FINAL
THIRD FIVE-YEAR REVIEW REPORT

PERFORMANCE-BASED REMEDIATION AT MARCH AIR RESERVE BASE AND FORMER MARCH AIR FORCE BASE, CALIFORNIA

Prepared for:

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September 29, 2014

Five-Year Review

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14. ABSTRACT

This Report presents the results of the third five-year review for 15 sites located at March ARB/Former March AFB, California. The 15 sites addressed in this report are Sites 1, 4, 5, 6, 7, 11, 17, 19, 29, 31, 34, L, 18, 33 and OU 1 Groundwater Plume. The purpose of the five-year review is to evaluate whether the remedies implemented at the sites discussed above are functioning as intended by their respective Record of Decisions and remain protective of human health and the environment.

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Final Third Five-Year Review Report, Performance-Based Remediation at March Air Reserve Base and Former March Air Force Base, California

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EXECUTIVE SUMMARY

This is the third five-year review (FYR) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 15 remediation sites at March Air Reserve Base (ARB) and the former March Air Force Base (AFB). When March AFB realigned, the property retained by the United States Air Force (USAF) was renamed March ARB. The property transferred out of USAF control is referred to as the former March AFB. This review is similar in format to the second five-year review completed in 2009 and has been conducted in accordance with the United States Environmental Protection Agency (USEPA) Comprehensive Five-Year Review Guidance (June 2001), the Recommended Evaluation of Institutional Controls: Supplement to the "Comprehensive Five-Year Review Guidance (September 2011), Five-Year Summary Form Template (December 2011), and Clarifying the Use of Protectiveness Determinations for CERCLA Five-Year Reviews (September 2012).

The 15 sites addressed in this report are the following:

- **Operable Unit 1:** Site 4 - Landfill No. 6; Site 5 – Landfill No. 3; Site 7– Fire Protection Training Area No. 2; Site 18 - Engine Test Cell; Site 29 – Fire Protection Training Area No. 1; Site 31 – Solvent Spill; Site 34 - Pritchard Refueling System; and Operable Unit 1 Groundwater Plume
- **Operable Unit 2:** Site 1- Aircraft Isolation Area/Fuel Drainage Area; Site 6 – Landfill No. 4; Site 11 – Bulk Fuels Storage Area; Site 17 – Swimming Pool Fill; and Site 19 – West March Sludge Drying Beds
- **Operable Unit 3:** Site 33 – Panero Aircraft Refueling Facility
- **Operable Unit 4:** Site L – Former Non-Commissioned Officer (NCO) Club Swimming Pool/Polychlorinated Biphenyl (PCB) Site.

Based on the Department of Defense (DoD) Manual 4715.20 guidance/policy as implemented via Air Force Instruction (AFI) 32-7020, Section 16.5.1.2, Site 33, Panero Aircraft Refueling Facility (Petroleum Site) which was not included in the last Five-Year Review will be evaluated as part of this Five-Year Review. In addition, as discussed in the June 11, 2013 Remedial Project Manager (RPM) meeting, the following two sites which were evaluated in the last Five-Year Review will not be evaluated in this Five-Year Review.

- **Site 12 – Civil Engineering Yard** - Closed as part of the last Five-Year Review in 2009.
- **Site 42 – Building 3404 Transformers** - This site was addressed in the OU 2 Record of Decision (ROD) (April 2004) as a no further action site for soil and groundwater components with no restriction on land use. Responsibility for maintenance of the non-CERCLA) component (i.e., the concrete surface) has been transferred to the County of Riverside.

The purpose of the five-year review is to evaluate whether the remedies implemented at the 13 CERCLA sites and two petroleum sites (18 and 33) are functioning as intended by their respective RODs (USAF 1995, 2004, 2005a, 2005b) and Remedial Action Plan (RAP) (Air Force Reserve Command [AFRC] 2003a, b), and remain protective of human health and the environment. The VOCs (including benzene) and the impact of the vapor intrusion pathway at these Sites will be evaluated as part of the Basewide groundwater addressed as CG049 in OU5 FFS and ROD. The data cut-off date of May 31, 2013 was agreed upon during the June 11, 2013 RPM Meeting. This date was also used as the cut-off date for evaluation of revisions to toxicity criteria, USEPA RSLs, and MCLs.

The technical assessments performed during this 5-year review examined the following questions:

- Question A – Is the remedy functioning as intended by the decision document?
- Question B – Are the assumptions used at the time of the remedy still valid?
- Question C – Has any other information come to light that could call into question, the protectiveness of the remedy?

To answer these questions, the 5-year review included:

- Review of applicable site documents such as RODs, remedial action design documents, and site operations and maintenance (O&M) records and reports;
- Review of newly promulgated standards and applicable or relevant and appropriate requirements (ARARs) and pertinent toxicity values;
- Interviews with site managers; and
- Performing site inspections.

Upon completion of the document reviews, interviews, and site inspections, conclusions of the 5-year review were developed. These conclusions include identification of remedy deficiencies, recommendations and follow-up actions, and a determination of whether the remedy is or is not

protective of human health and the environment. Each remedy is evaluated for short term and long term protectiveness.

One of the factors considered in the five-year review evaluation is the impact on protectiveness of groundwater that has risen in some areas of March ARB at the rate of about 1-foot to 2 feet per year over the last several years. As the groundwater comes into contact with more soil, there is the potential of transferring contamination from the soil to groundwater. The Basewide impact of rising groundwater and potential for vapor intrusion (VI) will be evaluated as Consolidated Groundwater Site 49 (CG049) in OU5. The upcoming CGO49 Focused Feasibility Study and ROD will include steps for addressing rising groundwater.

Different procedures for ICs are used for sites on property retained by the USAF and for sites transferred from USAF control. ICs on transferred property are contained in deed restrictions and State Land Use Covenants. The ROD-required IC language for transferred property is included in Findings of Suitability for Early Transfer (FOSETs). The ROD-required ICs on retained property are included in the March ARB Base General Plan.

Table ES-1 presents a summary of all remediation sites and has the sites in numerical order by OU. Sites in a completed ROD with contamination left in place above levels allowing for unlimited use and unrestricted exposure (UU/UE) are included in this 5-year review.

Table ES-1. Sites at March ARB/Former March AFB
(Page 1 of 11)

Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
Operable Unit 1 Sites						
Site 4	Landfill No. 6	OU1	AFRPA (Transferred)	Household waste, oil, and solvents	Landfill was capped in 1995. Waste remains on-site. Landfill cap, groundwater extraction and treatment, and use restrictions in ROD.	Yes
Site 5	Landfill No. 3	OU1	AFRC (March ARB, Retained by AF)	Sanitary waste and construction rubble	No further action in OU1 ROD, but waste remains on site.	Yes
Site 7	Fire Protection Training Area No. 2	OU1	AFRPA (Transferred)	Fuels, oils and solvents	Restricted from residential use in ROD. Another source of contamination was found in 2007. A ROD Amendment to select a soil remedy is in the process of regulatory review.	Yes
Site 9	Oil/Water Separator	OU1	AFRC (March ARB, Retained by AF)	Fuels and solvents	No further action in ROD. The regulatory agencies concurred on the UU/UE recommendation for the site (AECOM 2013h).	No
Site 10	Flightline Drainage Channel	OU1	AFRC (March ARB, Retained by AF)	Fuels, oils, and solvents with PAHs in surface soils	The regulatory agencies concurred on the UU/UE recommendation for the site (AECOM 2013h).	No

Table ES-1. Sites at March ARB/Former March AFB
(Page 2 of 11)

Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
Site 13	Tank Truck Spill	OU1	AFRC (March ARB, Retained by AF)	Fuels	No further action in ROD. The regulatory agencies concurred on the UU/UE recommendation for the site (AECOM 2013h).	No
Site 14	Liquid Fuel Pump Station Overflow	OU1	AFRC (March ARB, Retained by AF)	Jet Fuel	No further action in ROD. The regulatory agencies concurred on the UU/UE recommendation for the site (AECOM 2013h).	No
Site 15	Fire Protection Training Area No. 3	OU1	AFRC (March ARB, Retained by AF)	Fuels, BTEX	The regulatory agencies concurred on the UU/UE recommendation for the site (AECOM 2013h).	No
Site 16	East March Sludge Drying Beds	OU1	AFRC (March ARB, Retained by AF)	Sludge	No further action in ROD. The regulatory agencies concurred on the UU/UE recommendation for the site (AECOM 2013h).	No
Site 18	Engine Test Cell	OU1	AFRC (March ARB, Retained by AF)	Fuel and BTEX	Contamination remains above UU/UE levels as specified in the Remedial Action Plan. A Technical Memorandum dated 16 July 2013 was submitted by the Air Force to document transfer of site as a Petroleum site under RWQCB oversight. Additionally any solvents would be transferred to CG049 Basewide groundwater program.	Yes

Table ES-1. Sites at March ARB/Former March AFB
(Page 3 of 11)

Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
Site 29	Fire Protection Training Area No. 1	OU1	AFRC (March ARB, Retained by AF)	Fuels, oils, and solvents	Restricted from residential use in ROD.	Yes
Site 31	Solvent Spill	OU1	AFRC (March ARB, Retained by AF)	Solvents and PAHs	A soil and groundwater treatment system was installed in 1996. Most of the system has been turned off. PAH in surface soil. Soil vapor and groundwater extraction in ROD for groundwater and subsurface soil, excavation in ROD for surface soil.	Yes
Site 34	Pritchard Refueling System	OU1	AFRC (March ARB, Retained by AF)	Fuels, BTEX and PAHs	A bio-venting pilot study was used to clean the soil. Surface soil PAH contamination remains above UU/UE levels. Bioventing for subsurface soils and excavation for surface soils in ROD.	Yes
Site 38	PCB Spill Site	OU1	AFRPA (Transferred)	PCBs	The contamination was removed and the OU1 RI did not identify additional contamination. No further action in the ROD(USAF 1995) based on UU/UE was concurred by the regulators.	No
OU1 Ground-water Plume	OU1 Groundwater Plume	OU1	AFRPA/ AFRC	Solvents	Long-term monitoring and extraction and treatment required by ROD are ongoing.	Yes

Table ES-1. Sites at March ARB/Former March AFB
(Page 4 of 11)

Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
Operable Unit 2 Sites						
Site 1	Aircraft Isolation Area/Fuel Drainage Area	AFRC OU2 Sites 1, 11, 37 & 39	AFRC (March ARB, Retained by AF)	Fuel, solvents and PAHs	Majority of contaminated soil removed in 1995. Restricted from residential use in ROD.	Yes
Site 2	Waste Oil Pits/Solvent Tanks	No ROD, included in OU2 RI/FS	AFRC (March ARB, Retained by AF)	Fuels, oils and solvents	The regulatory agencies concurred on the UU/UE recommendation for the site (AECOM 2013h). Solvent contamination to be included in the CG049 OU5 ROD.	No
Site 3	Landfill No. 5	AFRPA OU2	AFRPA (Transferred)	Household waste, oil, and solvents	Waste was consolidated in the Site 6 landfill. No waste is present. No further action in ROD (AFRPA 2004), based on unlimited use and unrestricted exposure (UU/UE), was concurred by the regulators.	No
Site 6	Landfill No. 4	AFRPA OU2	AFRPA (Transferred)	Household waste and construction rubble	Closed with a newly engineered waste cell design. Waste remains in place. Use restrictions in ROD to protect the waste cell.	Yes
Site 8	Flight Line Shop Area/ Operations	To be included in a future ROD	AFRC (March ARB, Retained by AF)	Fuels, oils and solvents	Some contaminated soils were removed. A Supplemental Remedial Investigation/Focused Feasibility Study was completed. Remedy selection process ongoing	No
Site 11	Bulk Fuel Storage Area	AFRC OU2 Sites 1, 11, 37, and 39	AFRC (March ARB, Retained by AF)	Fuels and PAHs	Restricted from residential use in ROD.	Yes

Table ES-1. Sites at March ARB/Former March AFB
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Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
Site 12	Civil Engineering Yard	AFRPA OU2	AFRPA (Transferred)	Oils and solvents	Response action completed and the Site was closed in 2008 without restrictions.	No
Site 17	Swimming Pool Fill	AFRPA OU2	AFRPA (Transferred)	Solvents, shop wastes, and demolition debris	Pool structure and contents were removed in 1994. Contamination remains above UU/UE levels. Use restrictions in ROD.	Yes
Site 19	West March Sludge Drying Beds	AFRPA OU2	AFRPA (Transferred)	Sludge	Land use restrictions in ROD.	Yes
Site 20	Landfill No. 7, West March	AFRPA OU2	AFRPA (Transferred)	Household waste	Soil and waste were excavated and placed in Site 6. No contamination remains above UU/UE levels at the site. No further action in ROD.	No
Site 22	Landfill No. 2	AFRPA OU2	AFRPA (Transferred)	None	Investigated in the OU2 RI/FS. No evidence of a landfill was found. No further action in ROD.	No
Site 23	East March Effluent Pond, Nandina and Heacock Street	AFRPA OU2	AFRPA (Transferred)	Treated wastewater	No soil contamination found. No further action in ROD.	No
Site 24	Landfill No. 1	AFRPA OU2	AFRPA (Transferred)	Household waste and incinerator ash	Waste and soil were excavated in 1995 and placed at Site 6. No contamination remains above UU/UE levels. No further action in ROD.	No

Table ES-1. Sites at March ARB/Former March AFB
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Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
Site 25	Munitions Residue Burial Area	AFRPA OU2	AFRPA (Transferred)	Munitions residue	Non-hazardous waste was removed and placed in Site 6 landfill. No contamination remains above UU/UE levels. No further action in ROD.	No
Site 26	Water Treatment Sludge, West March	AFRPA OU2	AFRPA (Transferred)	Sludge	Contamination removed and placed in Site 6. No contamination remains above UU/UE levels. No further action in ROD.	No
Site 27	Building 422 Underground POL Tanks	No ROD, but included in OU2 RI/FS	AFRC (March ARB, Retained by AF)	Fuels	The regulatory agencies concurred on the UU/UE recommendation for the site (AECOM 2013h).	No
Site 28	Basewide Groundwater Monitoring Wells	None, originally included in OU2	AFRC (March ARB, Retained by AF)	Zone monitoring wells	Well network was part of the Basewide groundwater monitoring well network. No specific site identified (see Note 1).	No
Site 30	Construction Rubble Site	AFRPA OU2	AFRPA (Transferred)	Construction rubble	Debris removed. No contaminants identified above UU/UE levels. No further action in ROD.	No
Site 32	Building Demolition Areas	None, originally included in OU2	AFRPA (Transferred)	Assumed to contain construction rubble	Not located. Site was removed from the IRP list because the sites were not considered to present a risk for adverse affects on human health or the environment.	No

Table ES-1. Sites at March ARB/Former March AFB
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Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
Site 35	15th AF HQ leaking USTs	AFRPA OU2	AFRPA (Transferred)	Fuels	The USTs were removed and bio-venting was used to clean the site. No remaining contamination above UU/UE levels. No further action in ROD.	No
Site 36	Building 458 Leach Pit	To be included in a future OU2 ROD	AFRC (March ARB, Retained by AF)	Solvents	Some contaminated soil removed in 1994. Groundwater and Soil Vapor Extraction system operated for several years.	No
Site 37	PCB Spill Site at Building 317	OU2 AFRC Sites 1, 11, 37 & 39	AFRC (March ARB, Retained by AF)	PCBs	No further action in ROD (AFRC 2005) based on UU/UE was concurred by the regulators.	No
Site 39	Base Gas Station, Building 2406	OU2 AFRC Sites 1, 11, 37 & 39	AFRC (March ARB, Retained by AF)	Fuels	No further action in ROD. The regulatory agencies concurred on the UU/UE recommendation for the site (AECOM 2013h).	No
Site 40	Landfill No. 8	AFRPA OU2	AFRPA (Transferred)	Household waste	Waste was removed in 1996 and placed at Site 6. No contamination remains above UU/UE levels. No further action in ROD.	No

Table ES-1. Sites at March ARB/Former March AFB
(Page 8 of 11)

Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
Site 42	Building 3404 Transformers	AFRPA OU2	AFRPA (Transferred)	PCBs	Contaminated soil removed. No further action in ROD (AFRPA 2004) for soil and groundwater based on UU/UE, land use covenant between current owner (County of Riverside) and California Department of Toxic Substances Control (DTSC) for PCB contamination in the concrete surface (a non-CERCLA component) inside Building 3404.	No
Site 2/27 Ground-water Plume	Site 2/27 Groundwater Plume	None	AFRC (March ARB, Retained by AF)	Fuel and solvents	Some groundwater cleanup accomplished with the Site 2 cleanup. Solvent contamination to be included in the upcoming CG049 OU5 ROD.	No
Operable Unit 3 Site						
Site 33*	Panero Aircraft Refueling Facility	None	AFRC (March ARB, Retained by AF)	Fuels and BTEX	Tanks were removed. Clean up being done under a Remedial Action Plan with the Regional Water Quality Control Board, Santa Ana Region. A Soil Vapor Extraction system removed significant amounts of fuel and now has been shut down with the active portion of the cleanup complete. Monitoring continues.	Yes

Table ES-1. Sites at March ARB/Former March AFB
(Page 9 of 11)

Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
Operable Unit 4 Sites						
Site 21	Effluent Pond	OU4	AFRPA (Transferred)	Treated waste water	No contamination identified above UU/UE levels. No further action in ROD.	No
Site 41	Hawes Radio Relay Facility, Barstow	OU4	AFRPA (Transferred)	Fuels and oil	Four USTs were removed in 1995. No contamination remains above UU/UE levels. No further action in ROD.	No
Site 44	Base Water Tower, Bldg 407	OU4	AFRC (March ARB, Retained by AF)	Mercury	Contaminated soil removed in 1997. No further action in ROD (AFCEE 2005) based on UU/UE was concurred by the regulators.	No
Site L (Site 45)	Former NCO Club Swimming Pool/PCB Site	OU4	AFRPA (Transferred)	PCBs	Some contaminated soil removed. Restricted from residential use in ROD.	Yes
Water Tank, Bldg 6601	Water Tank	OU4	AFRPA (Transferred)	Mercury	Contaminated soil removed. No further action in ROD (AFCEE 2005) based on UU/UE was concurred by the regulators.	No
Water Tank, Bldg 3410	Water Tank	OU4	AFRPA (Transferred)	Mercury	No contamination found above UU/UE levels. No action in ROD (AFCEE 2005) based on UU/UE was concurred by the regulators.	No
March Base Hospital/ Dental Clinic	Former Hospital and Dental Clinic	OU4	AFRPA (Transferred)	Mercury	No action in ROD (AFCEE 2005) based on UU/UE was concurred by the regulators.	No

Table ES-1. Sites at March ARB/Former March AFB
(Page 10 of 11)

Site	Site Description	ROD (see note on last page of table)	AFRPA/ AFRC	Contaminants	Actions/Status	Included in 5-Year Review?
No Operable Unit						
Site 43	Former Automotive Maintenance Area/Cal Trans Site	None	AFRPA (Transferred)	Fuels and BTEX	Contaminated soil removed. No further action for soil and groundwater based on UU/UE was concurred by the Regional Water Quality Control Board, Santa Ana Region under the UST program based on the Closure Letters received in 2002 and 2003.	No

Table ES-1. Sites at March ARB/Former March AFB
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Notes:
* Site 33 is a petroleum site and is being cleaned up under a RAP with the RWQCB under the Porter-Cologne Water Quality Control Act. There is no ROD for OU3 and none is planned.

&	and
AF	Air Force
AFRC	Air Force Reserve Command
AFRPA	Air Force Real Property Agency
ARB	Air Reserve Base
BTEX	benzene, toluene, ethylbenzene and xylenes
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CG049	Consolidated Groundwater Site 49
DTSC	Department of Toxic Substances Control
ESD	Explanation of Significant Differences
FS	Feasibility Study
HQ	headquarters
IRP	Installation Restoration Program
MCL	maximum contaminant level
No.	number
OU	Operable Unit
PAH	polynuclear aromatic hydrocarbon
PCB	polychlorinated biphenyl
POL	petroleum, oil and lubricants
PP	Proposed Plan
RI	Remedial Investigation
ROD	Record of Decision
RWQCB	Regional Water Quality Control Board, Santa Ana Region
UST	underground storage tank
vs.	versus

Note 1. Site 28, Zone Monitoring, was established in the IRP Phase II, Stage I in 1985 (Administrative Record number 8). The zone included suspected sources of solvents in groundwater. The zone monitoring concept was superseded by the ongoing groundwater monitoring program. Site 28 was not carried forward into a ROD. Also see OU1 Groundwater Plume following the numbered sites.

ROD Note: There are two existing RODs for OU2 sites. OU2 was set up before March AFB realigned in 1996. Separate ROD documents were prepared to meet the different requirements for sites retained by the Air Force and for sites transferred out of Air Force control. A ROD was completed for OU2 sites on the former March AFB (AFRPA OU2 sites), property that is no longer controlled by the Air Force. A ROD was completed for four OU2 sites on March ARB (OU2 AFRC Sites 1, 11, 37 & 39), property retained by the Air Force. Additional investigation was required for the remaining two OU2 sites, Site 8 and 36. A separate ROD for these sites is planned.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: March Air Force Base		
EPA ID: CA4570024527		
Region: 9	**State:** CA	**City/County:** Riverside/Riverside
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: Other Federal Agency **If "Other Federal Agency" was selected above, enter Agency name:** United States Air Force		
Author name (Federal or State Project Manager): United States Air Force		
Author affiliation: United States Air Force		
Review period: September 2013 – September 2014		
Date of site inspection: September 23, 2013		
Type of review: Statutory		
Review number: 3		
Triggering action date: September 2009		
Due date *(five years after triggering action date)*: September 2014		

Five-Year Review Summary Form (continued)

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU1 (Sites 4, 5,18, 29, 31, 34), OU2 (Sites 1, 6, 11, 17, and 19), OU3 (Site 33), and OU4 (Site L)

Issues and Recommendations Identified in the Five-Year Review:

OU(s): Site 7-OU1	Issue Category: Changed Site Conditions			
	Issue: A source of TCE contamination was recently discovered at the Site and the extent of TCE contamination has not been fully characterized by the previous FFS.			
	Recommendation: Conduct an additional investigation to fully characterize TCE soil contamination, amend previous FFS, and amend (as required) remedy selected in Draft Final RODA.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	Federal Facility	Federal Facility	2014

OU(s): OU1 Groundwater Plume	Issue Category: Remedy Performance			
	Issue: Site conditions have changed due to rising groundwater levels and the Basewide groundwater model needs to be updated, and the vapor intrusion risk assessment needs to be completed.			
	Recommendation: Investigate the impacts of rising groundwater in the OU1 Groundwater Plume, update the Basewide groundwater model, complete the vapor intrusion risk assessment as part of the Basewide groundwater OU5 FFS, and select a remedy in the OU5 ROD.			
Affect Current Protectiveness	Affect Future Protectiveness	Implementing Party	Oversight Party	Milestone Date
No	Yes	Federal Facility	Federal Facility	2014.

Five-Year Review Summary Form (continued)

Protectiveness Statement(s) – Operable Unit 1 (Site 4 - Landfill No. 6, Site 5 - Landfill No.3, Site 7 - Fire Protection Training Area No. 2, Site 18 - Engine Test Cell, Site 29 - Fire Protection Training Area No. 1, Site 31 - Solvent Spill, Site 34 - Pritchard Refueling System, and OU1 Groundwater Plume)

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
Operable Unit 1	Short-term Protective	Click here to enter date.

Protectiveness Statement:

The remedy at OU1 is short term protective of human health and the environment. For the remedy to be protective in the long-term, the following actions need to be taken:

- Conduct an additional investigation at Site 7 to fully characterize TCE soil contamination, amend previous FFS, and amend (as required) remedy selected in Draft Final RODA.
- Investigate the impacts of rising groundwater in the OU1 Groundwater Plume, update the Basewide groundwater model, complete the vapor intrusion risk assessment as part of the Basewide groundwater OU5 FFS, and select a remedy in the OU5 ROD.
- Complete the remedy implementation at Site 34, so that the Site will be protective in the long term.

Five-Year Review Summary Form (continued)

Protectiveness Statement(s) – Operable Unit 2 (Site 1 - Aircraft Isolation Area/Fuel Drainage Area, Site 6 - Landfill No.4, Site 11 - Bulk Fuels Storage Area, Site 17 - Swimming Pool Fill, and Site 19 - West March Sludge Drying Beds)		
Operable Unit: Operable Unit 2	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Click here to enter date.
Protectiveness Statement: The remedy at OU2 is protective of human health and the environment.		

Protectiveness Statement(s) – Operable Unit 3 (Site 33 – Panero Aircraft Refueling Facility)		
Operable Unit: Operable Unit 3	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Click here to enter date.
Protectiveness Statement: The remedy at OU3 is protective of human health and the environment.		

Protectiveness Statement(s) – Operable Unit 4 (Site L – Former NCO Club Swimming Pool/PCB Site)		
Operable Unit: Operable Unit 4	*Protectiveness Determination:* Protective	*Addendum Due Date (if applicable):* Click here to enter date.
Protectiveness Statement: The remedy at OU4 is protective of human health and the environment.		

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LIST OF ACRONYMS AND ABBREVIATIONS

<	less than
§	section
&	and
#	number
µg/L	micrograms per liter
AECOM	AECOM Technical Services, Inc.
AFB	Air Force Base
AFCEC	Air Force Civic Engineer Center
AFRC	Air Force Reserve Command
AFRPA	Air Force Real Property Agency
AMC	Air Mobility Command
ANG	Air National Guard
AOC	area of concern
AR	Administrative Record
ARAR	applicable or relevant and appropriate requirement
ARB	Air Reserve Base
BGP	Base General Plan
bgs	below ground surface
Bldg	building
BRAC	Base Realignment and Closure
BTEX	benzene, toluene, ethylbenzene, xylenes
Cal/EPA	California Environmental Protection Agency
CAP	Corrective Action Plan
CCR	California Code of Regulations
CDRL	Contract Deliverables Requirements List
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response Compensation and Liability Information System
CFR	Code of Federal Regulations
CG049	Consolidated Groundwater Site 49
COC	contaminant of concern
CTCL	carbon tetrachloride
DCA	dichloroethane
DCE	dichloroethene
DoD	Department of Defense
DQO	data quality objective
DTSC	Department of Toxic Substances Control, California

LIST OF ACRONYMS AND ABBREVIATIONS *(Continued)*

e.g.	for example (exempli gratia)
E.O.	Executive Order
Earth Tech	Earth Tech, Inc.
EGETS	Expanded Groundwater Extraction Treatment System
EPC	exposure point concentration
ERP	Environmental Restoration Program
ESD	Explanation of Significant Differences
ESI	Expanded Source Investigation
FFA	Federal Facilities Agreement
FFS	Focused Feasibility Study
FOSET	Finding of Suitability for Early Transfer
FRI	Focused Remedial Investigation
ft	foot or feet
HASP	Health and Safety Plan
HHRA	human health risk assessment
HI	hazard index
HpCDD	heptachlorodibenzo-p-dioxin
HQ	hazard quotient or headquarters
I-215	Interstate 215
IC	institutional control
i.e.	that is (id est)
IRP	Installation Restoration Program
IT	IT Corporation
JPA	Joint Powers Authority
LOX	liquid oxygen
LUC	land use control
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
MJPA	March Joint Powers Authority
MNA	monitored natural attenuation
msl	mean sea level
MW	monitoring well
MWH	MWH Americas, Inc.
NFA	no further action
NCO	Non-Commissioned Officer
NCP	National Oil and Hazardous Substances Pollution Contingency Plan

LIST OF ACRONYMS AND ABBREVIATIONS *(Continued)*

ND	not detected
NPL	National Priorities List
No.	number
OCDD	octachlorodibenzo-p-dioxin
O&M	operations and maintenance
OHM	OHM Remediation Services Corporation
OU	Operable Unit
OWS	oil/water separator
PBRC	Performance-Based Remediation Contract
PCB	polychlorinated biphenyl
PCE	tetrachloroethene
PFC	perfluorinated compound
POC	point-of-compliance
ppb	parts per billion
ppbv	parts per billion by volume
PRG	preliminary remediation goal
RAB	Restoration Advisory Board
RAO	remedial action objective
RA-O	remedial action-operation
RAP	Remedial Action Plan
RAR	Risk Assessment Revision
RCRA	Resource Conservation and Recovery Act
RD/RA	remedial design/remedial action
RFA	RCRA Facility Assessment
RI	Remedial Investigation
RIA	Remedial Investigation Addendum
ROD	Record of Decision
RODA	Record of Decision Amendment
RPM	Remedial Project Manager
RSL	regional screening level
RWQCB	Regional Water Quality Control Board, Santa Ana Region
SAC	Strategic Air Command
SARA	Superfund Amendments and Reauthorization Act
SC	site closeout
SVE	soil vapor extraction
TCDD	tetrachlorodibenzo-p-dioxin
TCE	trichloroethene
TCR	target cancer risk

LIST OF ACRONYMS AND ABBREVIATIONS *(Continued)*

TEF	toxic equivalent factor
TEQ	toxicity equivalent
Tetra Tech	Tetra Tech, Inc.
THQ	target hazard quotient
TPH	total petroleum hydrocarbons
TRC	target incremental lifetime cancer risk
TM	Technical Memorandum
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USEPA	United States Environmental Protection Agency
UST	underground storage tank
UU/UE	unlimited use/unrestricted exposure
VOC	volatile organic compound
vs.	versus

1.0 INTRODUCTION

This Report presents the results of the third five-year review for 15 sites located at March Air Force Base (AFB)/Air Reserve Base (ARB), California.

The 15 sites addressed in this report are the following:

- **Operable Unit (OU) 1:** Site 4 - Landfill No. 6; Site 5 – Landfill No. 3; Site 7– Fire Protection Training Area No. 2; Site 18 - Engine Test Cell; Site 29 – Fire Protection Training Area No. 1; Site 31 – Solvent Spill; Site 34 - Pritchard Refueling System; and OU1 1 Groundwater Plume
- **Operable Unit 2:** Site 1- Aircraft Isolation Area/Fuel Drainage Area; Site 6 – Landfill No. 4; Site 11 – Bulk Fuels Storage Area; Site 17 – Swimming Pool Fill; and Site 19 – West March Sludge Drying Beds
- **Operable Unit 3:** Site 33 – Panero Aircraft Refueling Facility
- **Operable Unit 4:** Site L – Former Non-Commissioned Officer (NCO) Club Swimming Pool/Polychlorinated Biphenyl (PCB) Site.

Based on the Department of Defense (DoD) Manual 4715.20 guidance/policy as implemented via Air Force Instruction (AFI) 32-7020, Section 16.5.1.2; Site 33, Panero Aircraft Refueling Facility (Petroleum Site) which was not included in the last Five-Year Review will be evaluated as part of this Five-Year Review In addition, as discussed in the June 11, 2013 Remedial Project Manager (RPM) meeting, the following two sites which were evaluated in the last Five-Year Review will not be evaluated in this Five-Year Review.

- **Site 12 – Civil Engineering Yard** - Closed as part of the last Five-Year Review in 2009.
- **Site 42 – Building 3404 Transformers** - The site was addressed in the OU 2 Record of Decision (ROD) (April 2004) as a no further action site for soil and groundwater components with no restriction on land use. Responsibility for maintenance of the non-Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) component (i.e., the concrete surface) has been transferred to the County of Riverside.

The purpose of the five-year review is to evaluate whether the remedies implemented at the sites discussed above are functioning as intended by their respective RODs (USAF 1995, 2004, 2005a, 2005b) and Remedial Action Plan (Air Force Reserve Command [AFRC] 2003a, b),and remain

protective of human health and the environment. The data cut-off date of May 31, 2013 was agreed upon during the June 11, 2013 RPM Meeting. This date was also used as the cut-off date for evaluation of revisions to toxicity criteria, USEPA RSLs, and MCLs. In addition, five-year review reports identify issues found during the review, if any, and identify recommendations to address them. The methods, findings, and conclusions of the reviews conducted are documented in this Five-Year Review Report. The data analysis in support of the five-year review and this report were prepared by AECOM Technical Services, Inc. (AECOM) on behalf of the United States Air Force (USAF).

This review is required by statute. The CERCLA section (§)121 as amended, states:

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

The March ARB Federal Facilities Agreement (FFA) defines a site as follows:

> "Site" shall include the Federal Facility of March Air Force Base as defined above, the facility as defined above, any area off the facility to or under which a release of hazardous substances has migrated, or threatens to migrate, from a source on or at March AFB.

The FFA also states in paragraph 5.2:

> March AFB is a facility under the jurisdiction, custody, or control of the Department of Defense within the meaning of Executive Order 12580, 52 Federal Register 2923, 29 January 1987. The Department of the Air Force is authorized to act in behalf of the Secretary of Defense for all functions delegated by the President through E.O. 12580 which are relevant to this Agreement.

The National Oil and Hazardous Substances Pollution Contingency Plan (NCP) part 300.430(f)(4)(ii) of the Code of Federal Regulations (CFR) states:

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

This is the third five-year review for March AFB/ARB. The triggering action for this review is the September 2009 five-year review. The five-year review is required because hazardous substances,

pollutants, or contaminants remain at a site above levels that allow for UU/UE. Sites in a completed ROD are listed in Table 1-1 below along with the criteria for inclusion/exclusion in this 5-year review.

Table 1-1. Sites in Completed RODs
(Page 1 of 2)

ROD	Site Number	Included in this Review	Rationale for Inclusion/Exclusion
OU 1	4	Yes	Landfill cap and groundwater extraction and treatment.
OU 1	5	Yes	No further action in ROD, but solid waste remains on-site.
OU 1	7	Yes	Restricted from residential use, more contamination found in 2007.
OU 1	9	No	No contamination above UU/UE levels.
OU 1	10	No	No contamination above UU/UE levels.
OU 1	13	No	No contamination above UU/UE levels.
OU 1	14	No	No contamination above UU/UE levels.
OU 1	15	No	No contamination above UU/UE levels.
OU 1	16	No	No contamination above UU/UE levels.
OU 1	18	Yes	Fuel contamination on this petroleum site, oversight provided by Regional Water Quality Control Board, Santa Ana Region. Based on the Department of Defense (DoD) Manual 4715.20 guidance/policy as implemented via AFI 32-7020, Section 16.5.1.2, this petroleum site will continue to be evaluated as part of this Five-Year review.
OU 1	29	Yes	Restricted from residential use.
OU 1	31	Yes	Groundwater extraction and treatment in progress.
OU 1	34	Yes	PAH contamination in surface soil.
OU 1	38	No	No contamination above UU/UE levels.
OU 1	OU1 Groundwater Plume	Yes	Contamination above UU/UE levels.
AFRPA OU2	3	No	No contamination above UU/UE levels.
AFRPA OU2	6	Yes	Waste containment cell in place.
AFRPA OU2	12	No	No contamination above UU/UE levels.
AFRPA OU2	17	Yes	Use restrictions.
AFRPA OU2	19	Yes	Use restrictions.
AFRPA OU2	20	No	No contamination above UU/UE levels.
AFRPA OU2	22	No	No contamination above UU/UE levels.
AFRPA OU2	23	No	No contamination above UU/UE levels.
AFRPA OU2	24	No	No contamination above UU/UE levels.
AFRPA OU2	25	No	No contamination above UU/UE levels.
AFRPA OU2	26	No	No contamination above UU/UE levels.

Table 1-1. Sites in Completed RODs
(Page 2 of 2)

ROD	Site Number	Included in this Review	Rationale for Inclusion/Exclusion
AFRPA OU2	30	No	No contamination above UU/UE levels.
AFRPA OU2	35	No	No contamination above UU/UE levels.
AFRPA OU2	40	No	No contamination above UU/UE levels.
AFRPA OU2	42	No	No CERCLA contamination above UU/UE levels. The County of Riverside has the responsibility of maintenance of the non-CERCLA component i.e., concrete surface.
AFRC OU2	1	Yes	Restricted from residential use.
AFRC OU2	11	Yes	Restricted from residential use.
AFRC OU2	37	No	No contamination above UU/UE levels.
AFRC OU2	39	No	No contamination above UU/UE levels.
OU3*	33	Yes	Fuel contamination on this petroleum site, oversight provided by Regional Water Quality Control Board, Santa Ana Region. Based on the DoD Manual 4715.20 guidance/policy as implemented via AFI 32-7020, Section 16.5.1.2, this petroleum site will be evaluated as part of this Five-Year review.
OU4	21	No	No contamination above UU/UE levels.
OU4	41	No	No contamination above UU/UE levels.
OU4	44	No	No contamination above UU/UE levels.
OU4	L	Yes	Restricted from residential use.
OU4	Water Tank, Bldg 6601	No	No contamination above UU/UE levels.
OU4	Water Tank, Bldg 3410	No	No contamination above UU/UE levels.
OU4	March Base Hospital/Dental Clinic	No	No contamination above UU/UE levels.

