# Draft
# Environmental Impact Report/ Environmental Assessment

## Edwards Air Force Base

## Open Burn/Open Detonation Units

August 5, 2013

Prepared by:

California Environmental Protection Agency
Department of Toxic Substances Control

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## ABBREVIATIONS AND ACRONYMS

| | |
|---|---|
| °C | degrees Centigrade |
| °F | degrees Fahrenheit |
| AEI | average exposed individual |
| AFB | Air Force Base |
| AFI | Air Force Instruction |
| AFTC | Air Force Test Center |
| AFFTC | Air Force Flight Test Center |
| AFRL | Air Force Research Laboratory |
| AICUZ | Air Installation Compatible Use Zones |
| AP | ammonium perchlorate |
| APCDs | air pollution control districts |
| AQMDs | air quality management districts |
| AVAQMD | Antelope Valley Air Quality Management District |
| BNOISE | Blast Noise |
| BLM | Bureau of Land Management |
| BO | Biological Opinion |
| CAA | Clean Air Act |
| CAAQS | California Ambient Air Quality Standards |
| Cal/EPA | California Environmental Protection Agency |
| Cal-OSHA | California Department of Industrial Relations |
| CARB | California Air Resources Board |
| CCAA | California Clean Air Act |
| CCR | California Code of Regulations |
| CDFW | California Department of Fish and Wildlife |
| CDNL | community day-night average level |
| CEQ | Council on Environmental Quality |
| CEQA | California Environmental Quality Act |
| CERCLA | Comprehensive Environmental Response, Compensation, and Liability Act |
| CFR | Code of Federal Regulations |
| CHHSLs | California Human Health Screening Levels |
| CHP | California Highway Patrol |
| CNEL | community noise equivalent level |
| $CO_2$ | carbon dioxide |
| $CO_2e$ | carbon dioxide equivalent |
| COC | chemical of concern |
| COPEC | Chemical of Potential Ecological Concern |
| CSEL | C-weighted Sound Exposure Level |
| CWA | Clean Water Act |
| dB | decibel |
| dBA | A-weighted decibel |
| dBC | C-weighted decibel |
| dBP | peak sound level |

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|---|---|
| DEA | Draft Environmental Assessment |
| DEIR | Draft Environmental Impact Report |
| dl | decaliter |
| DoD | Department of Defense |
| DOT | Department of Transportation |
| DTSC | Department of Toxic Substances Control |
| EA | Environmental Assessment |
| ECW | energetic-contaminated waste |
| EIR | Environmental Impact Report |
| EIS | Environmental Impact Statement |
| EKAPCD | Eastern Kern Air Pollution Control District |
| EOD | Explosive Ordnance Disposal |
| EPC | exposure point concentration |
| EPCRA | Emergency Planning and Community Right-to-Know Act |
| ERA | Ecological Risk Assessment |
| ERP | Environmental Restoration Program |
| ESA | Endangered Species Act |
| ESL | Environmental Screening Level |
| g | gram |
| FFA | Federal Facility Agreement |
| GC/MS | gas chromatography/mass spectrometry |
| HI | hazard index |
| HQ | hazard quotient |
| HRA | Health Risk Assessment |
| HSC | Health and Safety Code |
| HWSF | Hazardous Waste Support Facility |
| Hz | Hertz (units of $s^{-1}$) |
| ICRMP | Integrated Cultural Resources Management Plan |
| INRMP | Integrated Natural Resources Management Plan |
| ISCST | Industrial Source Complex Short-term |
| km | kilometer |
| lb | pound |
| Ldn | day-night average sound level |
| Leq | equivalent sound levels |
| m | meter |
| MDAQMD | Mojave Desert Air Quality Management District |
| MEI | maximally exposed individual |
| mg | milligram ($10^{-3}$ g) |
| MMR | Military Munitions Rule |
| MRIP | Munitions Rule Implementation Policy |
| MRL | Minimum Reporting Limit |
| MSA | Munitions Storage Area |
| MSL | mean sea level |
| NAAQS | National Ambient Air Quality Standards |
| NAHC | Native American Heritage Commission |
| NC | nitrocellulose |

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|---|---|
| NEPA | National Environmental Quality Act |
| NEW | net explosive weight |
| NG | nitroglycerin |
| NHPA | National Historic Preservation Act |
| NQ | nitroguanidine |
| $NO_2$ | nitrogen dioxide |
| NOAEL | no observed adverse effect level |
| NOP | Notice of Preparation |
| NPDES | National Pollutant Discharge Elimination System |
| NRHP | National Register of Historic Places |
| OB/OD | Open Burn/Open Detonation |
| OEHHA | Office of Environmental Health Hazard Assessment |
| OSHA | Occupational Safety and Health Administration |
| $PbN_3$ | lead azide |
| PBX | plastic-bonded explosive |
| PCB | polychlorinated biphenyls |
| PEP | propellants, explosives and pyrotechnics |
| PIRA | Precision Impact Range Area |
| PM2.5 | fine particulate matter 2.5 microns and under |
| PM10 | respirable particulate matter 10 microns and under |
| POTW | publicly-owned treatment works |
| PRC | Public Resources Code |
| PRG | Preliminary Remediation Goal |
| RCRA | Resource Conservation and Recovery Act |
| RDT&E | research, development, test and evaluation |
| REL | reference exposure level |
| RME | reasonable maximum exposure |
| RWQCB | Regional Water Quality Control Board |
| RYBP | radiocarbon years before present |
| s | second |
| SARA | Superfund Amendments and Reauthorization Act |
| SCAQMD | South Coast Air Quality Management District |
| SHPO | State Historic Preservation Officer |
| SIP | State Implementation Plan |
| SOP | Standard Operating Procedures |
| SVOC | semi-volatile organic compound |
| SWRCB | California State Water Resources Control Board |
| SWRCB | State Water Resources Control Board |
| TNT | trinitrotoluene |
| TPH | total petroleum hydrocarbons |
| TTLC | Total Threshold Limit Concentration |
| UCL | upper confidence limit |
| µg | microgram ($10^{-6}$ g) |
| USAF | United States Air Force |
| USC | United States Code |
| USEPA | United States Environmental Protection Agency |

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|---|---|
| USFWS | United States Fish and Wildlife Service |
| VOC | volatile organic compound |
| WWTP | Wastewater Treatment Plant |
| yr | year |

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# *EXECUTIVE SUMMARY*

## ES-1 INTRODUCTION

This Draft Environmental Impact Report (DEIR), and Environmental Assessment (EA), provides an analysis of the environmental impacts associated with the issuance of a Class 3 Hazardous Waste Facility Permit Modification by the Department of Toxic Substances Control (DTSC). The Permit Modification would allow Edwards Air Force Base (Edwards) to continue to treat reactive hazardous waste by open burn/open detonation (OB/OD), to consolidate these treatment activities at the Explosive Ordnance Disposal (EOD) Range in the Precision Impact Range Area (PIRA), and to expand operations beyond those currently authorized. Approval of this activity would modify Edwards' existing Hazardous Waste Facility Permit (Permit) issued by DTSC in November 2005 and effective through November 2015 by adding two existing treatment units for OB and OD. Approval of this activity would also terminate Edwards' current authorization to operate OB/OD treatment units at other locations.

DTSC is required to make a determination on Edwards' Permit Modification application pursuant to the provision of the California Health and Safety Code (HSC) Division 20, Chapter 6.5, Article 9. This action is considered a discretionary action that requires DTSC to conduct an environmental analysis of potential impacts associated with approval of the Permit Modification application pursuant to the provisions of the Public Resources Code (PRC) Division 13, Section 21100 *et seq*., the California Environmental Quality Act (CEQA) (PRC Division 13, Section 21000 *et seq*.), and associated State CEQA Guidelines (California Code of Regulations (CCR) Title 14, Section 15000 *et seq*.). When a project could have a significant impact on the environment, the agency with principal responsibility of carrying out or approving the project (the Lead Agency) is required to prepare an Environmental Impact Report (EIR). DTSC is the designated Lead Agency under CEQA to prepare the EIR.

The United States Air Force (Air Force) at Edwards is the federal agency requesting the permit modification and is responsible for implementing and carrying out the project requirements. Under the National Environmental Policy Act (NEPA) of 1969, as amended (Code of Federal Regulations (CFR) Title 40, Parts 1500-1508), the Council on Environmental Quality (CEQ) Regulations Implementing the Procedural Provisions of NEPA, and the Air Force *Environmental Impact Analysis Process* (CFR Title 32, Part 989), the Air Force is required to prepare a NEPA document for projects it funds or implements.

In a project such as this one, where both state and federal agencies have responsibilities, both CEQA and NEPA encourage the Lead Agency to prepare a combined CEQA/NEPA document to avoid the need for the federal agency to prepare a separate document for the same project (CCR, Title 14, Section 15222 and CFR Title 32, Part 1506.2). An EIR may be prepared for a project under

CEQA, while an EA may be prepared under NEPA, due to differences in legal standards for significant effect under the state and federal environmental laws. The Lead Agency is required to consult with the federal agency in the preparation of the joint document; the document must include all the sections required in both NEPA and CEQA; and the document must be approved by both agencies.

This environmental document will be used by the state DTSC as part of the process for making a decision on issuing the Permit Modification, and by Edwards in making a decision to carry out the treatment activity according to the requirements of the Permit.

The primary purposes of this DEIR/DEA are to:

- Present a detailed description of the proposed project at the Edwards facility.
- Identify and evaluate potential environmental consequences of the proposed project, including direct, indirect, short-term, long term, cumulative, and unavoidable impacts.
- Indicate the manner in which those environmental consequences can be mitigated or avoided.
- Identify and analyze alternatives that may avoid or substantially lessen potentially significant environmental impacts associated with the proposed project.
- Identify any impacts that, even with implementation of mitigation measures, would be unavoidable and adverse.
- Provide documentation that supports these determinations.

The CEQA Guidelines provide the standard on which DTSC will base the adequacy of the DEIR. Specifically, the Guidelines state:

> "An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness and a good faith effort at full disclosure (CCR Title 14, Section 15151)."

This DEIR/DEA is being circulated to potentially affected agencies and the public for review and comment.

This Executive Summary has been prepared in accordance with CEQA and NEPA and the implementing regulations. The CEQA Guidelines state that an EIR should contain a brief summary of the proposed actions and its consequences, and should identify:

- Each significant effect with proposed mitigation measures and alternatives that would reduce or avoid that effect;
- Areas of controversy known to the Lead Agency including issues raised by the agencies and the public; and
- Issues to be resolved including the choice among alternatives and how to mitigate the significant effects.

The CEQ Regulations require that an EA should include brief discussions of:

- The need for the proposal;
- Alternative courses of action for any proposal which involves unresolved conflicts concerning alternative uses of available resources;
- The environmental impacts of the proposed action and alternatives; and
- A listing of agencies and persons consulted.

## ES-2 OVERVIEW

### ES-2.1 Project Location

Edwards is located in the Antelope Valley region of the western Mojave Desert in Southern California approximately sixty (60) miles northeast of Los Angeles, California. The base covers an area of 307,516 acres or 470 square miles. The facility lies within three counties: the southeastern portion of Kern, northeastern portion of Los Angeles, and western portion of San Bernardino. See regional map, Figure ES-1, Edwards Location Map.

The OB/OD Units are located in a remote area of the PIRA in Kern County. The PIRA is a 91,000 acre test site for aircraft systems, equipment, and ground activities. The map coordinates for the units are: Township 9 North, Range 9 West, Section 35 (San Bernardino Meridian), at Latitude 34$^{o}$ 49' 47", Longitude 117$^{o}$ 48' 05". The nearest base boundary is 1.7 miles to the southeast. The

Global Positioning System (GPS) coordinates of the center point of the EOD Range are Latitude 34$^{o}$ 49.728' N, Longitude 117$^{o}$ 48.063' W. See project location map, Figure ES-2, Edwards Map and Location of OB/OD Units.

## ES-2.2 Project Description

Edwards has applied for a Class 3 Permit Modification that would allow Edwards to continue to treat reactive hazardous waste by OB/OD, to consolidate these treatment activities to the existing OB/OD units at the EOD Range in the PIRA, and to expand operations beyond those currently authorized. The reactive hazardous wastes, also referred to as energetics, contain a substance or mixture of substances capable by chemical reaction of producing gas at high temperature and pressure so as to cause damage to the surroundings. The term energetic includes all solid and liquid materials variously known as:

- high and low explosives;
- propellants together with igniter, primer, and initiating charges; and
- pyrotechnics (e.g., illuminant, smoke, delay, decoy, flare, and incendiary compositions).

The energetics are generated onsite from research, development, test, and evaluation (RDT&E) activities; contained in energetic-contaminated wastes (ECW) from the research laboratories; or contained in military munitions items that are reclassified as obsolete while in storage.

The OB/OD Units are operated and maintained by personnel from the EOD unit at Edwards. The OB/OD Units consist of an OB area and an OD area. Treatment is by burning reactive hazardous waste on the ground surface using a remote electronic ignition device or detonating on the ground surface using bulk explosive as a donor charge. Issuance of this Permit Modification would impose the requirements of the CCR Title 22, Division 4.5, Chapter 14 upon OB/OD operations conducted by Edwards. A detailed description of the activities that would be authorized by the proposed Permit Modification is contained in Section 2.3 - Project Characteristics. The Permit expires in November 2015. A Closure Plan for both Units is included as part of the Permit Modification application.

## ES-2.3 Need for the Proposed Project

Edwards was granted Interim Status Authorization by DTSC to operate its existing OB/OD units pursuant to HSC Section 25200.5. The treatment units are currently operating under the June 1981 Interim Status Authorization and the January 19, 1993 Stipulation and Order. The authorization allows for operation of the OB/OD units only until DTSC makes a hazardous waste facility permit determination. Edwards has applied for a modification to the existing Permit to

continue to treat reactive hazardous waste by OB/OD, to consolidate these treatment activities to the existing OB/OD units at the EOD Range in the PIRA, and to expand operations beyond those in the Interim Status Authorization.

Edwards is one of the Air Force's principal sites for aircraft flight test and training and propellant research. The capability to treat reactive hazardous waste generated by Edwards' RDT&E activities onsite is critical to the RDT&E mission, since the unstable nature of the hazardous waste makes transport to other installations unsafe. The reactive wastes from the laboratories are research and development materials that have not been fully classified with respect to explosive safety. The reactive components of these waste items are experimental in nature which means that the composition and explosive stability of the waste may be poorly defined. In order to transport a laboratory waste item off-site, the waste item must be assigned a shipping classification. Because each waste item is unique, a new classification is needed for virtually every item generated. Military munitions items have been altered or damaged through test and evaluation activities. Department of Transportation (DOT), Department of Defense (DoD), and Air Force regulations prohibit the transport of most of Edwards' reactive wastes on public roads or railways because of the unique dangers associated with the reactive wastes produced during RDT&E operations.

The unstable nature of both the laboratory wastes and the RDT&E military munitions waste, prolonged storage of these wastes, and absence of assignments of shipping classifications and packaging procedures presents a safety concern. Without onsite treatment capability, compliance with the 90-day limit for storage of these wastes under the Resource Conservation and Recovery Act (RCRA) will be difficult to maintain. DoD continues to explore alternative technologies to OB/OD for the treatment of waste energetic and munitions items. Safe, environmentally sound technologies will be implemented for the treatment of these wastes, when and if they become available.

## ES-2.4 Project Objectives

Pursuant to CCR Title 14, Section 15124, an EIR is required to provide a statement of the objectives sought for the proposed project. The objectives of the proposed project are:

- To allow Edwards to continue its mission to conduct weapons RDT&E for the Air Force at current or increased levels.
- To render reactive hazardous wastes generated at the facility by RDT&E work non-hazardous.
- To treat reactive hazardous waste in an environmentally protective manner using standard operating practices that are protective of the safety of employees handling the waste and consistent with 1)

current provisions of the HSC Division 20, Chapter 6.5, and CCR Title 22, Chapter 14 for management of hazardous waste, 2) HSC Section 39000 *et seq*., for compliance with the California Clean Air Act (CCAA), and 3) CCR Title 29 for occupational health and safety.

- To avoid or limit potential offsite environmental impacts from the generation, transport, storage, treatment and/or disposal of reactive hazardous wastes, consistent with the provisions of CCR Title 22, Section 66264.31.

- To treat reactive hazardous waste efficiently and economically by a method or process that would eliminate or reduce the need for further handling, remediation, or consideration in the future.

- To close the treatment units in a manner that will ensure future protection of human health and the environment and will be consistent with the closure performance standards specified in CCR Title 22, Section 66264.111.

## ES-2.5 Environmental Resource Areas Examined

The State CEQA Guidelines (CCR Title 14, Sections 15126.2 and 15128) require an EIR to:

> "identify and focus on the significant environmental effects of the proposed project" and "to provide a statement briefly indicating the reasons various possible significant effects were determined not to be significant and were, therefore, not discussed in detail in the EIR".

The CEQ Regulations (CFR Title 40, Part 1508.9) state that the EA is meant to be:

> "a concise public document for which a Federal agency is responsible that serves to:
>
> 1. Briefly provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.
>
> 2. Aid an agency's compliance with the Act when no environmental impact statement is necessary.
>
> 3. Facilitate preparation of a statement when one is necessary."

Based on the Notice of Preparation (NOP), public scoping, and a preliminary review of the Permit Modification application, it was determined that the proposed

project may have the potential to significantly affect certain environmental resource areas. This DEIR/DEA will examine in detail the following potentially affected environmental resource areas:

- Air Quality
- Biological Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology and Water Quality
- Noise/Vibration

DTSC and Edwards determined that other environmental resource areas would not be significantly affected by the project and consequently will not be examined in detail in this DEIR/DEA. These environmental resource areas determined to be unaffected are:

- Aesthetics
- Agricultural Resources
- Cultural Resources
- Land Use and Planning
- Mineral Resources
- Population and Housing
- Public Services
- Recreation
- Transportation and Traffic
- Utilities and Service Systems

## ES-3 POTENTIALLY SIGNIFICANT ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Anticipated environmental impacts of the proposed project are evaluated in Section 4.0 for those potentially affected environmental resource areas that were identified during preliminary review of the Permit Modification application as having the potential to result in significant impacts to the environment. Feasible protective measures that could minimize significant adverse impacts are identified. In most cases, these protective measures are already in place and are described as part of the project. The significant environmental impacts, protective and mitigation measures and residual impacts for each environmental resource area are shown in Table ES-1, Environmental Impacts Summary.

Analyses contained in the DEIR/DEA show that, while the project has the potential to significantly affect these resources, impacts were found to be less-than-significant or imposition of protective measures would reduce impacts to less-than-significant levels. These analyses depend on results found in the Human Health Risk Assessment (HRA), Predictive Ecological Risk Assessment

(ERA), Validation Study of the ERA, annual Soil and Plant Sampling Reports, quarterly Groundwater Monitoring Reports, and Noise Analysis Report that were completed to support the proposed project.

## ES-4 ALTERNATIVES TO THE PROPOSED PROJECT

The State CEQA Guidelines (CCR Title 14, Section 15126.6) require an EIR to:

> "describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives."

The Air Force Environmental Impact Analysis Process (CFR Title 32, Part 989) requires an EA to:

> "analyze reasonable alternatives to the proposed action and the 'no action' alternative in all EAs and EISs (*Environmental Impact Statements*), as fully as the proposed action alternative.
>
> 'Reasonable' alternatives are those that meet the underlying purpose and need for the proposed action and that would cause a reasonable person to inquire further before choosing a particular course of action. Reasonable alternatives are not limited to those directly within the power of the Air Force to implement. They may involve another government agency or military service to assist in the project or even to become the lead agency. The Air Force must also consider reasonable alternatives raised during the scoping process (see Part 989.18) or suggested by others, as well as combinations of alternatives."

The following project alternatives were considered:

- Alternative 1 No Project
- Alternative 2 Disposal or Treatment Offsite
- Alternative 3 Treatment by Alternative Technologies Onsite
- Alternative 4 Approval of Permit Modification with Special Conditions
- Alternative 5 Approval of Permit Modification as Requested

<u>Alternative 1 - No Project /No Action</u>

Under this alternative, DTSC would deny the application for a Permit Modification. Edwards would lose authorization for the OB/OD units and would discontinue treatment of reactive hazardous waste by OB/OD. If Edwards continued to generate reactive hazardous wastes, the facility would be required to analyze the hazardous waste to determine if it could be transported to an

offsite treatment facility. Reactive hazardous waste that could not be transported would be treated at Edwards under an emergency permit.

Alternative 2 – Disposal or Treatment Offsite

Under this alternative Edwards would identify an offsite facility, either DoD or commercially managed, in California or out of state, to treat and/or dispose of the hazardous waste. Treatment would be by OB/OD or other means. Edwards would be required to determine or obtain a shipping classification for all the hazardous waste transported. The waste would be transported on public road to final disposal or treatment facilities.

Alternative 3 – Treatment by Alternative Technologies Onsite

Under this alternative Edwards would identify and install a hazardous waste unit for treatment of reactive hazardous waste by means other than OB/OD. Edwards would be required to apply for a permit modification to the existing Permit to implement the technology.

Evaluation of Alternative 3 also satisfies the requirements of HSC Section 41801, which prohibits open outdoor fires for the purpose of disposal or burning of solid waste unless the fire is necessary for the prevention of a fire hazard which cannot be abated by any other means.

Alternative 4 – Approval of Permit Modification with Special Conditions

Under this alternative DTSC would issue the Permit Modification, with special Permit conditions designed to alleviate the potential environmental impacts of the proposed project, either in addition to or in lieu of the procedures in the operating plan submitted by Edwards.

Alternative 5 - Approval of Permit Modification as Requested

Under this alternative, DTSC would issue the Permit Modification for the amounts and under the conditions requested in the operating plan submitted by Edwards with their application.

An evaluation of the project alternatives, including their ability to meet the objectives of the proposed project, and their ability to avoid or minimize significant environmental impacts, is provided in Section 7.0 - Project Alternative Analysis. **The Draft EIR/EA concluded that Alternative 4, Approval of Permit Modification with Special Conditions, is the environmentally superior alternative and that it meets the objectives of the proposed project.**

## ES-5 AREAS OF CONTROVERSY/CONCERN

There are no areas of controversy regarding this project. During the scoping process, the following concerns were identified by public agencies and the public:

- The DEIR should address all environmental resource areas, without relying on information available at the time of the scoping process as it may not be current or sufficient.

- Consider impacts on agriculture, in particular:
  - alfalfa fields;
  - livestock;
  - pork; and
  - milk.

- Consider impacts on housing.

- Consider impacts on Eastside Elementary School.

- Consider impacts on biological resources, in particular:
  - desert tortoise;
  - Mojave ground squirrel;
  - kangaroo rat;
  - migratory birds (flyway);
  - buzzards or vultures; and
  - burrowing owls.

- Consider impacts on health risks, in particular:
  - risks to children; and
  - risk/hazard to people with lung conditions, such as cystic fibrosis and asthma.

- Consider impacts on water quality, in particular:
  - impacts on drinking water wells;
  - cumulative impact on project to use treated sewage sludge as fertilizer;
  - impact on uncapped wells;
  - impacts on the water sources used by independent water companies and small water districts (Averydale Mutual Water Company).

- Consider impacts from flooding.

- Consider impacts on property values.

## ES-6 ISSUES TO BE RESOLVED

There are no remaining outstanding issues to be resolved with regard to the environmental analyses contained in the Draft EIR/EA.

## Table ES-1 Environmental Impacts Summary

| Environmental Resource Areas | Significant Impact | Protective/Mitigation Measure | Residual Impact |
|---|---|---|---|
| **Air Quality** | The project causes emissions of criteria pollutants, and toxic air contaminants. | The following Air Quality Protective Measures (AQPM's) are included in the Burn Plan approved by EKAPCD, the Permit Modification application, and/or the draft Permit Modification:<br>• Operations are limited to periods of specific meteorological conditions, such that emissions from the operations will not result in exceeding CAAQS or NAAQS, and will not create a public nuisance;<br>• Events will not be conducted on "no burn" days confirmed by EKCAPCD;<br>• The types, annual amounts, and single event amounts of hazardous waste, plus the donor charge to initiate the event, shall be limited such that a projected lifetime cancer risk of less than $1x10^{-6}$ and chronic and acute HI of 1.0 shall not be exceeded;<br>• Hazardous waste to be treated must be in a condition that will facilitate combustion and minimize smoke emitted during treatment; and<br>• The facility will investigate and periodically report on methods to directly measure OB/OD emissions. | The project will contribute toward background concentrations of criteria pollutants and toxic air contaminants. Impacts are considered to be less than significant with the implementation of AQPMs that are included in the Burn Plan approved by EKAPCD and 15 tons or less of PM10 emissions produced annually. |
| | The project may produce odors from operation of vehicles and dust. | None | The odors will be short-lived and imperceptible at the facility boundary. Therefore, impacts will be less than significant. |

| Environmental Resource Areas | Significant Impact | Protective/Mitigation Measure | Residual Impact |
|---|---|---|---|
| **Biological Resources** | The project site is within the known range of the desert tortoise, a threatened species, and within a habitat type which typically supports the species. | The following Biological Resource Protective Measures (BRPMs) are included in the draft Permit Modification, are provisions of the BO directly applicable to operations on the PIRA, and/or are standard operating practices for range activities at Edwards.<br>• The facility will periodically monitor soil to detect buildup of contaminants. The monitoring plan and reports must be approved by DTSC. The environmental monitoring plan must include actions to be taken in the event that monitoring results demonstrate an increase of contamination or risk to any media.<br>• Under the provisions of the BO issued by USFWS an annual report will be submitted of all projects covered by the provisions of the BO; Surveys must be conducted for all projects in desert tortoise habitat. Results of survey efforts and effectiveness of take or avoidance measures for all projects are provided to the USFWS in the annual report;<br>• Personnel working in or near desert tortoise habitat must be briefed regarding tortoise awareness, impact avoidance, and operational procedures to avoid harming desert tortoise and to minimize loss of their habitat, such as clearly marking project area boundaries, relocating animals at-risk found within project boundaries, and minimizing predation risks; and,<br>• No new disturbance or surface disturbing activities will be implemented outside the established project boundary.<br>• Metal flashing (24 inches in height) has been erected at the bottom of the chain-link fencing around the OB/OD Units and on the gates to keep Desert Tortoises out of the fenced area. | BRPMs have been put in place to protect the Desert Tortoise. Therefore, impacts from project activities will be less than significant. |
| | The project site is within the known range of the Mohave ground squirrel, a State-listed threatened species. | The following Biological Resource Protective Measures (BRPMs) are included in the draft Permit Modification, and/or are standard operating practices for range activities at Edwards. | BRPMs have been put in place to protect the Mojave Ground Squirrel. Therefore, impacts from project activities will be less than significant. |

| | | | |
|---|---|---|---|
| | | • The facility will periodically monitor soil to detect buildup of contaminants. The monitoring plan and reports must be approved by DTSC. The environmental monitoring plan must include actions to be taken in the event that monitoring results demonstrate an increase of contamination or risk to any media.<br>• Metal flashing (24 inches in height) has been erected at the bottom of the chain-link fencing around the OB/OD Units and on the gates to keep Mohave ground squirrels out of the fenced area.<br>• A survey of the OB/OD units will be conducted by an authorized Biologist prior to OB/OD operations.<br>• No new disturbance or surface disturbing activities will be implemented outside the established project boundary. | |
| **Geology and Soils** | Disruption and displacement of soil. Detonations also cause the soil to powder. These conditions increase the potential for wind erosion. Soil erosion may occur during flash floods. | None | Continuation of ground-disturbing activity will have a negligible effect on the rate of soil erosion. Therefore, impacts will be less than significant. |
| **Greenhouse Gas (GHG)** | The project causes minor emissions of GHG. | None | GHG emissions from the project are below the EKAPCD threshold. Therefore, impacts will be less than significant. |
| **Hazards and Hazardous Materials** | The project increases risk to facility personnel. | The facility follows mandated safety protocols for the handling, storage, transportation, and treatment of munitions/explosives. For example:<br>• Transportation is only on designated hazardous waste hauling routes;<br>• The units are operated only during daylight;<br>• Most of the propellant and munitions are in solid form.<br>• There are little or no liquids which may be spilled or dispersed;<br>• The number of workers at the site is limited to minimize potential collision and material handling | Risk to the public, facility personnel, and the environment will be below acceptable levels. Therefore, impacts will be less than significant. |

| | | | |
|---|---|---|---|
| | | hazards;<br>• Personnel participating in an event are trained in basic hazardous waste management and safety, destruction of explosives, transportation of explosives, firing systems, handling of munitions residue, permit requirements and environmental impacts;<br>• The event is initiated with blasting caps, safety and time fuses, detonation cord, igniters and squibs. Electrical charges are not used in order to prevent accidental ignition from static electricity; and Personnel retreat approximately one mile prior to detonation. | |
| | The project causes emissions of toxic air contaminants. | The following Hazardous Materials Protective Measures (HMPMs) are included in the Burn Plan approved by EKAPCD, the Permit Modification application, and/or the draft Permit Modification:<br>• Operations are limited to periods of specific meteorological conditions, which will not allow air quality standards or risk and hazard thresholds to be exceeded;<br>• The types, annual amounts, and single event amounts of hazardous waste, plus the donor charge to initiate the event, shall be limited such that a projected lifetime cancer risk of less than $1x10^{-6}$ and chronic and acute HI of 1.0 shall not be exceeded;<br>• Prior to each event, the quantity and family of the hazardous waste will be entered into a database. If an event is scheduled that will exceed the annual quantity limits, or the event limits, the type and/or quantity of munitions/explosives must be adjusted, or the event must be cancelled; DTSC will inspect the database periodically to verify data input and compliance with limitations; and<br>• The facility will periodically monitor soil to detect build-up of contaminants. | The project will contribute toward background concentrations for criteria pollutants and toxic air contaminants. However, HMPMs have been put in place to minimize impacts. Therefore, impacts will be less than significant. |
| **Hydrology and Water Quality** | The project emits air toxics that could contaminate soils and percolate into the groundwater. | Monitoring wells have been installed around the OB/OD Units. Monitoring results to date have not identified contaminates from operations. The draft Permit Modification includes requirements for continued monitoring and reporting, and requires a mitigation plan if indications of contamination | No impacts to surface or groundwater have occurred and groundwater will continue to be monitored. Therefore, impacts will be less than significant. |

| | | | |
|---|---|---|---|
| | | are identified. | |
| **Noise/Vibration** | The project temporarily increases noise levels and causes vibration in the immediate vicinity of the project area. | Edwards has completed a noise assessment (discussed in Section 4.9.4.1), which included a discussion of meteorological conditions that could cause short term noise events to exceed128 dB off-site. However, the Burn Plan approved by EKAPCD, the Permit Modification application, and/or the draft Permit Modification include restrictions for metrological conditions, and time of day that would limit OD events such that the 128 dB offsite noise criteria, and a CNEL of 60 dB would not be exceeded offsite. | Due to the remoteness of the proposed project area and terms and conditions included in the draft Permit Modification, noise and vibration impacts of the proposed project will only be to facility personnel and property in the vicinity. Therefore, impacts will be less than significant. |

**Figure ES-1 Edwards Location Map**

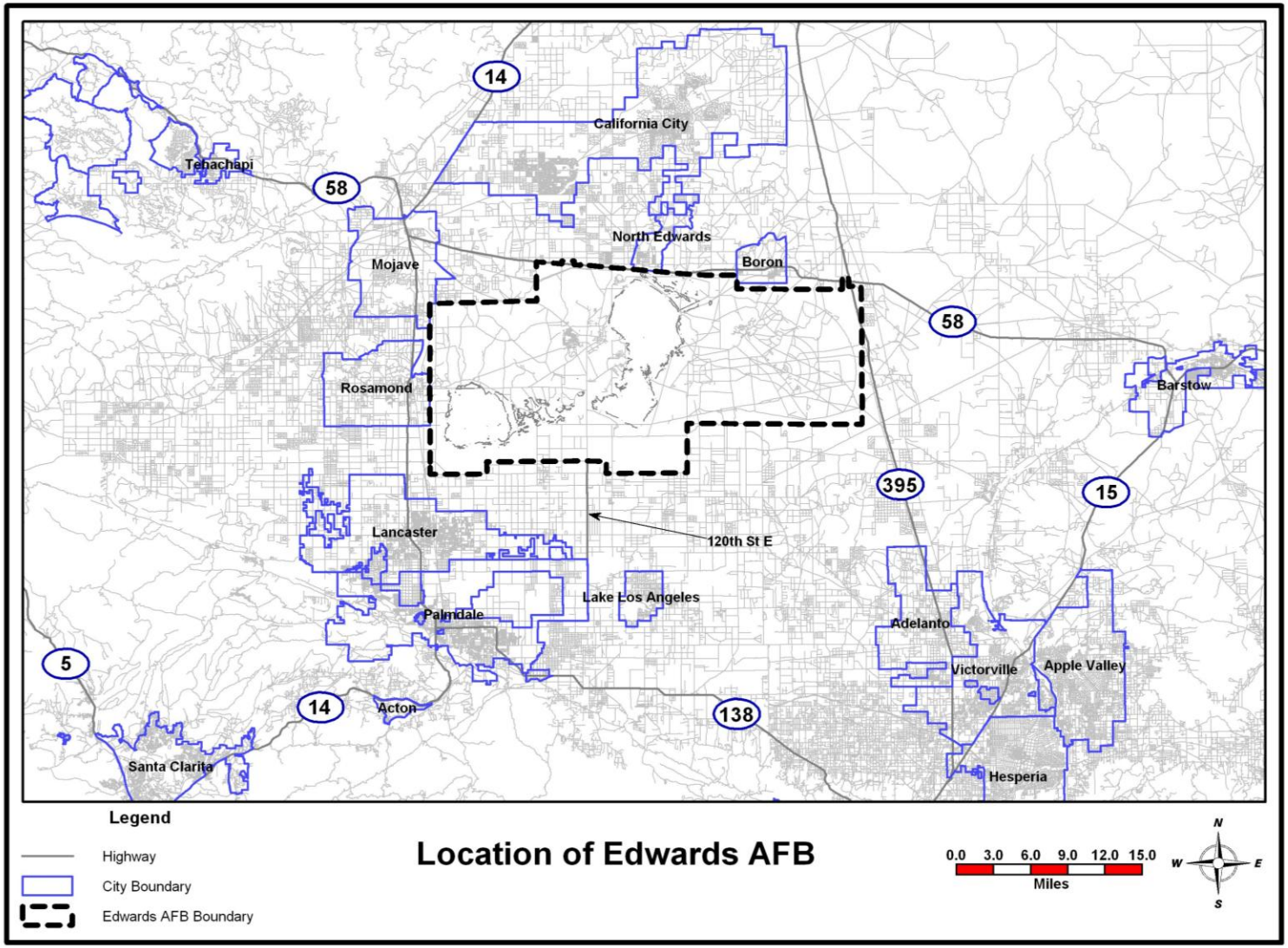
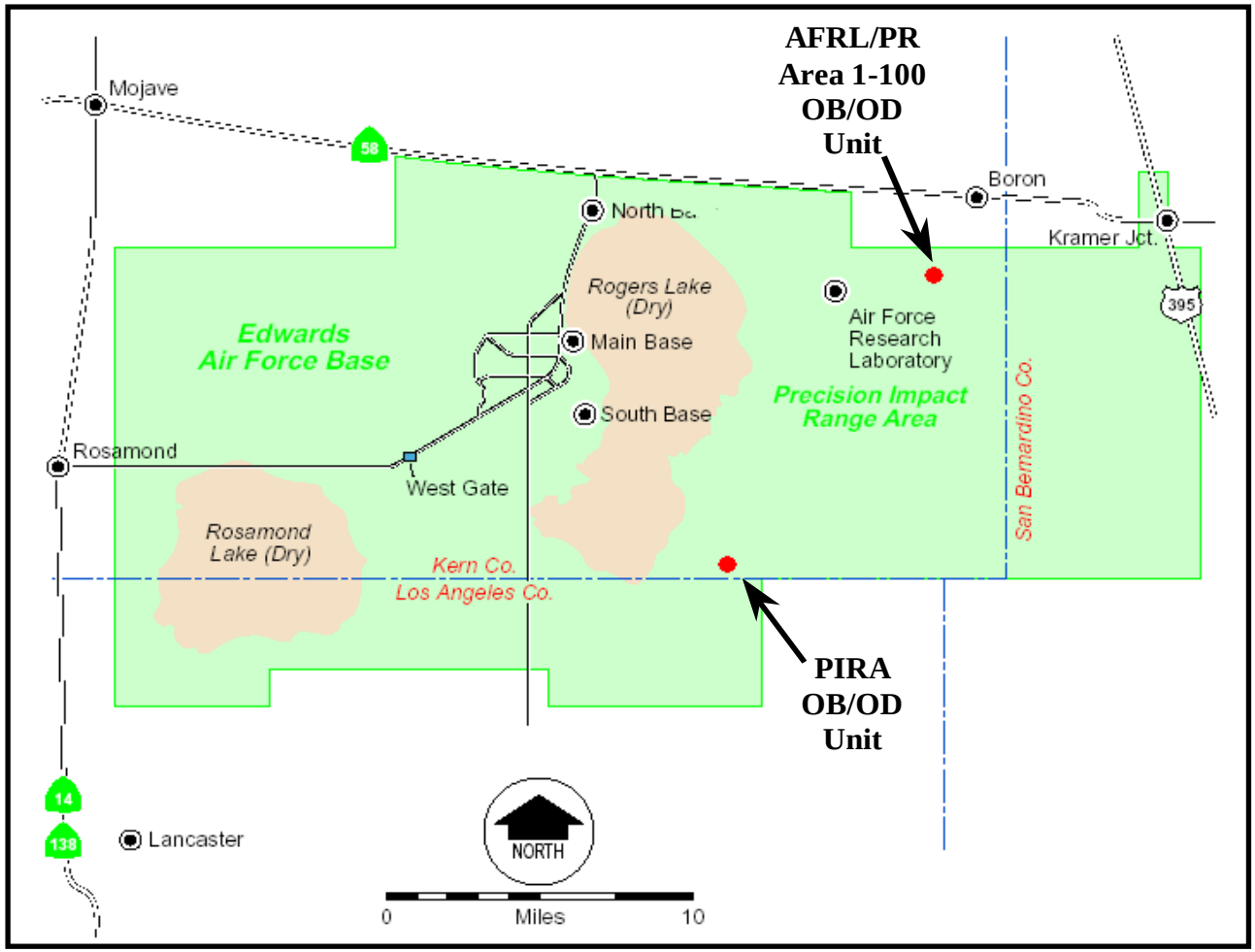


**Figure ES-2 Edwards Map and Location of OB/OD Units**



# *SECTION 1.0 – INTRODUCTION*

## 1.1 PURPOSE OF THE DRAFT EIR/EA

This Draft EIR/EA provides an analysis of the environmental impacts associated with the issuance of a Class 3 Permit Modification by DTSC. The Permit Modification would allow Edwards to continue to treat reactive hazardous waste by OB/OD, to consolidate these treatment activities at the EOD Range in the PIRA, and to expand operations beyond those currently authorized. The reactive hazardous wastes, also referred to as energetic, contain a substance or mixture of substances capable by chemical reaction of producing gases at high temperatures and pressure so as to cause damage to the surroundings. The term energetic includes all solid and liquid materials variously known as:

- High and low explosives;
- Propellants together with igniter, primer, and initiating charges; and
- Pyrotechnics (e.g., illuminant, smoke, delay, decoy, flare, and incendiary compositions).

