

UNITED STATES AIR FORCE
INSTALLATION RESTORATION PROGRAM

FINAL

**Second Five-Year Review Report for the Washrack/Treatment
Area (WTA) De-listed National Priorities List (NPL) Site
McChord Air Force Base, Washington**



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Air Force Center for Environmental Excellence
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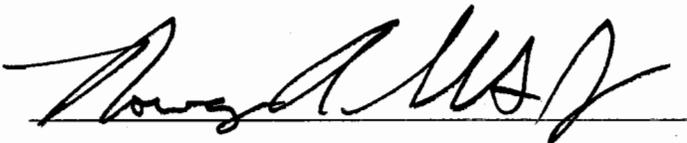
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September 2004

**Lead Agency Acceptance
Second Five-Year Review
McChord Air Force Base—WTA De-listed NPL Site**

This signature sheet documents the United States Air Force acceptance of the second Five-Year Review for the WTA De-listed NPL Site at McChord Air Force Base.



Rowayne A. Schatz, Jr.
Colonel, United States Air Force
Commander, 62nd Airlift Wing

25 SEP 04

Date

Support Agency Acceptance
Second Five-Year Review
McChord Air Force Base—WTA De-listed NPL Site

This signature sheet documents the United States Environmental Protection Agency acceptance of the second Five-Year Review for the WTA De-listed NPL Site at McChord Air Force Base.

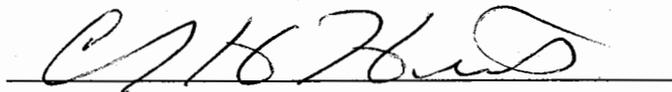


Daniel D. Opalski, Director
Environmental Cleanup Office
Region X
U.S. Environmental Protection Agency

9/29/04
Date

Support Agency Acceptance
Second Five-Year Review
McChord Air Force Base—WTA De-listed NPL Site

This signature sheet documents the Washington State Department of Ecology acceptance of the second Five-Year Review for the WTA De-listed NPL Site at McChord Air Force Base.



Chuck H. Hinds, P.E.
Toxics Cleanup Program
Washington State Department of Ecology

10/4/04
Date

EXECUTIVE SUMMARY

The purpose of this Five-Year Review is to evaluate the implementation and performance of the remedial actions that were selected in the Record of Decision and Explanation of Significant Differences (ESD) for the Washrack/Treatment Area (WTA) National Priorities List (NPL) site at McChord Air Force Base, Washington. The WTA was de-listed from the NPL in 1996 because no Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) hazardous substances remained at the site. The revised remedy selected by the ESD is natural attenuation of the floating fuel and long-term monitoring. This is the second Five-Year Review for the WTA. The trigger for this review was the signing of the first Five-Year Review report on September 30, 1999.

The Five-Year Review Summary Form on the following pages presents the issues that were identified during the review, provides associated recommendations and follow-up actions, and includes a protectiveness statement.

The assessment of this Five-Year Review found that the remedy is operating as intended by decision documents. Remediation levels for groundwater generally have been attained throughout the site, and no CERCLA hazardous substances have been left in place. Weathered, diesel-range total petroleum hydrocarbon (TPH) is the only contaminant that remains in place above Model Toxics Control Act (MTCA) cleanup levels. Future monitoring will be overseen by the Washington State Department of Ecology. As such, it is recommended that this report be considered the final Five-Year Review for the WTA under CERCLA.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name: MCCHORD AIR FORCE BASE (WASH RACK/TREATMENT AREA)		
EPA ID: WA8570024200		
Region: 10	State: WA	City/County: Tacoma, Pierce County
SITE STATUS		
NPL status: <input type="checkbox"/> Final <input checked="" type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status Natural Attenuation and Monitoring		
Multiple OUs?* No	Construction completion date: 06/01/1994 (Issuance of ESD)	
Has site been put into reuse? Site continues to be used for industrial purposes.		
REVIEW STATUS		
Lead agency: U.S. Air Force		
Author name: Brenda Zehr		
Author title: Restoration Chief, Environmental Management Flight		Author affiliation: McChord AFB 62 CES/CEV
Review period:** 9/30/1999 to 9/30/2004		
Date(s) of site inspection: Last inspection—March 2004		
Type of review:		
<input checked="" type="checkbox"/> Post-SARA <input type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> NPL State/Tribe-lead <input type="checkbox"/> Regional Discretion		
Review number: 2 (second)		
Triggering action:		
<input type="checkbox"/> Actual RA Onsite Construction at OU # _____		<input type="checkbox"/> Actual RA Start at OU# _____
<input type="checkbox"/> Construction Completion		<input checked="" type="checkbox"/> Previous Five-Year Review Report
<input type="checkbox"/> Other (specify)		
Triggering action date: 9/30/1999		
Due date: 9/30/2004		

* ["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, cont'd.

Issues:

Should this second Five-Year Review of the WTA be the final CERCLA review?

Should sampling of inorganics in groundwater at Site SD-54 be discontinued?

Should sampling of benzene, toluene, ethylbenzene, and xylenes (BTEX), TPH, and lead in groundwater at Site DP-60 be modified?

Recommendations and Follow-Up Actions:

This second Five-Year Review should be the final review under CERCLA. The WTA was deleted from the NPL in 1996, and no CERCLA hazardous substances remain at the WTA. Regulatory oversight of monitoring, reporting, and reviews should be transferred to the Washington State Department of Ecology.

Groundwater sampling at Site DP-60 should be modified to include only diesel-range TPH, consistently reported above MTCA cleanup levels since the last Five-Year Review. Sampling of BTEX, gasoline-range TPH, and lead should be discontinued.

Groundwater sampling should cease at Site SD-54 (Washington State Department of Ecology action only). The only contaminant detected at concentrations exceeding site remediation levels during the last 5 years was cadmium in one unfiltered sample. The WTA is an industrial site, and shallow groundwater from the Qvr aquifer is not used as a potable water source.

Protectiveness Statement(s):

The remedy at the WTA is protective of human health and the environment. Monitoring conducted over 10 years demonstrates that groundwater conditions with institutional controls in place are stable and protective. The WTA is in the industrial portion of McChord AFB that is inaccessible to the public and the majority of base personnel, and the shallow groundwater is not utilized as a potable water source. Continued sampling does not increase the protectiveness of the remedy and, as such, no additional monitoring is recommended for Site SD-54. Site DP-60 is recommended for transfer to Washington State Department of Ecology for regulatory supervision and continued monitoring as a petroleum site.