Notes:
* The Decision Document for Site 33 is the Remedial Action Plan (AFRC 2003b)

AFRC	Air Force Reserve Command
AFRPA	Air Force Real Property Agency
Bldg	building
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
OU	Operable Unit
ROD	Record of Decision
UU/UE	unlimited use and unrestricted exposure

A summary of the status of all the remediation sites by site number is presented in Table ES-1. The Air Force is the lead agency at March AFB/ARB. There is a FFA between the Air Force, United USEPA and State of California (USAF 1990). Section 27 of the FFA calls for a 5-Year review to be performed and reviewed by the FFA parties.

March AFB was realigned in 1996. The portion of March retained by the Air Force was re-designated as March ARB. Due to realignment, substantial areas of March (particularly at West March) have been transferred to civilian and other agencies, decreasing the 1993 area of the March AFB by about two thirds. The transferred area is referred to as the Former March AFB. The remediation of sites on March ARB is the responsibility of the Air Force Reserve Command (AFRC). The remediation of sites on the Former March AFB is the responsibility of Air Force Real Property Agency (AFRPA).

The technical assessments performed during this 5-year review examined the following questions:

- Question A – Is the remedy functioning as intended by the decision document?
- Question B – Are the assumptions used at the time of the remedy still valid?
- Question C – Has any other information come to light that could call into question the protectiveness of the remedy?

To answer these questions, the 5-year review included:

- Review of applicable site documents such as RODs, remedial action design documents, and site operations and maintenance (O&M) records and reports.
- Review of newly promulgated standards and applicable or relevant and appropriate requirements (ARARs) and pertinent toxicity values.
- Interviews with site managers.
- Performing site inspections.

Upon completion of the document reviews, interviews, and site inspections, conclusions of the 5-year review were developed. These conclusions include identification of remedy deficiencies, recommendations and follow-up actions, and a determination of whether the remedy is or is not expected to be protective of human health and the environment.

The Comprehensive Environmental Response Compensation and Liability Information System (CERCLIS) identification number is CA4570024527.

2.0 SITE CHRONOLOGY

Table 2-1 list the major events in the March AFB/March ARB cleanup program, while Tables 2-2, 2-3, 2-4, and 2-5 list the major chronology of events for OU 1, OU2, OU3, and OU4 respectively.

Table 2-1. March AFB/March ARB Major Events
(Page 1 of 2)

Date	Event
1918	Alessandro Aviation Field opened. Would eventually become March AFB.
March 1983	March AFB IRP process began.
November 1989	March AFB listed on the National Priorities List (NPL).
September 1990	Federal Facilities Agreement (FFA) signed.
July 1994	Final OU1 Remedial Investigation/Feasibility Study (RI/FS) published.
September 1994	OU3 FS report issued. It was later determined that the single site in OU3, Site 33, was a petroleum site and, as such, was outside of CERCLA. The Site 33 cleanup is being overseen by the Regional Water Quality Control Board, Santa Ana Region under the Porter-Cologne Water Quality Control Act. However, based on the DoD Manual 4715.20 guidance/policy as implemented via AFI 32-7020, Section 16.5.1.2, Site 33 is being evaluated for protectiveness as part of this Five-Year Review.
April 1996	March AFB realigns. Approximately one third of March AFB was retained by the Air Force as March ARB. Process begins to transfer other two thirds of March AFB out of Air Force control.
June 1996	OU1 Record of Decision (ROD) signed.
July 1997	OU2 RI/FS published.
2000	Because of delays in completing the OU2 ROD and the need to have a completed ROD for the sites that are not to be retained by the Air Force (these are the Air Force Real Property Agency [AFRPA] sites), the process to create separate OU2 ROD documents was started.
September 2000	Explanation of Significant Differences (ESD) for Sites 10 and 15.
September 2003	First 5-Year Review completed.
December 2003	Former OU3 Remedial Action Plan approved.
May 2004	ROD for AFRPA OU2 sites signed.
July 2004	OU4 Focused RI issued.
September 2005	ROD for AFRC OU2 Sites 1, 11, 37 and 39 signed.
September 2005	OU4 ROD signed.
2008	Land transfer complete.
2009	Final Supplemental Remedial Investigation/Focused Feasibility Study for the remaining OU2 sites, Site 8 and Site 36 (AFRC sites).
September 2009	Second 5-Year Review completed.
October 2010	Final Focused Feasibility Study for Site FT007, Operable Unit 1.
March 2011	Proposed Plan for Site FT007, Operable Unit 1.
December 2011	Revised Draft Basewide Groundwater Focused Remedial Investigation (FRI) and Focused Feasibility Study (FFS) submitted to the agencies and later withdrawn by the Air Force.
December 2011	Soil Vapor Investigation Report for Site FT007, Operable Unit 1.

Table 2-1. March AFB/March ARB Major Events
(Page 2 of 2)

Date	Event
January 2012	Final Corrective Action Plan for Surficial Soils Impacted by Lead and Petroleum Material, Site FT007, Operable Unit 1.
February 2013	Draft Final Record of Decision Amendment (RODA) for Operable Unit 1, Site FT007.
May 2013	Draft Proposed Plan for Site 31.
May 2013	ESD for Site 34.
July 2013	Draft Proposed Plan for Site 36.
2014	Revised Draft CG049 Focused Remedial Investigation and Focused Feasibility Study for the Basewide groundwater submitted to the Air Force. When a ROD is completed for CG049, all OU5 sites will be in a single ROD.

Notes:
AFB Air Force Base
AFRC Air Force Reserve Command
ARB Air Reserve Base
CERCLA Comprehensive Environmental, Response, Compensation, and Liability Act
CG049 Consolidated Groundwater Site 49
FFS Focused Feasibility Study
FRI Focused Remedial Investigation
IRP Installation Restoration Program

Table 2-2. Operable Unit 1 Chronology of Site Events
(Page 1 of 2)

Date	Event	Administrative Record Number or Other Record
March 1983	March AFB IRP process began (Phase I Record Search)	2
March 1985	Phase II, Stage 1 began	8, 9, 10
June 1987	Phase II, Stage 2 investigations began	15, 16, 17, 18, 19
July through December 1988	Phase II, Stage 3 performed	29, 30
December 1988	Phase II, Stage 4 began	87, 88
November 1989	March AFB listed on the National Priorities List (NPL)	54 Federal Register, November 21, 1989, at page 48187
September 1990	Federal Facilities Agreement (FFA) signed by the Air Force, U SEPA, and State of California; Base divided into three separate OUs to facilitate environmental restoration planning and implementation, 39 sites listed	53
July 1994	Final OU1 Remedial Investigation /Feasibility Study (RI/FS) published	279 -285
1994	Landfill Cap placed on Site 4	364

Table 2-2. Operable Unit 1 Chronology of Site Events
(Page 2 of 2)

June 1996	OU1 ROD signed	544
September 2000	Explanation of Significant Differences (ESD) Sites 10 and 15	1648
September 2003	First 5-Year Review completed	2197
November 2007	Site 4 Rising Groundwater Evaluation	2362
2007 -2008	Site 7 Investigation	2533
September 2009	Second 5-Year Review completed	2480
October 2010	Final Focused Feasibility Study for Site FT007, Operable Unit 1	2531
March 2011	Proposed Plan for Site FT007, Operable Unit 1	2544
December 2011	Revised Draft Basewide Groundwater Focused Remedial Investigation (FRI) and Focused Feasibility Study (FFS) submitted to the agencies and later withdrawn by the Air Force	Pending
December 2011	Soil Vapor Investigation Report for Site FT007, Operable Unit 1	Pending
January 2012	Final Corrective Action Plan for Surficial Soils Impacted by Lead and Petroleum Material, Site FT007, Operable Unit 1	Pending
February 2013	Draft Final Record of Decision Amendment (RODA) for Operable Unit 1, Site FT007	Pending
May 2013	Draft Proposed Plan for Site 31	Pending
October 2013	ESD for Site 34	Pending

Notes:
AFB Air Force Base
FFS Focused Feasibility Study
FRI Focused Remedial Investigation
IRP Installation Restoration Program
OU Operable Unit
ROD Record of Decision
USEPA United States Environmental Protection Agency

Table 2-3. Operable Unit 2 Chronology of Site Events

Date	Event	Administrative Record Number or Other Record
March 1983	March AFB IRP process began (Phase I Record Search)	2
March 1985	Phase II, Stage 1 began	8, 9, 10
June 1987	Phase II, Stage 2 investigations began	15, 16, 17, 18, 19
July through December 1988	Phase II, Stage 3 performed	29, 30
December 1988	Phase II, Stage 4 began	87, 88
November 1989	March AFB listed on the National Priorities List (NPL)	54 Federal Register, November 21, 1989, at page 48187
September 1990	Federal Facilities Agreement (FFA) signed by the Air Force, USEPA, and State of California; Base divided into three separate OUs to facilitate environmental restoration planning and implementation, 39 sites listed	53
April 1991	Site 40, 41 and 43 added to IRP	91
1994	Site 4 Landfill Cap Construction	364
July 1994	Site 17 Removal Action	349
1994-1995	Bioventing System at Site 34	771
December 1995	Site 1 Removal Action	552, 668, 581
1996	Site 12 Removal Action	739
1996	Site 6 Waste Cell Construction	789
July 1997	Final RI/FS report issued	678 -694
May 2004	ROD for AFRPA sites signed. This is the first ROD with OU2 sites.	2226
September 2005	ROD for AFRC OU2 Sites 1, 11, 37 and 39 signed. This is the second ROD with OU2 sites.	2289
April 2008	Site 12 Remedial Action Complete, Site Closed	2480
2009	Final Supplemental Remedial Investigation/Focused Feasibility Study for the remaining OU2 sites, Site 8 and Site 36 (AFRC sites). When a ROD is completed for Sites 8 and 36, all OU2 sites will be in a ROD.	2489
July 2013	Draft Proposed Plan for Site 36	Pending

Notes:

AFB	Air Force Base
AFRC	Air Force Reserve Command
AFRPA	Air Force Real Property Agency
FFS	Focused Feasibility Study
IRP	Installation Restoration Program
OU	Operable Unit
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
USEPA	United States Environmental Protection Agency

Table 2-4. Operable Unit 3 Chronology of Site Events

Date	Event	Administrative Record Number or Other Record
March 1983	March AFB IRP process began (Phase I Record Search)	2
March 1985	Phase II, Stage 1 began	8, 9, 10
June 1987	Phase II, Stage 2 investigations began	15, 16, 17, 18, 19
July through December 1988	Phase II, Stage 3 performed	29, 30
December 1988	Phase II, Stage 4 began	87, 88
November 1989	March AFB listed on the National Priorities List (NPL)	54 Federal Register, November 21, 1989, at page 48187
September 1990	Federal Facilities Agreement (FFA) signed by the Air Force, U SEPA, and State of California; Base divided into three separate OUs to facilitate environmental restoration planning and implementation, 39 sites listed	53
August 1994	RI report issued	304 -306
September 1994	FS report issued	288 -289
May 1997	Decision Document Removal Action Upgrade signed	700
October 2003	Remedial Action Plan submitted	2063
December 2003	Remedial Action Plan approved	2062

Notes:
AFB Air Force Base
FS Feasibility Study
IRP Installation Restoration Program
OU Operable Unit
RI Remedial Investigation
USEPA United States Environmental Protection Agency

Table 2-5. Operable Unit 4 Chronology of Site Events

Date	Event	Administrative Record Number or Other Record
March 1983	March AFB IRP process began (Phase I Record Search)	2
March 1985	Phase II, Stage 1 began	8, 9, 10
June 1987	Phase II, Stage 2 investigations began	15, 16, 17, 18, 19
July through December 1988	Phase II, Stage 3 performed	29, 30
December 1988	Phase II, Stage 4 began	87, 88
November 1989	March AFB listed on the National Priorities List (NPL)	54 Federal Register, November 21, 1989, at page 48187
September 1990	Federal Facilities Agreement (FFA) signed by the Air Force, USEPA, and State of California; Base divided into three separate OUs to facilitate environmental restoration planning and implementation, 39 sites listed	53
April 1991	Sites 40, 41 and 43 added to IRP	91
June 1996	Site L Removal Action	883
June 2000	Site L Mitigation	1302
July 2004	OU4 Focused RI issued	1995
September 2005	OU4 ROD signed	2261

Notes:
AFB Air Force Base
IRP Installation Restoration Program
OU Operable Unit
RI Remedial Investigation
ROD Record of Decision
USEPA United States Environmental Protection Agency

3.0 BASE AND OPERABLE UNIT BACKGROUND

This section provides an overview of the Base and operable unit (OU) background and history.

3.1 LOCATION

March AFB/March ARB is located at the northern end of the Perris Valley, east of the city of Riverside, in Riverside County, California. March AFB (the Base) is approximately 60 miles east of Los Angeles and 90 miles north of San Diego (Figure 3-1). The Base lies in sections of Township 3 South, Range 4 West, and covers portions of the Riverside East, Steele Peak, and Sunnymead, California quadrangle maps. The Base is bisected by Interstate 215 (I-215) in a northwest-southeast direction. The section to the east of the freeway is commonly referred to as the Main Base, and the section to the west is referred to as West March (Figure 3-2).

3.2 POPULATION

The total population in the vicinity of March AFB/ARB is over 500,000, including the cities of Moreno Valley, Riverside and Perris (Western Riverside Council of Governments, 2006).

3.3 LAND USE

The primary land use surrounding the Main Base is commercial and light industrial to the east and south, and agricultural to the south. Agricultural land uses are being displaced by commercial/light industrial uses. The western boundary of the Main Base/ARB is parallel to I-215. The current land use of the Main Base is primarily classified as industrial and comprises of repair, maintenance, and operation of military aircraft activities.

Most of the area in West March is no longer being retained by the Air Force and is planned for industrial reuse. Significant new construction is currently ongoing. To the west of West March is civilian housing of the city of Riverside.

3.4 CLIMATE

The climate of the March AFB/ARB is characterized as Mediterranean to semi-arid, with warm to hot summers and mild winters. Precipitation in the area averages about 14 inches of annual rainfall and primarily occurs from November through March.

3.5 GEOLOGY AND HYDROLOGY

March AFB/ARB is on the Perris Erosional Surface and the Paloma Surface. The depositional surface is underlain by sediments of various thicknesses that have filled the Perris Groundwater Basin. There are bedrock outcroppings on West March and near Site 18.

The bedrock surface was defined by a gravimetric survey and described as "complex bedrock scour surface morphology." The ground surface at the Main Base is relatively flat. Depth to bedrock ranges from 0-foot (at the bedrock outcroppings) to 900 feet below ground surface (bgs).

Subsurface investigations at the Main Base show that most of the underlying sediments consist of laterally discontinuous, interbedded fine to medium sands, silts, and lean clays with minor amounts of gravel. The uppermost units are not affected by elevation changes in the bedrock surface; deeper units are interrupted by bedrock highs.

On the Main Base, groundwater flow direction is generally to the southeast. Groundwater has been rising at the rate of 1-foot to 2 feet per year since the early 1990s. On average, groundwater levels increased approximately 0.2 feet between May 2011 and May 2012. The groundwater rise along with changes in well production in and around the Base has caused changes in the groundwater flow direction over the years. Groundwater on the Main Base has been characterized as semi-confined.

Groundwater on West March is essentially unconfined. Groundwater on West March exists in a relatively thin layer of weathered bedrock and alluvial soils.

3.5.1 GROUNDWATER LEVELS

Historic groundwater levels in the vicinity of March AFB rose approximately 40 ft to 50 ft between 1970 and 1984 (CH2M Hill 1984). Since 1992, groundwater levels have generally risen at rates of less

than 2 ft per year in the central part of the Base. Rising water levels are attributed to changes in land use from primarily agricultural to primarily suburban (mixed residential/commercial use), infiltration from Perris Reservoir approximately 3 miles southeast of the Base, and changes to groundwater extraction (e.g., cessation of pumping at former Base water supply wells and reduced pumping at the Box Springs wells) (AECOM 2011b).

The areas with the greatest increases in groundwater elevations since 1993 are the northwestern portion of the Base where a groundwater level increase of approximately 59 ft was noted (from 1990 to 2012) in 28MW01 and the southeastern off-Base area where an increase of approximately 89 ft was noted (from 1993 to 2012) in 5MW20. The area with the smallest groundwater level increase since 1992 is the northeastern portion of the off-Base area (east of Site 4), measured in 4MW05, where water levels have increased approximately 12 ft over that same period (AECOM 2013g).

Figure 3-3 shows the groundwater contours from 1970 and Figure 3-4 presents the three dimensional rendering of the bedrock surface with 1970 water levels. Note that in 1970, the groundwater in the northeast corner of the Base was between 1,400 feet and 1,450 feet above mean sea level. Figure 3-5 shows the groundwater contours in 1993 and Figure 3-6 presents the three dimensional rendering of the bedrock surface with 1993 water levels. In 1993, the groundwater in the northeast corner of the Base was around 1,480 feet above mean sea level in 1993. Figure 3-7 presents the three dimensional rendering of the bedrock surface with 2011 water levels and Figure 3-8 presents the historic three dimensional rendering of the bedrock surface. Figure 3-9 shows the groundwater contours in 2012. The groundwater in the northeast corner is now above 1,515 feet above mean sea level. Note that the direction of groundwater flow has changed somewhat over this period of time. In 1970 and 1993 the direction of flow was generally east to southeast. In the most recent monitoring round groundwater flow was generally more south to southeast.

Groundwater levels on West March are not rising.

3.6 SOIL

The Cieneba-Rockland-Fallbrook association and the Monserate-Arlington-Exeter association are the two major soil associations in the March AFB/ARB area. The Cieneba-Rockland-Fallbrook association is derived from granitic rock and occurs on the western portion of Base property. These soils are

typically 1-foot to 3 feet thick, with a surface layer of sandy loam to fine sandy loam; they are well drained, coarse to medium grained, with slopes ranging from 2 percent to 50 percent. The Monserate-Arlington-Exeter association is derived from granitic alluvium and occurs on the eastern portion of the Base. These well-drained soils have a surface layer of sandy loam, are fine to medium grained, and generally form gentle slopes.

3.7 SURFACE WATER AND WETLANDS

Permanent surface water impoundments do not exist on the Main Base. Small wetlands are associated with some of the West March sites, particularly Sites 6 and 40. Former quarries have filled with water and now support riparian habitats in these areas.

The United States Army Corps of Engineers (USACE) has performed a delineation of jurisdictional wetlands associated with the Cactus and Heacock flood control channels. These artificial channels act as ephemeral streams, support scattered wetland vegetation, and are considered waters of the United States. The USACE determined that approximately 2.17 acres of jurisdictional wetlands exist in the Heacock storm drain. The locations of these intermittent, localized patches of wetland vegetation change each year in accordance with the high volume, high velocity storm water flow through these channels during periods of rain.

3.8 WATER USE AND WELL INVENTORY

Water supply wells exist around March ARB. These wells have been primarily used for agricultural and domestic water supplies. See Section 4.8 for a discussion of water supply well sampling and Figure 4-9 for the location of water supply wells.

In previous years, March AFB owned wells that produced the Base's water supply. All of these wells have been destroyed. Four of these wells (BPW-1 through BPW-4) were situated on the Main Base. The other two (BPW-5 and BPW-6) were southeast of the Main Base on the Gregory Radio Site. Production well use on the Main Base ceased in 1983 and the wells (BPW-1 through BPW-4) were destroyed in May 1997. Use of BPW-5 and BPW-6 was discontinued in 1988 and the wells were destroyed in 2000. Water for March ARB/former March AFB is now supplied by the Western Municipal Water District from Northern California through the State Water Project.

3.9 RISK ASSESSMENT

EPA has published several new and relevant risk assessment guidance documents since the previous five-year review period. The following new guidance documents were reviewed to verify that the remedies at OU1, OU2, OU3, and OU4 remain valid:

- EPA. 2009. Risk Assessment Guidance for Superfund: Volume I Human Health Evaluation Manual –Part F, Supplemental Guidance for Inhalation Risk Assessment. January.
- EPA. 2011. Exposure Factors Handbook: 2011 Edition.

During this five-year review period (2009 to 2014), although no major changes to default exposure factors were implemented under RAGS, other key updates to human health risk assessment methodology under RAGS were made. For example, for RODs signed in 1996 with risk assessments done prior to that, the risk assessment methodology for assessing inhalation risk has changed significantly, in terms of intake equations (formerly found in RAGS Part A and RAGS Part B, EPA,1989, 1991) or default exposure factors Risk Assessment Guidance for Superfund, EPA, August 16, 1991). Within the current five-year review period, the HHRA methodology has shifted to use a concentration in air is used as the exposure metric (e.g., $\mu g/m^3$) rather than mathematically calculating an inhalation intake of a contaminant in air based on ingestion rate and body weight. The updated methodology is found in RAGS Part F, Supplemental Guidance for Inhalation Risk Assessment (EPA, 2009). This change in exposure assessment methodology since the ROD is a methodological change being addressed for basewide VI at OU5.

3.10 OPERABLE UNIT SITES

The OU concept to group similar sites in order to reduce overhead costs is used at March ARB/AFB.

3.10.1 OU1

OU1 is a groundwater and soil unit encompassing the sites along the eastern boundary and the OU1 groundwater plume. The OU1 Sites are 4, 5, 7, 9, 10, 13, 14, 15, 16, 18, 29, 31, 34 and 38. The OU1 ROD was signed in 1996, and was the only completed ROD at the time of the 2003 five-year review. The first five-year review in 2003 assessed Sites 4, 5, 7, 10, 15, 18, 29, 31, 34 and the OU1

groundwater plume. The other sites had no contamination left in place. The remediation at Sites 10 and 15 was completed after the OU1 ROD was signed and the 2003 five-year review recommended these sites not be included in further reviews.

The OU1 sites included in this review are Sites 4, 5, 7, 18, 29, 31, 34 and the OU1 groundwater plume (which are the same sites that were included in the second five-year review2009).

The OU1 site status is summarized in the following table.

Table 3-1. OU1 Site Status

Site Group	Sites In This 5-Year Review	Sites Not In This 5-Year Review
All OU1 ROD Sites	4, 5, 7, 18, 29, 31, 34, OU1 groundwater plume	9, 10, 13, 14, 15, 16, 38
OU1 ROD Sites on March ARB (AFRC sites)	5, 18, 29, 31, 34, OU1 groundwater plume	9, 10, 13, 14, 15, 16
OU1 ROD Sites on the former March AFB (AFRPA Sites)	4, 7	38

Notes:
AFB Air Force Base
AFRC Air Force Reserve Command
AFRPA Air Force Real Property Agency
ARB Air Reserve Base
OU Operable Unit
ROD Record of Decision

3.10.2 OU2

OU2 is a groundwater and soil unit for all sites not included in the other OUs. The OU2 sites are 1, 2, 3, 6, 8, 11, 12, 17, 19, 20, 22, 23, 24, 25, 26, 27, 28, 30, 32, 35, 36, 37, 39, 40, and 42. When March AFB realigned in 1996, the OU2 ROD had not been completed. Subsequently, a ROD for the OU2 sites property that was not retained by the Air Force was signed in 2004 (AFRPA OU2 ROD, USAF 2004) and a ROD for most of the sites on property retained by the Air Force was signed in 2005 (ROD for Sites 1, 11, 37 and 39, USAF 2005a). A ROD has not been completed for two sites being retained by the Air Force (Sites 8 and 36). Sites 2 and 27 are petroleum sites and are being closed under a Remedial Action Plan (RAP) with the RWQCB under the Porter-Cologne Water Quality

Control Act. Site 28, Monitoring Wells, and Site 32, Construction Debris Area, were not continued forward to a ROD.

The OU2 sites included in this review are Sites 1, 6, 11, 17, and 19. No contamination was left in place at Sites 3, 12, 20, 22, 23, 24, 25, 26, 28, 32, 35, 37, 39, 40, and 42.

The OU2 site status is summarized in the following table.

Table 3-2. OU2 Site Status

Site Group	Sites In This 5-Year Review	Sites Not In This 5-Year Review
AFRPA OU2 ROD (May 04) Sites	6, 17, 19	3, 12, 20, 22, 23, 24, 25, 26, 30, 35, 40, 42
AFRC OU2 ROD for Sites 1, 11, 37 and 39 (September 05) Sites	1, 11	37, 39
Future AFRC OU2 ROD Site		8, 36
Petroleum Sites originally included in OU2		2, 27
OU2 Sites not carried forward to a ROD		28, 32

Notes:
AFRC Air Force Reserve Command
AFRPA Air Force Real Property Agency
OU Operable Unit
ROD Record of Decision

3.10.3 OU3

OU3 has only one site, Site 33, the former Panero aircraft fueling system. Site 33 is a petroleum site and is being cleaned up under a RAP with the RWQCB under the Porter-Cologne Water Quality Control Act. There is no ROD for OU3 and none is planned. This petroleum site is being evaluated as part of this five-year review in accordance with the DoD 5-year guidance found within DoD Manual 4715.20, Defense Environmental Restoration Program (DERP) Management, revised as a result of the Federal Facilities Cleanup Dialogue (FFCD) meetings hosted by EPA's Federal Facility Restoration and Reuse Office and an internal EPA IG audit, and AFI32-7020 Section 16.

3.10.4 OU4

OU4 consists of Sites 21, 41, 44, L, Water Tower 3410, Water Tank 6601, and Hospital and Dental Clinic. The OU4 ROD was signed in 2005.

The OU4 site included in this review is Site L. The other sites have no contamination left in place.

3.10.5 OU5

Currently, the USAF is in the process of issuing the Revised Draft Consolidated Groundwater Site 49 (CG049) Focused Remedial Investigation (FRI) and Focused Feasibility Study (FFS) for the Basewide groundwater to the regulatory agencies. Components of the Basewide Groundwater Plume will include groundwater underlying OUs 1 and 2 and other ERP sites at March ARB. These components will be incorporated into a new OU (i.e., OU 5), hereafter referred to as the Consolidated Groundwater Site 49 (or CG049); therefore, OU 5 will supersede all previous groundwater components of OUs except at Site 36.

3.11 VAPOR INTRUSION

A revised draft CG049 FRI/FFS which includes the evaluation of the vapor intrusion pathway has been submitted to the Air Force for review (AECOM 2014 in prep.) Thus, the impact of vapor intrusion pathway will be evaluated as part of the Basewide groundwater addressed as Consolidated Groundwater Site 49 (CG049) in OU5.

3.12 COMMUNITY INVOLVEMENT AND INTERVIEWS

A Restoration Advisory Board (RAB) has been established for the cleanup at March. The RAB is a citizens' advisory group for the environmental cleanup of the Base.

The public was informed of the five-year review at the 6 November 2013 RAB meeting and the public can access a copy of the Five-Year Review document through the March Administrative Record once the Draft is submitted to the regulators. A display ad is placed in the local newspaper (Riverside Press-Enterprise) for the RAB meetings and notice of the RAB meetings is sent out to the RAB mailing list. A review of the draft five-year review was the featured presentation at the 6 November RAB meeting.

No comments that would require changing the draft five-year review were received. Minutes of 6 November RAB meeting are included in Appendix B.

The 5-year review was performed by AECOM on behalf of the Air Force for March ARB. The 5-year review consisted of the following activities: a review of related documents and a site inspection. As part of this 5-year review the following personnel were contacted as part of the interview process:

- John Lucey, U.S. EPA, Region 9;
- Stephen Niou, California DTSC;
- Patricia Hannon, California RWQCB, Santa Ana Region;
- Eric Lehto, Air Force;
- Jerry W. Bingham, BRAC Environmental Coordinator; and
- Gerald Budlong, Restoration Advisory Board Co-Chair.

The completed interview record forms were provided by all except U.S. EPA and RWQCB, and are included in Appendix G.

4.0 OPERABLE UNIT 1 SITES

This Section includes the evaluation of the following OU1 Sites for protectiveness:

- Site 4 - Landfill No. 6;
- Site 5 – Landfill No. 3;
- Site 7– Fire Protection Training Area No. 2;
- Site 18 - Engine Test Cell;
- Site 29 – Fire Protection Training Area No. 1;
- Site 31 – Solvent Spill;
- Site 34 - Pritchard Refueling System; and
- Operable Unit 1 Groundwater Plume.

4.1 SITE 4 – LANDFILL NO. 6

Site 4 (LF004) covers approximately 8.5 acres and is situated along the eastern boundary of the former Base (Figure 4-1). It is on the former March AFB and the environmental cleanup is controlled by the AFCEC. Site 4 is an OU1 site and is included in the OU1 ROD (USAF 1995).

Currently: Transferred to the city of Moreno Valley Community Services District. A landfill cap and groundwater extraction wells have been installed. The Air Force is responsible for maintenance of the landfill cap and operating the groundwater extraction wells and groundwater treatment system. ICs are in place in the form of deed restrictions and a State Land Use Covenant. The groundwater extraction wells are in place and working properly. Groundwater monitoring indicates that rising groundwater levels on the Main Base are not degrading the remedy at Site 4.

Historic: A section of the Heacock storm drain runs southerly adjacent to the site's eastern boundary. Heacock Street is approximately 250 feet from the eastern boundary of the site. A residential housing area is situated across Heacock Street along the northern two thirds of the site. Grassy fields, formerly part of the Base property, are to the west of the site.

The Site 4 landfill was in operation from 1955 to 1969. The RI/FS performed at Site 4 noted that the landfill is up to 25 feet deep and contains primarily sanitary waste, construction rubble and debris. Small amounts of medical wastes and empty petroleum product containers were also present. An estimated 150,000 cubic yards of waste were deposited at the landfill during its operation.

Soil samples from boreholes, test pits, and surface locations as well as soil gas and groundwater samples were collected from Site 4. Based on the results of the sampling, it was noted that beryllium and several PAHs were present in the surface soil (0-2 feet bgs) at concentrations that exceed USEPA Region 9 PRGs. The analytical data also indicated that presence of very low concentrations of chlorinated solvents in the subsurface soil and soil gas beneath the site.

Groundwater sampling also found several chemicals greater than the MCL for drinking water. Two of the chemicals, bis(2-ethylhexyl)phthalate and methylene chloride, were determined to be lab contaminants after the ROD was signed. The 1996 and 1997 Annual Groundwater Monitoring Reports (ARs 802 and 995) listed them as common laboratory contaminants. Bis(2-ethylhexyl)phthalate and methylene chloride are no longer contaminants of concern. The remaining groundwater chemicals above their respective MCLs in the OU1 ROD are listed below.

Table 4-1. Site 4 Groundwater Concentrations Exceeding MCLs in the 1996 OU1 ROD

Chemical	Maximum Concentration (μg/L)	MCL in OU1 ROD (μg/L)	Current MCL (μg/L)
PCE	260	5	5
TCE	85	5	5
Vinyl Chloride	8	0.5*	0.5*
cis-1,2-Dichloroethene	21	6*	6*

Notes:
* California MCL
μg/L micrograms per liter
MCL maximum contaminant level
OU Operable Unit
PCE tetrachloroethene
ROD Record of Decision
TCE trichloroethene

Site 4 is contained in FOSET for Parcels D-1, I-2, J-4, and K-5D South, February 2007 (USAF 2007). The property associated with Site 4 (Parcel I-2) was transferred via an early transfer approved by USEPA with the Governor's concurrence, and deed restrictions are in place as well as a State Land Use Covenant in accordance with the FOSET. The deed restrictions and State Land Use Covenant are

recorded with the County of Riverside. The specific deed restrictions from the FOSET are presented in Appendix D. They include restricting Site 4 from residential use, protecting the landfill cover and prohibiting groundwater extraction for any purpose other than monitoring.

4.1.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 4.

4.1.1.1 Remedy Selection

The remedial actions selected in the OU1 ROD are summarized below. The OU1 ROD was finalized in 1995 and signed in 1996. The remedial action objectives have been implemented as described below.

- Obtain closure of the landfill in accordance with substantive requirement of California regulations (Title 23, Chapter 15, Article 8). This included installation of a cap over the landfill, protection of the cap from erosion, long-term maintenance of the cap, and groundwater monitoring.
- Secure the site by enclosing it in fencing that will limit access except for monitoring and maintenance activities.
- Implement groundwater extraction and treatment.
- Implementation of deed restrictions to prohibit the use of site groundwater, until groundwater cleanup standards have been achieved.

The groundwater plume associated with Site 4 will be considered remediated when the groundwater meets the specified cleanup levels in Table 4-1.

In the OU1 ROD, the Site 4 groundwater remedy was grouped with the OU1 groundwater plume remedy (see Section 4.8). The OU1 ROD identified the groundwater remedial action as an expansion of the groundwater extraction and treatment system at the Base boundary in order to control/minimize the off-Base migration of the on-Base plume and to treat the contaminated water from the existing plume. The plume downgradient of the base boundary will be allowed to dissipate. Groundwater monitoring will be performed to ensure the on-Base portion of plume does not migrate off-Base, to

ensure the maximum concentration of off-Base contaminants continues to fall, and to ensure the off-Base plume does not threaten off-Base water supplies.

4.1.1.2 Remedy Implementation

Groundwater

At Site 4, there are three extraction wells, 4EX01, 4EX02 and 4MW01. Water from these wells is treated at Site 31. These wells are part of the Expanded Groundwater Extraction and Treatment System (EGETS), a series of groundwater wells that prevent contaminated groundwater from leaving the Base (see Section 4.6 and Section 4.8). As part of the operation of this system, the wells are redeveloped as required, to maintain groundwater pumping rates. The Site 4 wells are subject to bio-fouling and generally have to be redeveloped more often.

Monitoring of the groundwater around Site 4 is accomplished under the Basewide groundwater monitoring program. The Draft 2011-2012 Annual Monitoring Report (AECOM 2013b) recommends continued monitoring. The groundwater program includes semiannual groundwater level measurements on the Main Base. The groundwater surface is currently above the bottom in the waste in the northern and central sections of Site 4. See Section 4.1.2.3 for a further discussion of the impact of rising groundwater. Groundwater levels have been increasing on the Main Base, however, groundwater levels decreased by an average of 0.5-foot from the second quarter of 2011 to the second Quarter of 2012 at Site 4. However, Site 4 water levels increased overall by approximately 0.9-foot per year since 2000.

Landfill/Soil

The landfill cap was constructed in 1994. The cap was constructed in two parts. One part is the sloped area next to the Heacock storm drain. The other part is the relatively flat areas of the landfill. The cap next to the Heacock storm drain consists of (from bottom to top): a compacted subgrade layer, a 1-foot compacted foundation layer, an 18-inch clay barrier layer, a 6-inch sand filter layer, a 6-inch gravel bedding layer, a non-woven geotextile, and 2 feet to 4 feet of rip-rap. Concrete was placed over the rip-rap in some areas to prevent erosion. The cap over the rest of the landfill consists of (from bottom to top): a 1-foot undisturbed native cover layer, a 6-inch compacted native foundation layer, a 6-inch screened native foundation layer, a barrier layer, a 9-inch screened cover layer, and a 9-inch vegetative

layer. The area was seeded in November 1994. Other features of the closure efforts included fencing, perimeter drain installation, road construction and well installation.

4.1.1.3 System Operations/Operations and Maintenance

System operations for the past five years were conducted in accordance with the approved Landfill Operations and Maintenance Work Plan, OU1, Site 4, Landfill 6 (Tetra Tech Inc. and Black & Veatch 1999), Landfill Operations, Maintenance, and Monitoring Work Plan Addendum (AECOM 2010), and the Remedial Action-Operation (RA-O) Work Plan Addendum (AECOM 2013c). System operations, as they are described in the RA-O Work Plan Addendum, are as follows:

- Security fencing is visually inspected on a semiannual basis or after major storm events. Repairs are performed as needed.
- Annual inspection of the landfill to confirm that ICs that are part of the remedy have not been violated.
- Five settlement monuments are inspected semiannually and after major storm events to ensure that they are intact and no areas have been disturbed. Repairs are performed as needed. The five settlement monuments are surveyed by a license land surveyor every five years in order to monitor settlement.
- The rip-rap protective layer along the Heacock Channel is visually inspected semiannually and after major storm events to ensure that no erosion is taking place and that no areas have been disturbed. Repairs are performed as needed.
- The clean out risers, drainage ditches, and the overflow channel are visually inspected semiannually and after major storm events to ensure that they are in good working condition, free of any debris, and that no areas have been disturbed. Repairs are performed as needed.
- Visual inspections of the vegetative cover are performed semiannually to note areas of erosion, subsidence, or other damage. Areas of sparse or dead grass are remulched or reseeded.
- The membrane liner is inspected semiannually and after major storm events to ensure that no erosion is taking place and that no areas have been disturbed. Repairs are performed as needed.
- Surface runoff water is monitored in order to note any discharging of contaminants.
- Groundwater monitoring at point-of-compliance (POC) wells and a background monitoring well occurs on a semiannual basis as part of the Basewide groundwater

sampling program. The POC wells are 4MW5, 4MW13, 4MW19, 4MW18 (if needed), 4MW20, and 4MW22. The background well is 6M4MW24.

