



California Regional Water Quality Control Board



Linda S. Adams
Secretary for
Environmental Protection

Lahontan Region

Arnold Schwarzenegger
Governor

Victorville Office

14440 Civic Drive, Suite 200, Victorville, California 92392
(760) 241-6583 • Fax (760) 241-7308
<http://www.waterboards.ca.gov/lahontan>

March 25, 2008

To Attached Mailing List

FILE: EAFB ROD

LAHONTAN REGIONAL BOARD MEETING, APRIL 9 AND 10, 2008 IN LANCASTER, CALIFORNIA

Enclosed for your information is a copy of your proposed agenda item for your review. The Regional Board will be considering adopting the proposed resolution during its **April 9 and 10, 2008** meeting in Barstow, California.

If you need further information regarding this meeting, please contact our office.

Sincerely,

Rebecca Phillips
Office Technician

Enclosures: Item 9

MAILING LIST
EAFB SOUTH AFRL TI WAIVER/CONTAINMENT ZONE

Ai Duong 95 th ABW/ CEVR	Ray Sugiura Earth Tech	Ruby Messersmith, General Manager North Edwards Water District
Patrice Hallman 95 th ABW/CEVR	Sarah Grossi Earth Tech	Lorelei H. Oviatt Supervising Planner Kern County Planning Department
Joe Healy USEPA REGION 9	Peter Phillips URS Corp.	Victor Yaw
John Harris Cal EPA/DTSC	David Newman	John Russell SWRCB
Jose Salcedo Cal EPA/DTSC	Wendy Reed, Director Antelope Valley Conservancy	Barbara Houghton Kern County DEHS
Jay (Jehiel) Cass SWQCB	Pete Lopez Boron CSD	John Ukkestad, President AV United Water Purveyors
Gemma Fregoso	Dean Baker	Bob Smith
Carolyn Coe	Michelle Tucker	William Brandweiner

MAILING LIST
EAFB SOUTH AFRL TI WAIVER/CONTAINMENT ZONE

Brenda Weems-Hunter

Peter Zorba

Leslie Uhazy

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION**

**MEETING OF APRIL 9 AND 10, 2008
BARSTOW, CALIFORNIA**

ITEM: 9

SUBJECT: RESOLUTION AUTHORIZING THE EXECUTIVE OFFICER TO SIGN THE RECORD OF DECISION FOR THE SOIL AND DEBRIS SITES, OPERABLE UNITS 4 AND 9, EDWARDS AIR FORCE BASE, KERN COUNTY

CHRONOLOGY: This is a new item

ISSUE: Should the Water Board concur with the remedial action proposed by the Air Force for 18 sites, including limited groundwater degradation related to two sites and an engineered alternative final cover for a closed landfill, and authorize the Executive Officer to sign the Record of Decision? The Board is asked to evaluate whether the proposed action complies with State requirements based on information presented with this item.

DISCUSSION: Edwards Air Force Base has submitted a Draft Final Record of Decision for proposed remedial actions for 18 Soil and Debris Sites at Operable Units 4 and 9. These sites are located at the Air Force Research Laboratory. Further action is proposed for the following 10 sites shown in Table 1, below. These sites will have Land Use Controls where necessary to ensure there are no remaining risks to human health or the environment.

Table 1 – AFRL Soil and Debris Sites - Further Action

Site	Name	Further Action
13	Closed Landfill	<ul style="list-style-type: none"> ▪ Post closure maintenance and monitoring ▪ Land Use Controls
36	Former wastewater evaporation tank	<ul style="list-style-type: none"> ▪ Shallow soil excavation ▪ Land Use Controls
167	Beryllium firing range	<ul style="list-style-type: none"> ▪ Post closure maintenance and monitoring ▪ Land Use Controls
312	Polychlorinated Biphenyl Spill	<ul style="list-style-type: none"> ▪ Shallow soil excavation ▪ No Land Use Controls – Unrestricted Use
318	Test Area 1-120 Catch Basin	<ul style="list-style-type: none"> ▪ Land Use Controls
6 & 113	Abandoned Mine Shafts	<ul style="list-style-type: none"> ▪ Post closure maintenance and monitoring ▪ Natural attenuation and monitoring of groundwater containing N-nitrosodimethylamine (NDMA) near detection levels ▪ Land Use Controls
115	Missile Silos 1 & 2	<ul style="list-style-type: none"> ▪ Post closure maintenance and monitoring ▪ Land Use Controls

No further action is proposed for the eight sites listed on Table 2, below.

Table 2 – AFRL Soil and Debris No Further Action Sites

Site	Name
7	Beryllium Waste Piles
26	Former Fire Training Areas
150	Building 8451 Former Evaporation Pond
153 & 396	Former Civil Engineering Yard Dry Wells
166	Building 8240 Former Waste Discharge Area
170 & 171	Building 8595 Former Vapor Degreaser Pit
172	Building 8595 Former Outdoor Waste Sump
329	Test Area 1-46

Numerous Interim Corrective Actions have been completed to date. There are only two sites in this Record of Decision with a groundwater component. These are abandoned mine shafts (Sites 6 & 113) that were used for industrial waste disposal. Natural attenuation and long term monitoring are proposed for these sites. The groundwater remedy for these two sites meets State requirements to allow limited groundwater degradation because (1) NDMA concentrations are low and declining over last three years, (2) current NDMA concentrations are less than the State Notification Level, (3) the area of degraded groundwater is localized, (4) the sites are in a remote location with no potential groundwater users affected, (5) no other contaminants are detected, and (6) natural attenuation of remaining NDMA in groundwater meets the conditions required by the State's degradation policy.

For all sites except Sites 6 and 113, groundwater actions will be addressed by a separate Record of Decision that has either been adopted (e.g. South Air Force Research Laboratory Groundwater) or will be considered later. This Record of Decision also documents that the engineered alternative final cover placed over Site 13 (Old Landfill) meets the performance requirements of state regulations in title 27, Cal. Code of Regulations.

