept 2004	Sep-04		
4		Draft 2004 Fall Sampling Report, Groundwater Monitoring at Landfill, OU4 dated January 2005	Jan-05		
		Draft 2005 Annual Sampling Report, Groundwater, Landfill Source Area			
		2007 Groundwater Monitoring and Data Analysis at the Landfill Source Area, Operable Unit 4	Apr-07		
		2007 Annual Sampling Report, Groundwater Monitoring and Data Analysis at the Landfill Source Area	May-08		
		2008 Groundwater Monitoring and Data Analysis at the Landfill Source Area, Operable Unit 4	May-08		
		2008 Annual Sampling Report, Groundwater Monitoring and Data Analysis at the Landfill Source Area	Oct-09		
		2009 Work Plan, Groundwater Monitoring at the Landfill Source Area, Operable Unit 4	Jun-09		
		2009 Annual Sampling Report, Groundwater Monitoring and Data Analysis at the Landfill Source Area	May-10		
		2010 Work Plan Technical Memorandum Groundwater Monitoring at the Landfill Source Area, OU4	May-10		
		2010 Annual Sampling Report Groundwater Monitoring and Data Analysis, Landfill Source Area	May-11		
4		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		1997 Groundwater Sampling, Final Report, Landfill Monitoring Wells, DOWL/Ogden	Feb-98		
		November 1997 Groundwater Sampling Final Report: ROD RAD Study, DOWL/Ogden	Apr-98		
		Final Sampling Report, Sep 97-May 98, DOWL/Ogden	Aug-98		
		Technical Memorandum: Landfill Cap Sampling, COE	Aug-98		
		Memorandum, Fort Wainwright Landfill Cap Project Post-Construction Insp., DOWL/Ogden	Sep-98		
		Final Sampling Report (Nested Wells), DOWL/Ogden	Sep-98		
		Final Landfill Monitoring Wells, Sep 98, Groundwater Sampling Report, DOWL/Ogden	Sep-98		
		Groundwater Sampling Report, Final Report, May 99, ROD RADS, DOWL/Ogden	Oct-98		
		Final Dec 98 Groundwater Sampling Report, Landfill, DOWL/Ogden	Dec-98		
		Groundwater Sampling Report, ROD RADS, July 99 CSY	May-99		
		March/June 99 Groundwater Sampling Report, Landfill Monitoring Wells, DOWL/Ogden	Jul-99		
		Technical Memorandum: Landfill Post-Construction Inspection, DOWL/Ogden	Jul-99		
		Landfill Cap Inspection Report, DOWL/Ogden	Jul-99		
		Groundwater Sampling Report, Draft, Landfill Monitoring Wells, DOWL/Ogden	Mar-00		
		August 99 Groundwater Sampling Report, Landfill, Final, DOWL/Ogden	Aug-00		
		March 2000 Groundwater Sampling Report, Landfill Monitoring Wells, DOWL/Ogden	Dec-00		
		Coal Storage yard, Raw Data Report, OU4, ASCI/NANA, Jan-01	Jan-01		
	x	CSY Draft 2000 Annual Monitoring Report, DOWL	Jan-01		
		Corrected Table 1, OU4 Raw Data rt for landfill at FWA dated April 2001	Apr-01		
		OU4 Raw Data Report for Landfill at FWA Apr 01	Apr-01		
		OU4 raw data report for g/w sampling at the CSY, June 2001	Jun-01		
		August 00 Groundwater Sampling Report, Landfill, Final, DOWL/Ogden	Sep-01		
		OU4 Landfill Sep 2001 raw monitoring data, FWA, Nov 2001	Nov-01		
		Fall 2001 Groundwater Raw Data Report Landfill	Nov-01		
		OU4 Coal Storage Yard Fall 2001 Raw Monitoring Data, FWA, Dec 2001	Dec-01		

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OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Coal Storage Yard Fall 2001 Raw Soil Sampling Data, OU4, ASCI/NANA/Dowl, Dec-01	Dec-01		
		OU4 Landfill Groundwater Sampling Chemical Data Quality Review	Dec-01		
		Chemical Data Quality Assessment Report Landfill 2001 Groundwater Sampling	Feb-02		
		2001 Annual Groundwater Sampling Report Landfill Draft	May-02		
		Draft Groundwater Monitoring and Data Analysis at the Landfill Source Area Work Plan	Jun-02		
		Raw Data Report Coal Storage Yard Soil Sampling	Aug-02		
4		CSY Spring 2002 Raw Data Report , OU4, ASCI/NANA, September-02	Sep-02		
		Sampling Data Report for Groundwater Sampling at the Landfill	Sep-02		
		Chemical Data Quality Review Spring 2002 Landfill Monitoring	Sep-02		
		Field Notes for gw and soil sampling at Landfill and CSY Sept/October 2002	Oct-02		
		Sampling Data Report: Fall Sampling at OU4 Landfill December 2002	Dec-02		
		CLOSES Evaluation Coal Storage Yard	Jan-03		
		Draft Annual Report 2002 Landfill	Apr-03		
		Field Notes for gw sampling at CSY, dated May 2003	May-03		
		Sampling Data Report: Spring 2003 CSY, dated July 2003	Jul-03		
		Sampling Data Report: Spring 2003 Landfill, dated July 2003	Jul-03		
		Sampling Data Report Fall 2003, Landfill, dated November 2003	Nov-03		
		Sampling Data Report Fall 2003, OU4 Coal Storage Yard, dated November 2003	Nov-03		
		Well Decommissioning Letter Report for CSY, OU4 dated Dec 2003	Dec-03		
		Well Repair Letter Report for Landfill, OU4 dated Dec 2003	Dec-03		
		CDQR Fall 2003 GW Monitoring at the CSY, OU4 dated Dec 2003	Dec-03		
		CDQR Fall 2003 GW Monitoring at the Landfill, OU4 dated Dec 2003	Dec-03		
		Technical Memorandum: Coal Storage Yard Remediation System Decommissioning, dated August 2004	Aug-04		
		CSY Spring 2002 Raw Data Report	Spring 2002		
		Tech Memo 2005 Spring Sampling Results groundwater monitoring	Jun-05		
		Draft August 2000 Groundwater Sampling Report for Landfill Monitoring Wells	Aug-00		Confirm date of issuance
5	x	OU5 ROD	Mar-99	One-time plus amendments	
5		Feasibility Studies		Once	
		OU5 Feasibility Study, HLA	Nov-97		
		Final OU 5 Feasibility Study, CH2MHill	Jun-98		
		Final Six-Phase Soil Heating/Column Study Treatability Study Work Plan, CH2MHill	Aug-99		
		Vertical Air Sparging Curtain/Feasibility Study, WQFS, CH2MHill	Jul-00		
		Final Column Study Report, WQFS 1, CH2MHill	Sep-00		
		Intrinsic Remediation Evaluation, EQFS, CH2MHill	Nov-00		
		WQFS Six-Phase Soil Heating/Column Study TS Work Plan, Comments on Draft, CH2MHill	Mar-01		
5		Remedial Design		Once	
		Remedial Investigation Report OU5	Nov-96		
		Proposed Plan for Remedial Action at OU 5, CH2MHill	Jun-98		
		WQFS3 RA WP Final FWA Apr 2000	Apr-00		
		Bldg 1060 west, RAWP OU5, FWA Apr 2000	Apr-00		
		Final PAH eval WP, WQFS2, FWA, May 00	May-00		
		Final TM SS&HP, WQFS3 & 1060 W, Aug 00	Aug-00		

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OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Preliminary draft RA WP, WQFS2, FWA, Aug 00	Aug-00		
		WQFS1B Preliminary Draft Remedial Action Work Plan, ENSR	Jan-01		
		WQFS Subarea 2, Draft PAH Evaluation Report	Feb-01		
		OU5WQFS3, Final SVE/AS RA WP April 2001	Apr-01		
		Oxidizer Cost/Benefit Analysis Report for OU3, OU5 and other areas at Ft. Wainwright Ak	Apr-01		also in OU3
		OU5 1060W, final SVE/AS RA WP April 2001	Apr-01		
		Source Area Remedial Action Work Plan May 2001	May-01		
5		Revised Site Safety & Health Plan, OU5, Northwind, May-01	May-01		
		Draft work plan, 2002 CRAPP, FWA Dec 2001	Dec-01		
		Groundwater Contaminant Data Collection and Trend Analysis Work Plan	Jun-02		
		EQFS Monitored Natural Attenuation Sampling Plan	Oct-02		
		AS/SVE OM&M Project Schedule OU5, Northwind, Nov-02	Nov-02		
		FINAL OU5 Quality Assurance Program Plan , Northwind, Jun-03	Jun-03		
		Final Horizontal Well Remediation System Air Sparge Probe Redevelopment Monitoring Work Plan, dated Aug 2003	Aug-03		
		EQFS Monitored Natural Attenuation Long Term Monitoring Plan	Jul-04		
		Draft Technical Memorandum and QAPP, EQFS OU5 FWA dated June 2005	Jun-05		
		Site Specific Safety and health Plan	Jun-05		
		Birch Hill Lead Investigation Work Plan Remedial Area 1A	Sep-05		
		WQFS Subarea 3 Final SVE/AS RA Work Plan, North Wind	NA		
		Building 1060 West, Remedial Action Work Plan, CH2MHill	NA		
		EQFS Intrinsic Remediatin Evaluation, CH2MHill	NA		
		Addendum to final work plan, Chena River Aquatic Asmt			
		Draft WQFS3, RA WP, OU5, FWA, AK			
		Draft EQFS Monitored Natural Attenuation Long-Term Monitoring Plan, OU5			
		Final Birch Hill Lead Investigation Work Plan, Remedial Area 1A			
5		Aquatic Assessment		Ongoing	
	x	Chena River Aquatic Assessment Program, 1997-98, Vol I & II, ABR/CH2MHill	Mar-99		
	x	Chena River Aquatic Assessment Program, Spring and Summer, ABR	Sep-99		
		1998 and 1999 Chena River Surface Water Sampling Technical Memo, WQFS2, CH2MHill	Dec-99		
		1998 and 1999 Chena River Surface Water Sampling Technical Memo, WQFS2, CH2MHill			Confirm date of issuance
		Chena River Assessment Program, OU5, ABR/CH2MHill			Confirm date of issuance
	x	Technical Memorandum: Chena River Aquatic Assessment Program, Interim Report, CH2MHill	Dec-99		
		1998-99 Chena River Surface Water Sampling Tech Memo, CH2M Hill			
		Chena River Aquatic Assessment Program, ABR/CH2M Hill			
		Final 2002 Sediment Quality Monitoring Program, Chena River Aqua Asmt Prog, FWA, CH2M Hill, Apr-03	Apr-03		
		Final Work Plan for the 2002 Chena River Aquatic Assessment Program, FWA AK, CH2M Hill, Apr-02	Apr-02		
5		Remedial Action Report(s)		Once in draft, finalized when RAOs are met	
		SPSH& RFH Draft final report WQFS/OU5, FWA Jan 00	Jan-00		
		Annual Air Sparging Curtain/Source Area monitoring Report, WQFS1 and 2, OU5, CH2M Hill, Mar-00	Mar-00		
		Anl Mon Rpt Hwell, TS OU5 FWA/FRA March 2000	Mar-00		

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OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Building 1060 West, Remedial Action Work Plan, CH2M Hill, Apr-00	Apr-00		
		Building 1060W, Remedial Action Work Plan, CH2M Hill, Apr-00	Apr-00		
		WQFS Remedial Action Work Plan, Final, CH2M Hill, Apr-00	Apr-00		
		Bldg 1060TS Annual Rpt, Yr 5, FWA AK May 2000	May-00		
		Verticle Sparging Curtain TS WQFS2 Semi Anl Mon Rpt Yr 2 July 00	Jul-00		
		Final Column Study Report, WQFS1, Operable Unit 5, CH2M Hill, Sep-00	Sep-00		
		Draft Decom RA Sys at Bldg 1060 & 3562 & Draft SSHP Sep 00	Sep-00		
5		Final Tech Memo Site Safety & Health Plan, WQFS3 & 1060W, Northwind, Aug-00 Final, Column Study Report, WQFS1, CH2M Hill, Sep-00	Sep-00		
		Chemical Data Report, WQFS, OU5, Alaska District Corps of Engineers, Oct-00	Oct-00		
		Final Work Plan for Decommissioning Remediation Systems at Bldgs 1060 East & 3562, Final Site Safety and Health Plan, ASCI/NANA, Oct-00	Oct-00		
		Intrinsic Remediation Evaluation EQFS FWA AK Nov 00	Nov-00		
		Memo: After Action Report, Soil Heating Treatability Study Soil Borings, CH2M Hill, Nov-00	Nov-00		
		RAR for decom ts at Bldgs 1060 and 3562, FWA, Nov 2000	Nov-00		
		Remedial Action Report for Decommissioning Remediation Systems at Bldgs 1060 East and 3562, ASCI/NANA, Nov-00	Nov-00		
		Final Construction report for WQFS3/1060W rem sys at fwa apr 01	Jan-01		
		AS Curtain & Source Area TS 99 Anl Rpt OU5 FWA AK Jan 01	Jan-01		
		Draft PAH Eval Report WQFS Subarea 2 Feb 2001	Feb-01		
		OU5 Horiz Well Tmt Sys Final 2000 Annual Mon Rprt March 2001	Mar-01		
		Draft 2000 PDRAR Apr 01	Apr-01		
		Draft AS Crutain & Source Area TS 2000 Annual Rpt Apr 01	Apr-01		
		SP heating & RF heating TS final report, WQFS, OU5, FWA, April 2001	Apr-01		
		1060W, Final Soil Vapor Extraction/Air Sparging Remedial Action Work Plan, Northwind, Apr-01	Apr-01		
		Construction Report for WQFS3/1060W, Remedial Systems, Northwind, Apr-01	Apr-01		
		Six Phase Soil Heating and Radio Frequency Heating, Treatability Study Final Report, WQFS, CH2M Hill, Apr-01	Apr-01		
		WQFS3, Final Soil Vapor Extraction/Air Sparging Remedial Action Work Plan, Northwind, Apr-01	Apr-01		
	x	Draft 2000 Preliminary Draft Remedial Action Report	Apr-01		
		OU5 WQFS2 Vertical Sparging Curtain TS Year 3 semi-annual rpt, May 2001	May-01		
		Final Design Drawings for Treatment System at WQFS1A, ENSR/Voom/CH2M Hill, May-01	May-01		
		Final Tech Memo for Construction Activities at WQFS1A, 1C&2, Northwind, May-01	May-01		
		Final WP for Decon Red Sysm @1060 & 3562, FWA 10/00&Final SSHP	Nov-01		
		OU5 Air Sparge Curtain and Source Area Treatability Study 2000 Annual Report, CH2M Hill, Dec-01	Dec-01		
		OU5 AS Curtain & SA treatabilities studies 00 annual rpt fwa dec 2001	Dec-01		
		Mid-Year TM for Bldg 1060W & WQFS3 Rem Sysm, OU5, FWA Dec 2001	Dec-01		
		Draft 01 annual report, ou5 source area TS, fwa AKJan 02	Jan-02		
		OU5, WQFS, PAH Evaluation Report, FWA, CH2M Hill, Apr-02	Apr-02		
		West Quartermaster's Fueling System Subarea 3, Bldg 1060 West Remediation Systems 2001 Annual Report	Jun-02		
		Post Construction Report WQFS1 and WQFS2 Remediation System Modifications	Jun-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		2002 Interim Remedial Action Report September 2002	Sep-02		
		Source Area Treatability Study, 2001 Annual Report, OU5, CH2M Hill, Dec-02	Dec-02		
		Final Sparge Curtain Source Area Horizontal Well Air Sparge/Soil Vapor Extraction Treatment Systems	Jan-03		
		Draft CLOSES Evaluation WQFS OU5	Feb-03		
		OU5 WQFS CLOSES Evaluation , CH2M Hill, May-03	May-03		
		Draft OU5 Annual Report, March 2002-February 2003, dated September 2003	Sep-03		
		Final OU5 Annual Report March 2002 to Feb 2003 FWA dated February 2005	Feb-05		
		Birch Hill Lead Investigation Draft Report Area 1A	Dec-05		
5		Draft Annual Report July 2004 to July 2005	Jan-06		
		Draft EQFS Monitored Natural Attenuation Sampling Fall 2005 Report	Feb-06		
		Final Annual Report March 2003 to June 2004 OU5	Feb-06		
		TM, CRAAP, OU5, FWA, Interim Report			
		CRAAP OU5 FWA			
		Draft Birch Hill Lead Investigation Report, Remedial 1A, FWA			
		Final Source Area Treatability Study, 2001 Annual Report			
		Approach to Estimating Cleanup Times, WQFS, CH2M Hill			
		Birch Hill UST Site Draft Remedial Investigation, Ecology and Environment			
		Mid-Year Tech Memo for Bldgs 1060W & WQFS3 Remedial Systems, Northwind, Dec			
5		Drawing/ as-builts		See RD and PDRARs	
		Drawings, Planned Remedial Action Augmentation, WQFS1A, ENSR/VOOM/CH2MHill	Jun-05		
		Operable Unit 5, WQFS1C Remedial Action Design Drawings, ENSR/Voom/CH2M Hill, Nov-00	Nov-00		
		Design Drawings, Operable Unit 5, WQFS1A Remedial Action, ENSR/Voom/CH2M Hill, Dec-00	Dec-00		
		Operable Unit 5, WQFS1B, Remedial Action Design Drawings, ENSR/Voom/CH2M Hill, Jan-01	Jan-01		
		OU5 Final Design Drawing for Treatment System at WQFS1A, FWA May 2001	May-01		
		OU5 Final Remedial Action Design Drawings for WQFS2&WQFS1C, June 2001	Jun-01		
		Drawings/RAWP tests			
5		O&M Manuals and Reports		Once	
		Draft OM&M Manual for WQFS3 Rem Sysm, March 2001	Mar-01		
		Final Bldg 1060W rem sys op, main & mon manual, OU5, Nov 2001	Nov-01		
		Final Source Area Remediation System Operation, Maintenance, and Monitoring Manual	Nov-05		
		Final Sparge Curtain Remediation System Operation, Maintenance, and Monitoring Manual	Nov-05		
		Final Horizontal Well Remediation System Operation, Maintenance, and Monitoring Manual	Nov-05		
5		GW, SW, and air monitoring plans & reports		Annual	
		Draft Final 1999 G/W Sampling WQFS FWA AKJun 2000	Jun-00		
		Radio Frequency Heating/Six Phase Soil Heating Treatability Study Ntrient Addition Work Plan Addendum., CH2M Hill, Jul-00	Jul-00		
		Air Sparging Curtain and Source Area Treatability Study, 1999 Annual Report, CH2M Hill, Jan-01	Jan-01		
		Horizontal Well Treatment System Final 2000 Annual Monitoring, Hart Crowser, Mar-01	Mar-01		
		Draft 00 WQFS nutrient amendment, g/w sampling & summary report, April 2001	Apr-01		
		WQFS2 Vertical Air Sparging Curtain Treatability Study Year 3, Semi-Annual Report, CH2M Hill, May-01	May-01		
		Project Schedule for Horizontal Well Optimization, Indoor Air @ 1060, Updated QAPP, Northwind, Jun-02	Jun-02		
		WQFS Sub-Area 3 & Bldg 1060W Remediation Systems 2001 Annual Report, Northwind, Jun-02	Jun-02		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		Indoor Air Monitoring, Building 1060W, Northwind, Aug-02	Aug-02		
		Groundwater Contaminant Data Colllection Work Plan	Oct-02		
		FINAL Sparge Curtain Source Area & Horizontal Well Remediation System 2001 Annual Rpt, Northwind, Jan-03	Jan-03		
		Horizontal Well Remediation System AS Probe Monitoring Report, OU5 FWA dated February 2004	Feb-04		
		Final Technical Memorandum Results of Indoor Air Monitoring at Building 1060 dated March 2004	Mar-04		
		Draft EQFS Monitored Natural Attenuation Sampling Fall 05 Report	Fall 2005		
		2006 Final OU5 Work Plan	Sep-06		
		2006 Final OU5 Monitoring Report	Feb-08		
5		2007 Work Plan Amendment	May-07		
		2007 Final OU5 Monitoring Report	May-08		
		2008 Work Plan Amendment	May-08		
		2008 OU5 Monitoring Report	Apr-09		
		Draft 2009 OU5 Work Plan Amendment_Decom	Apr-09		
		2009 Work Plan Amendment Operable Unit 5	Jun-09		
		2009 Monitoring Report Operable Unit 5	Jul-10		
		Evaluation of the OU5 Monitoring Well Network Using MAROS	Feb-10		
	x	2010 Monitoring Report Operable Unit 5	May-11		
5		GW sampling results and any other relevant sampling/ monitoring data or records		As specified by ROD or PDRAR	
		Technical Memorandum: OU 5 Feasibility Study Groundwater Monitoring Results, CH2MHill	Oct-97		
		Monitoring Well Survey and Groundwater Modeling, ENSR	Feb-99		
		Installation Report, Source Area Treatability Study, CH2MHill	Feb-99		
		Quarterly Monitoring Report, OU 5 Treatability Study, Horizontal Well, Hart Crowser	Feb-99		
		Quarterly Monitoring Report, 1 Dec 98-3 Mar 99,Treatability Study, Hart Crowser	Apr-99		
		Bldg 1060 Treatability Study Annual Report Year 4, Jan 98-Dec 98, CH2MHill	May-99		
		Source Area TS WQFS Semiannual Monitoring Report, CH2MHill	Jul-99		
		Quarterly Monitoring Report, Horizontal Well/Driven Progress, WQFS1, Hart Crowser	Sep-99		
		Chemical Data Report, COE Geotechnical Branch	Oct-99		
		TM: Evaluating Remedial Operations for Implementation at OU5, CH2MHill	Oct-99		
		Semi-Annual Monitoring Report, Vertical Air Sparging Curtain, WQFS2, CH2MHill	Dec-99		
		Annual Monitoring Report, Horizontal Wells, Hart Crowser	Mar-00		
		Annual Air Sparging Curtain/Source Area Monitoring Report,WQFS1 and 2, CH2MHill	Mar-00		
		Annual Monitoring Report, Horizontal Wells, Hart Crowser, Mar-00	Mar-00		
		Soil Borings & Groundwater Monitoring Well Logs, Spring 2000 Field Activities, Bldgs. 2062 and OU5, Alaska District Corps of Engineers, Apr-00	Apr-00		
		March 30, 2000 Groundwater Sampling Results, Bldg 2063 and Apple Road, COE	Apr-00		
		Time to Cleanup Tool: Spreadsheet Documentation, OU5 and FWA, CH2MHill	May-00		
		Bldg 1060 Treatability Study Annual Report Year 5, CH2MHill	May-00		
		Soil Borings and Groundwater Monitoring Well Logs, Field Activities at Bldgs 2063 and Operable Unit 5 (Apple Road), Alaska District Corps of Engineers, Jun-00	Jun-00		
		In Situ A/S Tmt Efficienty Tracer Tseting 6 Jun 00	Jun-00		

Listing of Reports and Documents Related to Operable Units at Ft Wainwright Available at the time of the 2011 Five-Year Review