Prior to the award of a Performance Based Remediation (PBR) contract in June 2012, O&M actions at March ARB/former March AFB were grouped into different contracts with the goal of providing a comprehensive environmental solution for the entire March ARB/former March AFB complex. Costs were generally in line with estimates and had not changed appreciably up to the PBR contract award. In the future, as sole operator, the PBR contractor will be able to provide a more effective assessment of possible O&M optimizations/reductions.

4.1.1.4 Progress Since the Last 5-Year Review

The Basewide groundwater program has been monitoring contaminant concentrations and groundwater levels (see Section 4.1.2.3). The rising groundwater, which was an issue during the last 5-year review in 2009, has been addressed in Section 4.1.2.3.

4.1.2 SITE 4 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 4.

4.1.2.1 Site Inspection

The site inspection started on 23 September 2013 by AECOM personnel. No discrepancies were noted. No evidence of unauthorized digging was observed. Vandalism has occurred at Site 4 in the past including an incidence of wire theft. Motion sensor lighting and simulated surveillance cameras were installed at the site post vandalism. No further vandalism has occurred since the security features were added. The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

4.1.2.2 Risk Information Review

Human Health Risk

Soil

The ROD for this site was signed in 1996. The current toxicity criteria from regional screening tables (RSL) tables, dated May 2013, obtained from the USEPA website, were reviewed and are consistent

with the toxicity criteria used for the cleanup levels of COCs at Site 4 in the ROD. The COCs identified for Site 4 in the ROD were benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenz(a,h)anthracene and indeno(1,2,3-c,d)pyrene. Concerns about the protectiveness of the remedy are driven by the groundwater.

Regulations dealing with landfill closure requirements have been administratively changed from California Code of Regulations (CCR) Title 23 to Title 27. Actual requirements have not changed.

Groundwater

The following standards were identified as ARARs in the OU1 ROD. They were reviewed for changes that could affect protectiveness:

- MCLs for Primary Drinking Water (Title 22, CCR, Division 4, Chapter 15, Article 5.5, Section 64444.5
- National Primary Drinking Water Regulations (40 CFR 141.61, MCLs for Organic Contaminants)

The most restrictive MCLs for the COCs have not changed since the OU1 ROD was signed.

Ecological Risk

Site 4 is in a developed area of the former March AFB; ecological risk was not evaluated for the OU1 ROD. Site conditions have not changed, therefore the conclusions stated in the ROD are still valid.

4.1.2.3 Data Review

Landfill

Site 4 landfill monitoring is documented in annual monitoring reports. A review of the 2009 Annual Operations, Monitoring and Maintenance Report, Operable Unit 1, IRP Site 4; 2010 Annual Operations, Monitoring, and Maintenance Report, Operable Unit 1, IRP Site 4 and Operable Unit 2, IRP Site 6; 2011 Annual Operations, Monitoring, and Maintenance Report, Operable Unit 1, IRP Site 4

and Operable Unit 2, IRP Site 6; and the 2012 Annual Landfill Remedial Action-Operation Report, IRP Sites 4, 5, and 6 (AECOM 2010a, 2010b, 2011, 2012a, 2013d) showed that:

- Required inspections and maintenance has been performed. A depression in the Strip Landfill immediately north of Settlement Monument SM-2 was repaired in February 2011. The depression was approximately 13 inches deep at the center and measured 60 feet long by 25 feet wide. No evidence of stress cracks or loss of barrier layer integrity was observed in two test pits excavated prior to the repair. Approximately 83 cubic yards of silty sand was imported to the site and spread, graded, and compacted to complete the repair.

- Landfill point of compliance monitoring under CFR, Title 40, Part 258 and CCR Title 27, Subchapter 3, Article was discontinued in 2003. Since there are groundwater extraction wells on the site, Site 4 is an active remediation site. The landfill compliance monitoring requirements are to determine if there is leakage from a landfill under passive conditions. TCE and PCE plumes are monitored and evaluated at Site 4 under the groundwater monitoring program. Analysis of the TCE and PCE plumes indicate that the landfill is not a continuing source of contamination, as discussed in the following section on groundwater. This indicates that monitoring for additional pollutants does not need to be reinstated. For reference, a listing of the priority pollutants found at Site 4 is included in Appendix F.

- Landfill gas perimeter monitoring was conducted. Methane levels were below the compliance limit of 5 percent in 2009 and 2012. Readings from probe LFG-9 in March 2010 and March 2011 were 32 percent and 34percent, respectively, above 5 percent compliance limit. Since March 2011, methane levels in LFG-9 have been measured at 0.0 percent.

Groundwater

Peak contaminant concentrations have decreased since the OU1 ROD with the exception of breakdown product cis-1,2-dichloroethene (see Table 4-2).

Table 4-2. Site 4 Groundwater Concentrations in 2011-2012 Annual Monitoring Report vs OU1 ROD (1995) Concentrations

Chemical	1996 or Earlier Maximum Concentration from OU1 ROD(µg/L)	2011-2012 Maximum Concentration from Draft 2011-2012 Annual Monitoring Report, Long-Term Groundwater Monitoring Programs (µg/L)
PCE	260	95
TCE	85	27
Vinyl Chloride	8	0.20
cis-1,2-Dichloroethene	21	49 (Note 1)

Notes:

Note 1: Elevated concentrations of the breakdown product cis-1, 2 DCE are typically encountered in areas of historically high PCE and TCE concentrations due to biodegradation of these chlorinated hydrocarbons.

µg/L micrograms per liter
DCE dichloroethene
OU Operable Unit
PCE tetrachloroethene
ROD Record of Decision
TCE trichloroethene
vs. versus

South of Site 4, bedrock monitoring Well OU1MW4 has shown consistently high PCE levels ranging from 25 µg/L to 100 µg/L with no clear trend. In general, the groundwater plumes for PCE in the upper alluvial unit did not change significantly between 2007 and 2012. The PCE and TCE groundwater plumes in the lower alluvial and bedrock units have not changed significantly since 2000 (AECOM 2013b, 2013e).

The effects of the rising groundwater were evaluated in the Revised Final Operable Unit 1, IRP Site 4, Landfill No. 6, Rising Groundwater Evaluation Report, Former March Air Force Base (AECOM 2009). The report evaluated the rising groundwater and corrective actions and costs of implementation to bring Site 4 into compliance with CCR Title 27, Chapter 3, Subchapter 2, Article 3(c), §20240, which states that landfill waste must be at least 5 feet above the surface of the groundwater.

Additional groundwater sampling was performed from 2007 through 2008, which determined that the submerged waste in the central and northern portions of the Site 4 landfill was not a continuing source of contamination (AFRC 2009a; MWH 2009). During the April 2009 Remedial Project Managers Meeting, the RWQCB agreed that the existing remedy was adequate and that further action at the site would not be necessary (AFRC 2009b). This indicates that groundwater is protected with the existing

system and further efforts to achieve a 5-foot separation would not provide enough value to warrant the cost. Monitoring and analysis continues.

4.1.3 SITE 4 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 4. Additional sampling and analysis are being conducted.

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

Implementation of Institutional Controls and Other Measures: The ICs are identified in deed restrictions and a State Land Use Covenant, both on file with the County of Riverside. Inspections conducted since the last 5-Year review in 2009 have indicated and verified no breaches in the IC restrictions.

Remedial Action Performance: Analysis of the TCE and PCE plumes indicate that the landfill is not a continuing source of contamination. The landfill cap and site fences prevent direct access to the wastes.

System Operations/Operations and Maintenance: The current O&M procedures include routine cap maintenance, landfill gas monitoring, groundwater extraction and monitoring. As part of the closure/post closure requirements, the Air Force prepares semiannual and annual inspection reports for regulatory review and comments. Groundwater extraction and monitoring will continue until cleanup goals are achieved.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented..

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the 5-year review. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure identified. No site-specific VI assessment has been completed, and the VI pathway is being addressed under OU5 basewide groundwater ROD.

Changes in Toxicity and Other Contaminant Characteristics: Though there have been changes in toxicity or other contaminant characteristics for TCE and PCE, the Federal or State MCLs (driven by the ARARs) have not changed, and therefore, it does not affect the protectiveness of the remedy. In addition, under EPA OSWER guidance (9200.4-23, August 22, 1997, Clarification of the Role of

ARARs in Establishing PRGs under CERCLA), compliance with ARARs is deemed to be protective absent very unique situations and factors which are not present here.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

4.1.4 SITE 4 ISSUES

None.

4.1.5 SITE 4 ASSESSMENT

The landfill cap and site fences prevent direct access to the wastes. LUCs are contained in property transfer documents to help prevent future direct access to the wastes. The landfill gas monitoring demonstrates that Site 4 is meeting landfill gas standards.

4.1.6 SITE 4 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

4.1.7 PROTECTIVENESS STATEMENT

The remedy at Site 4 is protective of human health and the environment.

4.1.8 NEXT REVIEW

Site 4 should be included in the next 5-year review, five years from the completion of this review.

4.2 SITE 5 – LANDFILL NO. 3

Site 5 (LF005) is on March ARB and is controlled by the AFRC. Site 5 covers approximately 5 acres and is situated along the southeast side of the flightline area (Figure 4-2). Site 5 is an OU1 site and is included in the OU1 ROD (USAF 1995).

Currently: Located on March ARB. Site 5 is identified as a former landfill in the March ARB General Plan. Site 5 was identified for NFA in the OU1 ROD. No ICs or LUCs were identified as part of the remedy for Site 5. However, since landfill materials remain, the March ARB General Plan maintains a record of the landfill limits.

Historic: The landfill was in operation from the late 1940s to approximately 1960. The OU1 RI/FS performed at Site 5 noted that the landfill consisted of construction rubble, newspaper, office waste, bottles and miscellaneous paper products. The construction rubble makes up a majority of the waste. The landfill pits range from 12 feet to 17 feet in depth. It is estimated that approximately 18,500 cubic yards of waste are present at Site 5 based on the OU1 RI/FS.

Soil samples from boreholes, test pits, and surface locations as well as soil gas and groundwater samples were collected from Site 5 during the OU1 RI/FS. Based on the analytical results, there were no significant levels of contaminants found in the soil or soil gas. Analysis of Basewide groundwater contamination indicates that Site 5 is not a source of groundwater contamination. Contaminants found in the groundwater at Site 5 are being dealt with under the OU1 Groundwater Plume (Section 4.8).

Risk assessments were conducted for Site 5 following USEPA Region 9 and California Environmental Protection Agency (Cal/EPA) guidance. The risk assessments produced estimates of the potential risk to public health that could result from ingesting the contaminants detected at Site 5. These risks were determined to be insignificant and the site was approved for NFA based on UU/UE in the OU1 ROD.

Site 5 is part of March ARB and there are no plans to transfer the property from Air Force control. Site 5 is secured from the general public by the Base fence. The Site 5 groundwater is not being used.

4.2.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 5.

4.2.1.1 Remedy Selection

The remedial action identified in the OU1 ROD for Site 5 was NFA because Site 5 contained no significant levels of contamination in the soil or soil gas. The OU1 ROD was issued in 1995. Contaminants identified in the groundwater beneath Site 5 are attributable to other upgradient sources and are addressed in the OU1 Groundwater Plume remedy.

4.2.1.2 Remedy Implementation

The NFA remedy selected did not require any action to be taken on the site.

4.2.1.3 System Operations/Operations and Maintenance

There are no O&M activities required at the site since the approved action at Site 5 was NFA, however, the non-engineered soil cover present at LF005 will be inspected semiannually and maintained if required in accordance with the RA-O Work Plan Addendum (AECOM 2013c). Significant cracks, depressions, and erosion areas will be noted, and repairs made if waste is exposed.

4.2.1.4 Progress Since the Last 5-Year Review

LUC objectives have been implemented as part of the Draft Land Use Control Implementation Plan (AECOM 2012b). These objectives include identifying the landfill in the BGP, ensuring the site continues to be included in the Base Digging Permit process to prevent inadvertent exposure to waste materials, and performance of an annual LUC inspection to verify that objectives are met. No issues were identified during the last 5-year review in 2009.

4.2.2 SITE 5 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 5.

4.2.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. No evidence of unauthorized digging was observed.

The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

4.2.2.2 Risk Information Review

Human Health Risk

The ROD for this site was issued in 1995. No risk to current or future populations was identified from the soil. Groundwater risk in the Site 5 area is included in the OU1 groundwater plume (see Section 4.8).

Site 5 has been identified as a landfill in the BGP (see Appendix C.). The Base Digging Permit process requires that any excavating or digging on-Base have the approval of the Base environmental office before any work is conducted. The Digging Permit process is used to prevent inadvertent exposure to landfill materials.

Ecological Risk

Site 5 is in a developed area of March ARB; ecological risk was not evaluated for the OU1 ROD. Site conditions have not changed; therefore the conclusions stated in the ROD are still valid.

4.2.2.3 Data Review

A review of the OU1 ROD signed in 1996 indicated that the site did not pose a threat to human health and the environment and was approved for NFA.

Groundwater levels are measured semiannually throughout the Base. Groundwater levels have been rising at the rate of about 1-foot to 2 feet per year. Groundwater levels measured in the Site 5 area are approximately 23 feet bgs with landfill materials at 12 feet to 17 feet bgs.

Table 4-3. Site 5 Groundwater Elevations

Well Number, North to South Along Site 5	First Quarter 2013 Groundwater Elevation (ft msl)	Top of Casing Elevation (ft msl)	Depth of Water Below Top of Casing (ft)	Screened Interval (ft below Top of Casing)
9MW02	1474.48	1497.21	22.73	148.56-158.56
5MW28	1472.98	1495.58	22.60	124.20-134.20
5MW29	14670.76	1494.45	23.69	91.65-101.65
5MW30	14670.27	1494.43	24.16	149.56-159.56
5MW01	14670.32	1494.87	24.55	47.05-87.05

Notes:
ft feet
msl mean sea level

4.2.3 SITE 5 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 5.

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

Implementation of Institutional Controls and Other Measures: The OU1 ROD listed Site 5 as a NFA site. No ICs or LUCs were identified as necessary for the Site 5 remedy to be protective of human health and the environment. However, since landfill materials remain in place, Site 5 has been identified as a landfill in the BGP and all earth work on-Base is subject to the digging permit system.

Remedial Action Performance: The OU1 ROD required NFA at Site 5. Therefore, there are no remedial action performance criteria to evaluate. Groundwater in the area of Site 5 will continue to be monitored under the Basewide Groundwater Monitoring Program under the CG049 Site.

System Operations/Operations and Maintenance: There are no O&M procedures at Site 5 since the site was approved for NFA in the OU1 ROD; however, the non-engineered soil cover present at LF005 will be inspected semiannually and maintained if required in accordance with the RA-O Work Plan Addendum (AECOM 2013c). Significant cracks, depressions, and erosion areas will be noted, and repairs made if waste is exposed. The Base ensures that no unauthorized excavation occurs at the site with the Base Digging Permit system.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

4.2.4 SITE 5 ISSUES

No major deficiencies were noted during the 5-year review.

4.2.5 SITE 5 ASSESSMENT

Site 5 is a NFA site in the OU1 ROD and remains Air Force property. Solid waste remains in place. Solid waste has not been added to the site since approximately 1960. Due to the age of the solid waste, methane or other landfill gas generation should not be of concern. Currently, groundwater is greater than 5 feet below the waste. The site is recorded in the BGP and unauthorized digging is prevented by the Base Digging Permit process.

4.2.6 SITE 5 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

4.2.7 PROTECTIVENESS STATEMENT

The remedy at Site 5 is protective of human health and the environment.

4.2.8 NEXT REVIEW

Site 5 is a NFA in the OU1 ROD based on residential reuse and remains Air Force Property. The site is recorded in the BGP and unauthorized digging is prevented by the Base Digging Permit process. Since all that remains in the landfill cells is non-hazardous solid waste, Site 5 should be removed from the CERCLA five-year review process.

4.3 SITE 7 – FIRE PROTECTION TRAINING AREA NO. 2

Between 1954 and 1978, fire-training exercises were conducted in unlined training pits at Site 7 (FT007) situated along the southeast perimeter of the former March AFB boundary, north of the former Alert Facility and southeast of the March ARB flightline apron (Figure 4-3). It is on the former March AFB and the environmental cleanup is controlled by AFCEC. Site 7 is an OU1 site and is included in the OU1 ROD (USAF 1995).

Currently: Land ownership **t**ransferred to the MJPA. Currently the property is open space with future industrial reuse projected. ICs to prevent residential use are in place in the form of deed restrictions and a State Land Use Covenant.

Site 7 is contained in a FOSET for Parcels D-1, I-2, J-4, and K-5D South, February 2007 (USAF 2007). The property associated with Site 7 (Parcel D-1) was transferred to the MJPA via an early transfer approved by USEPA with the Governor's concurrence, and deed restrictions are in place as well as a State Land Use Covenant in accordance with the FOSET. The deed restrictions and State Land Use Covenant are recorded with the County of Riverside. Perfluorinated Compounds (PFCs) release assessment at FT007 is ongoing and sampling is scheduled in February 2015.

Historic: An estimated 50,000 to 100,000 gallons of waste per year was burned between 1961 and 1978. Wastes used in training exercises reportedly included contaminated fuel, waste oils, and spent solvents. Three distinct burn pits were identified in historic aerial photographs of the Base. A portion of the site may also have been used for crash rescue training.

Initial OU1 RI/FS field investigations took place in 1992, during the months of April through July and again in December. During the OU1 RI, soil samples from boreholes and surface locations as well as groundwater samples were collected from Site 7. Sampling results indicated that beryllium, lead, manganese and dioxins were present in the surface soils (0-foot to 2 feet bgs) above the December 1991 USEPA Region 9 residential PRGs, but below industrial PRGs. Industrial PRGs were used to determine the need for cleanup at Site 7 because a residential reuse was unlikely. Based on an industrial risk assessment, no physical cleanup was required by the 1995 OU1 ROD.

Site 7 is within the OU1 groundwater plume. No specific Site 7 groundwater cleanup was called for in the OU1 ROD. Groundwater at Site 7 is not being used.

As part of the OU1 groundwater remedy, a series of extraction wells were placed at the Base boundary. At most of the extraction wells, contaminant concentrations have decreased or remained stable. Increases in TCE concentrations in two of these wells, EX05A and OU1GEW04, were observed during 2007. This led to an additional investigation at Site 7 to identify the source of the TCE. Soil borings and groundwater sampling during the additional investigation found a source of TCE subsurface contamination at the site in 2007 (MWH 2008a).

A pilot study/interim action consisting of soil vapor extraction (SVE) for subsurface TCE contamination and excavation with off-site disposal for the surficial fuel/metals contamination has been implemented.

4.3.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 7.

4.3.1.1 Remedy Selection

Site 7 is prohibited from residential use. The 1995 OU1 ROD selected remedy for Site 7 states, "The Air Force will ensure that this site is used appropriately in the future by implementing deed restrictions prohibiting residential land use." In the OU1 ROD, USEPA Region 9 industrial PRGs were used, rather than residential PRGs, for the following reasons:

- It is unlikely to be used for residential purposes in the future.
- Cleanup of Site 7 to UU/UE is considered cost prohibitive in light of the minor risk reduction that would be achieved. The remedial action identified in the OU1 ROD was NFA based on industrial use. The OU1 ROD was issued in 1995.

4.3.1.2 Remedy Implementation

The Air Force implemented the OU1 ROD remedy in the form of deed restrictions. In addition, a State Land Use Covenant has been placed on the property as required by the FOSET to protect human health and the environment. The deed restrictions and State Land Use Covenant are recorded with the County of Riverside. The specific deed restrictions from the FOSET are in Appendix D.

The Site 7 restrictions include a prohibition on residential use, and a prohibition on groundwater extraction for any purpose other than groundwater monitoring.

4.3.1.3 System Operations/Operations and Maintenance

System operation was not required for the remedy selected in the OU1 ROD for Site 7.

4.3.1.4 Progress Since the Last 5-Year Review

Following the issuance of the OU1 ROD in 1995, increasing concentrations of TCE in groundwater were noted at EGETS extraction wells EX05A and OU1GEW04 as groundwater elevations rose. This prompted additional investigation to determine the TCE source within the Area of Concern (AOC 48). Soil borings and groundwater sampling during an investigation at AOC 48 found a "hot spot" of subsurface contamination (primarily TCE and petroleum hydrocarbons) at Site 7 in 2007 (MWH 2008a). Based on the EPA letter dated 30 September 2009, a FFS was developed in 2010 which presented a revised remedial alternative of SVE with on-site carbon treatment and institutional controls for the subsurface contamination (MWH 2010a). From September 2010 to February 2011, a SVE system was installed as a treatability study/pilot test. This pilot test was performed to ensure validity of the treatment technology (ARs 2603 and 2546). A skid mounted system was installed and soil vapor extraction was performed from June 2011 to July 2012. It extracted and treated an estimated 2,548 pounds of TCE and 3,900 pounds of total petroleum hydrocarbons (TPH). The system was shut down in July 2012, and a rebound evaluation was conducted in April 2013. To address subsurface soil issues, the Air Force has developed an OU1 ROD Amendment (USAF 2013c) for Site 7 detailing the proposed remedy of soil vapor extraction and ICs. The document is under review by the regulatory agencies.

In addition, the AOC 48 investigation reviewed the fire training areas originally investigated and reported during the OU1 RI (Earth Tech 1995). Under the State Petroleum Program, a Corrective Action Plan (CAP) was developed to address surficial soil impacted by lead and petroleum material in 2012 (MWH 2012). The locations of the organic lead detections corresponded with locations of the greatest amount of observed tar material, found discontinuously over much of the Site 7 surface soil (MWH 2008a). In 2013, surficial lead and petroleum material were removed and disposed of off-site at an approved treatment facility in accordance with the CAP (MWH 2012). Sample results indicate CAP criteria for case closure have been met, and RWQCB approval is pending. The CAP also included clean-up by soil vapor extraction of low levels of benzene discovered when investigating findings of low levels of benzene at nearby commercial property.

4.3.2 SITE 7 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 7.

4.3.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. Access to the site is through a locked gate. No evidence of unauthorized digging was observed.

The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

4.3.2.2 Risk Information Review Human Health Risk

The investigation into increased TCE levels at Site 7 obtained new contaminant information. The OU1 ROD and the 2003 5-year review identified six chemicals exceeding the USEPA Region 9 PRGs: beryllium, lead, manganese, 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin, heptachlorinated dibenzo-p-dioxins, total and hexachlorinated dibenzo-p-dioxins, total.

The OU1 ROD prohibited residential use as the remedy. The 2003 and 2009 5-year reviews concurred that land use restrictions was an appropriate remedy.

Currently, a Draft Final ROD Amendment (USAF 2013c), which includes an updated risk assessment for TCE in soils is under review by the regulatory agencies.

Ecological Risk

Site 7 is in the Main Base area of the former March AFB; ecological risk was not evaluated for the OU1 ROD. Site conditions have not changed, therefore the conclusions stated in the ROD are still valid. In addition, ecological exposure pathways (for groundwater exposure) are incomplete.

4.3.2.3 Data Review

Elevated levels of TCE in extraction wells EX05A and OU1GEW04 raised a concern that there was an area of previously undiscovered source of contamination within Site 7. This led to an investigation and review of prior remedial work. Four monitoring wells (MWs), OU1MW20,

OU1MW21, OU1MW22 and OU1MW23, were installed in the upper alluvium in late 2007. In December 2007, the maximum concentration of TCE of 250 micrograms per liter (μg/L) was reported in MW OU1MW21. TCE concentrations measured in September 2012 were all below the MCL of 5 μg/L in MWs OU1MW20 through OU1MW23 with a maximum concentration of 4.4 μg/L in OU1MW23.

The TCE concentrations reported in extraction wells EX05A and OU1GEW04 along the eastern boundary of Site 7 in April 2013 were 69 μg/L and 35 μg/L respectively. Concentrations decreased from the historic high of 190 μg/L at well OU1GEW04 reported in 2009 and 130 μg/L reported in June 2005 and November 2007.

The pilot study soil vapor extraction and carbon treatment system operated 12 months from June 2011 to July 2012 extracting from 4 wells. Soil vapor concentrations reported in April 2013 from SVE wells indicated the highest level of results from the 15 feet to 25 feet bgs zone. Reported concentrations ranged from 1,900 parts per billion by volume (ppbv) in 7SVE01 to 1,400,000 ppbv in 7SVE03. The interim SVE treatment system removed 2,548 pounds of TCE and 3,900 pounds of TPH as of June 2012.

4.3.3 SITE 7 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 7.

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

Implementation of Institutional Controls and Other Measures: The prohibition against residential use and other LUCs as listed in Section 4.3.1.2 have been placed in property transfer documents. Inspections have indicated and verified no breaches in the IC restrictions.

Remedial ***Action Performance:*** The land use restrictions remain in place. The site has no residential land use. Increases in TCE in extraction wells EX05A and OU1GEW4 led to additional site investigation. Subsequent investigation as described in Section 4.3.3.4 indicates that TCE concentrations measured in September 2012 were all below the MCL of 5 μg/L in monitoring wells OU1MW20–MW23 and the TCE concentrations measured in extraction wells EX05A and OU1GEW04 along the eastern boundary of Site 7 in 2013 were much lower than those reported in 2009. In addition, a soil vapor extraction pilot study was performed from June 2011 to July 2012 and treated an estimated 2,548 pounds of TCE and 3,900 pounds of TPH. The decrease in concentrations indicates the remedial action is performing acceptably.

The pilot SVE indicates that optimization is possible.

System Operations/Operations and Maintenance: RODA is currently under regulatory review, which adds SVE to the remedy.

Opportunities for Optimization: SVE as a means for additional mass removal.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the 5-year review. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure were identified. No site-specific VI assessment has been completed, and the VI pathway is being addressed under OU5 basewide groundwater ROD.

Changes in Toxicity and Other Contaminant Characteristics: Though there have been changes in toxicity or other contaminant characteristics for TCE, the Federal or State MCLs (driven by the ARARs) have not changed, and therefore, it does not affect the protectiveness of the remedy. In addition, under EPA OSWER guidance (9200.4-23, August 22, 1997, Clarification of the Role of ARARs in Establishing PRGs under CERCLA), compliance with ARARs is deemed to be protective absent very unique situations and factors which are not present here.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No. To address subsurface soil issues, the Air Force has developed an OU1 ROD Amendment (USAF 2013c) for Site 7 detailing the proposed remedy of soil vapor extraction and ICs. The document is under review by the regulatory agencies.

4.3.4 SITE 7 ISSUES

A source of TCE contamination was recently discovered at the Site and the extent of TCE contamination has not been fully characterized by the previous FFS.

4.3.5 SITE 7 ASSESSMENT

The decrease in concentrations indicates the remedial action is performing acceptably.

4.3.6 SITE 7 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The following recommendation is made:

- Conduct an additional investigation to fully characterize TCE soil contamination, amend previous FFS, and amend (as required) remedy selected in Draft Final RODA.

4.3.7 SITE 7 PROTECTIVENESS STATEMENT

The OU1 ROD remedy at Site 7 is protective in the short term of human health and the environment since institutional controls in the form of deed restrictions and a State Land Use Covenant are in place. However, in order for the remedy to be protective in the long-term, the 1995 OU1 remedy must be amended to address TCE source contamination in soil. The Air Force is currently working to fully characterize the TCE source area and amend the OU1 ROD as necessary to address long-term protectiveness. In addition, the impact of rising groundwater will continue to be evaluated as part of the Basewide groundwater remedy's monitoring program.

4.3.8 NEXT REVIEW

Site 7 should be included in the next 5-year review, five years from the completion of this review.

4.3.8.1 Data Review

Elevated levels of TCE in extraction wells EX05A and OU1GEW04 raised a concern that there was an area of previously undiscovered contamination within Site 7. This led to an investigation and review of prior remedial work. Four monitoring wells (MWs), OU1MW20, OU1MW21, OU1MW22 and OU1MW23, were installed in the upper alluvium in late 2007. In December 2007, the maximum concentration of TCE of 250 micrograms per liter (μg/L) was reported in MW OU1MW21. TCE concentrations measured in September 2012 were all below the MCL of 5 μg/L in MWs OU1MW20 through OU1MW23 with a maximum concentration of 4.4 μg/L in OU1MW23.

The TCE concentrations reported in extraction wells EX05A and OU1GEW04 along the eastern boundary of Site 7 in April 2013 were 69 μg/L and 35 μg/L respectively. Concentrations decreased from the historic high of 190 μg/L at well OU1GEW04 reported in 2009 and 130 μg/L reported in June 2005 and November 2007.

A pilot study soil vapor extraction and carbon treatment system operated 12 months from June 2011 to July 2012 extracting from 4 wells. Soil vapor concentrations reported in April 2013 from SVE wells indicated the highest level of results from the 15 feet to 25 feet bgs zone. Reported concentrations ranged from 1,900 parts per billion by volume (ppbv) in 7SVE01 to 1,400,000 ppbv in 7SVE03. The interim SVE treatment system removed 2,548 pounds of TCE and 3,900 pounds of TPH as of June 2012.

4.3.9 SITE 7 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 7.

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

Implementation of Institutional Controls and Other Measures: The prohibition against residential use and other LUCs as listed in Section 4.3.1.2 have been placed in property transfer documents. Inspections have indicated and verified no breaches in the IC restrictions.

Remedial Action Performance: The land use restrictions remain in place. The site has no residential land use. Increases in TCE in extraction wells EX05A and OU1GEW4 led to additional site investigation. Subsequent investigation as described in Section 4.3.3.4 indicates that TCE concentrations measured in September 2012 were all below the MCL of 5 μg/L in monitoring wells OU1MW20–MW23 and the TCE concentrations measured in extraction wells EX05A and OU1GEW04 along the eastern boundary of Site 7 in 2013 were much lower than those reported in 2009. In addition, a soil vapor extraction pilot study was performed from June 2011 to July 2012 and treated an estimated 2,548 pounds of TCE and 3,900 pounds of TPH. The decrease in concentrations indicates the remedial action is performing acceptably. The pilot SVE indicates that optimization is possible.

System Operations/Operations and Maintenance: RODA is currently under regulatory review, which adds SVE to the remedy.

Opportunities for Optimization: SVE as a means for additional mass removal.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the five-year review. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure were identified. No site-specific VI assessment has been completed, and the VI pathway is being addressed under OU5 basewide groundwater ROD.

Changes in Toxicity and Other Contaminant Characteristics: Though there have been changes in toxicity or other contaminant characteristics for TCE, the Federal or State MCLs (driven by the ARARs) have not changed, and therefore, it does not affect the protectiveness of the remedy. In addition, under EPA OSWER guidance (9200.4-23, August 22, 1997, Clarification of the Role of ARARs in Establishing PRGs under CERCLA), compliance with ARARs is deemed to be protective absent very unique situations and factors which are not present here.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No. To address subsurface soil issues, the Air Force has developed an OU1 ROD Amendment (USAF 2013c) for Site 7 detailing the proposed remedy of soil venting and ICs. The document is under review by the regulatory agencies.

4.3.10 SITE 7 ISSUES

A source of contamination was recently discovered at the Site and the extent of contamination has not been fully characterized by previous FFS.

4.3.11 SITE 7 ASSESSMENT

The decrease in concentrations indicates the remedial action is performing acceptably.

4.3.12 SITE 7 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The following recommendation is made:

- Conduct an additional investigation to fully characterize soil contamination, amend previous FFS, and amend (as required) remedy selected in Draft Final RODA.

4.3.13 SITE 7 PROTECTIVENESS STATEMENT

The remedy at Site 7 is protective in the short term of human health and the environment since institutional controls are in place. However, in order for the remedy to be protective in the long-term,

the current remedy must be revised to address an identified source of soil and groundwater contamination, so as to ensure protectiveness. In addition, the impact of rising groundwater will also continue to be evaluated as part of the Basewide groundwater.

4.3.14 NEXT REVIEW

Site 7 should be included in the next 5-year review, five years from the completion of this review.

4.4 SITE 18 – ENGINE TEST CELL

Site 18 (OT018) is situated between the primary runway to the west, the aircraft parking apron to the east, and taxiways to the north and south (Figure 4-4). It is on March ARB and is controlled by the AFCEC. Site 18 is an OU1 site and is included in the OU1 ROD (USAF 1995).

Currently: Monitoring of groundwater is conducted done under a RAP (AFRC 2003a) between the Air Force and the RWQCB, which was further revised in 2008 (AFRC 2008). Requirements for monitoring were reduced further based on the RWQCB comments in 2013 (RWQCB 2013). Site 18 is in a secured area of March ARB. The VOCs (including benzene) and the impact of the vapor intrusion pathway at the Site will be evaluated as part of the Basewide groundwater addressed as CG049 in OU5 FFS and ROD.

Historic: A jet engine test cell historically operated within the area of Site 18. The test cell was constructed in 1957 and was inactive for an undetermined amount of time prior to its demolition in 2000. An oil/water separator (OWS) was installed in 1976, prior to that time, the test cell floor drain emptied into a dry well. The OWS has also been removed. Other suspected sources for fuel found on-site were older fuel tanks predating the jet engine test cell and aircraft fuel tanks.

During the OU1 RI/FS, soil samples were collected from boreholes and surface locations. The surface soil sampling reported beryllium at concentrations greater than the residential PRG. A risk assessment was performed, and it showed that beryllium did not require remediation. The primary subsurface soil contaminants were jet fuel and its components.

Groundwater was also sampled during the OU1 RI/FS. Free product (jet fuel) was found in several of the MWs. In addition, groundwater sampling found several chemicals greater than the MCL for drinking water.

One of the chemicals, methylene chloride, was determined to be a laboratory contaminant after the ROD was signed. The 1996 and 1997 Annual Groundwater Monitoring Reports (ARs 802 and 995) listed it as a common laboratory contaminant. Methylene chloride is no longer a COC.

Total phenols were also listed as a Site 18 groundwater contaminant in the OU1 ROD. 1998/1999 Annual Monitoring Report (AR 2088) stated that the phenols were most likely associated with the biodegradation of naphthalene, a common semivolatile compound found in fuel. It was agreed that other fuel components (benzene, ethylbenzene, toluene, and xylenes [BTEX]) would be used to evaluate fuel groundwater contamination.

The remaining groundwater chemicals above the MCLs in the OU1 ROD are listed on the following table.

Table 4-4. Site 18 Groundwater Concentrations Exceeding MCLs

Chemical	Maximum Concentration (µg/L)	OU1 ROD MCLs (1995) (µg/L)	Remedial Action Plan (2003) (µg/L)
Benzene	12,000	1	250*
Toluene	11,000	150	150
Ethylbenzene	1,500	680	700
Xylenes, Total	7,700	1750	1750

Notes:
* 250 µg/L is a site-specific cleanup goal for benzene per the 2003 RAP based on the Regional Board Report Jan 1996 for "low risk" sites.
µg/L micrograms per liter
MCL maximum contaminant level
OU Operable Unit
ROD Record of Decision

The remedial action selected in the OU1 ROD was soil vapor and groundwater extraction. Initial remedial actions (conducted in 1996 and 1997) consisted of additional site investigations and a pilot test. Several alternative cleanup remedies (air sparging, high vacuum extraction, and free-product removal) were also investigated, but were not shown to be an improvement over the selected OU1 ROD remedy. Based on the additional investigations, the conceptual site model was refined. The primary

source of contamination was determined to be a floor drain in the jet engine test cell. Prior to the OWS installation in 1976, the floor drain led to a dry well. The fuel drained to the dry well and migrated away from the well horizontally through sandy soil layers. Over the years, rising groundwater has submerged the sandy soil layers. The rising groundwater either smeared the fuel across previously uncontaminated soil or trapped the fuel in between relatively uncontaminated soil and groundwater layers.

Subsequent investigations at Site 18 consisted of long-term aquifer pump tests, SVE tests, and construction of a three well dual phase extraction system. System construction and functional testing, and checkout were completed in 1999. The treatment approach involved groundwater extraction and treatment, free-product removal, and dewatering of the site to allow removal of contaminants in the smear zone.

The system was unsuccessful in lowering the groundwater level and removing adequate amounts of contamination.

Subsequent review showed the contamination at Site 18 consisted of petroleum products which are exempt from regulation under CERCLA, as amended by the Superfund Amendment and Reauthorization Act.

