

**Revised Final
Explanation of Significant Difference
from the Record of Decision for
Soil Operable Unit Sites
and
Groundwater Operable Unit Plumes**

**Soil Sites WP-07/FT-11, ST-37/ST-39/SS-54, SD-57, SD-59, OT-69
Main Base/SAC Area Plume, Site 7 Plume, Northeast Plume**

Mather, California

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Table of Contents

1.0	Introduction.....	1
2.0	Summary of Site History, Contamination, and Selected Remedy	5
2.1	Groundwater OU: Selected Remedies	6
2.1.1	Main Base/SAC Area Plume.....	7
2.1.2	Site 7 Plume	7
2.1.3	Northeast Plume	8
2.2	Soil OU: Selected Remedies.....	9
2.2.1	Site WP-07/FT-11	9
2.2.2	Site ST-37/ST-39/SD-54.....	10
2.2.3	Site SD-57	11
2.2.4	Site SD-59	11
2.2.5	Site OT-69	13
3.0	Description of and Basis for the Significant Differences	14
3.1	Changes to Certain Cleanup Levels.....	14
3.1.1	Application of the Narrative Soil Cleanup Levels	14
3.1.2	Removal of the Numeric Soil Cleanup Levels.....	15
3.2	Institutional Controls	16
3.2.1	Remedial Action Objectives for Soil OU Sites and Groundwater OU Plumes with Institutional Controls	17
3.3	Imposition of Specific Institutional Controls	17
3.3.1	Institutional Controls to Protect the Remedial Systems or the Remedial Actions	17
3.3.2	Institutional Control Common to Groundwater OU Plumes.....	19
3.3.3	Institutional Control Specific to Certain Soil OU Sites	19
3.3.3.1	Site 7/11.....	19
3.3.3.2	Sites 37/39/54, 57, and 59	19
3.3.3.3	Site OT-69.....	20
3.4	Implementation of Institutional Controls.....	20
3.4.1	Implementation.....	20
3.4.2	Restrictions Prior to Property Transfer	21
3.4.3	Deed Restrictions and Reservation of Access.....	21
3.4.4	Notice of Institutional Controls.....	27
3.4.5	Annual Evaluations/Monitoring	28
3.4.6	Response to Violations.....	29
3.4.7	Approval of Institutional Control Modification or Termination.....	30
3.4.8	State Land Use Covenants.....	30
3.5	Geographic Locations Where Institutional Controls Apply	31
3.5.1	Areas With Institutional Controls to Protect the Remedial Systems	31
3.5.1.1	The Remediation Systems for Soil OU Site WP-07/FT-11 and the WP-07 Groundwater OU Plume	31
3.5.1.2	The Site ST-37/ST-39/SS-54 Remediation System	34
3.5.1.3	The Site SD-57 Remediation System.....	34

3.5.1.4	The Site SD-59 Remediation System.....	34
3.5.2	Areas Where Institutional Controls to Protect Human Health from Soil Gas Apply.....	34
3.5.3	Areas Where Institutional Controls for the Groundwater Plumes Apply	35
3.5.3.1	The Main Base/SAC Area Plume	35
3.5.3.2	The Northeast Plume.....	35
3.5.4	Areas Where Institutional Controls to Protect Human Health from Potentially Hazardous Munitions Debris Apply	35
3.6	Duration of Institutional Controls.....	42
4.0	Affirmation of the Statutory Determinations	43
5.0	Public Participation Activities	44
6.0	ESD Signature Page.....	45
7.0	References.....	46

Index of Figures and Tables

Figures

Figure 1	Groundwater OU Plumes.....	3
Figure 2	Soil OU Site Locations.....	4
Figure 3	Site WP-07/FT-11 System Components.....	33
Figure 4	Site ST-37/ST-39/SS-54 System Components.....	36
Figure 5	Site SD-57 System Components	37
Figure 6	Site SD-59 System Components.....	38
Figure 7	Site OT-69 IC Areas.....	39
Figure 8	MBSA Plume System Components.....	40
Figure 9	Northeast Plume System Components.....	41

Tables

Table 1	Groundwater OU and Soil OU Relevant and Appropriate State Requirements.....	32
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List of Acronyms

AC&W	Aircraft Control and Warning
AGE	aerospace ground equipment
AFB	Air Force Base
AFBCA	Air Force Base Conversion Agency
AFRPA	Air Force Real Property Agency
AR	Administrative Record
ARAR	Applicable or Relevant and Appropriate Requirement
BTEX	benzene, toluene, ethylbenzene, xylenes
CCR	California Code of Regulations
CCl ₄	carbon tetrachloride
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CIWMB	California Integrated Waste Management Board
COC	contaminant of concern
Central Valley Water Board	Central Valley Regional Water Quality Control Board
DCE	dichloroethene
DCP	dichloropropane
DTSC	Department of Toxic Substances Control
ESD	Explanation of Significant Difference
FFA	Federal Facility Agreement
FT	IRP site designation for fire training sites
gpm	gallon(s) per minute
IC	institutional control
IRP	Installation Restoration Program
MBSA	Main Base/SAC Area
MCL	Maximum Contaminant Level
NCP	National Contingency Plan
OT	IRP site designation for the category “other”
OU	operable unit
OWS	oil-water separator
PCE	perchloroethene (a.k.a. tetrachloroethene)
POL	petroleum, oil, and lubricant
ppm	parts per million
RAB	Restoration Advisory Board

List of Acronyms (continued)

RAO	Remedial Action Objective
ROD	Record of Decision
SAC	Strategic Air Command
SD	IRP site designation for storm drain
SLUC	State Land Use Covenant
SS	IRP site designation for sanitary sewer (i.e. oil/water separators)
ST	IRP site designation for storage tanks
SVE	Soil Vapor Extraction
TCE	trichloroethene
TPH-d	total petroleum hydrocarbons reported as diesel
TPH-g	total petroleum hydrocarbons reported as gasoline
ug/L	micrograms per liter
USAF	United States Air Force
U.S. EPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	volatile organic compound
WP	IRP site designation for waste pits
yd ³	cubic yard

1.0 Introduction

This document presents an Explanation of Significant Difference (ESD) for the Record of Decision (ROD) (AFBCA, 1996), signed in June 1996, for the Soil Operable Unit (OU) sites and Groundwater Operable Unit (OU) plumes at the former Mather Air Force Base (now Mather) in Sacramento County, California. The ESD specifically addresses changes to selected remedies, changes to the cleanup levels for certain soil OU sites, and adds institutional controls (ICs) to protect human health and the environment, as well as the remedial systems and actions associated with the cleanup of the soil OU sites and the groundwater OU plumes. Figure 1 shows the location of the plumes that make up the Groundwater OU at Mather, which are protected by land-use restrictions. Figure 2 shows the locations of the remaining Soil OU sites. The ROD was signed by the United States Air Force (USAF), the United States Environmental Protection Agency (U.S. EPA), and the State of California (State).

The Groundwater OU consists of three plumes, the Main Base/Strategic Air Command (SAC) Area (MBSA) Plume, the Northeast Plume, and the Site 7 Plume. The remedies for the MBSA and Site 7 plumes are air stripping with reinjection of treated groundwater into the aquifer system; the remedy for the Northeast Plume is groundwater monitoring and reassessment. The Soils OU sites for which remediation is ongoing are all undergoing soil vapor extraction and/or bioventing. The Soil OU sites are WP-07 (capped landfill and in situ remediation); FT-11 (in situ remediation in conjunction with WP-07); ST-29 and ST-71 (sites not regulated under the Comprehensive Environmental Response, Compensation, and Liability Act [CERCLA] but physically connected to an installed CERCLA treatment unit); ST-37, ST-39, and SS-54 (cluster of sites undergoing in situ remediation and includes the remediation of certain portions of OT-23, which is a Basewide OU site); SD-57 (in situ remediation); SD-59 (in situ remediation and includes the remediation of LF-18, which is a Basewide OU site), and OT-69 (closed after CERCLA remediation but for which ICs are being instituted during investigation under the Military Munitions Response Program). Although Installation Restoration Program (IRP) sites are often referred to without the two-letter prefix for the remainder of this ESD, the site numbers may include the two-letter prefix.

This ESD, prepared in accordance with Section 117(c) of CERCLA and the National Contingency Plan (NCP) at 40 CFR 300.435 (c)(2)(i), documents significant differences to the remedies selected in the 1996 ROD for the Groundwater OU Plumes and for Soil OU Sites 7, 11, 37, 39, 54, 57, 59, and 69. The U.S. EPA and State support the need for this ESD.

This ESD will become part of the Administrative Record (AR) for the Mather Air Force Base Soil and Groundwater OUs. The AR is located at the Air Force Real Property Agency (AFRPA) office at 3411 Olson Street, McClellan, California, 95652 (for access, please call 916-643-6420). This ESD will also be available online at <https://afrpaar.lackland.af.mil/ar/docsearch.aspx>

Figure 1, Groundwater OU Plumes

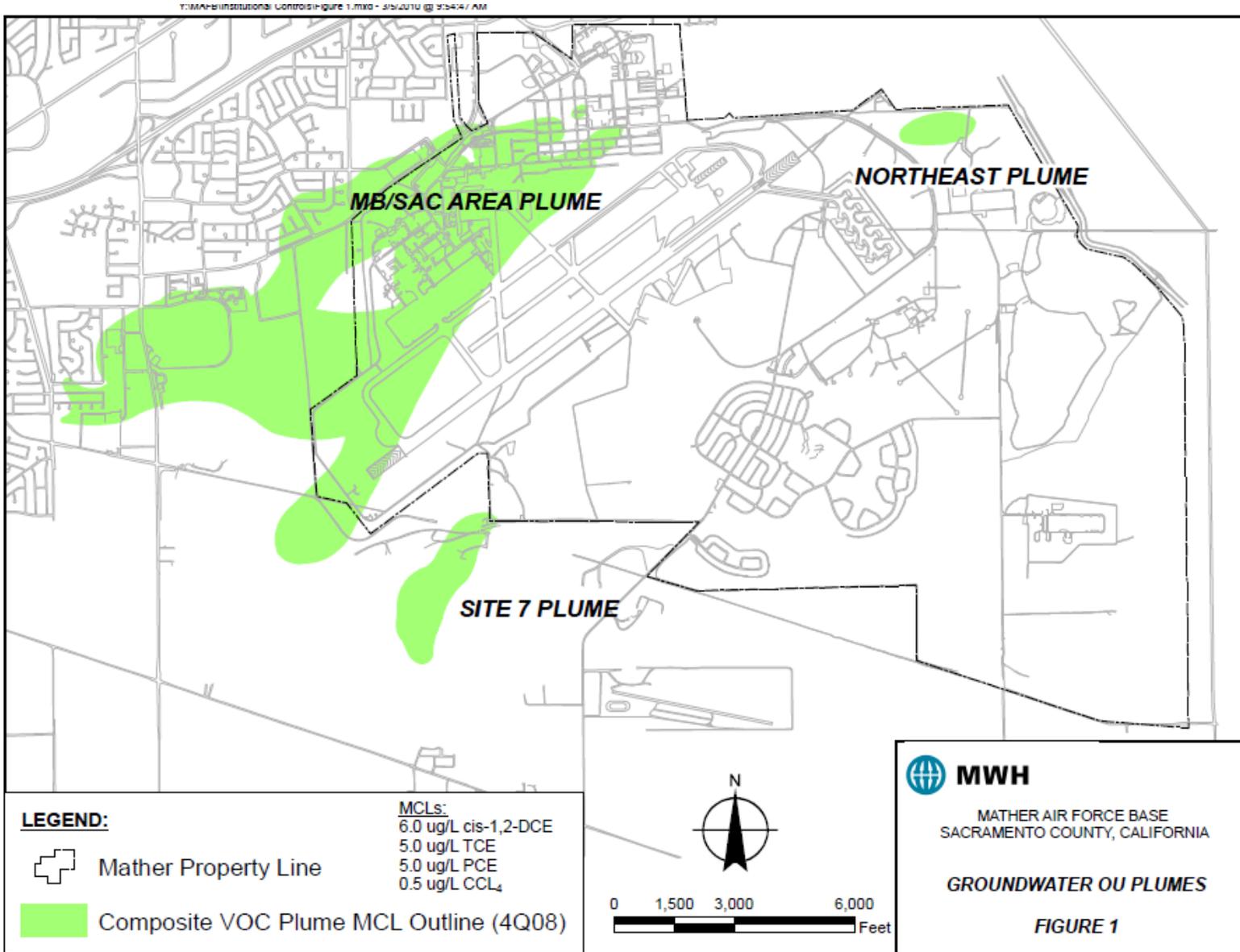
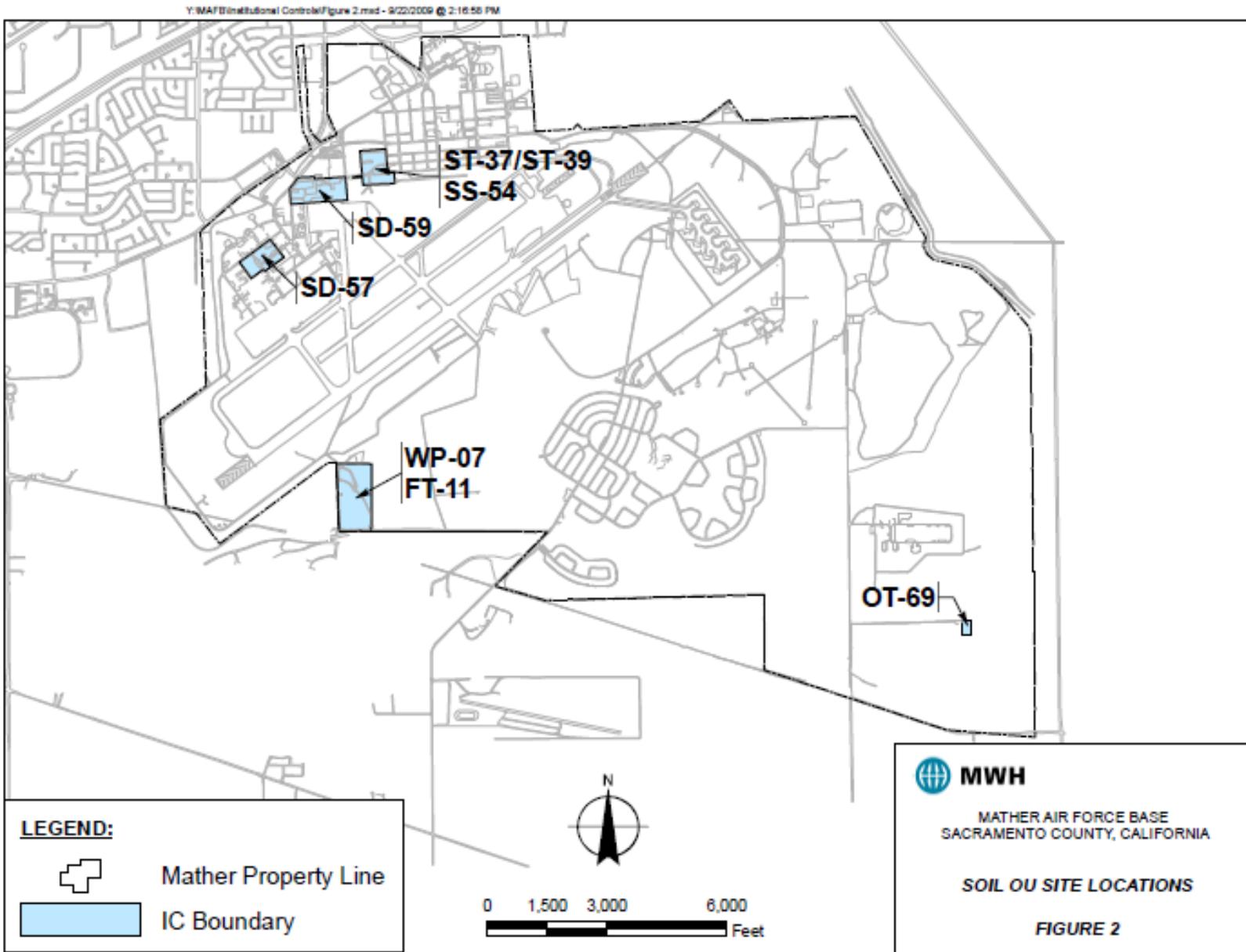