OU	Key Ref	Document	Issuance Date	Type/ Periodicity	Comments
		(email) RFH/SPSH TS Nutrient Add WP Addendum Jun 00	Jun-00		
		In Situ Air Sparging Treatment Efficiency Tracer Testing, CH2MHill	Jun-00		
		PAH Evaluation Work Plan, WQFS2, CH2M Hill, Jun-00	Jun-00		
		OU5 Final Chem Rpt for Mon Well inst & Samp Apple Rd, FWA, July 2000	Jul-00		
		20 Well Ground Water Field Sampling Plan Summer 2000	Jul-00		
		Memorandum from ABR on 11 Sep 00 T/C CRAAP	Sep-00		
		Chemical Data Report, WQFS, COE	Oct-00		
		After Action Report: Bldg 3564 and Soil Heating TS Soil Borings, CH2MHill	Nov-00		
		Final 1999 Groundwater Sampling, WQFS, CH2MHill	Dec-00		
		Final 1999 Groundwater Sampling, WQFS, CH2M Hill, Dec-00	Dec-00		
5		Air Sparging Curtain and Source Area Treatability Study, 1999 Annual Report, CH2MHill	Jan-01		
		Tech Memo: Apple Street Groundwater Investigation, OU5, Northwind, Feb-01	Feb-01		
		Final Spring 1999 Groundwater Sampling, EQFS, CH2MHill	Feb-01		
		Apple Street Groundwater Investigation Tech Memo	Feb-01		
		Final Spring 1999 Groundwater Sampling, EQFS, CH2M Hill, Feb-01	Feb-01		
		Groundwater modeling at FWA, Apr 01	Apr-01		
		OU5 Final Tech Memo for Construction Acivities at WQFS1A,1C & 2, May 2001	May-01		
		Revised spider diagrams, May 01 EQFS G/W Sampling Program	May-01		
		EQFS G/W Monitoring Well Sasmpling Program Summary & Spider Dia 9/01	Sep-01		
		TM Well decommissiong at OU5 Oct 2001	Oct-01		
		rev spider diagrams EQFS g/w sampling from May 2001, Nov 2001	Nov-01		
		OU5 WQFS Nutrient Amendment G/W Sampling & Summare rpt for 00, dec 01	Dec-01		
		2000 WQFS Nutrient Amendment Groundwater Sampling and Summary Report	Dec-01		
		WQFS Nutrient Amendment Groundwater Sampling and Summary Report for 2000, CH2M Hill, Dec-01	Dec-01		
		OU5 Air Sparging Curtain Treatability Study Analytical Data, FWA AK April 2002	Apr-02		
		OU5 Source Area Treatability Study Analytical Data, FWA AK, April 2002	Apr-02		
		Draft Tech Memo - Results of Indoor Air Monitoring at Building 1060 dated December 2003	Dec-03		
		Technical Memorandum Indoor Air Monitoring at Bldg 5010 dated October 2004	Oct-04		
		Monitored Natural Attenuation Sampling EQFS dated May 2005	May-05		
		Horizontal Well Treatability Study Annual Monitoring Report, Hart Crowser	Jun-05		
		Final Technical Memorandum Monitored Natural Attenuation Sampling East Quartermaster's Fueling Station	Sep-05		
		Soil Borings and Groundwater Monitoring Well Logs, Spring 2000, Bldg 2063 and OU5, COE	Spring 00		
		Semi Annual Monitoring Report, Vertical Air Sparging Curtain, WQFS, CH2M Hill			
		Approach Memo for H Well Maint WQFS3			
		Draft EQFS October 2002 Groundwater Results			
		Final Technical Memo, Monitored Natural Attenuation Sampling			
		TM: AAR, STS; AAR: 3564 soil borings; AAR Soil Htg TS Soil borings			
		Approach to Estimating Cleanup Times, WQFS, CH2MHill			Confirm date of issuance
		Semi-Annual Monitoring Report, Vertical Air Sparging Curtain, WQFS2, CH2MHill			Confirm date of issuance
		Horizontal Well Treatment System Final 2000 Annual Monitoring Report			Confirm date of issuance

Appendix C

Summary of Numeric Cleanup Goals for Each Operable Unit[1]

OU	Source Area	Medium	Contaminant of Concern	Cleanup Goal	Units	Basis
1	**Drum Burial Site**	**Groundwater**	1,1-Dichloroethene	7	µg/L	MCL
			Benzene	5	µg/L	MCL
			Vinyl chloride	2	µg/L	MCL
			Aldrin[3]	0.004	µg/L	RBC
			Dieldrin[3]	0.004	µg/L	RBC
		Soil	Aldrin[4]	3.8	mg/kg	RBC
			Dieldrin[4]	4.0	mg/kg	RBC
2	**DRMO Yard[2]**	**Groundwater**	Benzene	5	µg/L	MCL
			Tetrachloroethene	5	µg/L	MCL
			Trichloroethene	5	µg/L	MCL
			Vinyl chloride	2	µg/L	MCL
			1,1-Dichloroethene	7	µg/L	MCL
			cis-1,2-Dichloroethene	70	µg/L	MCL
	Bldg 1168 Leach Well[2]	**Groundwater**	Benzene	5	µg/L	MCL
			Trichloroethene	5	µg/L	MCL
			Vinyl chloride	2	µg/L	MCL
			1,1-Dichloroethene	7	µg/L	MCL
			cis-1,2-Dichloroethene	70	µg/L	MCL
3	**All**	**Groundwater**	Benzene	5	µg/L	MCL
			Toluene	1000	µg/L	MCL
			Ethylbenzene	700	µg/L	MCL
			1,2-Dibromoethane	0.05	µg/L	MCL
			1,2-Dichloroethane	5	µg/L	MCL
			1,2,4-Trimethyl benzene[5]	1.85	mg/L	RBC
			1,3,5-Trimethyl benzene[5]	1.85	mg/L	RBC
4	**Landfill**	**Groundwater**	Benzene	5	µg/L	MCL
			cis-1,2-Dichloroethene	70	µg/L	MCL
			1,1,2,2-Tetrachloroethane[3]	5.2	µg/L	RBC
			1,1,2-Trichloroethane	5	µg/L	MCL
			Trichloroethene	5	µg/L	MCL
			Vinyl chloride	2	µg/L	MCL
			Bis(2-Ethylhexyl)phthalate	6	µg/L	MCL
	Coal Storage Yard	**Groundwater**	Benzene	5	µg/L	MCL
			Bis(2-Ethylhexyl)phthalate	6	µg/L	MCL
			Trichloroethene	5	µg/L	MCL
			Toluene	1000	µg/L	MCL
5	**WQFS**	**Groundwater**	1,2-Dichloroethane	5	µg/L	MCL
			Benzene	5	µg/L	MCL
			Toluene	1000	µg/L	MCL
			Diesel Range Organics	1,500	µg/L	State Cleanup
			Gasoline Range Organics	2,200	µg/L	State Cleanup
			Residual Range Organics	1,100	µg/L	State Cleanup
	EQFS	**Groundwater**	1,2-Dichloroethane	5	µg/L	MCL
			Toluene	1000	µg/L	MCL
			Trichloroethene	5	µg/L	MCL
			1,2-Dibromoethane	0.05	µg/L	MCL
			bis(2-Chloroethyl) ether[3]	0.0092	µg/L	RBC
	Chena River Surface Water	**Surface Water**	TAH	10	µg/L	CWA & AWQS
			TAqH	15	µg/L	CWA & AWQS

[1] Table summarizes cleanup goals for ROD contaminants of concern. Applicability of State of Alaska cleanup levels for petroleum hydrocarbon contamination and Alaska Water Quality Standards are discussed in the RODs and the Federal Facility Agreement.
[2] Soil RAOs are based on State of Alaska cleanup levels for non-UST petroleum contamination.
[3] These contaminants now have State of Alaska MCLs in 18 AAC 75 Table C; cleanup levels from ROD are listed in table.
[3] These contaminants now have State of Alaska soil cleanup levels in 18 AAC 75 Table B1; cleanup levels from ROD are listed in table.
[4] Cleanup levels for Trimethylbenzene were changed in the OU3 ESD; State of Alaska MCLs (18 AAC 75 Table C) are listed in the table and are calculated based on residential exposure parameters and toxicity data from EPAs IRIS database.

Appendix D

Photograph 1 – Interpretive Display, 801 Drum Site
Operable Unit 1

Photograph 2 – 801 Drum Site Area
Operable Unit 1

Photograph 3 – Former Building 1168 Area Showing and Sitku Basin Housing Fencing, Operable Unit 2

Photograph 4 – Locked Monitoring Well AP-6807 Downgradient from DOL Yard, DRMO-1, Operable Unit 2

Photograph 5 – View Looking Up at the Birch Hill Tank Farm
Operable Unit 3

Photograph 6 – View Looking Down from Birch Hill Tank Farm
Operable Unit 3

Photograph 7 – Graffiti on Fence Signs and on Tank 315, Operable Unit 3

Photograph 8 – Fence Line Breach at Lazelle Road, Operable Unit 3

Photograph 9 – Post Fence Line along Thaw Channel Area (New Housing Development in Background) and Well AP-7844, Operable Unit 3

Photograph 10 – Interpretive Display, ROLF Area (Former Building 1144 Treatment System in Background), Operable Unit 3

Photograph 11 – Eight Car Header Upgradient Area Treatment System Operable Unit 3

Photograph 12 – Valve Pit A Treatment System and Hot Spot Treatment Area, Operable Unit 3

Photograph 13 – Central Header Hot Spot Treatment Area
Operable Unit 3

Photograph 14 – Central Header Treatment System
Operable Unit 3

Photograph 15 – Road Improvement and Protected Wells, Milepost 2.7 Area, Operable Unit 3

Photograph 16 – Frost Jacked Well AP-6035 at Milepost 2.7 Operable Unit 3

Photograph 17 – Milepost 3.0 Area
Operable Unit 3

Photograph 18 – Monitoring Well AP-7820R
Operable Unit 3

Photograph 19 – Interpretive Display for Closed Portion of the Fort Wainwright Landfill in Background, Operable Unit 4

Photograph 20 – Monitoring Well AP-5588 (Downgradient from Landfill) Operable Unit 4

Photograph 21 – Monitoring Well AP-6532 (Downgradient from Landfill) Operable Unit 4

Photograph 22 – Hydroaxed Area Outside of Landfill Fence Line, Operable Unit 4

Photograph 23 – Source Area Treatment System (Horizontal Well Treatment System Visible In Background), Operable Unit 5

Photograph 24 – Horizontal Well Treatment System (Source Area Treatment System Visible In Background), Operable Unit 5

Photograph 25 – New Pavement at AP-7553, EQFS
Operable Unit 5

Photograph 26 – Building 1060W Former Treatment System Area
Operable Unit 5

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: **801 Drum Burial Site** **Date of inspection:** **May 13, 2011**

Site Location: **Fort Wainwright, Alaska** **Operable Unit** **OU1** X **Site Map Attached**

EPA Region: **10** **EPA ID:** **AK6210022426**

Agency, office, or company leading the five-year review: **U.S. Army**

Weather/temperature: **Partly cloudy, mild temperatures, mid 40's**

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
☐ Other _____
X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	**X** N/A
As-built drawings	☐ Readily available	☐ Up to date	**X** N/A
Maintenance logs	☐ Readily available	☐ Up to date	**X** N/A

Remarks_____

Site-Specific Health and Safety Plan	**X** Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	**X** Readily available	☐ Up to date	**X** N/A

Remarks_____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	**X** N/A

Permits and Service Agreements

Air discharge permit	☐ Readily available	☐ Up to date	**X** N/A
Effluent discharge	☐ Readily available	☐ Up to date	**X** N/A

Groundwater Monitoring Records	☐ Readily available	**X** Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	**X** N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	☐ Gates secured	**X** N/A
Signs and other security measures	**X** In place	☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	**X** No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	**X** No	☐ N/A

Adequacy	**X** ICs are adequate	☐ ICs are inadequate	☐ N/A

Vandalism/trespassing evident	☐ Yes	**X** No	☐ N/A
Land use changes on site	☐ Yes	**X** No	☐ N/A

GENERAL SITE CONDITIONS

Roads	☐ Damaged	**X** Adequate	☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance **X** N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data
X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition
X All required wells located ☐Needs Maintenance

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: DRMO Yard **Date of inspection:** May 12, 2011

Site Location: Fort Wainwright, Alaska **Operable** Unit OU2 X **Site Map Attached**

EPA Region: 10 **EPA ID:** AK6210022426

Agency, office, or company leading the five-year review: U.S. Army

Weather/temperature: Partly cloudy, mild temperatures, mid 40's

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment
X Other: AS/SVE Treatment systems were decommissioned in 2008. Treatment of residual PCE in groundwater using in-situ chemical reduction.

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	**X** N/A
As-built drawings	☐ Readily available	☐ Up to date	**X** N/A
Maintenance logs	☐ Readily available	☐ Up to date	**X** N/A

Remarks_____

Site-Specific Health and Safety Plan	**X** Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	**X** Readily available	☐ Up to date	☐ N/A

Remarks_____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	**X** N/A

Permits and Service Agreements

Air discharge permit	☐ Readily available	☐ Up to date	**X** N/A
Effluent discharge	☐ Readily available	☐ Up to date	**X** N/A

Groundwater Monitoring Records	☐ Readily available	**X** Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	**X** N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	**X** ☐ Gates secured	☐ N/A
Signs and other security measures	**X** In place	☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	**X** No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	**X** No	☐ N/A

Adequacy	**X** ICs are adequate	☐ ICs are inadequate	☐ N/A

Vandalism/trespassing evident	☐ Yes	**X** No	☐ N/A
Land use changes on site	☐ Yes	**X** No	☐ N/A

GENERAL SITE CONDITIONS

Roads	☐ Damaged	**X** Adequate	☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance **X** N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data
X Groundwater plume is effectively contained **X** Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition
X All required wells located ☐Needs Maintenance

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: Birch Hill Tank Farm (Remedial Area 1b) **Date of inspection: May 13, 2011**

Site Location: Fort Wainwright, Alaska **Operable Unit OU3** X **Site Map Attached**

EPA Region: 10 **EPA ID: AK6210022426**

Agency, office, or company leading the five-year review: U.S. Army

Weather/temperature: Partly cloudy, mild temperatures, high 40's low 50's

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment
X Other: AS/SVE and Product Recovery (All systems have been shut down

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	**X** N/A
As-built drawings	☐ Readily available	☐ Up to date	**X** N/A
Maintenance logs	☐ Readily available	☐ Up to date	**X** N/A

Remarks_____

Site-Specific Health and Safety Plan	**X** Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	**X** Readily available	☐ Up to date	☐ N/A

Remarks_____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	**X** N/A

Permits and Service Agreements

Air discharge permit	☐ Readily available	☐ Up to date	**X** N/A
Effluent discharge	☐ Readily available	☐ Up to date	**X** N/A

Groundwater Monitoring Records	☐ Readily available	**X** Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	**X** N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	**X** Yes	☐ N/A
Signs and other security measures	**X** In place	☐ N/A

Institutional Controls (ICs)

Implementation and enforcement[1]

Site conditions imply ICs not properly implemented	**X** Yes	☐ No	☐ N/A
Site conditions imply ICs not being fully enforced	**X** Yes	☐ No	☐ N/A

Adequacy	**X** ICs are adequate	☐ ICs are inadequate	☐ N/A

Vandalism/trespassing evident	**X** Yes	☐ No	☐ N/A
Land use changes on site	☐ Yes	**X** No	☐ N/A

GENERAL SITE CONDITIONS

Roads	☐ Damaged	**X** Adequate	☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES

Groundwater Extraction Wells, Pumps, and Pipelines

Pumps, Wellhead Plumbing, and Electrical

☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance **X** N/A

Surface Water Collection Structures, Pumps, and Pipelines

Collection Structures, Pumps, and Electrical

☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data

X Groundwater plume is effectively contained

X Contaminant concentrations are generally declining

Monitored Natural Attenuation

Monitoring Wells (natural attenuation remedy)

X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition

X All required wells located ☐Needs Maintenance

[1] During the 2011 site inspection, the fence line surrounding the Birch Hill Tank Farm was observed to be compromised in several locations and evidence of graffiti was noted on the tanks; however, ICs for this site are considered to be properly implemented and enforced because no unauthorized digging was observed and all wells currently in the monitoring system were locked and in good condition.

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: **Railcar Off-Loading Facility (RA 2)** **Date of inspection: May 12, 2011**

Site Location: **Fort Wainwright, Alaska** **Operable Unit** **OU3** X **Site Map Attached**

EPA Region: **10** **EPA ID:** **AK6210022426**

Agency, office, or company leading the five-year review: **U.S. Army**

Weather/temperature: **Partly cloudy, mild temperatures, mid 40's**

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment
X Other: Air Sparge / Soil Vapor Extraction (all systems are currently shut down)

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	**X** N/A
As-built drawings	☐ Readily available	☐ Up to date	**X** N/A
Maintenance logs	☐ Readily available	☐ Up to date	**X** N/A

Remarks_____

Site-Specific Health and Safety Plan	**X** Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	**X** Readily available	☐ Up to date	☐ N/A

Remarks_____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	**X** N/A

Permits and Service Agreements

Air discharge permit	☐ Readily available	☐ Up to date	**X** N/A
Effluent discharge	☐ Readily available	☐ Up to date	**X** N/A

Groundwater Monitoring Records	☐ Readily available	**X** Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	**X** N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	☐ Gates secured	**X** N/A
Signs and other security measures	**X** In place	☐ N/A

Institutional Controls (ICs)

Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	**X** No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	**X** No	☐ N/A

Adequacy	**X** ICs are adequate	☐ ICs are inadequate	☐ N/A

Vandalism/trespassing evident	☐ Yes	**X** No	☐ N/A
Land use changes on site	☐ Yes	**X** No	☐ N/A

GENERAL SITE CONDITIONS

Roads	☐ Damaged	**X** Adequate	☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES

Groundwater Extraction Wells, Pumps, and Pipelines

Pumps, Wellhead Plumbing, and Electrical

☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance **X** N/A

Surface Water Collection Structures, Pumps, and Pipelines

Collection Structures, Pumps, and Electrical

☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data

X Groundwater plume is effectively contained

X Contaminant concentrations are generally declining

Monitored Natural Attenuation

Monitoring Wells (natural attenuation remedy)

X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition

X All required wells located **X** Needs Maintenance[1]

[1] One well at Valve Pit C is damaged and requires maintenance or an alternative sampling location should be chosen.

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: MP 2.7 and 3.0 **Date of inspection: May 13, 2011**

Site Location: Fort Wainwright, Alaska **Operable Unit OU3** X **Site Map Attached**

EPA Region: 10 **EPA ID: AK6210022426**

Agency, office, or company leading the five-year review: U.S. Army

Weather/temperature: Partly cloudy, mild temperatures, mid 40's to low 50's

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
☐ Access controls
X Institutional controls
☐ Groundwater pump and treatment
☐ Other _____
X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	**X** N/A
As-built drawings	☐ Readily available	☐ Up to date	**X** N/A
Maintenance logs	☐ Readily available	☐ Up to date	**X** N/A

Remarks_____

Site-Specific Health and Safety Plan	**X** Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	**X** Readily available	☐ Up to date	☐ N/A

Remarks_____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	**X** N/A

Permits and Service Agreements

Air discharge permit	☐ Readily available	☐ Up to date	**X** N/A
Effluent discharge	☐ Readily available	☐ Up to date	**X** N/A

Groundwater Monitoring Records	☐ Readily available	**X** Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	**X** N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	☐ Gates secured	**X** N/A
Signs and other security measures	☐ In place	**X** N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	**X** No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	**X** No	☐ N/A

Adequacy	**X** ICs are adequate	☐ ICs are inadequate	☐ N/A

Vandalism/trespassing evident	☐ Yes	**X** No	☐ N/A
Land use changes on site	☐ Yes	**X** No	☐ N/A

GENERAL SITE CONDITIONS

Roads	☐ Damaged	**X** Adequate	☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance **X** N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data
X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition
X All required wells located **X** Needs Maintenance

Note: Wells at these sites continue to frost jack.

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: Ft Wainwright Landfill **Date of inspection: May 13, 2011**

Site Location: Fort Wainwright, Alaska **Operable Unit OU4** X **Site Map Attached**

EPA Region: 10 **EPA ID: AK6210022426**

Agency, office, or company leading the five-year review: U.S. Army

Weather/temperature: Partly cloudy, mild temperatures, mid 40's to low 50's

Remedy Includes: (Check all that apply)

X Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
☐ Other _____
X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	**X** N/A
As-built drawings	☐ Readily available	☐ Up to date	**X** N/A
Maintenance logs	☐ Readily available	☐ Up to date	**X** N/A

Remarks_____

Site-Specific Health and Safety Plan	**X** Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	**X** Readily available	☐ Up to date	☐ N/A

Remarks_____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	**X** N/A

Permits and Service Agreements

Air discharge permit	☐ Readily available	☐ Up to date	**X** N/A
Effluent discharge	☐ Readily available	☐ Up to date	**X** N/A

Groundwater Monitoring Records	☐ Readily available	**X** Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	**X** N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	**X** Gates secured	☐ N/A
Signs and other security measures	**X** In place	☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	**X** No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	**X** No	☐ N/A

Adequacy	**X** ICs are adequate	☐ ICs are inadequate	☐ N/A

Vandalism/trespassing evident	☐ Yes	**X** No	☐ N/A
Land use changes on site	☐ Yes	**X** No	☐ N/A

GENERAL SITE CONDITIONS

Roads	☐ Damaged	**X** Adequate	☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance **X** N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data
X Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition
X All required wells located ☐Needs Maintenance

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: **Remedial Area 1A Birch Hill Aboveground Storage Tanks** **Date of inspection: May 12, 2011**

Site Location: **Fort Wainwright, Alaska** **Operable Unit** **OU5** **X Site Map Attached**

EPA Region: **10** **EPA ID:** **AK6210022426**

Agency, office, or company leading the five-year review: **U.S. Army**

Weather/temperature: **Partly cloudy, mild temperatures, mid 40's**

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
☐ Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment
☐ Other_____

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	☐ Readily available	☐ Up to date	**X** N/A
As-built drawings	☐ Readily available	☐ Up to date	**X** N/A
Maintenance logs	☐ Readily available	☐ Up to date	**X** N/A

Remarks_____

Site-Specific Health and Safety Plan	**X** Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	**X** Readily available	☐ Up to date	☐ N/A

Remarks_____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	**X** N/A
Permits and Service Agreements			
Air discharge permit	☐ Readily available	☐ Up to date	**X** N/A
Effluent discharge	☐ Readily available	☐ Up to date	**X** N/A
Groundwater Monitoring Records	☐ Readily available	☐ Up to date	**X** N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	**X** N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	**X** Yes	☐ N/A
Signs and other security measures	**X** In place	☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	**X** Yes	☐ No	☐ N/A
Site conditions imply ICs not being fully enforced	**X** Yes	☐ No	☐ N/A

Adequacy	☐ ICs are adequate	**X** ICs are inadequate	☐ N/A

Vandalism/trespassing evident	**X** Yes	☐ No	☐ N/A
Land use changes on site	☐ Yes	**X** No	☐ N/A

GENERAL SITE CONDITIONS

Roads	☐ Damaged	**X** Adequate	☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance **X** N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data
☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
☐Properly secured/locked ☐Functioning ☐Routinely sampled ☐Good condition
☐All required wells located ☐Needs Maintenance

Note: Increased security and repairs to the fence are required for ICs to effectively prevent access to the contaminated soil areas.

Five-Year Review Site Inspection Checklist

SITE INFORMATION

Site name: **EQFS / WQFS / Chena River** **Date of inspection: May 12, 2011**

Site Location: **Fort Wainwright, Alaska** **Operable Unit** **OU5** X **Site Map Attached**

EPA Region: **10** **EPA ID:** **AK6210022426**

Agency, office, or company leading the five-year review: **U.S. Army**

Weather/temperature: **Partly cloudy, mild temperatures, mid 40's**

Remedy Includes: (Check all that apply)

☐ Landfill cover/containment
X Access controls
X Institutional controls
☐ Groundwater pump and treatment
X Monitored natural attenuation
☐ Groundwater containment
☐ Vertical barrier walls
☐ Surface water collection and treatment
X Other: AS / SVE (The Source Area and Horizontal Well Treatment Systems are shut down and scheduled for decommissioning. The 1060 Treatment System at the EQFS has been decommissioned.)

ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

O&M manual	**X** Readily available	☐ Up to date	☐ N/A
As-built drawings	**X** Readily available	☐ Up to date	☐ N/A
Maintenance logs	**X** Readily available	☐ Up to date	☐ N/A

Remarks On-site documents and records are available for the Sparge Curtain Treatment System.

Site-Specific Health and Safety Plan	**X** Readily available	☐ Up to date	☐ N/A
Contingency Plan/Emergency Response Plan	**X** Readily available	☐ Up to date	☐ N/A

Remarks_____

O&M and OSHA Training Records	☐ Readily available	☐ Up to date	**X** N/A
Permits and Service Agreements			
Air discharge permit	☐ Readily available	☐ Up to date	**X** N/A
Effluent discharge	☐ Readily available	☐ Up to date	**X** N/A
Groundwater Monitoring Records	☐ Readily available	**X** Up to date	☐ N/A
Daily Access/Security Logs	☐ Readily available	☐ Up to date	**X** N/A

ACCESS AND INSTITUTIONAL CONTROLS (Show location on a site map)

Fencing damaged	☐ Gates secured	**X** N/A
Signs and other security measures	**X** In place	☐ N/A

Institutional Controls (ICs)
Implementation and enforcement

Site conditions imply ICs not properly implemented	☐ Yes	**X** No	☐ N/A
Site conditions imply ICs not being fully enforced	☐ Yes	**X** No	☐ N/A

Adequacy	**X** ICs are adequate	☐ ICs are inadequate	☐ N/A

Vandalism/trespassing evident	☐ Yes	**X** No	☐ N/A
Land use changes on site	☐ Yes	**X** No	☐ N/A

GENERAL SITE CONDITIONS

Roads	☐ Damaged	**X** Adequate	☐ N/A

GROUNDWATER/SURFACE WATER REMEDIES
Groundwater Extraction Wells, Pumps, and Pipelines
Pumps, Wellhead Plumbing, and Electrical
☐ Good condition **X** All required wells properly operating ☐ Needs Maintenance ☐ N/A

Surface Water Collection Structures, Pumps, and Pipelines
Collection Structures, Pumps, and Electrical
☐ Good condition ☐ Needs Maintenance **X** N/A

Monitoring Data
X Groundwater plume is effectively contained **X** Contaminant concentrations are generally declining

Monitored Natural Attenuation
Monitoring Wells (natural attenuation remedy)
X Properly secured/locked **X** Functioning **X** Routinely sampled **X** Good condition
X All required wells located ☐Needs Maintenance

Appendix E

Fort Wainwright Five-Year Review
Public Repository Status Memorandum

Repository Visits

On May 11, 2011, Fairbanks Environmental Services visited document repositories at the Noel Wien Library (1215 Cowles Street, Fairbanks, Alaska), the Administrative Record docket at the DPW Environmental Office (Building 3023, Ft Wainwright), and the Fort Wainwright Post Library (Building 3700). The repositories were visited to confirm the availability of documents in the Fort Wainwright NPL Site Administrative Record. This report summarizes the findings of these visits and suggests actions USARAK may take to ensure that complete sets of documents in the Administrative Record are readily available to the public.

Summary of Findings

The following table summarizes the availability of the Administrative Record at each of the three repositories available to the public for this NPL site.

Location	Hard Copy	Microfiche	CDs
Noel Wien Library Contact: Judy Countryman (907) 459-1033	Administrative Record Index The final OU6 102 Former Communications Site (TAKU) Remedial Investigation Report is currently available for review.	Administrative Record (pages 00001 – 102654) Nothing has been added since the 2001 visit and the file is basically in exactly the same condition as was found in 2001 and 2006.	Administrative Record, first 9 of 16 CDs (pages 00001 – 78697) Nothing appears to have been added since the 2001 visit.
Fort Wainwright Post Library Contact: Betty Luebke (907) 353-2642	Administrative Record Index Informational Repository Records of Decision Operable Unit 1 Operable Unit 2 Operable Unit 3 Operable Unit 4 Operable Unit 5 2001 Five-Year Review The final OU6 102 Former Communications Site (TAKU) Remedial Investigation Report is currently available for review	All microfiche has been removed from this location because there is no longer a microfiche reader available.	Administrative Record, first 9 of 16 CDs (pages 00001 – 78697) Nothing appears to have been added since the 2001 visit
Fort Wainwright DPW Environmental Office **(Main Administrative Record/Docket)** Contact: Joe Malen (907) 353-4512	Administrative Record index and hard copies of all documents on the record	No microfiche at this location	Administrative Record Entire 16 CD set (pages 00001 – 102654) DPW is currently in the process of updating the Administrative Record database.

Recommendations

Recommendations for maintenance of the Administrative Record are summarized in the following table. As in 2006, suggestions focus on whether to discontinue providing the Record in three different media (hard copy, microfiche, and CD) in favor of one media (CD-ROM), which would still meet the legal requirements for NPL site information repositories. It is understood that decisions to discontinue providing the Administrative Record in hard copy or microfiche will also consider whether public involvement goals for this site would continue to be met.

Location	Hard Copy	Microfiche	CDs
Noel Wien Library	All copies of RODS and other Fort Wainwright Documents have been purged. [1] Provide new hard copies of the RODS as well as the 2001 and 2006 Five-Year Reviews and the Explanation of Significant Differences (ESD) unless the decision is made to use CD-ROMs as the exclusive media type. Let the library know that the document should be kept indefinitely. [1]	Since microfiche is an outdated media, should consider discarding in favor of CD-ROM. However, if the decision is made to keep this media, the following recommendations apply: • Update record with copies of the 2001 and 2006 Five-Year Reviews and the ESD • Provide a two drawer microfiche file box to keep collection in order. • Provide placeholder cards to help ensure microfiche are returned to proper location in file box. • Perform periodic maintenance checks to ensure the collection is complete and in proper order	Need the February 1999 and 2000 updates, as well as copies of the 2001and 2006 Five-Year Reviews and the ESD Since computers are now available for viewing CD-ROMs, should consider making this the primary media for the information repository at this location
Fort Wainwright Post Library	Need copy of the ESD, the 2006 Five Year Review and primary OU6 documents used in the decision process (Remedial Investigation, Feasibility Study, Proposed Plan, and upon finalization, Record of Decision.) . Continue to update the collection on a regular basis, unless the decision is made to use CD-ROMs as the exclusive media type.	No action required since no microfiche reader is available at this location	Need the February 1999 and 2000 updates, as well as copies of the 2001 and 2006 Five-Year Reviews and the ESD Since computers are now available for viewing CD-ROMs, should consider making this the primary media for the information repository at this location.
Fort Wainwright DPW Environmental Office	No action required (i.e., continue to update the collection as reports and other documents become available).	No action required	No action required.

[1]The librarian indicated that unless someone speaks with her directly and gives her written direction that a document is required to stay for a certain amount of time, or indefinitely, it is discarded after 6 months to a year.

Potential to Discontinue Maintenance of Paper and Microfiche Copies

USARAK and EPA have discussed the possibility of providing the Administrative Record exclusively on CDs for public use, which would: a) simplify maintenance of the Record at locations with appropriately equipped PCs; b) reduce the use of paper and shelf space; and c) be a "friendlier" medium for today's users than are microfiche. Federal regulations [40 CFR 300.800(c)] state that:

> *Regions may maintain and make a convenience copy of the administrative record available to the public in a manner other than hard copy (e.g., on CD-ROM, microform, or a flash or thumb drive) in addition to a hard copy at the location at or near the site, so long as the appropriate viewing equipment is available. The Agency may also make the administrative record available on the internet, though this should not be the sole method by which the public can access the record.*

Computers with the capability to view CD-ROMs are available at both the Noel Wien and the Ft Wainwright Post Libraries.

Another alternative for facilitating public access to the Administrative Record would be for USARAK to post the information currently available on data CDs to the Fort Wainwright internet home pages, which can be accessed using the library's existing internet stations or any PC equipped to access the World Wide Web.

Appendix F

INTERVIEW FORMS AND RESPONSES

Interview forms were distributed to personnel listed in the table below during this Five-Year Review. Forms were either emailed (in both MSWord and PDF format) or sent by postage mail. The email and postal mail forms were sent on April 27, 2011. Copies of the email and distribution letter are attached. Returned forms / responses are provided in the proceeding section.

Agency / Affiliation	Name	Method of Delivery	Response
FWA Garrison Commander	Colonel Ronald M. Johnson	Postal Mail	No response
	Colonel Timothy A. Jones	Postal Mail	No response
Alaska Department of Environmental Conservation (ADEC)	Deb Caillouet	Email	No response
	Ken Spires	Email	No response
	Kent Monroe	Email	No response
Directorate of Public Works (DPW)	Karen Dearborn	Email	No response
	Therese Deardorff	Email	No response
	Linda Douglas	Email	Completed, returned via email
	Joe Malen	Email	No response
	Rielle Markey	Email	No response
Army Environmental Center (AEC)	Mark Eldridge	Email	No response
	Joe King	Email	No response
Environmental Protection Agency (EPA)	Bill Adams	Email	No response
	Jacques Gusmano	Email	No response
Restoration Advisory Board (RAB) Members	Tanana Chiefs Conference	Postal Mail	No response

DISTRIBUTION EMAIL

Karol Johnson

From: Karol Johnson
Sent: Friday, April 29, 2011 3:05 PM
To: 'Caillouet, Debra J (DEC)'; 'kent_monroe@dec.state.ak'; 'therese.deardorff@richardson.army.mil'; 'Karen Dearborn (karen.d.dearborn@usace.army.mil)'; 'james.spiers@alaska.gov'; 'linda.douglass@us.army.mil'; 'Malen, Joseph Mr CIV US USA IMCOM'; 'joseph.king5 @us.army.mil'; 'Eldridge, Stephen M POA'; Bill Adams ; gusmano.jacques@epa.gov; (b) (6)
Cc: Brock, Robert D POA; Craig Martin
Subject: FTW 5-YR Review - Interview Questionnaire
Attachments: 5YR Interview Questionnaire.pdf; 5YR Interview Questionnaire.docx

Hello,

Fairbanks Environmental Services has been tasked by the U.S. Army Corps of Engineers Alaska District with preparing the Third Five Year Review for remedial activities at the six operable units on Ft Wainwright, Alaska. As part of this review, we would like to get input from those that have been involved with or have had an interest in these projects. With this in mind, we have attached a copy of an interview form for you to fill out. Please go through the questionnaire and answer those questions that are applicable to you.

Please note that the interview form is provided in both MS Word, and PDF formal, please use whichever format is preferable. You can return your completed questionnaire via email, fax, or mail. If you would prefer to provide your input via a personal interview, or if you have any questions or comments, please contact us at the following:

Call, Fax or Email to;
Karol Johnson (Project Manager)
(907) 452-2462
Fax: (907) 452-2692
Karol@fesalaska.com

Mail to:

Fairbanks Environmental Services
3538 International Street
ATTN: Karol Johnson
Fairbanks, AK 99701

INTERVIEW FORM

RESPONSE

FORT WAINWRIGHT FIVE-YEAR REVIEW
INTERVIEW QUESTIONNAIRE

INTERVIEW RECORD	
Name: Linda Douglass	
Title: Public Affairs Officer	Organization: Garrison Public Affairs Office
Telephone No: 907-353-6701	E-Mail Address: linda.douglass@us.army.mil
Street Address: 1047-1 Nysteen Street	City, State, Zip: Fort Wainwright, AK 99703-5900
Interview Date: 3 May 2011	Site Name: Fort Wainwright
Interview Type: ☐ Telephone ☐ Visit x Email ☐ Questionnaire (by mail)	
Specific Site Involvement	
Operable Unit(s) Worked: ☐ OU1 ☐ OU2 ☐ OU3 ☐ OU4 ☐ OU5 ☐ OU6	
Date(s) of Involvement:	
Title / Position (with respect to sites): Public Affairs Officer	

The following general questions were adapted from the EPA's Comprehensive Five-Year Review Guidance. Please answer any questions that are applicable; if you need more space, you may attach a separate sheet.

INTERVIEW QUESTIONS

1. *What is your overall impression of the work conducted at the site? (general sentiment)*

   The projects have been the subject of public and media interest off and on over the years. The Environmental Section has worked hard to keep everyone informed of the progress of remediation and have been successful in easing the concerns of the local population

2. *From your perspective, what effect have remedial operations at the site had on the surrounding community?*

   While interest was high at the onset, as remediation continued interest dropped, both from civilians and media. Most people I've spoken with are satisfied that the Army is doing all it can – and all the right things – with its remediation and its continuing information flow to the public.

3. *Are you aware of any concerns from the local community regarding the site, operation, administration, implementation, or overall protectiveness of the remedies in the Record of Decision?*

   No – community interest waned after the initial discovery, and the community leaders appear satisfied that the Army is doing all it can to remediate the sites.

4. *Are you aware of any events, incidents, or activities at the site such as vandalism, trespassing, or emergency responses from local authorities?*

   no

5. *Are you aware of any changes in land use, access, or other site conditions that have occurred since the last 5-Year Review (2001) that you feel may impact the protectiveness of the site?*

   no

6. *Are there regular on-site inspections and/or operation, maintenance and monitoring (OMM) presence at the site? What is the frequency of O&M site inspections and activities?*

   N/A

7. **Have there been unexpected O&M difficulties or costs at the site since start-up or in the last five years?**

   N/A

8. **Have there been any significant changes in the O&M requirements, maintenance schedules, or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy?**

   N/A

9. **Have there been opportunities to optimize the operation, maintenance, or sampling efforts? Please describe changes, cost savings, and/or improved efficiency.**

   N/A

10. **Do you have any comments, suggestions, or recommendations regarding the site's management or operation?**

    No

Appendix G

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

APR 6 2007

Reply to
Attn of: ORC-158

Colonel David L. Shutt
Department of the Army
Installation Management Agency
Directorate of Public Works
Headquarters, U.S. Army Garrison, Alaska and Fort Richardson (PROV)
724 Postal Service Loop #4580
Fort Richardson, Alaska 99505-4500

Re: Amendment to the Fort Wainwright Federal Facility Agreement under CERCLA Section 120

Dear Colonel Schutt:

I am pleased to inform you that the amendment to the Federal Facility Agreement for Fort Wainwright has now been signed by all parties and became effective upon the date of my signature.

As you are aware, EPA and the U.S. Army Garrison, Alaska (USAG-AK) proposed to amend the Fort Wainwright Federal Facility Agreement (FTW FFA) utilizing Section XXXIII (Modification/Amendment of Agreement) to add a new Operable Unit (OU) 6 to address a newly discovered contaminated area known as the Communications Site (also known as Taku Gardens Housing Expansion Area). The Alaska Department of Environmental Conservation (ADEC), a party to the original FTW FFA was fully supportive of the amendment. The original FTW FFA contained language that utilized a site-wide OU, OU5, to serve as a comprehensive post-wide document for all new or previously unresolved sources. With the discovery of the Communication Site, it is apparent to EPA, USAG-AK, and ADEC that the inclusion of new sources in OU 5 is no longer a workable solution. The Record of Decision (ROD) for OU 5, issued in 1999, can not be amended without a completed remedial investigation/feasibility study (RI/FS) of the new source and a remedy in hand. The original FTW FFA did not expressly allow the Remedial Project Managers (RPMs) to create new OUs. The proposed amendment to the FTW FFA, and Attachment I thereto, will expressly allow the RPMs to create new OUs.

This amendment to the FTW FFA is a positive step toward beginning to work through the difficult issues that surround the Communications Site. We look forward to continued progress at Fort Wainwright.

If you should have any questions, please feel free to contact my office or Dan Opalski, EPA's Director of the Environmental Cleanup Program, at (206) 553-1855.

Sincerely,

Elin D. Miller, Regional Administrator
EPA Region 10

Enclosure

cc w/enc: Talis J. Colberg, Attorney General of Alaska
Addison D. Davis, IV, Deputy Assistant of the Army (I&E)
Larry Hartig, Commissioner of ADEC
Weston Lawton, USAK JAG
Cameron Leonard, Assistant Attorney General of Alaska

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
AND THE
ALASKA DEPARTMENT OF ENVIRONEMENTAL CONSERVATION
AND THE
UNITED STATES DEPARTMENT OF DEFENSE

IN THE MATTER OF:	)	AMENDMENT TO
	)	FEDERAL FACILITY AGREEMENT
The U.S. Army, 6th Infantry	)	UNDER CERCLA SECTION 120
Division (Light) and	)	
U.S. Army Garrison, Alaska	)	Administrative Docket Number:
Fort Wainwright, Alaska	)	1092-04-10-120
	)	

PURPOSE

1. The general purposes of this Amendment are: to incorporate the recently discovered source area known as the Communications Site (a/k/a Taku Gardens Housing Expansion Area) into the Federal Facility Agreement ("Agreement") entered into on March 25, 1992 by the Army, U.S. EPA, and ADEC (the "Parties"), by creating a new operable unit (OU), OU 6, for the Communications Site; and to provide the remedial project managers (RPMs) with authority to create additional OUs in the future to address additional new source areas that may be discovered. Terms used in this Amendment are defined in Part II of the Agreement, DEFINITIONS.

AUTHORITY TO AMEND

2. The Agreement may be and is hereby amended by unanimous agreement of the signatories pursuant to Part XXXIII, MODIFICATION/AMENDMENT OF AGREEMENT, paragraph 33.2. Pursuant to Part XXXIII, paragraph 33.3, such amendment shall be in writing, effective as of the date it is signed by all signatories, and shall be incorporated into and modify the Agreement.

AMENDMENTS

3. Paragraph 33.1 of the Agreement is amended by adding the following sentence to the end of the paragraph: In addition, the Project Managers may, by unanimous written agreement, create new OUs to address new source areas that were not addressed at the time the ROD for OU 5 was issued.

4. Attachment I (Scope of Work) to the Agreement is amended by adding the following new paragraph at the end of Section 1.0 (Introduction):

> Pursuant to the February 2007 Amendment to the Agreement, OU 6 was created for the purpose of including the recently discovered Communications Site. Additional new OUs may be created in the future to address additional potential source areas that may be discovered. Such new OUs, including OU 6, will follow the process specified in this Attachment except that source areas included therein will not be included as part of OU 5 and will not be evaluated as components of OU 5.

5. Attachment I (Scope of Work) to the Agreement is further amended by adding the following row to the end of Table 2 (Potential Source Areas): OU 6 – Communications Site.

6. The RPMs shall develop a timetable for scheduling the activities for OU 6 required by the Agreement, including Attachment I, as amended, and shall incorporate the timetable into Table 3 (Primary and Secondary Document Deadlines) of Attachment I.

7. This Amendment does not serve as precedent for future Department of Defense federal facility agreements.

EFFECTIVE DATE

8. This Amendment is effective upon signature of all Parties to this Amendment

For the Army:

ADDISON D. DAVIS, IV
Deputy Assistant Secretary of the Army (I&E)
Environment, Safety, and Occupational Health

2 MAR 07
Date

DAVID L. SHUTT
Colonel, U.S. Army
Commander, U.S. Army Garrison, Alaska

FEB 1[illegible]
Date

For ADEC:

LARRY HARTIG
Commissioner
Alaska Department of Environmental Conservation
State of Alaska

Date

TALIS J. COLBERG
Attorney General
State of Alaska

7-11-07
Date

For EPA:

ELIN D. MILLER
Regional Administrator
Region 10
United States Environmental Protection Agency

4/6/07
Date

If you should have any questions, please feel free to contact my office or Dan Opalski, EPA's Director of the Environmental Cleanup Program, at (206) 553-1855.

Sincerely,

Elin D. Miller, Regional Administrator
EPA Region 10

Enclosure

cc w/enc: Talis J. Colberg, Attorney General of Alaska
Addison D. Davis, IV, Deputy Assistant of the Army (I&E)
Larry Hartig, Commissioner of ADEC
Weston Lawton, USAK JAG
Cameron Leonard, Assistant Attorney General of Alaska

FORT WAINWRIGHT

CERCLA FEDERAL FACILITY AGREEMENT DELIVERABLE DOCUMENT

ACTION MEMORANDUM

SUBJECT: Action Memorandum for a Department of Army Time-Critical Removal Action at the Communications Site (a/k/a Taku Gardens Housing Expansion Area), and Imposition and Maintenance of Interim Land Use Controls, Fort Wainwright National Priorities List (NPL), Federal Facility Site, Fort Wainwright, Alaska.

FROM: DAVID L. SHUTT
Colonel, U.S. Army
Commander, U.S. Army Garrison, Alaska

TO: JENNIFER ROBERTS
Federal Facilities Restoration Program Manager
Alaska Department of Environmental Conservation

DANIEL D. OPALSKI, Director
Office of Environmental Cleanup
U.S. Environmental Protection Agency, Region 10

SITE ID: CERCLIS – AK6210022426
SSID - 10C7

I. PURPOSE

The purpose of this Action Memorandum is to document approval for a Time Critical Removal Action (TCRA) for upland soil contaminated with polychlorinated biphenyls (PCBs) and the imposition and maintenance of interim land use controls at the Communications Site (a/k/a Taku Gardens) within the Fort Wainwright Federal Facility NPL Site, located at Fort Wainwright, Alaska.

The removal action took place in September 2005 under urgent circumstances and is thus being documented after the fact, herein, now that sufficient time is available to do so. The actions taken soon after the discovery of PCB contamination consisted of the removal of high concentrations of PCB-contaminated soil and the installation of fencing and warning signs. These actions meet the criteria for initiating a removal action under the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR 300.415, as well as the requirements outlined in the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA).

Interim land use controls have been established for the Communications Site to assure safety and human health. Specifically, the Commander, U.S. Army Garrison Alaska has directed that residential occupancy will not be allowed in the housing at the Communications Site until all investigation and required cleanup is complete. The lifting of this restriction will be coordinated with both EPA Region X and the Alaska Department of Environmental Conservation (ADEC), as signatories to the Fort Wainwright's Federal Facility Agreement (FFA). The prohibitions to residential occupancy have been incorporated into the installation real property use master plan.

II. SITE CONDITIONS AND BACKGROUND

A. Site Description

1. Removal Site Evaluation

PCB-contaminated soil was discovered by construction crews in June 2005, while excavating at construction site 52, which is located in the southwestern corner of the Communications Site. Potential contamination was identified through field screening procedures employed for the entire construction site. Initial laboratory tests proved inconclusive, warranting a second round of sampling and analysis, which reveal very high PCB concentrations in the soil (up to 110,000 ppm) at the site 52 location (See Figure 1) and minor concentrations of other hazardous constituents.

2. **Physical Location**

The entire source area known as the Communications Site is located within the cantonment area of Fort Wainwright, Alaska. The entire area encompasses approximately 54 acres and is contained within an area bounded by Neely Road to the north, the Alaska Railroad to the east, Alder Avenue to the south, and White Street to the west. A military family housing complex borders the construction site to the west PCB-contaminated soil was initially discovered while excavating for Housing Unit 52 foundation, consisting of approximately 1/2 acre in the southwestern portion of the housing complex construction site. The area was roped off to exclude any entry. The Exclusion Zone was later expanded, and now encompasses approximately five acres of the southwest corner of the housing project site.

3. **Background and Site Characteristics**

In 2004, a preconstruction environmental survey was accomplished, showing that much of the site was a 1950s era military landfill. Minor concentrations of PCB contamination (< 2 ppm) were detected in two bore samples. Subsequent step out sampling conducted prior to construction did not confirm the presence of PCBs. To facilitate the environmental survey, the Army cleared surface vegetation. During that process, a considerable amount of metal waste and some military munitions debris was uncovered. Army munitions experts confirmed that the munitions debris items did not contain any explosive materials. .

Construction began in spring 2005. Additional metal debris and POL contamination was discovered on the site. As required by the contract, the contractor developed and implemented a screening process to detect possible contamination encountered during site excavation. The PCB contamination at construction Site 52 was discovered as a consequence of employing these procedures.