Consequently, a RAP was prepared to revise the remedy for Site 18 to address the groundwater jet fuel plume as a petroleum site (AFRC 2003a). This RAP was approved by the RWQCB on 5 January 2004 (RWQCB 2004). The RAP was further revised in 2008 (AFRC 2008). The revised remedy includes monitored natural attenuation (MNA), ICs (including land use restrictions), revisions to the groundwater monitoring network, well decommissioning, and free-product skimming. This remedy is discussed in detail in the revised RAP for the Jet Engine Test Cell Site (AFRC 2008). Based upon data from four years of monitoring at the site, it appears that natural attenuation of petroleum hydrocarbons in the source area and in the diffused plume is continuing (RWQCB 2008a). The 2008 RAP revision determined that MNA was no longer necessary at Site 18. However, in order to enhance free product recovery at Site 18, a passive free product recovery device was installed at monitoring Well 18MW04 on 3 March 2011. Monitoring Well 18MW04 was selected based on the well's location within the free-product plume at Site 18. The passive skimmer has remained in 18MW04 since it was installed.

The skimmer was removed in February 2013 for ease of monitoring. Due to the very limited amount of product captured in the past by the skimmer, its use will be discontinued. The groundwater cleanup goals for Site 18, as established in the RAP, are presented in Table 4-4.

4.4.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 18.

4.4.1.1 Remedy Selection

The remedial action identified in the OU1 ROD (USAF 1995) for Site 18 has been replaced by a Remedial Action Plan (AFRC 2003a and 2008). The remedy in the RAP is free product-skimming, monitoring and groundwater use restrictions.

4.4.1.2 Remedy Implementation

Groundwater and free-product levels are currently conducted semi-annually. Groundwater monitoring and sampling are performed annually. Sampling results are documented in the Annual Monitoring Report (AECOM 2013g).

4.4.1.3 System Operations/Operations and Maintenance

Monitoring and maintenance of MWs is being performed as required (AECOM 2013g).

4.4.1.4 Progress Since the Last 5-Year Review

No issues were identified during the last 5-year review in 2009. The Site 18 groundwater plume is shrinking. Upon review of the 2011-2012 Annual Monitoring Report for Petroleum Sites (AECOM 2013f), the RWQCB (California RWQCB 2013) recommended reducing the monitoring well network for the petroleum site to two locations at Site 18 (Wells 18MW02- downgradient plume location and 18MW09- center plume location), which will be utilized for monitoring of groundwater levels and for sampling for TPH and BTEX.

Based on the data collected and evaluated during the 2013 annual monitoring round (AECOM 2013g), groundwater at Sites 18 does not yet comply with groundwater cleanup goals specified in the RAP,

Jet Engine Test Cell Site (AFRC 2003a) and the Revisions to the RAP, Jet Engine Test Cell Site (AFRC 2008). The only site-specific COC detected at concentrations greater than the groundwater cleanup goal was benzene, which was detected above the site-specific cleanup goal of 250 μg/L in Well 18MW09 at a concentration of 2,600 μg/L.

4.4.2 SITE 18 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 18.

4.4.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. Site 18 is in a grassy area surrounded by aircraft runways and taxiways. Taxiways are used to get to Site 18; March ARB ground control limits access to the taxiways. No evidence of unauthorized digging or distressed vegetation was found.

The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

4.4.2.2 Risk Information Review

Ecological Risk

Site 18 is in a developed area of March ARB; ecological risk was not evaluated for in the OU1 ROD. Site conditions have not changed, therefore the conclusions stated in the ROD are still valid.

4.4.2.3 Data Review

The groundwater plume is shrinking. Upon review of the 2011-2012 Annual Monitoring Report for Petroleum Sites (AECOM 2013f), the RWQCB (California RWQCB 2013) recommended reducing the monitoring well network for the petroleum site to two locations at Site 18 (Wells 18MW02- downgradient plume location and 18MW09- center plume location), which will be utilized for monitoring of groundwater levels and for sampling for TPH and BTEX.

Based on the data collected and evaluated during the 2013 annual monitoring round (AECOM 2013b), groundwater at Sites 18 does not yet comply with groundwater cleanup goals specified in the RAP,

Jet Engine Test Cell Site (AFRC 2003a) and the Revisions to the RAP, Jet Engine Test Cell Site (AFRC 2008). The only site-specific COC detected at concentrations greater than the groundwater cleanup goal was benzene, which was detected above the site-specific cleanup goal of 250 μg/L in Well 18MW09 at a concentration of 2,600 μg/L. Water levels and free-phase product measurements were collected to the nearest 0.01-foot using a dual-phase indicator as part of the potentiometric survey performed during February and May 2013. The average depth to water (feet below top of casing) at Well 18MW02 ranged from 6.66 to 6.91 and at Well 18MW09 ranged from 5.91 to 6.36. No measureable free product was detected in the two locations at Site 18 (Wells 18MW02 and 18MW09).

4.4.3 SITE 18 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 18.

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

Implementation of Institutional Controls and Other Measures: No groundwater is being pumped from the site. Groundwater on March ARB is only being pumped for groundwater cleanup. No groundwater at March ARB is being used for drinking water or irrigation. The Base Digging Permit process requires that any excavating or digging on-Base have the approval of the Base environmental office before any work is conducted. Work coordination procedures are presented in AFI 32-1001, Operations Management. This ensures that the site is managed in a safe manner and that any work proposed in the area must be approved before work can be accomplished.

Remedial Action Performance: The Site 18 groundwater plume is shrinking and is documented in the Petroleum Sites Annual Monitoring Reports. The shrinking plume indicates the remedial action is performing acceptably.

System Operations/Operations and Maintenance: Groundwater monitoring is being performed and the groundwater plume is shrinking as documented in the Annual Monitoring Report (AECOM 2013g).

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the five-year review. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure were identified.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

4.4.4 SITE 18 ISSUES

No major deficiencies were noted during the five-year review.

4.4.5 SITE 18 ASSESSMENT

Site 18 is in an access controlled area of March ARB. Development of the site is severely limited by its proximity to March ARB runways and aircraft taxiways. The monitoring wells are in good condition. Groundwater monitoring is performed as scheduled. The groundwater plume is shrinking.

4.4.6 SITE 18 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

4.4.7 PROTECTIVENESS STATEMENT

The remedy at Site 18 is protective of human health and the environment.

4.4.8 NEXT REVIEW

If Site 18 is still part of the next review, the next review should be conducted within 5 years of the completion of this review.

4.5 SITE 29 – FIRE PROTECTION TRAINING AREA NO. 1

Site 29 (FT029) is on March ARB and is controlled by AFRC. Site 29 is situated along the eastern part of the Base, north of Site 9 (Figure 4-5). Site 29 is an OU1 site and is included in the OU1 ROD (USAF 1995).

Currently: Restricted from residential use, on March ARB. Use restriction is recorded in the BGP. The Air Force is pursuing regulatory and site closure for several sites at March AFB/ARB. As part of this process the USAF has submitted documentation that supports UU/UE. For Site 29, the USAF submitted the Draft RIA/RAR Report to the regulators in April 2013, which recommended UU/UE for the site. The RWQCB had no comments on the draft report, agreeing with UU/UE recommendation for the site. Comments were given by the DTSC and USEPA on the draft document. A Draft Final RIA/RAR Report incorporating responses to comments was submitted to the regulators in August 2013. The DTSC concurred with UU/UE for this site based on the information provided in the final document. At this point, the USEPA does not concur with the conclusions. The USAF will continue to work with the USEPA to achieve UU/UE for the Site.

Historic: The area was reportedly used as a fire protection training pit prior to 1951. A review of aerial photographs taken in 1959 showed the site covered an area of approximately 1 acre. The sources of soil contamination at Site 29 were burn pits situated throughout the southern portion of the site. While information about Site 29 is limited, large quantities of aviation gas, oils, jet fuels, and solvents were reported to have been used during training exercises for the Base fire department.

Initial field investigations at Site 29 were conducted from April 1992 throughout September 1992, and again from December 1992 to January 1993. An additional site characterization study was conducted in November 1993. Soil samples from boreholes and surface locations as well as groundwater samples were collected from Site 29.

The COCs in the soil were beryllium, lead, manganese, and dioxins. These contaminants were detected at concentrations greater than the December 1991 USEPA Region 9 residential PRGs, but lower than the industrial PRGs. Based on the 1991 industrial PRGs, no contaminants at this site require remediation.

Site 29 is within the OU1 groundwater plume; information relating to the groundwater contaminants at Site 29 can be found in the OU1 Groundwater Plume Review (see section 4.8 of this document). Site 29 groundwater is not being used.

4.5.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 29.

4.5.1.1 Remedy Selection

Site 29 is prohibited from residential use based on contaminants detected at concentrations greater than the December 1991 USEPA Region 9 residential use and less than the industrial use PRGs for soil. USEPA Region 9 industrial PRGs were used, rather than residential PRGs, for the remedy selection for the following reasons:

- Site 29 is retained by the Air Force as part of March ARB.
- It is unlikely to be used for residential purposes in the future.
- Cleanup of Site 29 to UU/UE standards is considered cost prohibitive in light of the minor risk reduction that would be achieved.

The remedial action identified in the OU1 ROD for Site 29 was NFA so long as the land use is restricted to industrial. The OU1 ROD was finalized in 1995. The prohibition against residential land use has been identified in the BGP and all earth work on-Base is subject to the digging permit system. Site 29 is on March ARB and is not planned to be transferred out of Air Force control. Contaminants identified in the groundwater beneath Site 29 are addressed in the OU1 Groundwater Plume remedy.

4.5.1.2 Remedy Implementation

The restriction from residential use is recorded in the BGP (April 2010). The Land Use Control section of the BGP is included in Appendix C. The ICs/LUCs section from the ROD is included in Appendix D.

4.5.1.3 System Operations/Operations and Maintenance

There are no O&M activities required at the site since the approved action at Site 29 was NFA. However, several groundwater wells located within the boundaries of Site 29 are monitored as part of the OU1 Groundwater Monitoring Program.

4.5.1.4 Progress Since the Last 5-Year Review

There have been no changes since the last 5-year review in 2009 nor were any issues identified during the last 5-year review in 2009.

4.5.2 SITE 29 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 29.

4.5.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. The site inspection confirmed that land use remains industrial and no evidence of unauthorized digging was found.

The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

4.5.2.2 Risk Information Review

4.5.2.3 Human Health Risk

Soil

The ROD for this site was signed in 1996. The OU1 ROD and 2003 5-year review identified five chemicals exceeding the USEPA Region 9 PRGs for beryllium, lead, manganese, 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin and heptachlorinated dibenzo-p-dioxins, total. The May 2013 toxicity criteria for some of the COCs have become less stringent; therefore, the change does not affect protectiveness. Risk evaluation results used as the basis for the remedy selection for Site 29 in the ROD were not re-evaluated for this five-year review, since no new data has been collected subsequent to the ROD.

No changes in exposure pathways or toxicity factors warranting risk recalculations have been identified. In summary, there have been no changes in the conditions at Site 29 that affect protectiveness.

Ecological Risk

Site 29 is in a developed area of March ARB; ecological risk was not evaluated for the OU1 ROD. Site conditions have not changed; therefore, the conclusions stated in the ROD are still valid.

4.5.2.4 Data Review

The restriction against residential land use is recorded in the BGP (updated in April 2010). The land use restriction section of the BGP is included in Appendix C.

4.5.3 SITE 29 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 29.

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

Implementation of Institutional Controls and Other Measures: The OU1 ROD listed Site 29 as NFA site. However, it used industrial PRGs to evaluate the site and stated that residential land use would be prohibited. The prohibition against residential land use has been identified in the BGP and all earth work on-Base is subject to the digging permit system. The site is restricted from residential land use, no residential uses are on the site and no future residential uses are planned. The Base Digging Permit process requires that any excavating or digging on-Base have the approval of the Base environmental office before any work is conducted. Work coordination procedures are in AFI 32-1001, Operations Management. This ensures that the site is managed in a safe manner and that any work proposed in the area must be approved before work can be done.

Remedial Action Performance: The OU1 ROD required NFA at Site 29 based on industrial use. Residential use is prohibited at the site; and the site inspection verified that no residential land use has occurred. Groundwater in the area of Site 29 will continue to be monitored under the Basewide Groundwater Monitoring Program.

System Operations/O&M: There are no O&M procedures at Site 29 since the site was approved for NFA in the OU1 ROD. However, several groundwater wells located within the boundaries of Site 29 are monitored as part of the OU1 Groundwater Monitoring Program.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the 5-year review. There were no current or future planned changes in land use.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

4.5.4 SITE 29 ISSUES

No major deficiencies were noted during the 5-year review.

4.5.5 SITE 29 ASSESSMENT

Site 29 is a NFA site in the OU1 ROD based on industrial land use and remains Air Force property. The site is recorded in the BGP and unauthorized digging is prevented by the Base Digging Permit process.

4.5.6 SITE 29 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

4.5.7 PROTECTIVENESS STATEMENT

The remedy at Site 29 is protective of human health and the environment.

4.5.8 NEXT REVIEW

Five-year reviews are required as long as contamination remains in place above UU/UE levels. The next review should be conducted within 5 years of the completion of this review.

4.6 SITE 31 – SOLVENT SPILL

Site 31 (SS031) is on the east-central portion of the Base, south of the main cantonment area and to the east of the aircraft parking apron (Figure 4-6). It is on March ARB and is controlled by AFRC. Site 31 is an OU1 site and is included in the OU1 ROD (USAF 995).

The site, initially described as an unconfirmed solvent disposal, is within the OU1 groundwater plume and is considered to be the source area for much of the TCE contamination in the plume. Site 31 comprises two source areas of contamination: Sites 31A and 31B.

Currently: Cleanup continues in the form of groundwater extraction via EGETS. Site 31 is on March ARB. A Proposed Plan has been prepared and submitted to the regulatory agencies to change the surface soil remedy to NFA based on UU/UE, and also to transfer the groundwater remedy to CG049 OU5 plume treatment.

Historic: Site 31A is south of Building 1211. The Building 1211 was used for gun cleaning. Drains from the cleaning area fed into an OWS south of the building. Leaks from the oil water separator plumbing system and unconfirmed reports of solvents being discharged to the ground are suspected to be the origin of the TCE.

Site 31B includes the area around the Liquid Oxygen (LOX) Facility, Building 1254.

Site sampling found PAHs, beryllium, lead and manganese in excess of residential PRGs in the surface soil. At that time, the goal was to clean up to residential levels, so industrial PRGs were not considered. A risk assessment was performed. The results of the risk assessment indicated that beryllium and manganese did not cause an unacceptable risk. For lead, the method developed by the DTSC was used to estimate blood-lead concentrations. Results indicated that lead did not require remediation. However, the OU1 ROD indicates that there was an unacceptable risk from several PAHs.

Groundwater sampling also found several chemicals in greater than MCL for drinking water. One chemical, bis(2-ethylhexyl)phthalate, was determined to be a laboratory contaminant after the ROD was signed. The 1996 and 1997 Annual Groundwater Monitoring Reports (ARs 802 and 995) listed it as a common laboratory contaminant. Bis(2ethylhexyl)phthalate is no longer a COC. The remaining groundwater chemicals above the MCLs in the OU1 ROD are listed below.

Table 4-5. Site 31 Groundwater Concentrations Exceeding MCLs in the OU1 ROD (1995)

Chemical	MCL from the OU1 ROD (µg/L)	Current MCL (µg/L)
TCE	5	5
1,1-Dichloroethene	6*	6*

Notes:
* California MCL
µg/L micrograms per liter
MCL maximum contaminant level
OU Operable Unit
ROD Record of Decision

4.6.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 31.

4.6.1.1 Remedy Selection

The remedial actions selected in the OU1 ROD (USAF 1995) are as follows:

- SVE with carbon adsorption treatment for subsurface contamination;
- Groundwater extraction, treatment and re-injection/re-use/disposal; and
- Excavation and treatment of contaminated surface soil.

4.6.1.2 Remedy Implementation

Surface Soil: PAH contamination is found on other sites at March ARB. After soil removal at Site 1 did not result in Site 1 being cleaned up to UU/UE levels, the risk from Site 31 was re-evaluated (MWH 2003). The site was re-sampled and the risk figures re-calculated. The risk was within the acceptable risk range for UU/UE use.

A Proposed Plan has been prepared and submitted to the regulatory agencies to change the surface soil remedy to NFA based on UU/UE.

Subsurface Soil: After a SVE pilot test in 1994, three dual phase (soil vapor and groundwater) wells were installed and put into operation as part of a treatability study in 1995. Full scale remediation started in 1996.

The soil vapor system was turned off in 1997 due to significantly reduced TCE vapor concentrations. No significant rebound in TCE or PCE was observed in subsequent vapor testing. BTEX was found in the soil vapor from well 31A-DEW6. No BTEX was found in groundwater or soil vapor from any other Site 31 wells. The SVE system continued to pull vapors from 31A-DEW6 (to remove BTEX) and 31B-DEW3, 31B-DEW4, and 31B-DEW5 (to improve groundwater extraction). The total amount of TCE removed by SVE was 167 pounds. The total amount of PCE removed by SVE was 44 pounds. In January 1999, BTEX was not-detected in 31ADEW6. The SVE portion of the remedial system was shut down in late 1999 due to low soil vapor contaminant concentrations (MWH 2002).

Groundwater: In 1996, full scale remediation of the groundwater started with 11 dual phase extraction wells and 2 groundwater extraction wells.

A program to optimize cleanup actions was developed and presented at the March AFB Groundwater Working Group meeting on 10 September 1997. The proposed site cleanup targets (more appropriately mass removal targets) and criteria for operation of the dual phase (soil vapor and groundwater) extraction wells at Site 31A were reviewed at the March AFB Cleanup Team meeting on 11 September 1997, including results of the supporting modeling simulations using the March AFB Groundwater Flow and Transport Model. Approval to start the rebound test program was given at this meeting.

Based on modeling simulations, groundwater at Site 31 with TCE concentrations in excess of 100 μg/L but less than 250 μg/L was predicted to result in a groundwater concentration of $<$ 5ppb at 200 feet inside the eastern Base boundary. Off-Base groundwater is further protected by the EGETS, a series of groundwater extraction and injection wells, which prevents contaminated water from leaving the Base. The cleanup (mass removal) targets and criteria are as follows:

- Site 31A source area maximum contaminant concentration (based on modeling) for attainment of < 5 ppb TCE 200 feet inside EGETS wells.
- Requirement of groundwater extraction wells to be considered for rebound test: Asymptotic Cleanup Profile Contaminant Concentration < 50 ppb TCE.
- Average target after groundwater rebound tests, < 50 ppb TCE.
- Maximum allowable TCE concentration for shut-down of any one well after rebound test, < 85 ppb for Site 31A wells and < 43 ppb for Site 31B wells.

The effect of the Site 31/EGETS system has operated over the last five years. Five extraction wells had met the rebound criteria in 1998; additional wells met the rebound evaluation later. As of May 2013, one well was extracting groundwater, 31BGEW03. All other wells were in rebound or post-rebound status.

4.6.1.3 System Operations/Operations and Maintenance

The Site 31/EGETS treatment plant System Operations/O&M are conducted in accordance with the Revised Final Operations and Maintenance Plan, (MWH 2002). The following samples are taken:

- Monthly "mid-bed" samples to monitor carbon consumption.
- Quarterly influent and effluent samples to monitor discharge requirements.
- Semiannual well samples to monitor contaminant trends.

In addition, influent and effluent flow rates are monitored. Semiannual process monitoring reports and quarterly discharge reports are generated. This system sampling has been performed over the last five years.

Prior to the award of a Performance Based Remediation (PBR) contract in June 2012, O&M actions at March ARB/former March AFB were grouped into different contracts with the goal of providing a comprehensive environmental solution for the entire March ARB/former March AFB complex. Costs were generally in line with estimates and had not changed appreciably up to the PBR contract award. In the future, as sole operator, the PBR contractor will be able to provide a more effective assessment of possible O&M optimizations/reductions.

4.6.1.4 Progress Since the Last 5-Year Review

No issues were identified during the last 5-year review in 2009. Peak contaminant concentrations have decreased since the OU1 ROD.

Table 4-6. Site 31 Maximum Groundwater Concentrations in 2012 vs. OU1 ROD (1995) Maximum Concentrations

Chemical	Maximum Concentration from Draft 2011-2012 Annual Monitoring Report, AFRC and AFRPA Groundwater Monitoring Programs (µg/L)	OU1 ROD (1995) Maximum Concentration (µg/L)
TCE	22 (31MW04)	1,400
1,1-Dichloroethene	4 (31MW04)	260

Notes:
µg/L micrograms per liter
AFRC Air Force Reserve Command
AFRPA Air Force Real Property Agency
OU Operable Unit
ROD Record of Decision

Only one of the groundwater extraction wells, 31BGEW03, was running in May 2013. The remaining extraction wells have met the rebound test criteria and are in post-rebound status. The most recent well to meet the rebound criteria is 31BGEW03. Well 31BGEW03 was placed in rebound status during July 2011, but was returned to operation in January 2012 due to increasing TCE concentrations.

Table 4-7. Concentration Trends in Site 31 Groundwater Extraction Wells

Well	June 2008 (µg/L)		May 2009 (µg/L)		May 2010 (µg/L)		May 2011 (µg/L)		May 2012 (µg/L)	
	TCE	PCE	TCE	PCE	TCE	PCE	TCE	PCE	TCE	PCE
31BGEW02	11	2	25	1.8	34	2	29	1.6	28	2.1
31BGEW03	61	2.7	52	3	64	2.3	43	3.0	46	3.4

Notes:
µg/L micrograms per liter
PCE tetrachloroethene
TCE trichloroethene

Additional contamination was suspected downgradient of 31BGEW03 (31BGEW03 itself is downgradient of what was thought to be an area of contamination at Site 31B). Wells OU1MW15A and B were placed just off-Base, downgradient of Site 31B. They were placed in a suspected area of high TCE. The initial elevated PCE level led to the installation of Wells OUMW16A and OUMW 16B. OUMW16A and OUMW16B were placed on-Base. Groundwater extraction began in

Well OU1MW16A in 2009. As of May 2013, Well OUMW16B has the highest level of TCE in the Site 31 area.

Table 4-8. Concentration Trends in Monitoring Wells Downgradient from Site 31

Well	June 2008 TCE/PCE (µg/L)		June 2009 TCE/PCE (µg/L)		May 2010 TCE/PCE (µg/L)		May 2011 TCE/PCE (µg/L)		May 2012 TCE/PCE (µg/L)	
OU1MW15A	76	2	57	1.8	65	2	38	1.4	35	1.5
OU1MW15B	6.4	0.29F	7.3	0.21F	8.4	0.26F	6.5	>1	0.55	>1F
OU1MW16A	160	8.9	190	5.9	84	3	54 S	2.5 S	42 S	2.8 S
OU1MW16B	83	2	68	1.8	69	2.2	54	1.7	75	3.3

Notes:
F= Less than the reporting limit
S= Screening Level Data
µg/L micrograms per liter
PCE tetrachloroethene
TCE trichloroethene

4.6.2 SITE 31 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 31.

4.6.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. The treatment system was up and running. Almost all of the water being treated comes from the EGETS system.

The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

4.6.2.2 Risk Information Review

Human Health Risk

The following standards were identified as ARARs in the OU1 ROD. They were reviewed for changes that could affect protectiveness:

- -MCLs for Primary Drinking Water (Title 22, CCR, Division 4, Chapter 15, Article 5.5, Section 64444.5; and

- -National Primary Drinking Water Regulations (40 CFR 141.61, MCLs for Organic Contaminants).

The most restrictive MCLs for the COCs have not changed since the OU1 ROD was signed.

Ecological Risk

Site 31 is in a developed area of March ARB; ecological risk was not evaluated for the OU1 ROD. Site conditions have not changed; therefore the conclusions stated in the ROD are still valid.

4.6.2.3 Data Review

Semiannual process monitoring reports are completed and submitted to the regulatory agencies (USEPA, DTSC and the RWQCB).

The Annual Process monitoring Report (July 2013) indicated that approximately 3.4 million gallons of water from Site 31 were treated during 2012 at the Site 31/EGETS treatment system. During 2012, approximately 1.81 pounds of VOCs were removed from the Site 31 groundwater.

4.6.3 SITE 31 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 31.

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

Implementation of Institutional Controls and Other Measures: The Digging Permit process insures that no unauthorized digging/construction occurs. This protects the treatment system piping and monitoring wells. Further review of the surface soil contamination indicates that NFA is needed. A Proposed Plan has been prepared and submitted to the regulatory agencies to change the surface soil remedy to NFA based on UU/UE. No Base groundwater is being currently used for drinking water; there are no plans to use Base groundwater for drinking water.

Remedial Action Performance: Rebound testing indicates that the remedial actions are effectively cleaning up the site.

System Operations/O&M: System operation is acceptable and documented by the semiannual process monitoring reports.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the 5-year review. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure identified. No site-specific VI assessment has been completed, and the VI pathway is being addressed under OU5 basewide groundwater ROD.

Changes in Toxicity and Other Contaminant Characteristics: Though there have been changes in toxicity or other contaminant characteristics for TCE, the Federal or State MCLs (driven by the ARARs) have not changed, and therefore, it does not affect the protectiveness of the remedy. In addition, under EPA OSWER guidance (9200.4-23, August 22, 1997, Clarification of the Role of ARARs in Establishing PRGs under CERCLA), compliance with ARARs is deemed to be protective absent very unique situations and factors which are not present here.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

4.6.4 SITE 31 ISSUES

No major deficiencies were noted during the 5-year review.

4.6.5 SITE 31 ASSESSMENT

The groundwater and subsurface soil remedy was implemented pursuant to the OU1 ROD. The remedy has been effective in reducing the level of subsurface soil and groundwater contamination and the remedy has been protective of human health and the environment.

The PAH contamination in the surface soil has been re-evaluated and is within the acceptable risk range for UU/UE use. A Proposed Plan has been prepared and submitted to the regulatory agencies to change the surface soil remedy to NFA based on UU/UE.

4.6.6 SITE 31 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

4.6.7 PROTECTIVENESS STATEMENT

The remedy at Site 31 is protective of human health and the environment.

4.6.8 NEXT REVIEW

Site 31 should be included in the next 5-year review, five years from the completion of this review.

4.7 SITE 34 – PRITCHARD REFUELING SYSTEM

Site 34 (ST034) encompasses the former Pritchard Refueling System. The site is next to Building 1245 at the southeast end of the aircraft parking apron (Figure 4-7). It is on March ARB and controlled by AFRC. Site 34 is an OU1 site and is included in the OU1 ROD (USAF 1995).

Currently: Site 34 is in an access controlled area inside of March ARB. Bioventing has cleaned up the subsurface soil (greater than 2 feet bgs). The OU1 ROD did not include LUCs for the surface soil (approximately the top 2 feet bgs), which included cleanup based on residential PRGs. The USAF submitted the Final Explanation of Significant Differences (ESD) in May 2013 (USAF 2013b) to document the change in surface soil remedy from excavation and low temperature thermal desorption to excavation with off-Base disposal of impacted soil to achieve UU/UE.

Historic: Six 50,000 gallon tanks were moved from the Panero Fueling System to Site 34 in 1962 to provide JP-4 jet fuel for jet aircraft. The tanks were discovered to be leaking during a geologic investigation for a construction project just south of the site in 1988. Use of this system was discontinued in 1990 and most of the piping system and tanks were removed in 1991. An additional 550-gallon tank was removed in 1999.

During the OU1 RI/FS, soil samples from boreholes and surface locations as well as groundwater samples were collected from Site 34 in order to determine the extent of contamination caused by the leaking USTs. Sampling results indicated that several PAHs and beryllium were present in the surface soil (0-foot to 2 feet bgs) at concentrations exceeding the December 1991 USEPA Region 9 PRGs. At the time, the goal was to clean up to residential levels, so industrial PRGs were not considered. Subsurface soil (from the ground surface to the groundwater level) contamination was also detected. The subsurface soil contaminants detected were benzene, ethylbenzene, and xylenes. In addition to the

soil contaminants, groundwater contamination was discovered. Benzene was detected in the groundwater at Site 34 at concentrations exceeding the established ARARs.

A human health risk assessment was conducted for Site 34 following USEPA Region 9 and Cal/EPA guidance. The risk assessment produced estimates of the potential risks to public health from the previously mentioned contaminants detected at Site 34. As a result of the risk assessment, PAHs in the surface soil were found to present a potential human health risk. Beryllium did not create an unacceptable risk.

OU1 ROD (USAF 1995) selected bioventing as the subsurface soil contamination remedy. Bioventing is a remedial technique that consists of injecting oxygen into the soil to stimulate the growth of hydrocarbon degrading microbes. These microbes use the hydrocarbons as an energy source and break them down into nonhazardous compounds.

A bioventing system was started 1994 and completed in 1995. The bioventing system was used to prevent degradation of the groundwater through migration of the contaminants from subsurface soil to groundwater. The system was shut down in December 1995 after investigations indicated that the subsurface soil had been remediated to the extent required to prevent groundwater degradation.

In addition, a 550-gallon UST was removed in June 1999. The UST was used to collect condensed fuel vapors from the pipeline feeding the Pritchard Refueling System.

Site 34 is within the OU1 groundwater plume. More information relating to the OU1 groundwater plume is presented in Section 4.8. The following sections address the surface soil contamination.

4.7.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for surface soil at Site 34.

4.7.1.1 Remedy Selection

The OU1 ROD (USAF 1995) identified excavation and low temperature thermal desorption as the preferred method of cleanup for the contaminated surface soil at Site 34. Excavation removes the

contaminated surface soil from the site and low temperature thermal desorption destroys the COCs, thereby protecting human health and the environment. However, a Final ESD was issued in May 2013 (USAF 2013) to document that the excavated soil will be disposed of off Base, rather than using low temperature thermal desorption for on-site disposal.

4.7.1.2 Remedy Implementation

PAH contamination is found on other sites at March ARB. After soil removal at Site 1 did not result in Site 1 being cleaned up to UU/UE levels, the risk from Site 34 was re-evaluated (MWH 2003). The site was resampled and the risk was recalculated. The risk was within the acceptable risk range for industrial workers. However, there was an unacceptable risk for potential future site residents.

4.7.1.3 System Operations/Operations and Maintenance

None.

4.7.1.4 Progress Since the Last 5-Year Review

No issues were identified during the last 5-year review in 2009. The Final ESD was issued in May 2013 as described in Section 4.7.1.1.

4.7.2 SITE 34 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review conducted for Site 34.

4.7.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. The site is contained within the March ARB flightline fence (a secured area inside of the March ARB perimeter fence). The site is hard packed dirt with little vegetation. No evidence of unauthorized digging was observed.

The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

4.7.2.2 Risk Information Review

Human Health Risk

Additional soil samples were collected and a new risk assessment performed in the Final Project Report, Sites 31 and 34 Investigations, January 2003 (MWH 2003). The risk assessment indicated that restriction from residential use is an appropriate remedy.

Ecological Risk

Site 34 is in a developed area of March ARB; ecological risk was not evaluated for the OU1 ROD. Site conditions have not changed; therefore the conclusions stated in the ROD are still valid.

4.7.2.3 Data Review

Additional soil samples were collected and a risk assessment performed in the Final Project Report, Sites 31 and 34 Investigations, January 2003 (MWH 2003). The risk assessment indicated that restriction from residential use is an appropriate remedy.

4.7.3 SITE 34 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 34.

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

Implementation of Institutional Controls and Other Measures: The Digging Permit process insures that no unauthorized digging/construction occurs (Appendix C).

Remedial Action Performance: The bioventing system effectively remediated the subsurface soil.

System Operations/Operation and maintenance: Groundwater monitoring of the OU1 plume continues.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the 5-year review. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure identified.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

4.7.4 SITE 34 ISSUES

No major deficiencies were noted during the 5-year review.

4.7.5 SITE 34 ASSESSMENT

Site 34 is in an access controlled area inside of March ARB. Development of the site is restricted because it is next to the aircraft parking ramp. The site is not being used. Bioventing has cleaned up the subsurface soil. Further evaluation of the PAH contamination in the surface soil indicates that restriction from residential use is appropriate.

4.7.6 SITE 34 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

4.7.7 PROTECTIVENESS STATEMENT

The remedy at Site 34 is short term protective of human health and the environment. Following remedy implementation, the Site will be protective in the long term.

4.7.8 NEXT REVIEW

Site 34 should be included in the next 5-year review, five years from the completion of this review if it has not achieved UU/UE by that time.

4.8 OPERABLE UNIT 1 GROUNDWATER PLUME

The OU1 ROD identified an OU1 groundwater plume. The plume extends from Site 31 south and east through Sites 34, 29, 9, 14, 16, 10, 9, 5, 15 and 7. The OU1 plume is on March ARB, the former March AFB and extends off-Base (Figure 4-8). The main source of the OU1 groundwater plume was suspected to be Site 31.

Currently: The OU1 plume is generally decreasing in size. In general, maximum plume concentrations are declining; however, there are some areas where concentrations are slightly increasing, especially in the downgradient portions on- and off-Base where concentrations are low compared to the source area concentrations.

Historic: Groundwater sampling results from the OU1 plume detected several chemicals greater than the MCL for drinking water.

Two of the chemicals, Bis(2-ethylhexyl)phthalate and methylene chloride, were determined to be laboratory contaminants after the ROD was signed. The 1996 and 1997 Annual Groundwater Monitoring Reports (ARs 802 and 995) listed them as common laboratory contaminants. Bis(2-ethylhexyl)phthalate and methylene chloride are no longer COCs.

Total phenols were listed as a component of the plume in the OU1 ROD. 1998/1999 Annual Monitoring Report (AR 2088) stated that the phenols were most likely associated with the biodegradation of naphthalene, a common semivolatile compound found in fuel. It was agreed that other fuel components (BTEX) would be used to evaluate fuel groundwater contamination.

The remaining groundwater chemicals above the MCLs in the OU1 ROD are listed below.

Table 4-9. OU1 Plume Groundwater Concentrations Exceeding MCLs in the OU1 ROD (1995)

Chemical	Maximum Concentration (µg/L)	OU1 ROD (1995) MCL (µg/L)	Current MCL (µg/L)
PCE	19	5	5
TCE	1400**	5	5
cis-1,2-Dichloroethene	30	6	6*
Benzene	420	1	1*
Carbon Tetrachloride	3	0.5	0.5*
1,1-Dichloroethene	260**	6	6*
1,2-Dichloroethane	25	0.5	0.5*

Notes:
* California MCL
** Same as the Site 31 Maximum Concentrations
µg/L micrograms per liter
MCL maximum contaminant level
OU Operable Unit
PCE tetrachloroethene
ROD Record of Decision
TCE trichloroethene

4.8.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for OU1 plume.

4.8.1.1 Remedy Selection

The OU1 ROD (USAF 1995) identified the remedial action as an expansion of the groundwater extraction and treatment at the Base boundary in order to stop the migration of the on-Base plume and to treat the contaminated water from the existing plume. The downgradient plume would be allowed to dissipate through natural processes. Groundwater monitoring would be conducted to ensure the on-Base portion of plume does not migrate off-Base, to ensure the maximum concentration of off-Base contaminants continues to fall, and to ensure the off-base plume does not threaten off-Base water supplies. There are prohibitions against groundwater use on base and on land transferred from the Air Force. The Air Force annually requests that the County not issue well permits in the off-Base plume areas.

4.8.1.2 Remedy Implementation

The original 9 extraction well system at the Base boundary was expanded to a 18 extraction well and 5 injection well system. Currently, there are 8 extraction wells operating for the Base boundary and 1 extraction well operating at Site 31. Injection well operation stopped in 2010.

The two original carbon vessels used to treat the groundwater have been augmented by two additional carbon vessels. The EGETS includes wells at Site 4 and Site 7. Since the OU1 ROD was finalized in 1995, the following off-Base OU1 monitoring wells have been added:

- OBMW01A and B;
- RBEMW01A thru E;
- OBMW02B;
- RBEMW02A and B;
- OBMW03;
- RBEMW03A and B;
- OBMW04A and B;
- RBEMW07A thru E;
- OBMW05A and B;
- RBEMW11A thru E;
- OBMW06A thru F;
- RBEMW12A thru E;
- OBMW07A and B;
- RBEMW13A thru E;
- OBMW08A thru D;
- OU1MW25 (installed in 2008);
- OBMW09A and B;

- OU1MW27 (installed in 2008);
- OBMW10A thru D;
- OU1MW24 (installed in 2009); and
- OBMW18.

No new OU1 plume monitoring wells have been added since 2009.

4.8.1.3 System Operations/Operations and Maintenance

The Site 31/EGETS treatment plant System Operations/O&M are conducted in accordance with the Revised Final Operations and Maintenance Plan, (MWH 2002). The following samples are taken:

- Monthly "mid-bed" samples to monitor carbon consumption.
- Quarterly influent and effluent samples to monitor discharge requirements.
- Semiannual extraction well samples to monitor contaminant trends.