The Air Force does not accept that California State requirements such as the Basin Plan Water Quality Objectives for Secondary drinking water standards, Resolution 68-16, and Resolution 92-49 are requirements for this remedial action from a legal perspective. However, it has complied with these requirements from a technical perspective in the proposed action. The ROD includes "agree-to-disagree" language that preserves each party's legal rights and allows the State to take further action if, in the future, the State finds that the remedy does not comply with California State requirements. Water Board staff has evaluated the proposed remedial action and finds that it complies with State groundwater cleanup requirements.

RECOMMENDATION:

Adoption of Resolution as proposed.

Enclosures:

1. Proposed Resolution
2. Staff Report

ENCLOSURE 1

09-0003

**CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION**

**RESOLUTION NO. R6V-2008-(PROPOSED)
AUTHORIZING THE EXECUTIVE OFFICER TO SIGN
THE RECORD OF DECISION
FOR SOIL AND DEBRIS SITES, OPERABLE UNITS 4 AND 9,
EDWARDS AIR FORCE BASE**

Kern County_____

WHEREAS, the California Regional Water Quality Control Board, Lahontan Region, (Water Board) finds:

1. Edwards Air Force Base (EAFB) submitted a Draft Final Record of Decision (ROD), dated January 30, 2008, for the Operable Units 4 and 9 (OU 4 & 9) Soil and Debris Sites. The ROD describes remedial actions at eight sites and reasons for no further remedial action at 10 sites.
2. EAFB has proposed change pages based on comments to the Draft Final ROD. EAFB, US Environmental Protection Agency, Department of Toxic Substances Control, and Water Board staff met on March 6, 2008 regarding comments and changes that will be incorporated in the Final ROD in response to these comments.
3. The Air Force and Water Board "agree-to-disagree" over whether certain State requirements are Applicable or Relevant and Appropriate Requirements for purposes of the remedial action.
4. The proposed remedial activities in the January 2008 Draft Final ROD will comply with all applicable or relevant and appropriate requirements of the Water Board and are protective of water quality.

THEREFORE BE IT RESOLVED:

That the Lahontan Water Board authorizes the Executive Officer to:

1. Concur with the remedial actions as documented in the January 2008 Draft Final Record of Decision; and
2. Sign the Final Record of Decision provided that there are no significant changes between the Draft Final and the Final Record of Decision as described in the Water Board staff report with this item.

I, Harold J. Singer, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Control Board, Lahontan Region, on April 10, 2008.

HAROLD J. SINGER
EXECUTIVE OFFICER

09-0004

ENCLOSURE 2

STAFF REPORT

RECORD OF DECISION

SOIL AND DEBRIS SITES, OPERABLE UNITS 4 AND 9

EDWARDS AIR FORCE BASE

April 2008

**California Regional Water Quality Control Board, Lahontan Region
14440 Civic Dr., Ste 200, Civic Drive
Victorville, CA 92393-2306**

Prepared by: Jehiel Cass, Water Resources Control Engineer

Reviewed by: Cindi Mitton, Senior Water Resources Control Engineer

09-0005

STAFF REPORT

SOIL AND DEBRIS SITES, OPERABLE UNITS 4 AND 9 EDWARDS AIR FORCE BASE

1. Introduction

This item provides information for the California Regional Water Quality Control Board, Lahontan Region (Lahontan Water Board) to consider regarding whether it concurs with a Record of Decision (ROD) for remedial actions at the Edwards Air Force Base (EAFB), South Air Force Research Laboratory (AFRL), Operable Units 4 and 9 (OU 4&9), Soil and Debris Sites. The Air Force submitted a Draft Final ROD for 18 sites, called the Soil and Debris Sites, dated January 30, 2008. This ROD addresses human health and ecological risks for shallow soil at all sites. For Sites 6 and 113 (Abandoned Mine Shafts) only, this ROD addresses low contaminant concentrations in groundwater. Further actions are proposed at eight (8) sites. No further remedial action is proposed at 10 sites.

The Water Board's role is to determine whether State requirements for cleanup are met and decide whether to concur with the Air Force's selected remedy. If the Water Board does not concur with the selected remedy, then specific direction should be provided to staff so that a Dispute Elevation process can be initiated under the Federal Facilities Agreement (FFA)¹. Water Board staff has reviewed the proposed remedy and the actions comply with Water Board requirements. Water Board staff recommends the Water Board authorize the Executive Officer to sign the Final Soil and Debris Sites ROD.

2. AFRL Soil and Debris Sites Information

EAFB is located in the western Mojave Desert. Figure 1 shows the base, which is a test facility dominated by two large dry lakebeds, Rosamond Dry Lake in the southwest corner of the base and Rogers Dry Lake in the center of the base. The AFRL is an active jet propulsion test facility constructed on Leuhman Ridge, located in the east-central portion of the base, east of Rogers Dry Lake. This ROD documents remedial decisions for 18 sites. For 16 of those sites, this ROD addresses soil issues related to surface risk to human health and the environment. The risk to groundwater from these sites has been or will be evaluated in a different ROD. For two sites, Sites 6 and 113, this ROD addresses decisions for both surface risk and risk to groundwater.

¹ Federal Facilities Agreement between the Air Force, US Environmental Protection Agency, CA Department of Toxic Substances Control, and the CA Regional Water Board, dated October 1990.

Figure 2 shows the locations of sites included in the Soil and Debris ROD with respect to the ROD that addresses groundwater issues at the site. These areas are: (1) South AFRL, (2) Arroyos AFRL and (3) Northeast AFRL and Mars Boulevard (two areas managed as one). The Water Board considered a ROD for the first area (South AFRL) in August 2007. RODs for the other 2 groundwater areas are not yet developed.