After initial discovery of the PCB contamination, only construction Site 52 was marked with warning tape and the contractor was instructed to keep workers out of the area. At some point following initial discovery of the PCB, construction crews entered the restricted area and spread contaminated soil by using the Site 52 soil to accomplish overfill work at other areas generally within the Exclusion Zone of Taku Gardens construction site. Upon discovery, the Army initiated an investigation. The contaminated soil was located through surface soil sampling, and returned to the Site 52. The Exclusion Zone was expanded to include seven additional excavation sites, and the Exclusion Zone was fenced and warning signs posted.

Historical photographs and records indicate that, beginning in the mid 1940s, the Communications Site was used for multiple purposes, including a salvage and reclamation yard. Temporary military barracks and offices were constructed in the early 1950s and were subsequently dismantled. A separate operation, the communications site, was located in the southwestern corner of the area during this period of time. Previous locations of radar systems are visible in some historic aerial photographs. When military operations ended, a portion of the land was developed into personal use garden plots and the remaining area was allowed to return to its natural state of vegetation. Little other historical information about the site is known and research is ongoing. Except for personal use garden plots contained on a few acres in the southwestern corner, the source area remained undeveloped for the last few decades until 2002-2003 when it was selected as the construction site for future military family housing.

In accomplishing the investigation to locate the moved PCB contaminated soil, the Army discovered that the site also contained other types of contamination including POL waste, solvents and munitions waste components. As a consequence, in 2006, the Army initiated a Preliminary Source Evaluation in compliance with the Fort Wainwright Federal Facility Agreement. A report of the findings of this undertaking was released in February 2007.

Fort Wainwright is a federally-owned facility managed by U.S. Army Garrison, Fort Wainwright, which is an installation-level command overseen by its higher headquarters U.S. Army Garrison, Alaska.

4. **Release or Threatened Release into the Environment of a Hazardous Substance, or Pollutant or Contaminant**

Available information indicates that, at some point in the past, PCB was released at the Communication Site. Sampling results of tests conducted across the site are recorded in the Preliminary Source Evaluation Narrative Report (2006). The test results showed PCB concentrations in soil as high as 115,000 ppm at Site 52.

Test results also indicated that additional contaminants may be present in subsurface soil and ground water at the source area. Site investigations indicate that large amounts of waste materials were buried at the site at some point in the distant past. This waste material was comprised of an extensive amount of scrap metal, which included some military munitions components and 55-gallon drums containing unknown residue. Removal of these buried waste materials is the subject of ongoing discussions with regulators. In addition, POL contamination was discovered in the northwestern portion of the site during construction; soil gas sampling of this area is scheduled for 2007.

The Army transitioned from removal to remedial response activities in accordance with 40 CFR 300.415(g) and the Fort Wainwright Federal Facilities Agreement in late 2005. An amendment to the Fort Wainwright Federal Facilities Agreement was signed by USEPA, ADEC and the Army in February 2007, and formally recognizes the Communication Site as Operable Unit 6.

5. **National Priorities List (NPL) Status**

The Communications Site is part of the Fort Wainwright Federal Facility Site, listed on the National Priorities List on August 30, 1990.

6. **Maps, Pictures, and Other Graphic Representations:** Attached map (See Figure 2) shows where the Exclusion Zone now lies in relation to the entire construction site, as well as shows other areas of potential concern. Maps also show the relationship of the entire site within the Fort Wainwright boundaries. (See Figure 3) In addition, existing construction debris piles are noted on the attached maps.

B. Actions to Date

1. **Previous Actions**

Investigations

Pre-construction geotechnical surveys were conducted at the Communications Site in late 2003 and 2004. Survey test results showed some amount of low-level PCB contamination. Unobtrusive geophysical testing was also done during this time frame, indicating several large areas of buried metal debris of an undetermined nature.

Following the discovery of PCBs in soil at Site 52 ranging from just above 1 to 115,000 ppm in July 2005, a sampling and analysis plan was jointly developed and approved by the Army, EPA and ADEC to determine the extent of the PCB contamination. In carrying out the plan, surface soil samples were collected and wipe samples were taken of construction and playground equipment, and of nearby houses. Temporary groundwater monitoring wells were installed to determine the migration potential of the PCBs. Soil borings, field screening and laboratory analyses were also carried out under the plan. The results of the sampling indicated that the highest concentrations of PCBs was largely limited to soil at or near the surface in a 5-acre section of the southwestern corner of the construction site, specifically Site 52. Surface sampling at Site 52 indicated that this was a localized historical source and was exposed due to the site clearances to a 2' depth from the prior surface. Any concentration greater than 1 ppm found

elsewhere on the site was solely due to contaminated soil inadvertently moved from Site 52, as discussed above.

In addition to PCB contaminated soil, petroleum contaminated soil was also discovered on the construction site. The source of the petroleum contamination is unknown but site investigation indicates it was not associated with any underground storage tank. Soil with petroleum concentrations exceeding state cleanup requirements was either removed for off-site treatment or stockpiled pending treatment, in a vacant lot near the installation Defense Reutilization & Marketing Office.

There remains on site stockpiles of metal debris excavated from the foundation work. These scrap piles were sifted through during the 2006 field season; that work is documented in the Preliminary Source Evaluation II. Remaining metals will be properly disposed of during the 2007 field season.

In early 2006, the site was temporarily divided into five sub-areas in consultation with the ADEC and the EPA) based on potential chemicals of concern, historical activities and available non-classified information The boundaries and associated buildings for the five sub-areas are defined on Figure 4, and the Preliminary Source Evaluation 2 (PSE2) work plan was developed in accordance with FFA procedures. The PSE2's site evaluation was conducted through the summer field season. Based on the construction contractors' field notes and photographs of items uncovered by the contractor during 2005, the Army ordnance experts concluded the site could also contain discarded munitions components. For this reason, munitions experts were hired as part of the 2006 PSE2 field work to ensure site safety and proper identification of munitions components. The area where munitions items were found is Area A (See Figure 4). Several munitions components were found in both the test trenches and piles of construction debris, located in debris piles in the Northern Area of the site. Environmental and ordnance experts reviewed the materials from the piles, and whenever an unidentifiable or potential munitions item was found military ordnance experts were called to the site for a final decision on its disposition. All munitions components discovered during 2006 were taken off-site and disposed of by military ordnance experts. Technical documents generated by or on behalf of the agencies include:

- Draft Preliminary Source Evaluation Narrative Report, August 2006 (Oasis)
- Field Sampling Plan, Revision 3, August 2006 (North Wind)
- Final Revision, Delineation and Remediation of Contaminated Soil, Groundwater and Debris at Stryker Brigade Cantonment Areas, Accident Prevention Plan, August 2006 (North Wind)

- Accident and Prevention Plan and Site Safety and Health Plan, Jul/Aug 2006 (North Wind)
- FWA-102 Former Communication Site (Taku Gardens) Work Plan Addendum, Spring 2006 (North Wind)
- FWA-102 Former Communication Site (Taku Gardens), Field Data Report February 2006 (North Wind)
- Draft Revision 1, Site Characterization and Remediation Work Plan, Fort Wainwright, Alaska, June 2005 (North Wind)

Response Actions

Following the August 2005 laboratory confirmation that Site 52 contained PCB contamination, excavated soil piles were covered and dust control measures put in place to prevent contamination from spreading beyond the suspected source area.

In September 2005, much of the 54-acre Communications Site was fenced to restrict access, and warning signs were posted. Additional fencing was also installed around the approximately 5-acre PCB exclusion area, to separately control access to that area of the site. Warning signs were posted along the perimeter of the exclusion area.

In September 2005, approximately 230 cubic yards of excavated soil, weighing about 478,000 pounds and containing the highest known PCB concentration levels, was removed directly from the Communications Site and shipped out-of-state to a permitted hazardous waste landfill in Oregon for proper disposal. The removal was resource limited, but did reduce the highest potential threats to site workers and nearby residents. The remaining PCB soil was stockpiled within the PCB exclusion area and properly covered with plastic sheeting. This soil is planned for removal during the upcoming 2007 field season.

In November 2006, a permanent 8-foot tall chain link fence, with barbed wire across the top, replaced the 5-foot fence around the perimeter of the 54 acre site, with the exception of approximately 0.3 miles. The existing 6-foot fence along this stretch was replaced with a permanent 8-foot high chain link fence with barbed wire in Spring 2007. Signs were placed every 100 feet of the enclosing fence, stating: *Restricted Area, Keep Out.*

As part of Army's response action, and as a condition for approval of this Action Memorandum, Fort Wainwright has placed interim land use controls on the Communications Site pursuant to the U.S. Army Alaska Institutional Controls Standards Operating Procedures (SOPs). The land use controls prohibit residential use and occupancy of the newly constructed housing units until all

investigation and cleanup required under CERCLA is complete and coordination has been undertaken with requisite federal and state regulators. These land use controls (LUCs) shall be maintained in the installation master plan IAW AR 210-20. The following land use controls shall remain in effect until such time as demonstrated that inhabitants may safely inhabit the structures built on the Communications Site:

- Land use restrictions prohibiting residential occupation of the site until all investigation and cleanup required under CERCLA to protect human health and the environment is complete and regulator coordination has been undertaken.
- Fencing and warning signs will be maintained around the perimeter of the site to restrict access.
- Groundwater restrictions prohibiting the drilling and use of water wells for potable water, fire suppression, irrigation or other consumptive purposes.
- Land use restrictions prohibiting soil disturbing activities associated with construction or renovation of new or existing facilities to include residential and commercial construction, road repair and realignment, utility work, digging, trenching, excavation, paving or drilling of soil borings, except when such activities are carried out in accordance with an Excavation Clearance Request approved by the Army in consultation with EPA and ADEC. In cases of emergency, standard reporting requirements and practices will be followed.

At the point that residential occupation is permitted, these interim LUCs will be reconsidered and long-term use restrictions may be imposed as part of a CERCLA remedy. Regulator coordination and ADEC and EPA concurrence would be sought prior to the imposition of such remedial LUCs.

Community Relations

On 31 August 2005, U.S. Army Garrison Alaska conducted a press conference where local media were provided information about the conditions discovered on the construction site.

On 6 September 2005, a public meeting was held at Fort Wainwright to inform Fort Wainwright residents and members of the surrounding community about site conditions. The EPA and ADEC remedial project managers participated in the meeting. Information was provided about general PCB hazards and potential PCB exposures. At the meeting the Army agreed to sample neighboring houses, playgrounds, and anything else residents may be concerned with.

Results of the residential sampling were delivered by hand to the residents in September 2005. The results showed no PCB contamination above risk based levels (1 ppm) outside the construction area. Newsletters are planned to update residents and the community of the current status of this site.

Community relations will be implemented in accordance with the Fort Wainwright Federal Facility Agreement. In addition, the Community Involvement Plan will be revised to include Operable Unit 6, and newsletters will be sent to the surrounding community.

2. Current Actions

Both EPA Region X and ADEC are currently reviewing the final PSE1 and draft PSE2 reports. When complete, the regulators and Army will evaluate the results, in accordance with the FFA process. During the upcoming 2007 field season, Army will begin work on a remedial investigation and feasibility study (RI/FS), which will include site-specific risk assessments and will be submitted as FFA deliverable documents. During the drafting of these documents, Army will coordinate with both EPA Region X and ADEC to ensure that any outstanding concerns are being addressed in the RI/FS. Additional removals where PCB contamination is greater than 1 ppm are also planned for the 2007 field season; these actions will be coordinated in accordance with the FFA parties.

The housing units that have been constructed on the Communications Site are vacant and will remain so until deemed safe for habitation.

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions at the Communications Site in September 2005 presented an immediate potential threat to public health or welfare or to the environment, thereby meeting the criteria for a time critical removal action as set forth in 40 CFR 300.415(b). This NCP requirement concerns the need to address actual or potential exposure to human populations from hazardous substances and to address possible migration of such contamination. The Communications Site sits next to a residential neighborhood. Tests showed that soil excavated within specific sections of the PCB exclusion area (Site 52) contained PCB concentrations as high as 111,000 ppm, so the PCB levels in stockpiled excavated soil in the exclusion area could potentially be quite high, even if diluted. These high concentrations of PCBs posed a potentially unacceptable risk if inadvertently inhaled or ingested. Also, the exposed excavated soil could have been released into the neighboring environment by being carried off the site by wind, storm water or snowmelt, so the removal action was undertaken to address any unacceptable risks posed by potential migration of contamination.

IV. ENDANGERMENT DETERMINATION

Given the very high concentrations of PCB at Site 52 and potential mobility of the excavated soil stockpiled within the PCB exclusion area, Army determined that it must conduct a removal action of the PCB-contaminated soil to address an unacceptable risk to public health and the environment.

V. CONSISTENCY DETERMINATION

The removal actions described in this Action Memorandum are otherwise appropriate and consistent with any future response action that may be taken. The removal of PCB-contaminated soil will not interfere with any future response activity that may be needed to address other possible soil and groundwater contamination that may be on the construction site, nor limit the possible range of alternative courses of action that may be available for this site. The completed removal action includes the implementation of interim land use controls to ensure protection of human health.

1. Engineering Evaluation/Cost Analysis (EE/CA)

Because the response actions were time critical, an Engineering Evaluation/Cost Analysis is not required.

2. Applicable or Relevant and Appropriate Requirements (ARARs)

The removal action elements involving the September 2005 disposal of PCB-contaminated soil attained or exceeded all ARARs to the extent practicable. Two factors were applied to determine whether the identification and attainment of ARARs was practicable: (1) the exigencies of the situation; and (2) the scope of the removal action to be taken.

Federal ARARs:

The following is a summary of Federal ARARs identified to date for the removal action elements involving the September 2005 disposal of PCB-contaminated soil:

Toxic Substances Control Act regulations [40 CFR Part 761] provides cleanup and disposal options for PCB remediation waste including PCB-contaminated soil, and provides guidance for institutional controls of PCB contaminated areas [40 CFR § 761 Subpart G].

U.S. Department of Transportation (DOT) requirements, 49 CFR Parts 171 through 180, relating to transportation of hazardous materials to off-site disposal facilities.

State of Alaska ARARs:

18 AAC §62.310 (transportation of hazardous materials) has been identified as a State applicable ARAR.

3. **Project Schedule**

The removal of PCB-contaminated soil, and the installation of fencing and warning signs, took place in September of 2005. The interim institutional controls for the Site, including the amendment of the installation master plan, will be considered effective upon all Parties signing this Action Memorandum.

VI. ESTIMATED COSTS:

Total cost for the removal of PCB-contaminated soil and the installation of fencing and warning signs is approximately $340,000. Additional costs associated with the implementation of the institutional controls consist primarily of Army management costs, which are expected to be less than $10,000. All costs of the removal action have been and will continue to be funded by the Department of Army.

VII. OUTSTANDING POLICY ISSUES: None

VIII. RECOMMENDATION

This decision document represents the selected removal action for the Communications Site in Fort Wainwright, Alaska, developed in accordance with CERCLA and the NCP section 300.415(b)(2) criteria for a removal. This decision is based on the administrative record for the site.

Future response actions at the Communications Site are subject to regulator coordination in accordance with the Ft. Wainwright FFA. This includes the imposition and maintenance of the interim land use controls described herein. Specifically, Fort Wainwright will maintain the prohibition against residential use of the Communications Site as part of its real property master plan until all investigation and cleanup required under CERCLA to protect human health and the environment is complete and regulator coordination has been undertaken. This commitment was also outlined in letters from COL Shutt, dated September 25, 2006, to both EPA Region X

and ADEC. Any decision to occupy this housing site will be first coordinated with EPA Region X and ADEC to ensure that all parties agree that the Communications Site may be used for residential purposes.

APPROVED:

For the Army:

DAVID L. SHUTT
Colonel, U.S. Army
Commander, U.S. Army Garrison, Alaska

CONCURRING:

For ADEC:

JENNIFER ROBERTS
Federal Facilities Restoration Program Manager
Alaska Department of Environmental Conservation

For EPA:

DANIEL D. OPALSKI
Director, Office of Environmental Cleanup
U.S. Environmental Protection Agency, Region 10

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For ADEC:

JENNIFER ROBERTS
Federal Facilities Restoration Program Manager
Alaska Department of Environmental Conservation

For EPA:

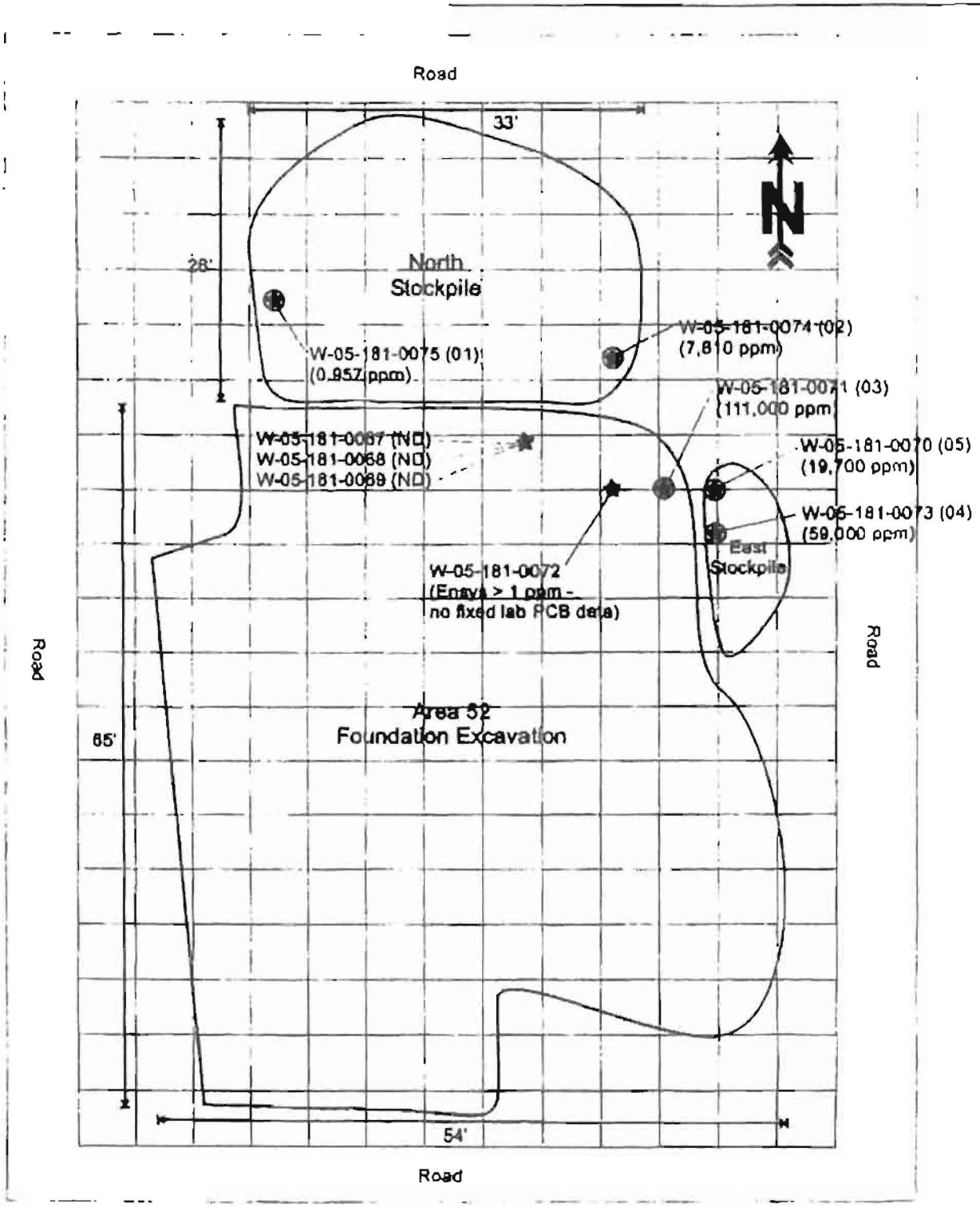
DANIEL D. OPALSKI
Director, Office of Environmental Cleanup
U.S. Environmental Protection Agency, Region 10

3.3 Master Plan Regulations, Army Regulation 210-20 - IC3

The Army issued a new regulation, Master Planning for Army Installations, AR 210-20, on July 13, 1987, updating an earlier regulation dated January 26, 1976. AR 210-20 "establishes the requirement for an installation master plan and planning board and specifies procedures for developing, submitting for approval, updating, and implementing the installation master plan." IC3 provides for comprehensive planning at Army installations and not only allows, but requires, incorporation of existing land-use and conditions into the Master Plan. IC3 provides a framework for comprehensive planning through the use of component plans, which include, but are not limited to, the following:

- Natural Resources Plan
- Environmental Protection Plan
- Installation Layout and Vicinity Plan
- Land-use Plan
- Future development Plan

The overall objective is to provide each installation with a master plan through the integration of each component plan into the installation master plan. The component plans form a series of narrative, tabular and graphic plans. Their integration into an installation master plan provides many benefits as outlined in AR 210-20, including "the mechanism for ensuring that installation projects are sited to meet operational, safety, physical security, and environmental requirements." PTA Office of the Chief Engineer in the Public Works Directorate is in charge of the master plan. A key component of the PTA master plan is the Arsenal Land-use map.48



★ Location of original sample (6/3005)

● Samples recollected (7/22/05)