In addition, influent and effluent flow rates are monitored. Semiannual process monitoring reports and quarterly discharge reports are generated. As part of the operation of this system, the wells are redeveloped to maintain groundwater pumping rates. The last redevelopment of an EGETS well was conducted in July 2012 in Well OU1GEW04.

The plume maps are redrawn each year in the Annual Monitoring Report based on that year's samples.

Prior to the award of a Performance Based Remediation (PBR) contract in June 2012, O&M actions at March ARB/former March AFB were grouped into different contracts with the goal of providing a comprehensive environmental solution for the entire March ARB/former March AFB complex. Costs were generally in line with estimates and had not changed appreciably up to the PBR contract award. In the future, as sole operator, the PBR contractor will be able to provide a more effective assessment of possible O&M optimizations/reductions.

4.8.1.4 Progress Since the Last 5-Year Review

The monitoring wells installed since the OU1 ROD was finalized have better defined the plume. The Remedial Process Optimization report (MWH 2007) identified the need for additional wells and

sampling. Most of this work was completed concurrent with the subject 5-year review period. The 2011-2012 Annual Monitoring Report compares the plume maps from 2000, 2007 and 2012 sampling years. The OU1 plume is generally decreasing in size and slowly moving downgradient.

Locations for additional monitoring wells are shown in the various annual groundwater monitoring reports (AMRs). AECOM reviewed the subject report and its list of recommendations to fill data gaps. Fourteen new wells were recommended, but only 5 were installed. The Air Force is evaluating the need for the additional monitoring wells..

4.8.2 OU1 PLUME 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for the OU1 plume.

4.8.2.1 Site Inspection

The OU1 plume site inspection was performed in conjunction with the Site 4, 7 and 31 site inspections on 23 September 2013 by AECOM personnel. The results of the site inspection are presented in Appendix A.

4.8.2.2 Risk Information Review

Human Health Risk

The following standards were identified as ARARs in the OU1 ROD. They were reviewed for changes that could affect protectiveness:

- MCLs for Primary Drinking Water (Title 22, CCR, Division 4, Chapter 15, Article 5.5, Section 64444.5.
- National Primary Drinking Water Regulations (40 CFR 141.61, MCLs for Organic Contaminants).

The most restrictive MCLs for the COCs have not changed since the OU1 ROD was finalized.

Ecological Risk

The groundwater plume does not impact surface water. No ecological risk assessment is required.

4.8.2.3 Data Review

The 2011-2012 Annual Monitoring Report evaluates the groundwater in and around March ARB/former March AFB. This report presents the following:

1. A comparison of the 2012 groundwater plumes to the 2007 and 2000 groundwater plumes.
2. Sampling results from off-Base water supply wells.
3. An EGETS evaluation.

2007 and 2012 Plume Comparison

The OU1 Plume is generally decreasing in size, but the plume is also slowly moving to the southeast (AECOM 2013b). Appendix E has the current concentrations of the chemicals listed in Table 4-10 for the OU1 Plume.

Sampling Results from Off-Base Water Supply Wells

The maximum detected concentrations in downgradient off-base water supply wells are summarized in Table 4-10 as follows:

Table 4-10. Water Supply Wells Contaminant Detections in Draft 2011-2012 Annual Monitoring Report

Well	Contaminant and Concentration (µg/L)	MCL (µg/L)
Bowers	No contaminants detected	Not Applicable
Clark1	Chloroform (1.0), 1,2-DCA (0.3)F	100, 0.5
Indian	TCE (1.3)	5
Mendez	Chloroform (0.22)F	100
Nordarse	No contaminants detected	Not Applicable
Perry1	TCE (0.71)	5
Terao	Chloroform (0.92)	100

Notes:
F – Detected between the method detection limit and the reporting limit
Perry1 TCE levels are consistent with historic levels.
µg/L micrograms per liter
DCA dichloroethane
MCL maximum contaminant level
TCE trichloroethene

Data Quality Objectives (DQOs) have been prepared for the water supply wells. As stated in the 2011 - 2012 Annual Monitoring Report, if the 95 percent upper confidence limit concentration for a COC or indicator compound is within 50 percent of the MCL in samples collected from off-Base water supply wells, then remedial options will be evaluated. None of the off-base wells exceeded this criterion. The Annual Monitoring Report concluded that no action, other than continued monitoring, is required in accordance with the DQOs (AECOM 2013b).

The water supply wells are shown in Figure 4-9. A similar analysis was also conducted on the water supply guard wells. No action, other than continued monitoring, was indicated.

EGETS Evaluation

Concentrations of TCE, PCE, and CTCL in monitoring wells were evaluated to monitor effectiveness of the EGETS capture in active and inactive extraction and injection wells. In general, no notable changes in concentrations of COCs occurred in the inactive extraction wells or associated monitoring wells between November 2006 (when 20 extraction wells were active) and May/June 2012 (when 10 extraction wells were active). Since February 2012, nine extraction wells have been active.

Maximum concentrations of TCE, PCE, and CTCL in off-Base wells were evaluated to help determine the effectiveness of the EGETS capture. This evaluation showed that concentrations of TCE, PCE, and CTCL have generally decreased since 1996, when the EGETS was constructed. A summary of the overall trends in off-Base wells is provided below:

- The maximum concentration of PCE of 11.6 μg/L (monitoring well OBMW05B) in June 2004 is greater than the maximum concentration of 7.3 μg/L (5MW31) in May 2012.
- The maximum concentration of TCE of 41 μg/L (5MW14) in September 1993 is greater than the maximum concentration of 13 μg/L (5MW07) in May 2012.
- The maximum concentration of CTCL of 2.7 μg/L (5MW36) in July 1999 is greater than the maximum concentration of 1.6 μg/L (OU1MW10) in May 2012 (AECOM 2013b).

Although the maximum off-Base concentrations of CTCL and TCE have decreased overall, there have been temporal fluctuations of PCE, TCE, and CTCL. Typically, these increasing concentration trends are small and are commensurate with dispersion of the OU 1 Plume to the south and southeast in the direction of groundwater flow. Therefore, while OU 1 plume boundaries have generally been

decreasing, there has been some expansion of the plume exceeding the OU 1 cleanup goals downgradient of the Base boundary, particularly within the lower alluvial and bedrock units. These trends indicate that the EGETS is generally effective, but not providing complete hydraulic containment.

4.8.3 OU1 PLUME TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for OU1 groundwater plume.

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

HASP/Contingency Plan: The HASP for long-term monitoring, long-term operation and long-term O&M is in place and properly implemented.

Implementation of Institutional Controls and Other Measures: The ICs on–Base will be implemented in accordance with the BGP. Riverside County officials have been notified of the properties off-Base that are impacted by the OU1 Plume and have been advised to deny the installation of wells. For property that has been transferred and is situated over the OU1 plume, such as property associated with Site 4 and Site 7, deed restrictions and a State Land Use Covenant are in place to restrict use of groundwater.

Remedial Action Performance: Results of groundwater sampling indicate that the OU1 remedial actions are generally remediating the groundwater contamination.

System Operations/Operations and Maintenance: System operation is acceptable and documented by the quarterly process monitoring reports and annual monitoring report.

Opportunities for Optimization: The Air Force will continue to evaluate the impacts of rising groundwater in the OU1 Groundwater Plume, will update the Basewide groundwater model, complete the vapor intrusion risk assessment as part of the Basewide groundwater OU5 FFS, and select a remedy in the OU5 ROD. Annual monitoring reports will continue to discuss changes in plume configuration, rising groundwater, vapor intrusion and data gaps in the monitoring program. Optimization of the monitoring program will be considered and instituted on an annual basis in consultation with regulatory partners.

Early Indicators of Potential Remedy Failure: The overall plume is stable or shrinking, which does not indicate remedy failure.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any

requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: Potential rising groundwater could rise into channels and subsurface structures. There were no current or future planned changes in groundwater or land use and no new contaminants, sources or routes of exposure identified. No site-specific VI assessment has been completed, and the VI pathway is being addressed under OU5 basewide groundwater ROD.

Changes in Toxicity and Other Contaminant Characteristics: Though there have been changes in toxicity or other contaminant characteristics for TCE and PCE, the Federal or State MCLs (driven by the ARARs) have not changed, and therefore, it does not affect the protectiveness of the remedy. In addition, under EPA OSWER guidance (9200.4-23, August 22, 1997, Clarification of the Role of ARARs in Establishing PRGs under CERCLA), compliance with ARARs is deemed to be protective absent very unique situations and factors which are not present here.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

4.8.4 OU1 PLUME ISSUES

Site conditions have changed due to rising groundwater levels and the Basewide groundwater model needs to be updated, and the vapor intrusion risk assessment needs to be completed.

4.8.5 OU1 PLUME ASSESSMENT

Based on the current monitoring well network, the OU1 plume is generally decreasing in size. Although some contaminants were detected in off-Base water supply wells, the contaminant concentrations were below MCLs and generally not increasing. The EGETS system is in place and functioning properly, however it may be providing incomplete hydraulic control at the eastern Base boundary.

4.8.6 OU1 PLUME RECOMMENDATIONS AND FOLLOW-UP ACTIONS

The following recommendation is made:

- Investigate the impacts of rising groundwater in the OU1 Groundwater Plume, update the Basewide groundwater model, complete the vapor intrusion risk assessment as part of the Basewide groundwater OU5 FFS, and select a remedy in the OU5 ROD.

Table 4-11. OU1 Recommendations and Follow-Up Actions

Issue	Recommendations/ Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Yes/No)	
					Current	Future
Rising Groundwater Basewide	Continue to monitor and evaluate as part of the Basewide groundwater FFS	AFCEC	State/EPA	FFS	No	Yes
VI	Complete VI assessment as part of OU5 basewide activities	AFCEC	State/EPA	FFS	No	Yes

Notes:
AFCEC Air Force Civil Engineer Center
VI vapor intrusion

4.8.7 PROTECTIVENESS STATEMENT

The remedy at OU1 Groundwater Plume is short term protective of human health and the environment. For the remedy to be protective in the long-term, the following actions need to be taken: Investigate the impacts of rising groundwater in the OU1 Groundwater Plume, update the Basewide groundwater model, complete the vapor intrusion risk assessment as part of the Basewide groundwater OU5 FFS, and select a remedy in the OU5 ROD.

4.8.8 NEXT REVIEW

The OU1 plume should be included in the next five-year review, five years from the completion of this review.

5.0 OPERABLE UNIT 2 SITES

This Section includes the evaluation of the following OU2 Sites for protectiveness:

- Site 1- Aircraft Isolation Area/Fuel Drainage Area;
- Site 6 – Landfill No. 4;
- Site 11 – Bulk Fuels Storage Area;
- Site 17 – Swimming Pool Fill; and
- Site 19 – West March Sludge Drying Beds.

5.1 SITE 1 – AIRCRAFT ISOLATION AREA/FUEL DRAINAGE AREA

Site 1 (SS001) is next to the northern taxiway connecting the primary runway to the aircraft parking apron (Figure 5-1). It is on March ARB and is controlled by the Air Force Civil Engineer Center (AFCEC). Site 1 is an OU2 site and is included in the AFRC ROD for Sites 1, 11, 37 and 39 (USAF 2005a).

Currently: Restricted from residential use, in a secured area of March ARB. Use restriction is recorded in the 2010 Base General Plan. The Air Force is pursuing regulatory and site closure for several sites at March AFB/ARB. As part of this process the USAF has submitted documentation that supports unlimited use, UU/UE. For Site 1, the USAF submitted the Draft Remedial Investigation Addendum (RIA)/Risk Assessment Revision (RAR) Report to the regulators in July 2013, which recommended UU/UE for the site. The RWQCB had no comments on the draft report and concurred with the UU/UE for the site. The DTSC and USEPA did not concur with the report citing the need for additional characterization. The USAF will continue to work with the DTSC and USEPA to achieve UU/UE for the Site.

Historic: During the early 1960's fuel was reportedly removed from aircraft into portable tanks for transfer to other parts of the Base. Reportedly, some of the fuel was drained directly to the ground. Chlorinated solvents such as TCE may have also been disposed of in this area.

Site sampling found no significant amounts of fuel or solvents, but levels of polynuclear aromatic hydrocarbons (PAHs) were found in the surface soil at concentrations that exceed USEPA Region 9 Preliminary Remediation Goals (PRGs). PAHs are chemicals that are formed from the burning of organic compounds and are a major component of asphalt. In December 1995, a time-critical removal action was conducted where approximately 3,200 cubic yards of affected soil were removed from the site and placed in a Site 6 waste cell (USAF 1996; OHM 1996; IT 1996; Tetra Tech 1997). Confirmation soil samples were collected from the surrounding undisturbed area. Post removal concentrations of PAHs were found to be within acceptable values for industrial land use (see USEPA letter in March 1996, Administrative Record 614).

Following soil removal, a large portion of the site was graded for construction of the new California ANG alert facility. The facility has been completed and is in operation. No change to the current industrial land use is planned.

5.1.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, and system operations process for Site 1.

5.1.1.1 Remedy Selection

The remedial action identified in the OU2 AFRC ROD for Sites 1, 11, 37 and 39 (USAF 2005a), for Site 1 was Land Use Controls (LUCs), consisting of a prohibition of residential type uses, to prevent exposure to PAH contamination existing in surface soils at the site and limiting access to the site to authorized personnel. Specifically, construction or use of Site 1 for residences, public or private schools, day care centers, or hospitals for human care will be prohibited. The ROD references that the Base Comprehensive Plan/BGP will incorporate the specific use restrictions required at Site 1.

5.1.1.2 Remedy Implementation

LUCs that prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities and playgrounds, and limit the access to authorized personnel have been recorded in the Base Comprehensive Plan/BGP (April 2010) with the reason for restrictions (elevated PAHs).

If Site 1 is transferred out of Air Force control, additional documentation and notifications are required.

The LUC section of the Base General Plan is included in Appendix C. The Institutional Controls/LUCs section from the ROD is reproduced in Appendix D.

5.1.1.3 System Operations/Operations and Maintenance

There are no O&M activities required at the site since the approved action at Site 1 was LUCs.

5.1.1.4 Progress Since the Last 5-Year Review

There have been no changes since the last 5-year review in 2009 and no issues were identified during the last 5-year review in 2009

5.1.2 SITE 1 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 1.

5.1.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. The site is contained within the March ARB alert complex, a secured area inside March ARB. Access to the alert complex is restricted by fencing with a guard at the gate. There is no residential land use on the site.

The site inspection form from the USEPA 5-year review guidance was completed and is included in Appendix A.

5.1.2.2 Risk Information Review

Human Health Risk

The ROD for this site was signed in September 2005. Risk evaluation results used as the basis for the remedy selection for Site 1 in the ROD were not re-evaluated for this five-year review, since no new data has been collected subsequent to the ROD.

The current toxicity criteria from regional screening tables (RSL) tables, dated May 2013, obtained from the USEPA website, were reviewed and are consistent with the toxicity criteria used for the COCs

at Site 1 in the ROD. The COCs identified for Site 1 in the ROD were benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene.

Ecological Risk

Site 1 is in a developed area of March ARB on the Main Base. Because the Main Base area of March ARB (such as Site 1) was highly developed, consisting of landscaping, buildings or pavement, it was not evaluated for ecological risk. Site conditions have not changed, therefore the conclusions stated in the ROD are still valid.

5.1.2.3 Data Review

The Annual Monitoring of LUCs Report for seven ERP Sites including Site 1, dated February 2013 (USAF 2013a) was reviewed. No changes in land use and no ground disturbance activities were reported. The restriction against residential land use is recorded in the BGP (updated in April 2010). The land use restriction section of the BGP is included in Appendix C.

5.1.3 SITE 1 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 1.

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

Implementation of Institutional Controls and Other Measures: The site is restricted from residential land use, no residential uses are currently on the site and no future residential uses are planned. The Base Digging Permit process requires that any excavating or digging on Base have the approval of the Base environmental office before any work is conducted. Work coordination procedures are in AFI 32-1001, Operations Management. This ensures that the site is managed in a safe manner and that any work proposed in the area must be approved before work can be accomplished.

Remedial Action Performance: The land use restriction remains in place. The site has no residential land use.

System Operations/ Operation and Maintenance: None required.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions or land use that affect exposure pathways were identified in the course of the 5-year review. Although there are buildings at, or within 100 feet of, Site 1 (see Figure 5-1), no COCs identified in the ROD are VOCs that present a VI risk from soil at Site 1, and Basewide groundwater is being assessed separately for the VI pathway as part of OU5.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

5.1.4 SITE 1 ISSUES

No major deficiencies were noted during the 5-year review.

5.1.5 SITE 1 ASSESSMENT

The site is within a secured area inside March ARB. The site is restricted from residential land use due to PAH contamination in the surface soil. There are no residential type uses on the site.

5.1.6 SITE 1 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

5.1.7 PROTECTIVENESS STATEMENT

The remedy at Site 1 is protective of human health and the environment..

5.1.8 NEXT REVIEW

Five year reviews are required as long as contamination remains in place above UU/UE levels. The next review should be conducted within 5 years of the completion of this review.

5.2 SITE 6 – LANDFILL NO. 4

Site 6 (LF006) is located on West March, north of Air Force Village West residential development, south of Van Buren Boulevard, east of Plummer Road, and west of Air Force Village West Drive (Figure 5-2). It is on the former March AFB and the environmental cleanup is controlled by the AFCEC. The landfill consists of three discrete areas: Site 6a (approximately 15 acres) the location of the main former landfill area; Site 6b Quarry (approximately 0.6- acre) the location of a former quarry; and Site 6b Pond (approximately 2.6 acres) the location of a pond. Site 6 is an OU2 site and is included in the AFRPA OU2 ROD, May 2004 (USAF 2004).

Currently: Transferred to the March Joint Powers Authority (MJPA). Two waste cells have been constructed. The Air Force is responsible for maintenance of the waste cells. ICs are in place in the form of deed restrictions and a State Land Use Covenant.

Historic: Site 6 was used by March AFB from the early 1950s to the early 1980s for disposal of household waste and construction debris. PAHs, polychlorinated biphenyls (PCBs), pesticides, herbicides, and dioxins were found in samples of soil and water collected during the OU2 RI.

The risk assessment in OU2 RI/FS found no unacceptable risk to current off-site receptors (there are no current on-site receptors). However, it documented unacceptable risk to future on-site residents, future industrial workers and future on-site construction workers.

To mitigate these risks and to protect groundwater, a waste cell was constructed on Site 6. A Site Specific Action Memorandum was prepared (AR 358) and approved (ARs 1250, 1252, and 1256). Material was removed from Site 6a and placed in a temporary stockpile. The removed material was visually screened for suspected hazardous material. Hazardous material was separated for disposal off-site at a licensed facility.

Two waste cells (A and B) were constructed to contain the waste. Construction details differ between the two cells, but both cells were similar. Clean fill was brought in to raise the wastes at least 5 feet above groundwater. A sub-drain system was installed, and then a bottom geomembrane and clay layer with a leachate collection system. An 18-inch layer of screened waste was placed next to protect the

geomembrane and the leachate collection system. The screening removed particles larger than ¾-inch. Unscreened waste was placed on top of the screened layer.

To complete the waste cell, a layer of screened waste was placed on top of the waste. Over the screened waste is a geomembrane, with gas relief vents, and a drainage layer. Finally, a 2-foot to 5-foot thick protective soil layer was placed on top of the waste cells. Approximately 19,300 cubic yards of material from Site 6b Pond and Site 6b Quarry were removed and placed in the waste cells.

Additional materials were placed in the waste cells as described in the Modification to the Site-Specific Removal Action Memorandum, Site 1, 9, 25 and 12 Underground Storage tank (UST) Locations and Consolidation to OU2 Site 6 AR 581). A total of 579,232 cubic yards of waste material was placed in the waste cells.

5.2.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 6.

5.2.1.1 Remedy Selection

The AFRPA OU2 ROD (USAF 2004), states that at Site 6, non-hazardous waste from old landfills was consolidated in engineered waste cells. ICs were selected as the remedy to protect the waste cells. The use, access, and activity restrictions will prevent persons from exposure to the wastes in the engineered cells.

5.2.1.2 Remedy Implementation

The waste cells have been protected and maintained by land use restrictions incorporated in the deed as grantee covenants and by a State Land Use Covenant. The deed restrictions and State Land Use Covenant are recorded with the County of Riverside. The specific deed restrictions from the AFRPA OU2 ROD are provided in Appendix D. They include restricting Site 6 from residential use, protecting the landfill cover and prohibiting groundwater extraction for any purpose other than monitoring.

The waste cells were constructed under a removal action prior to the selection of the remedy in the ROD.

5.2.1.3 System Operations/Operations and Maintenance

System operations for the past five years were performed in accordance with the approved Landfill Operations and Maintenance Work Plan, OU2, Site 6, Landfill 4 (Tetra Tech Inc. and Black & Veatch 1999b), Landfill Operations, Maintenance, and Monitoring Work Plan Addendum (AECOM 2010), and the Remedial Action-Operation (RA-O) Work Plan Addendum (AECOM 2013c). System operations, as they are described in the Work Plan, are as follows:

- Security fencing is visually inspected on a semiannually basis or after major storm events. Repairs are performed as needed.
- Annual inspection of the landfill to confirm that ICs that are part of the remedy have not been violated.
- Ten settlement monuments are inspected semiannually and after major storm events to ensure that they are intact and no areas have been disturbed. Repairs are performed as needed. The ten settlement monuments are surveyed by a licensed land surveyor every five years in order to monitor settlement.
- The surface drainage ditches and channels are visually inspected semiannually and after major storm events to ensure that they are in good working condition, free of any debris or silt and that no areas have been disturbed. Repairs are performed as needed.
- The clean out risers, drainage ditches, and the overflow channel are visually inspected semiannually and after major storm events to ensure that they are in good working condition, free of any debris, and that no areas have been disturbed. Repairs are performed as needed.
- Visual inspections of the vegetative cover are performed semiannually to ensure erosion is under control and that no areas have been disturbed.
- The final cover will be visually inspected semiannually and after major storm events. Corrective measures will be taken if the inspection reveals excessive erosion, surface irregularities, cracking, or other damage to the final cover.
- Leachate levels will be measured and recorded semiannually. A sample will be collected if the leachate is more than 18 inches in depth. Leachate is normally processed through the EGETS.
- The subdrain system will be visually inspected semiannually and after major storm events to ensure it is intact, in good condition and that no areas have been disturbed. Subdrains will be cleaned or repaired as needed.

- Groundwater monitoring at POC wells and background monitoring wells to determine the presence of contaminants from the landfill leachate and to continue monitoring groundwater quality upgradient of the site. The POC wells are 6M6MW5, 6M6MW6, 6M6MW7 and 5M6MW2. The background wells are 6M6MW3 and 5M6MW5. The wells were sampled semiannually for VOCs until the groundwater monitoring program was discontinued in 2012.

Prior to the award of a Performance Based Remediation (PBR) contract in June 2012, O&M actions at March ARB/former March AFB were grouped into different contracts with the goal of providing a comprehensive environmental solution for the entire March ARB/former March AFB complex. Costs were generally in line with estimates and had not changed appreciably up to the PBR contract award. In the future, as sole operator, the PBR contractor will be able to provide a more effective assessment of possible O&M optimizations/reductions.

5.2.1.4 Progress Since the Last 5-Year Review

No issues were identified during the last 5-year review in 2009. The Site 6 groundwater Detection Monitoring Program commenced shortly after the site was closed in 1997. Analytical results and statistical comparisons of the upgradient and downgradient groundwater monitoring wells and subdrain system (MH-2) do not indicate any significant VOC and/or general chemistry impacts to groundwater during the past 15 years of monitoring. Based on these results the Detection Monitoring Program was discontinued per recommendations in the regulatory approved Final Annual 2012 Landfill Remedial Action-Operation Report (AECOM 2013d).

5.2.2 SITE 6 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 6.

5.2.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. The site is secured within a fence with locked gates and warning signs. No evidence of unauthorized digging, vandalism or land use was found.

The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

5.2.2.2 Risk Information Review

Human Health Risk

Soil

The AFRPA OU2 ROD identified soil contaminants above the acceptable risk range. The contaminated soil was placed in the waste cells, eliminating the exposure pathway. The landfill is closed to any additional disposal.

Groundwater

Analytical results and statistical comparisons of the upgradient and downgradient groundwater monitoring wells and subdrain system (MH-2) did not indicate any significant VOC and/or general chemistry impacts to groundwater during the past 15 years of monitoring. The Detection Monitoring Program was discontinued based on recommendations in the regulatory approved Final Annual 2012 Landfill Remedial Action-Operation Report (AECOM 2013d).

Ecological Risk

A qualitative ecological risk assessment was performed after the waste cells were constructed. The ecological risk assessment concluded that, in general, the removal action had removed the primary contaminants of ecological concern (USAF 2004). Site conditions have not changed; therefore the conclusions stated in the risk assessment are still valid.

5.2.2.3 Data Review

Site 6 landfill monitoring is documented in annual monitoring reports. A review of the 2009 Annual Operations, Monitoring, and Maintenance Report Operable Unit 2, IRP Site 6; 2010 Annual Operations, Monitoring, and Maintenance Report, January through December 2005, Operable Unit 1, IRP Site 4 and Operable Unit 2, IRP Site 6; 2011 Annual Operations, Monitoring, and Maintenance Report, Operable Unit 1, IRP Site 4 and Operable Unit 2, IRP Site 6; and the 2012 Annual Landfill Remedial Action-Operation Report, IRP Sites 4, 5, and 6 (AECOM 2010b, 2011, 2012a, 2013d) showed that:

- Required inspections and maintenance has been performed.

- No significant levels of VOCs were found in the monitoring wells.
- Landfill leachate continues to be collected and processed at the EGETS.
- Methane levels from landfill gas perimeter probes are well below the compliance limit of 5 percent.

5.2.3 SITE 6 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 6.

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

Implementation of Institutional Controls and Other Measures: The ICs are identified in deed restrictions and a State Land Use Covenant, both on file with the County of Riverside. Inspections conducted since the last 5-Year review in 2009 have indicated and verified no breaches in the IC restrictions.

Remedial Action Performance: The landfill cap and the site fences prevent direct access to the wastes. Unlike Site 4, the wastes at Site 6 were excavated and a bottom structure for the waste cells was completed. To prevent groundwater from entering the waste cells, the bottom of the waste cells was raised 5 feet above groundwater levels, a sub drain system installed and a liner placed in the bottom of the waste cell.

System Operations/Operations and Maintenance: The current O&M procedures include routine cap maintenance, landfill gas monitoring, and leachate collection and treatment. As part of the closure/post closure requirements, the Air Force prepares semiannual and annual inspection reports for regulatory review and comments.

Opportunities for Optimization: Based on the analytical results and statistical comparisons of the groundwater monitoring wells and subdrain system (MH-2), the Detection Monitoring Program has been discontinued per recommendations in the regulatory approved Final Annual 2012 Landfill Remedial Action-Operation Report (AECOM 2013d).

Early Indicators of Potential Remedy Failure: None identified. Unlike the landfills on the Main Base on March ARB (such as Site 4 and Site 5) rising groundwater is not a concern at Site 6, which is located in West March on the former March AFB. West March is at a higher elevation than the Main Base. Bedrock outcropping are scattered throughout the Site 6 area. Groundwater level measurements taken at Site 6 monitoring wells show no trend of increasing groundwater levels.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: None. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure identified. No site-specific VI assessment has been completed, and the VI pathway is being addressed under OU5 basewide groundwater ROD.

Changes in Toxicity and Other Contaminant Characteristics: Though there have been changes in toxicity or other contaminant characteristics for TCE and PCE, the Federal or State MCLs (driven by the ARARs) have not changed, and therefore, it does not affect the protectiveness of the remedy. In addition, under EPA OSWER guidance (9200.4-23, August 22, 1997, Clarification of the Role of ARARs in Establishing PRGs under CERCLA), compliance with ARARs is deemed to be protective absent very unique situations and factors which are not present here.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy..

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No. Groundwater is generally not rising at this site.

5.2.4 SITE 6 ISSUES

None identified.

5.2.5 SITE 6 ASSESSMENT

The wastes at Site 6 are contained within a waste cell. The waste cell is regularly inspected and maintained. LUCs are contained in property transfer documents to help prevent future direct access to the wastes. The landfill gas monitoring demonstrates that Site 6 is meeting landfill gas standards.

5.2.6 SITE 6 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

5.2.7 PROTECTIVENESS STATEMENT

The remedy at Site 6 is protective of human health and the environment.

5.2.8 NEXT REVIEW

Site 6 should be included in the next 5-year review, five years from the completion of this review.

5.3 SITE 11 – BULK FUELS STORAGE AREA

Site 11 (SS011) is the tank farm area of approximately 20 acres in the northeast corner of the Base near the main gate. It is on March ARB and controlled by AFRC. The site includes the entire fuel storage facility and smaller portions to the northwest and southeast (Figure 5-3). Site 11 is an OU2 site and is included in the AFRC ROD for Sites 1, 11, 37 & 39 (USAF 2005a).

The fuel storage facility is enclosed by a fence with a locked gate. The site has been used as a storage and distribution facility for jet fuel since the early 1950s. A 1949 aerial photograph indicates that portions of the site were previously occupied by a motor-pool parking and storage area.

Currently: Restricted from residential use, in a secured area of March ARB. Use restriction recorded in the 2010 BGP. The Air Force is pursuing regulatory and site closure for several sites at March AFB/ARB. As part of this process the USAF is in the process of submitting documentation that supports UU/UE.

Historic: The site was investigated due to concerns about releases from historic site use (such as motor pool in the 1940s) as well as the current site use (fuel farm). A 10,000-gallon surface spill of fuel occurred in 1976 as the result of a transfer-valve malfunction.

Site sampling found elevated levels of a PAH in the surface soil; no significant amount of fuel contamination (evaporation removed a major fraction of fuel spilled on the surface) and no significant groundwater contamination was found. The maximum concentration of the PAH, benzo(a)pyrene was 0.15 mg/kg with the 2004 USEPA Region 9 residential PRG at 0.062 mg/kg and the industrial PRG at 0.21 mg/kg.

Concentrations of benzo(a)pyrene were found to be within acceptable risk values for industrial land. No change to the current industrial land use is planned.

5.3.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 11.

5.3.1.1 Remedy Selection

The remedial action identified in the ROD for Sites 1, 11, 37 and 39 for Site 11 (USAF 2005a) was LUCs, consisting of a prohibition of residential type uses, to prevent exposure to PAH contamination existing in surface soils at the site and limiting access to the site to authorized personnel. Specifically, construction or use of Site 11 for residences, public or private schools, day care centers, or hospitals for human care will be prohibited. The ROD references that the Base Comprehensive Plan/BGP will incorporate the specific use restrictions required at Site 1.

5.3.1.2 Remedy Implementation

LUCs that prohibit the development and use of property for residential housing, elementary and secondary schools, child care facilities and playgrounds, and limits the access to authorized personnel have been recorded in the BGP (April 2010) along with the reason for restrictions (elevated PAHs).

If Site 11 is transferred out of Air Force control, additional documentation and notifications are required.

The LUC section from the Base General Plan is included in Appendix C. The ICs/LUCs section from the ROD is included in Appendix D.

5.3.1.3 System Operations/Operations and Maintenance

There are no O&M activities required at the site since the approved action at Site 11 was LUCs.

5.3.1.4 Progress Since the Last 5-Year Review

There have been no changes since the last 5-year review in 2009 and no issues were identified during the last 5-year review in 2009.

5.3.2 SITE 11 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 11.

5.3.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. The site is at the bulk fuel storage area. The fence around the fuel storage area is in good condition. No evidence of unauthorized digging was observed. There is no residential land use at the site.

The site inspection form from the USEPA 5-year review guidance was completed and is included in Appendix A.

5.3.2.2 Risk Information Review

Human Health Risk

The ROD for this site was signed in September 2005. The risk assessment indicated that the residential carcinogenic risk is 2 x 10^{-4}, and the risk for industrial and construction workers is 6 x 10^{-5}, which is within the NCP-defined risk management range of 10^{-6} to 10^{-4}. No significant groundwater contaminants have been detected at Site 11. Risk evaluation results used as the basis for the remedy selection for Site 11 in the ROD were not re-evaluated for this five-year review, since no new data has been collected subsequent to the ROD.

The current toxicity criteria from regional screening tables (RSL) tables, dated May 2013, obtained from the USEPA website, were reviewed and are consistent with the toxicity criteria used for the COCs at Site 11 in the ROD (benzo[a]pyrene).

Ecological Risk

Site 11 is in a developed area of March ARB on the Main Base. Because the Main Base area of March ARB (such as Site 11) was highly developed, consisting of landscaping, buildings or pavement, it was not evaluated for ecological risk. Site conditions have not changed, therefore the conclusions stated in the ROD are still valid.

5.3.2.3 Data Review

The Annual Monitoring of LUCs Report for seven ERP Sites including Site 11, dated February 2013 (USAF 2013a) was reviewed. The LUCs are recorded in the BGP (updated in April 2010) and enforced through the Base Dig Permit process. The land use restriction section of the BGP is included

in Appendix C. No changes in land use occurred since 2009. Minor ground disturbance activities were evident during the recent site visit. The utility excavation activities were authorized by the Base Engineer through the dig permit process and were performed by a licensed contractor trained to perform work where exposure to contaminated soil may occur.

5.3.3 SITE 11 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 11.

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

Implementation of Institutional Controls and Other Measures: The site is restricted from residential land use, no residential uses are currently on the site and no future residential uses are planned. The Base Digging Permit process requires that any excavating or digging on-Base have the approval of the Base environmental office before any work is conducted. Work coordination procedures are in AFI 32-1001, Operations Management. This ensures that the site is managed in a safe manner and that any work proposed in the area must be approved before work can be accomplished.

Remedial Action Performance: The land use restriction remains in place. The site has no residential land use.

System Operations/Operations and Maintenance: None required.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the 5-year review. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure identified.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

5.3.4 SITE 11 ISSUES

No major deficiencies were noted during the 5-year review.

5.3.5 SITE 11 ASSESSMENT

The site is within a secured area inside March ARB. The site is restricted from residential land use due to PAH contamination in the surface soil. There are no residential type uses on the site.

5.3.6 SITE 11 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

5.3.7 PROTECTIVENESS STATEMENT

The remedy at Site 11 is protective of human health and the environment.

5.3.8 NEXT REVIEW

Five-year reviews are required as long as contamination remains in place above UU/UE levels. The next review should be conducted within 5 years of the completion of this review.

5.4 SITE 17 – SWIMMING POOL FILL

Site 17 (WP017) is a former Base swimming pool located on the Main Base on U Street between DeKay and K Streets (Figure 5-4). It is on the former March AFB and the environmental cleanup is controlled by the AFCEC. Site 17 is an OU2 site and is included in the AFRPA OU2 ROD (USAF 2004).

Currently: Transferred to the MJPA. ICs are in place in the form of deed restrictions and a State Land Use Covenant. The Air Force is pursuing regulatory and site closure for several sites at March AFB/ARB. As part of this process the USAF has submitted documentation that supports UU/UE. For Site 17, the USAF submitted the Draft Final RIA/RAR Report to the regulators in July 2013, which recommended UU/UE for the site. The RWQCB had no comments on the draft document concurring

with UU/UE for the site. The DTSC and USEPA had comments on the document which are currently being addressed. The USAF will continue to work with the DTSC and USEPA to achieve UU/UE for the Site.

Historic: The former swimming pool at Site 17 was closed in the 1970s. After it was closed, the pool was used as a disposal site and the wastes were covered with soil. The waste consisted of drums, paint containers, and demolition debris. After discussions with the regulatory agencies and the public, a decision was made to clean the site by removing the waste. The pool and its contents were removed during a 1994 interim removal action. The wastes were taken off-Base for disposal. The excavation was filled with clean soil.

The concrete pool bottom was removed as part of the removal action. Soil samples were collected from beneath the pool bottom. A PCB, Aroclor 1254 was found at levels ranging from 4.4 mg/kg to 0.8 mg/kg, which exceeded the residential PRG of 0.22 mg/kg.

Four additional soil samples from below the pool bottom were taken during the RI. One detection of Aroclor 1254 was reported at 0.021 mg/kg, and one detection of Aroclor 1260 was reported at 0.012 mg/kg. The remaining samples were below the method detection limit of 0.012.

The selected remedy for Site 17 in the AFRPA OU2 ROD (UASF 2004) is a prohibition against residential land use and drilling or excavation of more than 7 feet bgs. The prohibitions are based on PCBs in the soil at least 8 feet below ground surface.

5.4.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 17.