The energetics are generated onsite during RDT&E activities; contained in ECW from research laboratories; or contained in military munitions items that are reclassified as obsolete while in storage.

Approval of this activity would modify Edwards' existing Permit issued by DTSC in November 2005 and effective through November 2015. Issuance of this Class 3 Permit Modification would impose the requirements of CCR Title 22, Division 4.5, Chapter 14, upon OB/OD operations conducted by Edwards. The Permit determination would also terminate the current authorization.

Edwards is the applicant and responsible for implementing the project. Edwards is required to prepare an environmental analysis under NEPA, as amended, (42 USC Section 4321 *et seq*.), the *Council on Environmental Quality Regulations Implementing the Procedural Provisions of NEPA* (CFR Title 40, Parts 1500 - 1508), and *Department of the Air Force Environmental Impact Analysis Process* (CFR Title 32, Part 989).

DTSC is required to make a determination on Edwards' Permit Modification under the provisions of HSC Division 20, Chapter 6.5, Article 9. This action is considered a discretionary action that requires DTSC to conduct an environmental analysis of potential impacts associated with approval of the Permit Modification pursuant to the provisions of CEQA (PRC Division 13, Section 21000 *et seq*.) and associated state CEQA guidelines (CCR Title 14, Section 15000, *et seq*.). When a project could have a significant impact on the

environment, the agency with principal responsibility for carrying out or approving the project (the Lead Agency) is required to prepare an EIR.

In a project such as this one, where both state and federal agencies have responsibilities, both CEQA and NEPA encourage the Lead Agency to prepare a combined CEQA/NEPA document to avoid the need for the federal agency to prepare a separate document for the same project (CCR, Title 14, Section 15222 and CFR Title 32, Part 1506.2). An EIR may be prepared for a project under CEQA, while an EA may be prepared under NEPA, due to differences in legal standards for significant effect under the state and federal environmental laws. The Lead Agency is required to consult with the federal agency in the preparation of the joint document; the document must include all the sections required in both NEPA and CEQA; and the document must be approved by both agencies.

This environmental document will be used by the DTSC as part of the process for making a decision on issuing the Permit Modification, and by Edwards in making a decision to carry out the treatment activity according to the requirements of the Permit.

The primary purposes of this DEIR/DEA are to:

- Present a detailed description of the proposed project at the Edwards facility.
- Identify and evaluate potential environmental consequences of the proposed project.
- Indicate the manner in which those environmental consequences can be mitigated or avoided.
- Identify and analyze alternatives that may avoid or substantially lessen potentially significant environmental impacts associated with the proposed project.
- Identify any impacts that, even with implementation of mitigation measures, would be unavoidable and adverse.
- Provide documentation that supports these determinations.

The CEQA Guidelines provide the standard on which the adequacy of an EIR must be based. Specifically, the guidelines state:

> “An EIR should be prepared with a sufficient degree of analysis to provide decision makers with information which enables them to make a decision which intelligently takes account of environmental consequences. An evaluation of the environmental effects of a proposed project need not be

> exhaustive, but the sufficiency of an EIR is to be reviewed in the light of what is reasonably feasible. Disagreement among experts does not make an EIR inadequate, but the EIR should summarize the main points of disagreement among the experts. The courts have looked not for perfection but for adequacy, completeness and a good faith effort at full disclosure" (CCR Title 14, Section 15151).

This DEIR/DEA is being circulated to potentially affected agencies and the public for review and comment.

## 1.2 SCOPE OF THE DRAFT EIR/EA

### 1.2.1 Environmental Resource Areas Examined

The State CEQA Guidelines (CCR Title 14, Sections 15126.2 and 15128) require an EIR to:

> "identify and focus on the significant environmental effects of the proposed project" and "to provide a statement briefly indicating the reasons various possible significant effects were determined not to be significant and were, therefore, not discussed in detail in the EIR".

DTSC and Edwards reviewed Edwards' Permit Modification application and determined that several environmental resource areas could potentially be impacted by the proposed project if it were approved. Consequently, DTSC made the decision to prepare an EIR, and Edwards made a decision to prepare an EA. This combined document further evaluates whether these potential impacts would be significant.

DTSC gave notice that it would be preparing an EIR in a Notice of Preparation (NOP) that was used to solicit input from affected agencies and the public regarding the scope of the analysis that should be addressed in the EIR. This NOP identified those environmental resource areas that would be further evaluated. Based on the NOP, public scoping, and a preliminary review of the Permit Modification application, DTSC determined that the proposed project has the potential to significantly affect certain environmental resource areas which, consequently, would be examined in detail in this DEIR/DEA. These environmental resource areas and their corresponding section number in this report are:

- 4.3 Air Quality
- 4.4 Biological Resources
- 4.5 Geology and Soils
- 4.6 Greenhouse Gas Emissions
- 4.7 Hazards and Hazardous Materials
- 4.8 Hydrology and Water Quality

- 4.9 Noise/Vibration

### 1.2.2 Environmental Resource Areas Not Examined

The environmental resource areas that were determined not to be potentially impacted and the reasons why they would not be further examined in this document are described in the following paragraphs.

Aesthetics – The project does not have the potential to have a significant impact on aesthetics. There are no designated scenic areas or highways that have a view of the project site. State Highway 58, approximately twelve (12) miles to the north of the site, has been declared eligible for scenic highway designation; however, it has not been officially designated. The treatment by OB will produce a visible plume. Treatment by OD will produce a dust cloud and deposit small pieces of scrap metal in the immediate project area. The project will occur on a secure test range on base within a small, previously graded site in a remote area of open desert. The site is surrounded by chain-link fencing. Equipment is low profile. The terrain at Edwards' is a gently sloping, vast plain with very little topographic relief. The arid climate does not support much vegetation, although several Joshua trees grow outside the fencing. The site landform and vegetation are typical of and visually similar to the western Mojave Desert and do not have the qualities of a scenic vista. The existing visual character of the site and its surroundings would not be changed. The site facilities are not visible from Lancaster Boulevard, Rosamond Boulevard or other major public roads on or adjacent to the base, or from other areas accessible to the public. No lighting, or other source of light or glare that would affect day or nighttime views, is planned for the site. Therefore, further analysis of impacts to aesthetics was not deemed necessary.

Agricultural Resources – The project does not have the potential to have a significant impact on agricultural resources because no agricultural activities occur on base and agricultural uses off base will not be impacted by the proposed OB/OD operations. There is no designated Prime Farmland, Unique Farmland or Farmland of Statewide Importance within ten (10) miles of the proposed project site. On base, the land is classified as Nonagricultural and Natural Vegetation based on the most recently available data (2010) for Kern County from the Department of Conservation Farmland Mapping and Monitoring Program (FMMP). The nearest off base land in Los Angeles County is most recently described as "Other" (2008). Land that is described as Nonagricultural and Natural Vegetation includes heavily wooded, rocky or barren areas, riparian and wetland areas, and grassland areas which do not qualify for grazing land due to the size or land management restrictions. "Other" land is not included in any other mapping category, such as vacant, non-agricultural, and natural vegetation land, or low density rural developments, brush, timber, wetland, and riparian areas not suitable for livestock grazing, confined livestock, poultry, or aquaculture facilities, strip mines, and borrow pits. Generally, the surrounding land is arid

and not used for agriculture. The closest agricultural areas are located to the southwest of the base and primarily consist of irrigated alfalfa fields, onion production, and grazing.

The OB/OD project does not involve activities that would impact agricultural land or require the conversion of farmland, nor does it conflict with Williamson Act contracts. The site is desert environment and does not include any forest or timberland. There is no evidence of past agricultural use within Edwards' boundaries near the site. Therefore, further analysis of impacts to agriculture was not deemed necessary.

Cultural Resources – The project does not have the potential to have a significant impact on cultural resources. In January 1994, Edwards performed a cultural resources survey of the proposed OB/OD Units as part of an environmental assessment and in support of section 106 of the Natural Historic Preservation Act (NHPA). These initiatives were completed prior to initial construction. The ensuing report, Phase I Historic Properties Inventory for the Proposed Explosive Ordnance Disposal (EOD) Range Relocation, Edwards AFB, Kern County, California, sought to identify all potential cultural resources within the project's area of potential effect (APE), and assess the potential impact of project activities upon those resources. Before the onset of the project, Edwards notified the Native American Heritage Commission (NAHC) and thirteen representatives from neighboring Native American tribes about the project; one tribal representative visited the site and received detailed information about the proposed undertaking. Native American tribes and organizations did not register any concerns as a result of that consultation.

The study assessed a circular APE around the proposed OB/OD Unit that measured 5,280 feet in diameter. This APE represented the potential impact area for flying fragments from the open detonation pit. The survey resulted in the identification of 23 cultural resources sites within the APE: 14 were prehistoric lithic scatters composed primarily of chert flakes; 4 were prehistoric temporary camps, some of which contained evidence of animal bones and possible fire; and 4 sites were refuse deposits containing historic-period artifacts, and metal and glass fragments. The survey also identified a World War II era bombing target (Site CA-KER-3848H) within the APE. Edwards reported the results of the Phase I study to the California State Historic Preservation Office (SHPO) and recommended that site CA-KER-3848H be considered "ineligible" for listing on the National Register of Historic Places. The SHPO commented on the conclusion but did not respond to Edwards' clarification. Thus, the project proceeded as planned in accordance with 36 CFR § 800.3(c)(4), which establishes a 30 day limit for a SHPO to respond.

Prior to construction of the OB/OD Units, Edwards completed an archaeological data recovery program that consisted of photography and precise mapping of the World War II era bombing target. The effort thoroughly documented the physical

remains of the site and it preserved all associated information for later research. Because the site was documented, and because it was one of many already afforded protections by the restrictive nature of the base, it was no longer necessary to preserve this particular site. Site CA-KER-3848H has subsequently been graded, and fencing and other equipment have been installed in and around its area.

The 1995 Phase I study concluded that impacts to identified resources could be avoided if ordnance retrieval was conducted on foot, and if archaeological monitors were present during grading activities associated with the construction of the OB/OD Unit and the access road. Furthermore, it was recommended that the Base Historical Preservation Officer (BHPO) should be consulted if off-road vehicle travel was required. Currently, OB/OD activities occur within an existing disturbed area and along well established roads, and the recommended mitigation requirements from 1995 have been implemented and are part of the ongoing operational procedures that govern usage of the OB/OD Unit.

In accordance with regulations implementing the NHPA in 2009, Edwards and the SHPO entered into the Programmatic Agreement (PA) Among the United States Air Force and the California State Historic Preservation Officer Regarding Implementation of the Air Force Flight Test Center Mission and the Integrated Cultural Resources Management Plan (ICRMP) at Edwards Air Force Base, California. The ICRMP and PA are merely planning documents that facilitate compliance with the NHPA, but together with associated Federal regulations and laws, these documents guide Edwards in its proactive compliance and planning measures. The ICRMP is reviewed and updated annually, with a major review and revision occurring every five years. The most recent ICRMP covers federal fiscal years 2009 through 2014, and was updated in October 2012. The ICRMP contains compliance policies and standard operating procedures that facilitate compliance with legal responsibilities related to the historic preservation of cultural resources within Edwards AFB. Management goals are provided, along with the Cultural Resources Five-Year Work Plan that outline the projects programmed for completion. The ICRMP also identifies various public consultation requirements and includes parties that shall be consulted.

The Edwards Installation Commander has designated a BHPO with the authority to implement and manage the provisions of laws and regulations that govern on-base historic preservation. The BHPO is responsible for the planning and management of 4,000+ prehistoric-, historic-, and military-period resources located on 310,000+ acres on Edwards. On the Installation Commander's behalf, the BHPO coordinates and consults with the SHPO, Advisory Council on Historic Preservation (ACHP), concurring parties, American Indian tribes, and other concerned agencies, organizations, and persons. The BHPO is a member of the Edwards AFB Tribal Government to Government Coordination Team, which provides officials of Federally-Recognized tribes with expert and timely responses to questions about environmental issues on Edwards AFB.

The Team also coordinates and facilitates compliance by Edwards AFB with Federal laws and treaties, and Department of Defense (DoD) and United States Air Force (USAF) policies that include, but are not limited to: the National Historic Preservation Act of 1966 (NHPA), as amended through 2006; the Native American Graves Protection and Repatriation Act; Air Force Instruction (AFI) 32.7065, Cultural Resources Management Program; HQ USAF/CVA Memorandum, Consultation with American Indian Tribal Governments and Alaska Native Organizations (10 November 1997); and DoD Instruction 4710.02, DoD Interactions with Federally Recognized Tribes. The BHPO is a government employee who meets the Secretary of the Interior's "Professional Qualifications Standards" (36 CFR 800.2), and the officer works as an advocate for the protection and preservation of vital cultural resources on Edwards AFB.

The Edwards BHPO derives direct authority from the NHPA (36 CFR § 800.1[a]) and is charged with identifying cultural resources that could potentially be affected by proposed Federal undertakings, assessing the effects of those projects, and seeking ways to avoid, minimize or mitigate any adverse effects upon those properties. As "Federal Agency Official" (36 CFR § 800.2[a]), the BHPO has approval authority for all undertakings on Edwards AFB and can commit the agency to take appropriate action for specific undertakings as a result of compliance with section 106 of the NHPA. More generally, and in accordance with section 1 of the NHPA, the BHPO provides leadership for preservation, contributes to and gives maximum encouragement for preservation, and fosters the conditions under which modern society and prehistoric- and historic-period resources can exist in productive harmony.

To meet current obligations under the California Environmental Quality Act (CEQA) DTSC requested the NAHC conduct a search of their Sacred Lands File for the APE in December 2012. The results were sent in a letter to DTSC on December 21, 2012 which did not indicate the presence of any Native American cultural sites within one-half mile radius of the APE.

The NAHC included a list of Native American Tribes/contacts in the region and recommended that DTSC coordinate with them to assess if the proposed project might impact unknown Native American cultural resources within the APE. On February 26, 2013, DTSC sent a letter to all 28 Tribes/contacts on the list. The letter gave a brief description of the proposed project along with a map of the location. It also provided contact information to allow the Native Americans to contact DTSC in case they had any information or concerns regarding cultural resources at or near the project location. Follow-up phone calls were made to all Native American Tribes/contacts and additional information was e-mailed to each Tribe/contact who requested it. The names on the list were also added to the distribution list for the public notice regarding the Draft EIR. The results from the NAHC Sacred File search along with the list of Tribes that were contacted are provided in Appendix A-4.

On 22 March 2013, Reymundo Chapa (BHPO, Edwards AFB) and Rich Bark (Cultural Resources Section Manager, JT3/CH2MHILL) revisited the originally proposed APE from the 1995 Phase I survey. A records search and subsequent pedestrian survey of the area confirmed that 1) the nature of the sites identified within the report had not changed, 2) there are no new cultural resources located within the APE beyond those already identified in the report, and 3) there is no evidence for the continued existence of the World War II era bombing target (Site CA-KER-3848H). Based on this investigation, the BHPO has determined that all Federal NHPA section 106 consultation requirements have been satisfied and the project is clear to continue in its present scope with no further section 106 consultation obligations.

In conclusion, the project area has been adequately surveyed and cultural resources have been documented. No human remains have been identified in or near the APE. Project activities will not impact any sacred, historic, or prehistoric sites or resources that have been previously surveyed and documented at Edwards. Edwards shall comply with all appropriate Federal laws and regulations (e.g., Native American Graves Protection and Repatriation Act (25 USC 3001), Archaeological Resources Protection Act (16 USC 470aa-470mm), etc.) that apply in discovery situations. The BHPO and DTSC shall be contacted if inadvertent discoveries are made at any time during the course of this project, or if activities are planned that fall outside the scope of this project. Therefore, further analysis of impacts to cultural resources was not deemed necessary.

Land Use and Planning – The project does not have the potential to have a significant impact on land use and planning. Project activities will not impact current land use. Air Force Instruction (AFI) 32-7062, *Air Force Comprehensive Planning*, establishes the requirement for a comprehensive planning program at all Air Force installations. Accordingly, each installation must have a Comprehensive Plan consisting of the general plan, component plans, special plans and studies, and maps that document a wide range of activity necessary for decision making. The Comprehensive Plan contains a descriptive account of the land use, facilities, utility and circulation systems, and environmental resources on base. The proposed project is located on the PIRA, designated in the *Edwards Air Force Base Comprehensive Plan* as a test range. The OB/OD Units are an allowed use on the PIRA. Edwards has also completed an *Integrated Natural Resources Management Plan (INRMP)*, describing natural resources; and, describing cultural resources; and the *Air Installation Compatible Use Zones (AICUZ) Plan* describing noise-related issues. The project is consistent with requirements of the Edwards INRMP and ICRMP. Requirements of the INRMP and ICRMP, and the environmental assessments prepared for each plan, are incorporated into projects and operations on the PIRA.

The *Edwards AFB General Plan* is a summary document that provides written guidance to commanders, engineers, and the installation community on all

matters affecting development on the installation. Any deviations must be approved through the Air Force Test Center (AFTC) Corporate Board process. Since the base has land use authority over its lands, it is able to control placement of its land uses in a manner that will not adversely affect the base mission.

Edwards is included in the *California Desert Conservation Area Plan* that designates Edwards as federally-managed land. Adjacent federal lands to the south, southeast, and east are generally designated for limited uses. A *Final EIR and Statement (S) for the West Mojave Plan, A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment* were released in January 2005. The EIR/EIS states that it is consistent with the Edwards INRMP.

The areas in private ownership adjacent to the southeast portion of the base closest to the OB/OD Units are under the jurisdiction of Los Angeles and San Bernardino counties. The area in Los Angeles County is covered under the *Antelope Valley Area-wide General Plan*. Land use designations for the area include one site of less than 0.5 acre designated industrial, three small sites designated for open space, and the rest of the area nonurban residential at a density of one dwelling unit per 2 acres. Zoning in the area is primarily agricultural and industrial with some residential. The San Bernardino County land use designation on lands south of the base is resource conservation that provides for minimum lot size of 1 acre. The land uses are compatible with the land uses on base.

The closest residence is located in Hi-Vista, seven (7) miles to the south of the OB/OD Units in Los Angeles County. There are other widely separated residences located in the rural Los Angeles County area to the south of the base farther from the OB/OD Units. One residential use is located on the Los Angeles/San Bernardino County line to the southeast of the base boundary. Surrounding existing land use is primarily open space with some scattered alfalfa fields. No land-uses that would interfere with or be adversely affected by the base mission are known to be in this area.

The project will not physically divide an established community; will not change current land use on the project site or the surrounding area; nor will it conflict with applicable land use, habitat conservation, or natural community conservation plans, or policy or regulation of the agency with jurisdiction over the project (Edwards). Therefore, further analysis of impacts to land use was not deemed necessary.

<u>Mineral Resources</u> – The project does not have the potential to have a significant impact on mineral resources because the project takes place on a military base, with no potential for mineral resource exploitation. The nearest commercial mining activities take place to the northeast of the base at the Boron Mine located sixteen (16) miles from the site. There are no known locally or regionally

important mineral resources on the site or the surrounding area. Therefore, further analysis of impacts to mineral resources was not deemed necessary.

Population and Housing – The project does not have the potential to have a significant impact on population or housing. This is an existing project with existing workforce. The proposed project will not create an increase in the number of employees currently stationed at Edwards. No extensions of roads or other infrastructure are planned. Consequently, the project will not induce substantial population growth in the area, nor cause the displacement of existing housing or people, or necessitate construction of new or replacement housing in the area affected by the project. The closest off-base housing is seven (7) miles away and the closest on-base housing is eight (8) miles from the site. Housing is not impacted by the project. Therefore, further analysis of impacts to population and housing was not deemed necessary.

Public Services – The project does not have the potential to have a significant impact on public services. Air Force personnel provide police, fire, and medical services associated with the operations of the OB/OD Units. Prior to the start of the setup for each event, the facility fire department is notified.

The project will not result in new or altered local government facilities, affect acceptable service ratios, response times or other performance objectives for local fire or police, or affect schools, parks or other public facilities. The closest school on-base is Desert High School located 10.2 miles to the northwest. The closest off-base school is Eastside Elementary School located 13.7 miles to the southwest. The closest park is Branch Memorial Park located on-base, 5.5 miles west of the project site. All services in support of the OB/OD operation are supplied by Edwards. Therefore, further additional analysis of impacts to public services was not deemed necessary.

Recreation – The project does not have the potential to have a significant impact on recreation. Since all operations will be performed by currently available personnel, there would not be an increase in the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated. The closest park is Branch Memorial Park, located on-base 5.5 miles west of the project site. The project does not include recreational facilities or require construction or expansion of recreational facilities which might have an adverse physical effect on the environment. Therefore, further analysis of impacts to recreation was not deemed necessary.

Transportation and Traffic – The project does not have the potential to have a significant impact on transportation and traffic. All transportation of munitions and propellants from the Munitions Storage Area (MSA) and AFRL to the OB/OD Units takes place within the confines of the base. Waste materials are transported on designated routes for hazardous waste materials only on the day

of the treatment event. These designated routes do not pass near base housing or Main Base areas, and are not adjacent to base boundaries. Vehicles that will be utilized for transportation of project materials are already on base. A maximum of two vehicles would be used for transport of materials.

Mercury Boulevard, Avenue B, and Lancaster Boulevard are the major access routes to the OB/OD Units. All intersections on base operate at Level of Service C or better. The roads are not subject to heavy traffic, except during the morning (6:00 a.m. to 8:00 a.m.) and evening (3:30 p.m. to 5:30 p.m.) rush-hour commutes by base employees. The MSA, AFRL, and EOD personnel would plan for transport of unserviceable munitions to the OB/OD Units only during off-peak hours (8:30 a.m. to 3:00 p.m.). Specific detailed requirements in Air Force and DoD regulations covering the transportation of HAZMAT are followed.

Because of the small number of trips generated from this project, impacts on traffic, circulation, intersections, level of service, and emergency access are insignificant. Because all transportation takes place on the installation there is no impact to off-base transportation routes, traffic hazards due to incompatible uses, alternative transportation, or parking. Therefore, further analysis of impacts to transportation and traffic was not deemed necessary.

Utilities and Service Systems – The project does not have the potential to have a significant impact on utilities or service systems. There are no above or underground utilities or service systems on the PIRA in the OB/OD area and none are required for the project. Treatment by OB/OD does not use gas, water, electricity, or generate wastewater. Consequently, the project will not exceed wastewater treatment requirements, result in the construction or expansion of water or wastewater treatment facilities, result in the construction or expansion of storm water drainage facilities, or require water supplies from existing or expanded entitlements or resources.

The project may generate ash that must be disposed of in either the base landfill or a hazardous waste landfill, depending on the results of ash testing. There is sufficient capacity in the landfills to accommodate the ash. The project complies with federal, state and local statutes and regulations related to solid waste. Therefore, further analysis of impacts to utilities and service systems was not deemed necessary.

### 1.2.3 Disposition of Other Considerations

Socio-economics - The State CEQA Guidelines do not require an EIR to examine economic impacts, such as impacts on property values. However, the project will not result in physical changes to the environment or impacts from operation of the OB/OD Units that would lead to direct or indirect economic or social effects. Since the proposed project would provide a method of local treatment of reactive hazardous waste, the project may potentially contribute to retention and

expansion of Edwards' mission, and attraction of new missions to the facility. This may beneficially affect local economic growth, providing employment and job stability.

## 1.3 ORGANIZATION OF THE EIR

The content and format of this DEIR/DEA are organized into the following sections to meet the requirements of CEQA and the state CEQA Guidelines. The organization and content of the document is compatible with NEPA requirements.

Executive Summary. This section provides a summary of the proposed project and alternatives, potential impacts and mitigation measures.

1.0 – Introduction. This section describes the purpose and scope of the DEIR/DEA, and outlines the organization of the DEIR/DEA.

2.0 – Description of Proposed Project and Alternatives. This section provides a description of existing and proposed operations as requested in the Permit Modification and the No Project/No Action Alternative as required in CEQA and NEPA.

3.0 – Regulatory Framework. This section provides a description of the regulations and regulatory agencies applicable to the proposed project.

4.0 – Environmental Impact Analysis. This section provides an examination of the potential impacts that the proposed project may have upon the baseline environmental conditions in the vicinity of the project as they existed at the time the NOP was published. This environmental setting constitutes the baseline physical conditions by which DTSC determines whether an impact is significant in this DEIR/DEA (CCR Title 14, Section 15125(a)).

5.0 – Cumulative Impact Analysis. This section provides an identification of other projects (both public and private) that, together with the proposed project, could cumulatively affect the environment of the region. Cumulative impacts could occur to the extent that impacts related to the proposed project could combine with impacts from other new or ongoing projects in the vicinity of the Edwards facility.

6.0 – Other CEQA/NEPA Required Sections and Considerations. This section provides a discussion of other categories of environmental impacts that must be evaluated in a Draft EIR/EA in addition to those addressed in Section 4.0 – Environmental Impact Analysis.

7.0 – Project Alternative Analysis. This section provides a discussion of a range of reasonable alternatives to the proposed project that would feasibly

attain all or most of the basic objectives of the project and would avoid or substantially lessen any of the potentially significant environmental effects of the project. This section also provides a discussion of technical alternatives to OB/OD.

8.0 – Persons and Organizations Consulted. This section provides a list of individuals and organizations that have contributed data or concerns to be addressed in the Draft EIR/EA. Persons and organizations that contributed to preparation of the Draft EIR/EA also are identified.

## 1.4 OTHER AGENCIES THAT MAY USE THE EIR

This EIR is intended to be used by responsible and/or trustee agencies (as defined by sections 15381 and 15386 of the CEQA Guidelines) that may have review or discretionary authority over some component of the project. Agencies in addition to DTSC that may have responsibility over approval of certain project elements may include, but are not limited to, the following:

- California Department of Fish and Wildlife (CDFW)
- California Air Resources Board (CARB)
- California Department of Industrial Relations
- U.S. Air Force, Edwards Air Force Base
- U.S. Fish & Wildlife Service (U.S. FWS)
- Mojave Desert Air Quality Management District (MDAQMD)
- Eastern Kern Air Pollution Control District (EKAPCD)
- Kern County Department of Environmental Health Services
- Regional Walter Quality Control Board (RWQCB)
- Native American Heritage Commission (NAHC)
- State Historical Preservation Office (SHPO)

## **1.5 AVAILABILITY OF DRAFT EIR/EA**

Copies of the Draft EIR/EA and the Part B Permit Modification application are available at:

Department of Toxic Substances Control
8800 Cal Center Drive
Sacramento, California 95826
(916) 255-3545

Lancaster Public Library
601 W. Lancaster Blvd.
Lancaster, California 93534
~~(661) 275-2665~~ (661) 948-5029

Edwards Air Force Base Library

5 West Yeager Blvd.
Building 6225
Edwards AFB, CA 93524
(661) 275-2665

Copies of the Draft EIR/EA and the Permit Modification application can also be found at the following website:

www.envirostor.dtsc.ca.gov

Written comments on the proposed project and the DEIR/DEA can be submitted to:

Department of Toxic Substances Control
Sam Coe, Project Manager
8800 Cal Center Drive
Sacramento, California 95826

Written comments may also be submitted electronically to:

sam.coe@dtsc.ca.gov

A public hearing will be held on ~~September 17, 2013 at 6:00 pm~~ August 27, 2014 at 6:30 pm at:

Eastside Elementary School
6742 East Ave. H
Lancaster, CA 93535

## 1.6 REFERENCES

California Department of Conservation website on Farm Land Mapping and Monitoring Program (FMMP) – Enlarged Map Samples
http://www.conservation.ca.gov/dlrp/fmmp/mccu/Pages/sample_maps.aspx

Edwards Air Force Base. 1994. *Edwards Air Force Base Comprehensive Plan*.

Edwards Air Force Base. 1995. *Phase I Historic Properties Inventory for the Proposed Explosive Ordnance Disposal (EOD) Range Relocation, Edwards AFB, Kern County, California*.

Edwards Air Force Base. 2009. *Edwards Air Force Base General Plan*.

Edwards Air Force Base, 2009. *Integrated Cultural Resource Management Plan (ICRMP).*

Edwards Air Force Base, 2012. *Integrated Cultural Resource Management Plan (ICRMP) Annual Update*.

# *SECTION 2.0 – PROJECT DESCRIPTION*

## 2.1 FACILITY HISTORY

Edwards has been operating as a military facility since 1934. The AFRL was established as a rocket engine test facility in 1947. The Air Force Flight Test Center (AFFTC) and Test Pilot School were established in 1951. The AFFTC was recently renamed to the Air Force Test Center (AFTC). The base currently supports the development and ongoing use of manned and unmanned aircraft by the Air Force and other branches of the U.S. Armed Forces. Developmental testing and evaluation of aircraft and aircraft related avionics, flight controls, and weapons systems, and training of test pilots, test navigators, and flight test engineers are on-going activities. The AFRL Propulsion Directorate develops propulsion and related technologies for the Air Force including: turbine and rocket engines, advanced propulsion systems, fuels, propellants, and lubricants, and aircraft power. These activities generate reactive hazardous wastes including energetics whose stability is unknown.

There are currently two areas on base where hazardous waste treatment by OB/OD takes place, the OB/OD Units at the EOD Range on the PIRA and the OB Unit at Area 1-100 at the AFRL. OB/OD treatment on the PIRA began in 1974. The OB Unit at the AFRL Area 1-100 began operations in 1983. The Units are currently operating under Interim Status Authorization issued by DTSC pursuant to HSC Section 25200.5 and a Stipulation and Order issued in 1993, with treatment criteria based on explosive weight. Explosive weight is the weight of the energetic contained within the hazardous waste. The actual amount of waste treated (gross weight) includes non-energetic components, such as casing and packaging. The Interim Status Authorization allows for the treatment by OD on the PIRA of reactive hazardous waste generated at Edwards up to a maximum of 930 pounds explosive weight per year. This includes 548 pounds for OB and 382 pounds for OD. The AFRL site at Area 1-100 is authorized to treat up to 5,000 pounds of waste propellants per year by OB. The Interim Status Authorization does not specify any standards regarding the types of hazardous wastes to be treated, other than they must be reactive, or explosive in nature.

Under the Permit Modification application, the existing units will be consolidated at the OB/OD Units on the PIRA. The proposed limit per event will be 2,000 pounds (907.2 kg) explosive weight for OD, except that the maximum treatment quantity for an event including mercury-containing wastes will be 700 pounds (317.5 kg) in order to remain within health risk and hazard thresholds. The proposed limit per event will be 2,000 pounds explosive weight for OB. The proposed maximum annual quantity will be 150,000 pounds (75 tons or 68,040 kg), explosive weight. Although the application includes an annual maximum quantity, the actual amounts of each type of energetic waste that Edwards will be

able to treat will be determined by environmental regulatory standards and the noise impacts on the surrounding community.

The types of hazardous wastes treated by OB/OD at Edwards are shown on Table 2.1-1, Energetic Wastes to be treated at OB/OD Units.

### 2.1.1 Need for the Proposed Project

Edwards was granted Interim Status Authorization by DTSC to operate its existing OB/OD units pursuant to HSC Section 25200.5. The authorization granted by DTSC allows for operation of the OB/OD Units only until DTSC makes a hazardous waste facility permit determination. Edwards has applied for a modification to the existing Permit to continue to treat reactive hazardous waste by OB/OD, to consolidate these treatment activities at the EOD Range, and to expand operations from those in the current authorization.

Edwards is one of the Air Force's principal sites for aircraft flight test and training, and propellant research. The capability to treat reactive hazardous waste generated by Edwards' RDT&E activities onsite is critical to the RDT&E mission, since the unstable nature of the hazardous waste makes transport to other installations unsafe. The reactive wastes from the laboratories are research and development materials that have not been fully classified with respect to explosive safety. The reactive components of these waste items are experimental in nature which means that the composition and explosive stability of the waste may be poorly defined. In order to transport a laboratory waste item off-site, the waste item must be assigned a shipping classification. Because each waste item is unique, a new classification is needed for virtually every item generated. Military munitions items have been altered or damaged through test and evaluation activities. DOT, DoD, and Air Force regulations prohibit the transport of most of Edwards' reactive wastes on public roads or railways because of the unique dangers associated with the reactive wastes produced during RDT&E operations.

The unstable nature of both the laboratory wastes and the RDT&E military munitions waste, prolonged storage of these wastes and absence of assignments of shipping classifications and packaging procedures presents a safety concern. Without onsite treatment capability, compliance with the 90-day limit for storage of these wastes under the Resource Conservation and Recovery Act (RCRA) will be difficult to maintain. DoD continues to explore alternative technologies to OB/OD for the treatment of waste energetic and munitions items. Safe, environmentally sound technologies will be implemented for the treatment of these wastes, when and if they become available. In the meantime, OB/OD has been identified as the preferred method for the treatment of waste military munitions.

### 2.1.2 Project Objectives

Pursuant to CCR Title 14, Section 15124, an EIR is required to provide a statement of the objectives sought for the project proposed in the EIR. The objectives of the proposed project are:

- To allow Edwards to continue its mission to conduct weapons RDT&E for the Air Force at current or increased levels.
- To render reactive hazardous wastes generated at the facility by RDT&E work non-hazardous.
- To treat reactive hazardous waste in an environmentally protective manner using standard operating practices that are protective of the safety of employees handling the waste and consistent with current provisions of the HSC Division 20, Chapter 6.5, and CCR Title 22, Chapter 14, for management of hazardous waste, HSC Section 39000 et seq., for compliance with the CCAA, and CCR Title 29 for occupational health and safety.
- To avoid or limit potential offsite environmental impacts from the generation, transport, storage, treatment and/or disposal of reactive hazardous wastes, consistent with the provisions of CCR Title 22, Section 66264.31.
- To treat reactive hazardous waste efficiently and economically by a method or process that would eliminate or reduce the need for further handling, remediation, or consideration in the future.