Tables 1 and 2 describe sites with Further Action Proposed and No Further Action Proposed, respectively. These tables describe actions that have been completed to date, or are proposed as part of the remedy. These tables also state which ROD will include (in the case of the Arroyos or Northeast and Mars Boulevard RODs), or does include (in the case of the South AFRL ROD), a groundwater remedy for each site. The groundwater ROD will describe compliance with State requirements and the effect the site has to underlying groundwater. As stated above, this ROD includes a groundwater remedy for sites 6 and 113.

The Soil and Debris Sites ROD describes appropriate actions to ensure that human health or ecological risks are within EPA's acceptable range. Primarily, this takes the form of Land Use Controls (LUCs), both institutional controls (e.g. access restrictions implemented through the EAFB planning process) and engineering controls (fences, limited further excavation, etc.). Many sites discussed in this ROD historically contributed to groundwater degradation or pollution at the AFRL. The ROD documents interim or proposed actions that have been, or will be, completed so that these sites are not an ongoing source to groundwater or actions necessary to ensure that degraded or polluted groundwater is managed according to CERCLA and State requirements.

The ROD also documents that the engineered alternative final cover placed over Site 13 (Old Landfill) meets the performance requirements of state regulations. This site operated with Waste Discharge Requirements (Order 6-84-049) and was subject to federal subtitle D regulations required by Order 6-93-100-21. Both requirements were rescinded (Order 6-98-55) when the site was placed under federal CERCLA requirements with the understanding that closure and post-closure maintenance would continue under the CERCLA program. The ROD includes requirements for post-closure maintenance of the cover and landfill gas monitoring to satisfy Water Board and CA Integrated Waste Management Board requirements. Because Site 13 overlies the South AFRL groundwater plumes, groundwater monitoring will be integrated into the Remedial Design/Remedial Action requirements of that ROD, which was signed in September 2007.

3. Sites 6 and 113 Groundwater Contamination

Leuhman Ridge is a granitic intrusion that consists of competent and weathered fractured bedrock overlain by a relatively thin veneer of unconsolidated alluvial deposits that increases in thickness down slope from the crest of the ridge.

East of Lauhman Ridge is an alluvial valley where Sites 6 and 113; two abandoned mine shafts, are located. The sites are located about one-half mile apart. Both sites are located in Section 22, T10N 7W SBB&M. Surface flow at these sites is generally northwest, turning north into an arroyo in Section 15 and towards the EAFB boundary (to the north).

Waste rocket fuel in containers was disposed into the shafts, covered with liquid propellant and ignited. It is reported that during one event, multiple explosions occurred for an eight hour period. Each shaft is 12 ft by 12 ft square and likely extends deep, possibly to the groundwater table. A single monitoring well was installed adjacent to each mine shaft.

Trace concentrations of volatile organic compounds were detected below quantification limits (i.e., present, but concentration estimated) in groundwater samples from these wells. The contaminant N-nitrosodimethylamine (NDMA) was detected above the CA State Notification Level (NL) of 0.01 ug/L. The highest NDMA concentration was detected near Site 6 in 2003 (0.0907 ug/L). Since that time, concentrations have declined and, most recently, NDMA results are below the State NL.

A NL is not a numerical groundwater quality objective as defined in the Water Quality Control Plan for the Lahontan Region (Basin Plan). A NL is a health-based advisory level established by California Department of Public Health for chemicals in drinking water that lack maximum contaminant levels (MCLs). When chemicals are found at concentrations greater than their NLs in a drinking water supply, certain requirements and recommendations apply. The Basin Plan contains a narrative objective that "groundwater shall not contain concentrations of chemical constituents that adversely affect the water for beneficial use". Because of this objective, it is appropriate to consider the NL as trigger action level for groundwater cleanups. Due to the extremely low NDMA concentrations detected and the evidence of decreasing NDMA concentrations observed through monitoring, it is reasonable to conclude NDMA concentrations will continue to decline.

The total dissolved solids concentration in underlying groundwater is about 1,200 mg/L – over the recommended secondary drinking water standard of 500 mg/L but below the upper standard of 1,500 mg/L. Naturally occurring arsenic at Site 6 slightly exceeds the primary drinking water standard (0.05 mg/L). The overall water quality is marginal, but generally meets water quality objectives for beneficial uses specified in the Basin Plan.

These sites are in a very remote location of eastern EAFB. There is about one to two feet of alluvial soil overburden, then quartz monzonite bedrock. Groundwater is found in deep bedrock fractures (about 210 to 240 feet below ground surface).

The groundwater flow direction is to the northwest. The groundwater yield has not been specifically determined in this area, but is likely similar to the South AFRL area. At the South AFRL, production rates are from 1 gallon per minute (gpm) or less to a maximum of about 20 gpm. To meet the description for a source of drinking water (State Board Resolution 88-63) the yield must be at least 200 gallons per day (or 0.14 gpm). Therefore, it is likely that groundwater at Sites 6 and 113 meet the criteria of a "source of drinking water."

Groundwater beneath Sites 6 and 113 occurs in bedrock. Groundwater flow is fracture dominated with contaminant dispersion and dilution the primary natural attenuation mechanisms contributing to site cleanup. There is no evidence the sites are an active source of pollutants to groundwater. Therefore, site conditions are conducive to natural reduction of NDMA over time.

4. Site Investigations and Interim Actions Completed

As shown in Tables 1 and 2 in the column titled "Corrective Actions", numerous interim corrective actions and confirmation sampling events have been completed. As a result, all sites except for Sites 6 and 113 (Abandoned Mine shafts) either do not pose a continuing groundwater threat or the remaining threats to groundwater posed by contaminants in underlying bedrock are addressed in a separate ROD.