Long-Term Protectiveness:

Long-term protectiveness of the remedial action has been verified by 10 years of groundwater monitoring that confirm that all contaminants have remained on site and that some reduction in source concentrations has occurred over time. Institutional controls exist to prevent the completion of potential future exposure pathways.

Other Comments:

This is the last Five-Year Review under CERCLA. Future regulatory oversight will be transferred to the Washington State Department of Ecology.

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LIST OF ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
Air Force	U.S. Air Force
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CY	calendar year
Ecology	Washington State Department of Ecology
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Differences
FFA	Federal Facilities Agreement
ft/day	foot per day
IRP	Installation Restoration Program
LTM	Long-Term Monitoring
µg/L	micrograms per liter
MCL	Maximum Contaminant Level
MTCA	Model Toxics Control Act
NAPL	Non-Aqueous Phase Liquid
NCP	National Contingency Plan
NPL	National Priorities List
RAO	Remedial Action Objective
RI/FS	Remedial Investigation/Feasibility Study
RL	Remediation Level
ROD	Record of Decision
TPH	total petroleum hydrocarbon
URSG	URS Greiner Woodward Clyde
WTA	Washrack/Treatment Area

I. Introduction

The U.S. Air Force (Air Force) prepared this Five-Year Review report for the Washrack/Treatment Area (WTA) de-listed National Priorities List (NPL) site at McChord Air Force Base (AFB), Washington, pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) §121 and the National Contingency Plan (NCP). The WTA is the second of two operable units placed on the NPL at McChord AFB and was deleted from the NPL on September 26, 1996. The WTA site is being addressed through federal actions. The Air Force is the lead agency for cleanup of the WTA. The Washington State Department of Ecology (Ecology) is the lead regulatory agency, with the U.S. Environmental Protection Agency (EPA) as the secondary regulatory agency.

McChord AFB conducted this Five-Year Review of the remedial action(s) implemented at the WTA based on data collected from March 2000 through June 2004. The triggering action for this review was the completion date of the previous Five-Year Review, identified as September 30, 1999, in EPA's Waste LAN database. Tetra Tech FW, Inc. (formerly Foster Wheeler Environmental Corporation) supported McChord AFB in this review through their contract with the Air Force Center for Environmental Excellence (AFCEE). The purpose of a five-year review is to determine whether the remedy at a site remains protective of human health and the environment, and the review includes identification of any issues with the remedy and recommendations to address them.

This is the second Five-Year Review conducted for the WTA site. The first Five-Year Review, completed in September 30, 1999, concluded that the remedy was protective of human health and the environment (U.S. Air Force 1999). Both Ecology and EPA concurred with this assessment. The review was initiated because contaminant concentrations in groundwater at the site exceed levels that would allow unlimited use and unrestricted exposure. The purpose of this review is to determine whether the remedy at the site is protective of human health and the environment and whether the remedy remains the most appropriate action for the site.

II. Site Chronology

Table 1 provides a summary of events for the WTA.

Table 1. Chronology of Site Events for the WTA

Event	Date
Disposal activities at the site	Early 1950s to early 1970s
Department of Defense Installation Restoration Program (IRP) initiated at McChord AFB	1981
IRP Phase I—Records Search	1982
IRP Phase II—Site Investigation	1983
Discovery/Preliminary Assessment	1983
Site SD-54 designated as WTA and EPA nominates for inclusion on the NPL	1984
Conceptual Hydrocarbon Recovery Plan for Site DP-60	1986
Geotechnical/Environmental Investigation of Site DP-60	1986
Final listing on the NPL	1987
Federal Facilities Agreement (FFA) between Air Force, EPA, and Ecology finalized	1989
Site DP-60 included while planning the WTA Remedial Investigation/Feasibility Study (RI/FS)	1989
Human Health Risk Assessment finalized	1992
Ecological Risk Assessment finalized	1992
RI/FS finalized	1992
Proposed Plan identifying EPA's preferred remedy presented to public; start of public comment period	1992
Record of Decision (ROD) selecting the remedy signed	1992
Non-Aqueous Phase Liquid (NAPL) Pilot Test Study completed	1994
Explanation of Significant Differences (ESD) signed	1994
WTA incorporated in McChord AFB's Long-Term Monitoring (LTM) Program	1994
Notice of Intent to Delete published in the Federal Register	1996
Notice of Deletion published in the Federal Register	1996
First Five-Year Review completed	1999
Second Five-Year Review initiated	2004

III. Background

Physical Characteristics

The WTA is within an industrial and operational complex in the northern portion of McChord AFB, west of the main instrument runway and taxiways, and within portions of aircraft parking areas (Ramps C and D) (Figure 1). McChord is an active 4,638-acre military installation approximately 7 miles south of downtown Tacoma in central Pierce County, Washington.

Geographical features that roughly bound the site include the taxiway to the east, Ramp D to the south, Clover Creek to the west, and Ramp C to the north (Figure 2). The WTA is relatively flat, comprised of industrial facilities, and a mix of asphalt roadways, parking areas, aircraft ramps, and unimproved rocky soil and grass. Site SD-54 was established to address potential contaminants that may have entered the vadose zone via two leach pits designed to receive runoff from a former airplane washrack on Ramp D. A restored flat, grassy area of approximately 100 feet by 40 feet now overlies the two historical leach pits located north of Ramp D and immediately west of an oil/water separator (Figure 2). Site DP-60 comprises most of the area extending north of Site SD-54 to Ramp C, and includes the closed and restored infiltration ditches located in the general vicinity indicated on Figure 2.

Glacial sedimentary deposits that underlie the WTA consist of permeable sand and gravel outwash materials separated by till layers and interspersed non-glacial units. The Vashon Drift is the geologic unit exposed at the surface and consists of gravel, recessional outwash, till, and advance outwash units, as well as lacustrine silt. The uppermost hydrogeologic unit within the Vashon Drift hosts the shallow, unconfined aquifer within outwash sand and gravel. The unconfined aquifer extends from approximately 10 feet below ground surface (bgs) to a depth between 20 and 30 feet bgs. Groundwater within the unconfined aquifer at the WTA flows from south-southeast to north-northwest. Groundwater velocity occurs at an approximate rate of 120 feet per day (ft/day), with seasonal variation.

Land and Resource Use

The WTA is an entirely industrial area that supports airfield activities. Restricted access for the airfield applies to most of the site, including the roughly 22-acre area between Ramp C and Ramp D. Therefore, much of the WTA is not accessible to the public or most base personnel. Future use is for continued airfield industrial activities. There are no surface water bodies within the WTA.