5.4.1.1 Remedy Selection

The remedial action identified in the AFRPA OU2 ROD (USAF 2004) for Site 17 is a prohibition against residential, school, day care, or hospital land use and drilling or excavation of more than 7 feet bgs. The prohibitions are based on PCBs in the soil at least 8 feet below ground surface.

5.4.1.2 Remedy Implementation

Land use restrictions have been incorporated in the deed as grantee covenants and a State Land Use Covenant. The deed restrictions and State Land Use Covenant are recorded with the County of Riverside. The specific deed restrictions from the AFRPA OU2 ROD are included in Appendix D.

5.4.1.3 System Operations/Operations and Maintenance

There is no active clean up system on Site 17. Annual site inspections are conducted by MJPA in accordance with the State Land Use Covenants at the former March AFB.

5.4.1.4 Progress Since the Last 5-Year Review

There have been no changes since the last 5-year review in 2009 and no issues were identified during the last 5-year review in 2009. Property transferred to the MJPA. ICs are in place in the form of deed restrictions and a State Land Use Covenant. The deed restrictions and State Land Use Covenant are recorded with the County of Riverside.

5.4.2 SITE 17 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 17.

5.4.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. The site is within a housing area, bounded on two sides by the March ARB perimeter fence. Access to the housing area is restricted to residents and other authorized entrants by an automatic gate. No evidence of unauthorized digging was observed.

The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

5.4.2.2 Risk Information Review

Human Health Risk

The ROD for this site was signed in May 2004. Risk evaluation results used as the basis for the remedy selection for Site 17 in the ROD were not re-evaluated for this five-year review, since no new data has been collected subsequent to the ROD.

The current toxicity criteria from regional screening tables (RSL) tables, dated May 2013, obtained from the USEPA website, were reviewed and are consistent with the toxicity criteria used for the COCs (Aroclor 1254 and 1260) at Site 17 in the ROD.

Ecological Risk

Site 17 is in a developed area of March ARB on the Main Base. Because the Main Base area of March ARB (such as Site 17) was highly developed, consisting of landscaping, buildings or pavement, it was not evaluated for ecological risk. Site conditions have not changed, therefore the conclusions stated in the ROD are still valid.

5.4.2.3 Data Review

The Annual Inspection Report for Sites 7, 17, 19, L, and OU1 Groundwater was reviewed (MJPA 2013). No discrepancies were noted.

5.4.3 SITE 17 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 17.

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

Implementation of Institutional Controls and Other Measures: The site is restricted from residential land use, no residential uses are on the site and no future residential uses are planned. ICs are in place in the form of deed restrictions and a State Land Use Covenant. The prohibition against residential land use and digging has been identified in deed restrictions and a State Land Use Covenant, both on file with the County of Riverside. Inspections have indicated and verified no breaches in the IC restrictions.

Remedial Action Performance: The land use restrictions remain in place. The site has no residential land use and no evidence of digging activities.

System Operations/Operations and Maintenance: None required.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the 5-year review. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure identified.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

5.4.4 SITE 17 ISSUES

No major deficiencies were noted during the 5-year review.

5.4.5 SITE 17 ASSESSMENT

There is no evidence of unauthorized land use or digging. Land use restrictions are recorded in property transfer documents. A State Land Use Covenant is in place.

5.4.6 SITE 17 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

5.4.7 PROTECTIVENESS STATEMENT

The remedy at Site 17 is protective of human health and the environment.

5.4.8 NEXT REVIEW

Five- year reviews are required as long as contamination remains in place above UU/UE levels. The next review should be conducted within 5 years of the completion of this review.

5.5 SITE 19 – WEST MARCH SLUDGE DRYING BEDS

Site 19 (WP019) is about 7 acres in size, located at the southern end of West March (Figure 5-5), east of the active wastewater treatment plant. It is on the former March AFB and the environmental cleanup is controlled by AFCEC. The site is generally vacant land with four concrete lined drying beds in the western portion of the site. Site 19 is an OU2 site and is included in the AFRPA OU2 ROD (USAF 2004).

Currently: The site was transferred to the MJPA, and then to the Western Municipal Water District. ICs are in place in the form of deed restrictions and a State Land Use Covenant. The Air Force is pursuing regulatory and site closure for several sites at March AFB/ARB. As part of this process the USAF has submitted documentation that supports UU/UE. For Site 19, the USAF submitted the Draft Final RIA/RAR Report to the regulators in July 2013, which recommended UU/UE for the site. The RWQCB had no comments on the draft document concurring with UU/UE for the site. Following comment resolution, DTSC concurred with UU/UE for the site. The USEPA did not concur with the conclusions. The USAF will continue to work with the USEPA to achieve UU/UE for the Site.

Historic: Site 19 contains the four active lined sludge drying beds and three inactive, unlined sludge-drying beds associated with the sewage treatment plant. The plant was constructed in 1941 and used to process the wastewater from Camp Haan and March AFB. A total of 10 sludge-drying beds have historically been used at the site. Three of these beds have been backfilled. In 1990, when the plant was upgraded, four lined drying beds were constructed at the location of previously unlined beds.

In the past, wastewater treatment sludge was spread out in the unlined beds to dry. When dry, the sludge was removed from the drying beds. PAHs, PCBs, hexavalent chromium, and thallium were found in soil samples in the area of the unlined beds at levels above the residential PRGs; however, risk to industrial workers is within the acceptable risk range.

5.5.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 19.

5.5.1.1 Remedy Selection

The remedial action identified in the AFRPA OU2 ROD (USAF 2004) for Site 19 is a prohibition against residential, school, day care, or hospital land use and restrictions on soil disturbance activities.

5.5.1.2 Remedy Implementation

Land use restrictions have been incorporated in the deed as grantee covenants and by a State Land Use Covenant. The deed restrictions and State Land Use Covenant are recorded with the County of Riverside. The specific deed restrictions from the AFRPA OU2 ROD are included in Appendix D.

5.5.1.3 System Operations/Operations and Maintenance

There is no active cleanup system on Site 19. Annual site inspections are conducted by Western Municipal Water District in accordance with the State Land Use Covenants at the former March AFB.

5.5.1.4 Progress Since the Last 5-Year Review

There have been no changes since the last 5-year review in 2009 and no issues were identified during the last 5-year review in 2009.

5.5.2 SITE 19 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site 19.

5.5.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. Site 19 remains as a wastewater treatment plant, but is now referred to as a water recycling facility. Access to the site is restricted by fencing with a guard at the gate. There is no residential land use on the site. The Annual Inspection Report for Sites 7, 17, 19, L, and OU1 Groundwater was reviewed (MJPA 2013). No discrepancies were noted.

The site inspection form from the USEPA 5-year review guidance was completed and is included in Appendix A.

5.5.2.2 Risk Information Review

Human Health Risk

The ROD for this site was signed in 2004, and the RI/FS was completed in 1997. Both the ROD and RI/FS note that the major contributor to the unacceptable risk to future on-site residents, industrial workers, and construction workers is from potential future use of groundwater. Site 19 is not in a good water bearing area due to high bedrock.

Groundwater in the area of Site 19 is not currently consumed, and no current receptors were identified to be at risk from exposure to groundwater. For future on-site residents, risks above the acceptable range were identified from the ingestion and dermal contact with groundwater contaminated by arsenic, dieldrin, heptachlor epoxide, and 4 chloroaniline. Arsenic is the major contributor the risk from measured concentrations in groundwater. Further analysis of arsenic under the Basewide groundwater monitoring program has shown the levels of arsenic at Site 19 to be consistent with background levels of arsenic in the area of March AFB. Therefore, the levels of arsenic detected in the groundwater are believed to be indicative of background and not the result of Air Force activities at the site. Additionally, groundwater and bedrock are shallow in this area and the potential for future use of groundwater as a potable source is extremely unlikely.

Soil carcinogenic risk greater than 10^{-4} from PAHs for future residents and between 10^{-4} and 10^{-6} from PAHs, PCBs, and hexavalent chromium for future residents, industrial workers and construction workers was identified in the AFRPA ROD (USAF 2004). Also noncarcinogenic health risk hazard index greater than 1 was identified for soil.

Ecological Risk

A risk assessment summary was presented in the AFRPA OU2 ROD. The risk assessment concluded that damage to ecological receptors of concern from remediation of the site would probably cause more damage, due to destruction and loss of habitat, than if the contaminants were left in place. No new ecological receptors have been introduced to the site.

5.5.2.3 Data Review

The Annual Inspection Report for Sites 7, 17, 19, L, and OU1 Groundwater was reviewed (MJPA 2013). No discrepancies were noted.

5.5.3 SITE 19 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 19.

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

Implementation of Institutional Controls and Other Measures: The prohibition against residential land use and digging has been identified in deed restrictions and a State Land Use Covenant, both on file with the County of Riverside. Inspections have indicated and verified no breaches in the IC restrictions.

Remedial Action Performance: The land use restrictions remain in place. The site has no residential land use and there has been no evidence of digging without prior approval from the DTSC per State Land Use Covenant.

System Operations/Operations and Maintenance: None required.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid? Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the 5-year review. There were no current or future planned changes in land use.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

5.5.4 SITE 19 ISSUES

No major deficiencies were noted during the 5-year review.

5.5.5 SITE 19 ASSESSMENT

Site 19 remains in use as a water recycling facility. Land use restrictions are recorded in property transfer documents. A State Land Use covenant is in place.

5.5.6 SITE 19 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

5.5.7 PROTECTIVENESS STATEMENT

The remedy at Site 19 is protective of human health and the environment.

5.5.8 NEXT REVIEW

Five-year reviews are required as long as contamination remains in place above UU/UE levels. The next review should be conducted within 5 years of the completion of this review.

6.0 OPERABLE UNIT 3 SITES

This Section includes the evaluation of the following OU3 Site for protectiveness:

- Site 33 – Panero Aircraft Refueling Facility.

6.1 SITE 33 – PANERO AIRCRAFT REFUELING FACILITY

Site 33, the former Panero aircraft refueling system, is located in an unrestricted area of the Flightline near the current refueling system storage tanks (Figure 6-1). This system, which encompassed approximately 45 acres, consisted of 34 50,000-gallon steel fuel USTs, one 25,000-gallon defueling UST, a 550-gallon underground vapor recovery tank, a pump house, and approximately 7,500 feet of underground steel piping that delivered fuel to 20 refueling hydrants (Idaho National Engineering Laboratory 1996). The Panero refueling system was installed in 1952 and operated until 1990.

In 1987, fuel odors and stained soil were observed in subsurface soil at the Panero site during installation of a cathodic protection system. In 1991, the refueling system, including the USTs, pump house, and most of the underground piping, was removed under an emergency removal action. The excavation at the main tank area reached a depth of approximately 20 feet bgs. Contaminated soil was treated in a thermal treatment unit and returned to the excavation with additional clean backfill.

It is on March ARB and is controlled by AFRC. Site 33 is a petroleum site and is being cleaned up under a RAP with the RWQCB.

Currently: Monitoring and skimming of groundwater are being done under a RAP (AFRC 2003b) between the Air Force and the RWQCB, which was further revised in 2008 (AFRC 2008) and based on the RWQCB comments in 2013 (RWQCB 2013). Site 33 is in a secured area of March ARB. The VOCs (including benzene) and the impact of the vapor intrusion pathway at the Site will be evaluated as part of the Basewide groundwater addressed as CG049 in OU5 FFS and ROD.

Historic: Groundwater contamination at Site 33 primarily consists of fuel hydrocarbons, including an area of free product (jet fuel) and a dissolved BTEX plume. Soil contamination at the site poses no direct risk to human health; however, historic free product trapped below the water table serves as a continuing source of groundwater petroleum contamination (AFRC 2003b).

In 1990, groundwater remediation at Site 33 was initiated with free-product skimming. In 1994, a groundwater and free-product extraction and treatment system, including three free product recovery wells, began operation. In 1997, an expanded free product and dual-phase extraction system was installed. However, groundwater extraction was discontinued in August 1997, with the consent of the regulatory agencies, after it was determined that the system was not achieving its objective of lowering the groundwater level and exposing the soil for SVE. Manual free-product skimming conducted between June 2002 and January 2008 removed approximately 3.6 gallons of free product (MWH 2008a,b). During the 2011-2012 and 2012-2013 reporting period, free product was not detected at the Site 33 wells.

A RAP was prepared for Site 33 to address the remaining two areas of contamination at the site (AFRC 2003b). The two areas include an area of free product below the water table and a groundwater plume of dissolved BTEX that covers approximately 80 acres. The selected remedy included continued operation of the SVE system, free-product skimming, and ICs (including groundwater monitoring and site use restrictions). This remedy is discussed in detail in the RAP for the Panero Site (AFRC 2003b). The groundwater cleanup goals for Site 33, as established in the RAP, are presented in Table 6-1. This RAP was approved by the RWQCB on 24 December 2004 (RWQCB 2004). Based upon MNA data collected from 2003 through 2006, it appears that natural attenuation of petroleum hydrocarbons in the source area and in the diffused plume is continuing (MWH 2006). Therefore, it was determined that MNA sampling was no longer needed at Site 33.

Vapor extraction at Site 33 was stopped in January 2008 due to the submergence of the well screens below the water table and free-product mass transfer limitations at the SVE wells. Based on these conditions, the SVE system at Site 33 was recommended for permanent shut down in the Fourth Quarter 2007 Process Monitoring Report (MWH 2008a,b) and the Remedial Action Completion Report, Site 33 (Panero Site) (MWH 2008b). RWQCB subsequently approved the recommendation of closure of the SVE portion of the remedy and that no additional action was necessary for the vadose soil at Site 33 (California RWQCB 2008c). Demolition of the SVE treatment system was completed in December 2009 (MWH 2010b). Manual (passive) free-product skimming continues at Site 33 when the presence of free product is observed. Long-term groundwater monitoring will continue at Site 33 as described in the Remedial Action Completion Report (MWH 2008v).

Table 6-1. Site 33 Groundwater Cleanup Levels

Chemical	Remedial Action Plan (µg/L)
Benzene	250
Toluene	150
Ethylbenzene	700
Xylenes, Total	1750

Note
µg/L micrograms per liter

6.1.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site 33.

6.1.1.1 Remedy Selection

The remedial action identified in the RAP (AFRC 2003a and 2008) is free-product skimming, monitoring and groundwater use restrictions.

6.1.1.2 Remedy Implementation

Monitoring of groundwater levels are currently conducted semiannually. Groundwater sampling is done annually. Sampling results are documented in the Annual Monitoring Report for petroleum sites.

6.1.1.3 System Operations/Operations and Maintenance

Monitoring wells maintenance is conducted as required.

6.1.1.4 Progress Since the Last 5-Year Review

This is the First 5-year review for Site 33. The groundwater plume is shrinking. Upon review of the 2011-2012 Annual Monitoring Report for Petroleum Sites (AECOM 2013f), the RWQCB (RWQCB 2013) recommended reducing the monitoring well network for the petroleum site to two locations at Site 33 (Wells PANMW35- downgradient plume location and PANMW37- plume center location), which will be utilized for monitoring of groundwater levels and for sampling for TPH and BTEX.

Based on the data collected and evaluated during the 2013 annual monitoring round (AECOM 2013g), groundwater at Sites 33 does not yet comply with groundwater cleanup goals specified in the RAP,

RAP, Panero Site (AFRC 2003b). The only site-specific COC detected at concentrations greater than the groundwater cleanup goal was benzene, which was detected above the site-specific cleanup goal of 250 µg/L in Well PANMW37 at a concentration of 9,300 µg/L.

6.1.2 SITE 33 5-YEAR REVIEW FINDINGS

This section describes the findings of the five-year review for Site 33.

6.1.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. No evidence of unauthorized digging was found.

The site inspection form from the USEPA 5-year review guidance was completed and included in Appendix A.

6.1.2.2 Risk Information Review

Human Health Risk

Groundwater

There were no changes identified that affect the protectiveness.

Ecological Risk

Site 33 is in a developed area of March ARB; ecological risk was not evaluated for in the RAP. Site conditions have not changed; therefore the conclusions stated are still valid.

6.1.2.3 Data Review

The groundwater plume is shrinking. Upon review of the 2011-2012 Annual Monitoring Report for Petroleum Sites (AECOM 2013g), the RWQCB (RWQCB 2013) recommended reducing the monitoring well network for the petroleum site to two locations at Site 33 (Wells PANMW35- downgradient plume location and PANMW37- plume center location), which will be utilized for monitoring of groundwater levels and for sampling for TPH and BTEX.

Based on the data collected and evaluated during the 2013 annual monitoring round (AECOM 2013g), groundwater at Site 33 does not yet comply with groundwater cleanup goals specified in the RAP, RAP, Panero Site (AFRC 2003b). The only site-specific COC detected at concentrations greater than the groundwater cleanup goal was benzene, which was detected above the site-specific cleanup goal of 250 µg/L in Well PANMW37 at a concentration of 9,300 µg/L. Water levels and free-phase product measurements were collected to the nearest 0.01-foot using a dual-phase indicator as part of the potentiometric survey performed during February and May 2013. The average depth to water (feet below top of casing) at Well PANMW35 was about 10 feet and at Well PANMW37 was about 11 feet. No measureable free product was detected in the two locations at Site 33 (Wells PANMW35 and PANMW37).

6.1.3 SITE 33 TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site 33.

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

Implementation of Institutional Controls and Other Measures: LUC objectives have been implemented as part of the Draft Land Use Control Implementation Plan (AECOM 2012b). No groundwater is being pumped from the site. Groundwater on March ARB is only being pumped for groundwater cleanup. No water from underneath March ARB is being used for drinking water or irrigation.

Remedial Action Performance: The Site 33 groundwater plume is shrinking and is documented in the petroleum sites annual monitoring reports. The shrinking plume indicates the remedial action is performing acceptability.

System Operations/Operations and Maintenance: Groundwater monitoring is being conducted.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the five-year review. There were no current or future planned changes in land use and no new contaminants, sources or routes of exposure were identified.

Changes in Toxicity and Other Contaminant Characteristics: There have been no changes in toxicity or other contaminant characteristics that affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

6.1.4 SITE 33 ISSUES

No major deficiencies were noted during the five-year review.

6.1.5 SITE 33 ASSESSMENT

Site 33 is in an access controlled area of March ARB. The monitoring wells are in good condition. Groundwater monitoring is being performed as scheduled. The groundwater plume is shrinking.

6.1.6 SITE 33 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

6.1.7 PROTECTIVENESS STATEMENT

The remedy at Site 33 is protective of human health and the environment.

6.1.8 NEXT REVIEW

If Site 33 is still part of the next review, the next review should be conducted within 5 years of the completion of this review.

7.0 OPERABLE UNIT 4 SITES

This Section includes the evaluation of the following OU4 Site for protectiveness:

- Site L – Former NCO Club Swimming Pool/PCB Site.

7.1 SITE L – FORMER NCO CLUB SWIMMING POOL/PCB SITE

Site L, formerly a swimming pool at the NCO Club, is east of Riverside Drive and north of Meyer Drive (Figure 7-1). It is on the former March AFB and the environmental cleanup is controlled by AFCEC. Site L is an OU4 site and is included in the OU4 ROD (USAF 2005b).

Currently: Transferred to the MJPA. ICs are in place in the form of deed restrictions and a State Land Use Covenant. The Air Force is pursuing regulatory and site closure for several sites at March AFB/ARB. As part of this process the USAF has submitted documentation that supports UU/UE. For Site L, the USAF submitted, the Draft Final RIA/RAR document to the regulators in July 2013, which recommended UU/UE for the site. The RWQCB had no comments on the draft document concurring with no further action (NFA) for the site based on UU/UE. The DTSC had comments on the draft final document that will be addressed, upon which the DTSC will give a UU/UE letter for this site. The USEPA did not concur with the conclusions. The USAF will continue to work with the USEPA to achieve UU/UE for the Site.

Historic: The swimming pool at Site L was reportedly constructed in 1953 along with the NCO Club. The swimming pool was later used to store waste materials. The pool and waste were covered with soil. A removal action was conducted in 1996. The contents of the pool (mostly construction debris and soil) were removed and properly disposed. There were no drums or transformers in the pool. The pool structure was removed up to a depth of 14 feet bgs and confirmation soil samples were collected from the sidewalls and bottom of the excavation, following regulatory concurrence on backfilling. PCB was found in several samples above the 1998 residential and industrial PRGs. Final confirmation sampling at depths of 14 feet to 20 feet bgs indicated that the remaining soil contained Aroclor 1254 at concentrations ranging from 0.091 mg/kg to 6.4 mg/kg, which exceeds the 1998 residential PRG of 0.20 mg/kg in 5 samples (4 locations) at depths ranging from 14 feet to 20 feet bgs, and is localized in

the southern end of the swimming pool. Aroclor 1260 was reported (1.2 mg/kg) in only one of the confirmation samples at the southern end of the swimming pool at a depth of 17 feet bgs.

Additional samples were collected around the swimming pool and they also contained PCBs. This led to several rounds of additional soil sampling. The sampling found PCBs in the surface soil north and west of the excavated pool area. It was concluded that a single contaminant source was unlikely and that the contamination was probably the result of generalized application of PCB-containing oils for weed or dust control.

The site was mitigated in June 2000 by placement of 6 inches of clean fill over the contaminated soil, covering the 1.5-acre site with 4 inches of asphalt concrete and implementation of lease/deed restrictions on the property.

The risks were calculated in the ROD using the 2004 PRGs. Based on the 95 percent upper confidence limit and average residual concentration that remains on the site, the industrial cancer risk is approximately 1 x 10^{-6} and the residential cancer risk is approximately 1 x 10^{-5}. The industrial non-cancer risk is 0.2 and the residential non-cancer risk is 2.

7.1.1 REMEDIAL ACTIONS

This section describes the remedy selection, implementation, system operations, and cleanup process for Site L.

7.1.1.1 Remedy Selection

The selected remedy in the OU4 ROD (USAF 2005b) is IC prohibiting residential land use due to PCB contamination in the surface soil. The IC objective is to prohibit the development and use of property for residential housing, elementary and secondary schools, hospitals for human care, child care facilities, and playgrounds.

7.1.1.2 Remedy Implementation

Land use restrictions have been incorporated in the deed as grantee covenants and a State Land Use Covenant. The deed restrictions and State Land Use Covenant are recorded with the County of Riverside. The specific deed restrictions from the OU4 ROD are included in Appendix D.

7.1.1.3 System Operations/Operations and Maintenance

No system operation is required, annual inspections of the ICs are made in accordance with the State Land Use Covenants at the former March AFB.

7.1.1.4 Progress Since the Last 5-Year Review

There have been no changes since the last 5-year review in 2009 and no issues were identified during the last 5-year review in 2009. Site L was transferred to the MJPA. ICs are in place in the form of deed restrictions and a State Land Use Covenant. The deed restrictions and State Land Use Covenant are recorded with the County of Riverside.

7.1.2 SITE L 5-YEAR REVIEW FINDINGS

This section describes the findings of the 5-year review for Site L.

7.1.2.1 Site Inspection

The site inspection was performed on 23 September 2013 by AECOM personnel. No evidence of residential use or unauthorized digging was observed. Warning sign notifying people not to dig is in place. However, warning sign refers to an old telephone number and needs to be updated. The asphalt cover is in good repair.

The site inspection form from the USEPA 5-year review guidance was completed and is included in Appendix A.

7.1.2.2 Risk Information Review

Human Health Risk

The ROD for this site was signed in September 2005. Risk evaluation results used as the basis for the remedy selection for Site L in the ROD were not re-evaluated for this five-year review, since no new data has been collected subsequent to the ROD. The current toxicity criteria from regional screening tables (RSL) tables, dated May 2013, obtained from the USEPA website, were reviewed and changed slightly for Aroclor 1254 (change in residential RSL from 0.20 mg/kg to 0.22 mg/kg), but it does not affect the protectiveness of the remedy.

Ecological Risk

Site L is in a developed area of the former March AFB; ecological risk was not evaluated. Site conditions have not changed, therefore the conclusions stated in the ROD are still valid.

7.1.2.3 Data Review

The Annual Inspection Report for Sites 7, 17, 19, L, and OU1 Groundwater was reviewed (MJPA 2013). No discrepancies were noted.

7.1.3 SITE L TECHNICAL ASSESSMENT

The following conclusions support the protectiveness statement for Site L.

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

Implementation of Institutional Controls and Other Measures: The site is restricted from residential land use; no residential uses are currently on the site and no future residential uses are planned. ICs are in place in the form of deed restrictions and a State Land Use Covenant. The deed restrictions and State Land Use Covenant are recorded with the County of Riverside. Inspections have indicated and verified that no breaches in the IC restrictions.

Remedial Action Performance: The land use restriction remains in place. The site has no residential land use.

System Operations/Operations and Maintenance: None required.

Opportunities for Optimization: None identified.

Early Indicators of Potential Remedy Failure: None identified.

Question B: Are the assumptions used at the time of the remedy selection still valid?

Changes in "Standards" and "To Be Considered": The 5-year review did not identify any requirements, regulations, and standards that have changed since the ROD signing date that affect the protectiveness of the remedy as currently being implemented.

Changes in Exposure Pathway: No changes in site conditions that affect exposure pathways were identified in the course of the 5-year review. There were no current or future planned changes in land use.

Changes in Toxicity and Other Contaminant Characteristics: The toxicity criteria for Aroclor 1254

changed slightly (EPA residential RSL rose from 0.20 mg/kg to 0.22 mg/kg), but it does not affect the protectiveness of the remedy.

Changes in Risk Assessment Methodologies: There has been no change to the standardized risk assessment methodology that could affect the protectiveness of the remedy.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy? No.

7.1.4 SITE L ISSUES

No major deficiencies were noted during the 5-year review.

7.1.5 SITE L ASSESSMENT

The asphalt pavement remains in place and is in good repair. Warning signs are posted on several locations at the site. Land use restrictions are recorded in property transfer documents. A State Land Use Covenant and deed restrictions are in place.

7.1.6 SITE L RECOMMENDATIONS AND FOLLOW-UP ACTIONS

None.

7.1.7 PROTECTIVENESS STATEMENT

The remedy at Site L is protective of human health and the environment.

7.1.8 NEXT REVIEW

Five-year reviews are required as long as contamination remains in place above UU/UE levels. The next review should be conducted within 5 years of the completion of this review.

8.0 LIST OF DOCUMENTS REVIEWED

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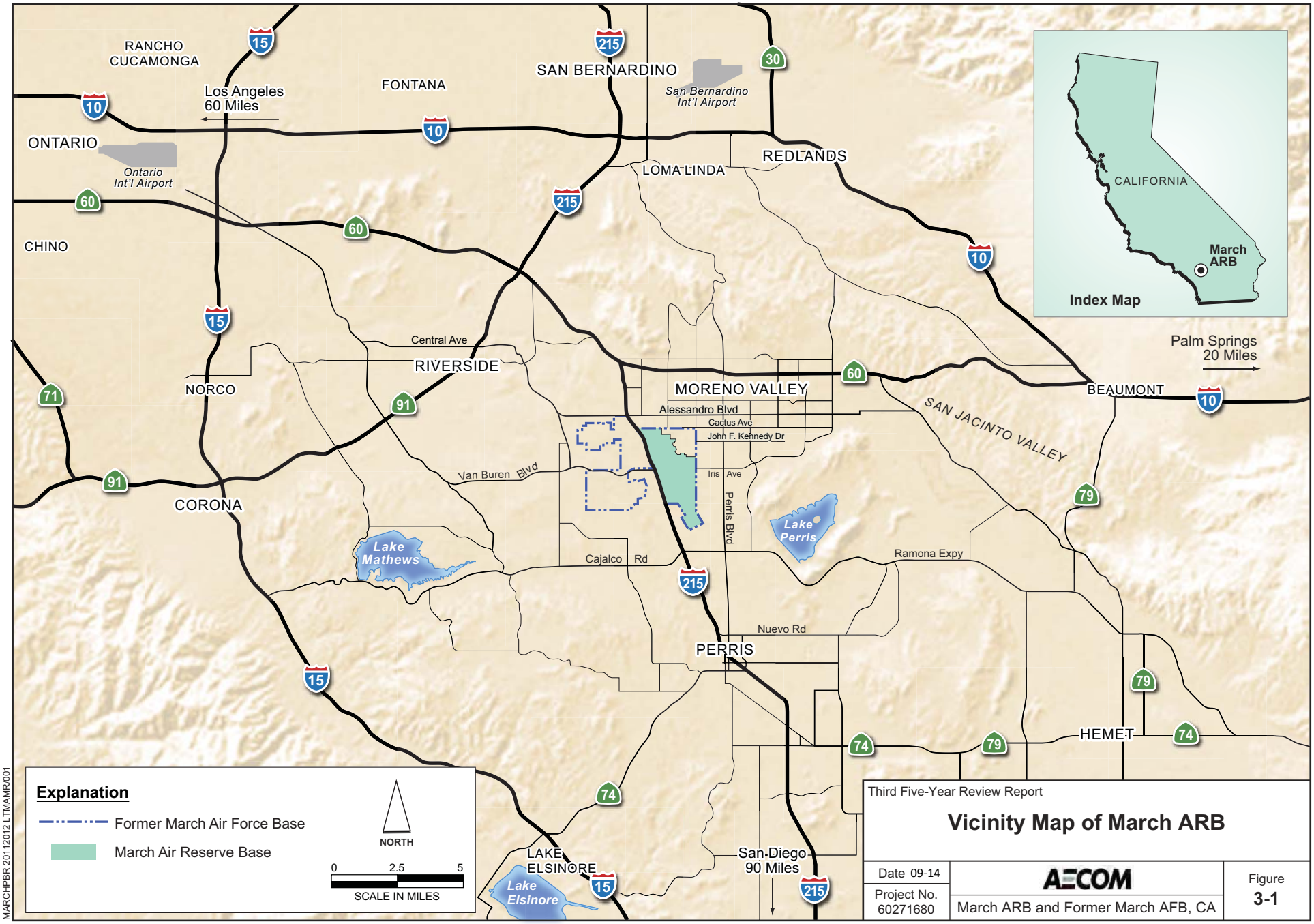
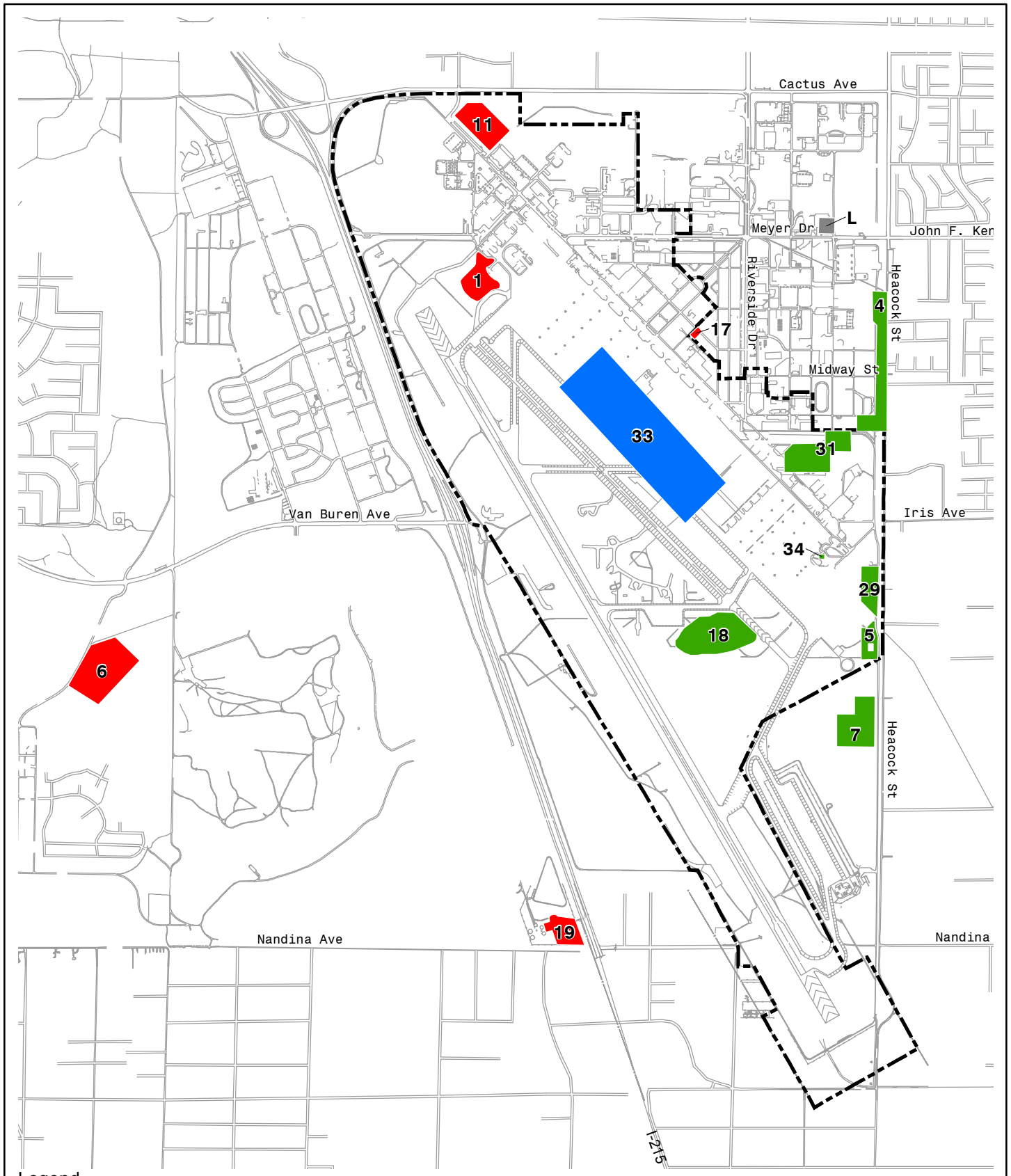
FIGURES



Third Five-Year Review Report

Vicinity Map of March ARB

Date 09-14	AECOM	Figure 3-1
Project No. 60271680	March ARB and Former March AFB, CA	



Legend

- Site in OU1
- Site in OU2
- Site 33
- Site in OU4
- Property Retained by Air Force Reserve Command

Note:
This Figure presents only the Sites evaluated in this Five-Year Review Report.

N

0 1,250 2,500

SCALE IN FEET

Third Five-Year Review Report

Base Map

Date 09-14	AECOM	Figure 3-2
Project No. 60271680	March ARB and Former March AFB, CA	

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Date: Monday, December 02, 2013 11:16:23 AM

RIVERSIDE

MORENO VALLEY

March ARB

Airfield

I-215

MORENO VALLEY

PERRIS

1450 1440 1430 1420 1410 1400 1390 1380 1370 1360 1350 1340 1330 1320 1310 1300 1290 1280 1270 1260 1250 1240 1230 1220 1210 1200 1190 1180 1170 1150

Legend

- Approximate Groundwater Elevation Contour (Ft MSL)
- Base Boundary
- Airfield Surface
- City Limits
- Highways

Map Location

Sources:
Spring 1990 groundwater contours were digitized from Figure 9 of the report *Installation Restoration Program Records Search for March Air Force Base, California* (CH2M Hill, April 1984).

March ARB boundary, airfield, and structures obtained from a DVD provided by March ARB.