## 2.2 PROJECT LOCATION

Edwards is located in the Antelope Valley region of the western Mojave Desert in Southern California approximately sixty (60) miles northeast of Los Angeles, California. The base covers an area of 307,517 acres. Major topographic features on base include Leuhman Ridge on the east, Red Hill on the northwest and Rosamond and Rogers dry lakebeds in the center and southwest portion of the base (Figure 2.2-1, Edwards Topographic Map). The base encompasses the Main Base, South Base and North Base areas; the AFRL; the National Aeronautics and Space Administration/Dryden Flight Research Center (NASA/DFRC); and the PIRA. Portions of the base are located in Kern, Los Angeles, and San Bernardino counties. The OB/OD Units at the EOD Range on the PIRA are located within Kern County on the southern portion of the base (Figure ES-2, Edwards Map and Location of OB/OD Units). The PIRA is designated in the *Edwards Air Force Base Comprehensive Plan* as a test range. The OB/OD Units are an allowed use on the PIRA.

The PIRA covers 91,000 acres of the eastern part of the base and is used for aircraft flight testing, EOD, and the placement of communication equipment. This area is used to test aircraft targeting equipment and for practice in precision bombing. Other activities and uses in the PIRA are severely restricted and occur only occasionally, scheduled around the range use. A large portion of the PIRA has been designated as desert tortoise critical habitat and requires personnel to follow different levels of protection measures for the listed threatened desert tortoise (Gopherus agassizii) based upon the zone and activities to be conducted.

The location of the OB/OD Units is seven (7) miles east of Edwards south gate, ten (10) miles southeast of Edwards west gate, fourteen (14) miles south of Edwards north gate, and North of Photo Resolution Road.

The OB/OD Units at the EOD Range are located on a relatively level area of the PIRA between 2,385 and 2,407 feet above mean sea level. The terrain in the area immediately adjacent to the EOD Range slopes gently toward the northwest (Figure 2.2-2, OB/OD Units Topographic Map).

The specific location of the EOD Range is as follows:

| | |
|---|---|
| Latitude: | $34^{o}$ 49.728’ N |
| Longitude: | $117^{o}$ 48.063’ W |
| (These coordinates identify the center point of the EOD Range) | |
| Township: | 9 N |
| Range: | 9 W |
| Section: | S 1/3 of Section 35 |
| Quadrangle: | Rogers Lake So., USGS 7.5 Minute Series, 1992 |
| Principal Median: | San Bernardino |

The coordinates of the EOD Range boundaries are:

| | |
|---|---|
| NE Corner: | Latitude $34^{o}$ 49.853’ N, Longitude $117^{o}$ 48.022’ W |
| SE Corner: | Latitude $34^{o}$ 49.627’ N, Longitude $117^{o}$ 47.968’ W |
| SW Corner: | Latitude $34^{o}$ 49.605’ N, Longitude $117^{o}$ 48.105’ W |
| NW Corner: | Latitude $34^{o}$ 49.832’ N, Longitude $117^{o}$ 48.158’ W |

The assessor’s parcel number is not applicable, as the EOD Range is totally within Edwards’ boundaries.

Edwards is predominately surrounded by undeveloped public lands that are federally owned and managed by the Bureau of Land Management (BLM). The on-base complexes include North Base, Main Base, South Base, and AFRL. The nearest off-base community is Hi Vista. Other communities near Edwards are Rosamond, Mojave, North Edwards, Boron, Redman, and Lancaster.

The areas in private ownership adjacent to the southeast portion of the base closest to the OB/OD Units are under the jurisdiction of Los Angeles and San Bernardino counties. The area in Los Angeles County is covered under the *Antelope Valley Area-wide General Plan*. Land use designations for the area include one site of less than 0.5 acre designated industrial, three small sites designated for open space, and the rest of the area nonurban residential at a density of one dwelling unit per 2 acres. Zoning in the area is primarily agricultural and industrial with some residential. The San Bernardino County land use designation on lands south of the base is resource conservation that provides for minimum lot size of 1 acre.

The nearest fenceline from the EOD Range lies approximately 1.7 miles to the east. The closest residential areas are Hi Vista, approximately seven (7) miles to the south in unincorporated Los Angeles County, and military housing on the Main Base, approximately 8.1 miles to the northwest. The closest industrial areas are South Base (6.5 miles) and AFRL (9 miles).

## 2.3 PROJECT CHARACTERISTICS

### 2.3.1 General Description of OB/OD Process

The OB/OD Units consist of OB and OD areas (Figure 2.3-1, Layout and Dimensions of OB/OD Units). Each unit is a 300-foot radius circle. An earth berm is located on the south half of the OB Unit to separate the active part of the unit from the staging area (Figure 2.3-2, Photo of OB Unit Showing Earth Barrier, Figure 2.3-3 Photo of OD Unit). The rectangular area encompassing the circles is enclosed by an 8-foot high chain-link fence with a gate at either end (Figure 2.3-4, Photo of Security Fence Surrounding OB/OD Units, Figure 2.3-5 Photo of OB/OD Units Entrance Gate). The chain-link fencing has barbed wire on top, and desert tortoise/Mohave ground squirrel exclusion fencing at the base and gates. The area inside the fence and the 15-foot wide road around the outside of the fence is graded to reduce the danger of fire. A small equipment storage unit and Initial Accumulation Point are located near the south gate within the fenced area (Figure 2.3-6, Photo of Equipment Storage and Initial Accumulation Point). A burn kettle and detonation pan placed on the site when the unit was constructed have never been used, and DTSC has determined that they are not required for the OB/OD Units operations. This equipment will be removed.

All OB/OD Units are operated and maintained by personnel from the EOD Unit stationed at Edwards. Operations are conducted by EOD personnel under strict DoD safety regulations, standard operating procedures specific to the OB/OD units at the EOD Range and the AFRL, and applicable environmental regulations. Treatment is by burning reactive hazardous wastes for OB or detonating reactive wastes using bulk explosives as a donor charge in the OD area.

Emissions from OB/OD potentially include VOCs, SVOCs, metals, and acid gases. Emissions also include dust disturbed by detonation. The chemicals potentially emitted from OB/OD treatment are listed in Section 4.3, Air Quality.

The annual and monthly quantity of waste treated will vary greatly. In addition to event and annual limits, the treatment quantity is restricted by health risk and hazard thresholds, logistical concerns, regulatory standards for criteria pollutants, ecological concerns, and noise impacts. The health risk and hazard thresholds are:

- a carcinogenic risk threshold of 1 in a million; and
- a noncarcinogenic chronic hazard index of 1.0; and
- an acute hazard index of 1.0.

The regulatory standards for criteria pollutants are enforced by the Eastern Kern Air Pollution Control District (EKAPCD).

The concentration, health risk, and health hazard by weight was determined for each type of energetic waste and meteorological conditions at the time of treatment (mid-day). For open detonation, the metal emissions from casings are included in calculation of the risk and hazard. For open burn, there are no emissions from casings. Prior to each event, an evaluation will be conducted to ensure that the amount to be treated will not exceed the maximum quantity limits for both single events and the cumulative annual total, and thus will not exceed the health risk and hazard thresholds. Logistical limits dictate that no more than an average of one OB and one OD event per day will be completed, unless prior approval is obtained from DTSC.

### 2.3.2 General Description of OB/OD Units Operations

#### 2.3.2.1 Access and Security

Security fencing surrounds the PIRA. The OB/OD Units are surrounded by an 8-foot chain-link fence topped with three strands of barbed wire and accessed by locked gates. All roads on base are closed to the general public and access is closely monitored. Access for authorized personnel is gained through controlled gates. All traffic on the PIRA, where the OB/OD Units are located, must enter through the Downfall Complex. Downfall personnel do not allow unauthorized personnel to enter the PIRA when specific operations such as the EOD treatment operations are occurring. The dirt access roads to the OB/OD Units are barricaded during OB/OD events. This remote siting provides the separation needed between the EOD Range and public areas to keep air blasts associated with the OB and OD operations away from potentially inhabited areas. Although both OB and OD events require safe distances to be maintained, detonations

create greater air blasts and need greater separation distances. For a typical detonation of 500 lbs of explosives, the separation distance must be at least 2,400 feet. Edwards requires an extra 100 feet, or a total of 2,500 feet, for added safety. For a maximum detonation of 2,000 lbs, the separation distance is 5,000 feet. All treatment operations are observed from a site outside the EOD safety distance zone.

#### 2.3.2.2 Transportation Characteristics

There is no storage of hazardous waste at the OB/OD Units. Waste propellants are stored in accumulation facilities near the AFRL where the waste is generated. Munitions are stored in the MSA at South Base. Generators are responsible for packaging and transfer of their waste by trained and certified personnel from the temporary accumulation areas to the OB/OD Units prior to the expiration of the waste's accumulation time limit. Waste to be treated is transported to the OB/OD Units by EOD and MSA or AFRL personnel on the day an event is scheduled. Munitions are hauled from the South Base Area along Jones Road, Lancaster Boulevard, Avenue B, Mercury Boulevard and Photo Resolution Road. The distance is approximately thirteen (13) miles on lightly traveled, two lane paved roads and 1.4 miles on a dirt road (Photo Resolution Road). Reactive hazardous waste from the AFRL (Building 8955) or MSA would be hauled along Silo Access Road, Phoenix Road, Mercury Boulevard, and Photo Resolution Road. This distance is approximately 14.7 miles. All roads except Photo Resolution Road are paved two lane roads. The routes on base for transportation of waste to the OB/OD Units at the EOD Range are shown on Figure 2.3-7, Onsite Transportation Routes. Personnel prepare and treat waste on the same day. Since treatment may not occur under adverse conditions, reactive hazardous waste is not transported when precipitation is present or anticipated.

#### 2.3.2.3 Inspections

The 90-day accumulation areas for hazardous waste are inspected weekly by Edwards' personnel using a standardized form.

DTSC inspects federal permitted facilities annually for compliance with Permit requirements. DTSC inspections will include the permitted Hazardous Waste Support Facility (HWSF) and the OB/OD Units. The local Certified Unified Program Agencies (CUPAs) are authorized to inspect all accumulation areas. The Kern County Department of Environmental Health is the local CUPA responsible for inspection of 90-day and 270-day accumulation areas.

#### 2.3.2.4 Emergency Prevention and Emergency Response

The Permit includes a Contingency Plan that addresses releases of hazardous substances, including energetics, and Edwards has adopted a Disaster Preparedness Plan, that addresses response to natural disasters and

catastrophic events. The Permit Modification application references the Contingency Plan and describes emergency prevention and emergency response equipment and procedures in detail.

### 2.3.3 Open Burning

#### 2.3.3.1 Operating Practices

The OB Unit is a 300-foot radius cleared circle on the ground surface on the southern portion of the fenced EOD Range area. Waste is placed in the OB circle and the remote electronic ignition is installed. The burn is initiated and monitored to completion. The burn can last from 30 seconds to several minutes.

Open burn generally consumes all waste materials and leaves only an ash residue. After 24 hours cooling, the ash is collected, tested, stored and disposed of as discussed below in Section 2.3.3.6.

#### 2.3.3.2 Wastes Treated

OB may be used to treat black powder, limited quantities of dynamite in bulk, smoke pots, bulk high explosives, nitrocellulose, primers, small arms ammunition, smokeless powder, trinitrotoluene (TNT) demolition blocks, tracer mix and other pyrotechnic mixtures, and rocket motor propellant grains.

Laboratory Waste Stream

The first type of waste stream is generated from laboratory-type activities (such as the research and development of new explosive/propellant formulations or scale up of new explosives/propellants). The energetic component of these wastes is experimental in nature and as such the composition and explosive stability may be poorly defined. The majority of these wastes are not identifiable with a military specification number. Those wastes that can be identified with a military specification number have been modified or disassembled for some research and development purpose. The majority of laboratory waste is bulk material, not packaged in a casing like bombs, missile motors or warheads. The laboratory waste stream also consists of ECW such as rags, wipes, and personal protection equipment contained in a velostat bag, scrap and samples from mixes and castings, residues from test sample preparation contained in a plastic buckets, cardboard boxes, or metal cans, small miscellaneous ordnance items, such as fuses, leads, thermal batteries, or detonators, and miscellaneous solvents contaminated with energetics.

#### 2.3.3.3 Prohibited Items

OB may not be used to treat detonators, both electric and percussion, large quantities of dynamite in bulk, explosive loaded grenades, high explosive bombs,

mortar ammunition, projectiles, rocket/missile warheads, mines, and bulk initiating explosives. These can only be treated by OD. Neither OB nor OD maybe used to treat homemade or improvised explosive devices, chemical warfare agents, chemical munitions, biological warfare agents, and nuclear weapons devices or components.

#### 2.3.3.4 Waste Analysis

The Waste Analysis Plan is discussed in detail in the Permit Modification application. The Plan includes the parameters for which each hazardous waste will be analyzed, the test methods, sampling methods, and sampling and analysis frequency. When the hazardous wastes are formulated at the AFRL, waste analysis relies primarily on generator knowledge. If no information is available, analysis of the waste may be conducted by a California certified laboratory using USEPA methods.

The Waste Analysis Plan includes sampling and analysis of residual ash. The ash analysis may vary depending on the composition of the energetic treated. Analyses would include explosives in all cases, and may include metals for some types of energetics and VOCs if solvents are treated.

#### 2.3.3.5 Treatment Emissions

Emissions from OB potentially include VOCs, SVOCs, metals, and acid gases. The chemicals potentially emitted from OB treatment are listed in Section 4.3, Air Quality.

#### 2.3.3.6 Hazardous Waste Generated by Treatment

After an OB event, the resultant ash is collected, sampled and analyzed. If the ash is hazardous, it is transported to the HWSF, a permitted hazardous waste storage unit, for consolidation and packaging prior to offsite disposal. Offsite disposal of the ash residue will be based on its waste profile.

### 2.3.4 <u>Open Detonation</u>

#### 2.3.4.1 Operating Practices

The OD Unit is a 300-foot radius cleared circle on the northern portion of the fenced EOD Range area. Waste is detonated on the ground surface using bulk explosive as a donor charge.

#### 2.3.4.2 Wastes Treated

The following reactive hazardous waste streams are treated by open detonation:

Munitions Waste Stream

The second type of waste stream includes military munitions items. Military munitions include but are not limited to small arms cartridges, cartridge actuated items and devices, engine starter cartridges, smoke and signal flares, thrusting devices, ignition train components, aircraft external source release and related devices, bombs, practice bombs, bomb units, submunitions, demolitions charges, fuses, grenades, land mines, priming and initiating devices, pyrotechnics, explosive components, miscellaneous explosive devices and accessory elements. The munitions waste stream consists of standard munitions completely identifiable with a military specification number and designated waste for a specific reason, subjected to some RDT&E activity, or acquired for a particular research and development activity and later declared waste.

#### 2.3.4.3 Prohibited Items

OD may not be used to treat homemade or improvised explosive devices, chemical warfare agents, chemical munitions, biological warfare agents, and nuclear weapons devices or components.

#### 2.3.4.4 Waste Analysis

The Waste Analysis Plan is discussed in detail in the Permit Modification application. The Plan includes the compounds and parameters for which each hazardous waste will be analyzed, the test methods, sampling methods, and sampling and analysis frequency. When the hazardous wastes are formulated at the AFRL, waste analysis relies primarily on generator knowledge. If no information is available, analysis of the waste may be conducted by a California certified laboratory using USEPA methods.

#### 2.3.4.5 Treatment Emissions

Emissions from OD potentially include VOCs, SVOCs, metals, and acid gases. Emissions also include dust disturbed by detonation. The chemicals potentially emitted from OD treatment are listed in Section 4.3 Air Quality.

#### 2.3.4.6 Hazardous Waste Generated by Treatment

No hazardous waste is generated by OD treatment. Periodically the floor of the OD circle is cleared of shrapnel and graded to fill in craters left by previous detonations. The shrapnel is certified “safe to transport and store onsite” and placed in a fenced yard used to collect, segregate, and log range residue prior to disposition.

### 2.3.5 Closure Plan

The currently authorized OB/OD Units will be closed when the Permit Modification determination is finalized. Closure of the currently authorized OB/OD Units is a subsequent project and environmental impacts from closure of these units are not evaluated in this DEIR/DEA. The CEQA requirements will be completed when Closure Plans for these units are prepared and submitted to DTSC.

Eventually the OB/OD Units at the EOD Range will be closed. The date of closure cannot be established at this time. However, the Permit Modification application includes procedures for closing and decontaminating the EOD Range OB and OD Units, including removal of debris, decontamination of structures, and removal of contaminated soil. The Closure Plan provides that all hazardous waste, waste residues, contaminated materials, and contaminated soils would be removed. In the event that not all contaminated materials or soils can be practically removed, the Closure Plan will be amended as necessary, and a permit modification will be required. The Closure Plan will be amended if any of the following occur:

- Changes in the operation plan or facility design affecting the Closure Plan.
- Change in anticipated year of closure.
- Unexpected events arising during partial or final closure that affect the Closure Plan.
- Changes in regulations that affect facility closure.
- Requests by DTSC.

As described in the plan, closure will be performed in accordance with CCR Title 22, Division 4.5, Chapter 14, Article 7, and will meet all federal and state closure performance standards. The closure performance standards require the units to be closed in a manner that will:

- Minimize the need for further maintenance.
- Control, minimize or eliminate post-closure escape of hazardous waste, hazardous constituents, leachate, contaminated runoff, or hazardous waste decomposition products.
- Ensure that any equipment or structures left onsite contain no hazardous waste or hazardous waste constituents.

In general, these standards will be met by:

- Removal or treatment of all hazardous waste present at the units at the time of closure.
- Decontamination or removal of structures, buildings, and equipment.
- Decontamination and reuse, salvage or, if necessary, disposal offsite at an appropriately-permitted facility, of mobile or fixed equipment used to transport and handle hazardous wastes.
- Characterization of materials, including closure-generated wastes such as water from decontamination, to determine if they are hazardous wastes in accordance with CCR Title 22, Sections 66261.3(e) and 66262.11.
- Cleanup, including removal, of soil based on site-specific cleanup levels, and cleanup of groundwater based on future groundwater use.

An independent registered professional engineer will monitor all closure activities and will be required to certify that they are conducted in accordance with the approved Closure Plan. Edwards will notify DTSC in writing at least 180 days prior to the date final closure is expected to begin, and at fifteen days prior to any closure performance sampling. Within 60 days of completion of final closure, Edwards will submit to DTSC certification that the final closure of the Units has been conducted in accordance with the specifications of the approved Closure Plan. A copy of the approved Closure Plan and subsequent authorized amendments will be maintained at the facility until closure is complete and certified.

If necessary, a Post-Closure Plan may also be required to be submitted to, and approved by DTSC. Post-closure requirements are not anticipated; however, they could be required if either of the following occurs:

- Groundwater contamination due to a release from the Units is confirmed at the time of closure.
- All hazardous waste, waste residues, contaminated materials, or contaminated soils are not removed at the time of closure.

The Post-Closure Plan would include long-term monitoring procedures and cleanup of any contamination above risk-based clean closure levels remaining in the vicinity.

### 2.3.6 RCRA Corrective Action

Corrective action addresses existing and future releases of hazardous waste and hazardous constituents from the OB/OD Units. In 1990, DTSC, Edwards, and the Lahontan Regional Water Quality Control Board (RWQCB) entered into a Federal Facility Agreement (FFA) governing the conduct of contaminated site identification, investigation and remediation, if applicable. One of the purposes of the FFA is to satisfy Edwards' RCRA corrective action obligations under the Permit. Although corrective action is ongoing at Edwards under the direction of DTSC, no corrective action is currently planned or anticipated at the PIRA EOD Range. Corrective action at the PIRA EOD Range, if necessary, would be conducted under the conditions and procedures specified in the FFA. Any corrective action that may become necessary will be a subsequent project. Corrective action at the PIRA EOD Range, including Interim Measures, will be designed to detect and prevent buildup of hazardous waste and hazardous constituents outside the units to unsafe levels.

## 2.4 OTHER ACTIVITIES NOT PART OF THE PROJECT

### 2.4.1 Permitted Hazardous Waste Facility Units

In November 2005 Edwards was issued a renewed Hazardous Waste Facility Permit for the HWSF. The Permit provides the capability to safely receive, segregate, transfer, and store hazardous wastes prior to transport offsite for final disposition. The Permit does not include storage of reactive hazardous waste or treatment of any type. Treatment of reactive hazardous waste at the OB/OD Units will be a modification to the existing Permit, adding two units for OB and OD. Storage of reactive hazardous waste beyond 90 days will not be permitted at Edwards.

### 2.4.2 Closure of Hazardous Waste Facility Units

Edwards has been allowed to treat hazardous waste by OB/OD under an Interim Status Authorization issued by DTSC pursuant to HSC Section 25200.5 and a Stipulation and Order issued in 1993. Under this authorization there are two areas on base where Edwards may treat hazardous waste by OB/OD, the OB Unit at Area 1-100 at the AFRL and the OB/OD Units at the EOD Range. Upon completion of the Permit Modification determination, the current authorization to operate will be terminated.

The OB Unit at the AFRL Area 1-100 began operations in 1983. Area 1-100 is located at the AFRL on the northeast corner of Edwards in San Bernardino and Kern Counties. Area 1-100 is located to the east of Leuhman Ridge, approximately 1.9 miles from the nearest base boundary, 2.7 miles from the nearest residence in North Edwards, and approximately five (5) miles east of the AFRL security gate which is the only access to the AFRL. The AFRL OB Unit at Area 1-100 is a 300-foot radius graded circle. Upon completion of the Permit

Modification determination, the OB Unit at Area 1-100 would be required to undergo closure. Area 1-100 will be closed as a separate project.

Additionally, hazardous waste was treated by OB/OD at sites south of the EOD Range in Los Angeles County beginning in 1974. These sites ceased operating when operations were authorized at the EOD Range and have been managed under Edwards' CERCLA response obligation. Closure of these sites will be integrated with the base Environmental Restoration Program (ERP).

### 2.4.3 Non-Regulated Hazardous Waste Processes

Beginning in 1997, DTSC delegated oversight of basic generator requirements to the local CUPAs. At Edwards, the CUPA is responsible for oversight and inspection of temporary accumulation sites. The CUPA having oversight responsibility at Edwards is the Kern County Environmental Health Services Department.

### 2.4.4 Hazardous Materials

Hazardous materials are managed in accordance with the Emergency Planning and Community Right to Know Act (EPCRA), United States Code Title 42, Chapter 116. EPCRA establishes reporting and planning requirements for businesses that handle, store, or manufacture certain hazardous materials. EPCRA is administered by the CUPAs.

### 2.4.5 Environmental Restoration Program

Site identification, investigation and remediation are ongoing at Edwards under the ERP. Former OB/OD sites in Los Angeles County were associated with the former target PB-10/Static Blast Area No. 1. No Further Investigation (NFI) status was granted in 2003 for Site 444, the open burn pit west of the former target PB-10/Static Blast Area No. 1. Investigation focusing on Site 270, the detonation area, has been completed. No significant contaminants of concern were found in the soil or groundwater, therefore in 2006 No Further Action (NFA) status was proposed for Site 270.

## Table 2.1-1 Energetic Wastes to be Treated at OB/OD Units

| Waste | OB Unit | OD Unit |
|---|---|---|
| Small arms cartridges .50 caliber and smaller | | X |
| Cartridge actuated items and devices[a] | | X |
| Engine starter cartridges[a] | | X |
| Smoke and signal flares[a] | | X |
| Thrusting devices | | X |
| Ignition train components[a] | | X |
| Aircraft external source release and related devices[a] | | X |
| Bombs, practice bombs, bomb units | | X |
| Submunitions | | X |
| Demolition charges | | X |
| Fuses | | X |
| Grenades | | X |
| Land mines | | X |
| Priming and initiating devices | | X |
| Pyrotechnics[a] | | X |
| Explosive components | | X |
| Miscellaneous explosive devices and accessory elements[a] | | X |
| Solid propellants | X | |
| Energetic contaminated waste materials | | |

Source: RCRA Part B/Subpart X, Permit Application for the Explosive Ordnance Disposal Range at Edwards Air Force Base, 2012.

Footnote:

[a] Treatment depends on requirements stated in USAF TO 11A-1-42.

**Figure 2.2-1 Edwards Topographic Map**

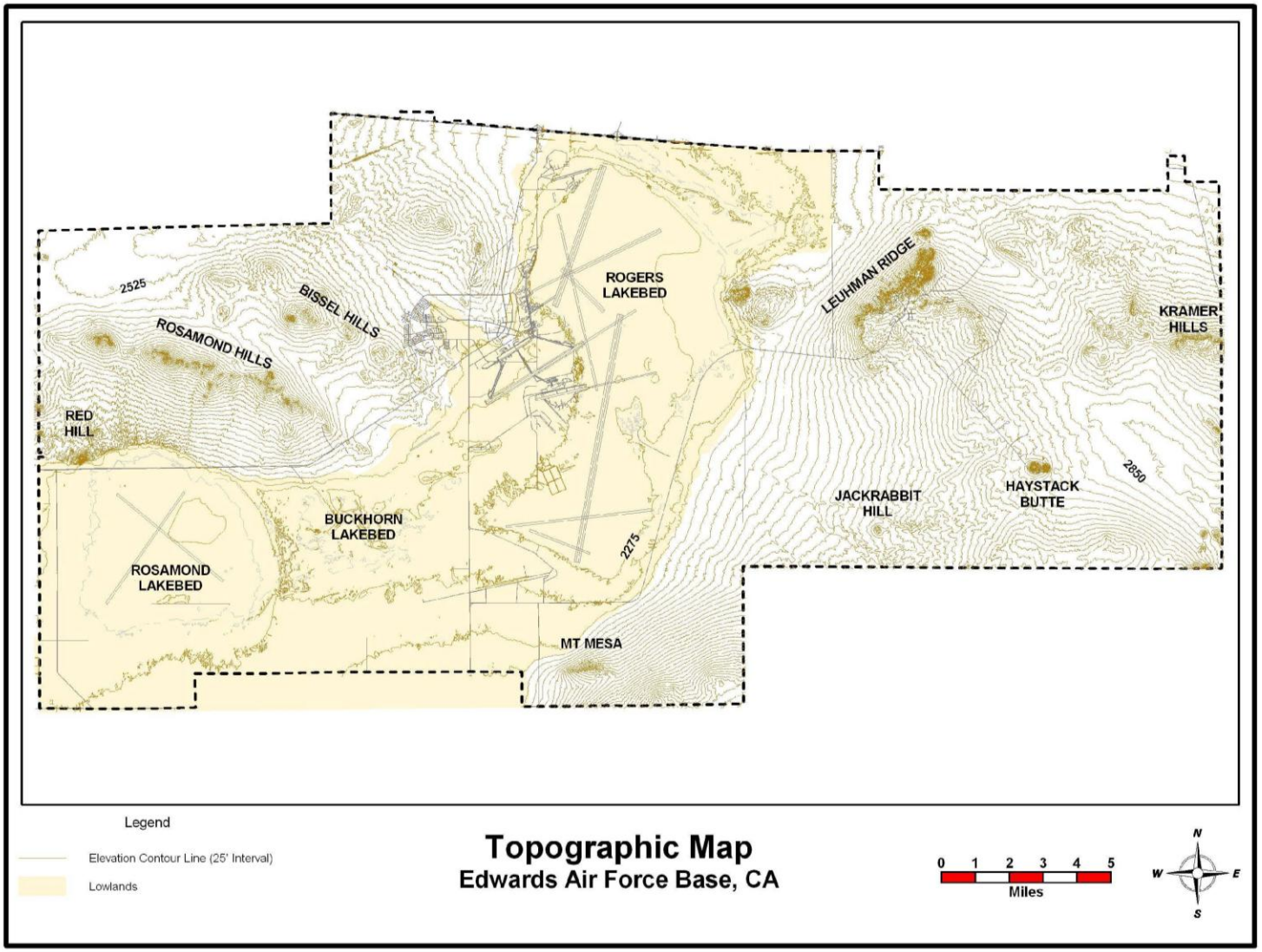


**Figure 2.2-2 OB/OD Units Topographic Map**

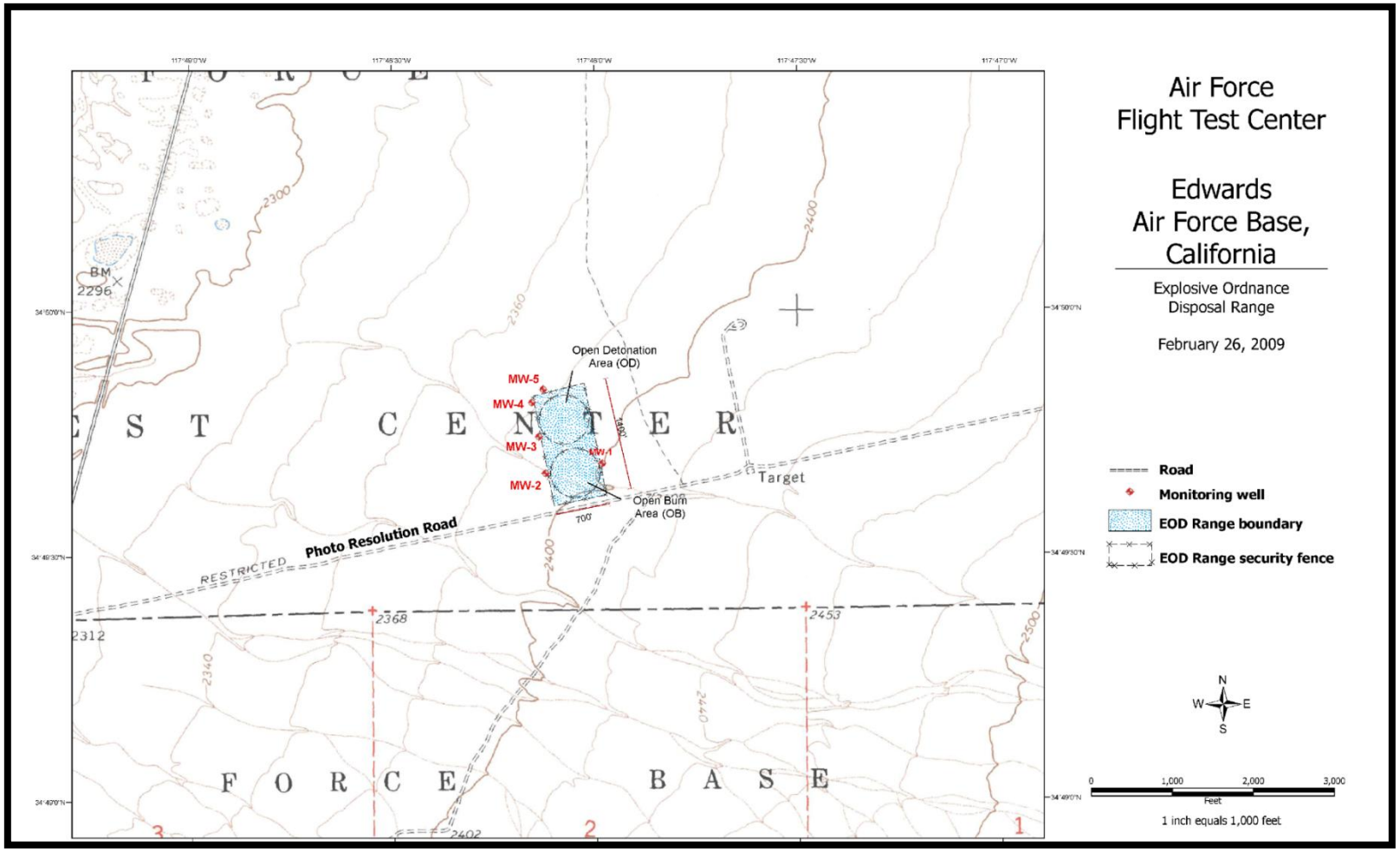


**Figure 2.3-1 Layout and Dimensions of OB/OD Units**

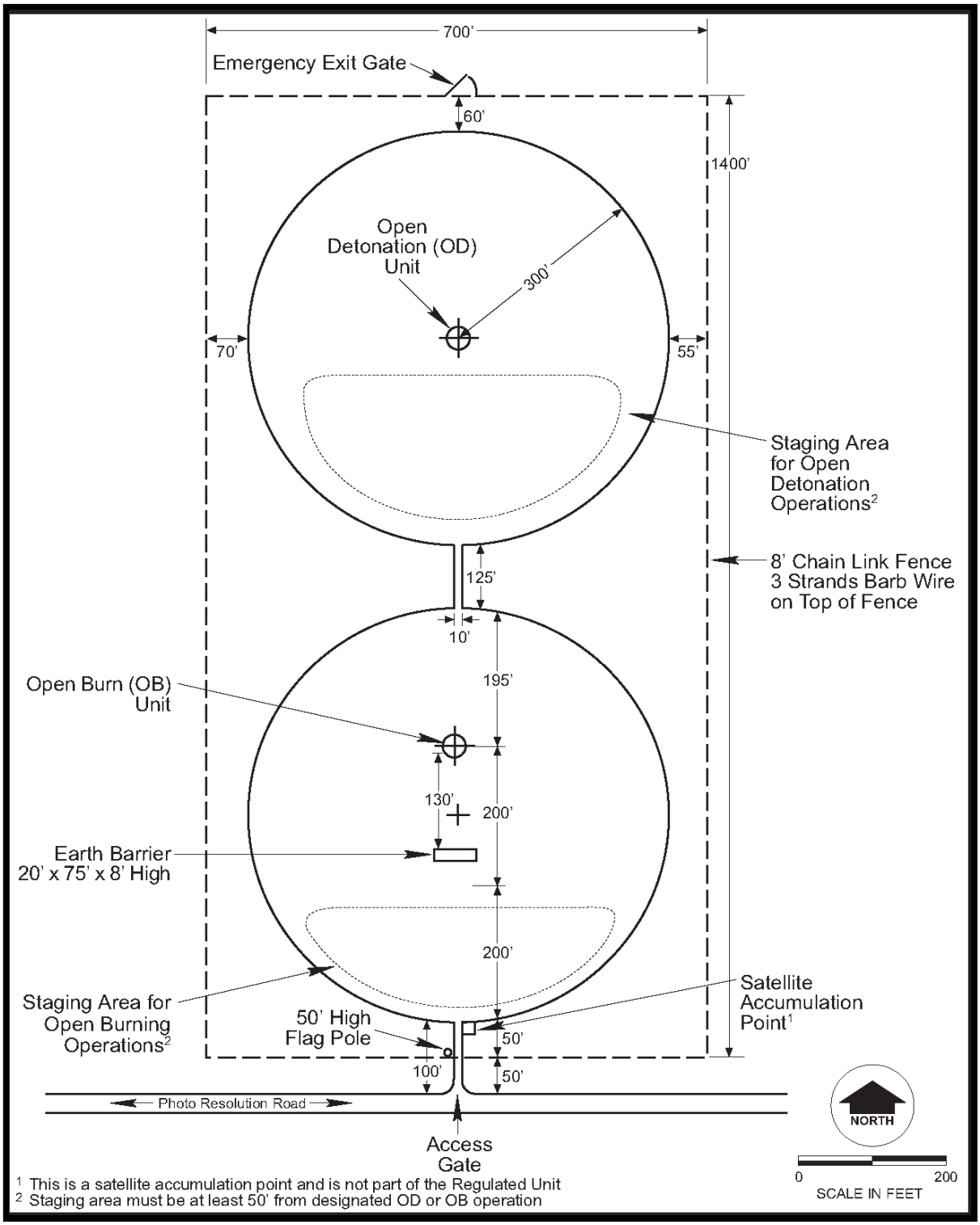


**Figure 2.3-2 Photo of OB Unit Showing Earth Barrier**

**Figure 2.3-3 Photo of OD Unit**

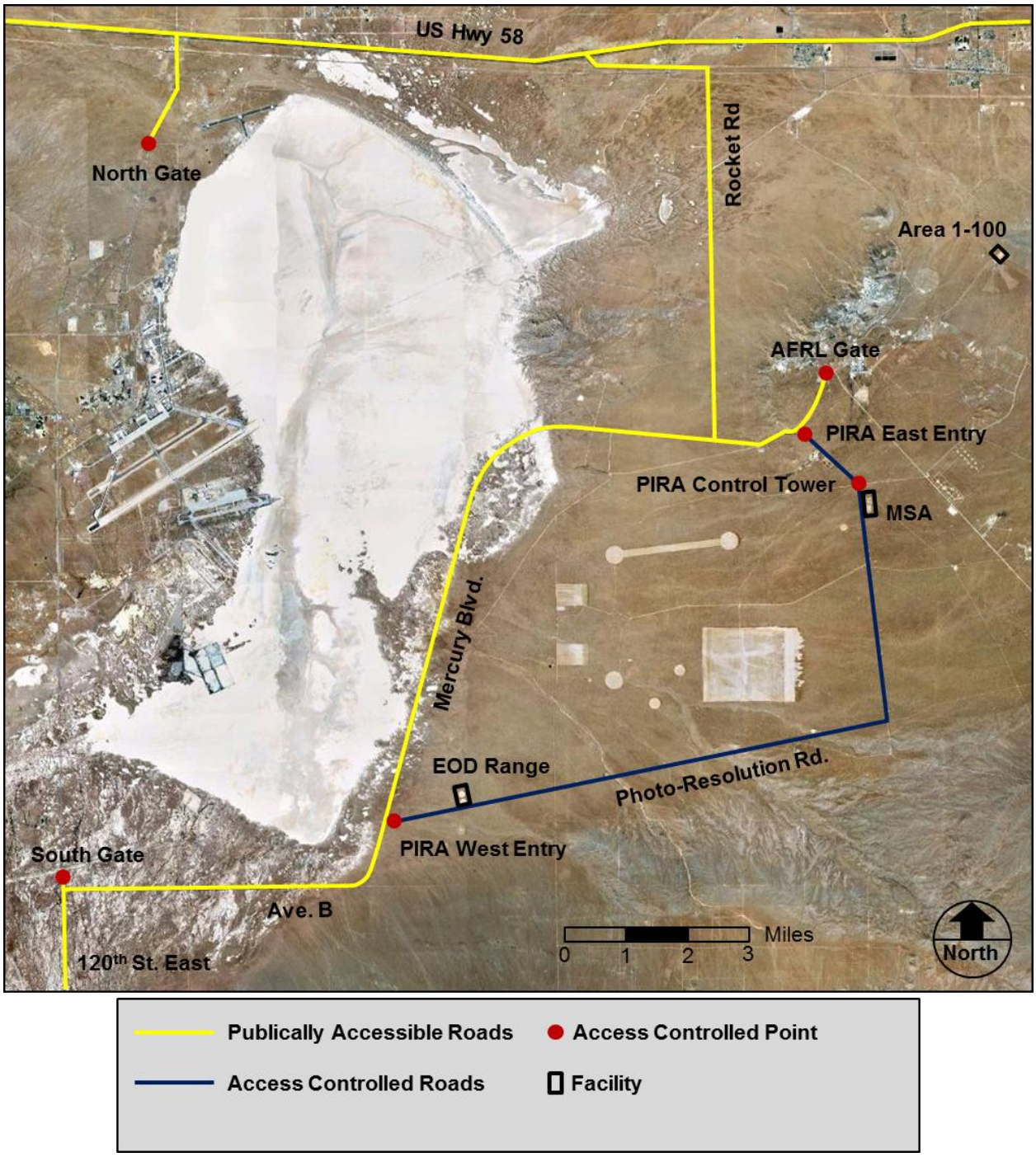
**Figure 2.3-4 Photo of Security Fence Surrounding OB/OD Units**

**Figure 2.3-5 Photo of OB/OD Units Entrance Gate**

Gate at entrance to OB/OD Units with Equipment Storage Shed in background, desert tortoise/Mohave ground-squirrel fencing at base of fence and barbed wire at top.