On-base and off-base water supplies are not threatened because groundwater is withdrawn from deeper sources located away from the WTA. McChord AFB withdraws drinking water from deeper aquifers and has no extraction wells in the shallow, unconfined aquifer. Furthermore, contaminants in the shallow aquifer at McChord AFB have not migrated from the WTA at concentrations above remediation levels, nor is there expectation such migration would occur in the future.

History of Contamination

Table 1 provides a summary of completion dates for enforcement and cleanup actions for the WTA. The Department of Defense IRP was initiated at McChord AFB in March 1981. The Phase I

Record Search (CH2M HILL 1982) identified two sites within the WTA, SD-54 (surface disposal) and DP-60 (disposal pit).

Site SD-54 includes a former washrack on Ramp D near Building 745, oil/water separator, and two leach pits (backfilled, circa 1986). This washrack area functioned as a paved aircraft washing facility where chemical solvents reportedly were used to remove oil, grease, and other foreign materials from airplanes and two unlined leach pits received runoff from this paved area. Site DP-60 includes storm drainage infiltration ditches (now backfilled) and a thin layer of floating fuel present on the unconfined aquifer.

The follow-up Phase II Confirmation/Quantification report (SAIC 1986) identified low-level organic contamination at both sites and recommended further studies to confirm contaminant characteristics and distribution.

Initially (in 1984), EPA designated only Site SD-54 as the WTA and nominated it for inclusion on the NPL. In 1987, the WTA was placed on the NPL. In 1989, the Air Force entered into a three-party FFA with EPA (Region 10) and Ecology. During planning of the CERCLA RI/FS in 1989, Site DP-60 was included as a floating fuel site in the WTA.

Initial Response

The Air Force completed an RI/FS for the WTA in 1992 (Ebasco 1992a, 1992b). The RI included sampling of site soils, groundwater, surface water (nearby Clover Creek), and surface-water sediment. Organic contaminants responsible for initial hazard ranking of SD-54 were not confirmed during the RI, with the exception of one low-concentration detection of benzene. Concentrations of inorganic compounds in groundwater were elevated compared to background; however, no unacceptable risks to human health or the environment were posed by the inorganic compounds. Total petroleum hydrocarbon (TPH) contamination and a thin layer of floating fuel were confirmed at Site DP-60 during the RI.

Basis for Taking Action

Characterization of WTA Sites SD-54 and DP-60 in the RI (Ebasco 1992a) for the nature and extent of contamination in groundwater, soil, surface water, and sediments identified two compounds of concern in groundwater. A single groundwater sample collected had a concentration of benzene (7.6 micrograms per liter [$\mu\text{g}/\text{L}$]) above the Maximum Contaminant Level (MCL) of 5 $\mu\text{g}/\text{L}$, while all other results from groundwater sampling were below the benzene MCL. Concentrations of TPH compounds in groundwater were above the Model Toxics Control Act (MTCA) Method A cleanup level of 1,000 $\mu\text{g}/\text{L}$ with a maximum concentration of TPH (undifferentiated) reported at 67,000 $\mu\text{g}/\text{L}$.

The WTA Human Health Risk Assessment and the Ecological Risk Assessment (Ebasco 1992a) evaluated potential effects of the contamination on human health and the environment. The risk assessment identified no unacceptable risks to human health from contaminants in site soils. The risk assessment also concluded that groundwater does not pose any risk to current on-site or off-site residents. An excess lifetime cancer risk of 1.29×10^{-5} was calculated based on exposure of potential future residents to benzene contamination in groundwater. The Ecological Risk Assessment

concluded that no contaminants in site soils or groundwater posed unacceptable risks to the environment.

A risk to human health on the order of 1×10^{-5} could warrant consideration for no further action. However, the Air Force, EPA, and Ecology proposed to address the groundwater contamination because benzene was detected at a concentration slightly exceeding the MCL of 5 $\mu\text{g}/\text{L}$. It was decided, therefore, to address the floating fuel at Site DP-60 to hasten the reduction in benzene concentrations. Furthermore, even though the RI did not discover significant contamination at Site SD-54, Ecology requested that monitoring be continued downgradient of the former leach pits to ensure that migration off site did not occur.

IV. Remedial Actions

Remedy Selection

The FS (Ebasco 1992b) evaluated alternatives for remediation of the contamination. The selected remedial action alternative stated in the ROD (U.S. Air Force 1992) included:

- Installation of one or more extraction trenches capable of capturing the floating fuel in the unconfined aquifer.
- Installation of on-site collection system(s) to contain fuel removed from the extraction trench(es).
- Re-use of the extracted fuel off site.
- Monitoring of the groundwater and the floating fuel extraction system during fuel removal to ensure the groundwater remediation levels are achieved throughout the site.
- Implementation of administrative and institutional controls such as restrictive covenants and McChord AFB command directives, which supplement engineering controls and minimize exposure to release of hazardous substances during remediation.

The goal of the selected remedy was to remove the floating fuel and reduce the benzene contamination in the groundwater associated with Site DP-60 to below 5 µg/L.

The ROD states the objective of the remedial action is to “remove the floating fuel from the groundwater, resulting in a reduction of fuel-related contaminants to levels that are protective of human health and the environment and are in compliance with Applicable or Relevant and Appropriate Requirements. In accordance with the NCP, remediation levels for groundwater shall generally be attained throughout the contaminated plume, or at and beyond the edge of the waste management area when waste is left in place.” Remediation levels listed in Table 13 of the ROD for individual compounds in groundwater are summarized in Table 2.

Table 2. Groundwater Remediation Levels for Site DP-60 (Floating Fuel Area)

Compound of Concern	Groundwater Remediation Level (µg/L)	Basis of Remediation Goal
Benzene	5	MCL
Toluene	1,000	MCL
Ethylbenzene	700	MCL
Xylene	10,000	MCL
TPH	1,000	MTCA Method A Cleanup Level
Lead	11	Base Background Level

MTCA Method A cleanup level for groundwater in 1992.

The ROD also contained actions to address Ecology concerns related to inorganic contaminants detected in leach pit soils at concentrations above MTCA cleanup levels. The contaminants were not

found to present an unacceptable risk to human health and the environment according to CERCLA. Remediation levels listed in the ROD, *Actions Related to the State of Washington's Regulations—Table 2*, for individual compounds detected in groundwater at Site SD-54 are shown in Table 3.