Figure 2, Soil OU Site Locations



2.0 Summary of Site History, Contamination, and Selected Remedy

Mather is located in central California, about 10 miles east of downtown Sacramento, and consists of the area that was formerly Mather Air Force Base (AFB). The base occupied approximately 5,845 acres at the time of closure in 1993, including 129 acres of easements. The topography consists of three relatively flat terraces, progressively lower to the north, and each sloping gently to the southwest. Surface water and groundwater flow are generally to the southwest, toward the Sacramento River. The water table is about 90 feet deep beneath the lowest terrace (the Riverbank Terrace), and about 160 feet deep beneath the highest terrace near Site OT-69. All of the other Soil OU sites addressed by this ESD are located on the lowest terrace. The groundwater OU plumes also lie beneath the Riverbank Terrace, except the Northeast Plume, which lies primarily beneath the Middle terrace, where depth to the water table is about 110 to 120 feet. The ground surface above much of the Site 7 Plume (south of the Mather boundary) has been excavated to about 30 feet below the former ground surface to remove aggregate resources, but the land surface subject to ICs as part of the Site 7 remedies is on Mather and the ground surface is about 90 feet above the water table.

The base was first activated in 1918 as a combat pilot training school, and then placed on inactive status from 1922 until 1930 and again from 1932 until 1941. The base reopened in 1941 as a pilot and navigator training post. After World War II, Mather AFB was the sole aerial navigation school for the United States military and its allies. In addition to the training conducted by the 323rd Flying Training Wing, Mather AFB hosted the Strategic Air Command 320th Bombardment Wing from 1958 to 1989 and hosted the 940th Air Refueling Group from 1976 to 1993.

The Aircraft Control and Warning Site (AC&W) at Mather was listed on the National Priorities List in 1987, followed by expansion of the listing to include the entire base in 1989. The USAF, U.S. EPA, and the State entered into a Federal Facility Agreement (FFA) in 1989 (USAF, 1989). The State of California is represented by the Department of Toxic Substances Control (DTSC), who in turn coordinates with other State regulatory agencies such as the Central Valley Regional Water Quality Control Board (Central Valley Water Board) and California Integrated Waste Management Board (CIWMB). Throughout this document the term “State of California” is used to refer collectively to the DTSC and other State agencies; communication to the State will be to DTSC who will in turn coordinate with the Central Valley Water Board, IWMB, and any other State agencies.

To facilitate investigation and cleanup of Mather the suspected contaminated areas were organized into six OUs based on specific site characteristics with a total of 89 sites. Investigation efforts are completed for all sites in the OUs. Final response actions were recommended according to CERCLA guidance in proposed plans, comments solicited from the public, and selected response actions documented in the RODs for the six OUs (AFBCA, 1993; AFBCA, 1995; AFBCA, 1996; AFBCA, 1998a; AFRPA, 2006).

2.1 Groundwater OU: Selected Remedies

This ESD provides a description of and basis for the significant differences represented by updating and clarifying the IC requirements, and establishing ICs to protect human health and the environment, as well as the Groundwater OU remedial systems (for the Soil OU sites see Section 2.2). This section summarizes the major components of the remedy selected for each Groundwater OU plume and describes the contamination present at each plume.

The Groundwater OU consists of all groundwater contamination originating from Mather with the exception of the AC&W OU Plume, which is addressed in a separate ROD (AFBCA, 1993). The Groundwater OU has been subdivided into the Site 7 Plume, which appears to emanate from a source or historic source at the IRP Site 7 waste pit (now a capped landfill); the Northeast Plume, with apparent source(s) at the IRP Site 4 landfill and possibly the IRP Site 3 landfill; the Main Base Plume, with its primary source at IRP Site 23 (a former dry cleaning plant) in the Main Base area; and the SAC Industrial Area Plume, with its principal source evident in the vicinity of IRP Site 57. The ROD combined the Main Base and SAC Industrial Area plumes for purposes of selecting the remedial alternative (see Figure 1, showing the Groundwater OU plumes).

Contamination at the Groundwater OU plumes exists as a result of past military operations conducted between 1918 and 1993. The main sources of contamination include dry cleaning operations (i.e., IRP Site 23), industrial activities, equipment maintenance (i.e., IRP Site 57), landfill disposal (i.e., Site 4 and possibly Site 3), other waste disposal activities (i.e., IRP Site 7), and fuels storage and delivery. Known vadose-zone sources are addressed as part of the Soil OU or the Basewide OU sites.

2.1.1 Main Base/SAC Area Plume

The Groundwater OU ROD selected a remedial action for the MBSA Plume that uses pump-and-treat technology, with removal of volatile contaminants (e.g., trichloroethene [TCE], perchloroethene [PCE], and carbon tetrachloride [CCl₄]) by air stripping, and reinjection (possibly in combination with other compatible discharge options) of the treated water into the aquifer. The major components of this remedy identified in the ROD included:

- a phased implementation program;
- groundwater extraction, to achieve aquifer cleanup standards, estimated but not limited to a total rate of 1,300 gallons per minute (gpm);
- treatment of the extracted groundwater through air stripping with off-gas treatment (i.e., carbon adsorption) to achieve aquifer cleanup standards of primary maximum contaminant levels (MCLs) (see Table 5-8 in ROD, AFBCA, 1996), and to achieve discharge standards;
- groundwater injection per standards (see Table 6-7 in ROD, AFBCA, 1996) in combination with other discharge options that are (a) consistent with attainment of cleanup standards, and (b) cost-effective;
- land-use restrictions will be implemented on USAF property as appropriate, in order to preclude installation of groundwater wells that would not be compatible with protection of public health and the environment; and
- monitoring the groundwater.

This ESD clarifies the next-to-last bulleted text above with respect to the implementation of land-use restrictions on USAF property, and establishes ICs to protect the remedial system components and to preclude any activities that are inconsistent with the remedial actions or access to the remedial system components.

2.1.2 Site 7 Plume

The Groundwater OU ROD selected a remedial action for the Site 7 plume that uses pump-and-treat technology, with removal of volatile contaminants by air stripping, and reinjection of the treated water into the aquifer. The major components of this remedy identified in the ROD included:

- groundwater extraction at a rate of approximately 250 gpm;

- treatment of the extracted groundwater through air stripping with off-gas treatment (i.e., carbon adsorption) to aquifer cleanup standards at primary MCLs (see Table 5-9 in ROD, AFBCA, 1996);
- groundwater injection per standards (see Table 6-7 in ROD, AFBCA, 1996);
- land-use restrictions will be implemented on USAF property as appropriate, in order to preclude installation of groundwater wells that would not be compatible with protection of public health and the environment; and
- monitoring the groundwater.

This ESD clarifies the next-to-last bulleted text above with respect to the implementation of land-use restrictions on USAF property, and establishes ICs to protect the remedial system components.

2.1.3 Northeast Plume

The Northeast Plume consists of a portion of groundwater contamination emanating from one or more source areas for PCE and dichloroethene (DCE) in the vicinity of the IRP Site LF-04 landfill. The contaminants of concern (COCs) identified in the ROD for the Northeast Plume are PCE; 1,2-DCE; CCl₄; chloromethane; and 1,2-Dichloropropane (DCP). However, only PCE and 1,2-DCE have been detected above their respective cleanup standards since the ROD was issued in 1996 (AFBCA 1996b). The maximum concentrations detected in the Northeast Plume since the ROD was issued are 23 micrograms per liter (ug/L) PCE and 27 ug/L 1,2-DCE. The cleanup standards for these COCs are 5 ug/L and 6 ug/L, respectively.

The remedial action selected for the Northeast Plume consists of long-term groundwater monitoring and periodic assessment of progress. The remedy called for reconsideration of active remediation if monitoring or modeling indicated that the contaminants would not meet cleanup standards within a reasonable time, or within 40 years of the ROD, or indicated that significant migration of the contaminants would occur at concentrations above the cleanup levels thereby adversely impacting human health or the environment.

The ROD also stated that because several of the contaminants are above the primary drinking water standards, ICs (such as deed restrictions) would be applied to prohibit the installation of groundwater supply wells on Mather that would jeopardize human health or the environment from the Northeast Groundwater Plume area.

This ESD clarifies the ICs that are applied on USAF property as part of the Northeast Plume remedy, to protect human health and the environment, and establishes ICs to protect the monitoring wells used to monitor performance of the Northeast Plume remedy.

2.2 *Soil OU: Selected Remedies*

This ESD provides a description of and basis for the significant differences represented by changing the cleanup levels for certain Soil OU sites, updating and clarifying the IC requirements, and establishing ICs to protect human health and the environment, as well as the Soil OU remedial systems (for the Groundwater OU plumes see Section 2.1). This section summarizes the major components of the remedy selected for each Soil OU site and describes the contamination present at each site. Since this ESD clarifies and adds remedies to the ROD for only the active Soil OU Sites 7, 11, 37, 39, 54, 57, 59, and 69 (see Figure 2 showing Soil OU site locations), it does not address Soil OU sites for which remediation has been completed.

2.2.1 Site WP-07/FT-11

Site 7 (7100 Area Disposal Site) and Site 11 (Existing Fire Training Area) were combined for the purpose of implementing in situ treatment to remediate total petroleum hydrocarbons reported as diesel (TPH-d). Site WP-07 was a gravel pit used for disposal of construction rubble as well as petroleum, oil, and lubricant (POL) wastes during the time period from 1953 to 1966. Site 7 is the apparent source area for the Site 7 groundwater contaminant plume that extends off base to the south-southwest. The USAF decided to use Site 7 to dispose of soil excavated from other IRP sites, and treated as necessary to meet municipal landfill acceptance criteria. This helped to fill in the former pit, and create a mound to shed rainwater. The site was capped in accordance with landfill closure regulations, using an impermeable liner material sandwiched between protective geotextile fabric, overlain by 2 feet of root zone soil that supports a vegetation layer. Site 11 is adjacent to the north of Site 7, and was the location of a fire training area where waste fuels were burned as a part of training exercises. A newer, lined, and monitored fire-training pit was built in the same general area. The COCs identified in the ROD are TPH-d (Site 7 and Site 11), and total petroleum hydrocarbons reported as gasoline (TPH-g) (Site 11).

The remediation strategy selected in the ROD and employed by the USAF has included installing and operating a soil vapor extraction (SVE) system to remove the more volatile fuel constituents from the vadose zone, and evaluating the extracted vapor for chlorinated solvents in case there is residual contamination that may still be contributing to the groundwater contamination plume. The landfill cap covers the area containing buried solid waste.

The major components of this remedy selected for Site 7/11 included:

- filling in the depression at Site 7 with inert fill;
- treating the contaminated shallow and deep soils at Sites 7 and 11 by in situ bioremediation and possibly SVE. The in situ bioremediation system could be converted to a SVE system if significant amounts of solvents are encountered, in order to speed up remediation;
- installing a prescriptive landfill cover over the Site 7 impacted area if site conditions indicates it is appropriate, or a vegetative cover if there is no threat to groundwater quality nor generation of landfill gases, using inert soils and/or non-designated soils to construct the foundation for the cap/cover; and
- monitoring the groundwater (if contamination remains in place that threatens groundwater quality).