A groundwater action component for Sites 6 and 113 is included in this ROD because these sites are outside the other groundwater management areas. Long term groundwater monitoring is the preferred ground water action for these sites primarily because: (1) NDMA concentrations are small and declining over the last three years, (2) current NDMA concentrations are less than the State NL, (3) the area of degraded groundwater is small and localized, (4) the sites are in a remote location with no potential groundwater users affected, and (5) no other contaminants are detected.

Natural attenuation meets the Water Board's non-degradation objective (e.g. Resolution 68-16) because (1) the degradation in groundwater is small, (2) the extent of degradation is localized, (3) the groundwater is of marginal quality, (4) no existing or potential groundwater uses are or will be affected, (5) it is technically and economically infeasible to use in-situ or ex-situ treatment methods in soil or groundwater to remove the waste due to safety and technological considerations, and (6) the ratio of cost to benefit does not warrant more active cleanup methods.

5. Possible Corrective Actions

The Feasibility Study evaluated the remedial alternatives shown on Table 3. These alternatives were compared against the nine criteria shown below to evaluate remedial alternatives.

- Overall protectiveness;
- Compliance with state and federal requirements;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume;
- Short-term effectiveness;
- Implementability;
- Cost;
- Regulatory agency acceptance; and
- Community acceptance.

6. Selected Remedy

Table 3 lists the general proposed remedy for each site (in bold). Table 1 lists the specific components of the remedy for each site.

The selected groundwater action for Sites 6 and 113 is similar to that for a Closed, Inactive, or Abandoned Landfills, (a term from Title 27, Cal. Code of Regulations). This requires sites to have groundwater Corrective Action requirements applied, to the extent feasible. The Sites 6 and 113 actions include as part of the post-ROD Remedial Development and Remedial Action plans:

- Continued monitoring and maintenance of the asphalt covers.
- Diversion of storm water away from the sites to prevent infiltration.
- Installation of additional groundwater monitoring points as necessary to establish the local groundwater flow gradient and provide data to establish background concentrations.
- Implementing a groundwater monitoring program for monitoring for NDMA concentrations.
- Consider the NDMA California State NL (0.01 ug/L) to be a trigger concentration upon which, if exceeded, the Remedial Design/Remedial Action Plan will be modified and implemented for enhanced groundwater monitoring; and include a process to consider whether further action is warranted.
- Implement Land Use Restrictions to protect public health.

7. Analysis of Water Board Requirements

Water Board staff's evaluation of the proposed remediation for each of the sites has determined that the proposed remedy meets the requirements of the Basin Plan, State laws, policies and regulations. The last column of Tables 1 and 2 titled "Analysis with State Requirements" provides a site specific evaluation. In summary, the proposed actions comply with the requirements described below.

- Section 13304 of the California Water Code requires dischargers that have polluted, or threaten to pollute, groundwater to clean it up.
- State Water Board Resolution No. 92-49 (*Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304*). This requires discharges of pollution or nuisance conditions to cleanup up groundwater and establishes groundwater cleanup levels at background or some higher level that does not result in pollution.
- State Water Board Resolution No. 68-16 (*Statement of Policy with Respect to Maintaining High Quality of Waters in California*). This requirement is known as the Non-Degradation policy and specifies conditions to be achieved when existing high quality waters may be degraded.
- Water Quality Control Plan for the Lahontan Region (Basin Plan) including, the following elements:
 - Table 2-2, Beneficial Uses for Groundwater of the Lahontan Region, Department of Water Resources Basin (DWR) Basin No. 6-44 (Antelope Valley) where the beneficial uses are Municipal (MUN), Agricultural (AGR), Industrial Service Supply (IND) and Freshwater Replenishment (FRSH)
 - Narrative and numerical groundwater quality objectives listed on page 3-11. These include primary and secondary drinking water standards.
 - Region Wide Prohibitions 1 and 3 listed on pages 4.1-1. These prohibit ongoing discharges that may cause degradation or pollution.
 - Soil Cleanup Levels listed on pages 4.2-4 and 4.2-5. This narrative criteria requires soils to be cleaned to background or to levels that do not pose a risk to human health or the environment and be protective of groundwater quality objectives.
- Title 27, California Code of Regulations (Also Title 23, Chapter 15). This regulation specifies landfill closure and post closure maintenance and monitoring requirements, procedures for completing groundwater corrective actions, and criteria for developing groundwater cleanup levels.

The ROD describes areas where the Air Force and Water Board "agree-to-disagree" regarding whether some state criteria are Applicable or Relevant and Appropriate Requirements (ARARs) for purposes of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). However,

Water Board staff agrees that the remedies described in the ROD comply with state requirements.

8. Conclusions

In January 2008, EAFB submitted a Draft Final ROD for the OU 4 and 9, Soil and Debris Sites. Water Board staff has reviewed the ROD and other available data and information. The Draft Final ROD satisfies state requirements, provided agreed upon responses to comments are incorporated in the Final ROD. Based on our review the proposed actions meet requirements of the Basin Plan, policies and regulations, and State law.