Table 3. Groundwater Remediation Levels for Site SD-54 (Leach Pits)

Compound of Concern	Groundwater Remediation Level (µg/L)	Basis of Remediation Goal
Cadmium	14	Base Background Level
Chromium	50	MCL
Copper	1,000	MCL
Lead	11	Base Background Level

Remedy Implementation

Beginning in 1993, the Air Force conducted a pilot test for NAPL recovery (EA Engineering, Science, and Technology, Inc. 1994). Pilot testing involved the installation of 1 test trench in the thickest known part of the floating fuel layer, the installation of 10 test pit observation wells, and passive on-site collection of the floating fuel. During the remedial design, the volume of the floating fuel was estimated at approximately 36,000 gallons, significantly less than initially estimated in the mid-1980s (100,000 gallons). The pilot test showed the thickness of floating fuel to be less than 0.1 foot thick. The fuel layer also was shown to be primarily an oily emulsion rather than a true immiscible liquid.

New site data collected during pilot testing of the remedial design showed that assumptions for site conditions applied during preparation of the RI/FS and ROD required revision. The new information decreased estimated quantities of floating fuel substantially. The pilot test demonstrated that passive extraction and re-use of the floating fuel were not feasible. Remedy selection was officially changed in 1994 in the ESD (EPA 1994) to natural attenuation of the floating fuel and long-term monitoring.

Groundwater monitoring of Site SD-54 and Site DP-60 began in calendar year (CY) 1994 to satisfy the requirements of the initial ROD and the modified remedial action specified in the ESD. A summary of groundwater monitoring results for Site DP-60 from CY 1994 to CY 1999 (coinciding with the first 5-year review period) is presented in Table 4. Sampling has been conducted using low flow protocols and procedures. At Site DP-60, weathered diesel-range TPH compounds (TPH C₁₂–C₂₄) at well CR-02 were consistently slightly above the remediation level (MTCA cleanup level) of 1,000 µg/L, although with a maximum detection of 55,000 µg/L. Results for TW-9 generally were below the remediation level. Concentrations of TPH were generally lower than in the RI, which reported a high of 67,000 µg/L (Ebasco, 1992a). Variability (peaks) in TPH concentration appeared to be highly influenced by the occasional presence of a fuel sheen or thin layer in the sampled well. A summary of groundwater monitoring results for Site SD-54 from CY 1994 to CY 1999 (coinciding with the first 5-year review period) is presented in Table 5. Well locations are identified on Figure 2. Values for metals in filtered (dissolved) samples were below remediation levels, although some unfiltered (total) samples for cadmium, chromium, and lead displayed elevated concentrations above the remediation levels. This pattern was attributed to metal-suspended sediment included in the

unfiltered samples, which were turbid due to fine-grained sediments in the CW-20 well screen interval (from the Vashon Till), even though low-flow methodologies were employed. Dissolved metals results indicated no elevated metal contamination associated with Site SD-54.

Institutional controls for the WTA are specified in the Base Comprehensive Plan (McChord AFB, 2001 and the most current update, in progress). The existing institutional controls minimize the potential for completing exposure pathways and ensure human health and the environment are not threatened. Institutional controls specific to the WTA include:

1. Listing and plan view maps showing the WTA as an IRP site.
2. Designated land use at the WTA for industrial activities only.
3. Restriction of land development within the WTA to industrial purposes only without review and approval by Environmental Management Flight staff.
4. Restriction of public access to the entire site and restriction of base personnel to the flight-line portion of the site (unless personnel are authorized entry for operations).
5. Restriction of groundwater usage from the shallow water table aquifer at the WTA for monitoring purposes only. All base potable water is obtained from deeper aquifers that are not within the site boundary. No wells exist at the WTA (other than resource protection wells for semi-annual sampling). Access to resource protection wells is regulated and monitored by Environmental Management Flight staff.

The Air Force also has administrative procedures that require project approval for projects that require construction, subsurface soil disturbance, or changes in land use. Air Force instructions and procedures require coordination with and prior approval from Environmental Management Flight if a proposed project is located on or near an IRP site.

The Air Force details WTA site conditions and sampling results in both quarterly technical information and annual reports. These reports are submitted to Ecology for review and comment.

The current base contact for institutional controls for the WTA is Brenda Zehr, Restoration Chief, Environmental Management Flight, 62 CES/CEV, 253-982-6202 (or her designee).

Table 4. Groundwater Monitoring at Site DP-60 from September 1994 through March 1999

Well ID	Date	Benzene (µg/L)	Ethylbenzene (µg/L)	Toluene (µg/L)	m,p-Xylenes (µg/L)	o-Xylene (µg/L)	TPH (C ₇ -C ₁₂) (µg/L)	TPH (C ₁₂ -C ₂₄) (µg/L)	Pb (Total) (µg/L)	Pb (Dissolved) (µg/L)
CR-02	Mar. 1999	<0.50	<0.50	0.6	1.6	NA	410	2,800	5.4	3.5
CR-02	Mar. 1998	<0.5	<0.5	<0.5	<0.5	NA	270	55,000	3.1	<3.0
CR-02	Sep. 1997	1.3	8.6	3.2	6.7	NA	670	2,500	<3.0	<3.0
CR-02	Mar. 1997	<0.5	8.9	0.77	5.1	NA	480	2,800	7.9	4
CR-02	Sep. 1996	<2.0	2.6	2	4.2	NA	550	1,800	<3.0	<3.0
CR-02	Mar. 1996	<2.0	<2.0	2.3	2.0	NA	790	1,300	1.9 B	1.4 B
CR-02	Oct. 1995	<1.0	<1.0	2	<1.0	<1.0	950	1,400	3.1	2.6 B
CR-02	Apr. 1995	1.1	1.5 P	2.1 BP	1.6	0.48 JP	880	1,500	3.8	1.9
CR-02	Sep. 1994	0.62 J	1.2	1.2 P	2.3	<1.0	1,100	8,100 D	5.6	4.3
Maximum		1.3	8.9	3.2	6.7	0.48	1,100	55,000	7.9	4.3
Mean		0.6	1.3	1.3	1.8	0.5	623.4	2,920.8	3.2	2.2
Site RL		5	700	1,000	10,000	10,000	1,000	1,000	11	11
TW-9	Mar. 1999	<0.50	1.7	5	6.6	NA	620	940	<3.0	<3.0
TW-9	Mar. 1998	0.69	<0.5	<0.5	<0.5	NA	330	3,600	16	<3.0
TW-9	Sep. 1997	<0.5	1.1	<0.5	2.8	NA	470	410	<3.0	<3.0
TW-9	Mar. 1997	<0.5	0.8	<0.5	1.3	NA	270	760	6.8	<3.0
TW-9	Sep. 1996	<2.0	<2.0	<2.0	1.1	NA	350	660	<3.0	<3.0
TW-9	Mar. 1996	<2.0	<2.0	<2.0	1.6	NA	790	600	0.72 B	<0.70
TW-9	Oct. 1995	<1.0	9.4	<1.0	<1.0	1.9	1,100	1,900	8	<2.0
TW-9	Apr. 1995	4.4	1	2.8 BP	5.9 P	1.4 P	1,200	540	8.3	2.1
TW-9	Sep. 1994	<1.0	2.5 P	<1.0	<1.0	<1.0	820	2,200	10.5	1.3 B
Maximum		4.4	9.4	5	6.6	1.9	1,200	3,600	16	2.1
Mean		0.6	1.3	0.7	1.4	1.1	582.9	993.4	3.8	1.2
Site RL		5	700	1,000	10,000	10,000	1,000	1,000	11	11

RL = Remediation Level

Concentrations > RLs are shown in **bold type**.