**Figure 2.3-6 Photo of Equipment Storage and Accumulation Point**

**Figure 2.3-7 Onsite Transportation Routes**



## *SECTION 3.0 - REGULATORY FRAMEWORK*

Items that meet the definition of a reactive hazardous waste and small arms ammunition are treated at the Edwards OB/OD Units. In order for a material or item to meet the definition of a reactive hazardous waste, it must first meet the regulatory definition of waste. Waste as defined in CCR Title 22, Section 66261.1 is any discarded material of any form (e.g., solid, liquid, or gas). Furthermore, CCR Title 22, Section 66261.2(b) defines a "discarded material" as material that is being abandoned by being disposed of, burned, or incinerated.

The definition of "hazardous material" includes both hazardous substance and hazardous waste. A hazardous substance is a raw material for a product or a process. Hazardous waste is a solid, liquid, or gas that is a by-product of a process, is no longer of use, or is a hazardous substance that has been spilled, leaked, or is no longer useable. Because of their potential danger to public health and the environment, hazardous materials are closely regulated by federal and state laws which focus on controlling the production, handling, storage, transportation, and disposal of hazardous materials. Section 3.2 provides a brief description of federal, state, and local agencies that implement hazardous materials regulations pursuant to the framework described in this section.

In general, a substance or waste is classified as "hazardous" if it is specifically listed as hazardous in CCR Title 22, if it is a mixture containing one or more listed wastes or substances, or if it is reactive, ignitable, corrosive, or toxic. In particular, the definition of the reactivity characteristic (CCR Title 22, Section 66261.23) includes the following criteria among others:

- the waste is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement (CCR Title 22, Section 66261.23(a)(6));

- the waste is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure (CCR Title 22, Section 66261.23(a)(7); and

- the waste is a forbidden explosive, a Class A explosive, or a Class B explosive (CCR Title 22, Section 66261.23(a)(8)).

Any one of the above reactivity criteria, or the other criteria identified in CCR Title 22, Section 66261.23(a), may cause a waste to be defined as a hazardous waste. A waste that exhibits the characteristic of reactivity has the EPA Hazardous Waste Code of D003 (CCR Title 22, Section 66261.23(b)). Small arms ammunition has the EPA Hazardous Waste Code of D001.

The Air Force has determined that the project is consistent with the California Desert Conservation Area Plan, administered by the BLM, and conforms with the terms and conditions as required by CFR Title 43, Part 1610.5.

The OB/OD Units are located on land owned by the United States Government, withdrawn for military activities for use by the Air Force. Local land use and zoning permits are not applicable or required. An operating permit and Burn Plan are also required for operations at the OB/OD Units. The operating permit is issued by the EKAPCD. A RWQCB Waste Discharge permit is not required for operations at the units.

## 3.1 STATUTES AND REGULATIONS

### 3.1.1 Federal Statutes and Regulations

#### 3.1.1.1 Resource Conservation and Recovery Act

The federal RCRA of 1976, amended in 1980 and 1984, is the principal federal legislation governing hazardous waste. Administered by the U.S. Environmental Protection Agency (USEPA), RCRA imposes reporting, permitting, and operational control on entities that generate, treat, store, or dispose of hazardous wastes. The RCRA is implemented by CFR Title 40, Parts 260 - 271.

During the mid-1980's, environmental regulators, aware that a means of measuring the impact from OB/OD operations to human health and the environment was lacking, added a provision to RCRA, known as the Subpart X regulations. This provision required that these operations be managed in a manner that would ensure protection of human health and the environment. The provision, promulgated in CFR Title 40, Parts 264.600 - 603, became effective in 1988.

Pursuant to RCRA, any person or entity that owns or operates a facility where hazardous waste is treated, stored, or disposed of, shall have a permit. Specifically, a hazardous waste facility is considered a treatment/ storage facility subject to RCRA regulation if it treats any of the established RCRA wastes or stores such wastes for over 90 days. Many state governments, such as California, are authorized by the USEPA to administer state hazardous waste management programs in lieu of the federal RCRA program. In the case of the proposed project, Edwards must comply with specific permit application requirements of DTSC.

Under RCRA, a facility in existence before 1980 was granted "interim status" provided the operator met certain requirements, such as filing of a Part A permit application (described below) and obtaining an USEPA identification number. The operator of an interim status facility was required to file a RCRA permit application that consists of Part A and Part B application. The Part A application

typically includes such items as the facility name, location, land type, facility contacts, operator information, Standard Industrial Classification and North American Industry Classification System codes, existing environmental permits, nature of the business, design and treatment processes, and a description of the hazardous waste that will be treated, stored, or disposed of at the facility.

Part B of a RCRA application contains more detailed, site-specific information regarding the facility description, design, structure, site geologic and hydrologic information, equipment operation, management practices, employee training, safety precautions, and emergency response/corrective action plans. In this DEIR, the Part B is referred to as the Permit Modification application.

#### 3.1.1.2 Comprehensive Environmental Response, Compensation, and Liability Act

The federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, also known as Superfund, and subsequent revisions were established to protect the public and the environment from a hazardous substances release. CERCLA authorizes allocation of funds for locating and assessing potentially hazardous sites, conducting immediate cleanup actions necessary for protection of public health, and performing long-term cleanup and monitoring of contaminated sites.

#### 3.1.1.3 Federal Water Pollution Control Act and Clean Water Act

The federal Water Pollution Control Act (FWPCA) of 1972, amended in 1977 by the Clean Water Act (CWA), regulates direct discharges into “navigable waters.” National Pollutant Discharge Elimination System (NPDES) permits are issued for the discharge of treated sewage by publicly-owned treatment works (POTW). Pursuant to the CWA, the USEPA has established national pretreatment standards that industrial users must meet before discharging to a POTW. The CWA requires all POTWs with a design flow of over 5 million gallons per day to establish pretreatment requirements to control industrial discharges of hazardous wastes into their sewer systems.

#### 3.1.1.4 Safe Drinking Water Act

The Safe Drinking Water Act (SDWA) was passed to protect public drinking water supplies from harmful contaminants. The SDWA is administered through regulatory programs that establish standards and treatment requirements for drinking water, the control of underground injection of wastes that might contaminate water supplies, and protection of groundwater.

#### 3.1.1.5 Federal Clean Air Act

The federal Clean Air Act of 1970 (CAA), as amended in 1990, forms the basis for the national air pollution control effort. Basic elements of the act include national ambient air quality standards (NAAQS) for major air pollutants, hazardous air pollutants standards, state attainment plans, motor vehicle emissions standards, stationary source emissions standards and permits, acid rain control measures, stratospheric ozone protection, and enforcement provisions. The 1990 amendments addressed five main areas: air-quality standards, motor vehicle emissions and alternative fuels, toxic air pollutants, acid rain, and stratospheric ozone depletion. In addition, it mandated the installment of the "Best Available Control Technology" to reduce the amount of air toxics emitted. The primary objective of the CAA is to establish federal standards for various pollutants from both stationary and mobile sources and to provide for the regulation of polluting emissions via state implementation plans (SIPs).

In 2007 the U.S. Supreme Court found that greenhouse gases (GHGs) are air pollutants and would be subject to regulation under the Clean Air Act. In 2009, the USEPA finalized the Endangerment and Cause or Contribute Findings for Greenhouse Gases determining that GHGs threaten the public health and welfare.

#### 3.1.1.6 Endangered Species Act

The Endangered Species Act (ESA) of 1973 defines categories of "endangered" and "threatened" species and provides a program for the conservation of the listed species and their respective habitats. The U.S. Fish and Wildlife Service (USFWS) maintains the endangered and threatened species lists. Species include birds, insects, fish, reptiles, mammals, crustaceans, flowers, grasses, and trees. The law prohibits any action, administrative or real, that results in a "taking" of a listed species, or adversely affects habitat. Federal law defines "taking" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."

#### 3.1.1.7 National Historic Preservation Act

The National Historic Preservation Act of 1966 (NHPA) provides for federal leadership for preservation, and the fostering of conditions under which modern society and prehistoric and historic resources can exist in harmony. As amended in 1992, Section 110 of the Act outlines a broad range of responsibilities for federal agencies, including establishment of preservation programs that provide for consideration of historic properties and the designation of qualified Federal Preservation Officers to coordinate their historic preservation activities.

#### 3.1.1.8 National Environmental Policy Act

The National Environmental Policy Act (NEPA) of 1969 establishes a national policy to promote efforts to prevent or eliminate damage to the environment and

biosphere and stimulate the health and welfare of man and to enrich the understanding of the ecological systems and natural resources important to the nation. In enacting NEPA, Congress recognized that nearly all federal activities affect the environment in some way and mandated that before federal agencies make decisions, they must consider the effects of their actions on the quality of the human environment. The Council on Environmental Quality (CEQ) was established as part of NEPA. The CEQ coordinates federal environmental efforts. The Air Force *Environmental Impact Analysis* Process (EIAP) provides procedures for implementing NEPA for Air Force actions (CFR Title 32, Part 989).

#### 3.1.1.9 National Transportation Act and Hazardous Materials Transportation Act

The National Transportation Act and Hazardous Materials Transportation Act establish provisions for interstate transport of hazardous waste.

### 3.1.2 <u>California State Statutes and Regulations</u>

#### 3.1.2.1 Hazardous Waste Control Act

The Hazardous Waste Control Act (HSC Division 20, Chapter 6.5), established in 1972, is the principal statute governing hazardous waste in California. Administered by DTSC, this law imposes reporting, permitting, and operating requirements on operators that generate, treat, store, or dispose of hazardous waste in California. Implementing regulations are contained in the CCR Title 22, Division 4, Chapter 20, Section 66270 *et seq*.

#### 3.1.2.2 Underground Storage Tanks Act

The Underground Storage Tanks Act (HSC Division 20, Chapter 6.7) and the storage tank regulations (CCR Title 23, Chapter 16) established the standards and procedures for the regulation of underground storage tanks. This law requires local implementing agencies (LIAs) to permit, inspect, and oversee monitoring programs to detect leakage of hazardous materials from underground storage tanks. Cleanup of contaminated soil and groundwater resulting from a leak or unauthorized discharge from an underground storage tank or associated plumbing may be directed by the LIA of the RWQCB.

#### 3.1.2.3 Air Toxics Hot Spots Information and Assessment Act

The Air Toxics “Hot Spots” Information and Assessment Act of 1987 (AB 2588; HSC Division 26, Section 44300 *et seq*.) establishes a statewide program to regulate toxic air contaminants that are released into the atmosphere. The Act requires operators of facilities that manufacture, formulate, use, or release air toxics, as defined in HSC Section 44321, to submit an inventory of the air toxics

emissions from individual facilities (HSC Section 44340). The Act authorizes the California Air Resources Board (CARB) to adopt regulations for implementing the Act, which are found in CCR Title 17.

The Act also requires regional and local air pollution control districts (APCDs) to prioritize and categorize pollutant emitting facilities as “high,” “intermediate,” or “low” priority for health risk assessment (HRA) (HSC Section 44360). The priorities for HRAs are based on several variables: emissions quantity, toxicity of emissions, and proximity of potential receptors. Those facilities that are characterized as high priority must submit an HRA to the district. Other, intermediate priority facilities, may be required to submit HRAs depending upon the air district’s regulations established pursuant to the Act.

#### 3.1.2.4 Porter-Cologne Water Quality Act

The Porter-Cologne Water Quality Act (1969) provides for coordinated regulatory controls over all activities that may affect water quality. The Porter-Cologne Act is found in the Water Code Sections 13000 - 14948. The California State Water Resources Control Board (SWRCB) was created in 1969 as the Lead Agency to enforce the Porter-Cologne Act, which provides for the establishment of waste discharge requirements for discharges to California waters, including groundwater.

#### 3.1.2.5 Safe Drinking Water and Toxic Enforcement Act

The Safe Drinking Water and Toxic Enforcement Act of 1986 (HSC Sections 25249.5 to 25249.13), commonly known as Proposition 65, and the Proposition 65 regulations (CCR Title 22 Sections 12000 to 14000), prohibit substantial discharges into sources of drinking water, or onto land from which substances will probably migrate into a source of drinking water, of substances listed under the regulations as carcinogenic or having reproductive toxicity.

Proposition 65 also requires public warnings prior to the exposure of drinking water sources, air, or soil to concentrations of listed substances. The California Environmental Protection Agency (Cal/EPA), Office of Environmental Health Hazard Assessment (OEHHA) is the primary implementing agency for Proposition 65. In the event of a water release of listed substances exceeding Proposition 65 toxicity thresholds, the applicant would first be required to notify DTSC and the RWQCB.

For a release into the soil, DTSC would be notified. For an airborne release, the air pollution control district would be notified. Pursuant to Proposition 65, the applicant would then be required to provide public notice of the release and its potential effects on human health in local newspapers and/or notices mailed to affected residents.

#### 3.1.2.6 California Endangered Species Act

The California ESA states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant population decline which, if not halted, would lead to a threatened or endangered designation, will be protected or preserved. The California ESA prohibits "take" of any species that the California Fish and Game Commission determines to be an endangered species or a threatened species. California defines “take” as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." The California ESA emphasizes early consultation with the California Department of Fish and Wildlife (CDFW) to avoid potential impacts to rare, endangered, and threatened species and to develop appropriate mitigation planning to offset project caused losses of listed species populations and their essential habitats.

#### 3.1.2.7 California Environmental Quality Act

CEQA (PRC Section 21000 *et seq.*) was enacted in 1970. The primary purpose of this Act is to require California public agencies to consider and document the environmental implications of their discretionary approval actions. CEQA applies only to *discretionary* activities proposed to be carried-out or approved by public agencies. It does not apply to private projects that do not require discretionary government approval. The issuance of a hazardous waste facility permit by DTSC is discretionary and, therefore, subject to the environmental review requirements of CEQA.

#### 3.1.2.8 Uniform Fire Code

The Uniform Fire Code, as adopted in CCR Title 19, contains provisions regarding the storage and/or handling of hazardous waste and wastes. The facility will be required to comply with all applicable fire regulations.

#### 3.1.2.9 California Global Warming Solutions Act

The California Global Warming Solutions Act of 2006, or Assembly Bill (AB) 32, was passed to establish a GHG reduction program for the state. AB 32 defines GHGs, mandates a significant reduction in GHGs and sets state GHG emission targets.

### 3.1.3 <u>Local Rules</u>

#### 3.1.3.1 Kern County Air Pollution Control District Rule 416

The EKAPCD has adopted EKAPCD Rule 416V., regarding OB/OD operations on military bases within the district. Under Rule 416V. no OB/OD operation may

be done without prior approval from the Air Pollution Control Officer through the approval of an OB/OD burn plan.

## 3.2 REGULATORY AGENCIES

Federal, state, regional, and local agencies responsible for the implementation and enforcement of the regulatory framework described in Section 3.1 are described in the following sections. Table 3.2-1 summarizes relevant hazardous material regulatory agencies and their statutory authority.

### 3.2.1 Federal Agencies

#### 3.2.1.1 U.S. Environmental Protection Agency

The USEPA is responsible for developing and implementing federal hazardous waste regulations pursuant to RCRA, CERCLA, and subsequent amendments. In addition, the USEPA is responsible for administering the federal CWA, Federal Water Pollution Control Act, and CAA and adopting federal regulations pursuant to the CWA and CAA. The USEPA authorizes certain state agencies, such as the Cal/EPA, to administer state hazardous waste management (DTSC), air quality (CARB), and water quality programs (SWRCB and RWQCB) in lieu of the federal programs. Therefore, the applicant must comply with specific permit application requirements of Cal/EPA.

#### 3.2.1.2 Department of Defense Explosive Safety Board

The DoD Explosive Safety Board oversees the safety aspects of ammunition and explosives development, manufacture, testing, maintenance, demilitarization, handling, transportation and storage of explosives, including chemical agents, at DoD facilities worldwide. The functions of the Explosive Safety Board include:

- review and approval of the explosives safety aspects of all plans for siting, construction or modification of ammunition and explosives facilities, including nearby structures and activities;
- safety surveys and evaluations of ammunition and explosives facilities and activities worldwide to determine compliance with applicable safety standards and to detect conditions endangering life or property; and
- establishing explosives safety standards by using test results, accident data, and theoretical or analytical techniques.

#### 3.2.1.3 Department of Defense U.S. Air Force

The Air Force at Edwards has responsibility for compliance with federal, state and local law. The implementation of OB/OD Units activities under the hazardous waste facility permit is discretionary and, therefore, subject to the environmental review requirements of NEPA and the Air Force regulations for implementing NEPA, as defined in CFR Title 32, Part 989, the Environmental Impact Analysis Process (EIAP).

#### 3.2.1.4 U.S. Department Of Transportation

DOT is responsible for implementing federal hazardous waste transportation provisions contained in the National Transportation Act and federal regulations adopted pursuant to the Act (CFR Title 49). The scope of federal regulation of hazardous waste transport is primarily related to the interstate transport of such waste. The California Highway Patrol (CHP) and DTSC are responsible for regulating in-state transport of hazardous wastes.

#### 3.2.1.5 Occupational Safety and Health Administration

The federal OSHA is responsible for implementation of the Occupational Safety and Health Act and federal regulations (CFR Title 29) adopted by OSHA pursuant to the Act, which include provisions governing the storage and handling of hazardous materials. In the case of California, OSHA has authorized the California Department of Industrial Relations (Cal-OSHA) to administer state occupational health and safety programs in lieu of the federal program.

#### 3.2.1.6 U.S. Fish and Wildlife Service

Under the federal ESA, the USFWS must be consulted before implementing an action that could affect endangered or threatened species. Such consultations require federal agencies, including the military, to prepare a Biological Assessment. After reviewing the assessment, the USFWS will issue a Biological Opinion (BO) stating whether or not actions of the federal agency will jeopardize the continued existence of any threatened or endangered species.

#### 3.2.1.7 Advisory Council on Historic Preservation

The Advisory Council on Historic Preservation is an independent federal agency that promotes the preservation, enhancement, and productive use of historic resources, encourages federal agencies to factor historic preservation into project requirements, and advises the President and Congress on national historic preservation policy. Federal agencies with real property management responsibilities are required to submit assessments and reports outlined in Executive Order 13287.

### 3.2.2 <u>California State Agencies</u>

#### 3.2.2.1 Department of Toxic Substances Control

DTSC, which is a department of the Cal/EPA, administers the California hazardous waste control program established under HSC Division 20, Chapter 6.5, and implemented by regulations contained in CCR Title 22. DTSC is authorized by the USEPA to act as the permitting agency for hazardous waste facilities in California under RCRA and associated federal regulations. DTSC is the Lead Agency for the proposed project and has discretionary authority over the approval or denial of proposed hazardous waste projects in California.

For the proposed project, DTSC intends to accomplish the following:

- Provide for public disclosure of any significant environmental effects associated with approval of the Permit Modification.
- Ensure that the treatment of hazardous wastes at Edwards are in compliance with state and federal requirements.

#### 3.2.2.2 California Air Resources Board

CARB, a department of the Cal/EPA, is the state agency responsible for administering the CCAA (HSC Section 39000 *et seq*.), the Air Toxics “Hot Spots” Information and Assessment Act (HSC Section 44300 *et seq*.), and the Global Warming Solutions Act (HSC Section 38500 *et seq*.). Implementing regulations for the CCAA, “Hot Spots” Act, and Global Warming Solutions Act are found in CCR Titles 13 and 17. CARB also oversees the local implementation of CCAA, state air toxics legislation, and the greenhouse gas reduction program by various APCDs and air quality management districts (AQMDs). When meteorological conditions warrant, CARB announces “no burn” days, which would prohibit OB/OD and other open burn activities. The applicant would be required to comply with all applicable air quality regulations, plans, and permitting processes.

#### 3.2.2.3 State Water Resources Control Board

The SWRCB and the nine RWQCBs, which are all part of the Cal/EPA, establish water quality standards as required by Section 303 of the federal CWA (United States Code Title 33, Part 1313) and the state Porter-Cologne Water Quality Control Act (Water Code Sections 3000 - 14958). The SWRCB oversees the regional administration of the NPDES by the individual RWQCBs, which act as the permitting agencies for discharges to surface waters pursuant to Part 402 of the federal CWA (United States Code Title 33, Part 1344). The SWRCB, through the individual RWQCBs, is also responsible for enforcing regulations adopted pursuant to the Underground Storage Tank Law.

#### 3.2.2.4 Regional Water Quality Control Board - Lahontan Region

The Lahontan RWQCB has jurisdiction over waste discharge to land in the project area and is responsible for issuing permits for discharging wastes to sewers subject to pretreatment. No discharges to surface waters or sewers are proposed.

#### 3.2.2.5 California State Fire Marshal

The California State Fire Marshall is responsible for the statewide implementation of Uniform Fire Code provisions regarding the storage and/or handling of hazardous wastes. The State Fire Marshall also acts as an oversight agency for local and regional fire agencies.

#### 3.2.2.6 California Highway Patrol

The CHP, in conjunction with DTSC, is responsible for the enforcement of California hazardous waste transportation provisions contained in HSC Chapter 6.5, Article 6. The CHP ensures that the transportation of all hazardous waste offsite is carried out pursuant to a valid registration issued by DTSC and that waste is transported on DTSC-approved routes, which are typically the shortest and safest routes. The applicant will be required to comply with all applicable state and federal hazardous waste transport provisions.

#### 3.2.2.7 California Department of Industrial Relations

Cal-OSHA is responsible for implementing provisions of the California Occupational Safety and Health Act and state regulations contained in CCR Title 8 adopted pursuant to the Act. The applicant will be required to comply with applicable Cal-OSHA regulations relating to hazardous waste treatment.

#### 3.2.2.8 California Office of Historic Preservation

The California Office of Historic Preservation is responsible for administration of federal and state mandated historic preservation programs in California. The applicant has entered into an agreement with the SHPO that details Air Force compliance with historic preservation requirements. The agreement requires preparation and submission of an annual report to the SHPO to document Edwards' implementation of the NHPA.

#### 3.2.2.9 Native American Heritage Commission

The Native American Heritage Commission was established by PRC Section 9097.9 et al. to provide protection to Native American burials, provide a procedure for the notification of most likely descendants regarding the discovery of Native American human remains and associated grave goods, bring legal action to prevent damage to sacred shrines, ceremonial sites, sanctified cemeteries, and places of worship on public property, and maintain an inventory

of sacred places. All state and local agencies are required to cooperate with the Native American Heritage Commission in transmitting to the commission copies of appropriate sections of all EIRs related to property, either identified by the commission or reasonably foreseeable, to be of special religious significance to Native Americans.

#### 3.2.2.10 California Department of Fish and Game

The CDFW has jurisdiction over the conservation, protection, and management of wildlife, native plants, and habitat necessary to maintain biologically sustainable populations. CDFW is a Trustee Agency, having jurisdiction over certain resources held in trust for the people of California. CDFW is required to consult with Lead Agencies and provide the requisite biological expertise to review and comment upon environmental documents and impacts arising from project activities. CDFW must be notified of CEQA documents regarding projects involving fish and wildlife of the state, rare and endangered native plants, wildlife areas, and ecological reserves.

### 3.2.3 Local Agencies

#### 3.2.3.1 Eastern Kern Air Pollution Control District

EKAPCD has jurisdiction of the project site and is responsible for ensuring compliance with air quality requirements, including air toxic emissions under the Air Toxics “Hot Spots” Act (HSC Section 44300 *et seq*.) and permitting of stationary sources of air emissions pursuant to the state and federal CAAs. The EKAPCD adopted Rule 416 that specifically applies to OB/OD operations on military bases. EKAPCD has adopted a policy determining the threshold of significance of project GHG emissions. When CARB announces marginal “no burn” days, the Air Pollution Control Officer makes a determination on whether to allow open burning based on local conditions.

#### 3.2.3.2 Kern County Department of Environmental Health Services

Kern County Department of Environmental Health Services is the CUPA for the portion of Edwards in Kern County, including the OB/OD Units. The CUPA is responsible for oversight of basic generator requirements, such as proper management of temporary accumulation areas.

**Table 3.2-1 Hazardous Material Regulatory Agencies Statutory and Regulatory Authority**

| Regulatory Agency | Statutory Authority/ Implementing Regulations |
|---|---|
| **Federal Agencies** | |
| Environmental Protection Agency | Federal Water Pollution Control Act (33 USC §1251 *et seq*.)<br><br>Clean Air Act (42 USC §7401 *et seq*.)<br><br>Resource Conservation and Recovery Act (42 USC §6901 *et seq*.)<br><br>Comprehensive Environmental Response, Compensation, and Liability Act (42 USC §9601 *et seq*.)<br><br>Superfund Amendments and Reauthorization Act (42 USC §9601 *et seq*.)<br><br>Title 40 CFR |
| Department of Defense Explosive Safety Board | (10 USC §172 *et seq*.) |
| Department of Defense, Air Force | Environmental Impact Analysis Process (EIAP) (Title 32 CFR, Part 989)<br><br>Title 40 CFR |
| Department of Transportation | Federal National Transportation Act (49 USC §5101 *et seq*.)<br><br>Title 49 CFR |
| Occupational Safety and Health Administration | Federal Occupational Health and Safety Act (29 USC §651 *et seq*.)<br><br>Title 29 CFR |
| U.S. Fish and Wildlife | 16 USC §1536 |
| Advisory Council on Historic Preservation | National Historic Preservation Act (16 USC §470) |

**Table 3.2-1 Hazardous Material Regulatory Agencies Statutory and Regulatory Authority (contd.)**

| Regulatory Agency | Statutory Authority/Implementing Regulations |
|---|---|
| **State Agencies** | |
| Department of Toxic Substances Control (DTSC) | State Hazardous Waste Control Law (HSC Ch. 6.5)<br>Hazardous Materials Release Response Plans/ Inventory Law (HSC Ch. 6.95)<br>Underground Storage Tanks Law (HSC Ch. 6.7 and 6.75)<br>Titles 17, 19, and 22 CCR<br>Proposition 65 (HSC §§25249.5 to 25249.13)<br>Title 22 CCR §§1200 to 1400 |
| California Air Resources Board (CARB) | State California Clean Air Act (HSC §39000 *et seq*.)<br>Air Toxics "Hot Spots" Act (HSC §44300 *et seq*.)<br>Global Warming Solutions Act (HSC §38500 *et seq*.)<br>Titles 13 and 17 CCR |
| State Water Resources Control Board (SWRCB) and Regional Water Quality Control Board (RWQCB) | Porter-Cologne Water Quality Control Act (Water Code §13000 *et seq*.)<br>Proposition 65 (HSC §§25249.5 to 25249.13)<br>Title 23 CCR<br>Title 22 CCR §§1200 to 1400 |
| Department of Health Services (DHS) | County Federal Water Pollution Control Act (33 USC §1251 *et seq*.)<br>Porter-Cologne Water Quality Control Act (Water Code §13000 *et seq*.) |
| State Fire Marshal | State Uniform Fire Code<br>Title 19 CCR |
| State Highway Patrol | HSC Chapter 6.5<br>Title 49 CFR |
| Department of Industrial Relations (Cal-OSHA) | Occupational Safety and Health Act (Labor Code §50 *et seq*.)<br>Title 8 CCR |
| Department of Fish and Game | Fish and Game Code §§2081 and 2090 |
| Office of Historic Preservation | PRC §§5097.94, 5097.98, and 5097.99<br>HSC §7050.5 |
| Native American Heritage Commission | PRC §5097.9 et al.<br>HSC §7050.5 |

**Table 3.2-1 Hazardous Material Regulatory Agencies Statutory and Regulatory Authority (contd.)**

| Regulatory Agency | Statutory Authority/Implementing Regulations |
|---|---|
| **Local Agencies** | |
| Kern County Department of Environmental Health Services (KCDEHS) | County Tanner Bill (HSC §§25135 and 25199.7)<br><br>HSC Ch. 6.5, 6.7, 6.75, and 6.95<br><br>Title 22 CCR<br><br>Proposition 65 (HSC §§25249.5 to 25249.13)<br><br>Title 22 CCR §§1200 to 1400 |
| Eastern Kern Air Pollution Control District (EKAPCD) | California Clean Air Act (HSC §39000 *et seq*.)<br><br>Air Toxics “Hot Spots” Act (HSC §44300 *et seq*.)<br><br>Proposition 65 (HSC §§25249.5 to 25249.13)<br><br>Title 22 CCR §§1200 to 1400 |
| Kern County Fire Department | Uniform Fire Code<br><br>Title 19 CCR |

# *SECTION 4.0 - ENVIRONMENTAL IMPACT ANALYSIS: ENVIRONMENTAL SETTING, IMPACTS, AND MITIGATION MEASURES*

## 4.1 ENVIRONMENTAL RESOURCE AREAS ADDRESSED

Public and agency input received during the NOP comment period and during the public scoping process helped to determine the scope of evaluation for this DEIR/DEA. Through this process, six environmental resource areas were examined for potential project impacts. These environmental resource areas and their corresponding section numbers are listed below:

- 4.3 Air Quality
- 4.4 Biological Resources
- 4.5 Geology and Soils
- 4.6 Greenhouse Gas Emissions
- 4.7 Hazards and Hazardous Materials
- 4.8 Hydrology and Water Quality
- 4.9 Noise/Vibration

## 4.2 ORGANIZATION OF ENVIRONMENTAL ANALYSIS

Each environmental resource area section is organized into the following subsections:

- Environmental Setting;
- Applicable Standards;
- Thresholds of Significance;
- Potential Environmental Impacts;
- Mitigation Measures;
- Level of Impacts after Mitigation; and
- References.

A description of each subsection follows.

### 4.2.1 Environmental Setting

This section describes the physical environmental conditions in the vicinity of the proposed project, as they existed at the time the NOP was published. The proposed project is Edwards' Permit Modification described in Section 2.0 - Project Description. This environmental setting constitutes the baseline physical conditions by which DTSC determined whether an impact is significant in this DEIR/DEA (CCR Title 14, Section 15125(a)). As an existing permitted facility, Edwards' physical characteristics were included in this baseline environmental description.

This section also contains an analysis of potential impacts associated with Closure Plan activities. The environmental setting when future Closure Plan activities will be implemented is currently unknown. Therefore, the analysis of potential impacts to the future setting may only be speculative. A more thorough analysis may become necessary if any of the activities proposed in the Closure Plan are amended.

### 4.2.2 Applicable Standards

This section sets forth the statutes and regulations applicable to the environmental resource being evaluated for potential impacts, and describes the agencies responsible for enforcement of these statutes and regulations as they relate to the proposed project.

### 4.2.3 Thresholds of Significance

This section sets forth the criteria used to determine when physical changes to the environment, created as a result of project approval, would be considered significant. The criteria used in each environmental resource area were based

on the Environmental Checklist in Appendix G of the CEQA Guidelines (as amended March 18, 2010).

### 4.2.4 Potential Environmental Impacts

This section provides an analysis of potential project impacts and the degree to which those impacts meet or exceed applicable thresholds of significance. The analysis also identifies any proposed controls that are inherent to the project that would serve to influence the level of impact. Impacts are categorized according to the following:

- *"Potentially Significant Impact"* applies if an effect is significant or potentially significant, or if information was lacking to make a finding of insignificance.

- *"Potentially Significant Unless Mitigated"* applies where the incorporation of mitigation measures has reduced an effect from "Potentially Significant Impact" to a "Less than Significant Impact." An objective standard or measure of significance is identified and compared to the level of impacts to be generated by the project upon implementation of the identified mitigation measures.

- *"Less than Significant Impact"* applies where the environmental impact does not exceed the threshold of significance.

- *"No Impact"* applies to projects that have no potential for impacting an environmental factor based on supporting evidentiary data.

### 4.2.5 Mitigation Measures

This section describes feasible mitigation measures that, if applicable, could minimize significant adverse impacts that may result with project approval.

CEQA Guidelines (CCR, Title 14, Section 15370) defines "mitigation" to include:

- Avoiding the impact altogether by not taking a certain action or parts of an action.

- Minimizing impacts by limiting the degree or magnitude of the action and its implementation.

- Rectifying the impact by repairing, rehabilitating, or restoring the impacted environment.

- Reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action.

- Compensating for the impact by replacing or providing substitute resources or environments.

In accordance with CEQA Guidelines (PRC Section 21081.6), a mitigation and monitoring program would be required to be adopted by DTSC to demonstrate and monitor compliance with any mitigation measures identified in this DEIR/DEA. The program would identify specific mitigation measures to be undertaken, when the measure would be implemented, and the agency responsible for oversight, implementation, and enforcement.

### 4.2.6 Level of Impacts after Mitigation

This section provides a summary explanation as to the level of impact to the environmental resource area after imposition of any required mitigation measures. If no mitigation measures are required, a statement to that effect is provided.

### 4.2.7 References

This section lists the documents and personal communications that were used to support the conclusions or findings in each environmental resources area section.

The following sections examine the potential impacts that the proposed project may have upon the “baseline” environmental conditions that exist for each environmental resource area affected by the proposed project.

## 4.3 AIR QUALITY

This section describes the existing air quality of the project area and the estimated impacts on air quality from compounds produced during OB/OD operations and maintenance activities related to the project.

### 4.3.1 Environmental Setting

Edwards lies within the Mojave Desert Air Basin (MDAB) (Figure 4.3-1) and is located within the jurisdiction of three local air districts: the Eastern Kern Air Pollution Control District (EKAPCD), the Mojave Desert Air Quality Management District (MDAQMD), and the Antelope Valley Air Quality Management District (AVAQMD) (Figure 4.3-2). Within the boundaries of Edwards the local air district boundaries coincide with those of the counties of Kern, San Bernardino, and Los Angeles respectively. The EOD Range (and most of the facilities on base) lies within the EKAPCD and all activities from the proposed project occur in an area under the jurisdiction of the EKAPCD.

Area mountain and valley basin topography causes a wide fluctuation in the levels of rainfall and temperature-induced basin wind flow patterns which affect air dispersion along mountain ridges, vertical mixing, and the photochemistry of pollutants. The Tehachapi Pass in the Tehachapi Mountains, the pass through Saugus on Highway 14, and Cajon Pass serve as conduits allowing air movement and pollutant transport from the San Joaquin Valley, the Los Angeles area, and the San Bernardino area into the Antelope Valley.