(#) Corresponds to COC location ID on recollected samples

ND = not detected

Figure 1
Area 52 Sampling Locations
and Aroclor 1260 Results

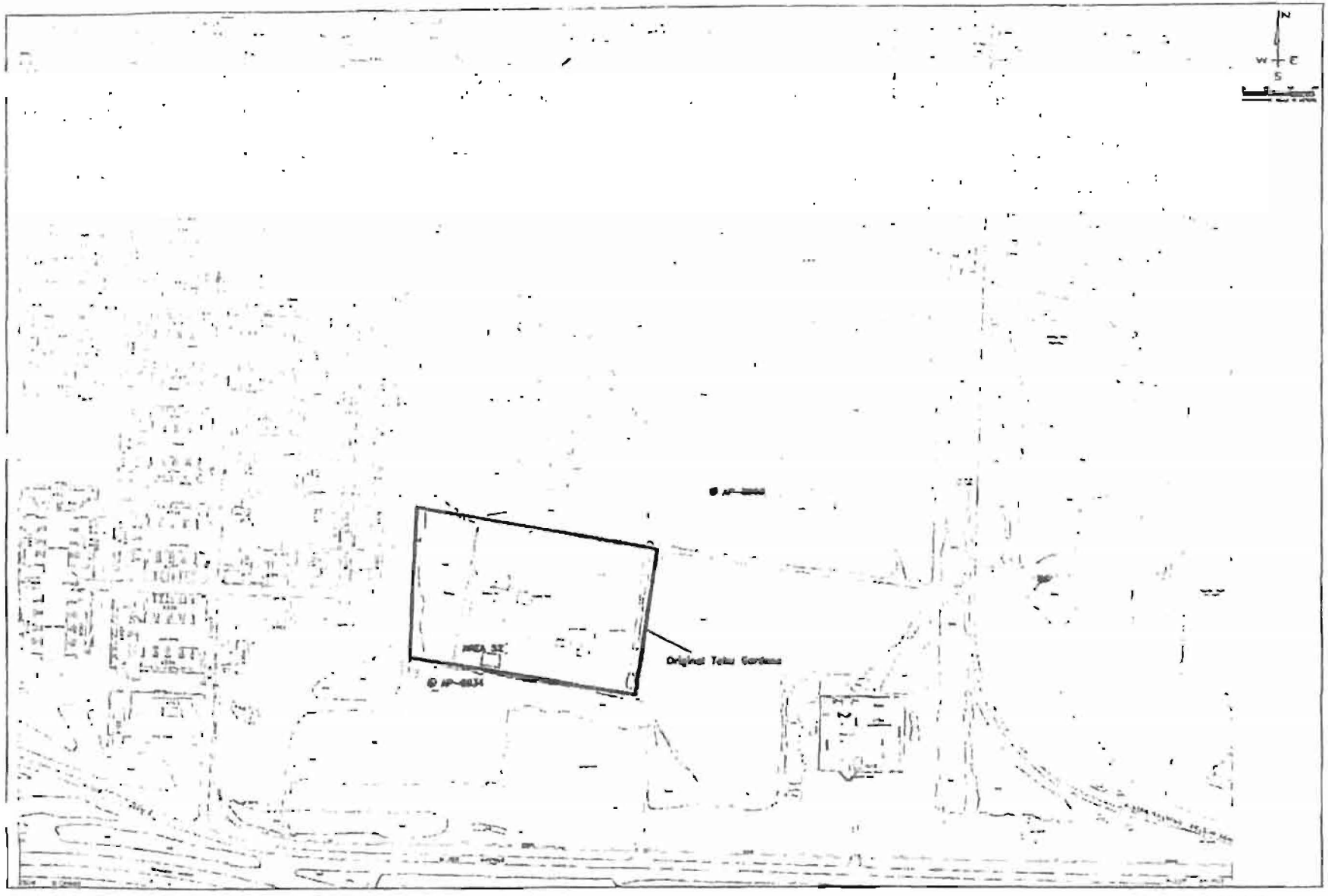


Figure 2
Exclusion Zone

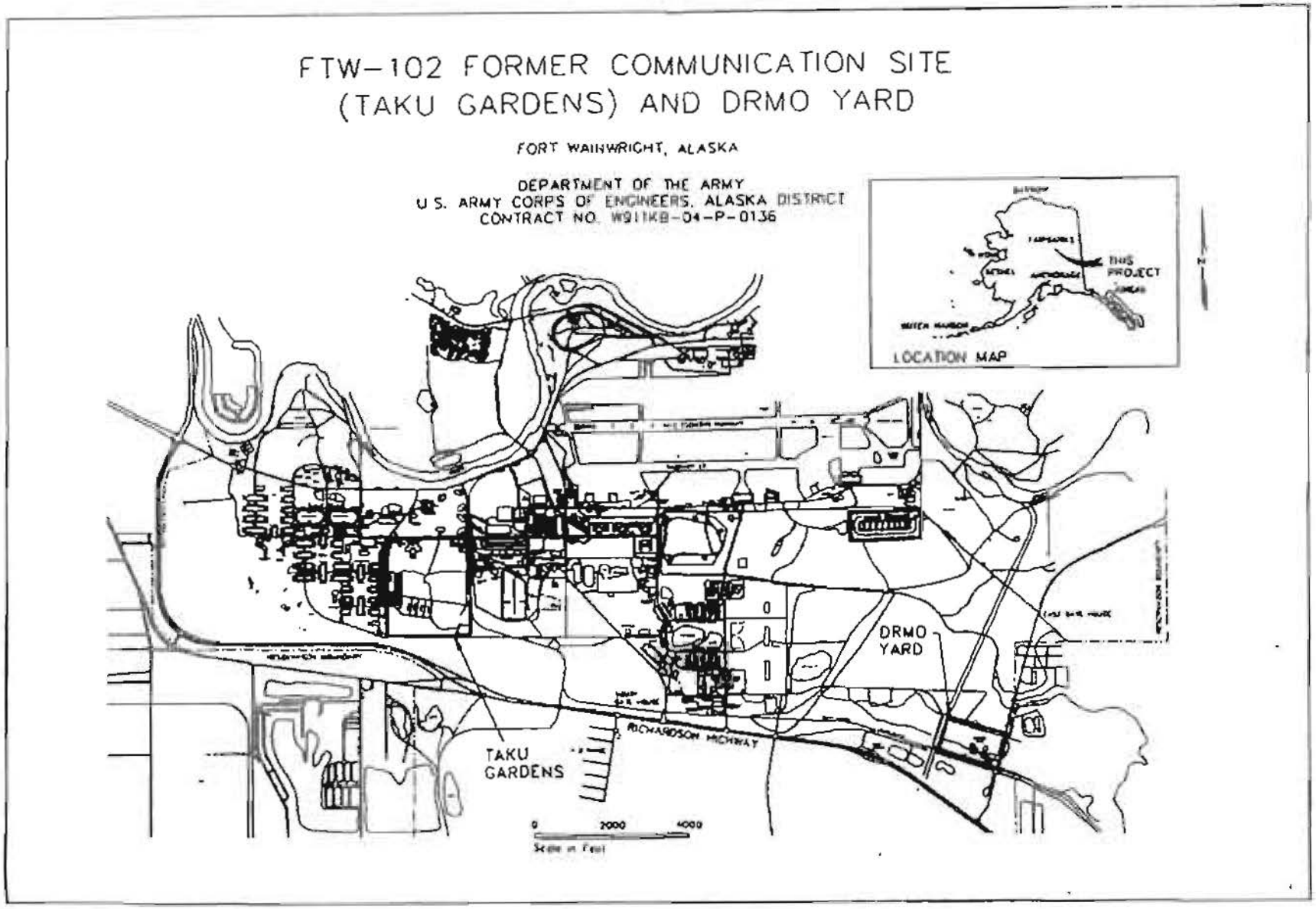


Figure 3
Fort Wainwright Location Map

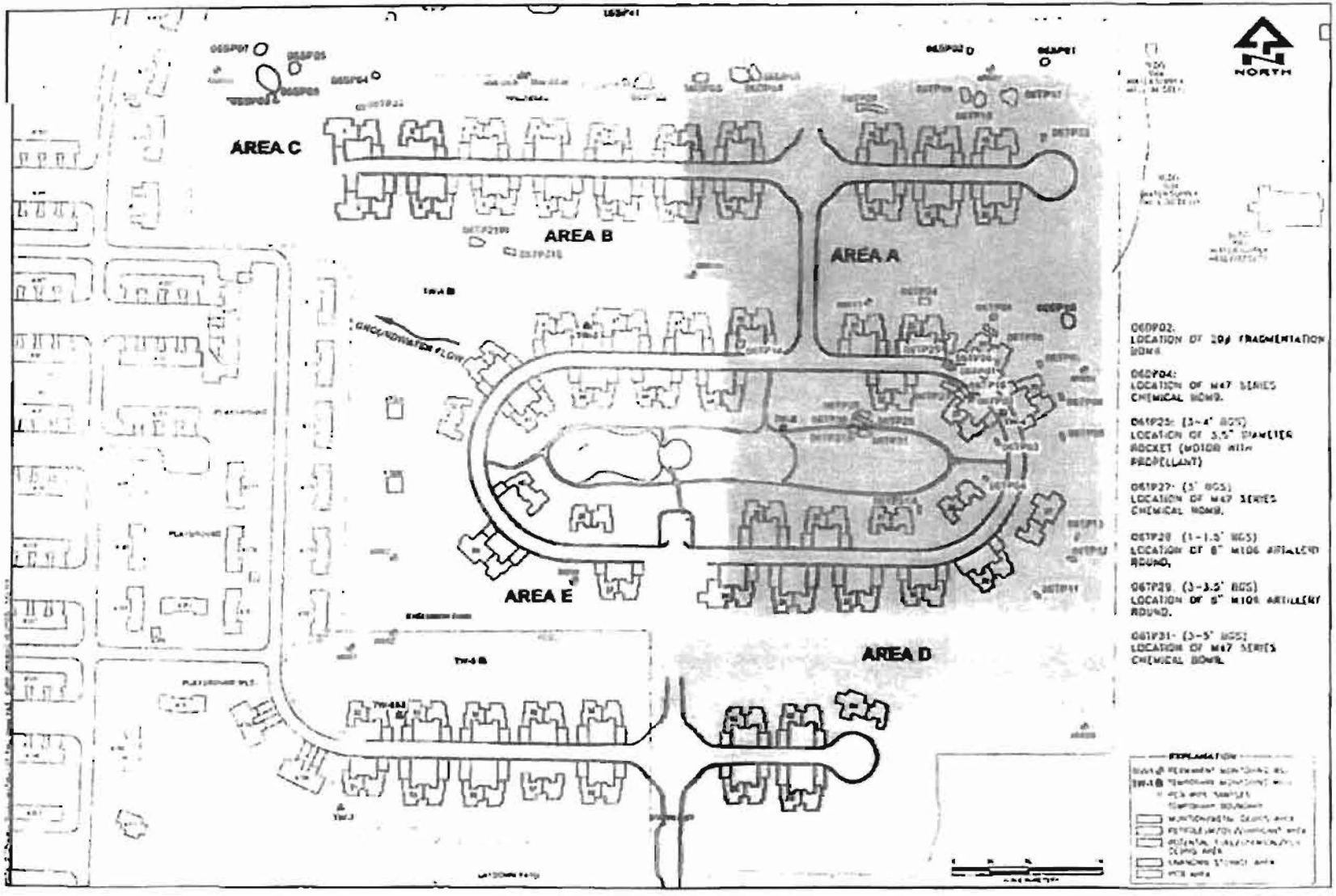

NORTH
AREA C
AREA B
AREA A
AREA E
AREA D
GROUNDWATER FLOW
060P02:
LOCATION OF 20# FRAGMENTATION BOMB
060P04:
LOCATION OF M47 SERIES CHEMICAL BOMB.
061P25: (3-4' BGS)
LOCATION OF 3.5" DIAMETER ROCKET (MOTOR WITH PROPELLANT)
061P27: (3' BGS)
LOCATION OF M47 SERIES CHEMICAL BOMB.
061P28 (1-1.5' BGS)
LOCATION OF 8" M106 ARTILLERY ROUND.
061P29 (3-3.5' BGS)
LOCATION OF 8" M106 ARTILLERY ROUND.
061P31: (3-5' BGS)
LOCATION OF M47 SERIES CHEMICAL BOMB.
EXPLANATION

Figure 4

Appendix H

Table H-1. Source Areas Listed by Operable Unit
(as defined in Attachment A of the Federal Facilities Agreement)

Source Areas in Operable Unit 1

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Alaska Railroad Storage Yard			NFA 6-Jan-95	
Beacon Tower landfill	Beacon Tower Drum Site		NFA 26-Jun-92	
Blair Lakes Drum Site		Drum removal	NFA 25-Jul-94	
Birch Hill Radioactive Waste Site			NFA 21-Mar-93	
Building 1128	Building 1128 Transformer Yard Drum Site		NFA 26-Jun-92	
Building 1567			NFA 10-Apr-95	
Building 1599			Transferred 2-Party	
Building 2077			Transferred 2-Party	IC under 2-Party Agreement
Building 2250			Transferred 2-Party	LTM 2-Party
Building 3015			NFA 10-Apr-95	Closed 2-Party
Burial Site M			NFA 26-Jun-92	
Chemical Warfare Disposal Area	Chemical Agent Dump Site	Interim Action ROD	NFA	
Drum Site West of DRMO	Site N-4		NFA OU1 ROD	
Blair Lakes Alpha Impact Area	Former Explosives Ordnance Detonation (EOD) Range		Transferred OU5 ROD	
Motor Pools Buildings (13 sites) *	1053, 1054, 1168, 3015, 3421(2), 3425(2), 3479(2), 3485(2), 3487		Transferred OU5 ROD	NFA OU5 ROD
Runway Radioactive Waste Site			NFA 26-Jun-92	
Trainor Gate Railroad Spur			NFA 30-Sep-92	

Source Areas in Operable Unit 1

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Building 3019	Transformer Storage Yard East of 3019		NFA 25-Jul-94	
Utilidor Expansion Drum Site			NFA 26-Jun-92	
Sites moved from OU2 to OU1 after FFA signature				
Drum Site South of the Landfill		Removal	NFA 25-Jul-94	
Engineer Park Drum Site		Removal	NFA 25-Jul-94	
801 Drum Burial Site		Removal	ROD OU1	Remedial Action

*Motor Pools Buildings included: Bldgs 1053, 1054, 1168, 3015, 3421A&B, 3425A&B, 3479, 3480, 3485A&B, and 3487.

Source Areas in Operable Unit 2

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Building 1168	Bldg 1168 Leach Well		ROD OU2	LTM
Building 3477			NFA 13-Jan-94	
801 Drum Burial Site		Transferred OU1	ROD OU1	Remedial Action
Tar Sites (4)			NFA 3-Jun-94	ADEC Solid Waste
Engineer Park Drum Site		Transferred OU1	NFA OU1 ROD	
Drum Site South of the Landfill	N-4	Transferred OU1	NFA OU1 ROD	
DRMO	DRMO 1&4			Remedial Action
Sites added after FFA signature				
North Post Site		Removal	Transferred 2-Party / OU2 ROD	LTM

Source Areas in Operable Unit 3

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Fairbanks Fuel Terminal	Birch Hill Tank Farm; Remedial Area 1B		OU3 ROD and ESD	Remedial action
Fairbanks-Eielson Pipeline	Milepost 2.7 & 3.0 and 15.75		OU3 ROD and ESD	Remedial action
Sites added after FFA signature				
Railcar Off-Loading Facility	ROLF		OU3 ROD and ESD	Remedial action
Remedial Area 1A	Birch Hill Above Ground Storage Area		Transferred OU5 ROD	Remedial Action

Source Areas in Operable Unit 4

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Landfill			OU4 ROD	Remedial Action
Power Plant Coal Yard	CSY		OU4 ROD	Remedial Action
Fire Training Pits	FTP	Removal	NFA 1-Sep-96	

Source Areas in Operable Unit 5

Source Area	Aliases (Name Changes)	Removal / Interim Actions	Disposition	Current Status
Open Burning/Open Detonation	OB/OD		NFA OU5	RCRA Deferred
Sites referred to OU5 from other Operable Units				
Blair Lakes Alpha Impact Area	Former Explosives Ordnance Detonation (EOD) Range		Transferred from OU1	NFA OU5 ROD
Motor Pools Buildings (13 sites)	1053, 1054, 1168, 3015, 3421(2), 3425(2), 3479(2), 3485(2), 3487		Transferred from OU1	NFA OU5 ROD
Fairbanks Fuel Terminal AST	Remedial Area 1a / Birch Hill Tank Farm ASTs		Transferred From OU3	Remedial Action
Sites added after FFA signature				
WQFS	WQFS 1, 2, 3		OU5 ROD	Remedial Action
	WQFS 4		Transferred 2-Party / OU5 ROD	NFA
EQFS			OU5 ROD	Remedial Action

Additional No Further Action Sites in Operable Unit 5 - 10 April 1995		
Ammo Storage	Floor Drains	One Lane Bridge
Blair Lakes Maneuver Area	Former Sewage Treatment Plant	South Side Treatment Plant Storage Area
Bldg 3026, Pest Control Shop	Former Storage Area	Trailer Park Open Dump
Bldg 4065, Hospital	Gravel Pit	Vehicle Wash Stations
Clear Creek Landfill	In-Service Transformers	Vet Clinic Leach field / Incinerator
Dennis Manor Riverbank Dump	North Wastewater Treatment Plant	Water Treatment Plant
Dry Cleaning Shop		

Table H-2. POL TWO-PARTY LISTED SITES TRACKING TABLES

September 2011

POL SOURCE AREAS
CONDUCTING ACTIVE TREATMENT or INSTITUTIONAL CONTROLS

SITE IDENTIFICATION		SITE STATUS REPORT
Building 2111/2112 ***Active Air Sparging*** ***DERA***	*IAP #:FTWW-087* *ADEC #:199031X021832 /199331X013302* *TNK #254-257/332-334* *ADEC FILE Number: 108.26.006/108.26.013*	*Buildings 2111/2112 were decommissioned in July 1995 when refueling operations shifted to a FARP (the temporary refueling point until another system was constructed). Completion of the demolition, excavation, and removal of Buildings 2111/2112 and the associated USTs/piping was completed in June 1996. Remediation of former Bldgs 2111/2112 will be through an air sparging treatment system which commenced summer 1996. Jan 99: Oct 98 samples show Benzene in g/w at 840 ppb; DRO at 4900 ppb; & GRO at 24K ppb. System operation will continue.* Apr 01: System will be optimized to better treat hot spots. Sampling pre and post operation will continue. *Reference UPC #FTW125.2004: Spring GW sampling occurred. System startup in May April 05, Fall gw sampling conducted week of October 15, 04. Three new wells installed July 2006: New monitoring wells installed to replace wells that were underwater during break up 19 September 2006 Treatment System off for rebound. Will evaluate starting treatment system in 07. CLOSES evaluation completed in 2007. Treatment system decommissioned in 2009. A treatability study to evaluate effectiveness of natural attenuation and effectiveness of ISCO & ORC injection is in process.*
Building 3570-Neely Road	*IAP #:FTWW-101* *ADEC #:200131x125601* *TNK #* *ADEC FILE Number:108.38.078*	*2002 Site discovery and release investigation 2003: 2003: GW sampling to occur in 2004. ROST report being finalized. 2004: Site investigation completed and additional wells installed. Workplan for TRTMT/monitoring completed. 2005:Elevated DRO,GRO,Benzene and 1,2 Dichloroethane in AP-9003. Chloromethane in well AP-8213 AS/SVE system with air oxidizer started up. Air complaints 2006: AS system only with air trtmt . System run only part of summer due to complaints. C.Soil Piles onsite over summer. 2007/2008 treatment system restarted in SVE only mode with 2 new wells installed. 2009 Onsite contractor trailer moved. SVE system operated continuously and AS restarted in June. Active treatment continues.*

POL SOURCE AREAS
UNDERGOING LONG-TERM MONITORING

SITE IDENTIFICATION		SITE STATUS REPORT
Building 2062 & 2063 ***Intrinsic Remediation*** ***VENC***	*IAP #:* *ADEC #:199531X034802/199531X034804* *TNK #244/245* *ADEC FILE Number:108.38.082,108.26.036* *108.38.082 108.26.036*	*The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work was completed during the summer of 1996. Work consisted of installing and sampling soil and groundwater probes. Based upon the RI report, intrinsic remediation will begin on this site began in 1997 and will run through 1998. Feb 99: Based on Sep 98, recommend LTM continue while active remediation discussed. Apr 01: Awaiting 2000 results/report; LTM should continue. Reference UPC # FTW125 2004 GW sampling occurred..10 wells and installed one new well to be sampled Fall 05 2005 Sampling 7 wells sampled. DRO only contaminant of concern, but concentrations exceed ADEC cleanup levels. Highest DRO value 12.0 ppm. Monitoring occurred in 2007 and 2009. The buildings were demolished in 2010. Next sampling event 2011with monitoring 7 wells every two years for GRO/BTEX/DRO.*

POL SOURCE AREAS
UNDERGOING LONG-TERM MONITORING

SITE IDENTIFICATION		SITE STATUS REPORT
Building 2077 ***(FTWW-003{2A})*** ***Intrinsic Remediation*** ***DERA***	*IAP #:FTWW-003* *ADEC #:199031X921807* *TNK #* *ADEC FILE Number:108.38.021*	*This site was part of OU-1. Investigation results indicate contaimination of groundwater and soil with DRO, heavy metals, PAH, and BTEX. This site was investigated under OU-1's Management Plan. Due to the types of contamination at this stie, RPMs have agreed (in the OU-1 ROD) that this source area will be transferred to and remediated under the Two-Party Agreement. A soil vapor extraction system was installed Summer of 1997. Aug 98: Clean confirmatory sampling expected. Dec 98: results indicate benzene still above MCLs in G/W (1500 ppb), as well as DRO/GRO. System will continue to run. Expansion or removal action to be discussed. Apr 01: No expansion will take place. Small removal action planned for Summer 01; system should operate around removal action. LTM plan will be developed post-removal sampling. 2003: Removal Action occurred. 2004 Installed one new monitoring well. Gw sampled in new well. Elevated concentrations of GRO and Benzene remain..Next monitoring event scheduled summer of 05. 2005: June 05 monitoring even showed elevated levels of GRO and benzene. Hopefully levels will decrease because of the substantial removal action. July 2006: No Action An Aircraft Parts Storage Bldg. Project near this site encountered soil contamnation at this source area during construction. Contaminated soils were removed. Monitoring will continue. Two wells were sampled in 2010. The same two wells will be sampled in 2011 and two additional wells will be installed and sampled downgradient of the excavation.*
Building 2250 ***(Golf Course)*** ***[FTWW-100 {3A}]*** ***Active SVE/AS*** ***DERA***	*IAP #:FTWW-100* *ADEC #:199531X924403* *199031X921803* *TNK #UNK* *ADEC FILE Number:108.38.081*	*ADEC closure has been obtained for the unknown 500- gallon gasoline tank; however, ADEC closure has not been obtained for the contamination that exists at the site unrelated to the UST. A combined air sparging/soil vapor extraction treatment system was installed and activated during the Release Investigation. Feb 99: Based on 98 sampling results, system operation will continue. Additional SVE wells may be added in 1999. Apr 01: Continue operation converting new soil borings into new SVE/AS wells; write 01 report with eye toward State requirements for ACLs. Reference UPC #FTW125 2004: ROST study completed. Replaced SVE Blower. GW sampleing occurred in May/June. 2004: CLOSES report. Contaminant is DRO Only. Recommend conditional closure. Sample 2 wells for DRO only once every 5 years. 2005: Sampling in June show43d an overall decrease in DRO but an increase in DRO in downgradient wells. Three wells were sampled for DRO in 2010. The treatment system will be decommissioned in 2011.*
Building 3483 (Motor Pool) ***[FTWW-057 {3A}]*** ***LTM*** ***DERA***	*IAP #:FTWW-057* *ADEC #:199231X026002* *TNK # 277 278* *ADEC FILE Number: 108.26.005*	*A soil vapor extracting/air sparging treatment system was installed by FERtech Environmental Systems (FERtech) in the fall of 1994 to remediate the soil contamination at Building 3483. Prior to FERtech's bankruptcy, the treatment system operated for several months. Harding Lawson and Associates assumed the treatment system, conducted an assessment of the system, installed system modifications where required, and began running the system in the summer of 1995. Feb 99: Based on 98 results, and benzene rebounds, spring 99 sampling event will determine if rebound occurred while system off. System may be run another year if warranted; if not, LTM and site closure plans will be negotiated. Apr 01: Upon receipt of 00 report, will evaluate LTM requirements. Reference UPC #FTW125 2004: ADEC agreed to decommission trtmt systems. July 2006: The army has requested closure of this site. Until that decision, the groundwater is being monitored. Three wells were sampled for GRO/BTEX/DRO in 2010 and will be sampled again in 2011.*
Building 3564 (Standby gen plant) ***[FTWW-099 {3A}]*** ***LTM*** ***DERA***	*IAP #:FTWW-099* *ADEC #:199531x924201* *TNK # 283,284* *ADEC FILE Number: 108.26.028*	*Remediation of contamination at this site commenced in the summer of 1996 by implementing an air sparging/soil vapor extraction treatment system. Feb 99: System recommended to run through 1999 season. LTM Plan will be recommended in next report. Building will be demolished in 1999; system will have to be off during the process. Apr 01: Bldg demo'd in 99, system restarted and ran until July 00. Will evaluate report and develop LTM Plan. System to be decommissioned/moved in 01. Reference UPC # FTW125 2002: Continue LTM and evaluate rebound 2003: no action 2004: gw sampling occurred. 8 wells sampled DRO and RRO exceeded cleanup levels. Plume not increasing. 2005: 4 of 6 wells exceeded ADEC cleanup levels for DRO July 2006: Seven wells sampled sampled annually for DRO/RRO. This site is scheduled to be sampled again in 2011.*