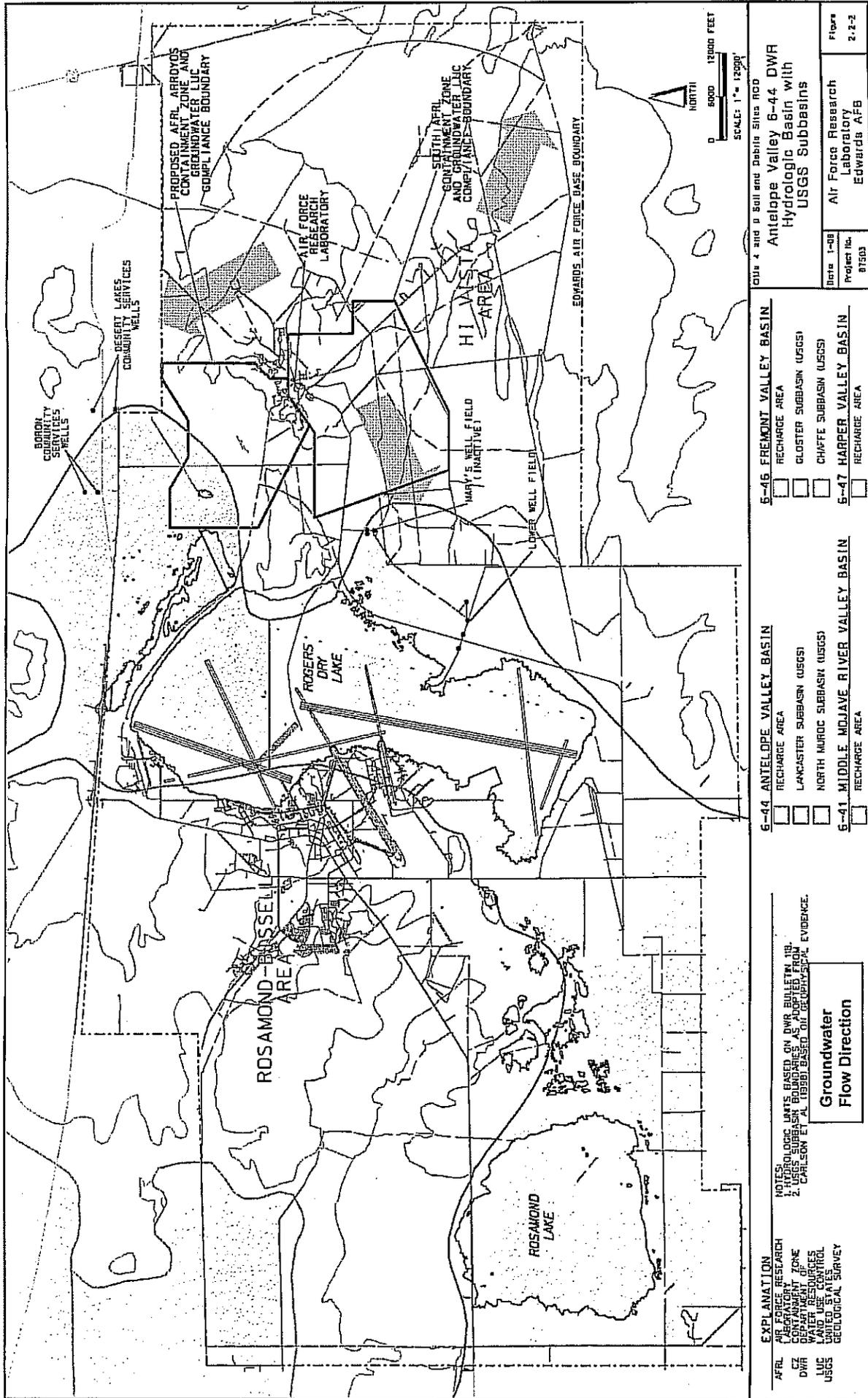
9. Recommendation

The Water Board is party to the EAFB FFA and is now asked to sign the Soil and Debris Sites ROD if it concurs with the actions proposed in the ROD. Staff recommends the Board adopt a resolution authorizing the Executive Officer to sign the EAFB Soil and Debris Sites.

- FIGURES:
1. Edwards AFB Area Map
 2. Edwards AFB AFRL Soil and Debris Sites

- TABLES:
1. Edwards AFB Air Force Research Laboratory – Soil and Debris Sites – Further Action Proposed
 2. Edwards AFB Air Force Research Laboratory - Soil and Debris Sites – No Further Action Proposed
 3. Alternatives Evaluated

FIGURE 1 Edwards AFB Area Map



City 4 and p Soil and Dabils Sites RCD
 Antelope Valley Basin 6-44 DWR
 Hydrogeologic Basin with
 USGS Subbasins

Date: 1-08
 Project No.: 87503
 Air Force Research Laboratory
 Edwards AFB

Flow: 2, 2-2

5-46 FREMONT VALLEY BASIN

RECHARGE AREA

GLOSTER SUBBASIN (USGS)

CHAFFE SUBBASIN (USGS)

5-47 HARPER VALLEY BASIN

RECHARGE AREA

6-44 ANTELOPE VALLEY BASIN

RECHARGE AREA

LANCASTER SUBBASIN (USGS)

NORTH MUROC SUBBASIN (USGS)

6-41 MIDDLE MOJAVE RIVER VALLEY BASIN

RECHARGE AREA

EXPLANATION

AFRL RESEARCH

AFRL CONTAINMENT ZONE

DWR DEPARTMENT ZONES

LUC LAND USE CONTROL

USGS UNITED STATES GEOLOGICAL SURVEY

NOTES:
 1. HYDROLOGIC LIMITS BASED ON DWR BULLETIN 108.
 2. USGS SUBBASIN BOUNDARIES AS ADOPTED FROM CARLEON ET AL (1988) BASED ON GEOPHYSICAL EVIDENCE.