The Mojave Desert has an arid desert climate sheltered from maritime weather influences of the Pacific Ocean by the Coastal range to the west and the San Gabriel Mountains to the south. Most of the region is characterized by hot summers, cold winters, infrequent rainfall, active air movement, and very low relative humidity. The arid climate of Edwards produces great variation in daily temperatures. Temperatures can range from a record high of 112 degrees Fahrenheit (°F) to a record low of -5°F. The annual mean temperature is 62°F, with monthly average high temperatures ranging from 97°F in July to 56°F in December, and monthly average low temperatures ranging from 70°F in July to 33°F in December.

Mean annual rainfall is approximately 5 inches per year. Precipitation occurs mostly during the winter months when the highest monthly rainfall averages over one inch in February. Thunderstorm activity is rare. Relative humidity is very low in the summer (30% to 50% in the early morning; 10% to 20% in the late afternoon). Mean annual evaporation is over 100 inches per year.

Evapotranspiration rates in the vicinity of the EOD Range are 66.4 inches per year. The intense solar radiation in the summer is highly conducive to the formation of ozone and other photochemical oxidants in the atmosphere, but only when precursor chemicals are present.

The prevailing wind direction is from the southwest to west (225 to 270 degrees) throughout the year with wind speeds generally below 16 knots (18 miles per hour) (Figure 4.3-3, Windrose). The highest average wind speeds occur during the spring with the lowest wind speeds occurring during the winter. Calm occurs about 13.93% of the time on an annual basis. Atmospheric stability, the measure of vertical dispersion of pollutants, is high at Edwards. Stable conditions, which are an indication of weak pollutant dispersion, exist about 57% of the time. Thus, the potential for collection of pollution in the area is relatively high.

### 4.3.2 Applicable Standards

#### 4.3.2.1 Air Quality Standards

The air quality of an area is most frequently evaluated by compliance with the National Ambient Air Quality Standards (NAAQS) for “criteria” pollutants designated by the USEPA and by compliance with the California Ambient Air Quality Standards (CAAQS). The federally designated criteria pollutants are carbon monoxide, ozone, nitrogen dioxide, sulfur dioxide, lead, respirable particulate matter ($PM_{10}$), and fine particulate matter ($PM_{2.5}$). The pollutants with state standards are ozone, $PM_{10}$, $PM_{2.5}$, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, visibility reducing particles, sulfates, hydrogen sulfide, and vinyl chloride. The standards are presented in Table 4.3-1, and represent levels of air quality that, with an adequate margin of safety, protect the public health and welfare.

The term “designation” is used to describe whether an area meets the air quality standards for each of the criteria pollutants. The area designations are reviewed each year. An attainment designation is assigned to areas where air quality levels are in compliance with ambient air quality standards; whereas, designated non-attainment areas persistently exceed or contribute to violations of these standards. An unclassified designation is given to areas with insufficient air quality data.

For federal designation of ozone, $PM_{2.5}$, carbon monoxide, and nitrogen dioxide, an area may be designated unclassifiable/attainment or non-attainment. For federal designation of sulfur dioxide and $PM_{10}$ an area may be designated attainment, unclassified, or non-attainment. For federal designation of lead, an area may be designated unclassified or non-attainment. For state designation, all pollutants with state standards except vinyl chloride may be designated attainment, non-attainment, or unclassified. For state designation, ozone may

have the additional designation of non-attainment-transitional. State area designation of vinyl chloride is not required.

#### 4.3.2.2 Attainment Status

The project area has non-attainment status under both state and federal standards for ozone. For $PM_{10}$ the area has non-attainment status for state and unclassified status for federal standards. The area has either attainment or unclassified status for $PM_{2.5}$, carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, hydrogen sulfide, sulfates, and visibility. Table 4.3-2 shows the CAAQS and NAAQS attainment status for the project area.

There is no maximum hourly federal standard for ozone. The 8-hour federal standard is 0.075 ppm. The hourly state standard is 0.09 ppm and the 8-hour state standard is 0.070 ppm. The closest monitoring station for determining compliance is at Lancaster, in the AVAQMD. The closest monitoring station in the EKAPCD is located in Mojave. Preliminary data for 2011 indicates that there were 53 exceedances of the maximum 8-hour federal standard at the Lancaster station, while there were 76 exceedances of the 8-hour state standard. There were nineteen (19) exceedances of the hourly state standard. The exceedances of the hourly state standard occurred on the same day as the exceedances of the state and federal 8-hour standard. The maximum 8-hour concentration was 0.100 ppm, while the maximum hourly concentration was 0.115 ppm. Preliminary data for 2011 indicates that there were twenty (20) exceedances of the maximum 8-hour federal standard at the Mojave station, while there were 43 exceedances of the 8-hour state standard. There were two (2) exceedances of the hourly state standard. The exceedances of the hourly state standard occurred on the same day as the exceedances of the state and federal 8-hour standard. The maximum 8-hour concentration was 0.092 ppm, while the maximum hourly concentration was 0.101 ppm.

The state standard for $PM_{10}$ for a 24-hour period is 50 micrograms per cubic meter ($\mu g/m^3$) and the annual average standard is 20 $\mu g/m^3$. Air monitoring stations are located in Lancaster and Mojave. State and national statistics differ at these stations. State and national statistics are based on different, although collocated, samplers. State conditions are based on local conditions, and national statistics are based on standard conditions. Finally, for annual averages, state criteria for ensuring sufficiency of data are more stringent than national criteria. Preliminary state and national data for 2011 indicates that there were no exceedances of the state 24-hour standard at Lancaster. There were 18 exceedances of the standard at the Mojave station reported using data from the state sampler, and no exceedances reported using data from the national sampler. The maximum 24-hour average concentration was 79.4 $\mu g/m^3$. Preliminary state data for 2011 indicates that there have been no exceedances of the state annual average standard at the Lancaster station since 2007 (28.3 $\mu g/m^3$). National data indicates an exceedance in 2009 (20.5 $\mu g/m^3$). The most

recent reported exceedance of the state annual average standard at the Mohave station from both state and national data was in 2008 (22.3 µg/m$^3$ and 24.4 µg/m$^3$ respectively).

#### 4.3.2.3 State Implementation Plan (SIP)

Under the 1990 CAA Amendments, a SIP was required to be prepared to address attainment of the federal standard for ozone. SIPs are a compilation of plans, programs (such as monitoring, modeling, permitting, etc.), district rules, state regulations and federal controls. Many of California's SIPs rely on the same core set of control strategies, including emission standards for cars and heavy trucks, fuel regulations and limits on emissions from consumer products. State law makes CARB the lead agency for all purposes related to the SIP. Local air districts prepare SIP elements and submit them to CARB for review and approval.

EKAPCD submitted an Ozone Attainment Demonstration, Maintenance Plan, and Redesignation Request in 2003. Ozone data collected from 1999 to 2002 at EKAPCD's three ozone monitors showed attainment of the NAAQS. Further, EKAPCD is "overwhelmingly" impacted by ozone transport from both the San Joaquin Valley Air Basin and the South Coast Air Basin. The overwhelming impact of ozone transport classification describes a condition when the emissions from the upwind area independently result in a violation of the ozone standards in the downwind area on any given day. Air pollutant emission sources in the downwind area by themselves do not cause exceedances of state or federal standards. Significant emission sources in the downwind area are not in the pathway of the air parcel that was transported from the upwind area. The responsibility for a violation caused by overwhelming transport lies within the upwind area. The transport mitigation regulation requires air basins which are identified as upwind areas to adopt best available retrofit control technology for some existing stationary sources of ozone precursor emissions. In addition, air basins which are classified as causing overwhelming transport must adopt sufficient control measures to attain the state ozone standard in the downwind areas when conditions are conducive to overwhelming transport. There are no state planning requirements for downwind areas where non-attainment is due to overwhelming impact by transport from upwind areas.

The State Strategy for California's 2007 SIP (State Strategy) is designed to allow California to meet the federal 8-hour ozone standard. California's mobile source control program serves as the foundation for the State Strategy. The State Strategy and ozone precursor pollutant ($NO_x$ and VOC) control measures implemented by the San Joaquin Valley Unified APCD, would provide emission reductions necessary to the meet the 8-hour ozone federal standard in the South Coast Air Basin and the San Joaquin Valley as well as downwind areas.

#### 4.3.2.4 Conformity with SIP

Federal facilities located in a NAAQS non-attainment area are required to comply with Federal Air Conformity rules and regulations in 40 CFR Parts 51 and 93. Under Air Conformity, a facility (such as Edwards) that initiates a new action must evaluate the new activities to ensure that emissions from stationary and mobile sources associated with that action do not interfere in that state's attainment of the NAAQS for one or more pollutants. This rule has been implemented locally as EKAPCD Rule 210.7.

Activities are presumed to conform to a SIP when the federal agency has met the following criteria:

- Demonstrated that the project would not:
  - cause or contribute to any new violation of any standard in any area;
  - interfere with provisions in the applicable SIP for maintenance of any standard;
  - increase the frequency or severity of any existing violation of any standard in any area; or
  - delay timely attainment of any standard or any required interim emission reductions or other milestones in any area: or

- The total of direct and indirect emissions from such future actions would be below the emission rates for a conformity determination: or

- The emissions from the type or category of actions and the amount of emissions from the action are included in the applicable SIP.

Under 40 CFR 93.153(c), the project is specifically exempt if the total net increase in direct and indirect emissions are below the emissions rates specified in 40 CFR 93.153(b). The project is located in a NAAQS non-attainment area for ozone. The applicable emissions rates for non-attainment areas inside an ozone transport region are 50 tons per year of VOCs and 100 tons per year of $NO_x$.

#### 4.3.2.5 Open Burn/Open Detonation Burn Plan

The EKAPCD has adopted Rule 416 to limit open burning within the district to only those activities for which there is no feasible or practical alternative. Part V. of Rule 416 requires Edwards to submit a Burn Plan and to comply with specific conditions and criteria, including the following:

- Limit the category and amount of hazardous waste to be treated each year to an amount with a projected lifetime toxic cancer risk less than one-in-one million and limit daily treatment amounts to that level not causing an impact above acute toxic thresholds.

- Limit open burn/open detonation operations or provide for mitigation when meteorological conditions could cause emissions to result in or contribute to an exceedance of any state or federal ambient air quality standard or cause a public nuisance.

- Hazardous waste treated must be free of non-PEP materials, except for those materials necessary to safely store, handle, or treat PEP or intimately-related materials also requiring treatment.

- Hazardous waste PEP must be in a condition facilitating combustion, assuring safe operation, and minimizing the amount of emissions emitted during treatment.

- The Burn Plan must include the following information:
  - location of proposed treatment operation,
  - category and amount of waste PEP to be treated,
  - directions and distances to nearby receptor areas,
  - air quality impact analysis showing expected impacts with respect to state and federal ambient air quality standards,
  - risk assessment for acute and chronic health effects,
  - meteorological criteria developed for the project,
  - projected schedule or frequency of OB/OD events,
  - specifications for monitoring and recording of critical project parameters, and
  - specifications for reporting and disseminating project information.

- Hazardous waste to be treated shall be limited to PEP generated from operations at the federal facility where the OB/OD operation is to take place.

- Open burn/open detonation operations shall be allowed on normal business days for the District, or on such other days as the District may approve.

- All open burn/open detonation operations shall conform to applicable jurisdictional fire codes.

- Open burn/open detonation operations shall not be initiated if emissions may drift into a populated area or create a public nuisance.

- Total amount of material treated in any one day may be limited by the District, taking into consideration potential for creation of a threat to public health.

- Records shall be maintained for the type and amount of PEP for each open burn/open detonation operation and shall be submitted to the

District no more than sixty days prior to the end of the burn plan approval period. Records shall be maintained for five years.

- District staff shall be permitted, when accompanied by appropriate personnel:
  - To enter premises where the OB/OD site is located or in which any records are required to be kept under requirements of the burn plan.
  - To inspect any equipment, operation, or method required by the burn plan.

  EKAPCD shall also have authority to require collection and analysis of emission samples from the source.

- A summary of data required to determine compliance with applicable provisions of this Rule shall be submitted to, and as prescribed by, the Control Officer.

As required by Rule 416, Edwards submitted a final detailed Burn Plan (Radian, 1996) to EKAPCD and the Burn Plan was approved by the District on 22 May 1997. The Burn Plan has been reviewed and renewed annually. The Burn Plan is currently under revision and a draft is expected to be submitted in the 4$^{th}$ Quarter 2013. The draft Burn Plan would contain a detailed emissions and dispersion modeling analysis for criteria pollutants, including ozone and $PM_{10}$ and toxic air contaminants.

#### 4.3.2.6 Human Health Risk Assessment

CCR Title 22, Section 66264.601 requires completion of a risk assessment to ensure that the location, design, construction, operation, maintenance, and closure of the OB/OD Units are protective of human health. The potential health effects of emissions from operations at the OB/OD Units have been evaluated in three prior HRAs: one HRA prepared for the DTSC in 1996 (Radian Corporation 1996); one as part of a Burn Plan prepared for the Eastern Kern County Air Pollution Control District (EKCAPCD) in 1997 (Radian Corporation 1997); and a Draft 2005 Edwards AFB OB/OD HRA (2005 EAFB HRA), which was not finalized or approved by DTSC. The most recent HRA (Edwards Air Force Base. 2012) was finalized in January 2012 and has been approved by DTSC. This 2012 HRA evaluates the potential health effects following the most current Office of Environmental Health Hazard Assessment (OEHHA) guidelines and other regulatory guidance documents, as well as updated PEP emissions data, ash and soil constituent data, air dispersion modeling and toxicity factors. For this 2012 HRA, DTSC also adopted a lifetime cancer risk threshold of one in one million ($1.0 \times 10^{-6}$) and hazard indices (HI) of 1.0 for non-carcinogenic chronic and acute health hazards.

The 2012 HRA is described more fully in Section 4.7, Hazards and Hazardous Materials. The following analysis of potential air impacts is primarily based on the 2012 HRA results.

#### 4.3.2.7 Title V Federal Operating Permit

The OB/OD Units operate under a Title V Federal Operating Permit (Permit Number 0131015) approved by the EKAPCD.

### 4.3.3 Thresholds of Significance

According to Appendix G of the state CEQA Guidelines, a project would normally have a significant adverse impact related to Air Quality if it would:

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

The significance thresholds are addressed in the following section.

### 4.3.4 Potential Environmental Impacts

Operations at the OB/OD Units have the potential to impact air quality. The 2012 HRA was completed to quantify air emissions and evaluate direct and indirect sources of emissions from operations at the OB/OD Units. These estimates are based on the maximum annual quantity and maximum event quantity of hazardous waste that could be treated under the proposed project. The draft Burn Plan uses the same methodology to quantify emissions as the 2012 HRA.

The emissions evaluated are from:

- Treatment of energetic wastes by OB, including ECW;
- Treatment of energetic wastes by OD, including metal casings;
- Entrainment of dust during OD;

- Fugitive dust and ash from wind erosion of the treatment site;
- Grading during the preparation and maintenance of the site; and
- Ash handling subsequent to OB/OD treatment.

The emissions from the proposed project were estimated using a variety of methods, including use of source test data taken from enclosed chamber (bang box) facilities, source test data from simulated detonations conducted in a test chamber, engineering analyses, material balance calculations, and use of emission factors provided by various regulatory agencies. Chemicals of concern (COCs) evaluated in the 2012 HRA are listed in Table 4.3-3. Ground-level concentrations for each compound were estimated from air dispersion modeling. Two models were used, SCREEN 3 and INPUFF. Each model simulates different activities associated with the OB/OD event.

#### 4.3.4.1 Criteria Pollutants

Criteria pollutants evaluated in the 2012 HRA are carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, and vinyl chloride. There are no quantifiable emissions of ozone, sulfates, and hydrogen sulfide from OB/OD operations. Ozone is formed in the presence of precursor pollutants ($NO_x$ and VOCs). Vinyl chloride is not evaluated further, as the area has no designation for this pollutant.

$PM_{10}$ and $PM_{2.5}$ ground-level concentrations are calculated from emission rates presented in the 2012 HRA. Particulate matter emissions are the sum of direct sources (entrainment of dust from OD event), and indirect sources (ash handling, grading, and wind erosion). Direct sources have emission rates defined per event. The indirect sources have defined annual emission rates independent of actual OB/OD events and are considered to occur on a continual basis. As there are no individual emission rates for $PM_{2.5}$, ground-level concentrations are calculated using the $PM_{10}$ emission rates. For indirect sources, the annual emission rate was used to calculate both 24-hour and annual average concentrations.

The criteria pollutant concentrations for the OB/OD Units are summarized in Table 4.3-4. The Table depicts exceedances of the California Ambient Air Quality Standards (CAAQS). For this evaluation, the ground-level concentration for nitrogen dioxide also includes nitric oxide to provide the $NO_x$ concentration. Except for $PM_{10}$, criteria pollutant ground level concentrations from OB/OD operations, performed under the conditions of the proposed project, would not cause an exceedance of federal or state ambient air quality standards. The project would not cause an exceedance of federal standards for $PM_{10}$. Since the area is designated non-attainment for $PM_{10}$ under the state standard, the project contributes to exceedance of the state $PM_{10}$ standard on a cumulative basis. Because the project would comply with the Burn Plan and contribute 15 tons or less of $PM_{10}$ annually, impacts to $PM_{10}$ are considered to be less than significant

on a cumulative basis. Emissions of the ozone precursor pollutants, $NO_x$ and VOC, are also less than significant.

#### 4.3.4.2 Toxic Air Contaminants

The 2012 HRA estimated ground-level concentrations for toxic air contaminants at the maximum point of exposure. Concentrations were calculated for treatment of the energetics as well as entrainment of dust from the crater caused by detonation, ash handling, fugitive dust from grading, and dust and ash from wind erosion. Toxic air contaminant concentrations for crater dust, grading, and windblown dust were based on soil concentration data from sampling conducted at AFRL and on the PIRA as part of the Edwards AFB Installation Restoration Program and other sampling events (EAFB 1999, EAFB 2003 and EAFB 2007). The AFRL samples are from the Area 1-100 OB/OD Unit (Site 39) that currently operates under the 1993 Stipulation & Order. The Stipulation & Order allows for operation of the OB/OD units only until DTSC makes a hazardous waste facility permit determination. The PIRA samples are from the former PIRA OB/OD Unit (Site 270) that was operational up to the early 1990s and is now inactive. Estimated concentrations of each chemical from each emission source are presented in Appendix G, of the 2012 HRA (see Appendix B of this report). Toxic air contaminant concentrations from OB/OD operations, performed under the conditions of the proposed project, minimally contribute toward background concentrations.

#### 4.3.4.3 Closure Plan

Implementation of the Closure Plan would involve soil sampling, decontamination, and possible removal of the equipment shed, concrete pads, and fencing. If soil contamination is found, the activities may include soil removal. Closure Plan activities would involve additional trips to and from the site. These activities would be temporary and trips generated would be few. Fugitive dust generated from soil removal would be similar to grading for maintenance of the Units. Thus, no significant impacts to air quality would result from implementation of the Closure Plan.

#### 4.3.4.4 Compliance with Thresholds of Significance

<u>Conflict with or obstruct implementation of the applicable air quality plan.</u>

The project is located in an area designated as nonattainment for federal and state ozone standards. The applicable air quality plan is the State Implementation Plan (SIP). The area has been demonstrated to be “overwhelmingly” impacted by ozone transport from both the San Joaquin Valley Air Basin and the South Coast Air Basin. The responsibility for a violation caused by overwhelming transport lies within the upwind area. There are no state planning requirements for downwind areas where non-attainment is due to

overwhelming impact by transport from upwind areas. The analyses indicate that the project itself would not cause or contribute to an exceedance of the federal or state standards for ozone. Therefore, the project will conform to the SIP.

Violate any air quality standard or contribute substantially to an existing or projected air quality violation.

The project area has non-attainment status under the federal and state ozone standards. The area has been demonstrated to be “overwhelmingly” impacted by ozone transport from both the San Joaquin Valley Air Basin and the South Coast Air Basin. The analyses indicate that the project itself would not cause or contribute to an air quality violation for ozone.

The project area has non-attainment status for the state standard for $PM_{10.}$ $PM_{10}$ emissions from the proposed project are the sum of entrainment of dust from OD, ash handling, grading, and wind erosion of dust and ash. EKAPCD Rule 416 requires submission of a Burn Plan to limit open burn/open detonation operations or provide for mitigation when meteorological conditions could cause emissions to result in or contribute to an exceedance of any state or federal ambient air quality standard. Terms and conditions included in the Burn Plan approved by EKAPCD, the EOD Range Operation Plan, and/or the draft Hazardous Waste Facility Permit Modification operating conditions, limit treatment to periods when there are no electrical, sand, dust, rain, or snow storms present and when the wind speed does not exceed 15 mph. Characteristics of the open burn/open detonation treatment operations would minimize potential emissions. For example, treatment events are anticipated to occur no more frequently than two times per month and have short durations, lasting less than five minutes per event. The analyses indicate that under the conditions of the Burn Plan, the Operation Plan, and the draft Hazardous Waste Facility Permit Modification, the project would not cause or substantially contribute to exceeding the state standard for $PM_{10}$. Pursuant to discussion with Julie Damo - Air Quality Engineer from the EKAPCD on April 19, 2013, compliance with the Burn Plan and $PM_{10}$ emissions of 15 tons or less annually with established controls for the project is considered a less than significant.

Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors).

The project area has non-attainment status under the federal and state standards for ozone and the state standard for $PM_{10}$. The area has been demonstrated to be “overwhelmingly” impacted by ozone transport from both the San Joaquin Valley Air Basin and the South Coast Air Basin. The responsibility for a violation caused by overwhelming transport lies within the upwind area. There are no state planning requirements for downwind areas where non-attainment is due to

overwhelming impact by transport from upwind areas. The analysis indicates that the project would contribute minimally toward background concentrations for all criteria pollutants including ozone precursors, $PM_{10}$, and other criteria pollutants, and therefore the increase would not be cumulatively considerable.

Expose sensitive receptors to substantial pollutant concentrations.

An HRA was completed to quantify air emissions from operations at the OB/OD Units and to determine the human health risk and hazard. The HRA indicates that the project would contribute minimally toward background concentrations for toxic air contaminants, and therefore the increase will not be cumulatively considerable.

In addition, the Air Quality Protection Measures (AQPMs) are included in the Burn Plan approved by EKAPCD, the Permit Modification application, and/or the draft Hazardous Waste Facility Permit Modification:

- Operations are limited to periods of specific meteorological conditions, such that emissions from the operations will not result in exceeding CAAQS or NAAQS, and will not create a public nuisance. Specifically, operations will not be conducted during periods of:
  - electrical, sand, dust, rain, or snow storms present at the EOD Range; or
  - electrical storms within 5.75 miles of the EOD Range.

  OB operations will not be conducted during periods of winds in excess of fifteen (15) miles per hour. In addition, events will not be conducted on “no burn” days confirmed by EKAPCD;

- The types, annual amounts, and single event amounts of hazardous waste, plus the donor charge to initiate the event, shall be limited such that a projected lifetime cancer risk of less than $1x10^{-6}$ and chronic and acute HI of 1.0 shall not be exceeded;

- Hazardous waste to be treated must be in a condition that will facilitate combustion and minimize smoke emitted during treatment;

- The facility will investigate and periodically report on methods to directly measure OB/OD emissions.

Create objectionable odors affecting a substantial number of people.

The project may produce odors from operation of vehicles and dust. The odors will be short-lived and imperceptible at the facility boundary. The nearest boundary point from the project site is approximately 1.6 miles and the nearest residential location is approximately 5.4 miles.

### 4.3.5 Mitigation Measures

AQPMs listed in Table ES-1 have been established by Edwards to minimize impacts to the environment. Potential impacts to air quality as a result of the proposed project will be less than significant for $NO_X$ and VOCs. Impacts to $PM_{10}$ will be cumulatively significant due to their contribution to air quality impacts for the region. However, the project will comply with the EKAPCD Rule 416 Burn Plan conditions. Therefore, project impacts to PM10 will be less than significant. Cumulative effects on $PM_{10}$ will be less than significant due to compliance with the Burn Plan conditions and $PM_{10}$ emissions of 15 tons or less annually. The annual estimated emissions of $PM_{10}$ from the facility are 3.9 tons. Mitigation measures are not required for $NO_X$ and VOCs.

### 4.3.6 Level of Impacts After Mitigation

Impacts to air quality from the proposed project to $NO_X$ and VOCs are less than significant, and mitigation is not required. AQPMs listed in Table ES-1 will be carried out. Impacts to $PM_{10}$ will be cumulatively less than significant due to the project's annual output of 15 tons or less of $PM_{10}$ and the project's compliance with the EKAPCD Rule 416 Burn Plan conditions. Cumulative effects on $PM_{10}$ would also be less than significant due to the operations level of 15 tons of $PM_{10}$ annually or less and compliance with the Burn Plan conditions. The annual estimated emissions of $PM_{10}$ from the facility are 3.9 tons.

### 4.3.7 References

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## Table 4.3-1 California and National Air Quality Standards

| Pollutant | Averaging Time | California Standards [a] Concentration [c] | Federal Standards Concentration [b] | |
|---|---|---|---|---|
| | | | Primary [c,d] | Secondary [c,e] |
| Ozone ($O_3$) | 1 Hour | 0.09 ppm (180 µg/m$^3$) | --- | Same as Primary Standard |
| | 8 Hour | 0.070 ppm (137 µg/m$^3$) | 0.075 ppm (147 µg/m$^3$) | |
| Respirable Particulate Matter ($PM_{10}$) | 24 Hour | 50 µg/m$^3$ | 150 µg/m$^3$ | Same as Primary Standard |
| | Annual Arithmetic Mean | 20 µg/m$^3$ | -- | |
| Fine Particulate Matter ($PM_{2.5}$) | 24 Hour | -- | 35 µg/m$^3$ | Same as Primary Standard |
| | Annual Arithmetic Mean | 12 µg/m$^3$ | 15 µg/m$^3$ | |
| Carbon Monoxide (CO) | 1 Hour | 20 ppm (23 mg/m$^3$) | 35 ppm (40 mg/m$^3$) | -- |
| | 8 Hour | 9.0 ppm (10 mg/m$^3$) | 9 ppm (10 mg/m$^3$) | |
| Nitrogen Dioxide ($NO_2$) | 1 Hour | 0.18 ppm (339 µg/m$^3$) | 0.100 ppm (188 µg/m$^3$) (see footnote f) | -- |
| | Annual Arithmetic Mean | 0.030 ppm (57 µg/m$^3$) | 0.053 ppm (100 µg/m$^3$) | Same as Primary Standard |
| Sulfur Dioxide ($SO_2$) | 1 Hour | 0.25 ppm (655 µg/m$^3$) | 0.075 ppm (196 µg/m$^3$) (see footnote g) | -- |
| | 3 Hour | -- | -- | 0.5 ppm (1300 µg/m$^3$) |
| | 24 Hour | 0.04 ppm (105 µg/m$^3$) | -- | -- |
| Lead [h] | 30 Day Average | 1.5 µg/m$^3$ | -- | -- |
| | Rolling 3-month Average | -- | 0.15 µg/m$^3$ | Same as Primary Standard |
| Visibility Reducing Particles | 8 Hour | Extinction coefficient of 0.23 per km - visibility of 10 miles or more due to particles when relative humidity is less than 70 percent. | -- | -- |
| Sulfates | 24 Hour | 25 µg/m$^3$ | -- | -- |
| Hydrogen Sulfide | 1 Hour | 0.03 ppm (42 µg/m$^3$) | -- | -- |
| Vinyl Chloride [h] | 24 Hour | 0.01 ppm (26 µg/m$^3$) | -- | -- |

Source: California Air Resources Board (CARB, 6/7/12)

ppm = parts per million
µg/m$^3$ = micrograms per cubic meter
mg/m$^3$ = milligrams per cubic meter

Footnotes:

[a] California standards for ozone, carbon monoxide, sulfur dioxide (1-hour and 24-hour), nitrogen dioxide, suspended particulate matter-$PM_{10}$, $PM_{2.5}$, and visibility reducing particles, are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the CCR.

[b] National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest eight hour concentration in a year, averaged over three years, is equal to or less than the standard. For $PM_{10}$, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For $PM_{2.5}$, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

[c] Concentration expressed first in units in which it was promulgated. (National standards for nitrogen dioxide and sulfur dioxide were promulgated in parts per billion (ppb), converted here to ppm.) Equivalent units given in parentheses are based upon a reference temperature of 25° C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25° C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.

[d] National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.

[e] National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.

[f] To attain this standard, the 3-year average of the 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 0.100 ppm.

[g] To attain this standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 0.075 ppm.

[h] The CARB has identified lead and vinyl chloride as “toxic air contaminants” with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.

**Table 4.3-2 Attainment Status of the Mojave Desert Air Basin**

| Pollutant | Federal Status[a] | State Status[b] |
|---|---|---|
| Ozone | Non-attainment | Non-attainment |
| $PM_{10}$ | Unclassified | Non-attainment |
| $PM_{2.5}$ | Unclassifiable/Attainment | Unclassified |
| Carbon Monoxide | Unclassifiable/Attainment | Unclassified/Attainment |
| Nitrogen Dioxide | Unclassifiable/Attainment | Attainment |
| Sulfur Dioxide | Unclassified | Attainment |
| Lead | Unclassified | Attainment |
| Visibility | Not Applicable[c] | Unclassified |
| Sulfates | Not Applicable[c] | Attainment |
| Hydrogen Sulfide | Not Applicable[c] | Unclassified |
| Vinyl Chloride | Not Applicable[c] | No Designation[d] |

Footnotes:

[a] See 40 CFR 81.305
[b] CCR Title 17, Division 3, Chapter 1, Subchapter 1
[c] Federal standards do not exist for these pollutants
[d] State area designations do not exist for this pollutant

## Table 4.3-3 Chemicals of Concern Evaluated in the Health Risk Assessment

1- & 2-Methylnaphthalene
1,1,1-Trichloroethane (Methyl chloroform)
1,1,2-Trichloroethane
1,1,3-Trimethyl-3-Phenylindane
Octahydro-1,3,5,7-Tetranitro-1,3,5,7-tetrazocane (HMX)
1,3,5-Trinitro-1,3,5-triazacyclohexane (RDX)
1,3,5-Trinitrobenzene
1,3-Butadiene
1,4-Dichlorobenzene
1-Nitropyrene
2,2,4-Trimethylpentane (isooctane)
2,4,6-Trinitrotoluene (TNT)
2,4-Dinitrotoluene
2,6-Dinitrotoluene
2-Methylnaphthalene
2-Methylphenol (o-Cresol)
2-Nitroaniline
2-Nitrodiphenylamine
2-Nitronaphthalene
2-Nitropropane
2-Toluidine
3,3-Dimethylbenzidine
4-Methylphenol (p-Cresol)
4-Nitrophenol
7,12-Dimethylbenz(a)anthracene
Acenaphthene
Acenaphthylene
Acetone
Acetophenone
Acetylene
Acrolein
Aluminum
Ammonia
Ammonium Perchlorate
Anthracene
Antimony
Arsenic
Barium
Benz(a)anthracene
Benzaldehyde
Benzene
Benzidine
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(k)fluoranthene
Benzyl Alcohol
Beryllium
Biphenyl
Bis(2-ethylhexyl) Phthalate
Boron
Bromodichloromethane
Bromoform (tribromomethane)
Bromomethane
Butyl Benzyl Phthalate
Cadmium
Calcium
Carbazole
Carbon Dioxide
Carbon Monoxide
Carbon Tetrachloride
Chlorine
Chloroform
Chloromethane (Methyl chloride)
Chloropicrin (trichloronitromethane)
Chromium
Chromium, Hexavalent (Chromium VI)
Chrysene
Cobalt
Copper
Cyclohexane
Dibenz(a,h)anthracene
Dibenzofuran
Dibromochloromethane
Dichlorodifluoromethane (Freon 12)
Diethyl Phthalate
Dimethyl Phthalate
Dimethylamine
Di-n-butyl Phthalate
Di-n-octyl Phthalate
Diphenylamine
Ethylbenzene
Ethylene
Fluoranthene
Fluorene
Fluorotrichloromethane (Freon 11)
Hydrogen Chloride
Hydrogen Cyanide
Iron

## Table 4.3-3 Chemicals of Concern Evaluated in the Health Risk Assessment (contd.)

Isophorone
Isoprene
Lead
Magnesium
Manganese
Mercury
Methane
Methylcyclohexane
Methylene chloride
Molybdenum
N,2,4,6-Tetranitroaniline
Naphthalene
n-Butylbenzene
Nickel
Nitric Oxide
Nitrogen Dioxide
Nitroglycerin
Nitroguanadine
N-Nitrosodiethylamine
N-Nitrosodiphenylamine
Non-benzene Aromatics
n-Propylbenzene
Octachlorodibenzofuran, 1,2,3,4,6,7,8,9-
Octachlorodibenzo-p-dioxin, 1,2,3,4,6,7,8,9-
Olefins
Paraffins
Phenanthrene
Phenol
Phosgene
Phosphorus
Potassium
Propylene
Pyrene
Selenium
Silica, Crystalline
Silver
Sodium
Strontium
Styrene
Sulfur Dioxide
t-Butylbenzene
Titanium
Total Heptachlorodibenzofuran (HpCDF)
Total Heptachlorodibenzo-p-dioxin (HpCDD)
Total Hexachlorodibenzofuran (HxCDF)
Total Hexachlorodibenzo-p-dioxin (HxCDD)
Total Pentachlorodibenzofuran (PeCDF)
Total Pentachlorodibenzo-p-dioxin (PeCDD)
Total Tetrachlorodibenzofuran (TCDF)
Total Tetrachlorodibenzo-p-dioxin (TCDD)
Urethane (Ethyl carbamate)
Vanadium
Vinyl Chloride
Zinc

## Table 4.3-4 Estimated Maximum Concentration of Criteria Pollutants from the OB/OD Units

| Pollutant | Averaging Time | Modeled Concentration | Background Concentration | Additive Concentration | Standard | |
|---|---|---|---|---|---|---|
| | | µg/m$^3$ | µg/m$^3$ | (In units of the standard) | CAAQS | NAAQS |
| $PM_{10}$ | 24-hr | 2.84 | **64.3*** | **67.2*** | 50 µg/m$^3$ | 150 µg/m$^3$ |
| | Annual Arithmetic Mean | 0.564 | **21.4*** | **21.9*** | 20 µg/m$^3$ | -- |
| $PM_{2.5}$ | 24-hr | 2.84 | 23.3 | 26.1 | -- | 35 µg/m$^3$ |
| | Annual Arithmetic Mean | 0.564 | 6.47 | 7.03 | 12 µg/m$^3$ | 15 µg/m$^3$ |
| Carbon Monoxide | 1-hr | 0.254 | 3280 | 3.3 | 23 mg/m$^3$ | 40 mg/m$^3$ |
| | 8-hr | 0.178 | 1680 | 1.7 | 10 mg/m$^3$ | 10 mg/m$^3$ |
| Nitrogen Dioxide | 1-hr | 0.0774 | 128 | 128 | 339 µg/m$^3$ | 188 µg/m$^3$ |
| | Annual Arithmetic Mean | 4.65E-10 | 27.6 | 27.6 | 57 µg/m$^3$ | 100 µg/m$^3$ |
| Sulfur Dioxide | 1-hr | 0.00231 | 34.9 | 34.9 | 655 µg/m$^3$ | 196 µg/m$^3$ |
| | 24-hr | 0.000924 | 26.2 | 26.2 | 105 µg/m$^3$ | -- |
| Lead | 30-day Average | 0.493 | 0.009 | 0.502 | 1.5 µg/m$^3$ | -- |
| | Rolling 3-month Average | 9.86E-09 | 0.009 | 0.009 | -- | 0.15 µg/m$^3$ |

Sources:

1. Edwards AFB PIRA OBOD HRA, Jan 2012; Volume I - EFs for direct sources (PEP and Crater-OD); and Volume 2 for indirect sources (OBOD Unit Area Wind Erosion, Unit Graded-area Tilling, Ash Residue Wind Erosion and Ash Residue Handling).
2. EKAPCD Attainment/Non-attainment Status, http://www.kernair.org/Documents/EKAPCD_Attainment-Non-attainment.pdf
3. NAAQS and CAAQS Standards, CARB, Feb 2012, http://www.arb.ca.gov/research/aaqs/aaqs2.pdf
4. The California Almanac of Emissions and Air Quality, 2009, http://www.arb.ca.gov/aqd/almanac/almanac09/almanac2009all.pdf - used for background GLC levels for all CP except Lead (Pb).
5. Annual Statewide Toxics Summary for Lead, http://www.arb.ca.gov/adam/toxics/statepages/pbstate.html - used for Pb GLC background levels.