City limits and highways from File Geodatabase Feature Class, (CWData.gbd) provided by Riverside County Transportation. (www.tlma.co.riverside.ca.us/online/content/gis_downloads.aspx)

Map Projection:
NAD 1983 Feet, California State Plane Zone 6, FIPS 0406

Datum:
North American, 1983

N W E S

2,000 1,000 0 2,000

Scale in Feet

Third Five-Year Review Report

1970 Water Level Surface

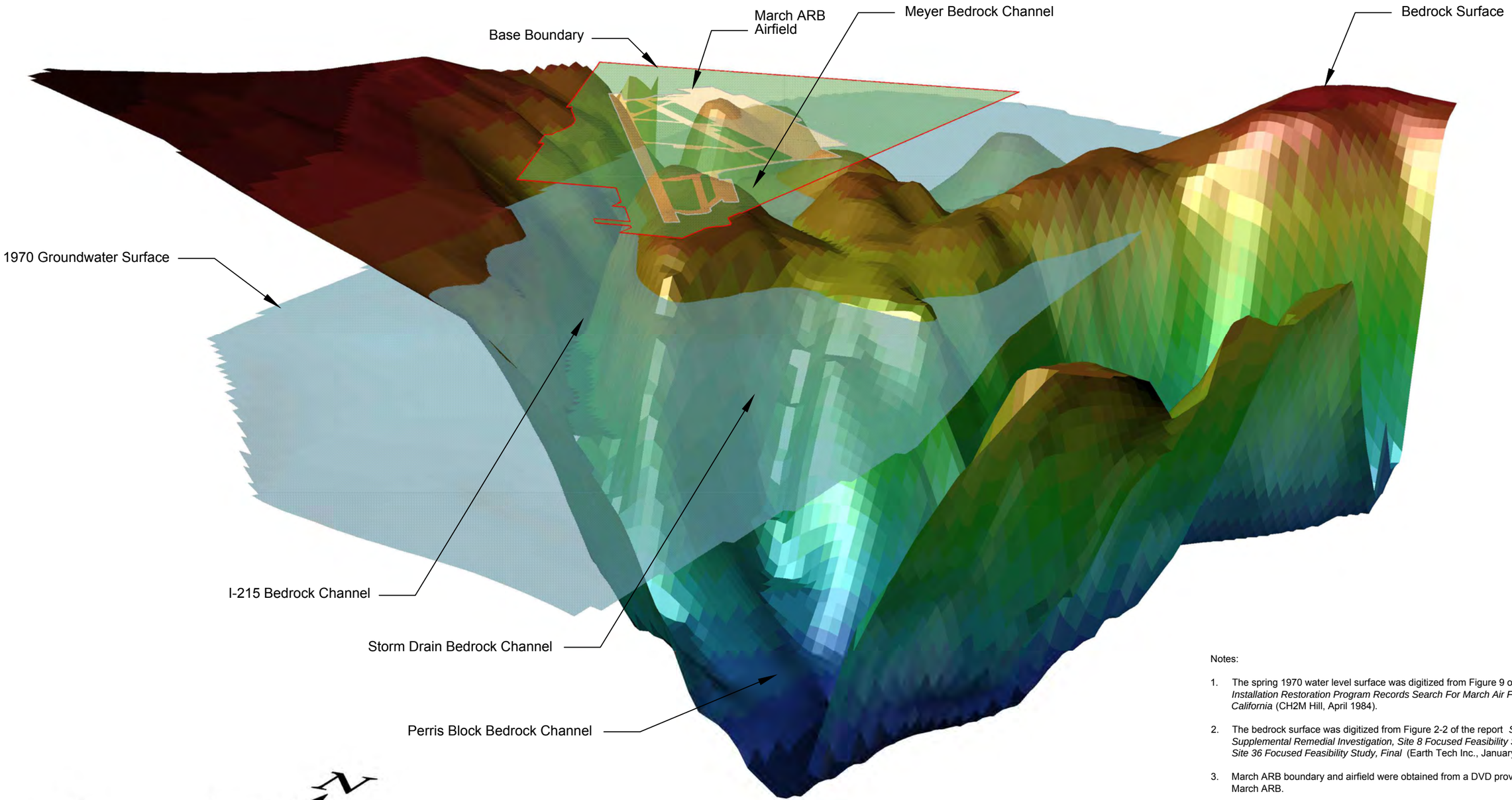
Date 09-14

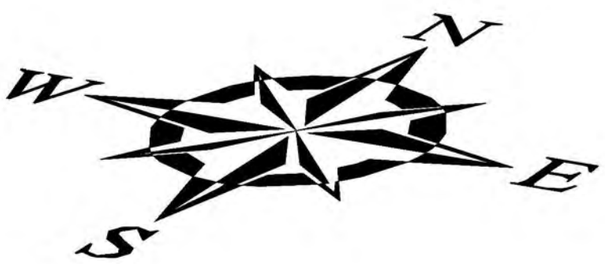
Project No. 60271680

AECOM

March ARB and Former March AFB, CA

Figure 3-3





Perspective View of the Bedrock Surface and 1970 Groundwater Surface

Southeast looking towards Northwest
10X Vertical Exaggeration

Notes:

1. The spring 1970 water level surface was digitized from Figure 9 of the report *Installation Restoration Program Records Search For March Air Force Base, California* (CH2M Hill, April 1984).
2. The bedrock surface was digitized from Figure 2-2 of the report *Site 8 Supplemental Remedial Investigation, Site 8 Focused Feasibility Study, and Site 36 Focused Feasibility Study, Final* (Earth Tech Inc., January 2009).
3. March ARB boundary and airfield were obtained from a DVD provided by March ARB.

Third Five-Year Review Report

Three-Dimensional Rendering of the Bedrock Surface with 1970 Water Levels

Date 09-14	AECOM	Figure 3-4
Project No. 60271680	March ARB and Former March AFB, CA	

RIVERSIDE

MORENO VALLEY

1475
1470
1480
1485
1480
1485
1480
1475
1470
1465
1460
1455
1450
1445
1440
1435
1430
1425
1420
1415
1410
1405
1400
1395
1390
1385
1380
1380
1375
1370
1370
1365
1360
1360
1355
1350
1345
1340
1335
1330

Airfield

March ARB

MORENO VALLEY

PERRIS

I-215

Legend

- Groundwater Elevation Contour (Ft MSL)
- Base Boundary
- Airfield Surface
- City Limits
- Highways

Map Location

Sources:
Second quarter 1993 water level elevations were otained from table "2010AMR_Historical_GWElev.xlsx" provided on a DVD by March ARB.

March ARB boundary, airfield, and structures obtained from a DVD provided by March ARB, Ca.

City limits and highways from File Geodatabase Feature Class, (CWData.gbd) provided by Riverside County Transportation. (www.tlma.co.riverside.ca.us/online/content/gis_downloads.aspx)

Map Projection:
NAD 1983 Feet, California State Plane Zone 6, FIPS 0406

Datum:
North American, 1983

N
W
E
S

2,000 1,000 0 2,000

Scale in Feet

Third Five-Year Review Report

1993 Water Level Surface

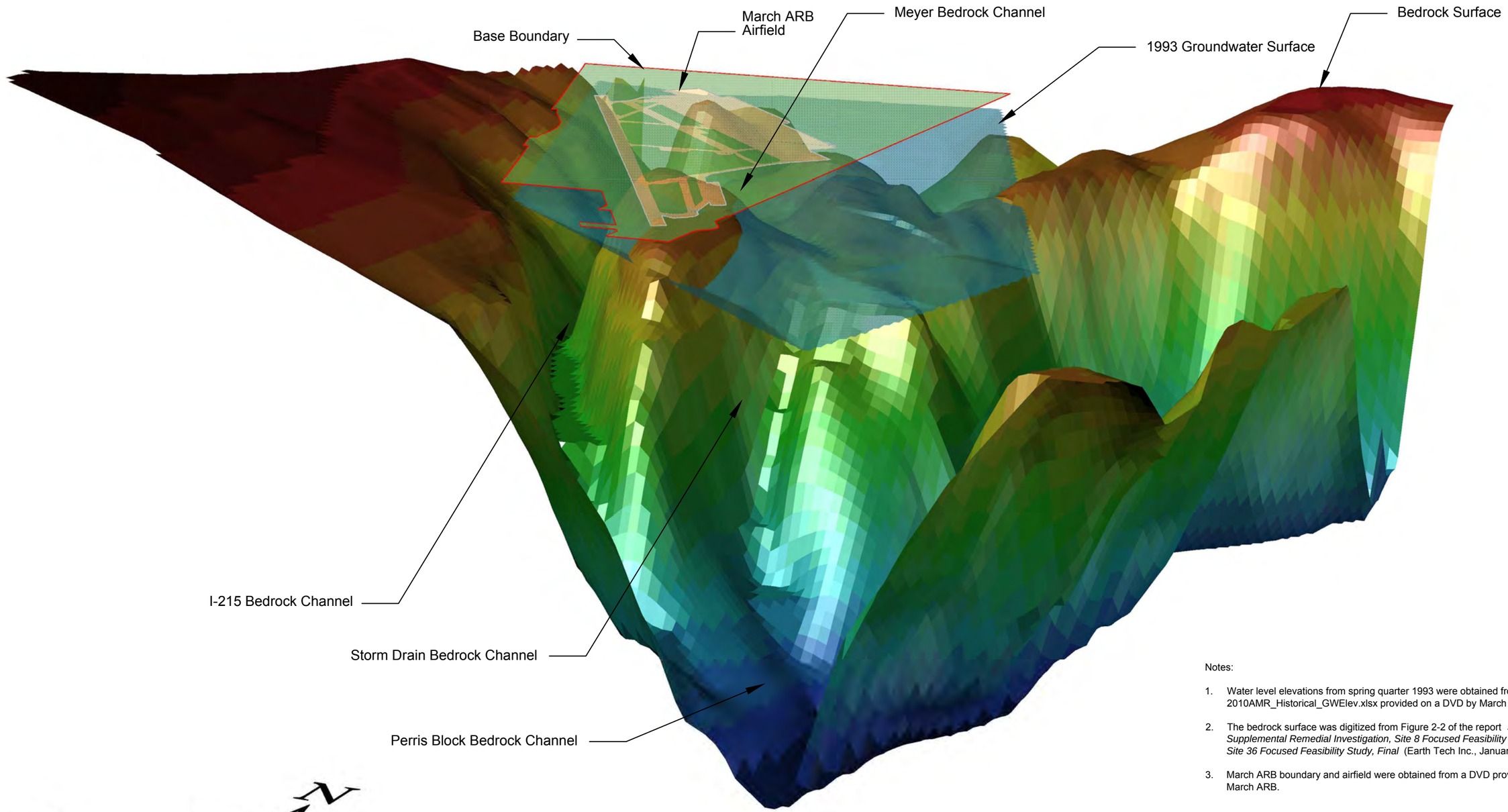
Date 09-14

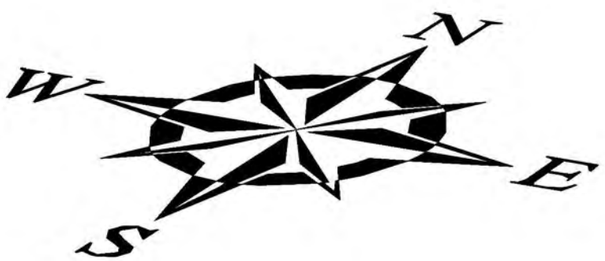
Project No. 60271680

AECOM

March ARB and Former March AFB, CA

Figure 3-5





Perspective View of the Bedrock Surface and 1993 Groundwater Surface

Southeast looking towards Northwest
10X Vertical Exaggeration

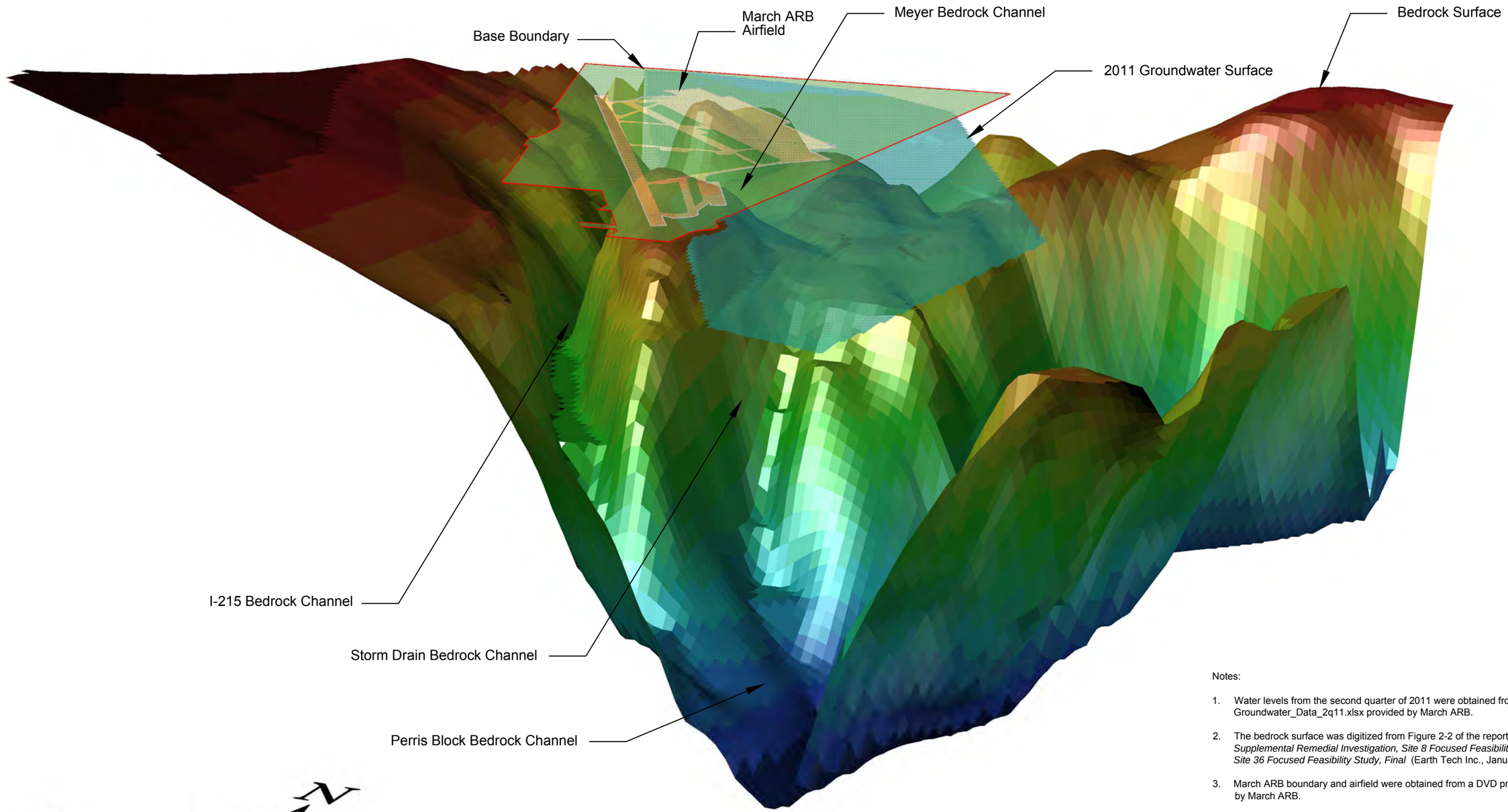
Notes:

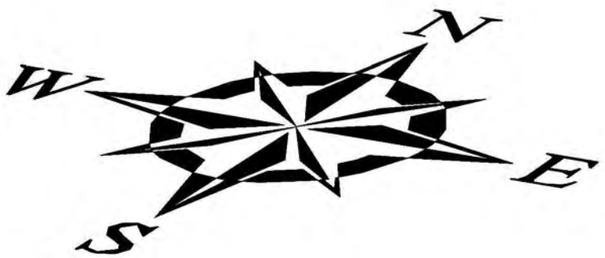
1. Water level elevations from spring quarter 1993 were obtained from table 2010AMR_Historical_GWElev.xlsx provided on a DVD by March ARB.
2. The bedrock surface was digitized from Figure 2-2 of the report *Site 8 Supplemental Remedial Investigation, Site 8 Focused Feasibility Study, and Site 36 Focused Feasibility Study, Final* (Earth Tech Inc., January 2009).
3. March ARB boundary and airfield were obtained from a DVD provided by March ARB.

Third Five-Year Review Report

Three-Dimensional Rendering of the Bedrock Surface with 1993 Water Levels

Date 09-14	AECOM	Figure 3-6
Project No. 60271680	March ARB and Former March AFB, CA	





Perspective View of the Bedrock Surface and 2011 Groundwater Surface

Southeast looking towards Northwest
10X Vertical Exaggeration

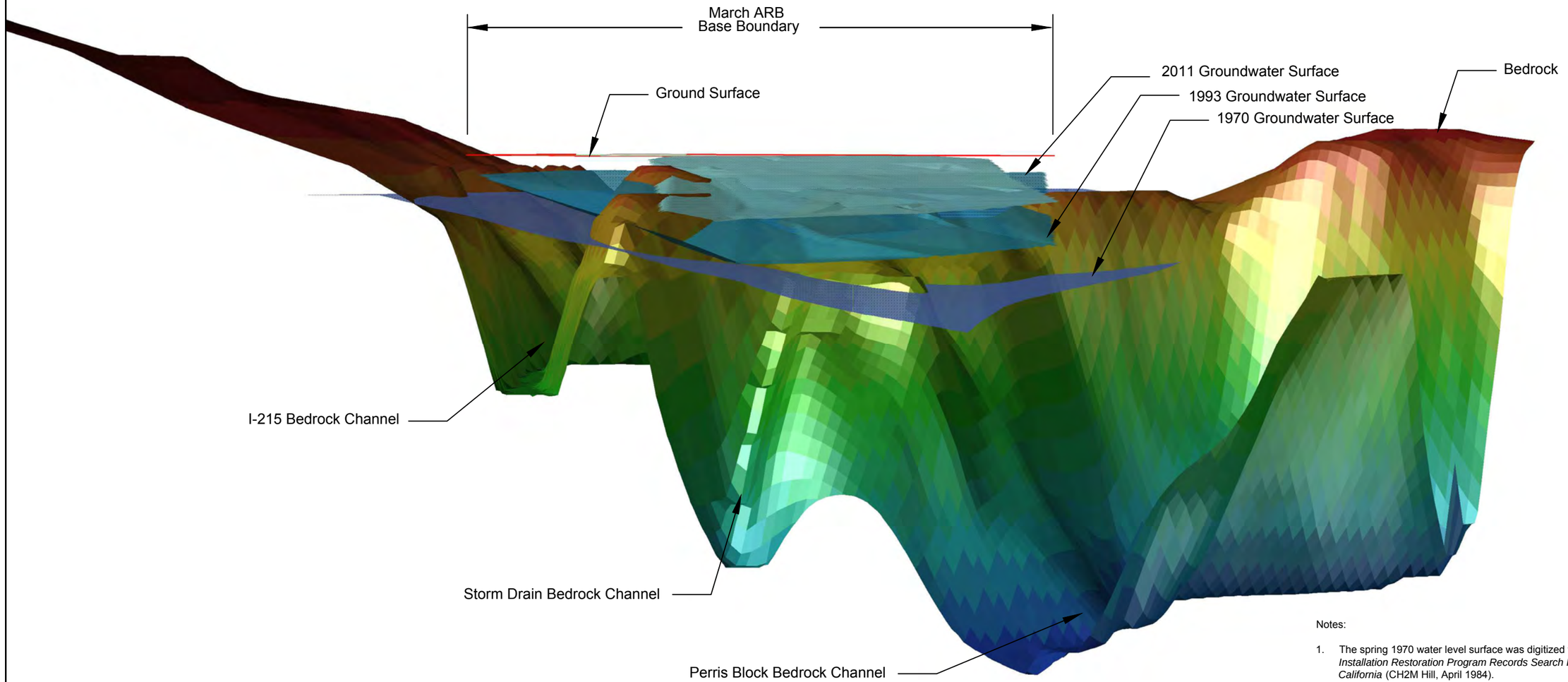
Notes:

1. Water levels from the second quarter of 2011 were obtained from table Groundwater_Data_2q11.xlsx provided by March ARB.
2. The bedrock surface was digitized from Figure 2-2 of the report *Site 8 Supplemental Remedial Investigation, Site 8 Focused Feasibility Study, and Site 36 Focused Feasibility Study, Final* (Earth Tech Inc., January 2009).
3. March ARB boundary and airfield were obtained from a DVD provided by March ARB.

Third Five-Year Review Report

Three-Dimensional Rendering of the Bedrock Surface with 2011 Water Levels

Date 09-14	AECOM	Figure 3-7
Project No. 60271680	March ARB and Former March AFB, CA	



Notes:

1. The spring 1970 water level surface was digitized from Figure 9 of the report *Installation Restoration Program Records Search For March Air Force Base, California* (CH2M Hill, April 1984).
2. Water level elevations from second quarter 1993 were obtained from table 2010AMR_Historical_GWElev.xlsx provided on a DVD by March ARB
3. Water levels from second quarter 2011 were obtained from table Groundwater_Data_2q11.xlsx provided by March ARB.
4. The bedrock surface was digitized from Figure 2-2 of the report *Site 8 Supplemental Remedial Investigation, Site 8 Focused Feasibility Study, and Site 36 Focused Feasibility Study, Final* (Earth Tech Inc., January 2009).
5. March ARB boundary and airfield were obtained from a DVD provided by March ARB.

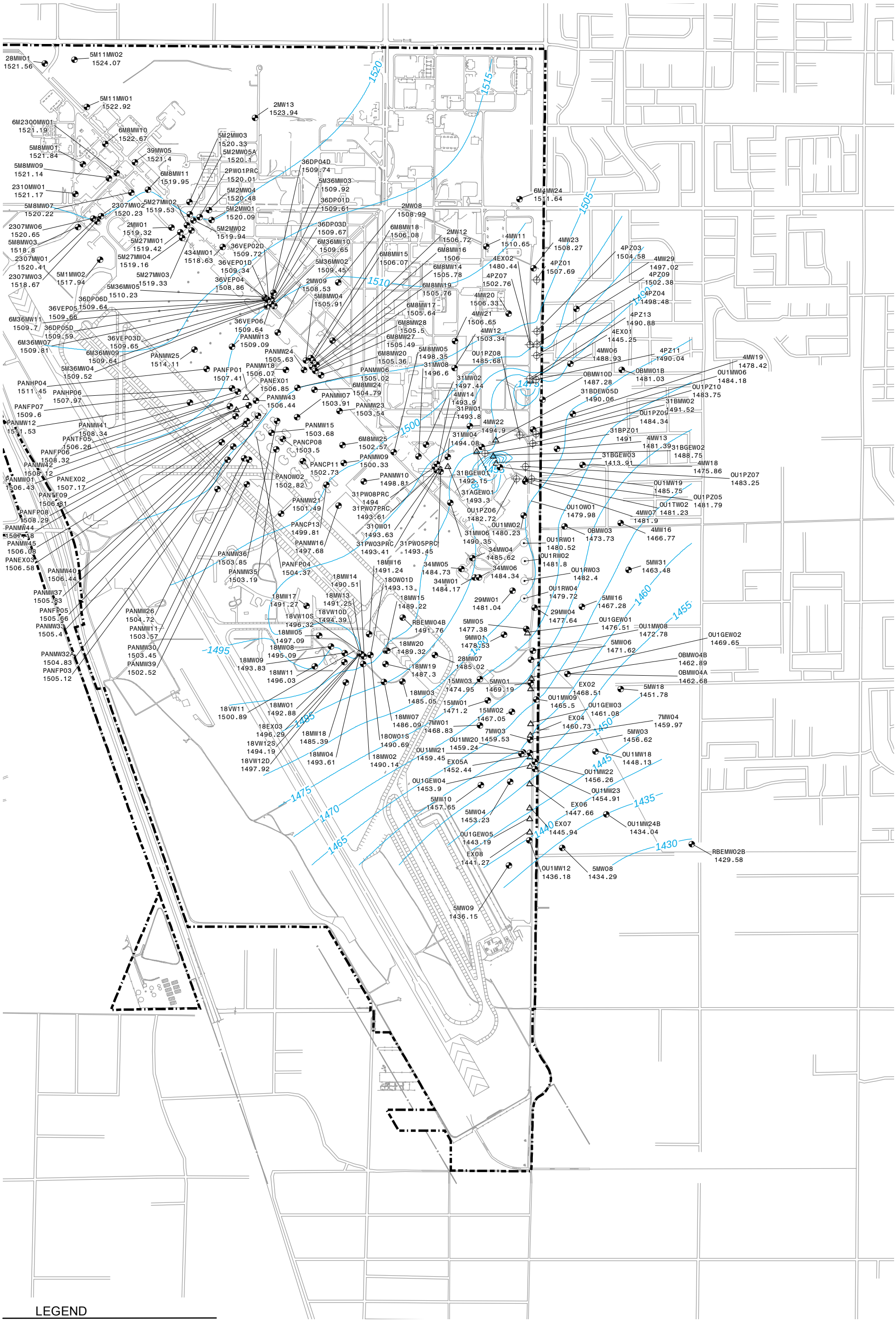
Perspective View of the Bedrock Surface and 2011, 1993, and 1970 Groundwater Surfaces

Southeast looking towards Northwest at Ground Surface
10X Vertical Exaggeration

Third Five-Year Review Report

Three-Dimensional Rendering of the Bedrock Surface with Water Level History

Date 09-14	AECOM	Figure 3-8
Project No. 60271680	March ARB and Former March AFB, CA	



LEGEND

- SECOND QUARTER 2012 GROUNDWATER ELEVATION CONTOURS (FT MSL)
- BASE PROPERTY LINE

GROUNDWATER WELLS

- △ EXTRACTION WELL
- ⊙ INJECTION WELL
- ◕ MONITORING WELL
- ⊕ PIEZOMETER
- ○ PRIVATE WELL

ABBREVIATIONS

AECOM	AECOM TECHNICAL SERVICES, INC.
AFB	AIR FORCE BASE
AGMR	ANNUAL GROUNDWATER MONITORING REPORT
ARB	AIR RESERVE BASE
CA	CALIFORNIA
FT MSL	FEET MEAN SEA LEVEL

N

0 750 1,500

SCALE IN FEET

Upper Alluvial Basewide Potentiometric Surface Map Second Quarter 2012

Date 09-14	AECOM	Figure 3-9
Project No. 60271680	March ARB and Former March AFB, CA	

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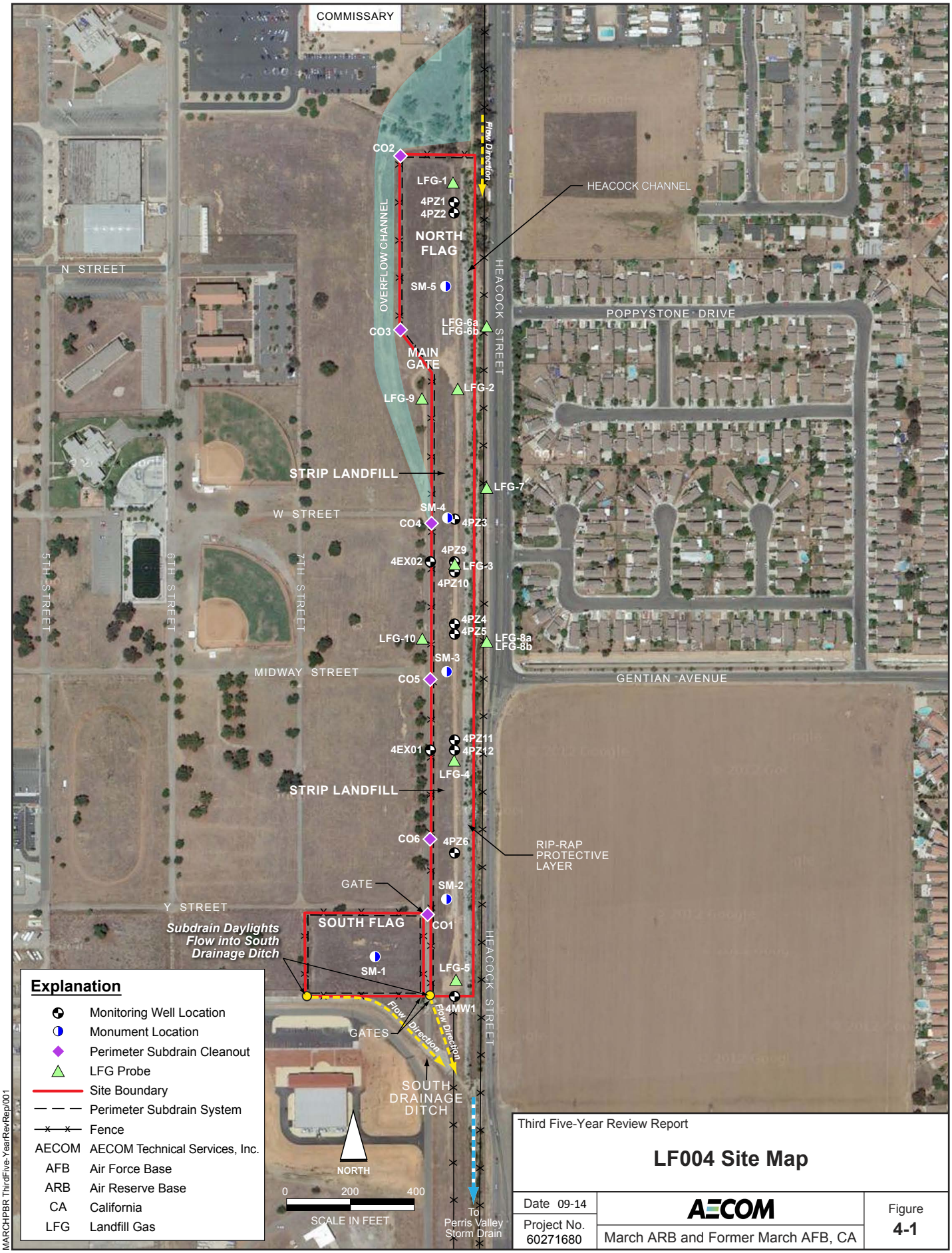
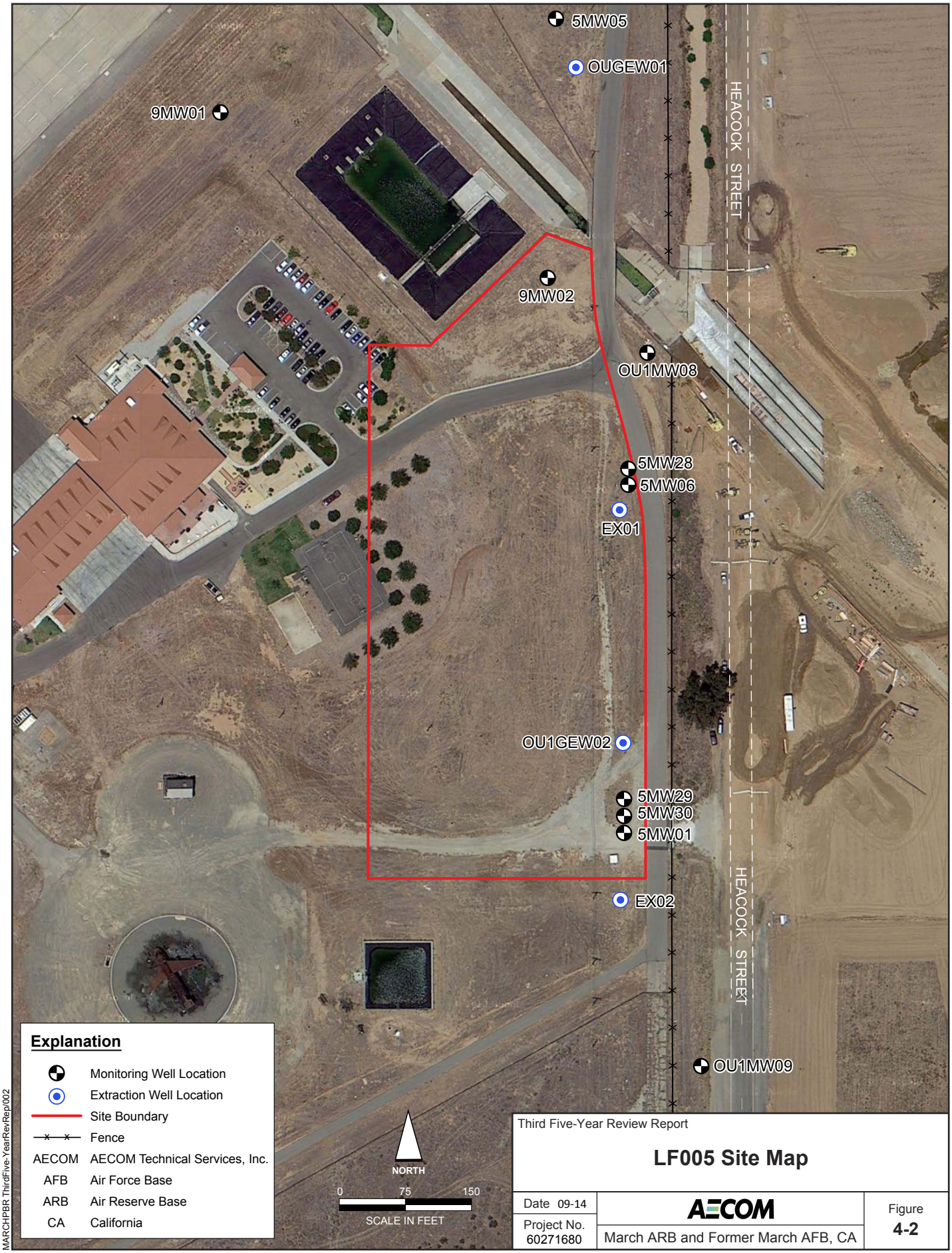


Third Five-Year Review Report

LF004 Site Map

Date 09-14	AECOM	Figure 4-1
Project No. 60271680	March ARB and Former March AFB, CA	

MARCHPBR ThirdFive-YearRevRep\001

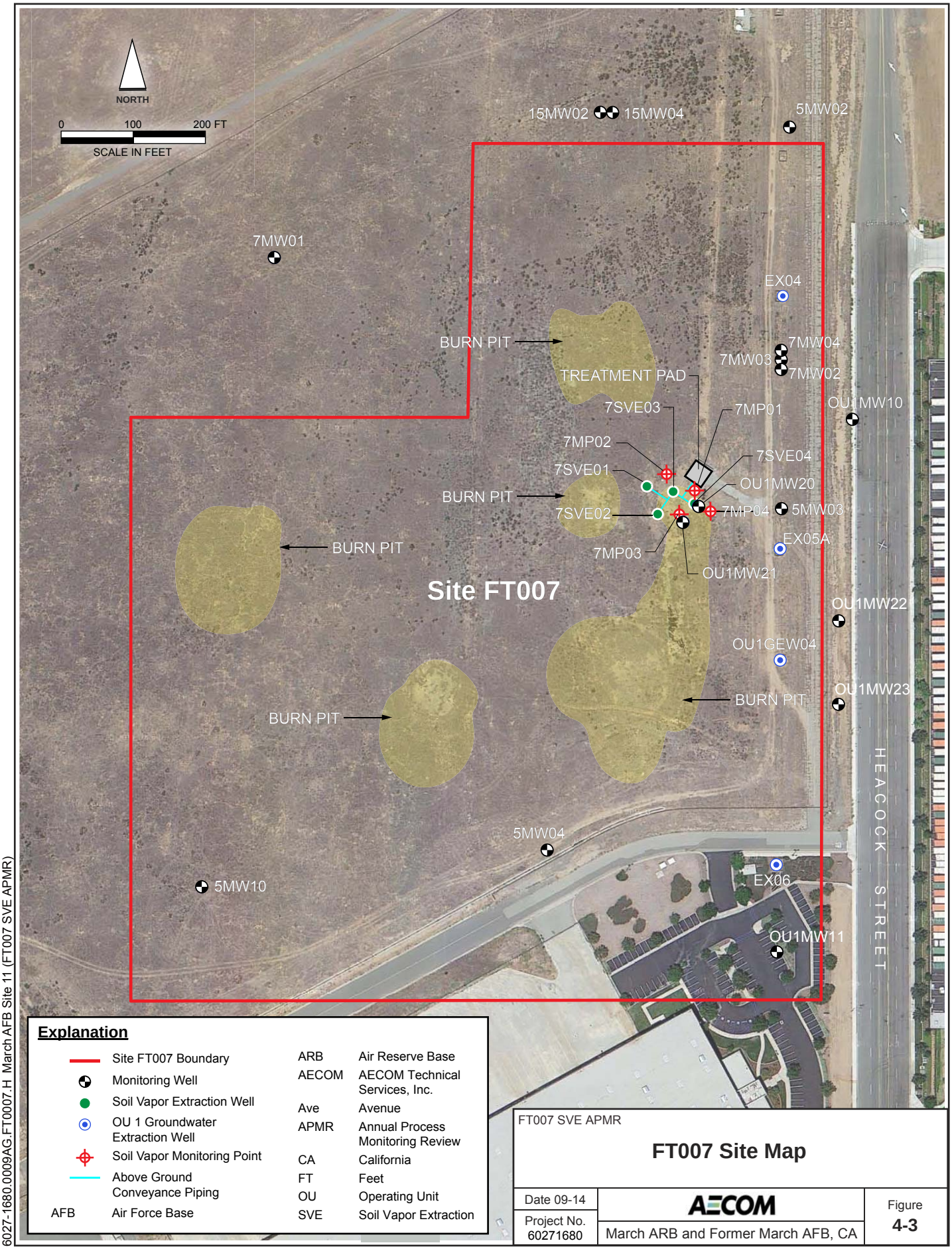


Third Five-Year Review Report

LF005 Site Map

Date 09-14	AECOM	Figure 4-2
Project No. 60271680	March ARB and Former March AFB, CA	

MARCHPBR ThirdFive-YearRevRep/002



Explanation

- Site FT007 Boundary
- Monitoring Well
- Soil Vapor Extraction Well
- OU 1 Groundwater Extraction Well
- Soil Vapor Monitoring Point
- Above Ground Conveyance Piping