The prescriptive landfill cover was constructed for Site WP-07. The remedy includes land-use restrictions required by Applicable or Relevant and Appropriate Requirements (ARARs) to protect the landfill cap at Site 7. This ESD clarifies and augments the remedy by establishing ICs to protect the other Site 7/11 remedial system components including the landfill, SVE system, and associated groundwater/gas monitoring wells.

2.2.2 Site ST-37/ST-39/SD-54

Sites 37, 39, and 54 were combined for the purpose of implementing in situ treatment to remediate petroleum constituents. Site 37 is a site where five underground storage tanks (USTs) were removed. Site 39 was the former hazardous waste storage yard, and prior to that, a storage and distribution point for aviation gasoline. Site 39 also contained pipelines and fuel filter sumps. Eight USTs were removed from Site 39. Site 54 was the Aerospace Ground Equipment (AGE) Repair Shop and contained a hazardous waste accumulation point. The COCs identified in the ROD are fuel components, oil, and grease. (The remediation of Site OT-23A/B/D is being addressed in concert with the remediation of ST-39.)

A SVE system was constructed in summer 1998, and later physically connected to the extraction systems at Site 29/71, which is a non-CERCLA soil IRP site. The major components of the remedy selected for Site 37/39/54 in the 1996 ROD included:

- excavating approximately 220 cubic yards (yd³) of contaminated surface soils to remove all contamination above acceptable levels;
- transporting the excavated soils to the on-base ex situ bioremediation facility;

- treating the excavated soils by ex situ bioremediation as appropriate;
- transporting the treated soils to, and consolidating them with, landfill cap foundation materials at Site 7, as appropriate;
- treating the contaminated shallow and deep soils by in situ bioremediation and possible SVE. The in situ bioremediation system could be converted if appropriate, to a SVE system if significant amounts of solvents are encountered in order to speed up remediation; and
- monitoring the groundwater if contamination that threatens groundwater quality remains at the site.

This ESD establishes ICs to prevent potential unacceptable exposure to volatile contaminants in indoor air and to protect the Site 37/39/54 remedial system components including the SVE system (including the extension to Site 29/71) and associated monitoring wells. Note that monitoring wells associated with the Site 37/39/54 remedial system include those installed to monitor Sites OT-23B and 23D.

2.2.3 Site SD-57

Site 57 was the AGE Washrack oil-water separator (OWS), Facility 7019. The COC identified in the ROD is TCE. A soil gas plume of TCE extends from this apparent source area to the southwest, overlying the heart of the TCE groundwater plume at the water table. A SVE system began operating at Site 57 in October 1997. In 2001, dual-phase extraction was initiated in water table groundwater extraction wells that not only removed vapor but also increased the groundwater extraction rate for the wells.

The major components of this remedy included:

- treating the contaminated shallow and deep soils by in situ SVE; and
- monitoring the groundwater if contamination that threatens groundwater quality remains at the site.

This ESD establishes ICs to prevent potential unacceptable exposure to volatile contaminants in indoor air and to protect the Site SD-57 remedial system components including the SVE system and associated monitoring wells.

2.2.4 Site SD-59

Site 59 was the Air Training Command Washrack OWS, Facility 4251. The COCs identified in the ROD are TPH-d and TPH-g. (The remediation of Site LF-18 is being addressed in concert with the remediation of Site SD-59).

The major components of the remedy selected in the 1996 ROD (AFBCA, 1996) included:

- excavating approximately 1,200 yd³ of contaminated shallow soils to remove all contamination above acceptable levels;
- transporting the excavated soils to the on-base ex situ bioremediation facility;
- treating the excavated soils by ex situ bioremediation as appropriate;
- transporting the treated soils to, and consolidating them with landfill cap foundation materials at Site 4 or Site 7, as appropriate; and
- monitoring the groundwater if contamination that threatens groundwater quality remains at the site.

The OWS and surrounding soil were excavated according to the remedial action selected in the ROD, but some contamination remained. As a result, additional remediation by in situ methods was chosen by the USAF to address the residual contamination, and documented in an ESD (AFBCA, 1998b).

After excavation failed to meet the cleanup levels established for the site, the 1998 ESD was issued to augment the remedy by changing to in situ treatment from ex situ treatment and deleting the associated on-site disposal component. The 1998 ESD presented these components for the further remedial actions:

- installation of injection/extraction well and monitoring points;
- removal of contaminated surface soil;
- pilot test to optimize the efficiency and cost of the SVE and/or the bioventing system;
- startup, operation, and maintenance of the system (including a potential switch from SVE to bioventing); and
- closure of the site after remedial goals have been met.

This ESD establishes ICs to prevent potential unacceptable exposure to volatile contaminants in indoor air and to protect the Site 59 remedial system components including the SVE system and associated monitoring wells.

2.2.5 Site OT-69

Site OT-69 was an ordnance burning/ordnance destruction area in the southeastern portion of the base, reportedly used for destruction of unwanted small ordnance, classified aircraft parts, and other materials. At the north end was a ‘popping’ furnace, and at the south end was a burn pit approximately four feet deep and ten feet in diameter. The area is unpaved and unlined, and drains southwest to join an unnamed ephemeral tributary of Morrison Creek. The COCs identified in the ROD are barium, manganese, zinc, dioxins, and furans.

The major components of the remedy selected in the 1996 ROD (AFBCA, 1996) included:

- removing surface water, if present, by pumping and discharging to the POTW;
- excavating approximately 8,680 yd³ of contaminated sediments and surface soils to remove all contamination above acceptable levels;
- transporting the excavated sediments and surface soils to, and consolidating them with landfill cap foundation materials at Site 4, as appropriate; and
- monitoring surface water as appropriate if contamination remains at the site that threatens surface water quality.

The remedy was accomplished over the period 1996 through 1999. The completion of the remedy was documented in the Remedial Action Report for Installation Restoration Program Site OT-69, Open Burn/Open Detonation Area (AFRPA, 2003), and concurrence was provided by U.S. EPA (U.S. EPA, 2003) and the State (DTSC, 2003).

In 2009, a clearance project was undertaken as part of the Air Force’s Military Munitions Response Program to evaluate the buried debris at Site OT-69, remove the buried debris, and to confirm the debris is inert as previously believed. The nature and volume of debris (very many small, individual items) encountered was greater than anticipated, and an additional field season is required for complete removal.

This ESD establishes ICs to prevent the potential unacceptable exposure to buried hazards at Site OT-69. Discovery of ordnance, munitions constituents, or explosive hazards is not anticipated.

3.0 Description of and Basis for the Significant Differences

3.1 Changes to Certain Cleanup Levels

The ROD for Soil OU Sites and Groundwater OU Plumes provided narrative soil cleanup levels for the vadose zone in order to minimize further degradation of the groundwater from contaminants of concern in the soil. The ROD specified a methodology and relevant factors for consideration. Notwithstanding these narrative cleanup levels, the ROD also imposed artificially low numeric cleanup levels for TPH-d and TPH-g at Sites 7/11, 37/39/54, and 59, as well as for benzene, toluene, ethylbenzene, and xylenes (BTEX) and oil and grease at Site 37/39/54. Rather than use artificially low numeric cleanup levels, this ESD removes the numeric cleanup levels and applies the existing narrative soil cleanup levels to these COCs. This ESD also adds a methodology for imposing ICs that address the threat to human health posed by indoor air contaminated with chemicals volatilizing from the shallow soil (vapor intrusion). Use of the narrative soil cleanup levels, in conjunction with this new methodology for addressing vapor intrusion, will adequately protect human health and the environment pursuant to CERCLA and the NCP.

3.1.1 Application of the Narrative Soil Cleanup Levels

This ESD applies the following narrative soil cleanup levels to Site 7/11 for the remediation of TPH-d/g; to Site 37/39/54 for the remediation of BTEX as well as TPH-d/g and oil & grease; and to Site 59 for the remediation of TPH-d/g:

The goal of cleaning up the vadose zone is to minimize further degradation of the groundwater by the contaminants in the soil. It is generally preferable from a technical and cost perspective to clean up contamination in the vadose zone before it reaches the groundwater. The soil cleanup standard will be achieved when the residual vadose zone contaminants will not cause the groundwater cleanup standard, as measured in groundwater wells monitoring the plume, to be exceeded after the cessation of the groundwater remediation. The Air Force will make the demonstration that the standard has been met through contaminant fate and transport modeling, trend analysis, mass balance, and/or other means. This demonstration will include examination of the effects of the residual vadose zone contamination in the groundwater using VLEACH or another appropriate vadose zone model, in conjunction with a groundwater fate and transport model, to predict the resulting concentration from this residual vadose zone contamination in the nearest groundwater wells monitoring the site.

This demonstration can be made prior to the cessation of groundwater remediation. The Air Force shall provide verification, through actual data, that the above standard has been met. The signatory parties to this Record of Decision (ROD) will jointly make the decision that the soil cleanup standard has been met.

The Air Force shall operate the SVE system until it makes the demonstration that the cleanup standard, set forth above, has been met. The Air Force shall continue to operate the SVE system if appropriate, after considering the following factors:

- a) Whether the predicted concentration of the leachate from the vadose zone (using VLEACH or another appropriate vadose zone model that interprets soil gas data) will exceed the groundwater cleanup standard;
- b) Whether the mass removal rate is approaching asymptotic levels after temporary shutdown periods and appropriate optimization of the SVE system;
- c) The additional cost of continuing to operate the SVE system at concentrations approaching asymptotic mass levels;
- d) The predicted effectiveness and cost of further enhancements to the SVE system (e.g., additional vapor extraction wells);
- e) Whether the cost of groundwater remediation will be significantly more if the residual vadose zone contamination is not addressed;
- f) Whether residual mass in the vadose zone will significantly prolong the time to attain the groundwater cleanup standard; and
- g) The incremental cost over time of vadose zone remediation compared to the incremental cost over time for groundwater remediation on the basis of a common unit (e.g., cost of pound of TCE removed) provided that the underlying groundwater has not reached aquifer cleanup levels.

The signatory parties agree that the Air Force may cycle the SVE system on and off in order to optimize the SVE operation and/or to evaluate the factors listed above.

Once SVE is terminated in accordance with the demonstration described in the preceding paragraphs quoted from the ROD, the USAF will reevaluate the need to implement bioventing.

3.1.2 Removal of the Numeric Soil Cleanup Levels

With respect to Site 7/11, Table 2-19 on page 2-33 of the ROD currently reflects numeric cleanup levels of 10 parts per million (ppm) for TPH-d and 1 ppm for TPH-g. This ESD removes these numeric cleanup levels for TPH-d/g.

With respect to Site 37/39/54, Table 2-23 on page 2-41 of the ROD currently reflects numeric cleanup levels of 10 ppm for TPH-d¹ and 1 ppm for TPH-g, and 430 ppm for oil and grease.

¹ Table 2-23 specifies a TPH-d cleanup level of 100 ppm only for Site 39.

The same Table also reflects the following cleanup levels for BTEX: benzene (i.e., $1E^{-01}$ ppm); toluene (i.e., 4.2 ppm); ethylbenzene (i.e., 2.9 ppm); and xylenes (i.e., 1.7 ppm). This ESD removes these numeric cleanup levels for TPH-d/g, oil and grease, and BTEX.

With respect to Site 59, Table 2-26 on page 2-45 of the ROD currently reflects numeric cleanup levels of 10 ppm for TPH-d and 1 ppm for TPH-g. This ESD removes these numeric cleanup levels for TPH-d/g.

3.2 Institutional Controls

The U.S. EPA and the State each identified concerns about lack of detail provided in the ROD for the Soil OU sites and Groundwater OU plumes regarding the imposition, implementation, and management of ICs. The U.S. EPA and the State recommended that details be clarified in a decision document. Since 1996 when the ROD was issued, the USAF has developed additional IC policies. ICs are added to, and considered an integral part of, the selected remedies that protect human health and the environment pursuant to CERCLA and the NCP. The USAF has also reached agreement with regulatory agencies on the IC implementation language and how to incorporate requirements related to California's State Land Use Covenants (SLUCs). Therefore, this ESD has been prepared to impose ICs, provide the IC implementation language, and address SLUC requirements for the Soil OU site and the Groundwater OU plume remedial actions.

This ESD defines the Remedial Action Objectives (RAOs) for the ICs; imposes specific ICs for certain Soil OU sites and Groundwater OU plumes² (i.e., WP-07/FT-11, ST-37/ST-39/SD-54 [Note: ST-39 includes Site OT-23A/B/D from the Basewide OU], SD-57, SD-59 [Note: includes Site LF-18 from the Basewide OU], and OT-69); depicts the geographic locations where ICs apply; and explains IC duration.

The significant differences from the ROD for Soil OU sites and Groundwater OU plumes that are established by this ESD consist of either explicitly adding ICs to the selected remedies or providing clarifying detail for other ICs. This ESD also explains the requirement for property recipients of any property subject to these ICs to enter into a SLUC allowing the State to enforce the ICs imposed by the ROD and this ESD.

² As depicted on Figure 1, the Groundwater OU plumes extend beyond the former Mather AFB boundary; therefore, much of the surface land areas that overlay the groundwater plumes are not owned by the USAF. This is especially true for the Site 7 Plume and the Main Base/SAC Area Plume. Imposing ICs by deed is impossible and executing a SLUC may only be accomplished with the property owner's agreement. Most of the off-base remedial system components are protected by easements or permits.