***Bold** – exceeds CAAQS

**Figure 4.3-1 Mojave Desert Air Basin**

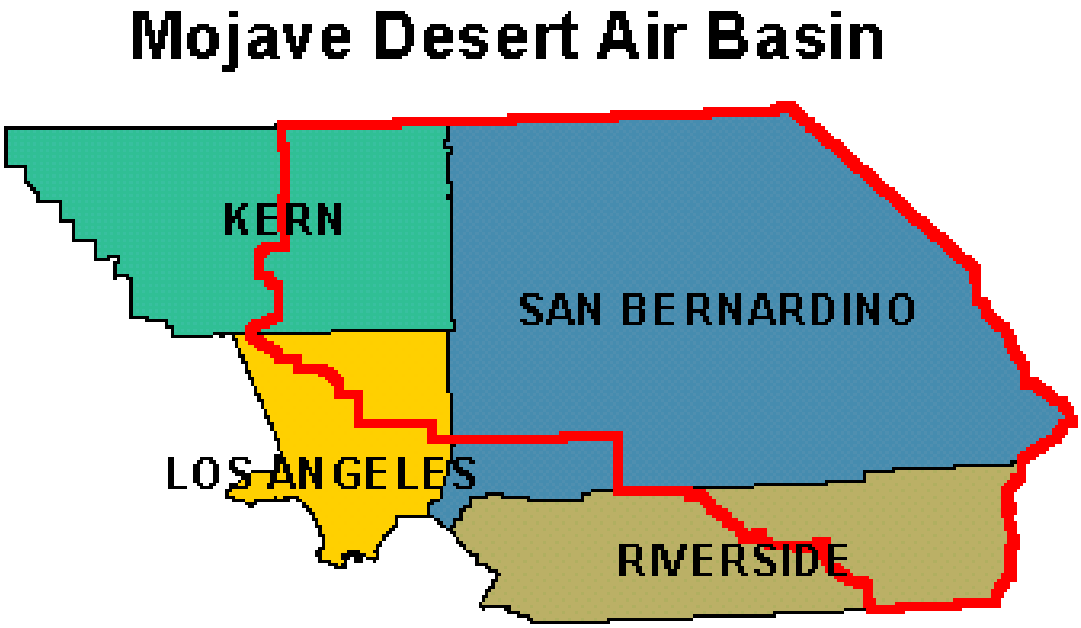


**Figure 4.3-2 Air Districts**

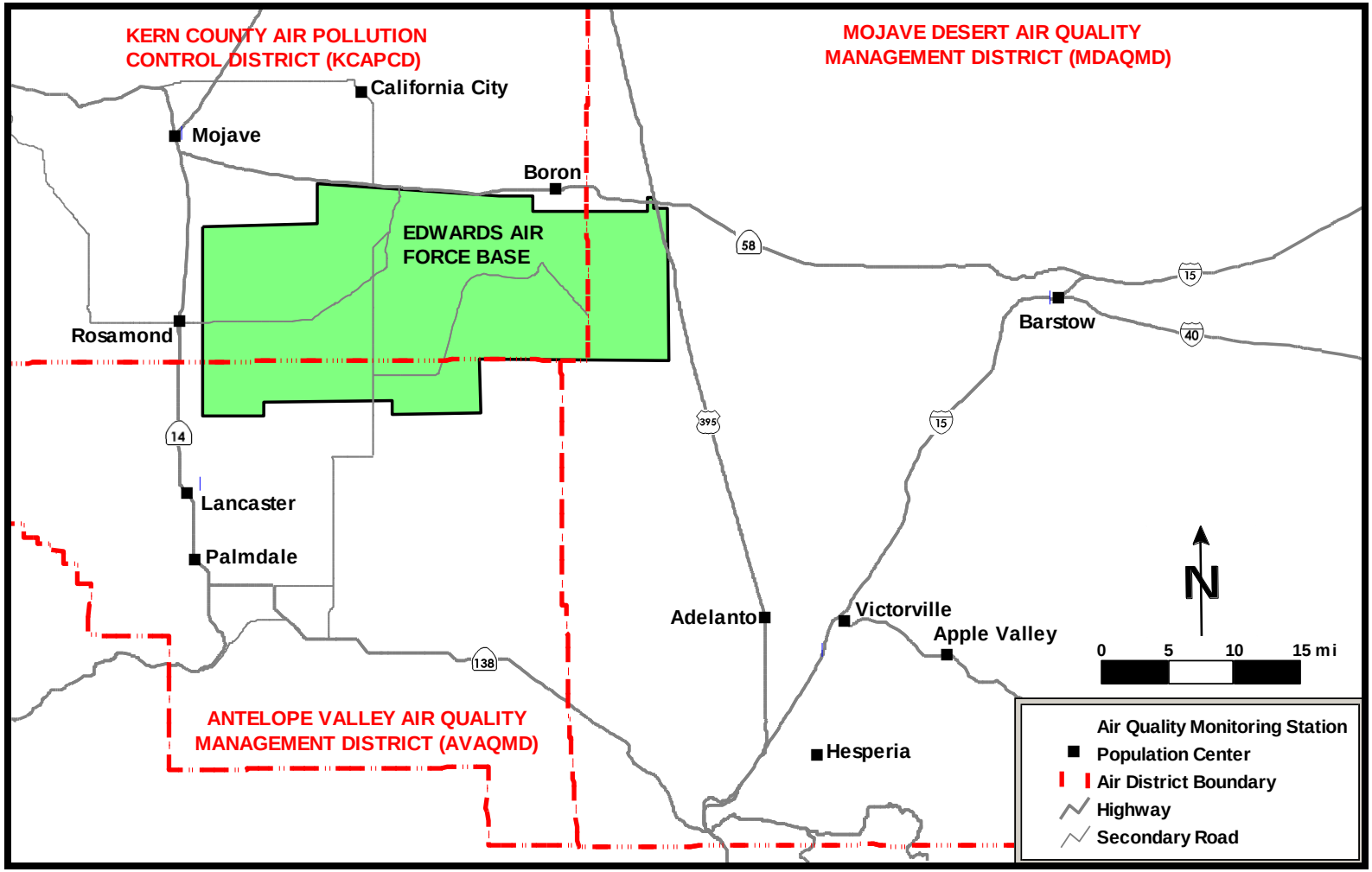
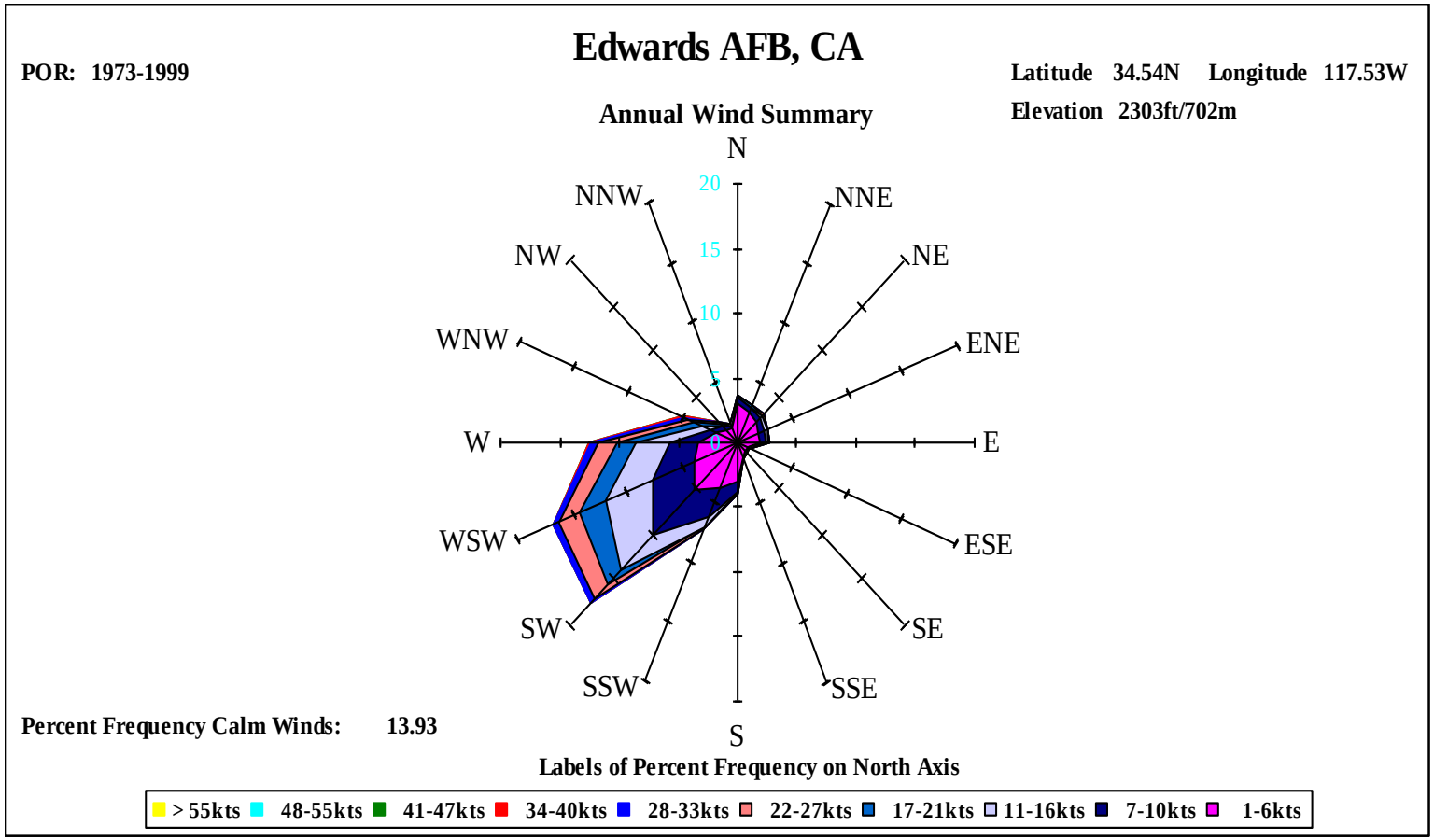


**Figure 4.3-3 Windrose**



## 4.4 BIOLOGICAL RESOURCES

This section describes the biological resources at Edwards and the estimated risk from operating the existing OB/OD Units located within the PIRA at Edwards. Biological resources include wildlife species, wildlife habitat, plant species, and plant communities. Plant communities are groups of plant species typically defined by the dominant plant species within the group. Wildlife habitats are the natural environments of animals, including the plant community, other animals, and air, water, and temperature conditions.

### 4.4.1 Environmental Setting

#### 4.4.1.1 Wildlife

Wildlife at Edwards includes mammals, birds, reptiles, amphibians, fish, and invertebrates. There are more than 30 mammal species at Edwards. Small mammal species include several species of kangaroo rat, pocket and deer mice, gophers, white-tailed antelope squirrel, California ground squirrel, Mohave ground squirrel, voles, and several species of bats. Larger mammals include desert cottontail, jackrabbit, coyotes, badgers, kit foxes, mountain lions, and bobcats. Table 4.4-1 lists wildlife species observed at Edwards.

Approximately 300 species of resident and migratory birds have been recorded at Edwards. The majority are migratory or transient species. The more common bird species are turkey vulture, northern harrier, red-tailed hawk, American kestrel, lesser nighthawk, northern flicker, Say's phoebe, western kingbird, horned lark, common raven, black-throated sparrow and sage sparrow. Less commonly observed species include the golden eagle, prairie falcon, Le Conte's thrasher, several species of flycatcher, thrasher, long-eared and short eared owls, and burrowing owls. Common birds observed in the vicinity of the OB/OD Units include Gambel's quail, mourning dove, horned larks, loggerhead shrike, sage sparrow, black-throated sparrow, white-crowned sparrow, house finch, and common raven.

The desert tortoise is present on Edwards and in the area of the OB/OD Units. Other species of reptiles commonly observed at Edwards include lizards such as the side-blotched, western whiptail, zebra-tailed and desert horned lizards. The most commonly observed snakes are the gopher, coachwhip, Mojave green rattlesnake and the sidewinder rattlesnake.

There are five species of amphibians on Edwards. Of these, two are native, the western toad and red-spotted toad and three are introduced: tree frogs, bullfrogs, and African clawed frogs.

There are no native fish on base; however, a few species are stocked in Branch Memorial Park Pond for recreational fishing.

Arthropods include insects (ants, aphids, bees, wasps, beetles, butterflies and moths, flies and mosquitoes, grasshoppers and crickets), spiders, crustaceans including three species of fairy shrimp, scorpions, and centipedes. Surveys of arthropods on Edwards found over 1,500 species on base. Over 93% of the arthropods found were insects.

#### 4.4.1.2 Vegetation

A number of studies have contributed to the information on vegetation at Edwards. The Natural Resources Conservation Service mapped plant associations as part of the soil mapping project of 1996. At that time, 50 plant associations were identified on Edwards.

A land cover map of the plant communities developed from the recent classification of multispectral LANDSAT-7 imagery provides refined knowledge of vegetation cover on Edwards. Ground trothing, surface observations compared to the images, verified that plant communities, and transitions between communities, were accurately defined by the LANDSAT-7 imagery. Classifications at the plant community level are shown in Figure 4.4-1, Plant Communities.

The main plant communities on base include Joshua tree woodland, creosote bush scrub, saltbush scrub, and mesquite woodland.

Joshua tree woodland covers approximately 52,800 acres on base. The largest Joshua tree woodlands on base occur on the PIRA. Joshua tree woodland does not have a distinctive understory of shrubs. The Joshua tree woodland is defined by the presence of the trees in sufficient density to visually become woodland. The main understory vegetation is four-wing saltbush or creosote, and burrobush. Other common species include desert dandelion, pincushion and fiddleneck. The OB/OD Units are located in the Joshua tree woodland plant community.

Creosote bush scrub, the most common plant community on base, lies to the south of the OB/OD Units. The dominant plant in this community is creosote bush. Other shrubs include winterfat, cheesebush, and Nevada tea. This plant community also supports annuals such as desert dandelion, pincushion, and fiddleneck.

The saltbush community is dominated by shadscale, Joshua trees, and inkweed. The saltbush community occurs south of the lakebeds.

Mesquite woodland visually dominates some of the largest drainages along Big and Little Rock Creeks as they approach Rogers Dry Lake. Mesquite is more like a very large bush than a tree. This habitat is identified by the presence of

Mojave rubber rabbitbrush, alkali mariposa lily, and the local endemic Parish's sagebrush. The mesquite woodlands are located several miles south and southwest of the OB/OD Units.

Over 300 species of plants are present in the Edwards area. A listing of plant species expected to occur around the OB/OD Units is provided in Table 4.4-2, Plant Species Observed in the OB/OD Units Area.

There is very little vegetation present within the fenced area of the OB/OD Units or outside and immediately adjacent to the fence, due to regular grading.

### 4.4.2 Applicable Standards

#### 4.4.2.1 Endangered, Threatened and Protected Species

Under the Federal Endangered Species Act (ESA), species may have federal status and be listed as endangered or threatened species. In addition, federal agencies maintain lists of species of concern which may also be under consideration for listing, but for which there is insufficient information to support listing at this time. Under the California ESA, species may have state status as endangered, threatened or species of special concern. Plant species may be listed by the State as endangered, threatened or rare. The status and locations of rare plants and animals in California are inventoried in the California Natural Diversity Database (CNDDB), maintained by the California Department of Fish and Wildlife (CDFW). The CDFW is a Trustee Agency and has jurisdiction over certain resources held in trust for the people of California. The CDFW must be notified when CEQA projects involve fish and wildlife of the state, rare and endangered native plants, wildlife areas, and ecological reserves. Although the CDFW cannot approve or disapprove a project as a Trustee Agency, lead and responsible agencies are required to consult with the CDFW.
A search of the CNDDB using the CDFW RareFind 3 software was conducted. The search identified two threatened species - the Mohave Ground Squirrel and the Desert Tortoise as having the potential to occur within the Rogers Lake South Quadrangle. The desert tortoise is the only resident wildlife species at Edwards that is federally listed as threatened. Other special species of concern that have the potential of occurring are the Burrowing Owl, Loggerhead Strike, and Le Conte's Thrasher. Other listed migratory birds have been observed at Edwards, but are likely to occur in the area only as transient species. All projects that potentially impact migratory birds are reviewed, and adaptive management is implemented to comply with the Migratory Bird Treaty Act. The Migratory Bird Treaty Act specifically prohibits taking migratory birds, including raptors, or any part, nest, or egg of migratory bird species.

There are no federal or state listed plant species on Edwards, however, several sensitive species exist. The desert cymopterus is a sensitive plant species found in the vicinity of the OB/OD Units.

Section 7 of the Federal ESA requires that the United States Fish and Wildlife Service (USFWS) be consulted before implementing an action that could affect endangered or threatened species. The Federal ESA specifically prohibits "taking" (e.g. killing, harming, or harassing) a federally listed endangered or threatened species. Such consultations require federal agencies to prepare a Biological Assessment. After reviewing the assessment, the USFWS issues a Biological Opinion (BO) stating whether actions of the federal agency will or will not take or jeopardize the continued existence of the threatened or endangered species. The BO contains reasonable and prudent measures that must be implemented to minimize the potential for "take." The BO covers a range of actions from habitat maintenance and enhancement, to programs covering operations conducted in the species' habitat.

The base manages species under consideration for listing under the state and federal ESAs, as well as other species considered sensitive or species of concern by various agencies. Measures already in place include surveys to determine location and abundance, reviewing all projects that have a potential to impact sensitive species through the National Environmental Policy Act (NEPA) process, and well-defined conservation measures. Although protection of non-listed species is not mandatory on federal installations, management of these species contributes to the overall maintenance of their natural populations and reduces the likelihood that these species will have to be given additional legislative protection in the future.

Edwards also manages non-federally listed species through the use of general conservation measures. These general conservation measures include limiting access to the base, allowing only official government activities, restoring disturbed areas, and technical review of all projects by a professional biologist. Contractor work is monitored to ensure compliance with environmental measures and policies. Specific activities that are controlled include prohibiting off-road activities except for designated areas, during emergencies, and specifically approved mission requirements; no grazing of domestic livestock or feral burros and horses; limiting vegetation harvesting to permitted activities and scientific studies; prohibiting dumping and littering; actively controlling unleashed dogs; and limiting the use of firearms to designated hunting areas and hunting seasons.

The listed and sensitive species are discussed in detail below.

#### 4.4.2.1.1 Desert Tortoise

The desert tortoise (*Gopherus agassizi*) was formally listed as a threatened species in 1990. In California, desert tortoises occur primarily within creosote bush scrub, saltbush scrub, and Joshua tree woodland plant communities. Optimal habitat has been characterized as creosote bush scrub in which

precipitation ranges from 2 to 8 inches annually, diversity of perennial plants is relatively high, and production of ephemeral plants and water sources is high. Desert tortoises are typically associated with gravelly flats or sandy soils with some clay, with the most favorable habitat occurring between elevations of 1,000 to 4,000 feet.

Critical habitat for the Mojave population of the desert tortoise was established by the USFWS in 1994 in the Desert Tortoise (Mojave Population) Recovery Plan. Designated critical habitat for the tortoise encompasses portions of the Mojave and Colorado Deserts that contain the primary constituent elements that are essential to the species' recovery and boundaries are based on Desert Wildlife Management Areas (DWMAs). Edwards has 65,516 acres of designated critical habitat on base. This critical habitat is located on the eastern and southeastern portion of the base and includes portions of the AFRL and PIRA. Critical habitat generally consists of creosote bush scrub and Joshua tree woodland habitats; however, xerophytic and halophytic saltbush and mesquite woodland are also present in critical habitat. Figure 4.4-2, Desert Tortoise Critical Habitat, provides a regional perspective of the location and amount of critical habitat on or near Edwards. The OB/OD Units lie just outside and to the west of the Fremont-Kramer designated critical habitat.

Surveys conducted throughout Edwards to determine relative density estimates of the desert tortoise indicate that the species occurs throughout the base; however, desert tortoise sign (live and dead tortoises, shell and other remains, scat, and tracks) is not distributed uniformly.

Relative density strip transects, developed by the BLM, were used to sample each USGS section (1 square mile) on Edwards from 1991 through 1994. A total of 345 sections were sampled; 126 sections were excluded. The 126 sections (about 80,640 acres or about 27 percent of the base) were excluded due to lack of desert tortoise habitat (e.g., Buckhorn, Rogers, and Rosamond Dry Lakes; Main, North, and South Base cantonment areas; AFRL facilities and fenced operational areas; PIRA graded targets; other operational areas; and housing areas). Surveys were conducted at BLM desert tortoise population trend plots with known tortoise densities in order to calibrate surveys at Edwards. An adjustment was made from total sign to total corrected sign (TCS), so that multiple sign from a single tortoise was reduced to a single record. Estimated tortoise density (relative density) was calculated by multiplying TCS by an observer's calibration coefficient. This technique has been criticized for producing high estimates and is no longer recommended for use by the federal and state resource agencies, therefore the Edwards estimates of relative density are not directly comparable with other estimates. Based on the inaccurate BLM technique, actual numbers of tortoises would be misleading and are not represented here.

Edwards conducted additional density surveys from 2006-2008 using the same

BLM method mentioned previously. Surveys were completed in 2008. The results of the tortoise densities from 2006 through 2008 have been compared to the 1991 to 1994 surveys and the estimated relative density per square mile has decreased about 25 percent.

Figure 4.4-3, Desert Tortoise Observations, shows the likelihood of occurrence of desert tortoise as low, medium, or high; and the locations of tortoise observations from 2003 through 2007. As shown on Figure 4.4-3, tortoises have more recently been observed in designated critical habitat and within the boundaries of the PIRA on the eastern portion of the base. Other observations also occur in the northwest portions of the base, while a few have been observed along the lakebeds and in the southwestern portions of the base. The OB/OD Units lie within the area of medium likelihood of occurrence of desert tortoise

The Air Force conducted a desert tortoise survey for the area of the OB/OD Units in February 2000. The methodology was based on USFWS survey protocol. A full coverage survey (100 percent) was performed on a 214-acre area centered on the OB/OD Units and an additional 70 acres was covered by belt transects. Biologists walked 30-foot wide parallel transects. In addition, the survey included 30-foot wide zone of influence belt transects extending 100, 300. 600, 1,200, and 2,400 feet from and parallel to the edge of the full coverage area. Zone of influence transects were surveyed to detect any tortoise occurring in adjacent areas whose home ranges may overlap the full coverage area. The purpose of the survey was to collect information to determine the presence of desert tortoises in the area surrounding the OB/OD Units and to collect information on the age and condition of desert tortoise burrows. The survey found desert tortoise sign for two live, hibernating desert tortoises, numerous desert tortoise burrows in various stages of use and degradation, scats, and several old, disarticulated bone scatters. The live tortoises and the majority of sign were found in the southern portion of the survey area, south of the existing desert tortoise exclusionary fence. See Figure 4.4-4, Desert Tortoise Sign Observed Within 100 Percent Coverage Survey Area and Zone of Influence Transects at New OB/OD Units.

A survey was also completed in January 2000 for a former OD site located approximately 0.5 miles south of the OB/OD Units. The site was used from 1983 to 1992 for explosive ordnance disposal. Methodology was similar to the survey in January 2000 for the new OB/OD Units. The 100 percent coverage covered 185 acres and belt transects an additional 64 acres. The purpose of the survey was to collect information to determine the presence of desert tortoises in the area surrounding the old OD site and to collect information on the age and condition of desert tortoise burrows to try and determine the impacts of detonations on burrows. Desert tortoise sign, including two live desert tortoises hibernating in burrows, burrows, scats, carcasses, and tortoise eggshell fragments, were found throughout the survey area. All categories of burrows (currently active to highly deteriorated) were found throughout the survey area.

The degree of burrow collapse would likely increase with proximity to the detonation center, and decreasing pattern of burrow collapse might be expected for the various areas radiating away from ground zero. No such patterns were detected. The impacts of past detonations on tortoises or tortoise burrows were not apparent. See Figure 4.4-5, Desert Tortoise Sign Observed Within 100 Percent Coverage Survey Area at Old OD Unit, and Figure 4.4-6, Desert Tortoise Sign Observed on Zone of Influence Transects at Old OD Unit.

In March of 1994, the USFWS issued a BO for Desert Tortoise on the PIRA that addresses activities at the EOD Range. This BO details and requires implementation of “reasonable and prudent measures” which Edwards is required to implement for all activities located within or adjacent to known or potential tortoise habitats. The BO covered treatment of up to 2,000 pounds of munitions and propellants per event and 10,000 pounds annually at the OB/OD Units. The BO allows for the “take” of five tortoises annually by direct mortality, and ten tortoises per year in the form of harassment (moving or permanent relocation. “Reasonable and prudent measures” as well as terms and conditions of the BO are routinely implemented such that potential for “take” of desert tortoise is minimized. These impact minimization measures include education programs, operating procedures for activities in the PIRA, clearly marking work area boundaries, relocating animals at-risk found within work area boundaries, minimizing common raven predation risks, and managing all potential habitat in accordance with the terms of the BO. Edwards is also required to prepare and submit an annual report of all desert tortoises relocated, and the amount of habitat disturbed. Results of survey efforts and effectiveness of “take” avoidance measures for all projects are provided to the USFWS in the annual report.

The proposed project includes an increase of treatment limits for the OB/OD Units. Edwards has prepared a base-wide biological assessment that is being evaluated by USFWS for completion of a base-wide programmatic BO for all actions that may affect the desert tortoise and/or its habitat. The basewide BO would cover the higher volume of unserviceable munitions and propellants currently proposed in the permit application. The BO is expected from the USFWS in the 4th Quarter 2013. Until the base-wide biological programmatic BO is issued, Edwards is bound by the proposed action described in the 1994 BO.

#### 4.4.2.1.2 Mohave Ground Squirrel

The Mohave ground squirrel (MGS) is a California state-listed threatened species. The MGS is a small rodent that occupies a restricted range in the northwestern Mojave Desert in San Bernardino, Los Angles, Kern, and Inyo counties, and is rare throughout its range.

The Mohave ground squirrel occupies all major desert scrub habitats in the western Mojave Desert. It has been observed in creosote bush scrub, saltbush

scrub, desert sink scrub, and Joshua tree woodland habitats. The Mohave ground squirrel inhabits flat to moderate terrain and is not generally found in steep topography. The species is found most frequently in sandy, alluvial soils, but is also found in gravely, and occasionally rocky, soils. The species typically emerges from hibernation in early to mid-March. Aestivation generally begins anytime between July and September, but during drought conditions, may begin as early as April or May.

Currently, there is no official federal protection status for the Mohave ground squirrel. In 2005 the Defenders of Wildlife petitioned the USFWS to list the Mohave ground squirrel, endemic to California, as an endangered species pursuant to the federal ESA, including the designation of critical habitat to be concurrent with the listing. Regardless of the status of the Mohave ground squirrel, Edwards has taken measures to manage the species through its INRMP. The following conservation strategies are from the INRMP:

- Develop and implement education awareness in concert with the Desert Tortoise Awareness Program.
- Continue to conserve habitat through road closure projects.
- Decrease habitat fragmentation through well planned habitat restoration projects in areas suitable for Mohave ground squirrel.
- Evaluate effectiveness of revegetation efforts in Mohave ground squirrel habitat.
- Complete baseline surveys at all HQA plots and record incidental sightings; enter GPS data into Edwards AFB GIS.
- Monitor populations and enter data into Edwards AFB GIS and Ecosystem Model.
- Use survey and monitoring data to develop a Predictive Habitat Model; verify model through ground truthing surveys.
- Use all inventory and incidental observations to map known populations.
- Share technical knowledge with the resource agencies and scientists.
- Consider for implementation the objectives in the West Mojave Plan that do not conflict with the military mission of the Air Force.
- Attend and participate in conservation working groups to further the survival of the species.

Edwards has been conducting surveys for Mohave ground squirrels since 1988 and continues to conduct baseline surveys in various habitats within existing long-term study plots to determine their presence and evidence of breeding populations at these sites. Prior to 2009, 50 locations on Edwards AFB had been surveyed for Mohave ground squirrels. Mohave ground squirrels were trapped or observed at 15 of these locations, primarily in Joshua tree woodland and halophytic saltbush scrub habitats. In 2009, a new survey protocol was established for Mohave Ground Squirrel on Edwards. It recommended increased

sampling in preferred habitats and in areas where incidental observations indicate their presence. Edwards intends to continue the surveys and share the data with federal, state, and non-governmental organizations. The surveys will assist with future management strategies and avoidance measures to protect the species and prevent it from being listed. Figure 4.4-7, Mohave Ground Squirrel Identified on Edwards AFB, shows where Mohave ground squirrels have been found on Edwards.

Mohave ground squirrels were confirmed in the area around the OB/OD Units during a focused survey in May 2000. The survey included visual and live trapping surveys using methods and guidelines recommended by the CDFW. No animals were detected during visual surveys. However, live trapping resulted in the capture of four animals, three pregnant females and one male northeast of the OB/OD facility. Based on the number of captured animals and data recorded, there is an active breeding population near the OB/OD Units.

In May 2001, a second survey was conducted to look for Mohave ground squirrels within the perimeter fence of the OB/OD Units. Visual and live-trapping surveys were conducted covering 100% of the area within the fenced boundary. No Mohave ground squirrels were found within the fenced area.

Metal flashing (24 inches in height) has been erected at the bottom of the chain-link fencing around the OB/OD Units and on the gates to keep Mohave ground squirrels out of the fenced area (See Figure 2.3-4 and Figure 2.3-5). On an annual basis in the spring and fall, Edwards staff or its contractors inspect the fence for breaks where Mohave Ground Squirrels could enter the facility. Repairs or fence replacement would be accomplished to the fence to deny access to the Mohave Ground Squirrel. (Note: This action would also keep tortoises from entering the facility).

The entire area within the fence and a 300 ft. buffer area outside the fence will be surveyed by an authorized biologist before OB/OD events take place. If Mohave Ground Squirrels are found inside the fenced OB/OD Facility, a trapping grid inside the facility would be reestablished to capture the animals, and they would be relocated outside the facility at least 500 feet from the fence. Relocation would be carried out only by an individual with a permit from CDFW. The fenced area would be monitored up until the detonation to ensure all of the Mohave Ground Squirrels have been removed and that Mohave Ground Squirrels have not reentered the fenced facility.

Since the construction of the fence surrounding the OB/OD units in 1997, no form of take on the Mohave Ground Squirrels including disturbing or destroying known or active Mohave Ground Squirrel burrows have occurred within these areas.

#### 4.4.2.1.3 Sensitive Plant Species

Inventories and surveys have been conducted on Edwards to locate CDFW species of concern. Extensive biological surveys have been completed for the three most sensitive plant species on base, the Barstow woolly sunflower, alkali mariposa lily, and desert cymopterus. Out of these three, desert cymopterus is the only one found in the vicinity of the project area. Figure 4.4-8, Sensitive Plants on Edwards, shows the known on-base locations of the sensitive plants. The sensitive plant populations vary from a few individuals to thousands of individuals within a concentrated area.

Desert cymopterus is a small perennial in the carrot family that flowers early in the spring. Desert cymopterus is protected primarily through the NEPA process. However, Edwards has completed several surveys for desert cymopterus and manages the species in its INRMP.

A base wide study in 1995 identified 14,093 individual desert cymopterus plants in populations of up to 3,448 plants, and population areas covering 122.3 hectares (302.2 acres). Additional studies were performed from 2000-2004 and several new populations were identified. The 1995 survey reported a population of 28 individual plants approximately 0.75 miles north of the OB/OD Units, and a few scattered individuals near and within the area of the OB/OD Units. No observations of desert cymopterus within the OB/OD Units have been made since the construction of the fence in 1997.

The base-wide conservation strategies for desert cymopterus listed below are from Edwards INRMP.

- Develop and implement education awareness in concert with the Desert Tortoise Awareness Program.
- Monitor areas where ground disturbance activities may occur, especially in areas where known populations have been documented.
- Record incidental sightings and monitor known populations of desert cymopterus; enter GPS data into Edwards AFB Ecosystem Model and GIS.
- Refine developed Predictive Habitat Model to locate other populations, and share knowledge with the resource agencies and other scientists.
- Share technical knowledge on desert cymopterus research studies with the resource agencies and scientists.

#### 4.4.2.2 Sikes Act

The Sikes Act requires the Secretary of Defense to carry out a program to provide for the conservation and rehabilitation of natural resources on military installations, sustainable multipurpose uses of resources, and public access for use of natural resources, subject to safety and military security considerations. To facilitate this program, the 1997 amendments required the preparation and

implementation of INRMPs.

The goals of an INRMP are to provide for the restoration, maintenance, and protection of biological diversity, biological integrity, and ecological health, while allowing for the military mission and appropriate human uses. Sikes Act guidance for the development of an INRMP provides for:

- no net loss in the capability of military installation lands to support the military mission of the installation;
- fish, wildlife, land, and forest management, and wildlife-oriented recreation;
- fish and wildlife habitat enhancement or modifications;
- wetland protection, enhancement, and restoration where necessary to support fish, wildlife, or plants;
- integration of and consistency among, the various activities conducted under the INRMP;
- establishment of specific natural resource management goals and objectives, and time frames for proposed actions;
- allowing public access to the military installation that is necessary or appropriate for the use subject to requirements necessary to ensure the safety and military security;
- sustainable use of natural resources by the public, to the extent that the use is not inconsistent with the needs of fish and wildlife resources, subject to requirements necessary to ensure safety and military security;
- enforcement of applicable natural resource laws (including regulations); and
- other activities as the Secretary of military departments determines appropriate.

The Edwards INRMP was updated in August 2008 in accordance with current requirements in AFI-32-7064, *Integrated Natural Resources Management*. The INRMP also implements Air Force Policy Directive 32-70, *Environmental Quality* and Department of Defense Instruction (DODI) 4715.3, *Environmental Conservation Program*.

The goals of the 2008 Edwards INRMP are:

- maintain and enhance quality and quantity of habitat that is suitable for management of desert tortoise on base;
- promote and improve education awareness on natural resources in the western Mojave desert;
- conserve high quality habitat for management of state listed and other sensitive species;
- improve water quality and increase biodiversity of aquatic resources;
- reestablish native habitat by eradication of exotic and invasive species;
- improve data collection and analysis by using the best available science and proven technologies to determine and track the health of the ecosystem;
- maintain and improve natural resource recreational opportunities;
- improve adaptive management strategies;
- improve integration of natural resources management with other base organizations consistent with the military mission; and
- promote regional planning and ecosystem management.

#### 4.4.2.3 Other Laws and Regulations

There are several other federal laws and regulations that are relevant to biological resources management decisions. The Bald Eagle Protection Act specifically prohibits taking bald and golden eagles or any part, nest, or egg of these species. Golden eagles are a transient species at Edwards.

The Migratory Bird Treaty Act specifically prohibits taking migratory birds, including raptors, or any part, nest, or egg of migratory bird species. Edwards is an important migratory bird area due to the presence of Piute Ponds, a large body of surface water functioning as manmade biological wetlands. These areas are of special concern because aquatic areas in the western Mojave Desert are a very limited resource. The INRMP identifies conservation of migratory birds and their habitat as a management goal.

#### 4.4.2.4 Ecological Risk Assessment

CCR Title 22, Section 66264.601 requires that miscellaneous units, such as the

OB/OD Units, be located, designed, constructed, operated, maintained, and closured in a manner that is protective of the environment. Consequently, DTSC required completion of an Ecological Risk Assessment (ERA). The ERA methodology approved by DTSC consists of two phases: a Predictive Study and a Validation Study. Both phases are described more fully in the following sections. The analysis of potential biological impacts is primarily based on the results from the ERA.

### 4.4.3 Thresholds of Significance

According to Appendix G of the state CEQA Guidelines, a project would normally have a significant adverse impact related to Biological Resources if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate sensitive, or special status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS;
- Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFW or USFWS;
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means;
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance;
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan.

The significance thresholds are addressed in the following section.

### 4.4.4 Potential Environmental Impacts

Operations at the OB/OD Units have the potential to impact biological resources. An ERA was completed to determine the impacts of emission of toxic air contaminants to biological resources. The ERA consists of two phases: a

Predictive Study and a Validation Study. This section provides a discussion of the methodology and results from the two phases of the ERA, and the analysis of the potential impacts of the project on biological resources. The project also has the potential to impact biological resources through increased exposure to noise and vibration from detonations.

#### 4.4.4.1 Ecological Risk Assessment - Predictive Study (Phase I)

The ERA - Predictive Study is equivalent to a USEPA Tier II “screening” assessment and to a DTSC Phase 1 “predictive” assessment. The USEPA Tier I “scoping” assessment, including the identification of local ecological receptors and qualitative potential exposure pathway assessment, is included as Appendix C of the Predictive Study.