POL SOURCE AREAS
UNDERGOING LONG-TERM MONITORING

SITE IDENTIFICATION		SITE STATUS REPORT
Building 5110 ***[FTWW-085 {3A}]*** ***Intrinsic remediation/LTM*** ***DERA***	*IAP #:FTWW-085* *ADEC #:199231x131002* *TNK #317* *ADEC FILE Number:* *108.38.037*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC concurs with semi-annual groundwater monitoring to determine if the downward trend in BTEX, DRO, and GRO continues and to monitor the downgradient early warning wells to ensure that potential offsite receptors are not threatened. Semi-annual monitoring has been conducted since 1996 Feb 99: 1998 results show no migration is occurring. Wells will continue to be monitored, and IR will continue for second year. Apr 01: Site not sampled in 00; will be sampled in 01 and LTM Plan evaluated for decrease in frequency after results reviewed. Reference UPC # FTW125. ** A closure letter has been received from ADEC for the unknown quantity of soil removed from the tank excavation.* *2002: Determine frequency of monitoring 2003 Draft Closes Report 2004 No Action 2005 Groundwater monitoring occurred. A well survey was completed and groundwater flow paths evaluatedin 2010 and three wells were monitored for DRO, GROn and BTEX. Sampling frequency will change to every 5 years.*
North Post Sites 3 and 4 ***North Post Site 3:*** ***CLOSED*** ***North Post Site 4:*** ***(FTWW-050 {1A})*** ***LTM*** ***DERA***	*IAP #: FTWW-050* *ADEC #:199031x921811* *TNK #* *ADEC FILE Number*	*The North Post Site was referred from Two-Party to Three Party Operable Unit 2, where extensive investigations were conducted. Based on those investigations, the North Post Site was referred back to the Two-Party and will be addressed as such. The proposed remediation for North Post Site 4 was an air sparging/soil vapor extraction treatment system and PAH soil excavation and thermal remediation. The treatment system was installed in the summer of 1996. Feb 99: Based on 1998 results, system operation will continue with possible modifications to system. Apr 01: Awaiting report to determine LTM Plan. System was shut off in Nov 00, and was last sampled at that time. System will not be removed yet this summer. ** A closure letter has been received from ADEC for North Post Site 3 and the 1,240 cubic yards of soil generated from both North Post Sites 3 and 4. 2004 GW Sampling occurred. 10 wells were sampled. Need to verify gw flow direction and assess natural attenuation. CLOSES report complete DRO contamination with benzene in one small area. Need rebound information. If no rebound Army will request conditional closure. This treatment system was decommissioned in 2009. Five wells were sampled October 2010 for DRO/BTEX and Fe and Sulfate. Sampling frequency at this site has been changed to biennially the next monitoring event is scheduled for 2012.*

POL SOURCE AREAS
MISCELLANEOUS ITEMS

SITE IDENTIFICATION		SITE STATUS REPORT
Vehicle Wash Rack ***Forward Air Refuleing Point*** ***(FARP)*** ***NFA: Not a CERCLA*** ***Restoration Site***	*IAP #: CC FTWW 001* *ADEC #:199531X134801* *TNK # 924* *ADEC FILE Number:* *108.26.034*	*The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work commenced in May 1996 and consists of installing and sampling soil and groundwater probes. It was determined that current operations and practices caused spills and potential contamination in this area. Therefore, this site is not CERCLA eligible, will not be addressed under the Two-Party POL Agreement, and no closure letter is required. Action at this site will be addressed IAW 18 AAC 75. One well AP-9081 installed as close as possible to wells installed during 1996 release investigation. GRO and DRO detected at concentrations below ADEC cleanup levels. No BTEX. DRP and GRP present, but below Cleanup levels. Moved into the Compliance Cleanup Program. 2009 Assessment report completed including UVOST. Contaminated soil removal occurred to support construction upgrades. Monitoring completed in 2010 with 5 wells sampled for GRO/VOCs, DRO, Fe, and Sulfate. Additional monitoring scheduled for 2011.*

POL SOURCE AREAS
REFERRED TO ANOTHER PROGRAM or OPERABLE UNIT

ITE IDENTIFICATION		SITE STATUS REPORT
Building 1053 ***[FTWW-005; NFA]***	*IAP #:FTWW-005* *ADEC #:199031-921805* *TNK #* *ADEC FILE Number:* *108.38.071.0*	*Referred from Two-Party to Three Party OU 5, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.* *********A closure letter has been received from ADEC for the* 10 *cubic yards of soil removed from the tank excavation, since the soil is being handled under the Two-Party. This site is listed as NFA for soils with special handling requirments if soils are removed, GW is being treated in EQFS, OU5.*
Buildidng 1054	*IAP#* *ADEC #: 199431x107702* *TNK#* *ADEC FILE* *Number: 108.38.068*	*NFA for Soils.. Groundwater referred to OU5 FTW CERCLA FEDERAL FACILITY AGREEMENT RECOMMENDED ACTION 3 June 1994 ADMIN RECORD Page 50087. This site is listed as NFA for soils with special handling requirments if soils are removed, GW is being treated in EQFS, OU5.*
Building 1059	*IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number:*	*Referred from Two-Party to Three Party OU 5, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.*
Building 1060 ***[FTWW-088]***	*IAP #:FTWW-088* *ADEC #:199331X013305* *TNK #208* *ADEC FILE Number:* *108.26.012*	*ADEC closure was received for UST 208. Building 1060 was referred from the Two-Party to OU 5 (Three Party Agreement), based on the upgradient groundwater contamination source. ADEC closure is not required for this site based on the referral to OU 5. This site has an on-going SVE/AS treatment system to address groundwater contamination. Reference UPC # FTW125.* ******** *A closure letter has been received from ADEC for the unknown quantity of soil removed from the tank excavation.*
Building 1070	*IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number:*	*Referred from Two-Party to Three Party OU 5, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.* ***** A closure letter is anticipated from ADEC for the 220 cubic yards of soil removed from the transfer line excavation.***
Building 1173	*IAP #:FTWW-055* *IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number:*	*Referred from Two-Party to Three Party OU 3, removing this site from the Two-Party Agreement. ADEC closure is not required for this site. Site is currently in LTM and is monitored annually each spring.*
Building 1565 ***[FTWW-019]***	*IAP #:FTWW-019* *ADEC #:* *TNK #325* *ADEC FILE Number:*	*Referred from Two-Party to Three Party OU 5, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.*
Building 1599 ***Institutional Controls*** ***VENC***	*IAP FTWW-026* *ADEC #:199031X921808* *TNK #* *ADEC FILE Number:* *108.38.065*	*The 1995 OU1 RI revealed only petroleum contamination at levels exceeding ADEC cleanup levels. Therefore, in accordance with the June 1997 ROD for OU1, Building 1599 has been referred to the Two Party Agreement for enforcement ofiInstitutional controls for soils with groundwater reffered for treatment with OU5.*

POL SOURCE AREAS
REFERRED TO ANOTHER PROGRAM or OPERABLE UNIT

ITE IDENTIFICATION		SITE STATUS REPORT
Building 3595 [FTWW-011]	*IAP #:FTWW--11* *ADEC #:199331X007101* *TNK #295,351,352* *ADEC FILE Number: 108.26.021*	*ADEC closure was received for USTs 295 and 352. Referred from Two-Party to Three Party OU4 for groundwater contamination unrelated to the USTs, removing this site from the Two-Party Agreement. ADEC closure is not required for the remaining groundwater contamination at this site.*
Pipeline Break North Post [FTWW-081]	*IAP #:FTWW-081* *ADEC #:199031X921811* *TNK #* *ADEC FILE Number: 108.38.069*	*Referred from Two-Party to Three Party OU 3, removing this site from the Two-Party Agreement. ADEC closure is not required for this site.*
DRMO POL Sites (Former Bldgs 5001,3,6) [FTWW-091{1A}] ***SVE/AS System*** ***DERA***	*IAP #:FTWW-091* *ADEC #:199531X924401* *TNK #311,312,314,357,358* *ADEC FILE Number:*	*The Site Assessment and Release Investigation reports for Building 5001, USTs 311, 312, 314, 357 and 358, were delivered to ADEC recommending site closure for USTs 311, 312, 357, and 358. A closure letter is anticipated from ADEC for USTs 311, 312, 357, and 358. The soil and groundwater contamination associated with UST 314, 315, and 316 will be addressed with a soil vapor extraction/air sparging treatment system. This system was installed during the Summer of 1996 and will address the downgradient groundwater contamination that has migrated near Building 5006. An additional system may be installed to treat petroleum contaminated soils since Building 5001 has been demolished. Feb 99: 1998 results indicate DRO at 17600 ppb in g/w. System operation will continue. Options for expansion and other alternatives will be discussed. Apr 01: Site will be reviewed in conjunction with OU2 sites; 00 report has not been received. Upon receipt, will evaluate operations/monitoring requirements. Reference UPC # FTW125. ** A closure letter has been received from ADEC for USTs 311, 312, 357, 358, and 23 cubic yards of soil associated with USTs 357/358.* ***After2004 these 2 Party sites will be considered with the OU2 DRMO sites.***
Tar Sites (W of FWA So. Post soccer field; Glass Park next to Bldg 4040; NW of the FWA Golf Source; W of Power Plant Cooling Pond)	*IAP #:FTWW-078* *ADEC #:* *TNK #* *ADEC FILE Number: 108.15.001*	*The sites were reportedly used as tar disposal areas. Because of concerns of leachate release, the sites were included in the FFA for further investigation. Sampling conducted in 1992, and the analytical results of the sampling including TCLP analysis, showed no potential for groundwater contamination. A CERCLA FFA NFA document was signed by the RPMs in 1994. Any further actions associated with these sites will be coordinated with the Solid Waste/Pollution Prevention program of ADEC.*

TWO PARTY SITES REQUIRING
OTHER ACTION or INSTITUTIONAL CONTROLS

SITE IDENTIFICATION		SITE STATUS REPORT
Birch Hill AST Tank Farm ***NO ACTION UNTIL TANKS ARE TO BE REMOVED***	*IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number*	*The Birch Hill AST Tank Farm was investigated under Operable Unit 3 of the Three Party Agreement. Due to the size and complexity of this site, it was broken out into two sub-areas: subarea 1A, which includes the ASTs (OU5), and subarea 1B (OU3), which includes everything remaining (i.e., the area between the truck fill stand and the base of Birch Hill and the area south of the truck fill stand, which includes Valve Pit A). Subarea 1A was moved from Operable Unit 3 to Operable Unit 5, and will will remain a Three Party source area, as stipulated in the Operable Unit 3 Record of Decision. Subarea 1A, the ASTs, was referred from the Three Party, Operable Unit 3, to the Two-Party Agreement. As such, only the ASTs will be addressed under the Two-Party. No action will be taken until such time as the tanks are removed.*

POL SOURCE AREAS
CLOSED UNDER THE TWO-PARTY AGREEMENT

SITE IDENTIFICATION		SITE STATUS REPORT
Building 1002 ***[FTWW-095{3A}]*** ***LTM*** ***DERA***	*IAP #:FTWW-095* *ADEC #:199531X924402* *TNK #202* *ADEC FILE* *Number:108.26.030*	*A combined air sparging/bioventing treatment system was installed and activated at Building 1002 during the Release Investigation. Monitoring of the system will be conducted to assess remediation progress and to determine when remediation has occurred. Aug 98: Clean confirmatory samples are anticipated. Oct 98 samples show benzene still above MCLs (29.7ppb). System will run for another season, through 1999. Apr 01: Benzene remains high (21.5 ppb); system will operate in 2001. Reference UPC # FTW125.* ******** *A closure letter has been received from ADEC for the 35 cubic yards of soil removed from the tank excavation. 2002: AS/SVE system discontinued. 2003 Trtmt system decommissioned. May 2004: LongTermMonitoring plan Sample one well every other year. Next montiroing event April 05, No sampling was conducted in 2004.June 05 July 2006: No action required. Clean up complete with letter from ADEC November 2009.*
Building 1056	*IAP #:* *ADEC #:* *TNK #325* *ADEC FILE Number*	*UST removed prior to 1988, ADEC closure under the Two-Party Agreement is not applicable.*
Building 1168 ***[FTWW-097{3A}]*** ***LTM*** ***DERA***	*IAP #:FTWW-097* *ADEC #:199531X924302* *TNK #213* *ADEC FILE* *Number:108.38.067.06*	*A combined air sparging/bioventing treatment system was installed and activated at Building 1168 during the Release Investigation. Monitoring of the system will be conducted to assess remediation progress and to determine when remediation has occurred. (Separate from the UST is a dry well (oil/water separator) which falls under the Three Party OU 2, currently operating a air sparging/soil vapor extraction treatment system installed in the winter of 1994, now off and being removed.) Fall 1998: Results warrant continued operation of system for at least another year. New SVE wells to be installed in 1999. Apr 01: Results low enough to warrant system being turned off; G/w will be sampled yearly; soil every 3 years (LTM Plan being developed.) Reference UPC # FTW125. ** A closure letter has been received from ADEC for the 165 cubic yards of soil removed from the tank excavation.* ***2003: Trtmt system decommissioned May 04 – decommissioned 3 dry wells. Next monitoring event summer 05*** *July 2006: Conditional Closure Letter issued in March 2005. Cleanup Complete with IC's issued from ADEC in June 2009.*
Building 1172 ***[FTWW-098 {3A}]*** ***NFA*** ***DERA***	*IAP #:FTWW-098* *ADEC #:199331X013303* *TNK #215 216* *ADEC FILE* *Number:108.26.019*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC concurs with semi-annual groundwater monitoring to determine if the downward trend of DRO contamination is continuing and to be certain that the downward trend or nondetection of GRO and BTEX compounds has stabilized or has not recurred. Feb 99: Site will be sampled once in 1999; based on those results, closure will be negotiated with state. Apr 01: State will evaluate for closure. Reference UPC # FTW125 2003 No Action, 2004 No Action 2005 No Action Letter from ADEC 23 Mar 2005 This site appears to be ready for NFRAP. Cleanup Complete determination issued January 2010*
Building 1191	*IAP #:* *ADEC #:199531x034801* *TNK #219* *ADEC FILE* *Number108.26.040*	*The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work was completed during the summer of 1996. Work consisted of installation and sampling soil and groundwater probes. (UPC #FTW125) Based on the draft RI and discussions on 5 Dec 96, a closure letter was received from the State on 28 May 1997. A closure letter was received July 1999, from ADEC for the 60 cubic yards of soil removed from the tank excavation.*
Building 1514 ***[FTWW-063; NFA]*** ***Conditional Closure***	*IAP #:ftww-063* *ADEC #:199231x026003* *TNK #221-224* *ADEC FILE* *Number108.26.008*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC concurs with semi-annual groundwater monitoring to confirm the downward trend of the contaminant levels and monitor the movement of GRO and BTEX contamination. Semi-annual monitoring has continued, and a downward trend in the contaminant levels, from the 1991 sampling event, has been observed. A closure letter was received from the State on December 17, 1999. Reference UPC # FTW125.* ******** *A closure letter was received July 1999 from ADEC for the unknown quantity of soil removed from the excavation of the tanks.*

POL SOURCE AREAS
CLOSED UNDER THE TWO-PARTY AGREEMENT

SITE IDENTIFICATION		SITE STATUS REPORT
Bldg 1541	*IAP#:* *ADEC #:* *TNK #* *ADEC File Number:* *108.26.046*	*NFA action issued by the state 31 Jan 1996*
Bldg 1543		*NFA issued by the state 7 Feb 1994*
Building 1546 (BLM) ***[FTWW-062{3A}]*** ***No further action.***	*IAP #:FTWW-062* *ADEC #:100231x026001* *TNK #227-233* *ADEC FILE Number:* *108.26.009*	*A bioventing/air sparging treatment system was installed by FERtech Environmental Systems (FERtech) in the fall of 1994 to remediate the soil contamination at Building 1546. Prior to FERtech's bankruptcy, the treatment system operated for several months. Harding Lawson and Associates assumed the treatment system, conducted an assessment of the system, installed system modifications where required, and began running the system in the summer of 1995. Jan 99: System off to evaluate rebound. G/W below cleanup standards for four events. Will be evaluated for closure end 1999 season. Apr 01: System off, being moved. Closure letter received from State December 17, 1999. Reference UPC # FTW-125. Conditional Closure letter issued in 04-2002*
Building 1563	*IAP #:* *ADEC #:1992310029501* *TNK #234* *ADEC FILE* *Number108.26.039*	*ADEC closure was received removing this site from the Two-Party Agreement. ** A closure letter has been received from ADEC for the 125 cubic yards of soil removed from the tank excavation. A closure letter was received March 8, 2005.*
Building 1594	*IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number*	*UST removed prior to 1988, ADEC closure under the Two-Party Agreement is not applicable*
Building 2060	*IAP#:* *ADEC#:* *TNK#* *ADEC FILE Number:* *108.26.042*	*No GW samples in 2004. 2 Borings drilled within the contaminated zones.. 2005: Conditional Closure. 4 Additional soil borings being collected. NFRAP letter sent 30 NOV 2005*
Building 2080	*IAP #:* *ADEC #:199331x013304* *TNK #247, 248* *ADEC FILE Number* *108.38.027, 108.26.027*	*ADEC closure was received removing this site from the Two-Party Agreement. A closure letter was received from ADEC February 8, 1994.*
Building 2092		
Building 2106	*IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number*	*UST removed prior to 1988, ADEC closure under the Two-Party Agreement is not applicable*
Building 2108	*IAP #:* *ADEC #:1995310020302* *TNK #253* *ADEC FiLE Number:* *108.26.045*	*ADEC closure was received for the site and the 22 cyds of thermally remediated soil. Closure letter dated January 31, 1996.*

POL SOURCE AREAS
CLOSED UNDER THE TWO-PARTY AGREEMENT

SITE IDENTIFICATION		SITE STATUS REPORT
Building 3011		*Information incomplete*
Building 3015 ***[FTWW-052; NFA]*** ***NFA based on signed PSE***	*IAP #:ftww-052* *ADEC #:199331x013301* *TNK #264,265* *ADEC FILE NUMBER: 108.26.026*	*ADEC closure was received for USTs 264 and 265 as well as the associated soils, which were thermally remediated. The Release Investigation recommending closure for the 8 seepage pits was delivered to ADEC. Reference UPC#: FTW096.* ******** *A closure letter has been received from ADEC for the eight seepage.*
Building 3403	*IAP #:* *ADEC #:* *TNK # 266* *ADEC FILE Number: 108.26.023*	*ADEC closure was received removing this site from the Two-Party Agreement. A closure letter was received January 31, 1996.*
Building 3421	*IAP #:ftww-001* *ADEC #:199331x013201* *TNK #322* *ADEC FILE Number: 108.26.018*	*ADEC closure was received May 26, 1995 removing this site from the Two-Party Agreement. An additional closure letter was received July 11, 2005.*
Building 3423 ***[FTWW-051; NFA]***	*IAP #:ftww-051* *ADEC #:199031x005901* *TNK #269,270* *ADEC FILE Number: 108.26.007*	*ADEC closure was received removing this site from the Two-Party Agreement. A closure letter was written January 31, 1996.*
Building 3425 ***[FTWW-89;NFA]*** ***VENC***	*IAP #:FTWW-089* *ADEC #:199031X025901* *TNK #323* *ADEC FILE Number:108.26.014*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC recommends semi-annual groundwater monitoring, to determine if the upward trend of DRO contamination is continuing. The isolated soil contamination, which is believed to be the result of a surface spill, was excavated and thermally remediated as a removal action under a contract. July 98: Upon removal of all soils, and receipt of the sampling results, the site was to be recommended for closure: Feb 99: This has already been closed in DSERTS. However, 1998 results show a small plume with elevated benzene levels (35 ppb). Another round of sampling will take place early 1999 to determine next step. Apr 01: Site was not sampled in 00; after 01 sampling event, will be evaluated for potential decreases in monitoring requirements. Reference UPC # FTW125 July 2006: No Action June 2007 Site closed. 09-2010 received approval to decommission wells.*
Building 3471	*IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number*	*USTs removed prior to 1988, ADEC closure under the Two-Party Agreement is not applicable*
Building 3479 ***[FTWW-090; NFA]***	*IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number*	*ADEC closure was received removing this site from the Two-Party Agreement*

POL SOURCE AREAS
CLOSED UNDER THE TWO-PARTY AGREEMENT

SITE IDENTIFICATION		SITE STATUS REPORT
Building 3481 (Motor Pool) ***FTWW-056; {3A}]*** ***LTM*** ***DERA***	*IAP #:FTWW-056* *ADEC #:199031X021829* *TNK #275 276* *ADEC FILE* *Number:108.26.017*	*Reference an ADEC letter dated February 16, 1996 regarding the State's position on this site. ADEC concurs with semi-annual groundwater monitoring to determine if the downward trend of DRO contamination is continuing and to be certain that the detection of GRO and BTEX compounds has not recurred. This groundwater sampling event should be tied to the sampling of Building 3483, since the RI revealed the commingling of the groundwater plumes for both buildings. Semi-annual monitoring has been conducted. Feb 99: Monitoring will continue to ensure natural attenuation is occuring and when cleanup levels are reached. Apr 01: Site not sampled in 00; upon 01 event, will evaluate decrease in monitoring requirements. Reference UPC # FTW125 July 2006: No Action In June 2007 site closure was received from ADEC.*
Building 3484 ***VENC***	*IAP #:* *ADEC #:* *TNK #* *ADEC FILE Number:*	*Building 3484 has known POL contaimiants. The contamination was identified during an upgrade of piping & dispensers in 1998. The building is a fuel facility. Contaminated soil was removed in Aug 98; however, after-action samples indicated POL contamination still remained in soil and groundwater. An RI is ongoing and g/w monitoring will be conducted through 1999. Once results are analyzed, potential future action will be discussed with the State. Mar 99: The RI was discussed with the State. The RI indicated no contamination; State concurred that no action would be required.*
Building 3485		*Closed as a motorpool with a NFA document in OU5 ROD*
Buildiing 3487		*Closed as a motorpool with a NFA documents in the ou5 ROD*
Building 3562 (PX) ***[FTWW-086 {3A}]*** ***NFA***	*IAP # FTWW-086* *ADEC #:199031x021806* *TNK# 279-282* *ADEC FILE Number:* *108.26.025*	*Remediation of contamination at this site is through an air sparging/soil vapor extraction treatment system. Confirmation soil borings were completed on 25 June 1995 to access the effectiveness of the treatment system. The treatment system will be operated at this site until remediation of the existing contamination is accomplished. Aug 98: Written closure letter received from State July 98, setting forth LTM until below MCLs. LTM will continue. Apr 01: Followed State requirements for LTM; met conditions of letter. State will review for final closure. Reference UPC # FTW125. July 2006: Clean up complete received from ADEC December 2009.*
Building 3724	*IAP#* *ADEC #:* *TNK#298* *ADEC FILE* *Number: 108.26.048*	*Closed with a letterfrom ADEC dated March 8, 2005*
Building 4051 ***NFA***	*IAP #:* *ADEC #:199531x034805* *TNK #300* *ADEC FILE Number:* *108.26.038*	*The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work was completed during the summer of 1996. Work consisted of installing and sampling soil and groundwater probes. Based upon discussions between USARAK and ADEC on 5 Dec 96 and the RI report, ADEC has recommended closure. A closure letter was received from the State on December 17, 1999. Reference UPC # FTW125.*