B (inorganics) = Estimated value, between reporting limit and instrument detection limit

J = Estimated value, between reporting limit and instrument detection limit

P = Greater than 25% difference between dual columns

D = Result from diluted analyses

NA = Not Analyzed

Table 5. Groundwater Monitoring at Site SD-54 from September 1994 through March 1998

Well ID	Date	Cd (T) (µg/L)	Cd (D) (µg/L)	Cr (T) (µg/L)	Cr (D) (µg/L)	Cu (T) (µg/L)	Cu (D) (µg/L)	Pb (T) (µg/L)	Pb (D) (µg/L)
CW-20	Mar. 1998	34	12	14	<10	<10	<10	18	3.5
CW-20	Mar. 1996	6.6	3.2 B	<3.1	4.3 B	<3.0	<3.0	4.7	2.5 B
CW-20	Sep. 1995	54.9	<5.0	106	<3.0	29.8	<3.0	144	2.4 B
CW-20	Apr. 1995	51.9	<2	73.7	<7	23.4	<3	76.1	2.8
CW-20	Sep. 1994	94.6	<2	169	<9	38.9	<4	226	<1
Maximum		94.6	12	106	4.3	38.9	5	226	3.5
Mean		36.0	2.5	31.0	3.5	11.5	2.0	46.2	2.0
Site RL		14	14	50	50	1,000	1,000	11	11
CW-29b	Mar. 1996	<1.0	<1.0	<3.1	<3.1	<3.0	<3.0	3.1	3.4
CW-29b	Sep. 1995	<5.0	<5.0	<3.0	<3.0	12.1 B	12.5 B	2.7 B	<2.0
CW-29b	Apr. 1995	<2	<2	<7	<7	34.7	4.9	10.6	5.6
CW-29b	Sep. 1994	<2	<2	<9	<9	<4	<4	2 B	1.1 B
Maximum		2.5	2.5	4.5	4.5	34.7	12.5	10.6	5.6
Mean		1.1	1.1	2.5	2.5	6.0	3.7	3.6	2.1
Site RL		14	14	50	50	1,000	1,000	11	11

RL = Remediation Level

Concentrations > RLs are shown in **bold type**.

B (inorganics) = Estimated value, between reporting limit and instrument detection limit

V. Progress Since the Last Five-Year Review

The first Five-Year Review (U.S. Air Force 1999) recommended continuation of groundwater monitoring according to the schedule in place at that time (Table 6) and review of the schedule every 2 years.

Table 6. Recommended Sampling Frequency from the Last Five-Year Review

WTA	Resource Protection Wells	Analytical Suite(s)	Frequency
Leach Pits	CW-20	Priority Pollutant Metals	Biannually
Floating Fuel	CR-02, TW-9	BTEX, TPH, Lead, and Natural Attenuation Parameters	Annually

The Air Force implemented the recommended sampling frequency beginning with the March 2000 sampling event (Table 7). Analytical results for the WTA were summarized in yearly Annual Reports (FPM Group, Ltd. and Foster Wheeler Environmental 2001; Foster Wheeler Environmental Corporation 2002, 2003; and Tetra Tech FW, Inc. 2004). Schedule recommendations were contained in each Annual Report; however, no changes occurred during the 5-year period.

Table 7. Actions Taken Since the Last Five-Year Review

Recommendations from Previous Review	Party Responsible	Action Taken and Outcome	Date of Action
Sample according to schedule in place	McChord AFB	Wells CR-02 and TW-9 sampled annually from March 2000 through June 2004 (5 sample events) Well CW-20 sampled biannually from March 2000 through March 2004 (3 sample events)	March 2000 through June 2004
Review of sampling schedule	McChord AFB	No change to sampling schedule	Annual Review

VI. Five-Year Review Process

Administrative Components

The WTA Five-Year Review team was led by Brenda Zehr, Restoration Chief, Environmental Management Flight, McChord AFB 62 CES/CEV. A kickoff teleconference to initiate the Five-Year Review was conducted by Ms. Zehr on December 19, 2003, that included representatives of McChord AFB, EPA, Ecology, and Tetra Tech FW, Inc.

Community Notification and Involvement

No community involvement was required for the Five-Year Review. The public will be notified via newspaper advertisement at the completion of the final Five-Year Review report, with copies made available at the public library.

Document Review

This Five-Year Review consists of a review of relevant documents including Annual Reports that contain monitoring data (see Data Review below). Applicable groundwater cleanup standards, as listed in the 1992 ROD, were reviewed. Current values for MCLs and MTCA Method A levels listed as remediation levels in Tables 2 and 3 were checked for changes since issuance of the ROD.

Data Review

The results of groundwater monitoring at the WTA are reported each year in the Annual Report (Foster Wheeler Environmental Corporation 1994, 1995, 2002, 2003; URS Greiner Woodward Clyde (URSG) and Foster Wheeler Environmental Corporation 1996, 1997, 1998, 1999, 2001; FPM Group, Ltd. and Foster Wheeler Environmental Corporation 2001; Tetra Tech FW, Inc. 2004).

Since the last Five-Year Review (September 1999), the Air Force has continued annual groundwater monitoring of Site DP-60 in accordance with the ROD (for benzene, toluene, ethylbenzene, and xylenes [BTEX], TPH, and lead) and biannual groundwater monitoring of Site SD-54 in response to Ecology requirements (for cadmium, chromium, copper, and lead). At Site DP-60, samples are collected from resource protection well CR-02 (in the middle of the floating fuel area) and resource protection well TW-9 (immediately downgradient of the floating fuel area). At Site SD-54, samples are collected from resource protection well CW-20 (immediately downgradient of the two former leach pits).

Since the last Five-Year Review, there continues to be no detections of CERCLA-regulated contaminants above regulatory limits.