##### 4.4.4.1.1 ERA Predictive Study Methodology

The steps followed in the Predictive Study included:

- Selection of assessment and measurement endpoints - Assessment endpoints are general statements of the ecological values that are considered worthy of protection. Measurement endpoints are used to define which types of impacts are significant;

- Selection of indicator species - Indicator species are defined as organisms that are likely to be exposed to the contaminants and/or are likely to be vulnerable or sensitive to the contaminants of concern. Indicator species were selected because evaluation of the potential effects on all species that exist in the vicinity of the OB/OD Units are not feasible. The Merriam kangaroo rat (*Dipodomys merriami*), the red-tailed hawk (*Buteo jamaicensis*), and plants were selected as indicator species. Due to its status as a threatened species, the desert tortoise was also selected as an indicator species; however, no toxicity information was available in the literature for the effects from the types of chemicals emitted from OB/OD operations for tortoises or any other reptiles. This prevented a quantitative analysis of potential impacts on the desert tortoise;

- Identification of Chemicals of Potential Ecological Concern (COPECs) - The COPEC identification process identifies substances that may be emitted from OB/OD operations and that have the potential to cause adverse effects. For the ERA, the chemical constituents and corresponding emission rates are those identified in the 1996 HRA. The revised 2012 HRA is based on an updated list of toxic air contaminants. For the revised HRA some compounds were eliminated from consideration and some chemicals were added. The list of compounds considered in the 2012 HRA was reviewed to

determine whether the ERA should also be revised based on the newly added compounds. The chemicals that have the highest potential to cause adverse effects to biological resources were considered in both HRAs, particularly metals. In addition, the 1996 HRA was based on more conservative assumptions regarding emission rates. Therefore, the calculation of risk in the1996 HRA overestimated exposure for these compounds. The ERA, being based on the 1996 HRA risk calculation, did not warrant revision in order to be protective of the environment;

- Selection of exposure pathways - Exposure pathways are routes by which COPECs may contact and enter the tissues of the indicator species. For animals these include inhalation, dermal absorption, incidental soil ingestion, and ingestion of plant or animal tissue. For plants these include exposure to air and uptake of chemicals in soil;

- Exposure dose - An exposure dose or exposure point concentration (EPC) is the value used to represent the contaminant concentration within an animal's habitat. Calculation of the exposure for the indicator species uses parameters specific to each species, such as food ingestion rate, body weight, and skin surface;

- Toxicity assessment - The toxicity assessment is an attempt to relate the dose or amount of exposure to the occurrence of an adverse effect. For animals the "no observed adverse effect levels" (NOAELs) were compared to the calculated concentrations. NOAELs are the highest tested dose of a substance that has been reported to have no harmful (adverse) health effects on people or animals. For plants the Effects Range-Low (ER-L) values for phytotoxic effects of chemicals in soil were used. The ER-Ls are designed to be concentrations at which effects occur in 10% of the exposed organisms; and

- Risk characterization - The primary tool used in the risk characterization is the hazard quotient (HQ). A HQ is defined as follows:

  HQ = Exposure Dose / NOAEL

  If a HQ is less than or equal to 1.0, the evaluated effect is unlikely to occur. If a HQ exceeds 1.0, a potential adverse effect may occur, although this does not necessarily mean that an adverse effect will occur or is likely to occur.

4.4.4.1.2 ERA Predictive Study Results

HQs exceeding 1.0 were predicted for aluminum for the kangaroo rat and the plant receptors and for cadmium, chromium, copper, and lead for the plant receptors. See Table 4.4-3, Results of ERA Predictive Study. There were no HQs greater than 1.0 for the red-tailed hawk. The greatest HQ predicted (14) was for plant uptake of aluminum. Average soil background concentrations had HQs exceeding 1.0 for aluminum and chromium. Therefore, the usefulness of the Predictive Study for assessing potential effects of aluminum and chromium was questionable.

Numerous sources of uncertainty are a part of the HQ calculations for the Predictive Study. Because many of the parameters are biased high, the calculated values are most likely greater than actual values. The greatest uncertainties resulted from the many assumptions that were required to model concentrations and from the limited toxicity information available. Additional data could not be gathered expediently to improve the toxicity assessment. However, the modeling uncertainties were amenable to field validation. Therefore, the ERA Validation Study was prepared. The purpose of the Validation Study was to evaluate the accuracy of the modeling conducted in the Predictive Study, using site-specific chemical data from soil and plant tissue collected downwind of an existing OB/OD unit. The Validation Study is discussed more fully in the next section.

#### 4.4.4.2 Ecological Risk Assessment – Validation Study (Phase II)

The Validation Study had three purposes:

- To collect background soil data and to evaluate the uptake of the COPECs into mature plants in a background area,
- To compare results for soil samples collected downwind from an existing OB/OD Unit to the background concentrations and to evaluate the uptake of the COPECs into mature plants in the downwind area, and
- To conduct soil phytotoxicity tests (i.e., plant growth studies) on soil collected from the background area and the downwind area.

The existing OD Unit is located approximately 2500 feet south of the EOD Range. The geology, meteorology, and land use is the same as the OB/OD Units. The unit had been inactive since 1992. The number of years in operation is unknown, but may have begun in the 1940's. The maximum reported quantity of hazardous waste munitions treated at the unit was 930 pounds per year.

Soil samples were collected from three downwind axes extending from the existing OD Unit and soil and plant samples were collected from downwind and background sampling grids. Placement of the downwind axes and downwind

grid were determined from previous air dispersion modeling results. Placement of the background sampling grid was based on comparison of land use, geology and meteorology factors. The background grid is in an area of minimum wind direction and velocity in relation to the existing OD Unit. Thirty-three soil samples were collected from the downwind sampling axes. Thirty soil and thirty plant samples were collected from both the downwind and background grids. The samples were analyzed for aluminum, cadmium, chromium, copper, and lead. The results were compared statistically to determine if the downwind concentrations were significantly higher than the background concentrations using the 95%/95% Upper Tolerance Limit (UTL) method, the means comparison method, and the 95% Upper Confidence Limit (UCL) method. If the concentration of a COPEC in the downwind area was significantly higher than background, then that COPEC would be carried forward to a Phase III ERA Impact Assessment.

Composite soil samples were collected from both the downwind and the background sampling grids, and soil phytotoxicity tests were conducted to evaluate the impact of COPECs on growth potential for five test plant species. If a COPEC from the downwind area was shown to have a negative impact on plant growth versus background, then that COPEC would be carried forward to a Phase III ERA Impact Assessment.

#### 4.4.4.3 Ecological Risk Assessment – Results

In general, the significant risks estimated during the Predictive Study were not confirmed by the Validation Study results. Validation Study results indicated that, except for copper, background soil concentrations were higher than the soil concentrations found in the downwind axes and grid. Background plant concentrations were similar to concentrations found in the downwind grid. In addition, the results are consistent with previous soil and plant sampling results in the PIRA area. Therefore, the observed COPEC soil and plant concentrations are considered to be representative of actual site conditions. See Table 4.4-4, Results of ERA Validation Study. Soil sample concentrations are found in Table 4.7-2, Site Soil Investigation Results. Plant sample concentrations are found in Table 4.4-5, Site Plant Investigation Results.

HQs exceeding 1.0 were predicted for aluminum, cadmium, chromium, copper, and lead. No detectable concentrations of cadmium were found in any of the soil and plant samples. Two of the three statistical methods determined that one downwind axes lead in soil concentration result was significantly higher than background. Two of the three statistical methods determined that one downwind grid copper in plant concentration result was significantly higher than background. Further qualitative review of the data indicates that the lead result is an outlier concentration that can be excluded from consideration. Further qualitative review of the data indicates that the copper result could be an outlier concentration and should be considered as questionable. All three statistical

methods determined that downwind grid COPEC in soil concentrations were not significantly higher than background. The overall conclusion of the soil and plant results is that copper may be a potential COPEC to be carried forward in an ERA Phase III Impact Assessment, but should be subject to careful consideration based on all of the available data.

Four composite test soil samples and were subjected to soil phytotoxicity tests along with two control soils, a sand control and a loam control, to evaluate the impact of COPECs on growth potential. Five plant species, wheat, rye grass, tomato, lettuce and radish, were planted in each soil type. The following results were reported:

- The percent emergence at 28 days,
- The average time to emergence,
- Plant height,
- The average dry weight of the shoots and the average dry weight of the roots,
- The total dry weight as the sum of the reported dry weight of the shoots and the reported dry weight of the roots,
- The shoot to root ratio as the average dry weight of the shoots divided by the average dry weight of the roots.

All composite test soils did have an effect on overall plant growth. All five test plant species selected for the plant growth study germinated, emerged, and grew in the four composite test soil samples collected. Although emergence was reduced for most of the species in the composite test soils compared to the loam control, none of the plant species exhibited a substantial reduction in emergence. However, the effects may be due to differences in nutrient levels rather than COPEC concentrations. In general, plant growth performance in the composite test soils fell between the sand (low-end) and loam (high-end) control soils. Overall, results from the plant growth study indicate that no adverse growth effects were observed that could not be attributed to a lack of nutrients in the soil.

The ERA Validation Study concluded that there is insufficient evidence to warrant progression to a Phase III Impact Assessment. However, copper and lead should be subject to consideration. The facility will be required to prepare and implement an environmental monitoring plan under the permit and may be subject to further testing based on on-going monitoring plan results.

#### 4.4.4.4 Plant Monitoring Results

In 2007, 2008, and 2009 soil and plant samples were collected and analyzed at the EOD Range. These results will determine a baseline for environmental monitoring which would be required under conditions of the draft Hazardous Waste Facility Permit Modification. The 34 plant sample locations are based on a polar sampling grid 5,000 feet in diameter centered on the EOD Range. The sample locations are primarily located downwind and outside of the EOD Range. Two locations were selected to coincide with a wash located along the south to southeast of the site. Plant samples were the outer two inches of leaves from the creosote bush where the bushes were collocated with soil samples. Contaminants in plant material are from plant uptake as well as deposition of contaminants on leaves and stems.

No statistical analysis has been completed for these results. There are no published screening levels to determine potential levels of concern for concentrations of contaminants in plants. The results are consistent with previous soil and plant sampling results in the PIRA area. There is no detectable spatial pattern of contaminant concentration. The maximum plant concentrations are shown on Table 4.7-5, Site Plant Investigation Results.

#### 4.4.4.5 Noise

The project also has the potential to impact biological resources by increased exposure to noise and vibration. The source of noise that may impact animals is primarily blast noise from OD, but also includes vehicle traffic, activities associated with preparation for treatment events, and grading. Transient and mobile species would avoid the area during these activities. The species of concern potentially impacted by noise and vibration are burrowing species, including the desert tortoise and the Mohave ground squirrel. Noise and vibration is discussed in Section 4.9.

#### 4.4.4.6 Closure Plan

Implementation of the Closure Plan would result in increased activity at the site that may disturb transient species. Soil samples may be collected from areas immediately outside the Units' boundaries, which may temporarily disturb previously undisturbed areas. Any impacts from these activities will be temporary. Thus, no significant impacts to biological resources would result from implementation of the Closure Plan.

#### 4.4.4.7 Compliance with Thresholds of Significance

<u>Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.</u>

#### 4.4.4.7.1 Desert Tortoise

The OB/OD Units are within the known range of desert tortoises and within a habitat type (Joshua tree woodland) and elevation (below 5000 feet) which typically supports this species. Desert tortoises are not deterred from living on active bombing ranges. The Air Force conducted a desert tortoise survey for the area of the OB/OD Units in February 2000. The survey found desert tortoise sign for two live, hibernating desert tortoises, numerous desert tortoise burrows in various stages of use and degradation, scats, and several old, disarticulated bone scatters. The live tortoises and the majority of sign were found in the southern portion of the survey area, south of the existing desert tortoise exclusionary fence. The fencing consists of materials approved by USFWS and was constructed at the base of the chain-link fence surrounding the OB/OD Units. In addition, a concrete wall was poured to a depth of 3 feet at the north and south gates of the OB/OD Units. These measures prevent tortoises from entering the OB/OD Units.

The BO issued to Edwards determined that the proposed action as described in the request for formal consultation is not likely to jeopardize the continued existence of the desert tortoise or result in adverse modification of critical habitat. Project-specific “reasonable and prudent measures” are routinely implemented so that potential for “take” of desert tortoise is minimized. The complete BO can be found in Appendix C-4, Biological Opinion.

The following terms and conditions are included in the draft Hazardous Waste Facility Permit Modification, and are provisions of the BO directly applicable to operations at the OB/OD Units, and/or are standard operating practices for range activities at Edwards:

- A DTSC permit condition will require an environmental monitoring plan to detect buildup of contaminants in the soil and groundwater and reports that must be approved by DTSC. The environmental monitoring plan approved by DTSC must include actions to be taken in the event that monitoring results demonstrate an increase of contamination or risk to any media.

- A survey would be conducted prior to OB/OD operations and any desert tortoises discovered crossing roads, or in the project area, would be relocated a safe distance away by Authorized biologists using guidelines issued by USFWS.

- Desert tortoises will be handled in full accordance with all applicable provisions and regulations of the Endangered Species Act. Authorized biologists are the only individuals approved to handle desert tortoises. The phrase “authorized” biologist, used in this section is defined as:

A qualified biologist who can further demonstrate that he or she has substantial field experience and training to handle and relocate desert tortoises, reconstruct burrows, and relocate eggs, and is authorized to handle desert tortoises.

None of the proposed measures will prohibit any individual from handling a desert tortoise when necessary to protect the safety or health of the animal.

- All workers are trained through the Desert Tortoise Awareness program that provides information on desert tortoise, and appropriate actions to take if they are encountered. Personnel working in or near tortoise habitat must be briefed regarding operational procedures to avoid harming desert tortoises and to minimize loss of their habitat. All personnel receiving the education program shall sign a statement indicating that they have read, understand, and will follow the protective measures. Copies of these statements shall be on file at the Environmental Management Office.

- Personnel will immediately report sightings of desert tortoises or sign found in the project area to the monitoring biologist or the Environmental Management Office.

- The project work areas will be fenced, flagged, or marked to define the limit of project activities.

- Vehicles will generally remain on previously established roads and within staging areas and follow flagged off road routes that have been surveyed or cleared of desert tortoises. When driving off road, operators will minimize disturbance to vegetation and not exceed twenty (20) miles per hour. All personnel will inspect under vehicles for desert tortoises prior to operating them in desert tortoise habitat.

- Parking and staging areas will be restricted to previously disturbed areas as much as possible.

- Acres of disturbance will be tracked to provide a basis for possible future revegetation and restoration efforts.

- To minimize predation risks, all trash and food items will be disposed of in common raven-proof containers, and regularly removed from project sites to reduce attraction of common ravens.

- An annual report will be submitted to the USFWS summarizing any injury, mortality, or handling of desert tortoises, disturbance of critical

habitat, and habitat restoration.

In summary, desert tortoises are present in the vicinity of the project site, but are prevented from approaching and entering the area by exclusionary fencing. Specific measures in the BO and INRMP would minimize take to fewer than authorized by the BO. The proposed project does not provide for or require disturbance of additional land area. The ERA Predictive and Validation studies show no on-going impacts to soil or plants. Given the existing soil conditions and considering prior operations at the proposed project area, exceedence of HQs would occur slowly over time. Compliance with EKAPCD Burn Plan and DTSC permit conditions will reduce the rate of contaminant buildup in soils and result in biological resource impacts that are less than significant. It is anticipated that the proposed action will result in no adverse impacts to this species.

#### 4.4.4.7.2 Mohave Ground Squirrel

Mohave ground squirrels were confirmed in the area around the OB/OD Units during a focused survey in May 2000. Based on the number of captured animals and data recorded, there was an active breeding population near the OB/OD Units. In May 2001, a second survey was conducted to look for Mohave ground squirrels within the perimeter fence of the OB/OD Units. No Mohave ground squirrels were found within the fenced area. Grading of the site has resulted in the elimination of vegetation over much of the unit and the adjacent staging areas. In addition, the vehicles and human activities associated with the preparation of treatment events most likely would divert wildlife from the site during treatment events.

Potential toxicological risks to the Mohave ground squirrel are the same as those to the Merriam kangaroo rat. HQs exceeding 1.0 were predicted for aluminum for the kangaroo rat. However, average soil background concentrations also had HQs exceeding 1.0.

Due to the fencing, absence of vegetation, and the continuing routine use of the site, it is unlikely that operations or actions at the OB/OD Units would affect small mammals, including Mohave ground squirrels.

#### 4.4.4.7.3 Sensitive Plant Species

Desert cymopterus is the only Edwards' species of concern that occurs near the OB/OD Units. Plants flower and seed well in high rainfall years but seedling growth is extremely low. The plants appear to be long-lived and well adapted to long droughts. The INRMP includes specific conservation measures, goals, and objectives for desert cymopterus. A desert cymopterus training program has been incorporated into the Desert Tortoise Awareness Program. The desert cymopterus training program includes a slide presentation on natural history, habitat and plant photos, a map of populations on base, importance of

conservation, and general protection measures to ensure survival of protected and sensitive species on Edwards.

The ERA Predictive Study resulted in HQs exceeding 1.0 in plants for aluminum, cadmium, chromium, copper, and lead. The greatest HQ predicted (14) was for plant uptake of aluminum, however average soil background concentrations also had HQs exceeding 1.0 for aluminum and chromium. The ERA Validation Study determined statistically that one downwind grid copper in plant concentration result may be significantly higher than background. Copper may be a potential COPEC, but should be subject to careful consideration based on all of the available data. The phytotoxicity tests resulted in all composite test soils affecting overall plant growth, however the effects may be due to differences in nutrient levels rather than COPEC concentrations. Results from the plant growth study indicate that no adverse growth effects were observed that could not be attributed to a lack of nutrients in the soil.

According to the INRMP the greatest threat to plants at Edwards appears to be habitat degradation from drought and over pumping of groundwater. The primary protection of sensitive plant species is limiting activities to surveyed areas and using existing roads and previously disturbed areas for all types of vehicles.

<u>Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations, or by California Department of Fish and Game or U.S. Fish and Wildlife Service.</u>

There are no riparian habitats or other sensitive natural communities located on or within the project site except for the sensitive species discussed above. Therefore, the conclusion is no impact for this project.

<u>Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.</u>

No impacts to wetlands will occur from this project. There are no federally protected wetlands as defined by Section 404 of the Clean Water Act located on EAFB property or within close proximity of the project site.

<u>Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.</u>

This project does not affect movement of any species, wildlife corridors, or nursery sites. In accordance with the Migratory Bird Treaty Act, if active nests are discovered within the fenced area, detonation would be postponed until the young have fledged.

Conflict with any local policies or ordinances protecting biological resources, such as tree preservation policy or ordinance.

The proposed project is compatible with the facility's INRMP, which identifies the projects and objectives to inventory and manage natural resources, emphasizing threatened or endangered species, species of special management concern, surface and groundwater resources, and habitat conservation. There are no other local policies or ordinances that apply to the facility.

Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Conservation Community Plan, or other approved local, regional, or state habitat conservation plan.

This project complies with the Desert Tortoise Habitat Management Plan, which designates the DTMA. The project is compatible with Edwards' INRMP, which contains the facility's habitat conservation plan. There are no other local, regional, or state plans that apply to the facility.

### 4.4.5 Mitigation Measures

BRPMs listed in table ES-1 will be carried out to protect the Desert Tortoise and Mohave Ground Squirrel located near the project location. Potential impacts to biological resources as a result of the proposed project will be less than significant. Therefore, further mitigation measures are not required.

### 4.4.6 Level of Impacts After Mitigation

Impacts to biological resources from the proposed project are less than significant. Further mitigation is not required.

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## Table 4.4-1 Wildlife Species Observed on Edwards

| Scientific Name | Common Name |
|---|---|
| **CRUSTACEANS** | |
| **Shrimp** | |
| *Branchinecta gigas* | Giant fairy shrimp |
| *Branchinecta mackini* | Alkali fairy shrimp |
| *Branchinecta lindahli* | Versatile fairy shrimp |
| *Lepiduras lemmoni* | Tadpole shrimp |
| *Eocyzicus digueti* | Clam shrimp |
| **AMPHIBIANS** | |
| *Xenophus laevis* | African clawed frog |
| *Rana catesbiana* | Bullfrog |
| *Bufo punctatus* | Red-spotted toad |
| *Hyla regilla* | Tree frog |
| *Bufo borealis* | Western toad |
| **REPTILES** | |
| **Tortoises** | |
| *Xerobates (Gopherus) agassizii* | Desert tortoise |
| **Lizards** | |
| *Coleonyx variegatus* | Banded gecko |
| *Sauromalus obesus* | Chuckwalla |
| *Xantusia vigilis* | Common night lizard |
| *Crotaphytus insularis* | Desert collared lizard |
| *Phrynosoma platyrhinos* | Desert horned lizard |
| *Dipsosaurus dorsalis* | Desert iguana |
| *Sceloporus magister* | Desert spiny lizard |
| *Eucmeces gilbertii* | Gilbert skink |
| *Gambelia wislizenii* | Long-nosed leopard lizard |
| *Urosaurus graciosus* | Long-tailed brush lizard |
| *Crotaphytus bicintores* | Mojave black-collared lizard |
| *Uta stansburiana* | Side-blotched lizard |
| *Sceloporus occidentalis* | Western fence lizard |
| *Cnemidophorus tigris* | Western whiptail |
| *Callisaurus draconoides* | Zebra-tailed lizard |
| **Snakes** | |
| *Chilomeniscus cinctus* | Banded sand snake |
| *Masticophis flagellum* | Coachwhip |
| *Lampropeltis getulus* | Common kingsnake |
| *Hypsiglena torquata* | Desert night snake |
| *Arizona elegans* | Glossy snake |
| *Pituophis melanoleucus* | Gopher snake |
| *Sonora semiannulata* | Ground snake |
| *Rhinocheeilus lecontei* | Long-nosed snake |
| *Crotalus scutulatus* | Mojave green rattlesnake |
| *Lichanura trivirgata* | Rosy boa |
| *Crotalus cerastes* | Sidewinder rattlesnake |
| *Phyllorhynchus decurtatus* | Spotted leaf-nosed snake |
| *Trimorphodon biscutatus* | Lyre snake |
| *Salvadora hexalepis* | Western patch-nosed snake |
| *Chionactis occipitalis* | Western shovel-nosed snake |

## Table 4.4-1 Wildlife Species Observed on Edwards (Continued)

| Scientific Name | Common Name |
|---|---|
| **BIRDS** | |
| *Piplio aberti* | Abert's towhee |
| *Melanerpes formicivorous* | Acorn woodpecker |
| *Selasphorus sasin* | Allen's hummingbird |
| *Recurvirostra americana* | American avocet |
| *Botaurus lentiginosus* | American bittern |
| *Fulica americana* | American coot |
| *Corvus brachyrhynchos* | American crow |
| *Phoenicopterus ruber* | American flamingo |
| *Pluvialis domenica* | American golden plover |
| *Spinus tristis* | American goldfinch |
| *Falco sparverius* | American kestrel |
| *Anthus spinoletta* | American pipit |
| *Turdus migratorius* | American robin |
| *Pelecanus erythrorhynchos* | American white pelican |
| *Anas penelope* | American wigeon |
| *Calypte anna* | Anna's hummingbird |
| *Sterna albifrons* | Arctic tern |
| *Myiarchus cinerascens* | Ash-throated flycatcher |
| *Dendroica coronata* | Audubon's warbler |
| *Haliaectus leucocephalus* | Bald eagle |
| *Riparia riparia* | Bank swallow |
| *Hurundo rustica* | Barn swallow |
| *Calidris bairdii* | Baird's sandpiper |
| *Pluvialis squatarola* | Black-bellied plover |
| *Tryngites subruficollis* | Buff-breasted sandpiper |
| *Archilochus alexandri* | Black-chinned hummingbird |
| *Nycticorax nycticorax* | Black-crowned night-heron |
| *Megaceryle alcyon* | Belted kingfisher |
| *Thryomanes bewickii* | Bewick's wren |
| *Polioptila caerulea* | Blue-gray gnatcatcher |
| *Molothrus ater* | Brown-headed cowbird |
| *Pheucticus melanocephalus* | Black-headed grosbeak |
| *Guiraca caerulea* | Blue grosbeak |
| *Sayornis nigricans* | Black phoebe |
| *Chlidonias niger* | Black tern |
| *Arenaria melanocephala* | Black turnstone |
| *Himantopus mexicanus* | Black-necked stilt |
| *Larus philadelphia* | Bonaparte's gull |
| *Branta bernicla* | Brant |
| *Euphagus cyanocephalus* | Brewer's blackbird |
| *Pelicanus occidentalis* | Brown pelican |
| *Spizella breweri* | Brewer's sparrow |
| *Polioptila melanura* | Black-tailed gnatcatcher |
| *Amphispiza bilineata* | Black-throated sparrow |
| *Dendroica nigrescens* | Black-throated gray warbler |
| *Bucephala albeola* | Bufflehead |
| *Icterus galbula bullocki* | Bullock's oriole |
| *Athene cunicularia* | Burrowing owl |
| *Anas discors* | Blue-winged teal |
| *Mniotitla varia* | Black-and-white warbler |

## Table 4.4-1 Wildlife Species Observed on Edwards (Continued)

| Scientific Name | Common Name |
|---|---|
| **BIRDS (Continued)** | |
| *Campylorhynchus brunneicapillus* | Cactus wren |
| *Bubulcus ibis* | Cattle egret |
| *Branta canadensis* | Canada goose |
| *Larus californicus* | California gull |
| *Tyrannus vociferans* | Cassin's kingbird |
| *Aythya americana* | Canvasback |
| *Callipepla californica* | California quail |
| *Hydroprogne caspia* | Caspian tern |
| *Toxostoma redividum* | California thrasher |
| *Vireo cassini (formerly solitary)* | Cassin's vireo |
| *Wilsonia canadensis* | Canada warbler |
| *Catherpes mexicanus* | Canyon wren |
| *Calcarius ornatus* | Chestnut-collared longspur |
| *Spizella pallida* | Clay-colored sparrow |
| *Bombycilla cedrorum* | Cedar waxwing |
| *Spizella passerina* | Chipping sparrow |
| *Alectoris chukar* | Chukar |
| *Anas cyanoptera* | Cinnamon teal |
| *Aechmophorus clarkii* | Clark's grebe |
| *Hirundo pyrrhonata* | Cliff swallow |
| *Bucephala clangula* | Common goldeneye |
| *Accipitera cooperi* | Cooper's hawk |
| *Calypte costae* | Costa's hummingbird |
| *Tyto alba* | Common barn owl |
| *Gavia immer* | Common loon |
| *Merfus merganser* | Common merganser |
| *Gallinula chloropus* | Common moorhen |
| *Chordeiles minor* | Common nighthawk |
| *Phalaenoptilus nuttalli* | Common poorwill |
| *Corvus corax* | Common raven |
| *Capella gallinago* | Common snipe |
| *Sterna hirundo* | Common tern |
| *Geothylpis trichas* | Common yellowthroat |
| *Phalacrocorax auritus* | Double-crested cormorant |
| *Junco hyemalis* | Dark-eyed junco |
| *Empidonax oberholseri* | Dusky flycatcher |
| *Calidris alpina* | Dunlin |
| *Podiceps nigricollis* | Eared grebe |
| *Sayornis phoebe* | Eastern phoebe |
| *Micrathene whitneyi* | Elf owl |
| *Philacte canagica* | Emperor goose |
| *Sturnus vulgaris* | European starling |
| *Buteo regalis* | Ferruginous hawk |
| *Passerella iliaca* | Fox sparrow |
| *Sterna forsteri* | Forster's tern |
| *Larus pipixcan* | Franklin's gull |
| *Dendrocygna bicolor* | Fulvous whistling duck |
| *Anas strepera* | Gadwall |
| *Callipepla gambelii* | Gambel's quail |
| *Ardea herodias* | Great blue heron |

## Table 4.4-1 Wildlife Species Observed on Edwards (Continued)

| Scientific Name | Common Name |
|---|---|
| **BIRDS (Continued)** | |
| *Butorides* | Green-backed heron |
| *Gelochelidon nilotica vanrossemi* | Gull-billed tern |
| *Regulus satrapa* | Golden-crowned kinglet |
| *Zonotricha atricapilla* | Golden-crowned sparrow |
| *Bubo virginianus* | Great horned owl |
| *Aquila chrysaetos* | Golden eagle |
| *Dumetella carolinensis* | Gray catbird |
| *Casmerodius albus* | Great egret |
| *Empidonax wrightii* | Grey flycatcher |
| *Butorides virescens* | Green heron |
| *Geococcyx californicanus* | Greater roadrunner |
| *Aythya affinis* | Greater scaup |
| *Vireo vicinior* | Gray vireo |
| *Anas crecca* | Green-winged teal |
| *Tringa flavipes* | Greater yellowlegs |
| *Quiscalus mexicanus* | Great-tailed grackle |
| *Chorura chorura* | Green-tailed towhee |
| *Anser albifrons* | Greater white-fronted goose |
| *Anas crecca* | Green-wing teal |
| *Empidonax hammondii* | Hammond’s flycatcher |
| *Parabuteo unicinctus* | Harris hawk |
| *Zonotricha querula* | Harris’ sparrow |
| *Larus heermanni* | Heermann’s gull |
| *Larus argentatus* | Herring gull |
| *Catharus guttatus* | Hermit thrush |
| *Dendroica occidentalis* | Hermit warbler |
| *Carpodactus mexicanus* | House finch |
| *Podiceps auritus* | Horned grebe |
| *Eremophilia alpestris* | California horned lark |
| *Lophodytes cycykkatys* | Hooded merganser |
| *Passer domesticus* | House sparrow |
| *Troglogytes aedon* | House wren |
| *Limosa lapponica* | Hudsonian godwit |
| *Vireo huttoni* | Hutton's vireo |
| *Charadrius vociferus* | Killdeer |
| *Carduelis lawrencei* | Lawrence's goldfinch |
| *Larus atricilla* | Laughing gull |
| *Calcarius lapponicus* | Lapland longspur |
| *Calamospiza melanocorys* | Lark sparrow |
| *Passerina amoena* | Lazuli bunting |
| *Numenius americanus* | Long-billed curlew |
| *Limnodromus scolopaceus* | Long-billed dowitcher |
| *Florida caerulea* | Little blue heron |
| *Picoides scalaris* | Ladder-backed woodpecker |
| *Toxostoma lecontei* | Le Conte's thrasher |
| *Ixobrychus exilis* | Western least bittern |
| *Vireo bellii pusillus* | Least bell's vireo |
| *Phoeniconaias minor* | Lesser flamingo |
| *Carduelis psaltria* | Lesser goldfinch |
| *Chordeiles acutipennis* | Lesser nighthawk |

## Table 4.4-1 Wildlife Species Observed on Edwards (Continued)

| Scientific Name | Common Name |
|---|---|
| **BIRDS (Continued)** | |
| *Asio otus* | Long-eared owl |
| *Caladris minutilla* | Least sandpiper |
| *Aythya affinis* | Lesser scaup |
| *Sterna albifrons* | Least tern |
| *Asyndesmus lewsi* | Lewis's woodpecker |
| *Tringa flavipes* | Lesser yellowlegs |
| *Pluvialis dominica* | Lesser golden plover |
| *Melospiza lincolnii* | Lincoln sparrow |
| *Lanius ludovicianus* | Loggerhead shrike |
| *Limosa fedoa* | Marbled godwit |
| *Anas platyrhynchos* | Mallard |
| *Cistothorus palustris* | Marsh wren |
| *Falco columbiarius* | Merlin |
| *Oporornis tolmiei* | Macgillivray's warbler |
| *Sialic currucoides* | Mountain bluebird |
| *Parus gambeli* | Mountain chickadee |
| *Zenaida macroura* | Mourning dove |
| *Charadrius montanus* | Mountain plover |
| *Dendroica coronata coronata* | Myrtle warbler |
| *Vermivora ruficapilla* | Nashville warbler |
| *Colaptes auratus* | Northern flicker |
| *Circus cyaneus* | Northern harrier |
| *Mimus polyglottos* | Northern mockingbird |
| *Icterus galbula* | Northern oriole |
| *Anas acuta* | Northern pintail |
| *Lanius excubitor* | Northern shrike |
| *Stelgid opteryx ruficollis* | Northern rough-winged swallow |
| *Anas clypeata* | Northern shoveler |
| *Dendrocopos nuttallii* | Nuttall's woodpecker |
| *Vermivora celata* | Orange-crowned warbler |
| *Clangula hyemalis* | Oldsquaw |
| *Nuttallornis borealis* | Olive-sided flycatcher |
| *Pandion haliaetus* | Osprey |
| *Epidonax difficilis* | Pacific-slope flycatcher |
| *Myioborus pictus* | Painted redstart |
| *Podilymbus podiceps* | Pied-billed grebe |
| *Falco peregrinus anatum* | Peregrine falcon |
| *Calidris melanotos* | Pectoral sandpiper |
| *Pluvialis fulva* | Pacific golden plover |
| *Phainopepla nitens* | Phainopepla |
| *Spinus pinus* | Pine siskin |
| *Falco mexicanus* | Prairie falcon |
| *Carpodacus purpureus* | Purple finch |
| *Progne subis* | Purple martin |
| *Larus delawarensis* | Ring-billed gull |
| *Mergus serrator* | Red-breasted merganser |
| *Sitta canadensis* | Red-breasted nuthatch |
| *Sphyrapicus ruber* | Red-breasted sapsucker |
| *Regulus calendula* | Ruby-crowned kinglet |
| *Loxia curvirostra* | Red crossbill |

## Table 4.4-1 Wildlife Species Observed on Edwards (Continued)

| Scientific Name | Common Name |
|---|---|
| **BIRDS (Continued)** | |
| *Aythya americana* | Redhead |
| *Calidris canutus* | Red knot |
| *Sphyrapius ruber* | Red-napped sapsucker |
| *Buteo lagopus* | Rough-legged hawk |
| *Aythya collaris* | Ring-necked duck |
| *Podiceps grisegena* | Red-necked grebe |
| *Phalaropus lobatus* | Red-necked phalarope |
| *Phasius colchicus* | Ring-necked pheasant |
| *Calidris ruficollis* | Rufous-necked sandpiper |
| *Columba livia* | Rock dove |
| *Chen rossii* | Ross's goose |
| *Salpinctes obsoletus* | Rock wren |
| *Colaptes auratus* | Common flicker |
| *Buteo lineatus* | Red-shouldered hawk |
| *Chalidris ruficollis* | Red-necked stint |
| *Buteo jamaicensis* | Red-tailed hawk |
| *Gavia stellata* | Red-throated loon |
| *Euphagus carolinus* | Rusty blackbird |
| *Oxyura jamaicensis* | Ruddy duck |
| *Philomachus pugnax* | Ruff |
| *Selasphorus rufus* | Rufous hummingbird |
| *Pipilo erythrophthalmus* | Rufous-sided towhee |
| *Arenaria interpres* | Ruddy turnstone |
| *Agelaius phoeniceus* | Red-winged blackbird |
| *Grus canadensis* | Greater sandhill crane |
| *Amphispiza belli* | Sage sparrow |
| *Xema sabinii* | Sabine's gull |
| *Calidris alba* | Sanderling |
| *Sayornis saya* | Say's phoebe |
| *Oreoscoptes montanus* | Sage thrasher |
| *Passerculus sandwichensis* | Savannah sparrow |
| *Limnodromus griseus* | Short-billed dowitcher |
| *Aphelocoma coerulescens* | Scrub jay |
| *Icterus parisorum* | Scott's oriole |
| *Piranga olivacea* | Scarlet tanager |
| *Asio flammea* | Short-eared owl |
| *Calidris pusilla* | Semipalmated plover |
| *Calidris pusillus* | Semipalmated sandpiper |
| *Egretta thula* | Snowy egret |
| *Chen caerulescens* | Snow goose |
| *Charadrius alexandrinus* | Snowy plover |
| *Porzana carolina* | Sora rail |
| *Tringa solitaria* | Solitary sandpiper |
| *Melospiza melodia* | Song sparrow |
| *Vireo solitarius* | Solitary vireo |
| *Actitis macularia* | Spotted sandpiper |
| *Pipilo fuscus* | Spotted towhee |
| *Accipitera striatus* | Sharp-shinned hawk |
| *Calidris acuminata* | Sharp-tailed sandpiper |
| *Micropalma himantopus* | Stilt sandpiper |

## Table 4.4-1 Wildlife Species Observed on Edwards (Continued)

| Scientific Name | Common Name |
|---|---|
| **BIRDS (Continued)** | |
| *Buteo swainsonii* | Swainson's hawk |
| *Melospiza georgiana* | Swamp sparrow |
| *Cahtarus ustulatus* | Swainson's thrush |
| *Vermivora peregrina* | Tennessee warbler |
| *Larus thayeri* | Thayer's gull |
| *Myadestes townsendi* | Townsend's solitaire |
| *Dendroica townsendi* | Townsend's warbler |
| *Agelaius tricolor* | Tricolored blackbird |
| *Tachycineta bicolor* | Tree swallow |
| *Tyrannus melancholicus* | Tropical kingbird |
| *Olor buccinator* | Trumpeter swan |
| *Cygnus columbianus* | Tundra swan |
| *Cathartes aura* | Turkey vulture |
| *Chaetura vauxi* | Vaux's swift |
| *Ixoreus naevius* | Varied thrush |
| *Pyrocephalus rubinus* | Vermillion flycatcher |
| *Auriparus flaviceps* | Verdin |
| *Pooecetes gramineus* | Vesper sparrow |
| *Tachycinetta thalassina* | Violet-green swallow |
| *Rallus limicola* | Virginia rail |
| *Vermivora virginiae* | Virginia's warbler |
| *Heteroscelus incanus* | Wandering tattler |
| *Vireo gilvus* | Warbling vireo |
| *Sitta carolinensis* | White-breasted nuthatch |
| *Zonotrichia leucophrys* | White-crowned sparrow |
| *Sialia currucoides* | Western bluebird |
| *Aechmophorus occidentalis* | Western grebe |
| *Larus occidentalis* | Western gull |
| *Tyrannus verticalis* | Western kingbird |
| *Sturnella neglecta* | Western meadowlark |
| *Calidris mauri* | Western sandpiper |
| *Piranga ludoviciana* | Western tanager |
| *Contipus cordidulus* | Western wood-pewee |
| *Pllegadis chihi* | White-faced ibis |
| *Nuenius phaeopus* | Whimbrel |
| *Elanus leucurus* | White-tailed kite |
| *Epidonax traillii* | Willow flycatcher |
| *Catoptrophorus semipalmatus* | Willet |
| *Phalaropus tricolor* | Wilson's phalarope |
| *Wilsonia pusilla* | Wilson's warbler |
| *Aix sponsa* | Wood duck |
| *Calidris fuscicollis* | White-rumped sandpiper |
| *Aeronautes saxatalis* | White-throated swift |
| *Melanitta deglandi* | White-winged scoter |
| *Icteria virens* | Yellow-breasted chat |
| *Sphyrapicus varius* | Yellow-bellied sapsucker |
| *Xanthocephalus xanthocephalus* | Yellow-headed blackbird |
| *Dendroica coronata* | Yellow-rumped warbler |
| *Dendroica petechia* | Yellow warbler |

## Table 4.4-1. Wildlife Species Observed on Edwards (Concluded)

| Scientific Name | Common Name |
|---|---|
| **MAMMALS** | |
| **Bats** | |
| *Nyctimops macrotus* | Big free-tailed bat |
| *Eumops perotis californicus* | California mastiff bat |
| *Myotis californicus* | California myotis |
| *Lasiurus cinereus* | Hoary bat |
| *Tadarida brasiliensis* | Mexican free-tailed bat |
| *Antrozous pallidus* | Pallid bat |
| *Nyctimops femorosacca* | Pocketed free-tailed bat |
| *Euderma maculata* | Spotted bat |
| *Corynorhinus towsendii* | Townsend's western big-eared bat |
| *Pipistrellus hesperus* | Western pipistrelle |
| **Carnivores** | |
| *Taxidea taxus* | Badger |
| *Lynx rufus* | Bobcat |
| *Canis latrans* | Coyote |
| *Vulpes macrotis* | Desert kit fox |
| *Urocyon cinereoargenteus* | Grey fox |
| *Felis concolor* | Mountain lion |
| *Procyon lotor* | Racoon |
| *Spilogale putorius* | Spotted skunk |
| **Rodents** | |
| *Thomomys bottae* | Botta's pocket gopher |
| *Peromyscus bolyii* | Brush mouse |
| *Perognathus eremicus* | Cactus mouse |
| *Citellus beechyi* | California ground squirrel |
| *Microtus californicus* | California mouse |
| *Peromyscus crinitus* | Canyon mouse |
| *Peromyscus maniculatus* | Deer mouse |
| *Dipodomys deserti* | Desert kangaroo rat |
| *Perognathus penicillatus* | Desert pocket mouse |
| *Neotoma lepida* | Desert woodrat |
| *Ondatra zibethica* | Muskrat |
| *Dipodomys microps* | Great Basin kangaroo rat |
| *Perognathus parvus* | Great Basin pocket mouse |
| *Perognathus longimembris* | Little pocket mouse |
| *Perognathus formosus* | Long-tailed mouse |
| *Chaetodipus formosus* | Long-tailed pocket mouse |
| *Dipodomys merriami* | Merriam's kangaroo rat |
| *Spermophilus mohavensis* | Mohave ground squirrel |
| *Dipodomys panamintinus* | Panamint kangaroo rat |
| *Perognathus inornatus* | San Joaquin pocket mouse |
| *Onychomys torridus* | Southern grasshopper mouse |
| *Reithrodontomys megalotis* | Western harvest mouse |
| *Ammospermophilus leucurus* | White-tailed antelope squirrel |
| **Rabbits and Hares** | |
| *Lepus californicus* | Black-tailed jackrabbit |
| *Sylvilagus auduboni* | Desert cottontail |

Source: Edwards AFB Integrated Natural Resources Management Plan, 2008.