3.2.1 Remedial Action Objectives for Soil OU Sites and Groundwater OU Plumes with Institutional Controls

ICs are non-engineering, non-technical mechanisms used to reduce or prevent human exposure to contaminants or to protect the remedial action and systems. The following IC objectives are hereby established for the Soil OU sites and the Groundwater OU plumes. Because these ICs become part of the selected remedies for the respective OU sites/plumes, they have associated RAOs until the remedial action is complete.

The RAOs for these ICs are: 1) preventing human exposure to groundwater with concentrations exceeding the cleanup levels that are specified in the Groundwater OU ROD; 2) preventing unacceptable human exposure to soil vapor or residual contamination at Sites 37/39/54, 57, and 59; 3) preventing unacceptable human exposure to potential buried hazards at Site OT-69, 4) protecting the integrity of the soil and groundwater remedial actions and systems, including the associated monitoring systems at Soil OU Sites 7/11, 37/39/54, 57, and 59 and for all three of the Groundwater OU plumes; and, 5) preserving access for the Air Force, U.S. EPA, and the State to the remedial systems and associated monitoring systems at all of the Soils OU sites and for all three of the Groundwater OU plumes. The specific ICs would be documented as environmental restrictive covenants in deeds and restrictions/prohibitions in SLUCs. Note that the remedial action objectives established in the Soils OU Sites and Groundwater OU Plumes ROD (AFBCA, 1996) for Site OT-69 were met by its remedial action as documented in the Site OT-69 Remedial Action Report (September 2003).

3.3 *Imposition of Specific Institutional Controls*

3.3.1 Institutional Controls to Protect the Remedial Systems or the Remedial Actions

The USAF imposes the following ICs to protect the remedial systems at the Soil OU sites or associated with the Groundwater OU plumes (see Section 3.5.1 for the areas where these ICs are applicable). The transferee will be prohibited from:

- damaging/disturbing/tampering with, or allowing others to damage/disturb/tamper with, the remediation system components, including but not limited to the extraction and injection systems, treatment systems, conveyance pipes, electrical, gas, or fiber optic lines, or monitoring wells, until such time as remediation is complete or components are no longer to be used for remediation;

- engaging in, or allowing others to engage in, activities that interfere with the effectiveness of any remediation system component; and
- engaging in, or allowing others to engage in, activities that would limit access for the Air Force, U.S. EPA, or the State to any equipment or component associated with the soil or groundwater remediation systems.

The USAF imposes the following ICs to protect the prescriptive landfill cap at Site 7 (see Section 3.5.1 for the areas where these ICs are applicable). The transferee will be prohibited from:

- interfering with the remedial action or damaging/disturbing/penetrating the engineered landfill cap or damaging/disturbing/ tampering with/removing or interfering with any associated remedial system components (e.g., containment system, drainage systems, erosion control systems for the landfill cover, survey monuments, gas vents, gas migration monitoring wells, groundwater monitoring system, access roads, settlement monuments, fencing, signage), or allowing others to do so, until such time as remediation is complete or the component is no longer used for the remedial action;
- engaging in, or allowing others to engage in, activities that interfere with the effectiveness of the landfill cap or any associated remedial system component;
- engaging in, or allowing others to engage in, activities that would limit access for the Air Force, U.S. EPA, or the State to the landfill cap or any associated remedial system component; and
- using, or allowing others to use, the Property within the landfill cap outline and 1000-foot buffer zone identified in Figure 3 for residential purposes (including mobile or modular homes), hospitals for human, public or private schools for persons under 18 years of age, nursery schools, or for day care centers for children.

In addition to the ICs imposed as an integral part of the Groundwater OU remedy in the ROD, the USAF imposes the following IC to protect the remedial actions associated with the Groundwater OU plumes (see Section 3.5.3 for the areas where this IC is applicable). The transferee will be prohibited from:

- conducting, or allowing others to conduct, any surface activities that introduce or allow infiltration of water/other fluids into the groundwater (e.g., construction/creation of any groundwater recharge area, percolation ponds, unlined surface impoundments/trenches, or irrigation for agricultural purposes), unless specifically approved in writing by the Air Force, the U.S. EPA, and the State.

3.3.2 Institutional Control Common to Groundwater OU Plumes

As part of the remedies originally selected in the Soil OU Sites and Groundwater OU Plumes ROD (AFBCA, 1996) for the groundwater plumes, the USAF will impose the following IC to prevent health risks from exposure to contaminated groundwater (see Section 3.5.3 for the areas where this IC is applicable). In addition to certain ICs identified in Section 3.3.1, the transferee will be prohibited from:

- installing wells or extracting groundwater, or allowing others to install wells or extract groundwater, for any purpose other than remediation or monitoring.

3.3.3 Institutional Control Specific to Certain Soil OU Sites

3.3.3.1 Site 7/11

The Site 7 landfill will also have the following institutional controls.

- Controls to minimize potential for completing the inhalation exposure pathway for methane and other gasses potentially migrating from the landfill sites, require future landowners to obtain approval for any changes in land use or site improvements within 1,000 feet of a landfill from the State, until and unless it is demonstrated that the landfill is no longer a threat to human health and the environment. This requirement is based on regulations at 27 California Code of Regulations (CCR) § 21190 that apply to landfill properties.

3.3.3.2 Sites 37/39/54, 57, and 59

Concentrations of aviation fuel and/or benzene at Site 37/39/54 and Site 59 may present unacceptable risk to human health through inhalation of indoor air should a building be constructed and occupied above volatile organic compound (VOC) contamination.

Concentrations of TCE at Site 57 may present the same type of unacceptable risk. In addition to certain ICs identified in Section 3.3.1, the USAF will impose the following ICs, if necessary, to prevent health risks from exposure to VOC contaminated shallow soils (see Section 3.5.2 for the areas where these ICs are applicable). The property recipient will be prohibited from:

- engaging in any surface or shallow soil disturbance (in the geographic area subject to the IC), until and unless it is demonstrated that VOC contamination at these site(s) is no longer a threat to human health and the environment; and
- constructing any structures for human occupation (in the geographic area subject to the IC) without evaluating or addressing the risks posed by vapor intrusion.

These ICs will be imposed only if necessary. If the site soil gas data demonstrates that all of the soil gas concentrations for each COC are compatible with unrestricted land use, then the USAF will not impose these ICs.

3.3.3.3 Site OT-69

Site OT-69 contains buried munitions debris that is believed to be inert. A deed restriction was included in the federal quitclaim deed when the property transfer occurred with a deferred CERCLA 120(h) covenant (February 2000). The deed restriction requires the Grantee and successors to provide written notification “of all proposals for any alterations or activities to be undertaken within the Property,” and prohibits the Grantee and successors from proceeding until “it has received written notice from the [Air Force] that the proposed alterations are acceptable.” This ESD clarifies that the existing deed restriction will remain until the munitions debris clearance is completed, and clarifies the ICs required to protect human health and the environment.

3.4 *Implementation of Institutional Controls*

3.4.1 Implementation

The IC alternative includes enforceable use restrictions in the form of ICs on the use of certain properties. Specific language is included in this ESD describing the responsibility of the USAF for implementing, monitoring, reporting on, and enforcing the ICs. Although the USAF is transferring responsibilities to the transferee and its successors by provisions to be included in the deed(s) transferring title to the property and may contractually arrange for third parties to perform any and all of the actions associated with the ICs, the USAF is ultimately responsible for the remedy (including ICs) before and after property transfer. The USAF will exercise this responsibility in accordance with CERCLA and the NCP. Therefore, compliance with the terms of this ESD will be protective of human health and the environment. Because the restrictions are specifically described below and the means for implementing the restrictions are detailed herein, it is not necessary for the USAF to submit any new post-ROD, ICs implementation documents, such as a Land Use Control Implementation Plan, new operation and maintenance plans, or remedial action work plan.

Meeting the RAOs shall be the primary and fundamental indicator of ICs performance, the ultimate aim of which is to protect human health and the environment. Performance measures for the ICs are the RAOs plus the actions necessary to achieve those objectives. It is anticipated that successful implementation, operation, maintenance, and completion of these measures will achieve protection of human health and the environment and compliance with all legal requirements.

The USAF may contractually arrange for third parties to perform any and all of the actions associated with the ICs, although the USAF is ultimately responsible under CERCLA for the successful implementation of ICs, including monitoring, maintenance, and review of the ICs. Maintenance, monitoring, and other controls as established in accordance with this ESD and the appropriate transfer documents will be continued until the ICs are no longer necessary. ICs shall be maintained until the concentrations of hazardous substances in the soil are at such levels as to allow for unrestricted use and exposure.

3.4.2 Restrictions Prior to Property Transfer

The sites for which ICs are being selected are currently leased by the USAF. During the time between the adoption of this ESD and deeding of the property, equivalent restrictions will be implemented pursuant to the terms of the existing lease, which requires the approval of the USAF for any construction or soil disturbance activity. The lease restrictions are in place and operational and will remain in place until the property is transferred by deed. At the time of deed transfer, lease restrictions will be superseded by equivalent use restrictions to be included in the federal deed and the SLUC as described in this ESD.

3.4.3 Deed Restrictions and Reservation of Access

The Federal deed(s) for any property including Sites 7/11, 37/39/54, 57, 59, or overlaying a groundwater plume, will include a description of the residual contamination on the property, consistent with the USAF's obligations under CERCLA Section 120(h) and the specific restrictions set forth in this Section. The Federal deeds may require additional specific restrictions from RODs addressing other residual contamination on the property. ICs, in the form of deed restrictions, are "environmental restrictions" under California Civil Code, Section 1471 (Section 1471). The deeds will include legal description of the property to which the ICs apply and will contain the provisions required by Section 1471 to qualify the ICs as "environmental restrictions" so that they run with the land. The restriction established in the deed transferring the property from the Air Force in 2000 will be maintained until the munitions clearance at Site OT-69 has been completed. The deed includes reservation of access for federal and state representatives.

The USAF and regulatory agencies may conduct inspections of the ICs and the affected property. The deeds or associated transaction documents will also contain a reservation of access to the property for the USAF, the U.S. EPA, and the State, and their respective officials, agents, employees, contractors, and subcontractors for purposes consistent with the USAF IRP or the FFA. The USAF will provide such access to regulatory agencies prior to transfer.

The environmental restrictions are the basis for part of the CERCLA Section 120(h)(3) covenant that the United States is required to include in the deed for any property that has had hazardous substances stored for one year or more or known to have been released or disposed of on the property.

For any deed (non-Federal entity) or letter of transfer (Federal entity) transferring all or part of any parcel including Sites 7/11, 37/39/54, 57, 59, or overlaying a groundwater plume, ICs in the form of land use restrictions, will be incorporated in the deed as grantee environmental restrictive covenants, in substantially the following language:

For Site 7/11:

- *Grantee covenants and agrees for itself and its successors and assigns that it will not damage/disturb/penetrate the engineered landfill cap or damage/disturb/tamper with/remove any of the remedial system components associated with the landfill (e.g., containment system, groundwater monitoring system, access roads, settlement monuments, fencing, signage), or impede or impair the landfill remediation activities, or allow others to do so. These components include but are not limited to the components identified in Exhibit __ [include appropriate exhibit depicting protected system(s) in deed].*
- *Grantee covenants and agrees for itself and its successors and assigns that it will not engage in, or allow others to engage in, activities that interfere with the effectiveness of the landfill cap or any of the remedial system components associated with the landfill.*
- *Grantee covenants and agrees for itself and its successors and assigns that it will not engage in, or allow others to engage in, activities that would limit access for the USAF, the U.S. EPA, and the State, and their respective officials, agents, employees, contractors, and subcontractors to the landfill cap or any of the remedial system components associated with the landfill, including groundwater and gas monitoring wells, vent wells, settlement monuments, drainage, subdrainage and erosion controls.”*
- *The Grantee covenants and agrees for itself and its successors and assigns that it will not use, or allow others to use, the Property within the landfill cap outline and 1000-foot buffer zone identified in Figure 3 for residential purposes (including mobile or modular homes), hospitals for human care, public or private schools for persons under 18 years of age, nursery schools, or for day care centers for children.*
- *The Grantee covenants for itself and its successors and assigns that it will not conduct or allow the conduct of the following activities at landfill WP-07. Any proposed activities must comply with CCR, Title 27, Section 21190.*

- *Construction, grading, removal, trenching, filling, earth movement, mining or planting that would disturb the soil or the landfill cover, (to include the vegetative cap).*
- *Disturbance of any existing or future groundwater or soil vapor monitoring wells or gas vents, or remedial system associated with the landfill.*
- *Disturbance or removal of fencing or signs intended to exclude the public from the landfill.*
- *Surface application of water (i.e. irrigation) that might result in ponding on the cap or erosion sufficient to degrade the cap.*
- *Disturbance of any equipment and systems associated with monitoring and maintenance are settlement monuments that could affect drainage, subdrainage, or erosion controls for the landfill cover.*
- *Activities that would change the land use that has been established for landfill WP-07. The current land use is a closed capped landfill.*
- *Any land use other than a closed, capped landfill.*

- *Grantee covenants for itself and its successors and assigns that it will obtain approval for any change in land use or site improvements within 1,000 feet of the site WP-07 landfill from the Department of Toxic Substances Control, until and unless it is demonstrated that contamination related to this landfill is no longer a threat to human health and the environment.”*