Groundwater Flow Direction

EDWARDS AFB/01/11/2008/0001

FIGURE 2 EAFB Air Force Research Laboratory Soil and Debris Sites

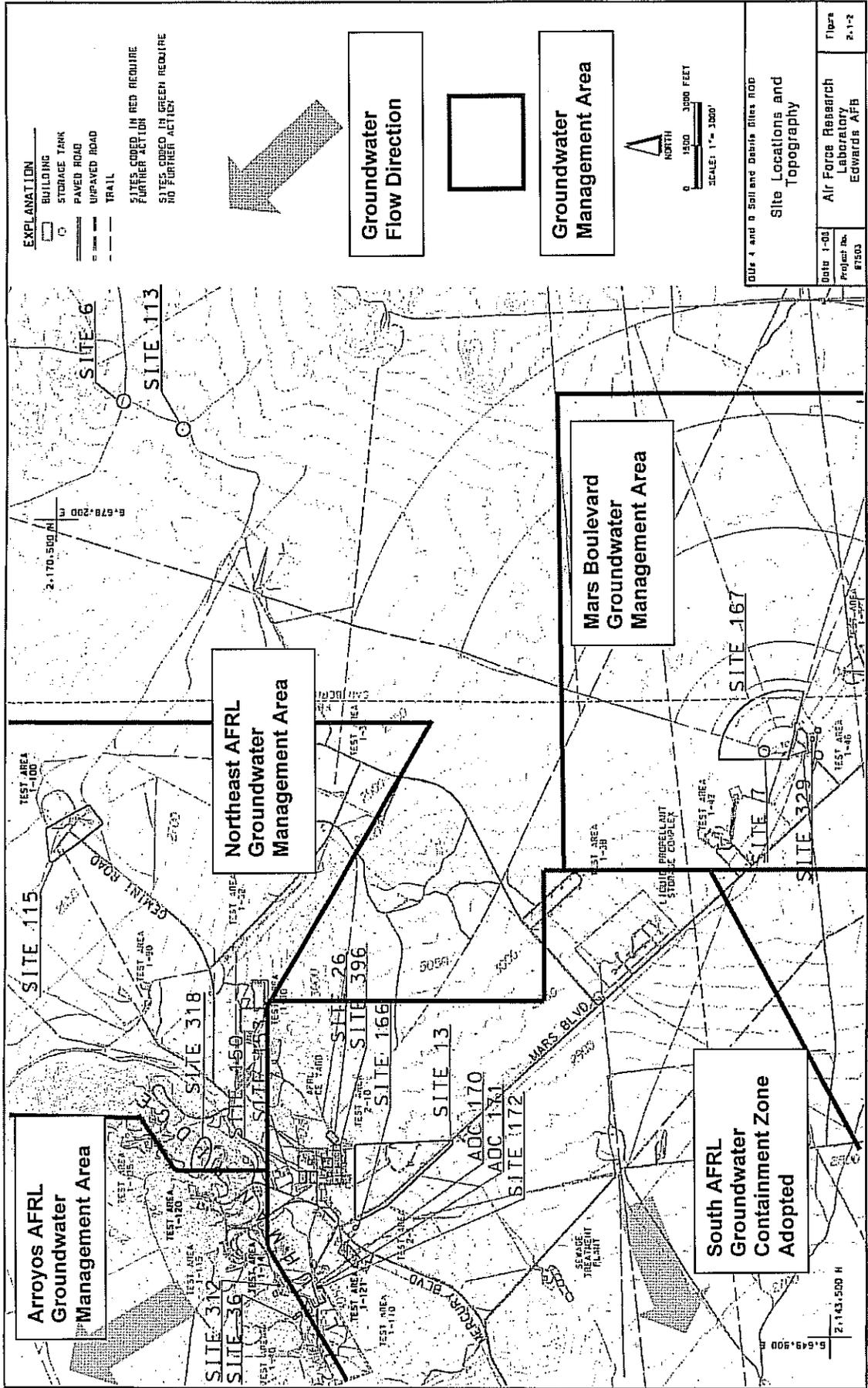


Table 1 – Edwards AFB Air Force Research Laboratory - Soil and Debris Sites – Further Actions Proposed

Site	OU	Name	Corrective Actions	Affected Media	Analysis With State Requirements
13	4	Closed AFRL Landfill	<p>Interim Actions Completed</p> <ul style="list-style-type: none"> Engineered alternative final cover consisting of geosynthetic clay 2-foot thick native vegetative soil cover Diversion channels and grading to prevent ponding <p>ROD Actions</p> <ul style="list-style-type: none"> Post closure maintenance and monitoring plan Implement LUCs to protect public health No groundwater monitoring – above SAFRL Containment Zone 	<ul style="list-style-type: none"> Landfill contents 	<ul style="list-style-type: none"> Meets Title 27, CCR § 20080(b) for engineered alternative final cover Implements Title 27 CCR post-closure maintenance and monitoring Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for site to have no risk or groundwater impacts
36	4	Test Area 1-21-Former Wastewater Evaporation Tank	<p>Interim Actions Completed</p> <ul style="list-style-type: none"> Tank and piping were removed 10 cubic yards of perchlorate impacted soil excavated and properly disposed <p>ROD Actions</p> <ul style="list-style-type: none"> Excavate 40-50 cubic yards of perchlorate impacted alluvial soil Implement LUCs to protect public health 	<ul style="list-style-type: none"> Shallow alluvial soil only Bedrock and underlying groundwater included in future Arroyos AFRL groundwater ROD 	<ul style="list-style-type: none"> Meets Title 27, CCR § 20380(e) for groundwater monitoring alternative because underlying groundwater is addressed in the South AFRL ROD. Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for shallow alluvial soils to have no risk or groundwater impacts Not Applicable
167	4	Test Area 1-46 Beryllium firing Range	<p>Interim Actions Completed</p> <ul style="list-style-type: none"> 10,400 cubic yards of soil consolidated into onsite Solid Waste Land Disposal Unit (SLDU) SLDU covered with high density polyethylene and liner and seeded soil with a fence <p>ROD Actions</p> <ul style="list-style-type: none"> Implement post-closure maintenance 	<ul style="list-style-type: none"> Landfill contents only Groundwater beneath the site is to be included in future Northeast AFRL and 	<ul style="list-style-type: none"> Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no risk or groundwater impacts Implements Title 27 CCR post-closure maintenance and monitoring to extent feasible Not Applicable