A summary of groundwater analytical results at Site DP-60, from March 2000 through June 2004, is presented in Table 8. Conclusions from Table 8 are as follows:

- Maximum and mean concentrations of BTEX, gasoline-range TPH, and lead continue to remain consistently below the site remediation levels. One gasoline-range TPH sample was equal to the site remediation level and one total (unfiltered) lead sample was slightly above the site remediation level.

- Maximum and mean concentrations of diesel-range TPH are the only site contaminant consistently above the site remediation level in both wells.
- There are no apparent trends toward increasing or decreasing concentrations of diesel-range TPH. As discussed in Section IV, peaks of TPH concentration appear correlated with the presence of a sheen or thin layer of floating fuel in the sampled well, and concentrations are lower than the peak reported in the RI.

Table 8. Groundwater Monitoring at Site DP-60 from March 2000 through June 2004

Well ID	Date	Benzene (µg/L)	Ethylbenzene (µg/L)	Toluene (µg/L)	m,p-Xylenes (µg/L)	o-Xylene (µg/L)	TPH (C ₇ -C ₁₂) (µg/L)	TPH (C ₁₂ -C ₂₄) (µg/L)	Pb (Total) (µg/L)	Pb (Dissolved) (µg/L)
CR-02	Mar. 2004	<0.2	0.6	<0.2	0.32 JP	<0.2	530	21,000 D	5.8	6.6
CR-02	Mar. 2003	<0.4	<0.6	0.63 P	0.9	<0.4	790	8,000 D	16.9	4.6
CR-02	Mar. 2002	<0.40	0.80	<0.40	<0.80	<0.40	580	2,600	2.3	2.1
CR-02	Mar. 2001	<2	<2	<3	<4	<2	1,000	4,800 D	3.8 B	3.5 B
CR-02	Mar. 2000	<0.2	0.27 P	0.32 P	0.45 P	<0.2	800	4,300 D	3	2 B
Maximum		<2	0.8	0.63	0.9	<2	1,000	21,000 D	16.9	6.6
Mean		0.2	0.5	0.4	0.6	0.2	720	6,200	4.8	3.4
Site RL		5	700	1,000	10,000	10,000	1,000	1,000	11	11
TW-9	June 2004	<0.20	0.46 P	0.79 P	3.5	2	430	1,700	3.1	0.76 B
TW-9	Mar. 2003	<0.2	<0.3	0.69 P	1.4	0.25 P	210	1,300	1.2	0.45 B
TW-9	Mar. 2002	<0.40	<0.60	<0.40	1.5	<0.40	580	6,900 D	2.1	1.1
TW-9	Mar. 2001	<1	<1	<1.5	<2	<1	410	3,100	6.9	0.24 B
TW-9	Mar. 2000	<0.2	<0.2	<0.3	1.3 P	<0.2	430	2,600 D	5.1	<1.1
Maximum		<1	<1	0.79	3.5	2	580	6,900	6.9	1.1
Mean		0.2	0.3	0.4	1.6	0.3	391.8	2,618	3.1	0.5
Site RL		5	700	1,000	10,000	10,000	1,000	1,000	11	11

RL = Remediation Level

Concentrations > RLs are shown in **bold type**.

B (inorganics) = Estimated value, between reporting limit and instrument detection limit.

J = Estimated value, between reporting limit and instrument detection limit

P = Greater than 25% difference between dual columns.

D = Result from diluted analyses.

Well TW-9 was inaccessible in March 2004.

A summary of groundwater analytical results at Site SD-54, from March 2000 through March 2004, is presented on Table 9. Conclusions from Table 9 are as follows:

- The maximum concentration (24.5 µg/L) of cadmium in unfiltered (total inorganics) samples was above the site remediation level of 14 µg/L while the mean concentrations (13.6 µg/L) of cadmium in unfiltered (total inorganics) samples and all filtered (dissolved inorganics) were below the remediation level.
- Maximum and mean concentrations of chromium, copper, and lead remain below site remediation levels.

Table 9. Groundwater Monitoring at Site SD-54 from March 2000 through March 2004

Well ID	Date	Cd (T) (µg/L)	Cd (D) (µg/L)	Cr (T) (µg/L)	Cr (D) (µg/L)	Cu (T) (µg/L)	Cu (D) (µg/L)	Pb (T) (µg/L)	Pb (D) (µg/L)
CW-20	March 2004	9.9	10.3	6.5	5.7	2.1 B	2.2 B	10.5	9.5
CW-20	March 2002	10.4	3.8	5.6	4.9	1.5	<0.43	5.4	1.9
CW-20	March 2000	24.5	11.3	4.2 B	2.8 B	2.8 B	1.2 B	5.7	2.4 B
Maximum		24.5	11.3	6.5	5.7	2.8 B	2.2 B	10.5	9.5
Mean		13.6	7.6	6	5.3	1.5	0.5	6.9	3.5
Site RL		14	14	50	50	1,000	1,000	11	11

RL = Remediation Level

Concentrations > RLs are shown in **bold type**.

B (inorganics) = Estimated value, between reporting limit and instrument detection limit.

Highlighted values will be updated when March 2004 results are received.

Site Inspection

A site inspection was conducted concurrently with the March 2004 and June 2004 sampling events at Sites DP-60 and SD-54. The site inspection indicated the following conditions:

- Land use at the WTA continues to be entirely industrial.
- Access to the WTA continues to be restricted to base workers. Flight-line areas in much of the site carry further access restrictions to base employees with flight-line authorization.
- The only wells at the WTA continue to be resource protection wells (e.g., CW-20, CR-02, and TW-9) that are used for monitoring purposes.

Interviews

No interviews were conducted for this review.

VII. Technical Assessment

The technical assessment follows EPA guidance (EPA 2001) and answers the following three questions in subsections below:

- **Question A:** Is the remedy functioning as intended by the decision documents?
- **Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives (RAOs) used at the time of the remedy selection still valid?
- **Question C:** Has any other information come to light that could call into question the protectiveness of the remedy?

Question A: Is the remedy functioning as intended by the decision documents?

The modified remedy specified in the ESD (EPA 1994) is intended to monitor the progress of the natural attenuation of the fuels associated with Site DP-60. In response to previous Ecology concerns, the remedy also includes monitoring of the groundwater downgradient of Site SD-54 for inorganic contaminants. The remedial action is functioning as intended. Resource protection wells have been sampled on schedule since implementation of McChord AFB's LTM Program in CY 1993. Sampling results are documented annually and reviewed/approved by the Air Force and Ecology. Remediation levels are met in groundwater for dissolved metals and individual organic compounds. The only groundwater monitoring results exceeding the remediation levels at Site SD-54 are for total cadmium (Table 9), which reflects particulate matter in the sample. The only groundwater monitoring results exceeding the remediation levels at Site DP-60 (Table 8) are for TPH, which reflects the presence of floating fuel, and for total lead, which reflects particulate matter in the sample. Benzene, which was the original risk-driver for the site, has been less than the remediation level for all sampling rounds.