- *The Grantee covenants for itself and its successors and assigns that it will not conduct or allow the conduct of the following activities within 1000 feet of landfill WP-07.*
 - *Construction of homes, schools, day care facilities, or hospitals. Prior to any construction on the Property, blueprints and other documentation demonstrating compliance with the following requirements of CCR, Title 27, Section 21190 (g), or in accordance with an equivalent design which will prevent gas migration into the building, unless an exemption has been issued shall be submitted to, and approved by, U.S. EPA, the California Department of Toxic Substances Control (DTSC), Central Valley Regional Water Quality Control Board (Central Valley Water Board), and the California Integrated Waste Management Board (CIWMB).*
 - *A geomembrane or equivalent system with low permeability to landfill gas shall be installed between the concrete floor slab of the building and the subgrade;*
 - *A permeable layer of open graded material of clean aggregate with a minimum thickness of 12 inches shall be installed between the geomembrane and the subgrade or slab;*
 - *A geotextile filter shall be utilized to prevent the introduction of fines into the permeable layer;*
 - *Perforated venting pipes shall be installed within the permeable layer and shall be designed to operate without clogging;*
 - *The venting pipe shall be constructed with the ability to be connected to induced draft exhaust system;*

- *Automatic methane gas sensors shall be installed within the permeable gas layer and inside the building to trigger an audible alarm when methane gas concentrations are detected;*
 - *Periodic methane gas monitoring shall be conducted inside all buildings and underground utilities in accordance with an approved monitoring plan; and*
 - *The concentration of methane gas must not exceed 1.25% by volume in air within the structure.*
- *Grantee covenants for itself and its successors and assigns to prohibit any activities that would limit access to, or be incompatible with effective operation of, the Landfill OU remedial system(s), including but not limited to the components identified in Exhibit __ [include appropriate exhibit depicting protected system(s) in deed].*

and

- *The Grantee covenants for itself and its successors and assigns that the owner or occupant will notify the U.S. EPA, DTSC, Central Valley Water Board, CIWMB, the Covenantor of the discovery of any activities interfering with or adversely affecting the landfill cap and associated monitoring systems at landfill WP-07. The Owner or Occupant shall provide the notification in accordance with [refer to section in deed or covenant where contact information for the parties is provided] within seven (7) working days after the discovery of the activity and shall include information regarding the type of activity, date of the activity, and location of the activity on the Property.*

For Sites 37/39/54, 57, and 59:

- *The Grantee covenants and agrees for itself and its successors and assigns that it will not engage in, or allow others to engage in, any surface or shallow soil disturbance activities on the Property except in connection with construction that complies with the institutional control that addresses vapor intrusion.*
- *With respect to risks that may be posed via indoor air contaminated by chemicals volatilizing from shallow soil gas (vapor intrusion), the Grantee covenants and agrees for itself and its successors and assigns either to (a) design and construct structures intended for occupancy within the area depicted on Exhibit __ [in the geographic area subject to this IC] in a manner that would mitigate unacceptable risk under CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) (for example, through installation of a vapor intrusion barrier or gas collection system); or (b) evaluate the potential for unacceptable risk prior to the erection of any new, occupied structure in the same area, and include mitigation of the vapor intrusion in the design/construction of the structure prior to occupancy if an unacceptable risk is posed under CERCLA and the NCP. The Grantee will coordinate any and all evaluation and potential mitigation measures with U.S. EPA and the State.*
- *Grantee covenants and agrees for itself and its successors and assigns that it will not damage/disturb/tamper with, or allow others to damage/disturb/tamper with, the*

remediation system components, including but not limited to the extraction and injection systems, treatment systems, conveyance pipes, electrical, gas, or fiber optic lines, or monitoring wells on the Property.

- *Grantee covenants and agrees for itself and its successors and assigns that it will not engage in, or allow others to engage in, activities that interfere with the effectiveness of any remediation system component on the Property.*
- *Grantee covenants and agrees for itself and its successors and assigns that it will not engage in, or allow others to engage in, activities that would limit access for the USAF, the U.S. EPA, and the State, and their respective officials, agents, employees, contractors, and subcontractors to any equipment/facilities/infrastructure associated with the remediation system component used in soil remediation on the Property.*

For Site OT-69, the USAF imposes the following ICs to protect human health until the munitions debris clearance at the site has been completed. The transferee is prohibited from:

- *engage in, or allow others to engage in, any surface or shallow soil disturbance activities within the Site OT-69 area identified in Figure 7, without first obtaining written approval from the Air Force, U.S. EPA, and the State.*
- *using, or allow others to use, the Property within the Site OT-69 area identified in Figure 7 for residential purposes (including mobile or modular homes), hospitals for human care, public or private schools for persons under 18 years of age, nursery schools, or for day care centers for children.*

For land surface areas overlaying the Main Base/SAC Area, Site 7, or Northeast groundwater plumes:

- *Grantee covenants and agrees for itself and its successors and assigns that it will not conduct, or allow others to conduct, any surface activities that introduce or allow infiltration of water/other fluids into the groundwater (e.g., construction/creation of any groundwater recharge area, percolation ponds, unlined surface impoundments/trenches, or irrigation for agricultural purposes), without the written approval of the Air Force, U.S. EPA, and the State.*
- *Grantee covenants and agrees for itself and its successors and assigns that it will not install wells or extract groundwater, or allow others to install wells or extract groundwater, for any purpose other than remediation or monitoring.*
- *Grantee covenants and agrees for itself and its successors and assigns that it will not damage/disturb/tamper with, or allow others to damage/disturb/tamper with, the remediation system components, including but not limited to the extraction and injection*

systems, treatment systems, conveyance pipes, electrical, gas, or fiber optic lines, or monitoring wells on the Property.

- *Grantee covenants and agrees for itself and its successors and assigns that it will not engage in, or allow others to engage in, activities that interfere with the effectiveness of any remediation system component on the Property.*
- *Grantee covenants and agrees for itself and its successors and assigns that it will not engage in, or allow others to engage in, activities that would limit access for the USAF, the U.S. EPA, and the State, and their respective officials, agents, employees, contractors, and subcontractors to any equipment/facilities/infrastructure associated with the remediation system component used in groundwater remediation on the Property.*

For any deed (non-Federal entity) or letter of transfer (Federal entity) transferring all or part of any parcel containing any portion of the Soil OU Sites 7/11, 37/39/54, 57, or 59, or overlaying a Groundwater OU plume, access for the U.S. Air Force and U.S. EPA will be maintained by substantially the following language incorporated in the deed(s):

The United States retains and reserves a perpetual and assignable easement and right of access on, over, and through the Property, to enter upon the Property in any case in which a remedial action or corrective action is found to be necessary on the part of the United States, without regard to whether such remedial action or correction action is on the Property or on adjoining or nearby lands. Such easement and right of access includes, without limitation, the right to perform any environmental investigation, survey, monitoring, sampling, testing, drilling, boring, coring, testpitting, installing monitoring or pumping wells or other treatment facilities, response action, corrective action, or any other action necessary for the United States to meet its responsibilities under applicable laws and as provided for in this instrument. Such easement and right of access shall be binding on the Grantee and its successors and assigns and shall run with the land.

In exercising such easement and right of access, the United States shall provide the Grantee or its successors or assigns, as the case may be, with reasonable notice of its intent to enter upon the Property and exercise its rights under this clause, which notice may be severely curtailed or even eliminated in emergency situations. The United States shall use reasonable means to avoid and to minimize interference with the Grantee's work and the Grantee's successors' and assigns' quiet enjoyment of the Property. At the completion of work, the work site shall be reasonably restored. Such easement and right of access includes the right to obtain and use utility services, including water, gas, electricity, sewer, and communications services available on the Property at a reasonable charge to the United States. Excluding the reasonable charges for such utility services, no fee, charge, or compensation will be due the Grantee, nor its successors and assigns, for the exercise of the easement and right of access hereby retained and reserved by the United States.

In exercising such easement and right of access, neither the Grantee nor its successors and assigns, as the case may be, shall have any claim at law or equity against the United States or any officer or employee of the United States based on actions taken by the United States or its officers, employees, agents, contractors of any tier, or servants pursuant to and in accordance with this clause: Provided, however, that nothing in this paragraph shall be considered as a waiver by the Grantee and its successors and assigns of any remedy available to them under the Federal Tort Claims Act.

For any deed (non-Federal entity) or letter of transfer (Federal entity) transferring all or part of any parcel containing any portion of the Soil OU Sites 7/11, 37/39/54, 57, or 59, or overlaying a Groundwater OU plume, access for the State of California will be maintained by substantially the following language incorporated in the deed(s):

State Access to Property. The right of access reserved to the United States in subparagraph [insert reference to three preceding paragraphs] above may be exercised by agencies of the United States, including, but not necessarily limited to the USAF and the USEPA Region IX. Further, notice is hereby given that the USEPA Region IX, the USAF, and the State of California have entered into an agreement commonly referred to as a Federal Facility Agreement (FFA); that, pursuant to the FFA, the USAF has a continuing duty to provide access to the property to the State of California; and that, the USAF will extend to the State of California, as necessary, the right to use the access reserved in subparagraph [insert reference to three preceding paragraphs] above. This right of access is for purposes, either on the Property or on adjoining lands, consistent with the Installation Restoration Program of the Grantor or the FFA, if applicable.

3.4.4 Notice of Institutional Controls

The USAF will include the specific deed restriction language set forth in this ESD in the deed for any parcel including Sites 7/11, 37/39/54, 57, 59, or overlaying a groundwater plume, and will provide a copy of the deed or other transfer documentation containing the use restrictions to the regulatory agencies as soon as practicable after transfer of fee title. The USAF will inform the property owner(s) of the necessary ICs in the draft deed.

Concurrent with the transfer of fee title from the USAF to the transferee, the Finding of Suitability for Transfer/Early Transfer and the location of the Administrative Record file will be communicated in writing to the property owners and to appropriate state and local agencies (with a copy to U.S. EPA) with authority regarding any of the activities or entities addressed in the controls to ensure that such agencies can factor the information into their oversight, approval, and decision-making activities regarding the property.

Prior to conveyance of any USAF property including Sites 7/11, 37/39/54, 57, 59, or overlaying a groundwater plume, U.S. EPA and State representatives will be given reasonable opportunity to review and comment on the applicable deed language described in this section and associated rights of entry for purposes of IC oversight and enforcement.

The USAF will provide notice to U.S. EPA and State at least six (6) months prior to any transfer or sale of property. If it is not possible for the facility to notify U.S. EPA and State at least six months prior to any transfer or sale, then the facility will notify U.S. EPA and State as soon as possible but no later than 60 days prior to the transfer or sale of any property subject to ICs. Additionally, the USAF further agrees to provide U.S. EPA and State with similar notice, within the same time frames, as to federal-to-federal transfers of property.

3.4.5 Annual Evaluations/Monitoring

Prior to property transfer, the USAF will conduct annual monitoring, provide annual reports describing whether property use has conformed to ICs or use restrictions, and undertake prompt action to address activity that is inconsistent with the IC objectives or use restrictions, or any action that may interfere with the effectiveness of the ICs. The monitoring results will be included in a separate report or as a section of another environmental report, if appropriate, and provided to the U.S. EPA and State. The annual monitoring reports will be used in preparation of the Five Year Review to evaluate the effectiveness of the remedy. Prior to transfer, the annual monitoring report submitted to the regulatory agencies by the USAF will evaluate the status of the ICs and how any IC deficiencies or inconsistent uses have been addressed.

Upon the effective date of property conveyance, the transferee (or other entity accepting such obligations [which may include, without limitation, subsequent transferees] or subsequent property owner(s)) will conduct annual physical inspections of property including Sites 7/11, 37/39/54, 57, 59, or overlaying a groundwater plume, to confirm continued compliance with all IC objectives unless and until the ICs at the site are terminated. The transferee or subsequent property owner(s) will provide to the USAF, the U.S. EPA, and State an annual monitoring report on the status of the ICs and how any IC deficiency or inconsistent uses have been addressed, whether use restrictions and controls were communicated in the deed(s) for any property transferred in the reporting period, and whether use of the property encompassing the area subject to ICs has conformed to such restrictions and controls. The USAF will place these transferee obligations in the deed or other transfer documentation.

If a transferee fails to provide an annual monitoring report as described above to the USAF, the USAF will notify U.S. EPA and State as soon as practicable. If U.S. EPA or State does not

receive the annual monitoring report from the transferee, it will notify the USAF as soon as practicable. Within 30 days of the report's due date, the USAF will take steps to determine whether ICs are effective and remain in place and advise the regulators of its efforts. In any event, within 90 days of the report's due date, the USAF shall determine the status of ICs and provide its written findings, with supporting evidence sufficient to confirm the reported status, based on the use restrictions/ICs and site conditions, to U.S. EPA and State unless either U.S. EPA or State, in its sole discretion, acts to confirm the status of the ICs independently.

The five-year reviews conducted by the USAF will also address whether the ICs in the ROD and this ESD were inserted in the deed, if property was transferred during the period covered; whether the owners and State and local agencies were notified of the ICs affecting the property, and whether use of the property has conformed to such ICs. Five-year reviews will make recommendations on the continuation, modification, or elimination of annual reports and IC monitoring frequencies. Five-year reviews are submitted by the USAF to the regulatory agencies for review and comment.

Although the USAF is transferring procedural responsibilities to the transferee and its successors by provisions to be included in the deed(s) transferring title to the property including Sites 7/11, 37/39/54, 57, 59, or overlaying a groundwater plume, and may contractually arrange for third parties to perform any and all of the actions associated with the ICs, the USAF is ultimately responsible for the remedy.

3.4.6 Response to Violations

Prior to property transfer, the USAF will notify U.S. EPA and the State as soon as practicable but no longer than 10 days after discovery of any activity that is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs. The USAF will notify the U.S. EPA and State regarding how the USAF has addressed or will address the breach within 10 days of sending U.S. EPA and State notification of the breach.