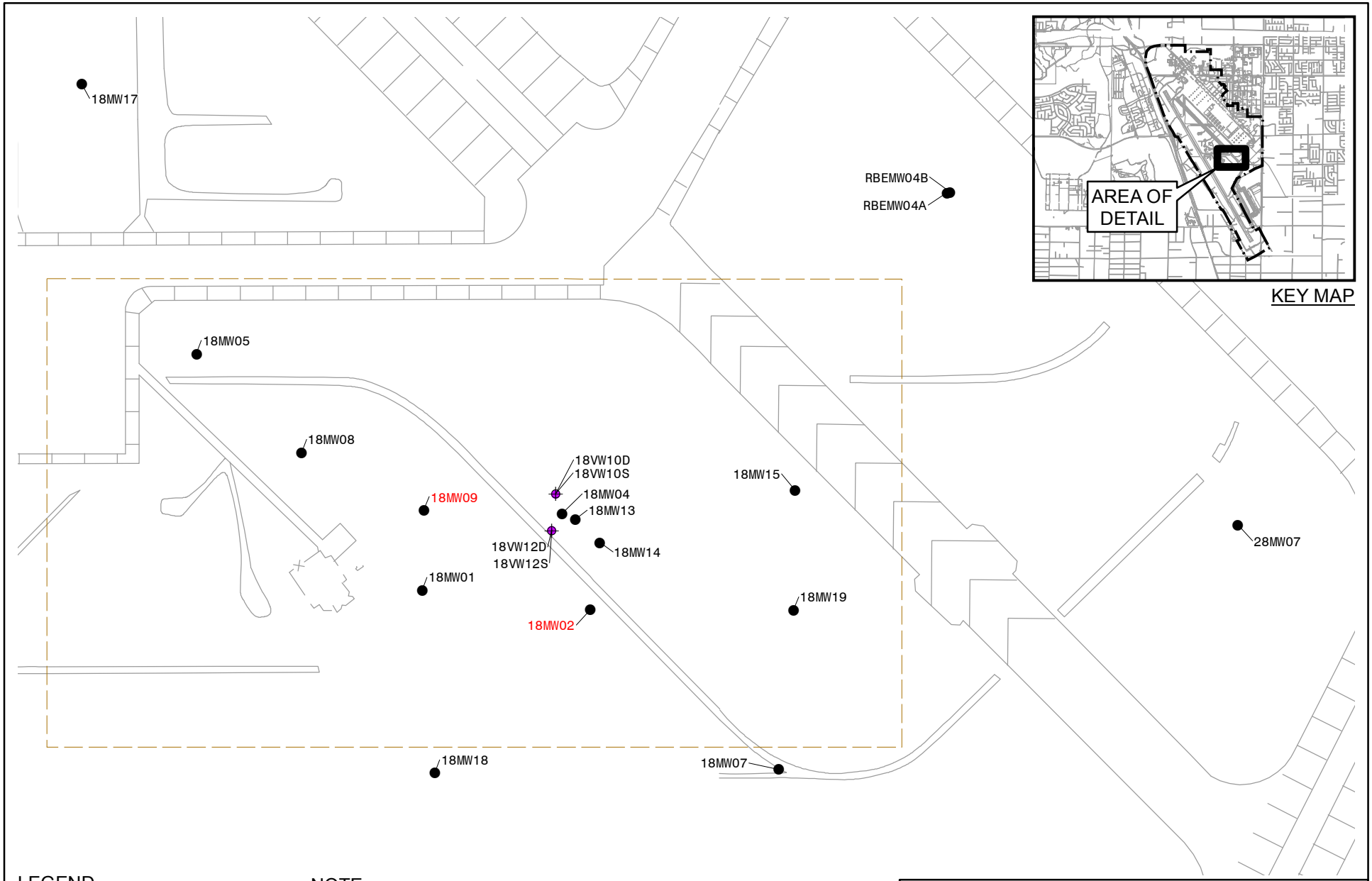
AFB Air Force Base
ARB Air Reserve Base
AECOM AECOM Technical Services, Inc.
Ave Avenue
APMR Annual Process Monitoring Review
CA California
FT Feet
OU Operating Unit
SVE Soil Vapor Extraction

FT007 SVE APMR

FT007 Site Map

Date 09-14	AECOM	Figure 4-3
Project No. 60271680	March ARB and Former March AFB, CA	

6027-1680.0009AG.FT0007.H March AFB Site 11 (FT007 SVE APMR)



Third Five-Year Review Report

Site 18
Site Map and Well Layout

Date 09-14	AECOM	Figure 4-4
Project No. 60271680	March ARB and Former March AFB, CA	

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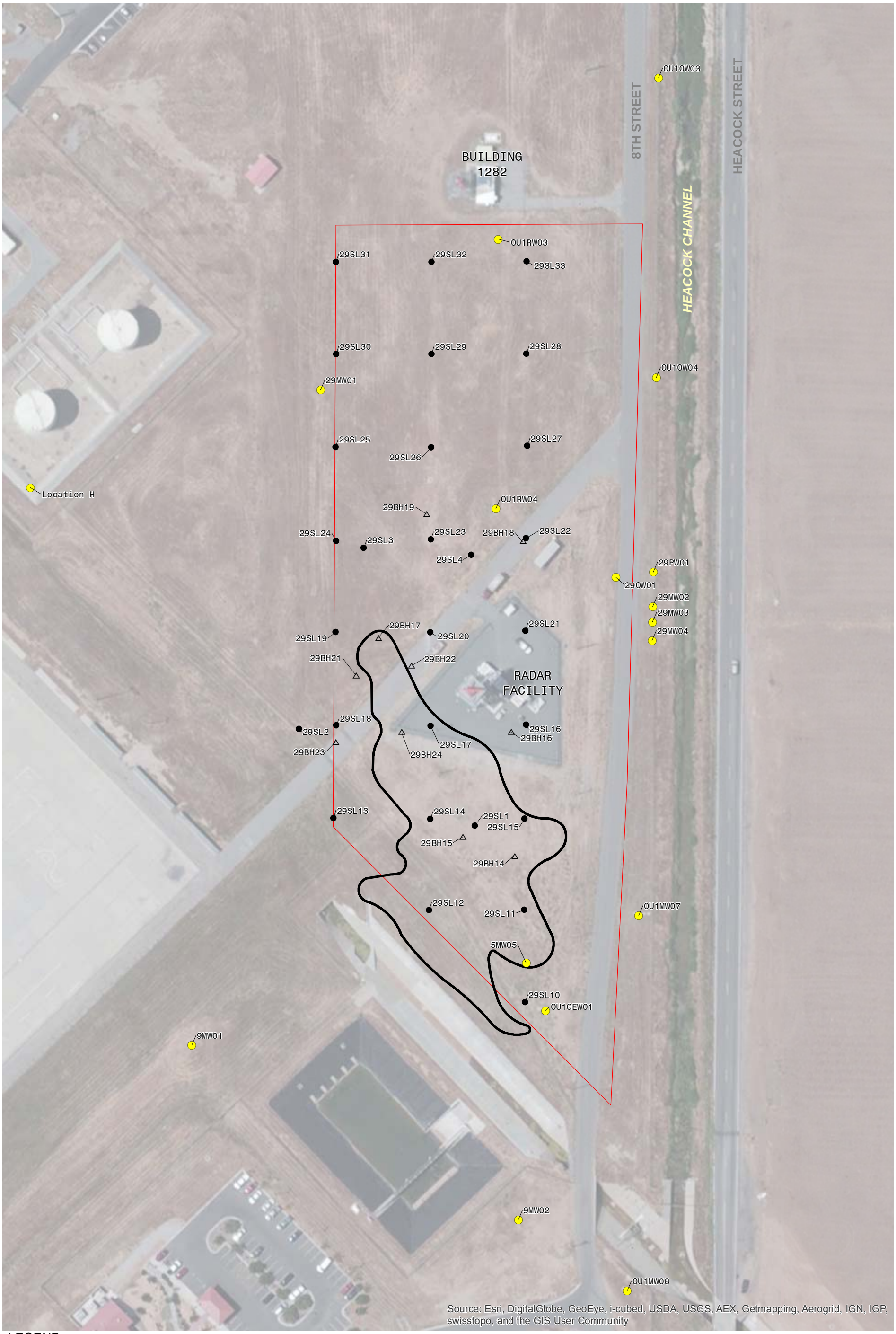

LEGEND

- WELL LOCATION
- BOREHOLE LOCATION
- SURFACE SOIL SAMPLE LOCATION
- APPROXIMATE AREA OF FORMER BURN PITS
- SITE 29 BOUNDARY

N

0 50 100

SCALE IN FEET

Third Five-Year Review Report

Site 29 Layout

Date 09-14	AECOM	Figure 4-5
Project No. 60271680	March ARB and Former March AFB, CA	

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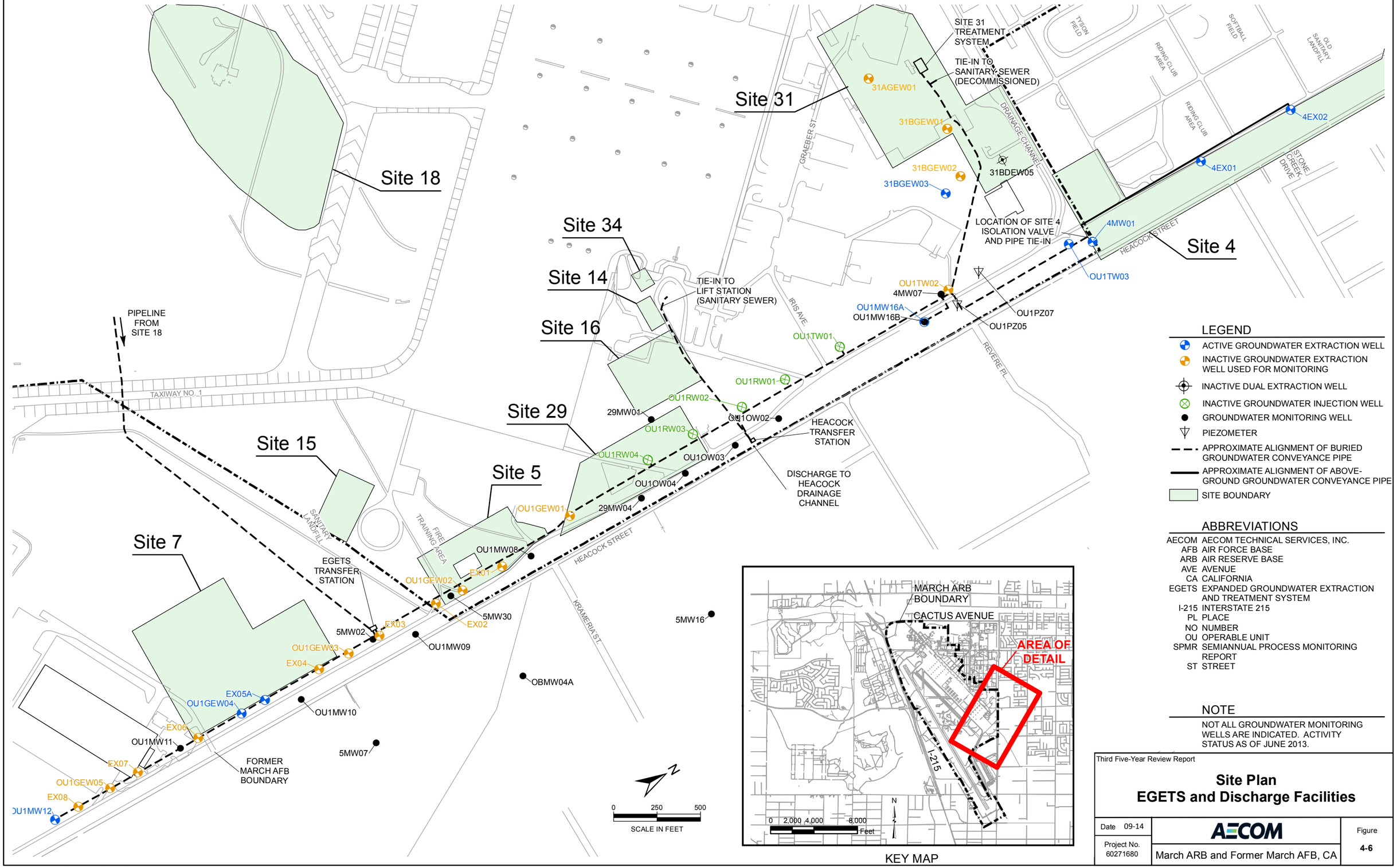

ABBREVIATIONS

AECOM	AECOM TECHNICAL SERVICES, INC.
AFB	AIR FORCE BASE
ARB	AIR RESERVE BASE
AVE	AVENUE
CA	CALIFORNIA
EGETS	EXPANDED GROUNDWATER EXTRACTION AND TREATMENT SYSTEM
I-215	INTERSTATE 215
PL	PLACE
NO	NUMBER
OU	OPERABLE UNIT
SPMR	SEMIANNUAL PROCESS MONITORING REPORT
ST	STREET

NOTE

NOT ALL GROUNDWATER MONITORING WELLS ARE INDICATED. ACTIVITY STATUS AS OF JUNE 2013.

Third Five-Year Review Report

Site Plan
EGETS and Discharge Facilities

Date 09-14	AECOM	Figure 4-6
Project No. 60271680	March ARB and Former March AFB, CA	

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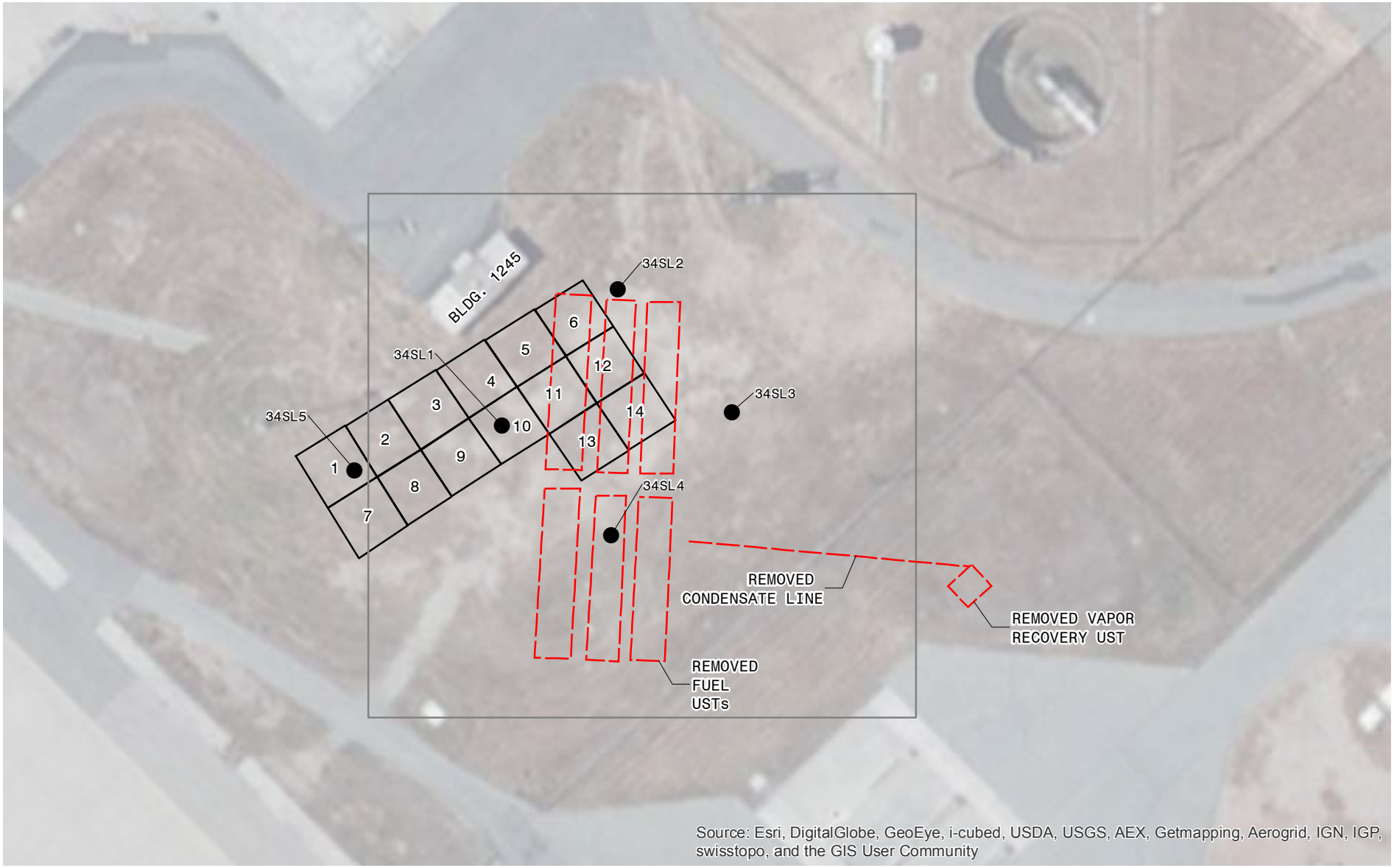

LEGEND

- 1992 SURFACE SOIL SAMPLE LOCATION
- 1 2 / 7 8 — 2002 PAH SAMPLING GRID
- APPROXIMATE SITE 34 BOUNDARY

N

0 25 50

SCALE IN FEET

Third Five-Year Review Report

Site 34 Layout
Pritchard Refueling System

Date 09-14	AECOM	Figure 4-7
Project No. 60271680	March ARB and Former March AFB, CA	

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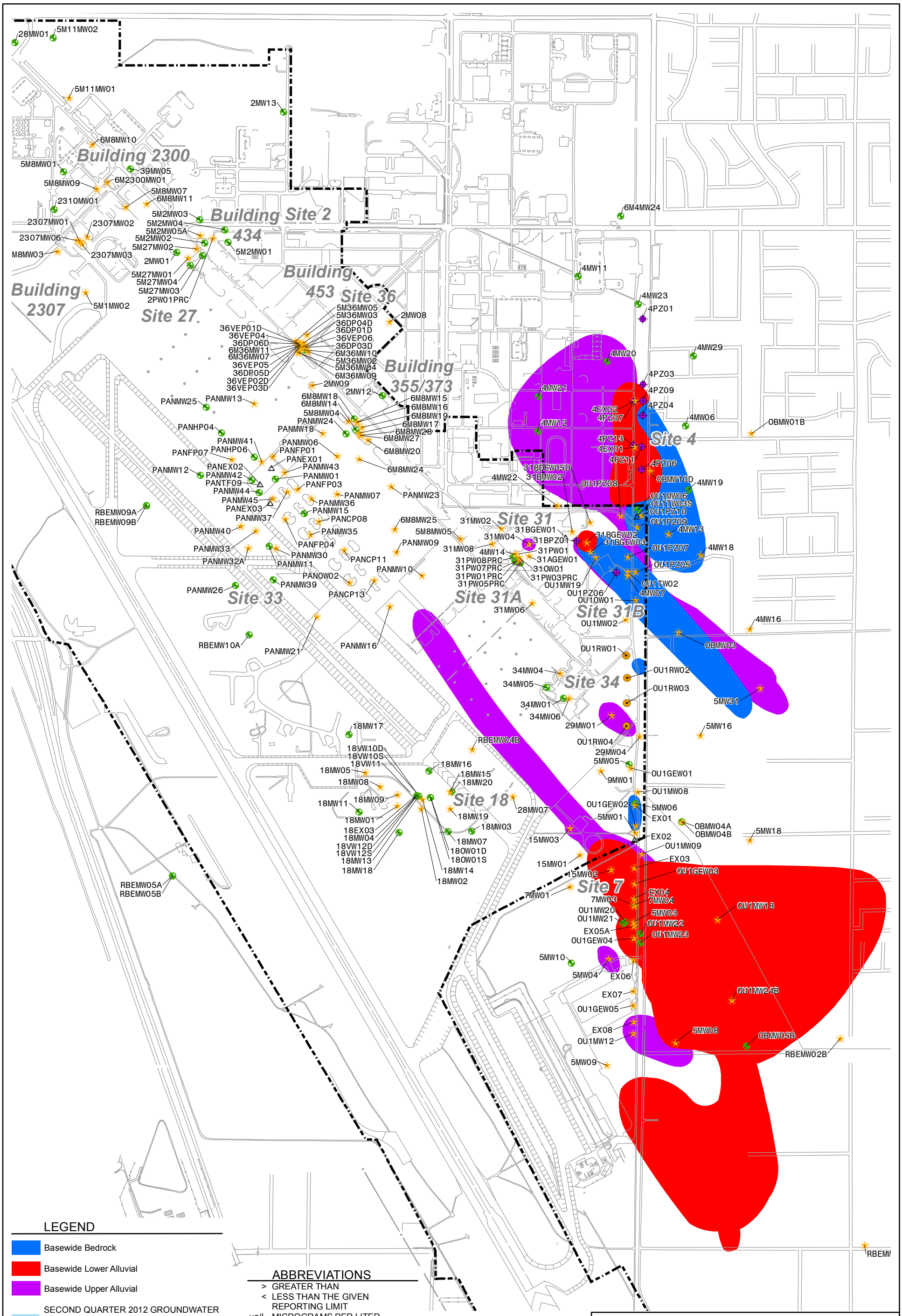

LEGEND

- Basewide Bedrock
- Basewide Lower Alluvial
- Basewide Upper Alluvial
- SECOND QUARTER 2012 GROUNDWATER ELEVATION CONTOURS (FT MSL)
- BASE PROPERTY LINE

GROUNDWATER WELLS

- EXTRACTION WELL
- INJECTION WELL
- MONITORING WELL
- PIEZOMETER
- WELL SAMPLED IN 2Q 2012

ABBREVIATIONS

>	GREATER THAN
<	LESS THAN THE GIVEN REPORTING LIMIT
µg/L	MICROGRAMS PER LITER
2Q	SECOND QUARTER
AECOM	AECOM TECHNICAL SERVICES, INC.
AFB	AIR FORCE BASE
AGMR	ANNUAL GROUNDWATER MONITORING REPORT
ARB	AIR RESERVE BASE
CA	CALIFORNIA
CTCL	CARBON TETRACHLORIDE
FT MSL	FEET MEAN SEA LEVEL
PCE	TETRACHLOROETHENE
TCE	TRICHLOROETHENE

N

0 580 1,160

SCALE IN FEET

OU-1 Plume
Operable Unit 1
5-Year Review
March Air Reserve Base

Date 09-14	AECOM	Figure 4-8
Project No. 60271680	March ARB and Former March AFB, CA	

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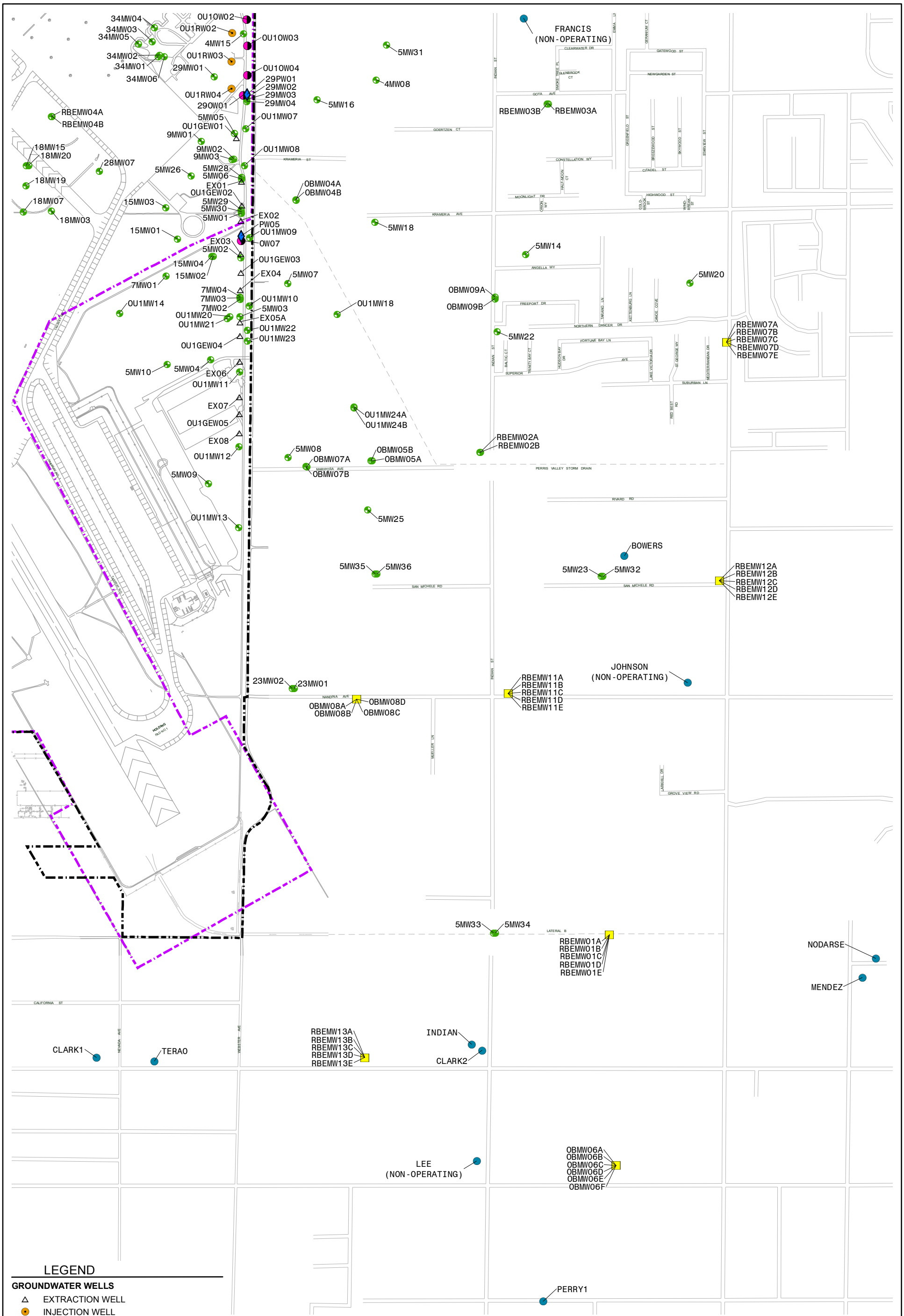

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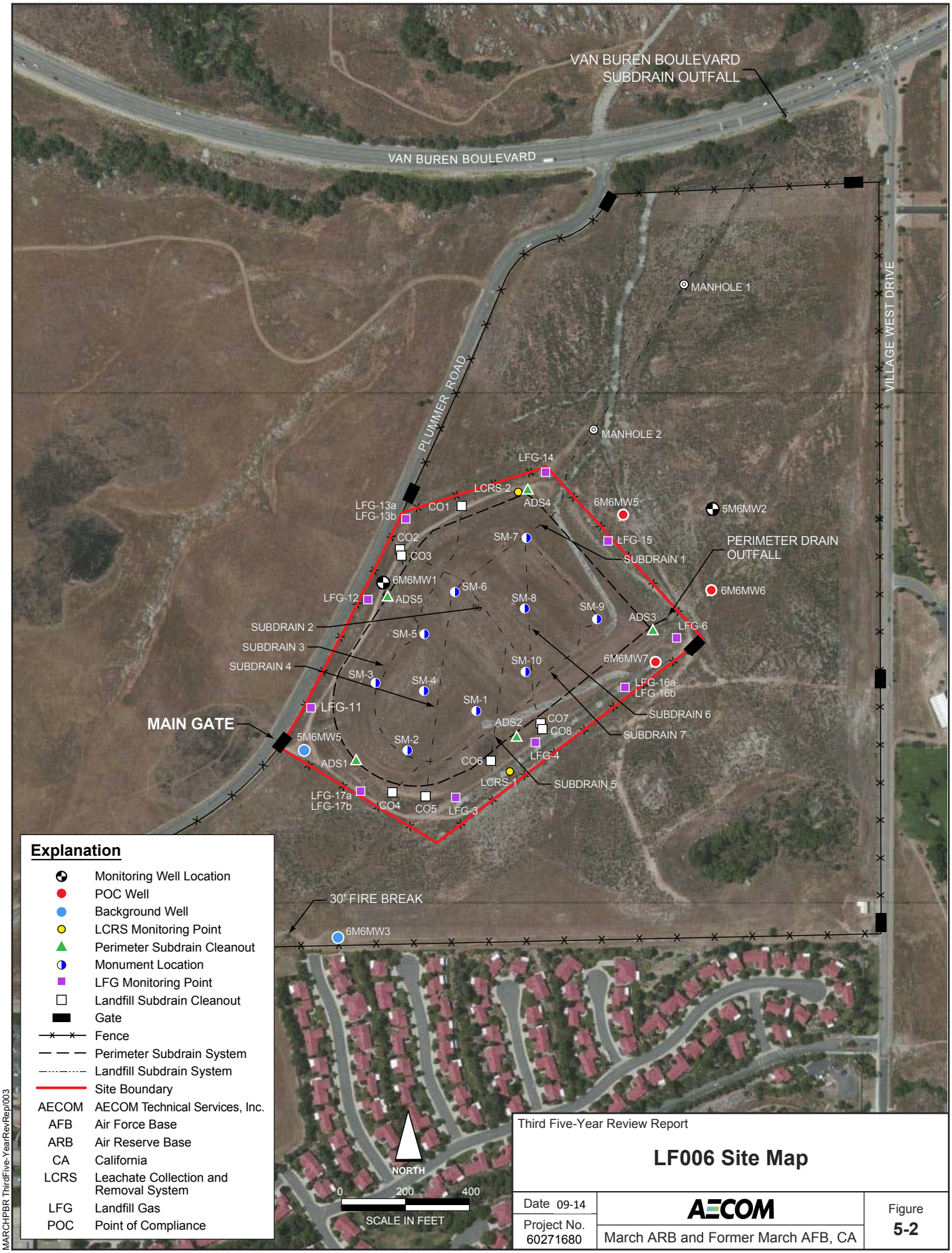
Third Five-Year Review Report

Site 1 Plan

Date 09-14	AECOM	Figure 5-1
Project No. 60271680	March ARB and Former March AFB, CA	

MARCHPBR Site1SupplementalRIReport/003



Explanation

- Monitoring Well Location
- POC Well
- Background Well
- LCRS Monitoring Point
- Perimeter Subdrain Cleanout
- Monument Location
- LFG Monitoring Point
- Landfill Subdrain Cleanout
- Gate
- Fence
- Perimeter Subdrain System
- Landfill Subdrain System
- Site Boundary

AECOM	AECOM Technical Services, Inc.
AFB	Air Force Base
ARB	Air Reserve Base
CA	California
LCRS	Leachate Collection and Removal System
LFG	Landfill Gas
POC	Point of Compliance

Third Five-Year Review Report

LF006 Site Map

Date 09-14	AECOM	Figure 5-2
Project No. 60271680	March ARB and Former March AFB, CA	

MARCHPBR ThirdFive-YearRevRep\003

LEGEND

- PREVIOUS SOIL SAMPLE LOCATION
- SITE BOUNDARY SS011

N

0 100 200

SCALE IN FEET

Third Five-Year Review Report

Site SS011 Layout

Date 09-14	AECOM	Figure 5-3
Project No. 60271680	March ARB and Former March AFB, CA	

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LEGEND

- STAGE 5 BORING (1994)
- CONFIRMATION SAMPLE (1994)
- GROUNDWATER MONITORING WELL (ABANDONED IN 2003)
- SOIL EXCAVATION AREA

N

0 20 40

SCALE IN FEET

Third Five-Year Review Report

Site 17 Layout
Confirmation Sample Locations

Date 09-14	AECOM	Figure 5-4
Project No. 60271680	March ARB and Former March AFB, CA	

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LEGEND

- SOIL BORING
- HAND-AUGER BORING
- ACTIVE SLUDGE DRYING BED
- FORMER SLUDGE DRYING BED
- SITE 19 BOUNDARY

ABBREVIATION

AFB	AIR FORCE BASE
ARB	AIR RESERVE BASE
CA	CALIFORNIA
SDB	SLUDGE DRYING BED

N

0 35 70

SCALE IN FEET

Third Five-Year Review Report

Site 19 Layout
Mid Upgrade
(3/9/2011)

Date 09-14

Project No. 60271680

AECOM

March ARB and Former March AFB, CA

Figure **5-5**

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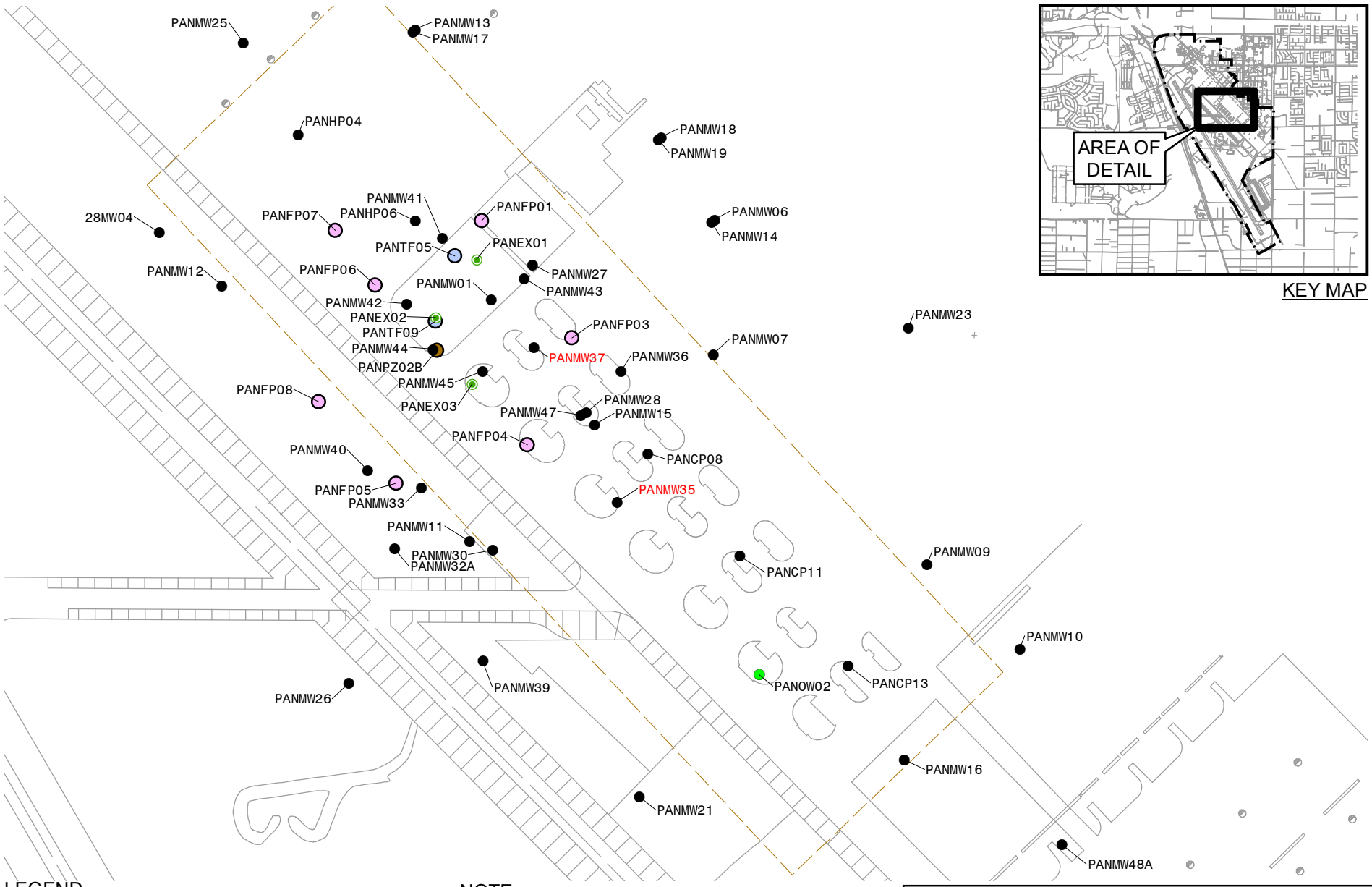

Third Five-Year Review Report

Site 33
Site Map and Well Layout

Date 09-14	AECOM	Figure 6-1
Project No. 60271680	March ARB and Former March AFB, CA	

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LEGEND

REMOVED SWIMMING POOL

APPROXIMATE SITE 45 BOUNDARY

NOTE: STRUCTURES ADJACENT TO THE REMOVED SWIMMING POOL ARE NO LONGER PRESENT.

N

0 25 50

SCALE IN FEET

Third Five-Year Review Report

Site 45 Layout

Date 09-14	AECOM	Figure 7-1
Project No. 60271680	March ARB and Former March AFB, CA	

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