Site	OU	Name	Corrective Actions	Affected Media	Analysis With State Requirements
312	4	Test Area 1-14 Polychlorinated Biphenyl (PCB) Spill Area	<p>Interim Actions Completed</p> <ul style="list-style-type: none"> PCB containing transformers were removed and replaced with a non-PCB containing transformer <p>ROD Actions</p> <ul style="list-style-type: none"> Excavation and dispose 73 cubic yards of PCB contaminated soil to achieve unrestricted use Cutting concrete pad and removing PCB contaminated concrete 	<p>Mars Boulevard AFRL groundwater ROD.</p> <ul style="list-style-type: none"> PCB impacted soil only Bedrock and underlying groundwater is to be included in future Arroyos AFRL groundwater ROD 	<ul style="list-style-type: none"> Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no risk or groundwater impacts. Not Applicable
318	4	Test Area 1-120 Catch Basin and Evaporation Pond	<p>Interim Actions Completed</p> <ul style="list-style-type: none"> None <p>ROD Actions</p> <ul style="list-style-type: none"> Implement LUCs to protect public health Install fence and signs 	<ul style="list-style-type: none"> Shallow alluvial soil only – Contains VOCs (TCE, PCE, toluene, and xylene) and the threat they pose to groundwater will be evaluated separately – Contains polycyclic aromatic hydrocarbons that are not mobile but pose exposure risk to humans Bedrock and underlying groundwater is to be included in future Northeast AFRL and Mars Boulevard AFRL groundwater ROD. 	<ul style="list-style-type: none"> Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no risk. Not Applicable
6 & 113	9	Abandoned Mine Shafts 1 & 2	<p>Interim Actions Completed</p> <ul style="list-style-type: none"> Industrial waste contents covered with backfill of native soil Asphalt cap placed over the shaft to prevent access and preclude infiltration Fences and signs installed around east mine shaft 	<ul style="list-style-type: none"> Industrial Waste Landfill Contents 	<ul style="list-style-type: none"> Meets Basin Plan, State Board Resolution 92-49, and Title 27 Cal. Code of Regulations criteria to manage waste in place as a Closed, Inactive or Abandoned Landfill. It is technically impractical to remove or treat industrial waste and unexploded ordnance in place.

09-0016

Site	OU	Name	Corrective Actions	Affected Media	Analysis With State Requirements
			<p>ROD Actions</p> <ul style="list-style-type: none"> ▪ Implement LUCs to protect public health ▪ Install fences and signs at both sites ▪ Develop and Implement a Post-Closure Maintenance and Monitoring Plan for asphalt cap integrity, stormwater diversion, and groundwater monitoring ▪ Include in the post-ROD Remedial Action Plan, installation of additional groundwater monitoring wells as needed to establish the local groundwater flow gradient and provide data to establish background concentrations. ▪ Develop groundwater Concentration Limits, or Concentration Limits Greater Than Background. ▪ Implement long-term groundwater monitoring. Natural attenuation is the primary mechanism for reducing NDMA in groundwater. ▪ Consider the NDMA CA State Notification Level (0.01 ug/L) as a trigger level for which the remedy will be reconsidered. 	<ul style="list-style-type: none"> ▪ Underlying groundwater 	<ul style="list-style-type: none"> ▪ Natural attenuation and long term monitoring of N-nitrosodimethylamine (NDMA) in groundwater below State Notification Level (NL). ▪ Some localized degradation of groundwater will occur. ▪ Meets State Board Resolution 68-16 and Basin Plan Region wide Prohibitions 1 and 2 (page 4.1-1) for allowing some degradation in that: <ul style="list-style-type: none"> ▪ The change in water quality is consistent with maximum benefit to people of the state because the proposed remedy is the least cost to the taxpayer, the underlying groundwater is only marginally degraded, and the underlying groundwater meets all other water quality objectives, and ▪ The change in water quality will not unreasonably affect present or anticipated beneficial uses because no existing or potential groundwater uses are or will be affected, and ▪ The change in water quality does not result in water quality less than prescribed in the Basin Plan because contaminants are less than receiving ground water quality numerical objectives, and ▪ Natural attenuation and long term monitoring are the best practical treatment or control of waste due to the technical and economical infeasibility of using other in-situ or ex-situ treatment methods. ▪ Meets Basin Plan Regionwide Prohibitions 3 (page 4.1-1) in that there

Site	OU	Name	Corrective Actions	Affected Media	Analysis With State Requirements
115	9	Test Area 1-100 Missile Silos 1 and 2	<p>Interim Actions Completed</p> <ul style="list-style-type: none"> ▪ None <p>ROD Actions</p> <ul style="list-style-type: none"> ▪ Implement LUCs to protect public health ▪ Install fence and signs ▪ Implement post-closure maintenance program for silo covers, asphalt cap integrity and groundwater monitoring 	<ul style="list-style-type: none"> ▪ Industrial Waste Contents <hr/> <ul style="list-style-type: none"> ▪ Groundwater to be addressed in Northeast AFRL and Mars Boulevard AFRL groundwater ROD. 	<p>is no further degradation or pollution from the site.</p> <ul style="list-style-type: none"> ▪ Meets Basin Plan exemption criteria for the Region wide Prohibitions (page 4.1-2) in that the project reduces pollution, there is no feasible alternative, land disturbance is minimized and the corrective action complies with other applicable water quality laws, regulations or policies. <ul style="list-style-type: none"> ▪ Meets Basin Plan, State Board Resolution 92-49, and Title 27 Cal. Code of Regulations criteria to manage waste in place as a Closed, Inactive or Abandoned Landfill. It is technically impractical to remove or treat industrial waste and unexploded ordnance in place. <hr/> <ul style="list-style-type: none"> ▪ Not Applicable

Table 2 – Edwards AFB Air Force Research Laboratory - Soil and Debris Sites – No Further Action Proposed