The deed or other transfer documentation will require that post transfer, the transferee will notify the USAF, the U.S. EPA, and State of any activity that is inconsistent with the IC objectives or use restrictions, or any other action that may interfere with the effectiveness of the ICs, and will address such activity or condition as soon as practicable, but in no case will the process be initiated later than 10 days after the transferee becomes aware of the breach. Post-transfer, if the transferee fails to satisfy its obligations pursuant to the SLUC, the State may enforce such obligations against the transferee. If there is failure of the selected remedy or a violation of selected remedy obligations (for example, an activity inconsistent with IC objectives or use

restrictions, or any action that may interfere with the effectiveness of the ICs), the State will notify the USAF and U.S. EPA in writing of such failure as soon as practicable (but no longer than 14 days) upon discovery of the inconsistent activity or action that interferes with the effectiveness of the IC, and initially seek corrective action or other recourse from the transferee. If, after diligent efforts, the State is unable to enforce the obligations of the SLUC or remedy obligations against the transferee, within 21 days following the State's notification, the parties shall confer to discuss re-implementation of the selected remedy or other necessary remedial actions to address the breach of the IC. Once the State reports that the transferee is unwilling or unable to undertake the remedial actions, the USAF will within 10 days inform the other Parties of measures it will take to address the breach.

3.4.7 Approval of Institutional Control Modification or Termination

Prior to transfer, the USAF shall not modify or terminate ICs or implementation actions, modify land use, or modify use restrictions that are part of the selected remedy without approval by U.S. EPA and State. The USAF shall seek prior concurrence before any anticipated action that may disrupt the effectiveness of the ICs or any action that may alter or negate the need for ICs.

Any grantee of property constrained by the ICs imposed through their transfer document(s) may request modification or termination of an IC. Modification or termination of an IC, except the SLUC (discussed below), requires USAF, U.S. EPA, and State approval.

Any modification or termination of the SLUC must be undertaken in accordance with State law; and will be the responsibility of the transferee or then-current owner or operator.

3.4.8 State Land Use Covenants

The signed deed and/or other legally binding transfer documents between the USAF and the transferee will include the specific land use restrictions (i.e., ICs), as well as a condition that the transferee execute and record a SLUC, within 10 days of transfer, to address any State obligations pursuant to State law, including Title 22 CCR, Section 67391.1. Portions of this regulation are added by this ESD to the ARARs in the ROD for the Soil OU Sites and Groundwater OU Plumes, as summarized in Table 1. Any letter of transfer (to a federal entity) will include a condition that future deeds to a non-federal entity include this requirement. The USAF will ensure that the transferee has met this condition. Site OT-69 is subject to a land-use covenant signed by the State and Sacramento County in 2000.

3.5 Geographic Locations Where Institutional Controls Apply

3.5.1 Areas With Institutional Controls to Protect the Remedial Systems

ICs for the protection of the remedial system components, and to preserve access to such components, apply to those geographic locations where the remedial system components are physically placed/located. The components of the USAF's remedial systems at Sites 7/11, 37/39/54, 57, 59 (including those associated with Site 18), or associated with the selected remedies for the three groundwater plumes, are shown on Figures 3 through 6 (Soil OU sites) and 3, 8, and 9 (Groundwater OU plumes) respectively. The components of the remedial systems are discussed in more detail below. Any additional components installed as a part of the remediation systems will also be subject to these ICs.

3.5.1.1 The Remediation Systems for Soil OU Site WP-07/FT-11 and the WP-07 Groundwater OU Plume

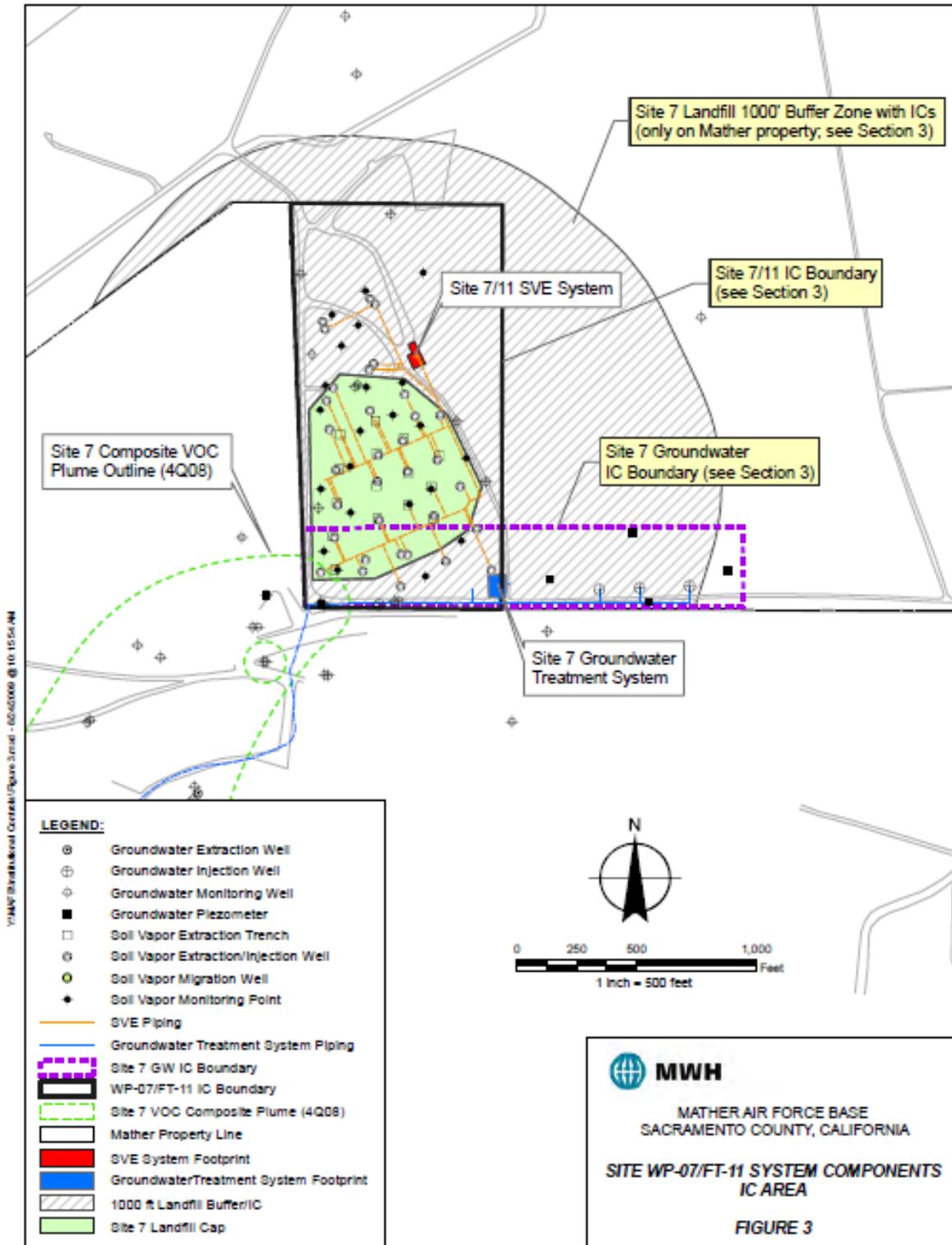
The components of the Site 7/11 systems on USAF property are shown on Figure 3. These components include the landfill cap at Site 7 and associated gas vent wells, gas monitoring wells, and drainage ditches; the in situ treatment system including blower and treatment units, conveyance piping, extraction wells, and monitoring wells; and the portions of the groundwater treatment system on Mather, including the air stripper treatment plant, conveyance piping, electrical and fiber optic lines, injection wells, and groundwater monitoring wells. Generally, system components associated with the groundwater plume that are not located on USAF property are protected by easements from the land owner. In addition to the ICs described herein, additional land-use restrictions on building structures within 1000 feet of the Site 7 landfill are contained in the Soil OU ARARs found in Title 14, CCR. Once dedeed, the property owner is subject to these restrictions as re-codified in Title 27, CCR, requiring enforcement agency approval for building within 1000 feet of the Site 7 landfill.

TABLE 1: Groundwater OU and Soil OU Relevant and Appropriate State Requirements

Requirement	ARAR Status	Source	Description
Action Specific			
Land Use Covenant	Relevant and Appropriate	Title 22, CCR, Section 67391.1(a)	Requires imposition of appropriate limitations on land use by recorded land use covenant when hazardous substances remain on the property at levels that are not suitable for unrestricted use of the land.
Land Use Covenant	Relevant and Appropriate	Title 22, CCR, Section 67391.1(d)	Requires that the land use covenant be recorded in the county where the land is located.
Land Use Covenant	Relevant and Appropriate	California Civil Code Section 1471(a) & (b)	Specifies requirements for land use covenants to apply to successors in title to the land.

CCR = California Code of Regulations

Figure 3, Site WP-07/FT-11 System Components



3.5.1.2 The Site ST-37/ST-39/SS-54 Remediation System

The components of the Site 37/39/54 system on USAF property are shown on Figure 4. These components include the in situ treatment system including blower and treatment unit or units, conveyance piping, extraction wells, and monitoring wells, including the extension of the conveyance system and extraction system at Site 29/71, which is a non-CERCLA soil IRP site. In addition, the remediation of Site OT-23A/B/D is being addressed in concert with the remediation of ST-39.

3.5.1.3 The Site SD-57 Remediation System

The components of the Site 57 system on USAF property are shown on Figure 5. These components include the in situ treatment system including blower and treatment unit, conveyance piping, vapor and dual-phase extraction wells, and monitoring wells.

3.5.1.4 The Site SD-59 Remediation System

The components of the Site 59 system on USAF property are shown on Figure 6. These components include the in situ treatment system including blower and treatment unit, conveyance piping, vapor extraction wells, and monitoring wells, including any extension to the conveyance system and extraction system at Site 18 and all associated wells.

3.5.2 Areas Where Institutional Controls to Protect Human Health from Soil Gas Apply

Some ICs may be imposed to eliminate or limit exposure pathways to human receptors in order to protect human health. For Sites 37/39/54, 57, and 59 (see Figures 4 through 6) shallow soil gas sampling for the COCs at these sites must take place prior to transfer. If the site soil gas data demonstrates that all of the soil gas concentrations for each COC are compatible with unrestricted land use, then the USAF will not impose ICs. If soil gas data for one or more of these sites indicates an unacceptable risk associated with potential exposure to indoor air, then ICs to protect human health will be applied for that to the areas shown in the appropriate figures for that site or sites (Figure 4 for Sites 37/39/54, Figure 5 for Site 57, and Figure 6 for Site 59). These IC boundaries include a buffer zone created by defining the IC boundaries to encompass an area that includes all sampling locations. Covenant language for these ICs is included in Section 3.4.3.

If this IC prohibiting surface and shallow soil disturbing activities is imposed, excavation and other soil disturbing activities may be allowed by the USAF, U.S. EPA, and the State if environmental and worker safety control measures are implemented.

3.5.3 Areas Where Institutional Controls for the Groundwater Plumes Apply

The IC areas associated with the three plumes addressed in this ESD will be determined before transfer based upon the areal extent of each plume that still exceeds the applicable cleanup level(s) with the addition of an adjacent buffer zone. The addition of such an adjacent buffer zone to the surface land areas overlying the plumes provides protection from any new well either allowing significant exposure to groundwater contamination or potentially interfering with the groundwater cleanup. At this time, the areal extent of the Groundwater OU plumes that still exceed above the cleanup levels with an appropriate adjacent buffer zone are as depicted in Figures 3, 8, and 9.

3.5.3.1 The Main Base/SAC Area Plume

The area subject to land-use restrictions as part of the MBSA Plume remedy are shown in Figure 8. This area includes the footprint of the plume where concentrations of any COC exceeds its cleanup level as of fourth quarter 2007 and a buffer zone. The boundaries of the buffer zone were selected using roadways and parcel boundaries to the extent practical to result in boundaries recognizable by semi-permanent geographical features.

3.5.3.2 The Northeast Plume

The area subject to land-use restrictions as part of the Northeast Plume remedy is shown in Figure 9. This area includes the footprint of the plume where concentrations of PCE or cis-1,2-DCE exceeded their respective cleanup levels as of fourth quarter 2008, and a buffer zone that includes the footprints of landfill sites 4 and 3. The boundaries of the buffer zone were selected to result in a simple rectangular geometry.

3.5.4 Areas Where Institutional Controls to Protect Human Health from Potentially Hazardous Munitions Debris Apply

Institutional controls at Site OT-69 cover the area of buried munitions debris. This area of institutional controls is shown in Figure 7.