POL SOURCE AREAS
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SITE IDENTIFICATION		SITE STATUS REPORT
Building 4057 [FTWW-058; NFA]	*IAP #:ftww-058* *ADEC #:199031x015702* *TNK #303* *ADEC FILE Number108.26.010*	*ADEC closure was received removing this site from the Two-Party Agreement with the OU5 ROD, April 6, 1999.*
Building 4065 [FTWW-059; NFA]	*IAP #:ftww-059* *ADEC #:1996310002302* *TNK #304,305* *ADEC FILE Number: 108.26.003*	*USTs removed prior to 1988, ADEC closure under the Two-Party Agreement was received on April 6, 1999 in a No Further Action document.*
Building 4110A ***NFA*** ***VENC***	*IAP #:* *ADEC #:199531x034806* *TNK #307a* *ADEC FILE Number: 108.26.037*	*ADEC closure has been obtained for UST 307A and the associated 105 cubic yards of soils from the tank excavation. Although closure has been received for the UST at Building 4110A, the building will remain a Two-Party site until the separate contamination under the building is addressed. During the Site Assessment at Building 4110 a leaking product return line that served the extracted UST was discovered. Fuel discharge was reported to be confined to an area beneath the building and attributed to a loose fitting. The Work Plan and Pilot Study Plan for the Release Investigation has been completed for this source area. The RI work was completed during the summer of 1996, and consisted of installing and sampling soil and groundwater probes. Based upon discussions between USARAK and ADEC on 5 Dec 96 on the preliminary findings, and the final RI report, ADEC has recommended closure. A closure letter was received from the State on December 17, 1999. Reference UPC # FTW125.*
Building 4110B ***Closed***	*IAP #:ADEC #:* *TNK #307B* *ADEC FILE Number*	*Reference UPC # FTW125.* ******* *A closure letter has been received from ADEC for Building 4110B, UST 307B and the associated soils.*
Building 4162	*IAP #:* *ADEC #:1990310020801* *TNK #308* *ADEC FILE Number: 108.26.033*	*ADEC closure was received on January 31, 1996, removing this site from the Two-Party Agreement. ADEC additionally completed a closure letter on May 24, 2005.*
Building 4247 [FTWW-060; NFA]	*IAP #:FTWW-060* *ADEC #:199231X131001* *TNK #309* *ADEC FILE Number: 108.38.036*	*ADEC closure was received dJDanuary 31, 1996 removing this site from the Two-Party Agreement. ADEC completed a closure letter on May 26, 1995.*
Building 5004 [FTWW-061; NFA]	*IAP #:FTWW-061* *ADEC #:199031X015701* *TNK #310* *ADEC FILE Number: 108.26.011*	*ADEC closure was received for the UST 310. Groundwater contamination suggests the possibility of an upgradient source. The investigation for the possible upgradient source was conducted under the Release Investigation for Buildings 5001 and 5003. The remediation of the upgradient groundwater contamination will be addressed with a soil vapor extraction/air sparging treatment system. The system is scheduled to be installed during the Fall of 1996, once Building 5001 has been demolished.* ******* *A closure letter has been received from ADEC for the 74 cubic yards of soil removed from the tank excavation.*

POL SOURCE AREAS
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SITE IDENTIFICATION		SITE STATUS REPORT
Birch Hill [FTWW-064; 2A; RI/FS]	*IAP #FTWW-064: ADEC #:199031X021807 TNK #345-355 ADEC FILE Number: 108.26.002*	*ADEC closure was received for UST 355 removing this UST from the Two-Party Agreement. ADEC closure has not been obtained for the remaining nine sites located at the Birch Hill Tank Farm Site. The Release Investigation for the remaining nine sites located at the Birch Hill Tank Farm Site was conducted in July of 1995 to delineation the extent of contamination associated with the sites. Based on the findings of that investigation, a corrective action was determined to be unnecessary at the nine abandoned Birch Hill UST Tank Farm Sites, since the existing contamination poses no human health risk for site visitors or future site works. The Release Investigation recommends closure for the nine existing sites. Reference UPC # FTW111.* ** *A closure letter has been received from ADEC for the Birch Hill Tank Farm Site.*
Contaminated Soil 1	*IAP #: ADEC #:199031X021802 TNK # ADEC FILE Number: 108.26.023*	*ADEC closure was received removing this site from the Two-Party Agreement*
Petroleum Contaminated Soil Piles ***NFA***	*IAP #: ADEC #:199231X033601 TNK # ADEC FILE Number:198.26.016*	*ADEC closure has been obtained for the thermal remediation of the 18,000 cyds of contaminated soil generated for the time period of 1990-1991. The following soil piles, requiring remediation under the Linder Soil Bioremediation Contract, either via bioremediation or thermal desorption, are currently under remediation: Hanger 1, Utilidor Construction, Vehicle Wash Rack (Southeast End of the Runway), Bldg. 1565, Bldg. 2060 (UST 242), Bldg. 2062 (UST 244), Bldg. 2063 (UST 245), Bldg. 2092 (UST 249), Bldg. 3407 (UST 375), Bldg. 3492, Bldg. 3494, Bldg. 3564, Bldg. 4051, Bldg. 5001 (USTs 311, 312, and 314), Bldg. 5006 (UST 316), and Bldg. T-369 (UST 355). Closure of the above soil piles is pending confirmation closure samples showing the soil has been remediated. Reference UPC # FTW114. A closure letter is anticipated from ADEC on July 12, 1999, for the following soil piles, characterized as clean under the Linder Soil Bioremediation Contract: Bldg. 1002, Bldg. 1053, Bldg. 1060, Bldg. 1070, Bldg. 1130, Bldg. 1168 (UST 213), Bldg. 1191, Bldg. 1514, Bldg. 1563, Bldg. 2092 (500 gallon tank), Bldg. 3203, Bldg. 3584, Bldg. 4065 (UST 373), Bldg. 4110B, Bldg. 5001 (soils associated with USTs 357 and 358), Bldg. 5004, Bldg. 5110, BLM Warehouse Extension, Golf Course soils, Gravel Pit Site, North Post Site 3, North Post Site 4, and 801 Drum Site.*

COMMENTS

REVIEW COMMENTS **PROJECT: Third Five Year Review**
DOCUMENT: Draft 2010 Third Five Year Review Report **LOCATION: Fort Wainwright, AK**

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 06 July 2011 REVIEWER: Deb Caillouet PHONE: (907) 269-0298	1. *Action taken on comment by:* *Karol Johnson, Fairbanks Environmental Services*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1	II	Date of Site Inspection should be May 2011 , and I believe this is a Post-SARA review.	A	The site inspection date was changed to May 2011 and the Type of Review was changed to Post-SARA.	
2	III	The fourth bullet item refers to State of Alaska MCLs being established for four contaminants of concern. Groundwater cleanup levels, which are state ARARs, have been established for these contaminants, however, they are not drinking water MCLs; they are risk-based concentrations calculated using a carcinogenic risk level of $1X10^{-5}$	A	"Groundwater MCLs" has been changed to say "groundwater cleanup levels".	
3	3.2, 3-2	Please provide the screening criteria that were used to determine the NFA status and an evaluation if those criteria are still appropriate (if that belongs in this document) but at least the criteria.	A	The NFA decision was made for each source area if: 1) the source area could not be identified or located in the investigation, 2) no known contamination existed or no visible sign of contamination was observed during the source area inspection, or 3) the site was taken care of under another program or was determined to be a non-site. This information was added to the text.	
4	3.3,3-3	Where does the other 5% of the potable water come from? There is at least one "emergency supply well" that has ICs restricting its use.	A	The other 5% of potable water comes from three individual wells, one class C well at DRMO and two wells at the Golf Course. Additionally, Golden Heart supplies water for Sitku Basin.	
5	Table 4-1	The NFA sites need to be reviewed. They have been removed from the IC map, Figure A-1. Comments on the individual sites are listed below.	A	These source areas were evaluated and NFA was agreed on by all three parties based on FFA and CERCLA criteria. If new evidence comes to the Army's attention that requires further consideration, the status of the site will be reviewed. The NFA sites have been added to the ICs map, Figure A-1.	

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6		**Blair Lakes Drum Site** The NF A Site Summaries indicates that there were two areas of buried drums near South Blair Lake. It appears that there was a removal action denoted on Plate 3 as South Drum Cleanup Area and the entire area is marked as 1987 cleanup limits. There is no indication that the buried drums on the north side of the lake were removed. There is an area marked as the 1987 Cleanup Disposal Site where the drums removed from the rest of the site were buried. As a landfill, with or without known releases, this site needs to have ICs to prevent movement of the soil, and because it is a landfill, it will always be suspect and if the contents are moved they will need to be characterized and properly handled.	Noted	The NFA decision for this site was documented in the OU1 ROD and other documents in the Administrative Record. This site has been added to the ICs map, Figure A-1.	
7		**Site N-4** Per the RI report: "Based on the results of the RI and RA, the Army, ADEC, and the United States Environmental Protection Agency (EPA) have recommended no further action for Site N4. A description of the no further-action decision can be found in the Administrative Record." In the NFA Site Summaries, OU1, the only document referring to Site N4 is a Recommended Action, Name Change from Drum Site West of DRMO to Site N-4. I cannot find any document saying the recommended action is NFA. As a landfill, with or without known releases, this site needs to have ICs to prevent movement of the soil, maintain an adequate cap/cover and because it is a landfill, it contains unknown wastes and if the contents are moved they will need to be characterized and properly handled.	Noted	Several Activities were conducted at Site N-4 including a Records Search, a RI, a Baseline Risk Assessment, and a Feasibility Study. Site N-4 was recommended for NFA in the Feasibility Study. The NFA decision for this site was finalized in the OU1 ROD. This site has been added to the ICs map, Figure A-1.	
8	4.2.2	Page 3-3 says the three water wells located along the Chena River, have not been used since 2002. Please reconcile.	A	The referenced sentence in Section 4.2.2 is incorrect and will be removed.	
9	4.2.3 , 4-6, Table 4-3	The current ADEC soil cleanup levels for aldrin should be 0.30 mg/kg (direct contact) and 0.07 mg/kg (migration to groundwater) and for dieldrin should be 0.32 mg/kg (direct contact) and 0.008 mg/kg (migration to groundwater) rather than the values that are listed. These soil cleanup levels are lower than those specified in the ROD.	A	The specified changes to the ADEC cleanup levels were made in table 4-3.	

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10	4.2.4, 4-9, and Table 4-4	IC section. There was an irrigation well installed in the 801 housing that did not go through the base dig permit and this did violate the ICs for the site.	Disagree	Installation of this well did not violate the IC policy because it was installed outside the area covered by the OU1 institutional controls. The irrigation well that was installed south of the 801 Housing area most likely did go through an excavation Clearance (dig permit) procedure, but since there were no unusual characteristics about the well (It was not for potable water) and it is not located in a specific institutional controlled area, and since it occurred almost ten years ago, the dig clearance document is not retrievable. The decision to test the well for contaminants was made when it was realized that this well provides water that is used to irrigate food or food products. However, doing this did not violate the institutional control policy.	
11	4.2.5, 4-11	Recommendations section. It states the risk-based concentrations are lower than the State of Alaska MCLs {should be "groundwater cleanup levels" rather than "MCLs"}, the risk-based cleanup levels are still protective and there is no reason to change the ROD. It is unclear, based on information included in the report; whether the aldrin or dieldrin in soil exceed the chemical specific State ARARs and warrant further evaluation.	A and Noted	MCLs were changed to cleanup levels. Soil removed from this site has been disposed of properly. Confirmation samples taken between 9 and 10 feet bgs within the 1996 drum excavation show that aldrin and dieldrin remainln soil at concentrations that exceed State cleanup levels for migration to groundwater. In-situ soil would be reconsidered if groundwater contaminant concentrations increase or if soils are disturbed. The verbiage “lower than State of Alaska MCLs” was changed to “less stringent than State of Alaska MCLs”	

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12	5.1, 5-1	**The Tar Sites** should have IC's as they are landfills and were not permitted; this is the only mechanism available for managing them.	A	Management of the Tar Sites is done through the ADEC solid waste program. This site was added to the ICs map as a site that was investigated.	
13	5.2.3 ,5-5, Soil and 5.3.3,5-13	The last sentence says that the numerical goals are summarized in Appendix C, but there are no soil numbers shown for OU2 soil. Please add the soil numbers to App. C.	A	ADEC cleanup levels are referenced in a footnote to Appendix C. The sentence in Section 5 was removed.	
14	5.3.4, 5-16	IC section. Please provide an inspection report on the use of the fire-suppressant tank and if it has been refilled using the restricted well since the last five year review.	A	At this time this class C emergency supply well is also supplying potable water for the DRMO facility and it is tested for contaminants of concern in accordance with ADEC requirements. An explanation of the IC restriction that applies to this well will be added to Section 5.	
15	5.3.4, 5-17	IC section. Please explain how the IC policy was followed, there was no excavation planned, they were only to use the surface for training at the one area contaminated and at the other area equipment was stored which also did not require a dig permit.. The spill reporting and the cleanup are not part of the IC policy but are regulations.	A	This information will be removed from the ICs section and added to the background information.	
16	General Section 6	The data presented includes 2010 but this data report has not been submitted for review. Without review of the data used to prepare this section cannot be validated. Please remove reference to all 2010 data.	Noted	It is anticipated that the 2010 OU3 Monitoring Report will have been reviewed before this 5YR review is finalized.	
17	6.3.1,6-3 and 6.3 .5, 6-11 IC section	Please update the current status of providing bottled water. At a recent FFA meeting it was mentioned that this was not happening at the church's request.	A	The current status will be updated. Bottled water was being supplied to the Steese Chapel, but the facility was not being used regularly and therefore the water was not being used. Because of this, Steese Chapel requested to have the bottled water delivery discontinued. The Army is currently filling a water holding tank at Shannon Park Baptist Church once a month.	

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18	6.4.5,6-25	AS/SVE Systems. This says that lead has not exceeded RAGS since 2008, but the only location that had exceeded RAGS for lead, GWP-91 was removed and no sampling has occurred since 2005 according to the Former Building 1144 paragraph on page 6-24. Without sampling the known area of exceedance stating that there were no exceedances is misleading. Please note this as a data gap.	A	The text was modified to note the data gap at GWP 91.	
19	6.3.1, 6-2 6.4.1,6-15 6.5.1,6-27	For each of these areas, the report should clarify whether all the abandoned fuel pipelines were removed or properly emptied and cleaned. If they have not been, any remaining abandoned fuel lines would be potential sources for ongoing or future releases.	A	A significant number of pipelines have been removed and cleaned and this has been reported. All known pipelines have been cleaned and removed. Any pipelines found in the future will be removed or cleaned and closed in place. The Army has an ongoing project to identify and remove fuel from any remaining pipelines that may be discovered in the future. This information was added to the text.	
20	6.5.4,6-32	The sentence " An additional finding that became apparent based on evaluations of post-ROD investigations related to the sources of contamination at the Milepost sites." Suggest removing the word that.	A	The word "that" was removed from the sentence.	
21	Table 6-9	Until the base follows through with the NFA letter, the statement that the NFA has been accepted should be removed.	Noted	A letter will be provided within the month.	
22	8.2.1 , 8-2	The 1st complete paragraph discusses a fuel leak near the WQFS in 1980 near Gaffney and Apple but Figure 3 in the ROD and in every other OU5 document the only place that Apple Street is labeled/identified is in association with the EQFS figures and site maps. From what I can tell this area is where the current AS curtain is located.	Noted	The text was changed to say "between Gaffney and the Chena River (in the area of the current Sparge Curtain treatment system)	
23	8.2.1, 8-2	Last paragraph of this section, 2nd sentence, it appears the word to is missing, " … intent off these soil samples was *to* document … " Also the introduction of the SC, SA and WHL terms into this paragraph without any definition prior to the statement or their significance is confusing. Suggest prior identification of these as hot spots/source areas/treatment	A	The word "to" was added to the sentence. The SC, SA, and HWL acronyms were identified and along with their associated WQFS areas.	

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		zones and which of the WQFSI, 2, 3, or 4 areas they are associated with.			
24	8.2.4, 8-10	WQFS2 Section. Please include the fact that the AS system was not operational for the last six months of 2010 due to the power being cut off.	A	This information was added to the first paragraph of the WQFS2 section.	
25	8.2.5, 8-13	The six month shut-down of the Air Sparge system in 2010 does call into question the protectiveness of the remedy if the base cannot keep the system operational. Please add a discussion of this.	A	An explanation for why the system was shutdown was added to the text under Variances. It was also explained that a boom was in place in the Chena River and during part the shutdown, no violations of the water quality standards were observed. Because of this, because no rebound of contaminants was observed during the fall 2010 sampling event, and because ICs are being implemented at this site the system is expected to still be protective.	
26	Table 8-2	Please add something like: Implement a notification system for EPA and DEC to assure that they are aware when systems are non-operational in a timely manner.	A	The Suggested Recommendation was added to table 8-2. RPMs will be notified if the systems are down for more than one month.	
27	8.3.1 , 8-14	It states a POL source removal was done in 2000 and the pipeline was capped. Clarify whether the line was pigged or otherwise emptied and cleaned.	A	This pipeline was pigged an cleaned in 2008 and recapped.	
28	Table 8-3	The Action Completed column implies that there was no extended shut-down of the air sparge curtain. This should be revised to include the problem.	A	The six month shutdown in 2010 was noted in the table.	
29	8.3.3, 8-19	Last paragraph this page, the DRO that was "encountered" during the paving project at 1565 was identified in the RI and is shown on Figure 9-18 of the RI . And interestingly the RI also shows the groundwater contamination and implies that the source is upgradient and not identified (Figure 9-24)	Noted		
30	Table 8-5	After reviewing the RI and the 2010 Monitoring Report again, DEC requests that monitoring be continued for MW 7553 at Bldg 1565, aka Flow Path C as recommended in the 2010 report. Please change the recommendations.	A	Recommendations now include: Continue sampling in specific wells associated with contamination found at Building 1565.	

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31	8.4.2, 8-22	It states all of the tanks were emptied and cleaned in 1993. Clarify whether the all the associated piping was removed or properly cleaned and closed in place.	A	The information in the OU3 ROD states that the tanks were emptied and cleaned and the pipes were purged. This information has also been added to the text in the background portion of Section 8.	
32	8.4.5, 8-25	Has any other information come to light? The State cleanup levels for lead in soil (ARARs) are now 400 mg/kg for unrestricted use and 800 mg/kg for commercial /industrial use. Further evaluation of the remedy for lead in soil is warranted.	Noted	An investigation was conducted at the Tank Farm and lead in soil was compared to the cleanup criteria. The remedy for lead in soils, which is ICs, remains protective even though the cleanup level has changed to 800 mg/kg. The ROD states that if the tanks are removed, lead in soil will be reevaluated.	
33	8.6,8-27	It is hard to say the ICs are effective if the fence keeps developing entrances. Also DEC has been requesting review of and participation in the development of the IC policy and SOPs for almost two years as a follow-up to the recommendation in the last Five Year review. No SOPs have been drafted and the promise of including them in the final 5-yr review does not provide any opportunity for input. The IC policy did not prevent continued construction at several sites even though contamination was identified in USACE pre-construction surveys, i.e. ATF, 336B etc.	Noted	The Army feels that the fact that fence penetrations have been discovered is a testament that ICs are in place. The Army has implemented ICs by following up with fence repairs each time a breach was discovered. Additionally, in order to address recurrent penetrations of the Birch Hill Tank Farm fence, a contractor field office has been established at the base of Birch Hill, within the fence line. No perimeter breaches have been observed since they arrived. Contractors have also reported increased MP surveillance in this area. It should also be noted that there is no risk of contact with lead contaminated soil during the winter months. This information will be added to Appendix A of the Report. The Army feels the IC policy has been effective. At 336B, the Army stopped work before digging began in contaminated areas. Part of the ICs included inspection of work at the ATF. At this site, the contractor was	

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				stopped when it was determined that they had exceeded the boundaries intended during the signing of the dig permit. Erroneous soil that was excavated was sampled and removed for disposal. Additionally, a flow chart has been developed that describes how ICs are implemented on Fort Wainwright. This was provided to ADEC for input. A written explanation of this process will is provided in the 5 Year Review, Appendix A.	
34	Table 8-10, 8-28	See the previous comment regarding ICs. Also, the recommendation regarding SOP coverage does not appear to have been implemented.	Noted	See previous response and responses to comments 38 and 39.	
35	Figures 8-5 through 8-8	Please include EQFS in the title block.	A	EQFS will be added to the title block	
36	9.1.5,9-10	The Proposed Plan date should be updated to the current schedule.	A	The draft Proposed Plan will be submitted to the regulators by 24 August, 2011. The final PP will be submitted in November 2011. The Milestone Date was updated in the text.	
37	Table 10-1	FEP Milepost 15.75, do not show a completion date until the base produces a letter.	A	A letter will be provided within the month.	
38	Table A-1	1. SOPs have not been developed, please correct. 2. Database including objectives, specific restrictions, controls has not been created, please delete statement implying it exists. 3. There has been no monitoring of SOP compliance as there have been no SOPs to be in compliance with. 4. The FF A meetings are not held quarterly. 5. The IC monitoring has only been incorporated into the active OU monitoring reports and was just instituted with the 2010 reports. This does not address all sites that should have ICs, many of the sites that are not actively being monitored or	1,2,3,5,6 Disagree 4 Accept	An updated IC policy was signed December 28, 2010 (Garrison Policy #49). US Army Alaska SOPs have been developed and are referenced in this policy. They are being enforced through implementation of the IC's policy. Monitoring of the ICs policy meets the needs of the SOPs. An IC Database currently exists and is available; however, it is a work in progress. The IC Database contains all the sites on Fort Wainwright with ICs as required by the	

REVIEW COMMENTS **PROJECT: Third Five Year Review**
DOCUMENT: Draft 2010 Third Five Year Review Report **LOCATION: Fort Wainwright, AK**

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 06 July 2011 REVIEWER: Deb Caillouet PHONE: (907) 269-0298	1. *Action taken on comment by:* *Karol Johnson, Fairbanks Environmental Services*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		treated should have restricted soil movement. 6. ADEC has only been notified of one fence break at the Birch Hill Tank Farm, not the ones identified in this document, and ADEC was present with the RPM when the break was discovered last year.		RODs. IC Monitoring has been conducted at regular intervals at the OUs covered by this 5YR Review and any infringement or known problems have been reported. Documentation of IC monitoring has recently been organized into the annual monitoring reports. Currently, all known contaminated sites have been or are in the process of being investigated and/or monitored. The post-wide IC policy is intended to manage ICs at all sites where construction is being performed. A flow chart that describes how ICs are implemented on Fort Wainwright has been developed and provided to ADEC for input. The Army is committed to reporting incidences when it is known that an IC has been breached. However, if the ADEC has concerns about specific sites that require additional ICs, please clarify. Over the years, ADEC and EPA have been informed several times during FFA meetings of each incident when a breach in the Birch Hill fencing was discovered. Table A-1 was updated to state that FFA meetings are conducted twice a year.	

REVIEW COMMENTS **PROJECT: Third Five Year Review**
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Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
39	Page A-2, Status of IC Program	Please rewrite this section to provide factual information about the current status of the IC system. There are no SOPs, the GIS system is not available, the Permit has not been updated and the map provided does not identify all areas where ICs are in effect.	Disagree	The army Alaska has had an IC policy in place since 1996 which included FWA FRA and FGA. The IC Policy was updated and SOP created in 2002 This policy was completed with input from all parties. Updates to the SOPs were filed at Fort Richardson. The IC policy has recently (12/10) been revised to reflect the separation of US Army Garrison FTW into a "Stand-Alone" Garrison. The Current IC Policy incorporates the previous SOP (2006). It should be noted that all Army policies and SOPs remain in effect until either reaching an expiration date, they are rescinded, or modified. a flow chart has been developed that describes how ICs are implemented on Fort Wainwright. This was provided to ADEC for input. A written explanation of this process will is provided in the 5 Year Review, Appendix A.	
40	Table A-2	ICs Program: ADEC is not aware of a post-wide IC inspection being conducted. Failure to adequately implement and monitor ICs does affect the protectiveness. The recommendations should include preparation and submittal, to ADEC and EPA, of an annual LUC/IC Inspection and Monitoring Report. The report should include a review and summary of activities conducted under the LUC/IC plan and SOPs, approvals that were granted or denied, any modifications to the plan or updates to the site boundaries in the GIS, any failures or violations of the plan and corrective measures that were implemented, and any other relevant information. A milestone date (i.e., January 30 each year) should be included for submittal of the annual reports.	A	A yearly Report of IC effectiveness and corrective actions taken will be submitted to ADEC and EPA. The Report is expected to be available annually in the spring. The Army is currently developing the information that will be provided in the Report.	