Site	OU	Name	Corrective Actions	Affected Media	Analysis With State Requirements
7	4	Test Area 1-46 Beryllium Contaminated Earth Piles	<ul style="list-style-type: none"> Excavation of beryllium contaminated soils Collection of soil confirmation samples Backfilled and vegetated 	<ul style="list-style-type: none"> Soil Only – Clean closure Groundwater will be addressed in the Northeast and Mars Boulevard Area ROD 	<ul style="list-style-type: none"> Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no groundwater impacts Not Applicable
26	4	Former Fire Training Area	<ul style="list-style-type: none"> Above ground fuel tank and underground pipeline removed and disposed 120 cubic yards of petroleum contaminated soil excavated and disposed at a non-hazardous soil recycling facility Confirmation samples collected 	<ul style="list-style-type: none"> Soil – Less than Action Levels of Leaking Underground Fuel Tank Manual Groundwater – Part of South AFRL ROD 	<ul style="list-style-type: none"> Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no groundwater impacts Not Applicable
150	4	Building 8451 Former Waste Evaporation Ponds	<ul style="list-style-type: none"> Pond filled with clean soil 	<ul style="list-style-type: none"> Soil – No inorganic or organic constituents detected above background Groundwater – Part of South AFRL ROD 	<ul style="list-style-type: none"> Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no groundwater impacts Not Applicable
153 & 396	4	Civil Engineering Dry Wells Associated with Buildings 8419, 8421, 8425, and 8431	<ul style="list-style-type: none"> Redirected air conditioning water to the sanitary sewer Removed sludge, soil and gravel from dry wells and disposed in a non-hazardous waste recycling facility Removed above ground portions of dry wells Filled in dry well casings to the surface with a cement slurry 	<ul style="list-style-type: none"> Soil – No inorganic or organic constituents detected above background Groundwater – Part of South AFRL ROD 	<ul style="list-style-type: none"> Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no groundwater impacts Site also closed by Kern Co Department of Environmental Health Services Not Applicable
05166	4	Building 8240 Former Waste Discharge Area and Removed Waste Oil	<ul style="list-style-type: none"> Waste oil tank removed Electric transformer removed 75 tons of petroleum contaminated soil excavated and treated at a land farm located on 	<ul style="list-style-type: none"> Soil – petroleum hydrocarbons of limited extent and low mobility and polychlorinated biphenyl less than risk levels 	<ul style="list-style-type: none"> Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no groundwater impacts

Site	OU	Name	Corrective Actions	Affected Media	Analysis With State Requirements
AOCs 170 & 171	4	Underground Storage Tank (UST) Building 8595 Indoor Vapor Degreaser Pit and Indoor Sump	the South Base <ul style="list-style-type: none"> Sludge in the sump removed and disposed off site as hazardous waste Pit and sump steam cleaned All drain holes backfilled with concrete or gravel Units were capped with reinforced concrete 180 square feet of damaged concrete replaced 	<ul style="list-style-type: none"> Groundwater – Part of South AFRL ROD Soil – Because walls and pit floor were intact, no soil samples were collected Groundwater – Part of South AFRL ROD 	<ul style="list-style-type: none"> Not Applicable Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no groundwater impacts Not Applicable
172	4	Building 8595 Outdoor Waste Sump	<ul style="list-style-type: none"> Sludge in the sump removed and disposed as off site as hazardous waste Sump chambers steam cleaned and inlet pipes removed Sump was filled with concrete slurry and capped by a concrete pad 	<ul style="list-style-type: none"> Soil – Considerable amounts of chlorinated solvents remain in soil beneath sump – soil vapor extraction conducted and discontinued when South AFRL ROD signed Groundwater – Part of South AFRL ROD 	<ul style="list-style-type: none"> Does not meet Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no groundwater impacts Not Applicable
329	4	Test Area 1-46 Former Wash Rack and Oxidation Pond	None – no organics detected above risk levels	<ul style="list-style-type: none"> Soil – No organic compounds above risk levels. Only inorganic above risk level is iron, likely naturally occurring Groundwater – Contains N-nitrosodimethylamine at concentrations below state action levels – To be addressed in Northeast AFRL and Mars Boulevard AFRL ROD. 	<ul style="list-style-type: none"> Meets Basin Plan and State Board Resolution 92-49, Section III.G criteria for remaining waste contents to have no groundwater impacts Not Applicable

**Table 3 – Alternatives Evaluated
(Preferred Alternative in Bold)**

Site	OU	Name	Alternative 1	Alternative 2	Alternative 3	Alternative 4
13	4	Closed AFRL Landfill	<ul style="list-style-type: none"> ▪ Continue Post-Closure Maintenance and Monitoring Plan ▪ Land Use Controls 	<ul style="list-style-type: none"> ▪ Land Use Controls 		
36	4	Test Area 1-21-Former Wastewater Evaporation Tank	No Action	<ul style="list-style-type: none"> ▪ Land Use Controls 	<ul style="list-style-type: none"> ▪ Shallow soil Excavation ▪ Land Use Controls 	<ul style="list-style-type: none"> ▪ Capping ▪ Land Use Controls
167	4	Test Area 1-46 Beryllium firing Range	<ul style="list-style-type: none"> ▪ Continue Post-Closure Maintenance and Monitoring Plan ▪ Land Use Controls 			
312	4	Test Area 1-14 Polychlorinated Biphenyl (PCB) Spill Area	No Action	<ul style="list-style-type: none"> ▪ Excavate and Remove impacted soil and concrete for industrial use ▪ Land Use Controls 	<ul style="list-style-type: none"> ▪ Excavate and Remove impacted soil and concrete for unrestricted use 	
318	4	Test Area 1-120 Catch Basin and Evaporation Pond	No Action	<ul style="list-style-type: none"> ▪ Land Use Controls 	<ul style="list-style-type: none"> ▪ Excavation ▪ In-Situ Land Farming 	
6 & 113	9	Abandoned Mine Shafts 1 & 2	No Action	<ul style="list-style-type: none"> ▪ Land Use Controls 		
115	9	Test Area 1-100 Missile Silos 1 and 2	No Action	<ul style="list-style-type: none"> ▪ Fences and Gates ▪ Land Use Controls 	<ul style="list-style-type: none"> ▪ Backfill and cap silos ▪ Land Use Controls 	