Institutional controls (control of land use, control of site access, and control of withdrawal of shallow groundwater) continue to effectively prevent human exposure to groundwater contamination by eliminating potential exposure pathways.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and Remedial Action Objectives (RAOs) used at the time of the remedy selection still valid?

Groundwater standards identified as site remediation levels (Tables 2 and 3) were reviewed for changes since issuance of the ROD in 1992 and the ESD in 1994. The MCLs for benzene, the principal contaminant of concern in groundwater at the WTA, has remained unchanged at 5 µg/L. MCLs for copper and lead have been changed since the ROD such that values are higher than site remediation levels, as shown on Table 10. Previous remediation levels for copper and lead are being met in groundwater. Revisions to MTCA Method A have adjusted the previous value of the TPH standard from 1,000 µg/L for all TPH to 1,000 µg/L for TPH-gasoline range (without benzene presence) and 500 µg/L for TPH-diesel range. The revised TPH-diesel range value is shown in Table 10.

Table 10. Changes in Chemical-Specific Standards

Contaminant	Media	Remediation Level (µg/L)	Standard (µg/L)		Source
Copper	Groundwater	1,000	Previous	1,000	MCL
			New	1,300	MCL
Lead	Groundwater	11	Previous	11	Base Background Level
			New	15	MCL
TPH	Groundwater	1,000	Previous	1,000 (TPH)	MTCA Method A
			New	500 (TPH-Diesel Range)	MTCA Method A

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No new information has come to light that could affect the protectiveness of the remedy.

Furthermore, no newly identified ecological risks have been found, nor have there been detrimental impacts from natural disasters or weather-related events.

Technical Assessment Summary

The remedy implemented at the WTA is protective, although continued monitoring of Site SD-54 and Site DP-60 does not increase the protectiveness. Monitoring indicates only petroleum products in groundwater above MTCA cleanup levels, and no hazardous substances, as defined by CERCLA, have been left in place. Existing institutional controls that prevent use of shallow groundwater do increase the protectiveness by eliminating potential exposure pathways. Remediation levels for the WTA remain applicable, and changes are recommended in response to three changes in standards since the ROD issuance. There is no other information that calls into question the protectiveness of the remedy.

VIII. Issues

Issues related to the effectiveness of the site remedy are listed on Table 11.

Table 11. Issues

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Make second Five-Year Review the last review, under CERCLA	N	N
Continue sampling at DP-60 for MTCA requirements	N	N
Cease sampling at SD-54	N	N

IX. Recommendations and Follow-Up Actions

Recommendations and follow-up actions are listed on Table 12. Monitoring indicates the presence of only petroleum products in groundwater slightly above MTCA cleanup levels, and no CERCLA hazardous substances have been left in place. Therefore, transfer of the site to Ecology oversight is recommended with continued monitoring of Site DP-60 for diesel-range TPH according to MTCA requirements. After transfer to Ecology, no further Five-Year Reviews will be conducted under CERCLA, although monitoring, reporting, and periodic reviews will be continued to satisfy MTCA requirements. Institutional controls should remain in place until Ecology agrees that no further action is required at Site DP-60.

Table 12. Recommendations and Follow-Up Actions

Issue	Recommendations and Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Complete Five-Year Review Process	End Five-Year Review of WTA after second review	McChord AFB	Ecology/ EPA	9/29/2004	N	N
Continue Sampling at Site DP-60 as a MTCA site	Transfer oversight of DP-60 to Ecology for continued monitoring after the March 2004 event	Ecology/ EPA	Ecology/ EPA	12/31/2004	N	N
Cease Sampling at Site SD-54	Delete SD-54 from sampling schedule after March 2004	McChord AFB	Ecology/ EPA	3/31/2004	N	N

X. Protectiveness Statement(s)

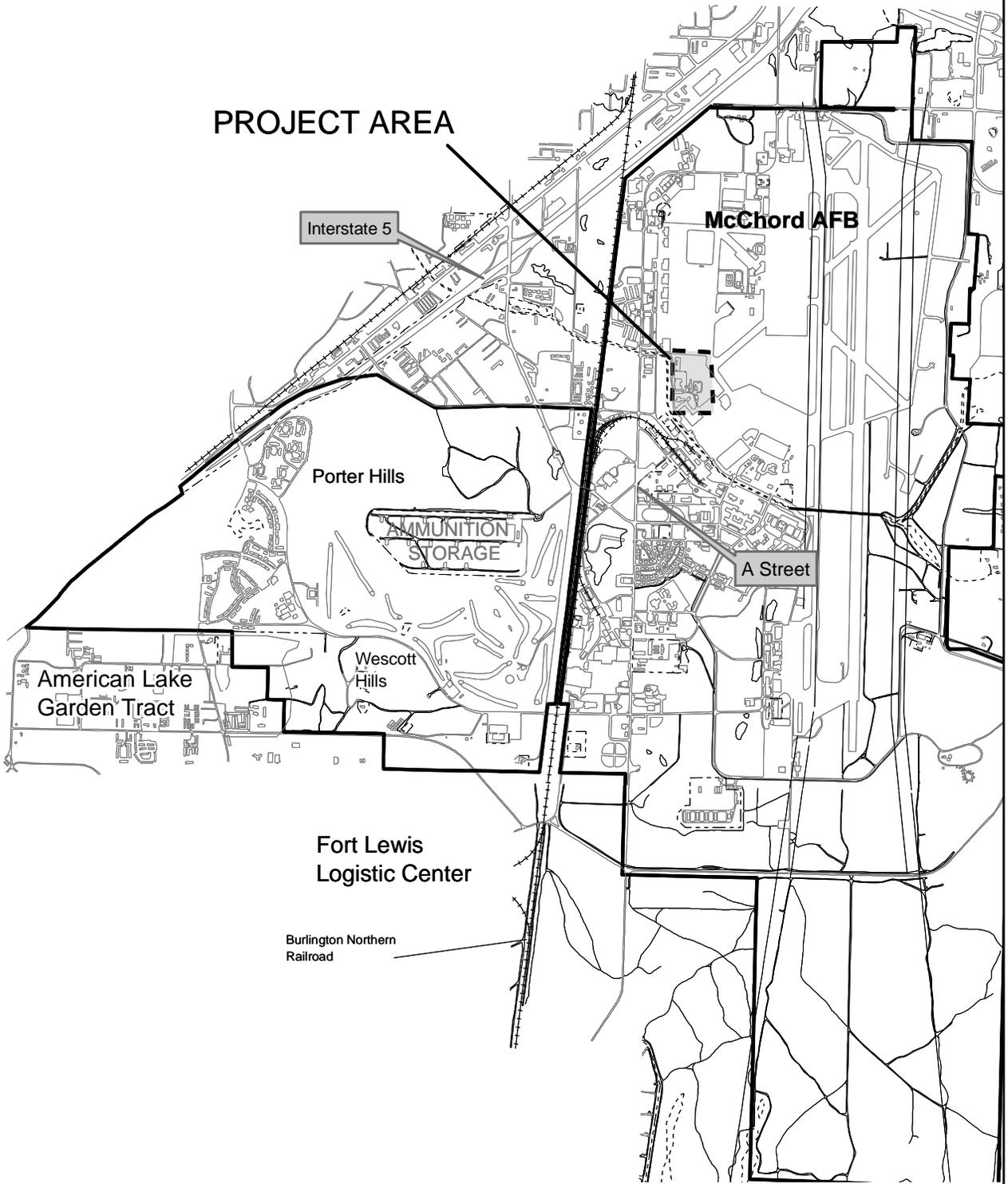
The remedy at the WTA is protective of human health and the environment. Results of over 10 years of monitoring demonstrate that groundwater conditions with institutional controls in place are stable and protective. Institutional controls exist that eliminate current exposure pathways and prevent the potential for completing future exposure pathways: the WTA is in the industrial portion of McChord AFB that is inaccessible to the public and the majority of base personnel; and the shallow groundwater is not utilized as a potable water source. Site DP-60 will continue to be monitored for diesel-range TPH under Ecology oversight. Monitoring of Site SD-54 will cease, as levels of inorganics have decreased below site remediation levels and further monitoring is no longer needed as a site remedy.