REVIEW COMMENTS

PROJECT: Fort Wainwright Third Five Year Review
DOCUMENT: Draft Final September 2011

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-EE-TE	DATE: 12/12/2011 REVIEWER: Deb Caillouet PHONE: (907) 269-0298	Action taken on comment by:

Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1	3.2, top of page 3-2	The FFA was updated in 2007 in order to include OU6.	**A**	The word to was added.	
2	3.2, top of page 3-2	2nd complete paragraph, there is an extra period in the third to last sentence.	**A**	The period was removed.	
3	3.3, top of page 3-4	If the policy from Cash is still in effect, please include it in the appendix. If it was superseded by the Jones policy please revise this paragraph.	**A**	The information was changed to reference the policy signed by Jones.	
4	5.2.1	The phrase, "and active AS/SVE system was completed in November 1994" should be deleted. Also there are duplicate footnotes on Page 5-1.	**A**	The extra sentence and the extra footnote were removed.	
5	6.3.4	Last sentence on the page, "There has been only minor contaminant rebound has not been observed and…" Please review for grammar.	**A**	The sentence grammar was corrected to say 'Contaminant rebound has not been observed…'	
6	6.4.5	Second to last sentence in the first paragraph of the AS/SVE section, there is an extra period.	**A**	The extra period was removed.	
7	6.4.5, page 6-26	The title of Table 6-7 should be changed to OU3 ROLF.	**A**	The title of Table 6-7 was changed.	
8	6.4.5, page 6-26	The repair/replacement of VPC-MP6 should be included in the recommendation.	**Noted**	It was decided by the RPMs that VPCMP2 would be sampled in place of VPC-MP6	
9	Table 6-11	No letter yet.	**A**	A letter has been drafted and will be provided to ADEC. The table will be corrected to state: "DPW will provide a letter to ADEC requesting closure for this site."	
10	8.2.2	In the History please add that they were reported to cleaned before being abandoned in place.	**A**	The requested information was added.	
11	8.2.4, page 8-10	WQSF2 paragraph, 2nd to last sentence has an extra period.	**A**	The extra period was removed.	

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Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
12	8.2.4, page 8-11	Paragraph titled All WQFS Sub-Areas. Since a non-clean pipeline was found during decommissioning, please add the statement about the on-going program to address newly found old pipelines.	**A**	The requested information was added.	
13	8.4.2	Typo, nigrogen.	**A**	The typo was corrected.	
14	8.4.4	Last paragraph, last sentence, In should not be capitalized.	**A**	The capital I was corrected.	
15	Pages 9-2 & 9-3	There are about three lines of text that should be at the end of 9-2 or the beginning of 9-3 that did not get printed.	**A**	These pages will be reprinted.	
16	Table 9-4	The public meeting for the Proposed Plan has to occur after the Proposed Plan has been prepared. My best guess would be January 2012, but have Joe choose a date. The enforceable deadline to complete the ROD is March 1, 2012.	**A**	The milestone date for the public meeting was clarified to say Winter 2011-2012. The date for the ROD was changed to say Summer 2012.	
17	10.1.3	Last sentence, 1st paragraph, please provide a year to go with 19 September.	**A**	The text was changed to say 19 September 2010	
18	Table 10-1, page 10-4	Still no letter for Mile Post 15.75, please revise to future.	**A**	A letter has been drafted and will be provided to ADEC. The table will be corrected to state: "DPW will provide a letter to ADEC requesting closure for this site."	
19	Table 10-2, page 10-9	OU6 section, please revise to match the revised Table 9-4.	**A**	The table was revised to include the same dates as the same dates as table 9-4.	
20	Table 11-1, page 11-3	In the Coal Storage Yard, ROA should be RAO.	**A**	ROA was changed to RAO	
21	Page A-1	Table A-1, last row, Status column, The comma between Master Plan and A section should be a period.	**A**	The comma was changed to a period.	
22	Page A-6 & A-7	A line or two did not get printed between these pages.	**A**	These pages will be reprinted.	
23	Page A-8	IC Effectiveness, 3rd paragraph, LUST should be there instead of Lust.	**A**	Lust was changed to LUST.	

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Item No.	Drawing Sheet No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTOR RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
24	Page C-1	DRMO Yard and Bldg 1168 Leach Well have the superscript 2 and the note is about soil cleanup levels but soil is not listed as a Medium.	**A**	The superscript discussing soil was removed from the table.	
25	Page C-1	There are two foot-note #3 and no foot-note #5.	**A**	The footnote numbers were corrected.	
26	Appendix D	801 Drum Burial Site. The date of the inspection is not the date on the photograph, please add the date of the photograph as another inspection day (This also applies to other sites). The Contingency Plan/Emergency Response plan has two boxes checked, one should be removed.	**A**	The inspections were completed on the date posted; however, some photographs either were missed or were not good quality and had to be retaken at a later date.	
27	Appendix D	DRMO Yard, Access add Institutional Controls, the location of the X for Fencing Damaged appears to mean it is damaged.	**A**	The form was corrected to include the correct placement of the X.	
28	Appendix D	Birch Hill Tank Farm (Remedial Area 1B). I do not think the fencing or the ICs associated with the fencing are required for the 1b portion. The issues are addressed in the OU5 1A area.	**A**	The discussion about the fence issue was removed from this form.	
29	D-2	Photograph 3 shows one bollard to be damaged, should this be fixed?	**A**	The bollard assessed to determine if it requires replacing.	
30	Table H-2	The Building 1054 Site has been reopened due to the various contamination found during the construction.	**A**	This verbiage was added to table H-2.	
31	Table 10-2, page 10-9	The dates in Table 10-2 need to be changed. It shows preparing the Record of Decision in 2011, but holding the Public meeting for the Proposed Plan in the Winter of 2012 and preparing the Proposed Plan in November 2012. The Proposed Plan has to have had public comment before the ROD. The PP is due October 6, 2011 and this will not be met as the Army has not even provided a draft to the regulators. The ROD is due to be complete March 1, 2012.	**A**	The milestone date for the proposed plan was changed to November 2011 (2012 was a typo), the public meeting was clarified to say Winter 2011-2012. The date for the ROD was changed to say Summer 2012.	
32	Table 10-2, Recommendations and Follow-up	In the ICs Program please add another item. The database of the LUC/IC Summary Documents (Attachment 5 of Appendix A) needs to be updated. A target completion of two years would satisfy DEC.	**A**	The recommendation to update the LUC/IC Summary Documents within the next two years was added.	

REVIEW COMMENTS **PROJECT: Third Five Year Review**
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U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 06 July 2011 REVIEWER: Jacques Gusmano PHONE:	1. *Action taken on comment by:*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1	Executive Summary ii	Change the inspection date and the"type of review" (post SARA) on the Summary Form.	A	The inspection date was changed to May 2011 and the Type of Review was changed to post-SARA	
2	Executive Summary iii	Correct the terminology for the ADEC clean-up levels, they are not MCLs, (iii) and Table 4-3.	A	The reference to MCL's was changed to cleanup levels.	
3	Section 4 Table 4-1	This Table outlines NFAs which have historically been addressed by previous RPMs; the ADEC comments to this section indicate documentation for that status may not be in their records. This lack of proper documentation for some three party and two party sites was discussed during the last FFA meeting. The Five Year Review is not the place to include this material, however this documentation must be entered into the Admin. Record, if not there already. Should the status of NFA change, the site would be added to the CERCLA process.	Noted		
4	Section 4 page 4-6	Update ADEC cleanup levels for aldrin and dieldrin	A	The correct ADEC cleanup levels for aldrin and dieldrin were added to Table 4-3.	

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U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 06 July 2011 REVIEWER: Jacques Gusmano PHONE:	1. *Action taken on comment by:*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
5	Section 8 page 8-13	Discuss the system shutdown last year and potential effects, if any; also state clearly if the system is still protective.	A	An explanation for why the system was shutdown was added to the text under Variances. It was also explained that because a boom was in place in the Chena River during part of the shutdown and because no rebound of contaminants was observed during the fall 2010 sampling event, the system is expected to still be protective.	
6	Section 8 page 8-25	We have been told that the Army may lease or transfer the tank-farm property (tank-farm 1a), which could affect OU5. If this is a possibility, discuss the Army's plans to deal with ICs and/or Remediate the lead contamination.	Noted	The DoD is actively engaged in discussing the transfer of this land to the Veteran's Association for use as a Veteran's cemetery. Prior to transfer, remediation of site contamination will be discussed in transfer documentation.	
7	Section 8 page 8-28 Table 8-10	Add that the Army will produce a yearly Report of IC effectiveness and corrective actions taken, for review by ADEC and EPA.	A	A yearly Report of IC effectiveness and corrective actions taken will be submitted to ADEC and EPA. The Report is expected to be available annually in December. The Army is currently developing the information that will be provided in the Report.	

REVIEW COMMENTS **PROJECT: Third Five Year Review**
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U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 06 July 2011 REVIEWER: Tim Bricefield PHONE:	1. *Action taken on comment by:*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1	General	Many if not most OUs include information about MNA NOT being observed to occur or only occurring more slowly than expected, such that it is not clear RAOs will be achieved in a reasonable timeframe. In many cases some additional treatment or amendments (ISCO) have been introduced in an effort to accelerate MNA, but at best monitoring has not yet shown if/when RAOs can be achieved. So a conclusion that the remedy is expected to be protective and cleanup goals are going to be met through MNA is at best premature, and perhaps questionable. This is the main issue causing me to conclude that EPA's protectiveness determination for OUs 1 through 5 should be of "currently protects human health and the environment because (describe elements of the remedy that protect HH& the E in the short term, eg. Actions taken + ICs). However, in order for the remedy to remain protective for the long term, the following actions need to be taken: e.g. monitor and evaluate effectiveness of ISCO, and if RAOs cannot be achieved in a reasonable timeframe, evaluate and if necessary take additional response actions." I believe this conclusion would be more accurate and consistent with the Guidance.	Noted	The RPM are continuing to evaluate remedies including monitored natural attenuation (MNA) at the Fort Wainwright Operable Units included in this Five Year Review. At this time, it is believed that observations are generally consistent with the expectations of the RODS. Results of monitoring at the OUs indicate that for the most part, the remedial process is on course and does not yet deviate from what was originally expected. The construction complete status of the sites in Fort Wainwright's Records of Decision was established only nine years ago, in September 2002. Less than one half of the time period estimated for cleanup has passed and it is believed that it is too early to evaluate whether remedies, including MNA, will or will not achieve RAOs in a reasonable timeframe. Additional treatability options such as ISCO are being tested to evaluate the potential for shortening the remediation time frame. The effectiveness of this technology will continue to be evaluated. It should be noted that at most sites DRO is the only contaminant that is expected to present long term issues, but again, at this point in time, this is too early to tell. The remedy at the Fort Wainwright OUs currently protects human health and the environment because the remedial actions performed to date have been in accordance with the requirements of the RODs and the remedies have functioned as designed. Institutional controls are in place to ensure the remedies are protective in the long term.	

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2	General	On the way to reaching this conclusion (or even EPAs) the Technical Assessment and responses to Questions A and possibly B should be revised somewhat. The responses to Question A (at least) should make it clear when the selected remedy is not functioning completely as intended, as MNA is NOT being observed to occur or only occurring more slowly than expected, such that it is not clear RAOs will be achieved in a reasonable timeframe, and additional treatment or amendments (ISCO) have been introduced in an effort to accelerate MNA. I suggest the Army look at Guidance Exhibit 4-1 for some further ideas about what the response to question A is intended to address.	Noted	See response to comment 1. It is believed that at this time, it is too early to say that the remedies are not functioning completely as intended in regards to MNA. It is also believed that at this time, this Five Year Review has taken into consideration the guidance in Exhibit 4-1 for answering Questions A and B.	
3	General	In the Issues and Recommendations Table(s) (see comment below), the MNA concern should be identified as an issue that could affect future protectiveness, since that conclusion is intended to include whether or not RAOs will be achieved in a reasonable timeframe – if it won't be, at some point it could affect protectiveness.	Noted	See response to comments 1 and 2.	
4	Section 11	The protectiveness statements should match the statements in each OU chapter, but these differ for no apparent reason. This should be corrected.	A	The protectiveness statements will be corrected to match the statements in each OU chapter. Question B in table 11-1 was corrected to match Question B in each OU section.	

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U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 06 July 2011 REVIEWER: Tim Bricefield PHONE:	1. *Action taken on comment by:*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
5		The draft is missing the Five Year Review Summary form, the format for which is on page E-15 of the Five Year Review Guidance;	Noted	A check of the guidance shows that page E-15 discusses the Executive Summary, however the Summary Form on page E-17 is the same as the one included in this report. Please clarify further.	
6		The Guidance calls for each OU Review to include a Table that lists Issues and whether they affect current or future protectiveness, and a second table showing the recommendations and follow-up actions associated with each issue (Guidance Exhibits 4-3 and 4-4) as an alternative, the two can be combined. This draft never identifies (or at least never labels) the "Issues", nor does it associate issues with recommendations and follow-up actions. The draft should be modified to clearly identify Issues and better conform to the Guidance.	Noted	For the previous two Five Year Reviews, issues have been discussed under the heading of Variances and/or included in the tables titled Recommendations and Follow Up Actions. Issues from previous 5 Year Reviews have been addressed in the tables titled Response to Recommendations from 2006 Five-Year Review. Variances that required a recommendation or follow up action were included in the recommendations table. These tables follow the format provided in the 5-Year Review Guidance, but do not specifically label the recommendations as "Issues".	
7		When addressing the previous comment, the Army should note and check that all significant or potentially significant issues should be identified in the appropriate Technical Assessment sub-section and then the general conclusions and significant issues need to be carried into the Technical Assessment Summary before appearing in the Issues section/table.	A	The document was reviewed to determine if all significant or potentially significant issues are identified. Issues are discussed in the appropriate sub-sections of the Report and significant issues requiring further action are carried into the tables titled Recommendations and Follow Up Actions.	

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Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
8		Institutional Controls: I commend the Army for providing at least some information about their ICs. However, in addition to the summary mention of ICs for each OU/site, the text should identify any IC failures or challenges that have occurred during the past five years or say that there have been none and ICs have been functioning as intended. An affirmation that no changes in IC boundaries or additional ICs are necessary is also desirable if accurate, and if not, then additional information is needed. The language in Table 4-4 for ICs under "Performance to date" is a start, but a bit more information there would be helpful, and some of the similar tables have even less info.	A	Additional information is being added to Appendix A, and where required in the text, that a) identifies IC challenges and b) provides examples that identify when ICs have been effective. There have been no changes in IC boundaries or additional ICs since the Second Five Year Review. This will be noted in Appendix A. The language in Table 4-4 as well as other tables that discuss the performance to date of the RAO will be reviewed and modified as necessary.	

REVIEW COMMENTS **PROJECT: Third Five Year Review**
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U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 24 August 2011 REVIEWER: Robert Pope PHONE:	1. *Action taken on comment by:* *K. Johnson, Fairbanks Env. Services*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1	General	In general, this is a thorough 5 Year Review. The document does a good job of listing all the RAOs for the various Operable Units, describing the implemented remedies and then stating a protectiveness statement for each OU. The last one is big as many 5 Year Reviews miss this requirement. In general, there is too much information included in the 5YR about past investigations and not enough clarity on results of the implemented remedies. Straightforward statements that the implemented remedy is working with data to back it up would be preferred (in the interest of streamlining). Several of the sites within the OUs seem to only have DRO and GRO. Some of these seem to have reached the RGs for non petroleum contaminants. Others seem to have only had DRO/GRO issues. This issue seems to present a problem regarding the petroleum exclusion under CERCLA and the need for continuing 5YRs on these sites. However, since the RODs pulled these in to the remedy, it	Noted	Streamlining the information provided for determining that the remedy is working will be considered during future Five-Year Review Reporting. An ESD/ROD Amendment to address the petroleum contaminants, specifically DRO/GRO, issues will be considered. Another option might be to consider transferring more sites to the Two Party agreement.	

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U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 24 August 2011 REVIEWER: Robert Pope PHONE:	1. *Action taken on comment by:* *K. Johnson, Fairbanks Env. Services*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		may require an ESD/ROD Amendment to address this issue. The possibility of removing these sites from the 5YR would make them only a 2 Party issue between the state and the Army. While this may provide clarity in the 5YR, it may or may not be helpful regarding relations with all 3 parties to the FFA.			
2	Sections 4 through 8	Almost all of the OUs rely on an RAO for GW using the phrase in a "restore groundwater to beneficial use in reasonable amount of time". While it is not required to define a "reasonable amount of time", the Army should conduct calculate a date for when each plume will reach the remedial goals, especially when the remedy relies on MNA to reach these goals.	Noted	The Army has calculated dates for when contaminant plumes at the OU sites will reach the remedial goals. This information has been presented in Annual Monitoring Reports and other historical documents that are referenced in this 5YR.	
3	Sections 4 through 8	If at all possible, the Army should provide plume maps that show the stability or shrinking of the plumes over time.	Noted	Plume maps depicting the stability or shrinking of the plumes over time have been presented in Annual Monitoring Reports that are referenced in this 5YR.	

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U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: 24 August 2011 REVIEWER: Robert Pope PHONE:	1. *Action taken on comment by:* *K. Johnson, Fairbanks Env. Services*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
4	Sections 4 through 8	In the case of MNA, a trend analysis should be better demonstrated to bolster the case the Army is making for reaching remedial goals in groundwater.	Noted	Trend analysis have been conducted and presented in Annual Monitoring Reports and other documents that are referenced in this 5YR.	
5	Section 6	For OU 3, the RAO of prevent use of gw... may be problematic as the property that has been sold does not seem to want to let the Army sample the gw as needed. Is it possible to work with a local government to restrict any use of gw in that area? While it seems protective now and in the short term, the description of the issue does not seem to indicate long term protectiveness. A recommendation may be needed to keep working on this issue during the next 5 years.	A	Protectiveness was determined based on the fact that contaminant concentrations have not been detected above cleanup levels in groundwater monitoring wells on the off-site property, drinking water will be provided to residence via city water lines. Also, discontinuous permafrost under this area either prevents the ability to obtain groundwater or provides a barrier between shallow groundwater and deep groundwater where contaminants are detected (at the interface between the alluvial aquifer and the bedrock aquifer.) However, a recommendation will be added to continue to evaluate this issue.	

REVIEW COMMENTS **PROJECT: Third Five Year Review**
DOCUMENT: Draft 2011 Third Five Year Review Report **LOCATION: Fort Wainwright, AK**

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	**DATE:** 24 August 2011 **REVIEWER: Robert Pope** **PHONE:**	**1.** ***Action taken on comment by:***	***K. Johnson, Fairbanks Env. Services***

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
6	Section 8	The protectiveness statement for OU 5, might be better stated as "will be protective" when the fence is repaired to keep the ICs fully implemented. Unless, you have maintenance plan that states the Army is doing fence inspections and repairs in a reasonable time frame. If not, this might be a recommendation. You may already have this covered.	Noted	The Army has implemented ICs by following up with fence repairs each time a breach was discovered. Additionally, in order to address recurrent penetrations of the Birch Hill Tank Farm fence, a contractor field office has been established at the base of Birch Hill, within the fence line. No perimeter breaches have been observed since they arrived. Contractors have also reported increased MP surveillance in this area. It should also be noted that there is no risk of contact with lead contaminated soil during the winter months. Additionally, an Annual IC report will describe inspections conducted and actions taken.	
7	Section 11	If you do have any variances in protectiveness statements, please remember the new 5 YR guidance. It states that we have to make our own protectiveness statements (if we don't agree with the Army's) and put the recommendations in CERCLIS to track.		Please Clarify.	

REVIEW COMMENTS **PROJECT: Third Five Year Review**
DOCUMENT: Draft 2010 Third Five Year Review Report **LOCATION: Fort Wainwright, AK**

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: REVIEWER: EPA Region 10 PHONE:	1. *Action taken on comment by:*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
1	OU3 Birch Hill Tank Farm; Remedial Area 2; and Remedial Area 3:	The remedies at OU3 currently protect human health and the environment, however Site conditions at Area I b (Birch Hill Tank Farm) and Area 3 (Milepost Sites), are such that the remedies will not be able to fully achieve the groundwater restoration Remedial Action Objective and ARARs. In order for the remedies to remain protective in the long-term, the Army must evaluate the feasibility of additional response actions to fully achieve the RAOs and propose a plan for final action at OU3	A	Page i of the Executive Summary, Page iv 'Five Year Review Summary Form', and Section 11, page 11-1 "Protectiveness Statements' were changed to say: "Remedies at OU3 are currently protective of human health and the environment. In order for the OU3 remedies to remain protective in the long-term, the Army will initiate appropriate responses, in cooperation with the EPA and State of Alaska, if future monitoring indicates there are significant changes of the contaminant plumes that would adversely affect human health and the environment."	
2	OU3 Birch Hill Tank Farm; Remedial Area 2; and Remedial Area 3:	If achieving these goals proves to be Technically Impracticable, the Army will need to seek to waive the ARARs. In the interim, exposure pathways that could result in unacceptable risks are being controlled and Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater.	A	Table 6-4, page 6-15, and Table 10-1, page 10-4, were changed to say: "The option for pursuing a TI Waiver was previously considered prior to the 2006 Five Year Review. The Army in agreement with EPA and ADEC determined that continued monitoring was sufficient for monitoring bedrock contamination on Birch Hill; however, further evaluation of a TI Waiver would be considered if future conditions warranted." Text was also added to Section 6.3.4 to provide more details of how contaminant concentrations have decreased over time and how exposure pathways are being controlled.	

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DOCUMENT: Draft 2010 Third Five Year Review Report **LOCATION: Fort Wainwright, AK**

U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: REVIEWER: EPA Region 10 PHONE:	1. *Action taken on comment by:*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
3	OU5 Quartermaster Fueling System, Birch Hill Tank Farm, Chena River, and Institutional Controls Program	The remedy at OU5 currently protects human health and the environment because Institutional Controls are preventing exposure to, or ingestion of, contaminated groundwater. However, in order for the remedy to fully comply with the selected remedy and remain protective for the long term, the Army needs to increase security and repair to the fence at the Birch Hill Tank Farm Remedial Area la.	A	Page i of the Executive Summary, Page iv 'Five Year Review Summary Form', and Section 11, page 11-1"Protectiveness Statements" were changed to say: "The remedy at Operable Unit 5 is currently protective; however, in order to remain protective in the long term, continued monitoring of the Remedial Area 1a fence will be conducted to ensure security and identify the need for repairs."	
4	Sitewide	The remedial actions at OUs 1,2, and 4 have been implemented and are protective. The remedies at OUs 3 and 5 currently protect human health and the environment, but require the follow-up actions documented in the Report and this letter to ensure they remain protective in the long term. Because some of the OUs are currently protective, the Site is considered currently protective and the follow-up actions documented in the Report and this letter need to be performed to ensure they remain protective in the long term.	Noted		
5	General	EPA will also be tracking the Army's progress toward the recommendations to ensure the remedy at OU3 remains protective in the long term. The EPA will be entering a due date of March 31, 2016 for the Army to complete the analysis of feasible alternatives and to issue a proposed plan for either additional response actions or a waiver	Noted	The Army will continue to work together with EPA and the State of Alaska to develop and implement effective remedial alternatives.	

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U.S. ARMY CORPS OF ENGINEERS CEPOA-EN-ES-M	DATE: REVIEWER: EPA Region 10 PHONE:	1. *Action taken on comment by:*

Item No.	Drawing Sht. No., Spec. Para.	COMMENTS	REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)	CONTRACTORS RESPONSE	USAED RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)
		of ARARs based on Technical Impracticability needed for OU3.			
		Consistent with EPA's August 1, 2011 memorandum "Program Priorities for Federal Facility Five-Year Reviews", the Five-Year Review Guidance Section 1.3.3 has been superceded and future Five Year Review due dates will be based on the planning date for this review (September 29, 2011). Therefore the next Five-Year Review will be due September 29, 2016, and the subsequent Review will be due September 29, 2021.	A	The next Five Year Review will be submitted September 29, 2016	