Figure 4, Site ST-37/ST-39/SS-54 System Components

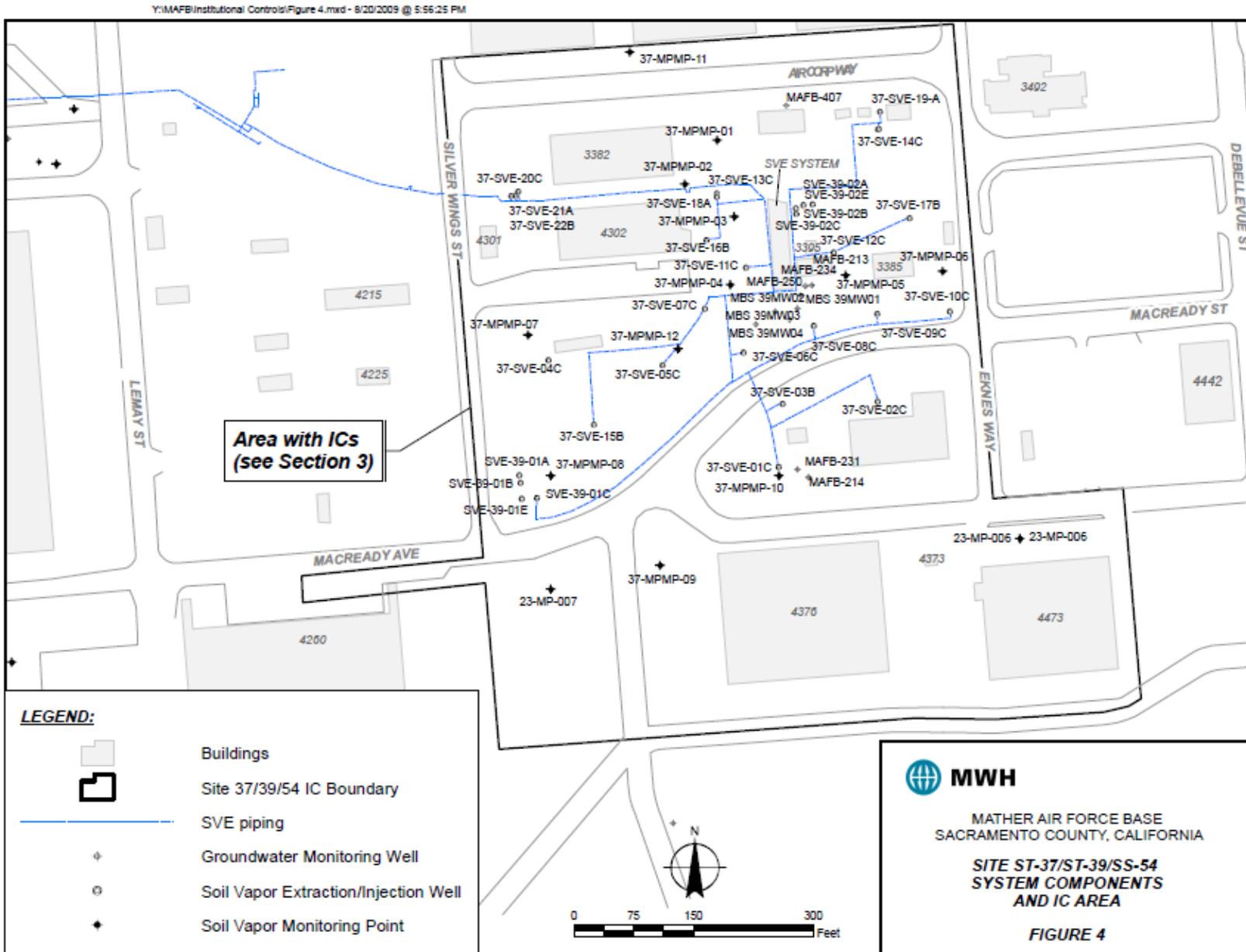


Figure 5, Site SD-57 System Components

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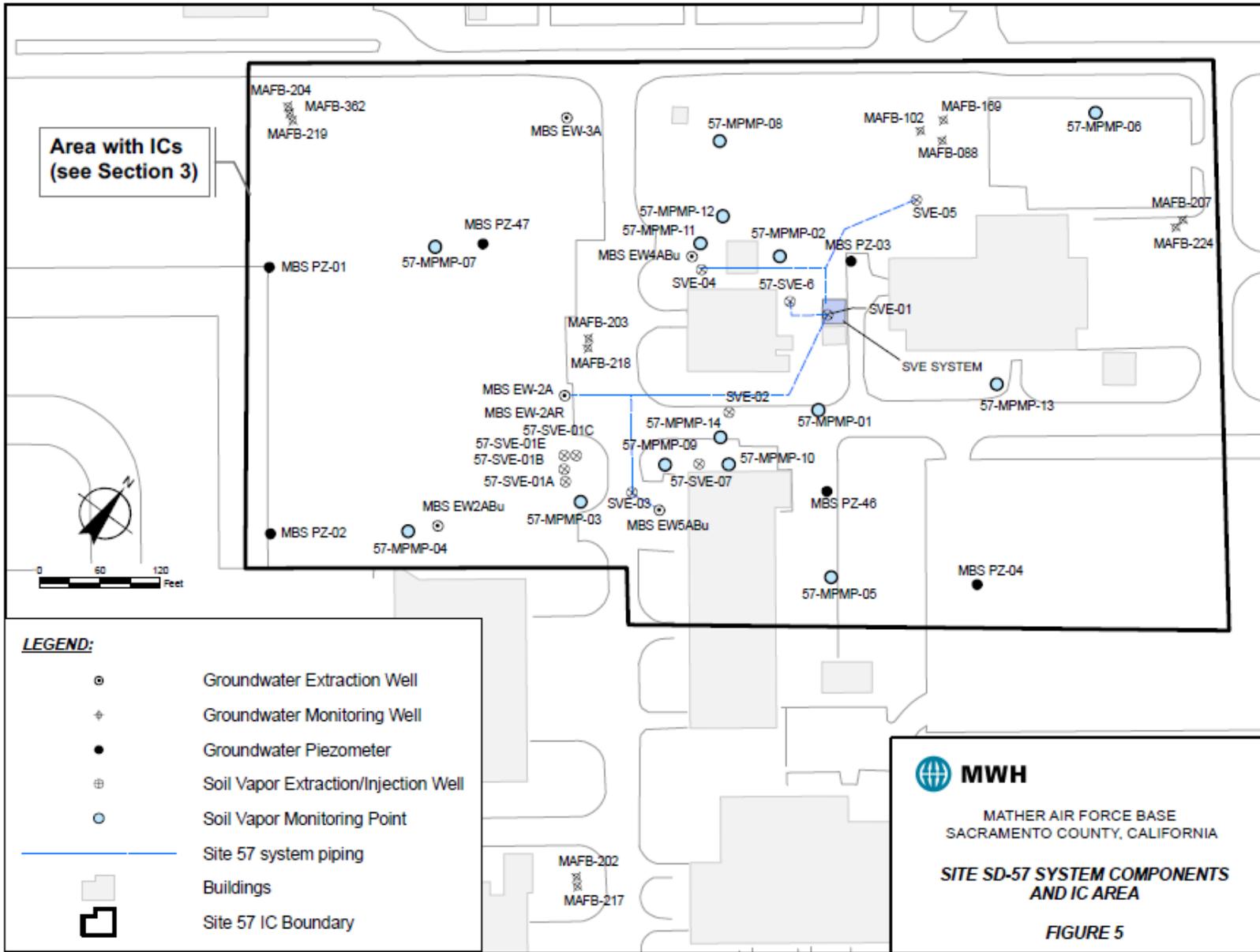