XI. Next Review

This is the final CERCLA Five-Year Review for the WTA because CERCLA remediation levels for groundwater have been attained throughout the site and no CERCLA hazardous substances have been left in place.

ATTACHMENTS

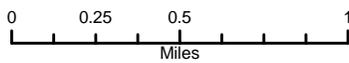
Attachment 1 Figures



Project Area



Base Boundary



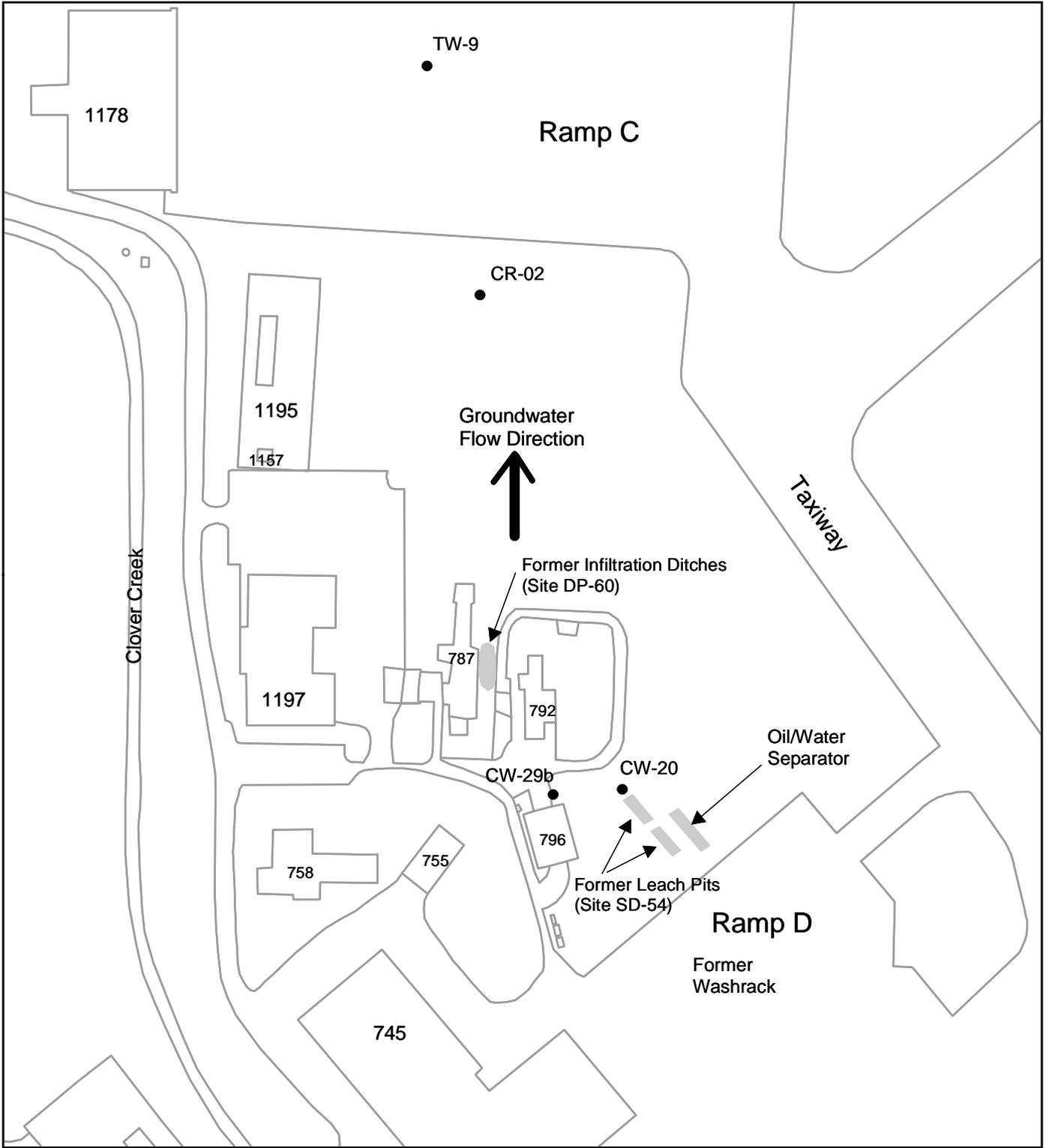
McChord AFB
Second Five-Year Review
Former WTA NPL Site

Figure 1
Vicinity Map

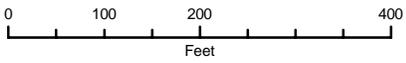
Date: 3/2004



TETRA TECH FW, INC.



- Resource Protection Wells
- ▭ Basemap



McChord AFB
Second Five-Year Review
Former WTA NPL Site

Figure 2
WTA Site and Resource
Protection Wells

Date: 3/2004



Attachment 2

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