Figure 6, Site SD-59 System Components

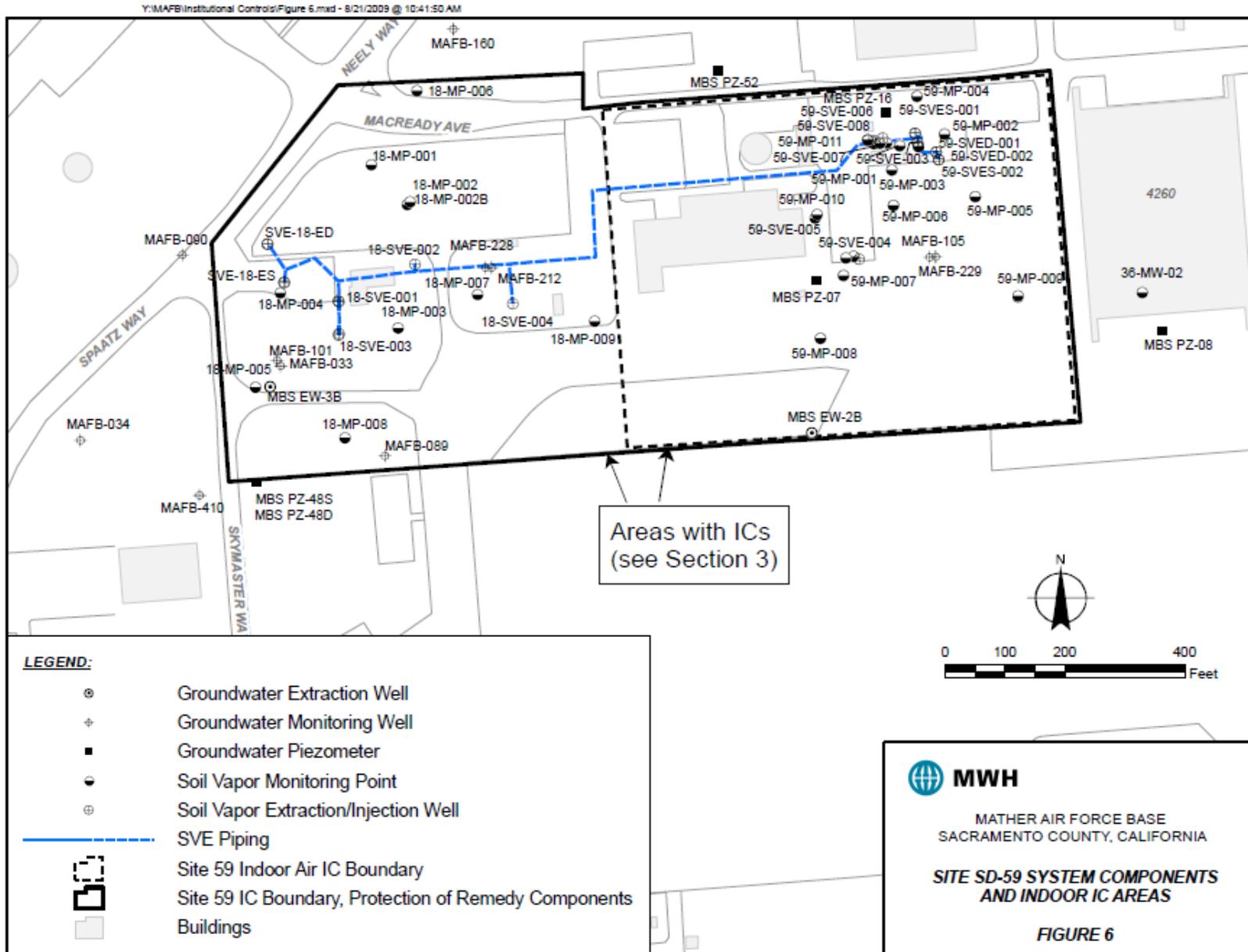


Figure 7, OT-69 IC Area

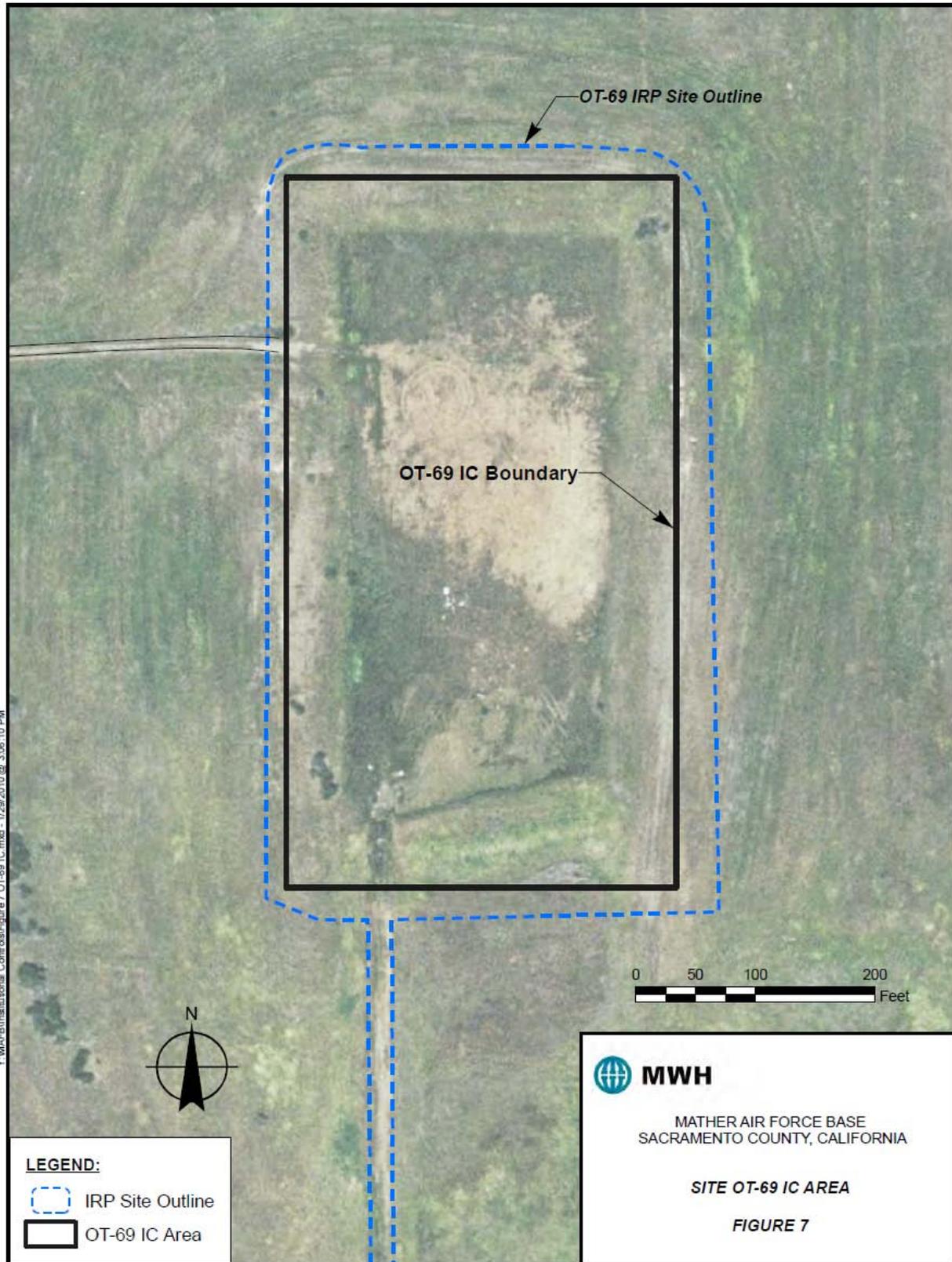


Figure 8, MBSA Plume System Components

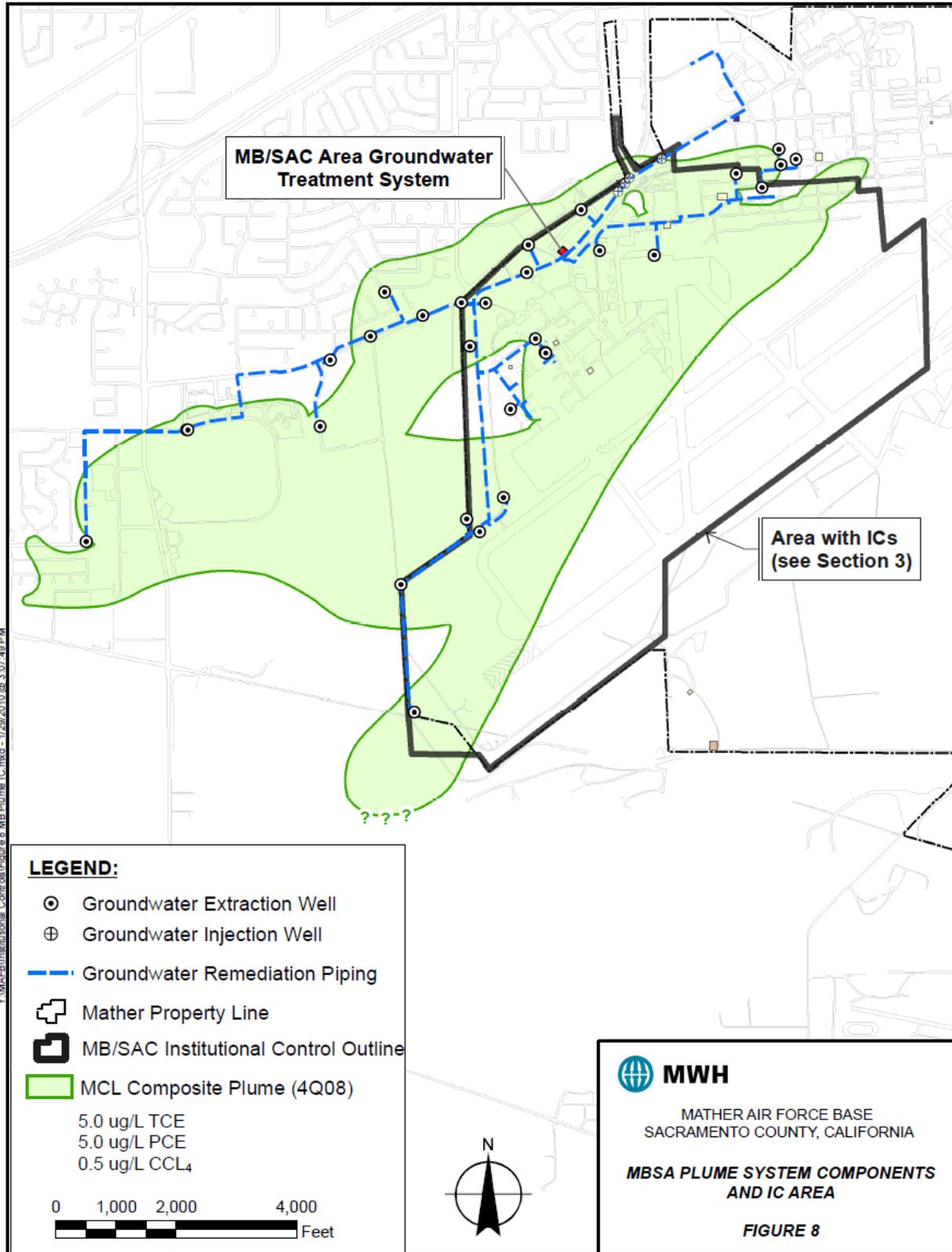
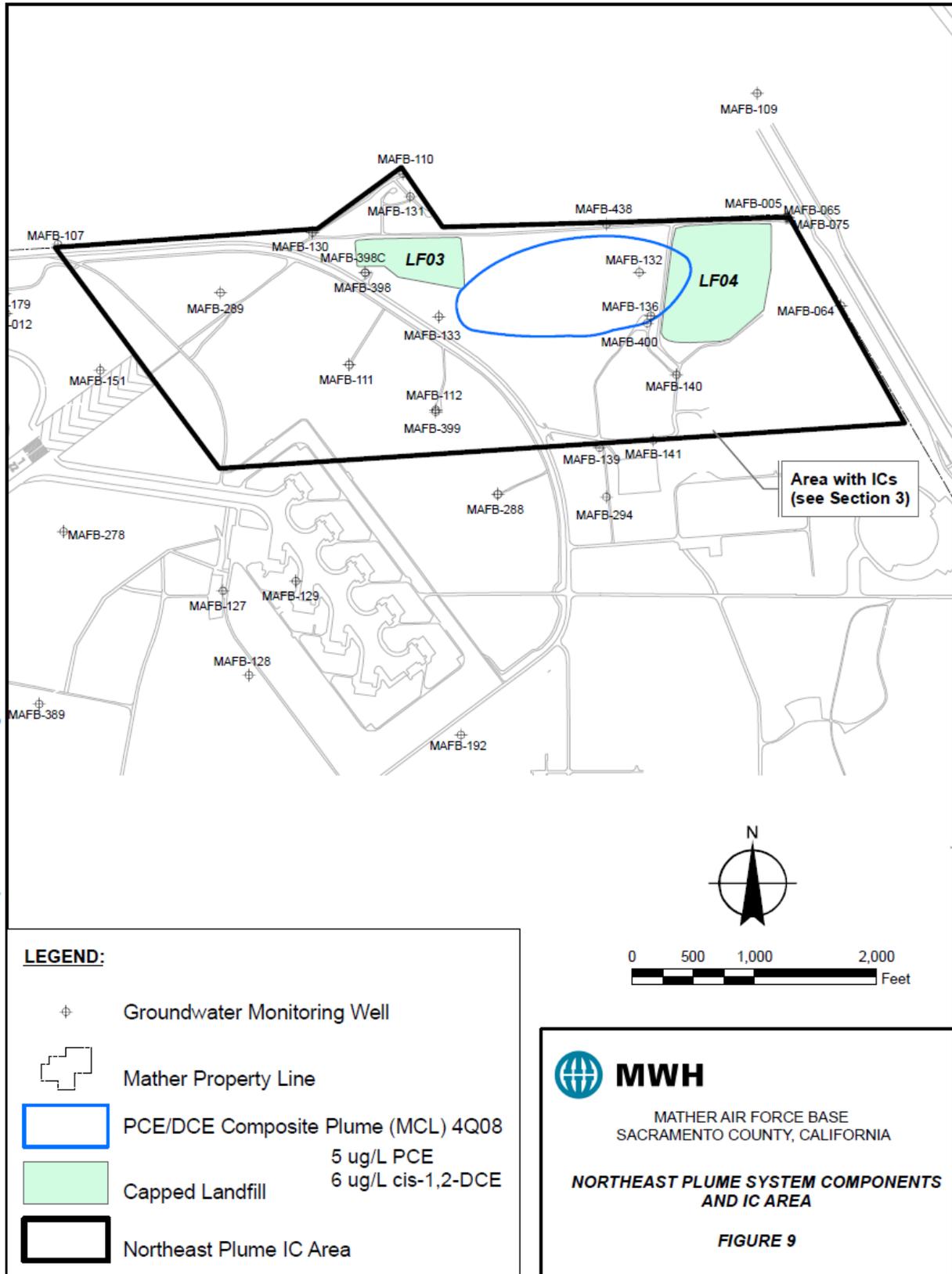


Figure 9, Northeast Plume System Components



3.6 Duration of Institutional Controls

The USAF, represented by AFRPA, is responsible for implementing, monitoring, and maintaining these remedies including ICs for the Soil OU sites and Groundwater OU plumes until and unless it is demonstrated that contamination at these locations is no longer a threat to human health and the environment.

The USAF recognizes that, at soil sites or in plumes where contaminants are left in place above levels allowing unlimited use and unrestricted exposure, ICs are used to ensure that these contaminants do not pose an unacceptable risk to human health or the environment. Thus, where there is a failure to meet IC RAOs or a failure of IC implementation actions that could lead directly to remedy failure, the USAF acknowledges that the regulators may seek to reopen the remedy decision in addition to exercising any other authorities they may have under CERCLA. The USAF will not waive, modify, or terminate any Groundwater OU plume or Soil OU site IC unless done in accordance with the ROD as modified by this ESD and deed provisions.

4.0 Affirmation of the Statutory Determinations

The ARARs addressed by the ROD are augmented by the additional ARARs identified in Table 1 of this ESD. This ESD specifically addresses changes to selected remedies, changes to the cleanup levels for certain soil OU sites, and adds ICs to protect human health and the environment, as well as the remedial systems and actions associated with the cleanup of the soil OU sites and the groundwater OU plumes.

Considering the changes/additions to the selected remedies as documented in this ESD, the USAF, U.S. EPA, and the State believe that these remedies are protective of human health and the environment, comply with federal and state requirements that were identified in the ROD and this ESD as ARARs, and are cost effective. In addition, the remedies continue to utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for these Soil OU sites and Groundwater OU plumes.

To the degree these remedies result in contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a review will be conducted no less frequently than each 5 years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

5.0 Public Participation Activities

Although the remedy is modified from the original decision document, the modification is not a fundamental change in the scope or purpose of the action; therefore, a formal comment period will not be conducted. A notice of availability and brief description of this ESD will be published in the *Sacramento Bee* after the ESD is signed. The ESD will become a part of the AR for the Soil OU sites and Groundwater OU plumes at the former Mather AFB. In addition, the topic will be discussed during the next Restoration Advisory Board (RAB) meeting for Mather following issuance of the revised final version of the ESD.

6.0 ESD Signature Page

This ESD for the Soil Operable Unit Sites and Groundwater Operable Unit Plumes ROD is final and will be made available to the public by placement in the AR and information repository [per NCP §§ 300.435(c)(2)(i)(A) and 300.285(a)(2)].

This ESD may be executed and delivered in any number of counterparts, each of which when executed and delivered shall be deemed to be an original, but all such counterparts shall together constitute one and the same document.

Decision Statement: The U.S. EPA and the Air Force jointly select the remedy augmentation described in this Revised ESD for the Soil OU sites and Groundwater OU plumes to add and clarify IC requirements for the Soil OU and Groundwater OU remedies and establish as ICs land-use restrictions to protect both Groundwater OU and Soils OU remedial systems and actions, and also to change the cleanup levels for TPH(d/g) at Sites 7/11, 37/39/54, and 59; and for BTEX and oil and grease at Site 37/39/54 from numerical standards to a narrative standard.



MR. JEFFERY P. DOMM
Deputy Director
Air Force Real Property Agency
U.S. Air Force

19 Feb 10

Date



MR. MICHAEL M. MONTGOMERY
Assistant Director of Federal Facilities and
Site Cleanup Branch, Region 9,
U.S. Environmental Protection Agency

August 9, 2010

Date

The State of California Department of Toxic Substances Control, Central Valley Regional Water Quality Control Board, and Integrated Waste Management Board had an opportunity to review and comment on this Revised ESD for the Soil OU sites and the Groundwater OU plumes.



MR. CHARLES RIDENOUR
Supervising Hazardous Substances Engineer I
Sacramento Office Brownfields and
Environmental Restoration Program
Department of Toxic Substance Control
California Environmental Protection Agency

8/25/10

Date

7.0 References

- AFBCA, 1993, Superfund Record of Decision: Aircraft Control and Warning Site, Mather Air Force Base, Sacramento County, California, December
- AFBCA, 1995, Superfund Record of Decision, Landfill Operable Unit Sites, Mather Air Force Base, Sacramento County, California, July
- AFBCA, 1996a, Community Relations Plan, January
- AFBCA, 1996b, Superfund Record of Decision, Soil Operable Unit Sites and Groundwater Operable Unit Plumes, Mather Air Force Base, Sacramento County, California, April
- AFBCA, 1998b, Record of Decision, Basewide Operable Unit Sites, Mather Air Force Base, California, August
- AFBCA, 1998c, Final Explanation of Significant Difference from the Record of Decision, Disposal of Contaminated Soil at Site 7/11, September
- AFRPA, 2003, Remedial Action Report for Installation Restoration Program Site OT-69, Open Burn/Open Detonation Area, September
- AFRPA, 2006, Record of Decision, Supplemental Basewide Operable Unit Sites, Mather Air Force Base, California, October
- Covenant to Restrict Use of Property Environmental Restriction, between the county of Sacramento and the State of California executed February 17, 2000, recorded by Sacramento County Clerk-Recorder February 18, 2000, reference 200002180242
- DTSC, 2003, Remedial Action Reports (RAR) for Installation Restoration Program (IRP) Sites OT-69 and 86, Mather, California, memorandum dated November 13, 2003.
- Quitclaim deed dated 1 February 2000 between the United States of America and the County of Sacramento, recorded by Sacramento County Clerk-Recorder February 9, 2000, reference #200002090755
- USAF, 1989, Interagency Agreement for Mather Air Force Base, dated July
- U.S. EPA, 2003, Approval of Remedial Action Report for Site OT-69 Ordnance Burning and Detonation Area, Former Mather Air Force Base, Mather, California, memorandum dated October 16, 2003