## Table 4.4-2 Plant Species Observed in the OB/OD Units Area

| Scientific Name | Common Name |
|---|---|
| *Achnatherum hymemoides* | Indian rice grass |
| *Achnatherum speciosa* | Desert needle grass |
| *Acamptopappus sphaerocephalus* | Goldenhead |
| *Ambrosia dumosa* | Burrobush |
| *Amsinckia tessallata* | Fiddleneck |
| *Atriplex canescens* | Four-wing saltbush |
| *Atriplex polycarpa* | Allscale |
| *Bromus rubens* | Red brome |
| *Bromus tectorum* | Cheat grass |
| *Ceratoides lanata* | Winterfat |
| *Erodium cicutarium* | Red-stem filaree |
| *Tetradymia glabrata* | Desert horse-brush |
| *Ephedra spp.* | Mormon tea |
| *Eriastrium sapphirinum* | Sapphire flower |
| *Eriogonum fasciculatum* | Desert buckwheat |
| *Haplopappus cooperi* | Cooper's goldenbush |
| *Hymencclea salsola* | Cheesebush |
| *Larrea tridentata* | Creosote |
| *Lessingia lemmonii* | Autumn vinegarweed |
| *Lycium cooperi* | Peachthorn |
| *Oenothera deltoides* | Dune evening primrose |
| *Opuntia basilaris* | Beavertail |
| *Opuntia echinocarpa* | Golden cholla |
| *Opuntia ramossuna* | Pencil cholla |
| *Schismus barbatus* | Split grass |
| *Tetradymia stenolepis* | Mojave cottonthorn |
| *Xylorhiza tortifolia* | Mojave aster |
| *Yucca brevifolia* | Joshua tree |

Source: Computer Sciences Corp., 2000

**Table 4.4-3 Results of Ecological Risk Assessment Predictive Study**

| Indicator Species | Analyte | Predicted HQ |
|---|---|---|
| Merriam kangaroo rat | aluminum | **2.2** |
| | cadmium | <1.0 |
| | chromium | <1.0 |
| | copper | <1.0 |
| | lead | <1.0 |
| Red-tailed hawk | aluminum | <1.0 |
| | cadmium | <1.0 |
| | chromium | <1.0 |
| | copper | <1.0 |
| | lead | <1.0 |
| plants | aluminum | **14** |
| | cadmium | **1.4** |
| | chromium | **1.9** |
| | copper | **2.1** |
| | lead | **1.1** |

Source: Ecological Risk Assessment PIRA OB/OD Unit, Edwards Air Force Base, September 1996 (Predictive Study)

HQ - hazard quotient

**Bold** - HQ > 1.0

**Table 4.4-4 Results of Ecological Risk Assessment Validation Study**

| Sample Location | Analyte | Comparison Method | | |
|---|---|---|---|---|
| | | Detects > UTL | Means Test Conclusion | Detects > UCL |
| Downwind Axes | aluminum | 0 | NS | 0 |
| | cadmium | ND | ND | ND |
| | chromium | 0 | NS | 0 |
| | copper | 0 | NS | 0 |
| | lead | 0 | NS | 0 |
| Downwind Soil | aluminum | 0 | NS | 1 |
| | cadmium | ND | ND | ND |
| | chromium | 0 | NS | 1 |
| | copper | 0 | NS | 2 |
| | lead | 1 | NS | 1 |
| Downwind Plants | aluminum | 0 | NS | 0 |
| | cadmium | ND | ND | ND |
| | chromium | ND | ND | ND |
| | copper | 1 | NS | 9 |
| | lead | ND | ND | ND |

Source: Ecological Risk Assessment Soil and Plant Material Analytic Results and Plant Growth Study Results, PIRA OB/OD Units, Edwards Air Force Base, January 2002 (Validation Study)

Detects – number of samples reporting results
UTL – Upper Tolerance Limit
UCL – Upper Confidence Limit
ND – COPEC was not detected in the sample
NS – comparison to background not statistically significant

# Table 4.4-5 Site Plant Investigation Results (mg/kg)

| Study (Concentration Value Reported) | ERA Validation Study, 2002[a] (mean) | | Annual Monitoring[b] (maximum) | | |
|---|---|---|---|---|---|
| | Downwind grid | Background grid | 2007 | 2008 | 2009 |
| **Metals** | | | | | |
| Aluminum | 179.24 | 295.99 | NA | 4340 | 4700 |
| Antimony | <PQL | 6.07 | 0.13Ja | 0.107J | 5.3 |
| Arsenic | 27.83 | 20.06 | <RL | 0.90J | 2.50C,RL1 |
| Barium | 14.73 | 10.81 | 18.0 | 52.46 | 20.6 |
| Beryllium | <PQL | 11.3 | <RL | 0.20J | <RL |
| Cadmium | <PQL | <PQL | <RL | 2.4 | 1.89 |
| Chromium, total | <PQL | <PQL | 4.4 | 5.38 | 8.49 |
| Chromium, hexavalent | NA | NA | NA | <RL | <RL |
| Cobalt | <PQL | <PQL | 0.32Ja | 1.7 | 0.343 |
| Copper | 3.85 | 3.56 | 7.0 | 7.95 | 9.49 |
| Iron | 267.38 | 382.45 | NA | NA | NA |
| Lead | <PQL | 4.92 | 1.0 | 4.47 | 0.632 |
| Manganese | 12.88 | 15.72 | NA | NA | NA |
| Mercury | NA | NA | 0.69 | 0.0536 | 0.021 |
| Molybdenum | <PQL | <PQL | 5.0 | 1.32 | 1.12 |
| Nickel | 2.75 | 2.61 | 3.53 | 6.20 | 5.35 |
| Selenium | NA | NA | 1.0 | 0.60J | 3.62J |
| Silver | <PQL | <PQL | 1.0 | <RL | 2.50 |
| Strontium | 118.37 | 119.52 | NA | NA | NA |
| Tin | 18.95 | 14.43 | NA | NA | NA |
| Titanium | 9.75 | 12.71 | NA | NA | NA |
| Thallium | NA | NA | 0.14Ja | 0.40J | 0.498RL1,J |
| Vanadium | <PQL | 3.57 | 1.85 | 12.26 | 1.46 |
| Zinc | 6.08 | 5.82 | 229 | 12.50 | 13.0 |
| **Orthophosphate** | NA | NA | 250 | 496 | 1140 |
| **Perchlorate** | NA | NA | 0.210 | 1.300 | 2.450 |
| **PAHs** | NA | NA | 90.000R-10 | 0.250 | 0.452RL1,J |
| **Dioxins/Furans** | NA | NA | 3.7E-12J,Q | 1.6E-11 | 2.9E-11 |

[a] Source: Ecological Risk Assessment: Soil and Plant Material Analytical Results and Plant Growth Study Results, Open Burn/Open Detonation Units, January 2002 (Validation Study). Samples were collected at 33 locations.

[b] Source: 2009 Soil and Plant Sampling Report for Open Burn/Open Detonation Area, Final. Samples were collected at 34 locations.

NA - no sample analyzed PQL– Practical Quantitation Limit RL – Reporting Limit

Data qualifiers:

C Calibration verification recovery was above the method control limit for this analyte. Analyte not detected, data not impacted.
J Estimated value. Analyte detected at a level less than the RL and greater than or equal to the method detection limit.
Ja Estimated result. Result is less than the RL.
R-10 The relative percent difference between the primary and confirmatory analysis exceeded 40 %. The higher value was reported.
RL1 Reporting limit raised due to sample matrix effects.
Q Estimated maximum possible concentration.

Notes:
Results are the highest that were not flagged, except when all results were flagged.

PAHs detected were acenaphthene, acenaphthylene, dibenz(a,h)anthracene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

Dioxins/furans are the highest results that were not flagged B or Ba (method blank contamination). Dioxins/furans are:

| | | |
|---|---|---|
| 1,2,3,4,6,7,8-HpCDD | 1,2,3,7,8-PeCDD | Total HpCDD |
| 1,2,3,4,6,7,8-HpCDF | 1,2,3,7,8-PeCDF (<RL) | Total HpCDF |
| 1,2,3,4,7,8,9-HpCDF | 2,3,4,6,7,8-HxCDF | Total HxCDD |
| 1,2,3,4,7,8-HxCDD (<RL) | 2,3,4,7,8-PeCDF (<RL) | Total HxCDF |
| 1,2,3,4,7,8-HxCDF | 2,3,7,8-TCDD (<RL) | Total PeCDD |
| 1,2,3,6,7,8-HxCDD | 2,3,7,8-TCDF | Total PeCDF |
| 1,2,3,6,7,8-HxCDF | OCDD | Total TCDD |
| 1,2,3,7,8,9-HxCDD | OCDF | Total TCDF |
| 1,2,3,7,8,9-HxCDF | | |

**Figure 4.4-1 Plant Communities on Edwards Air Force Base**

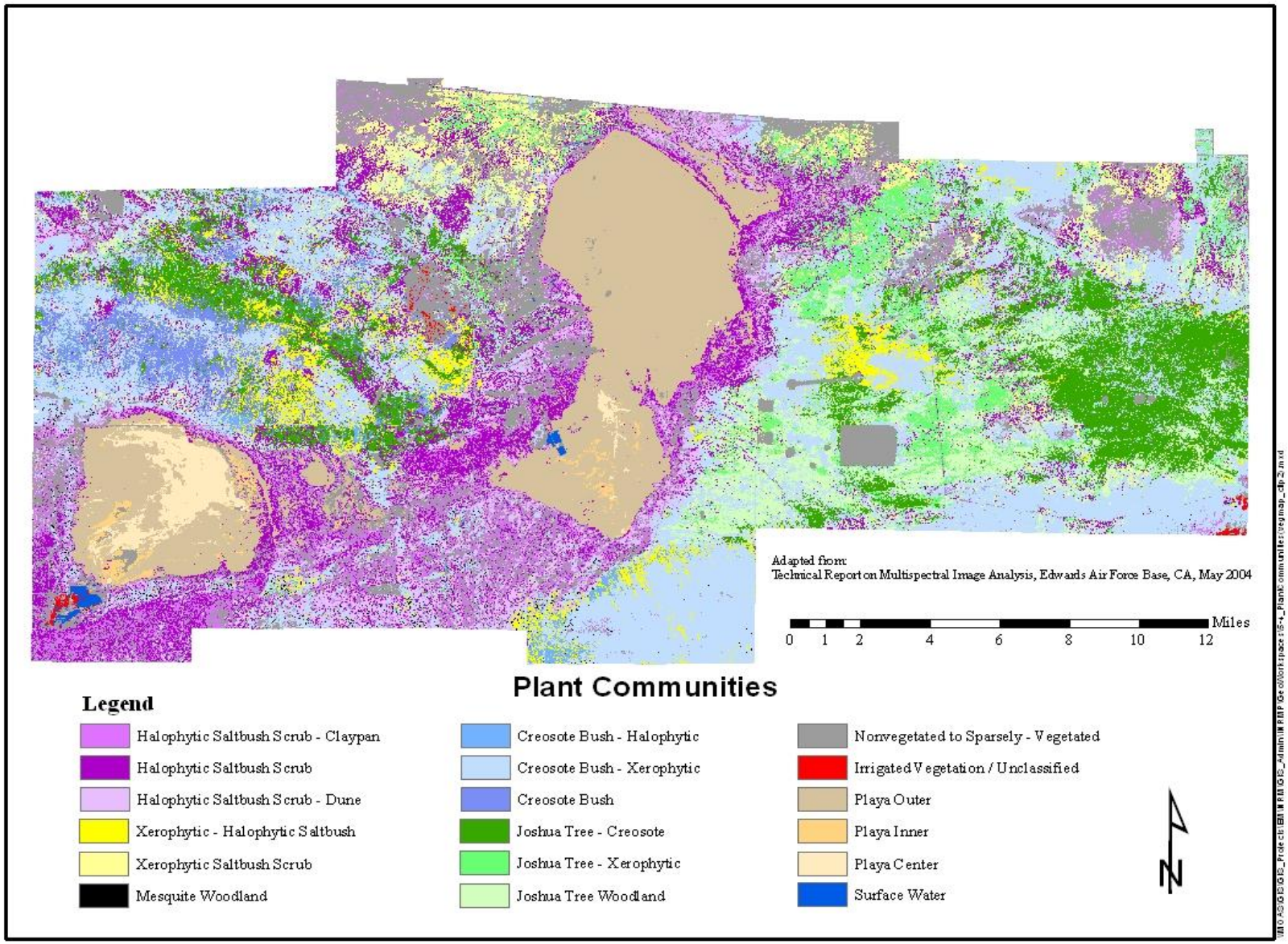


**Figure 4.4-2 Desert Tortoise Critical Habitat**

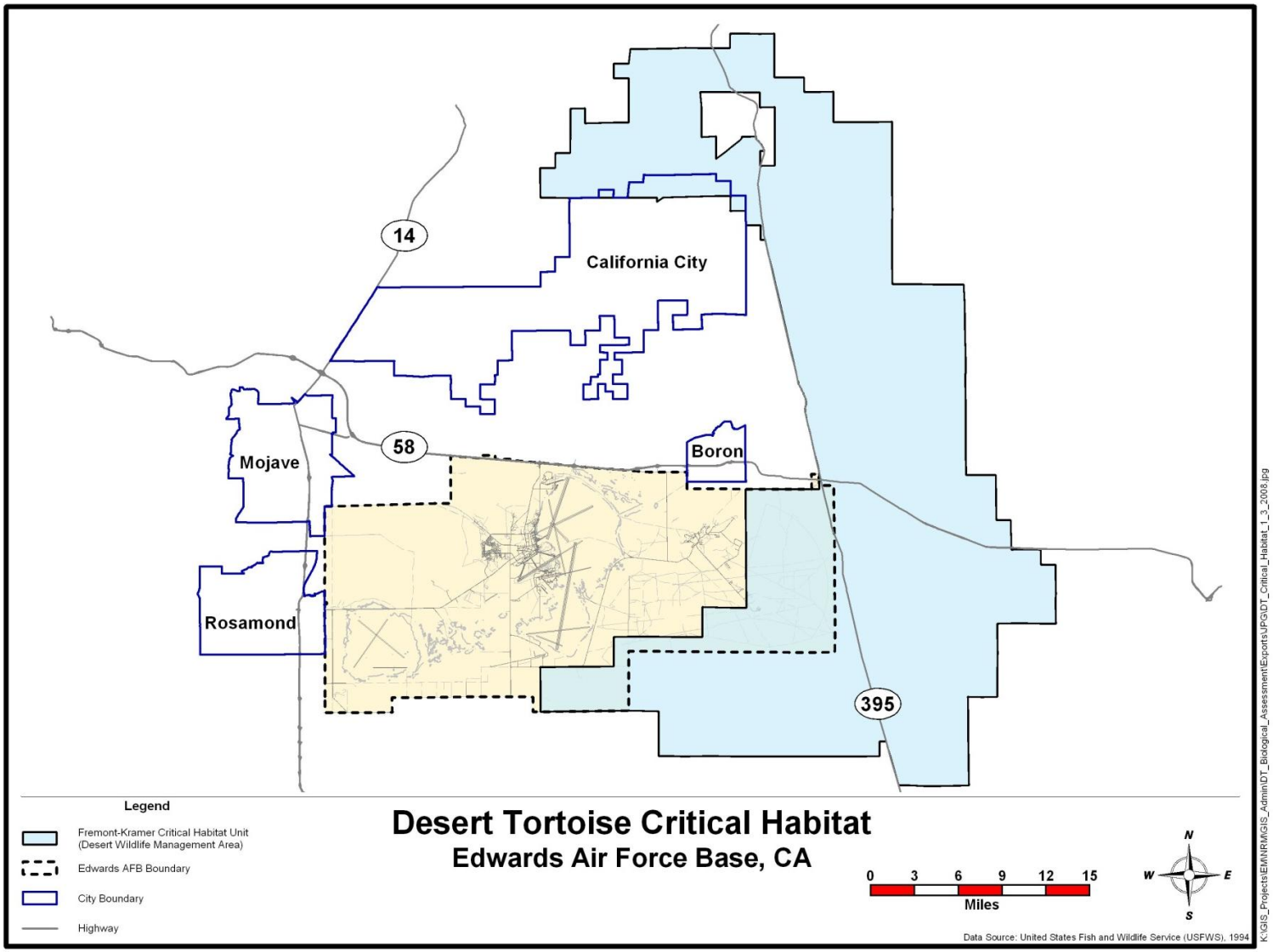


**Figure 4.4-3 Observations of Desert Tortoise on Edwards Air Force Base**

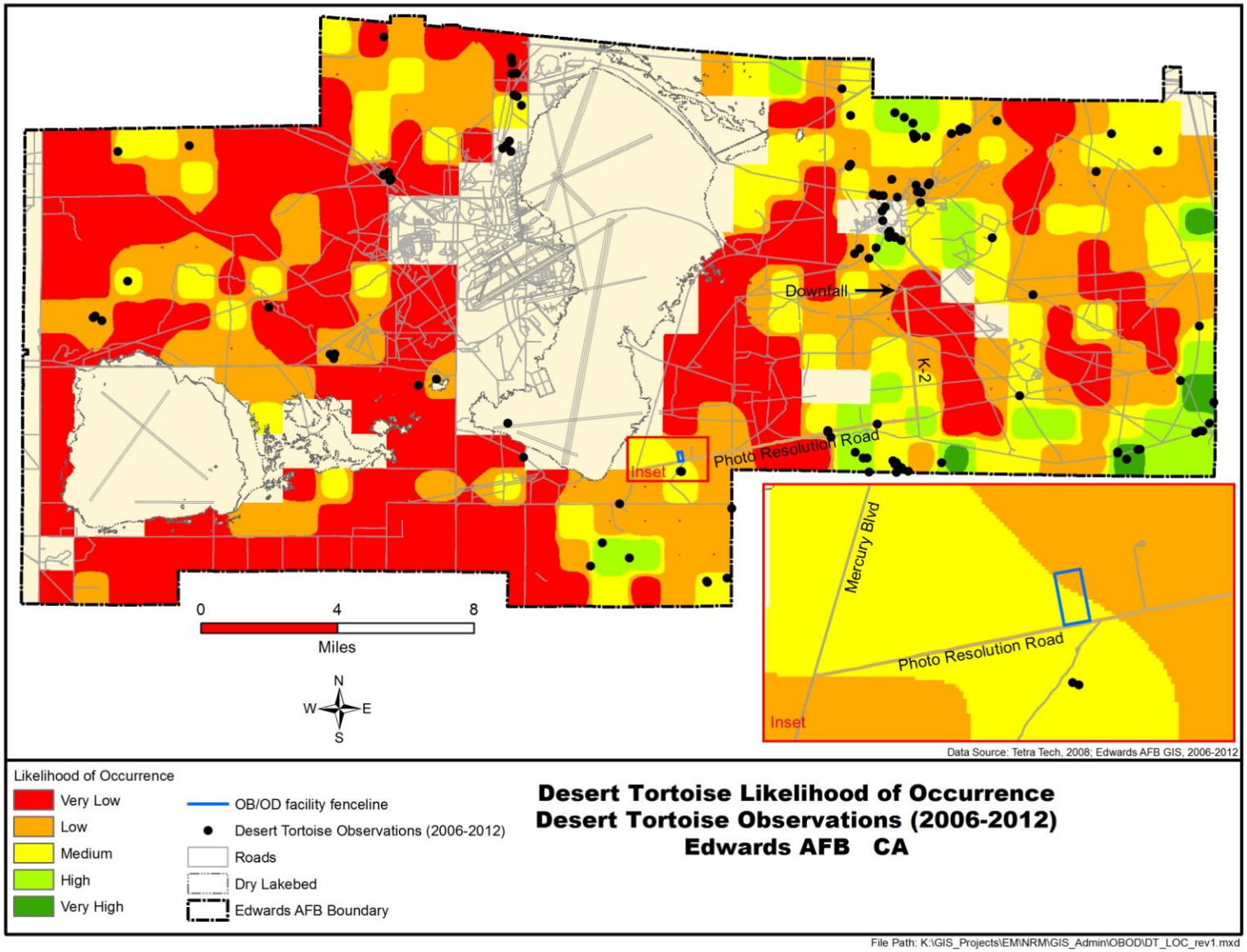


**Figure 4.4-4 Desert Tortoise Sign Observed Within 100 Percent Coverage Survey Area and Zone of Influence Transects at New OB/OD Units**

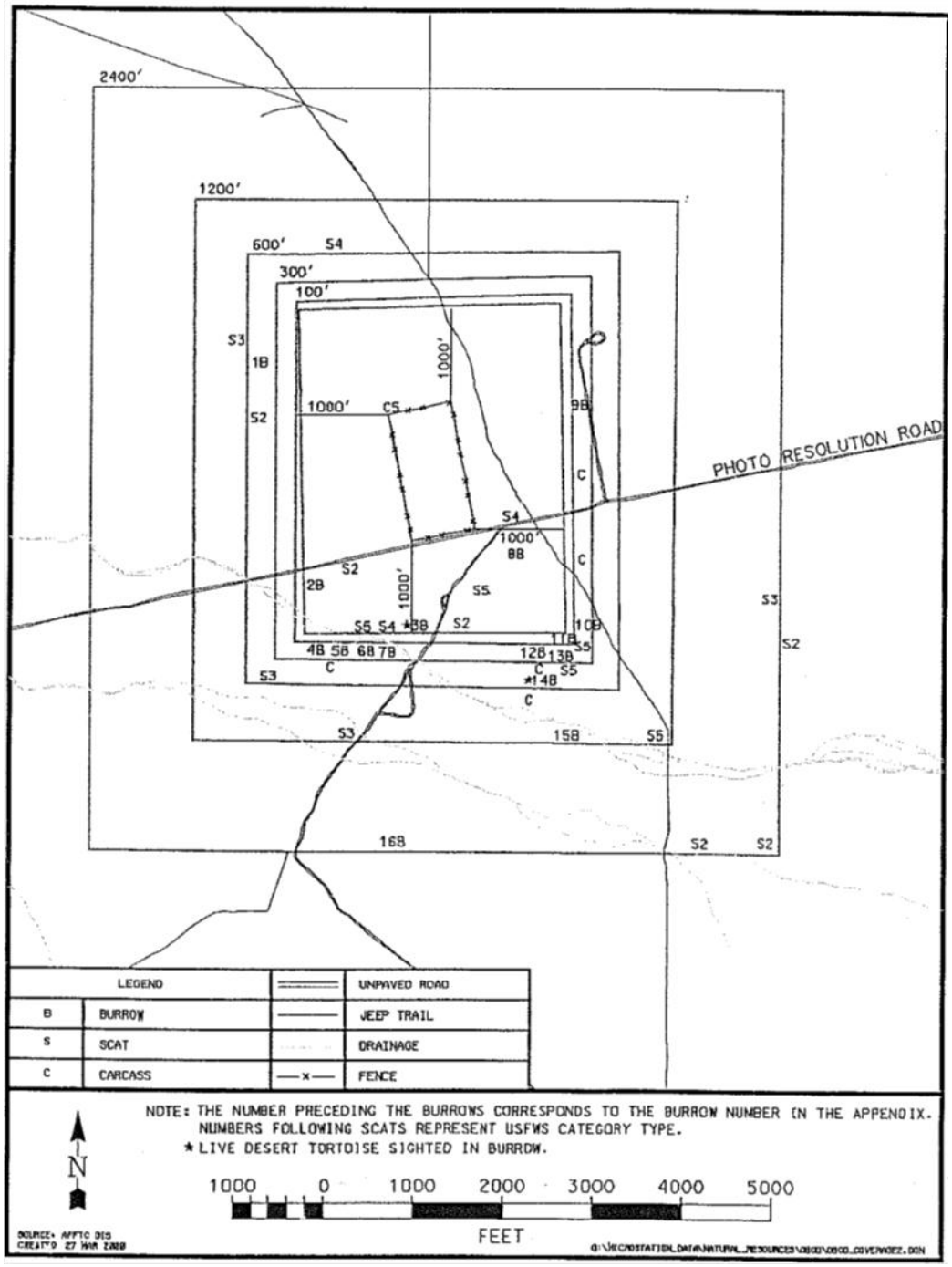


**Figure 4.4-5 Desert Tortoise Sign Observed Within 100 Percent Coverage Survey Area at Old OD Unit**

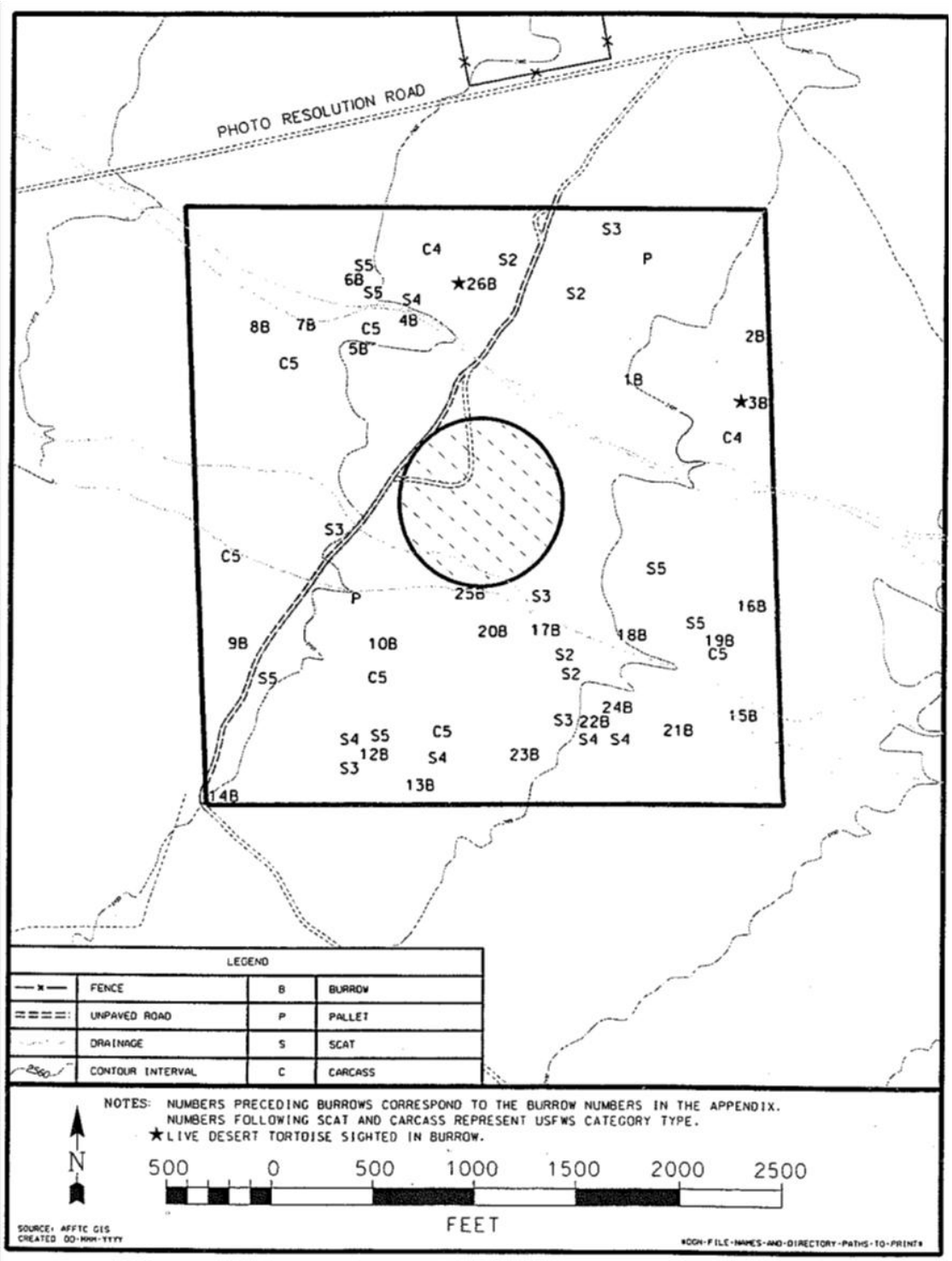


**Figure 4.4-6 Desert Tortoise Sign Observed on Zone of Influence Transects at Old OD Unit**

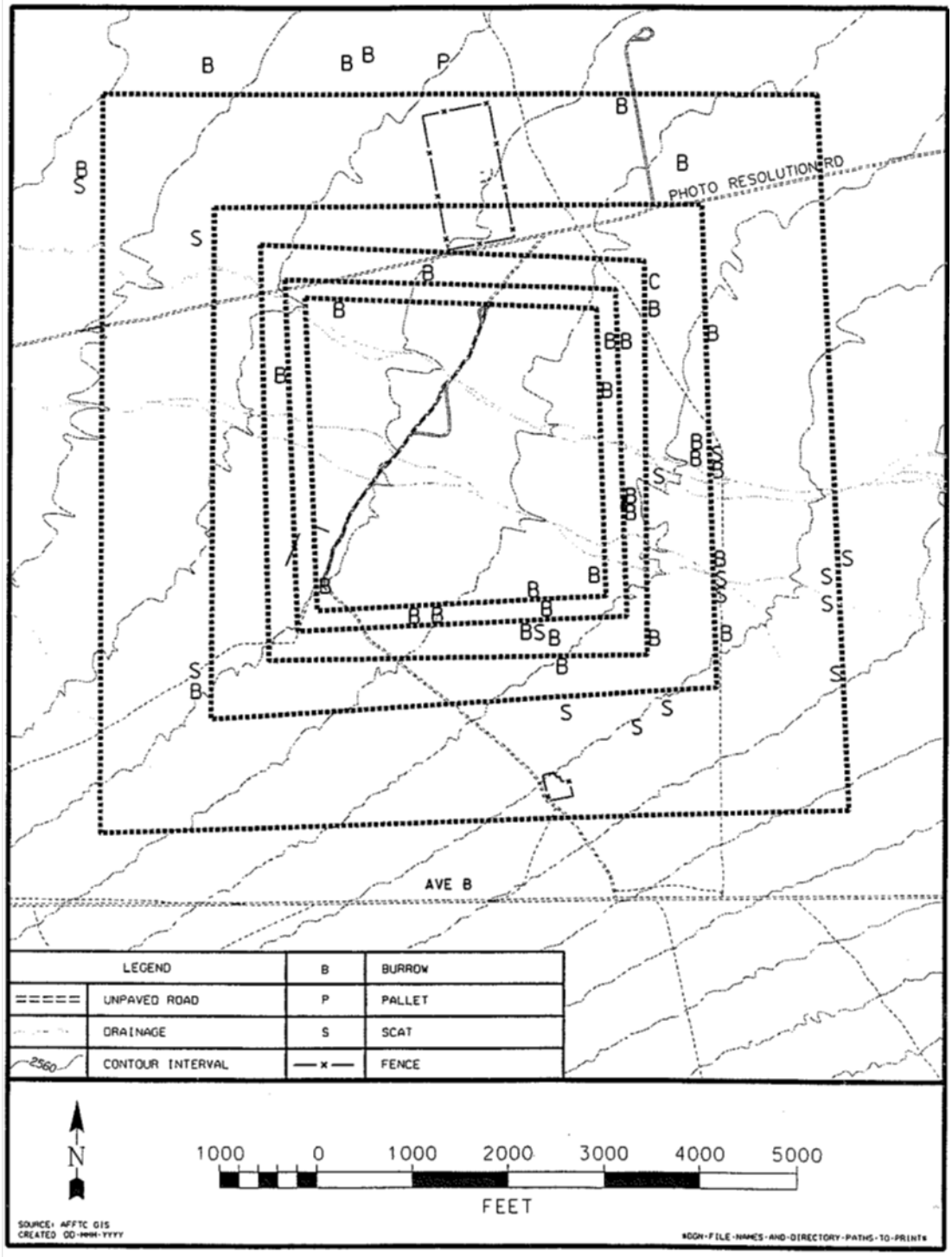


**Figure 4.4-7 Mohave Ground Squirrel Identified on Edwards**

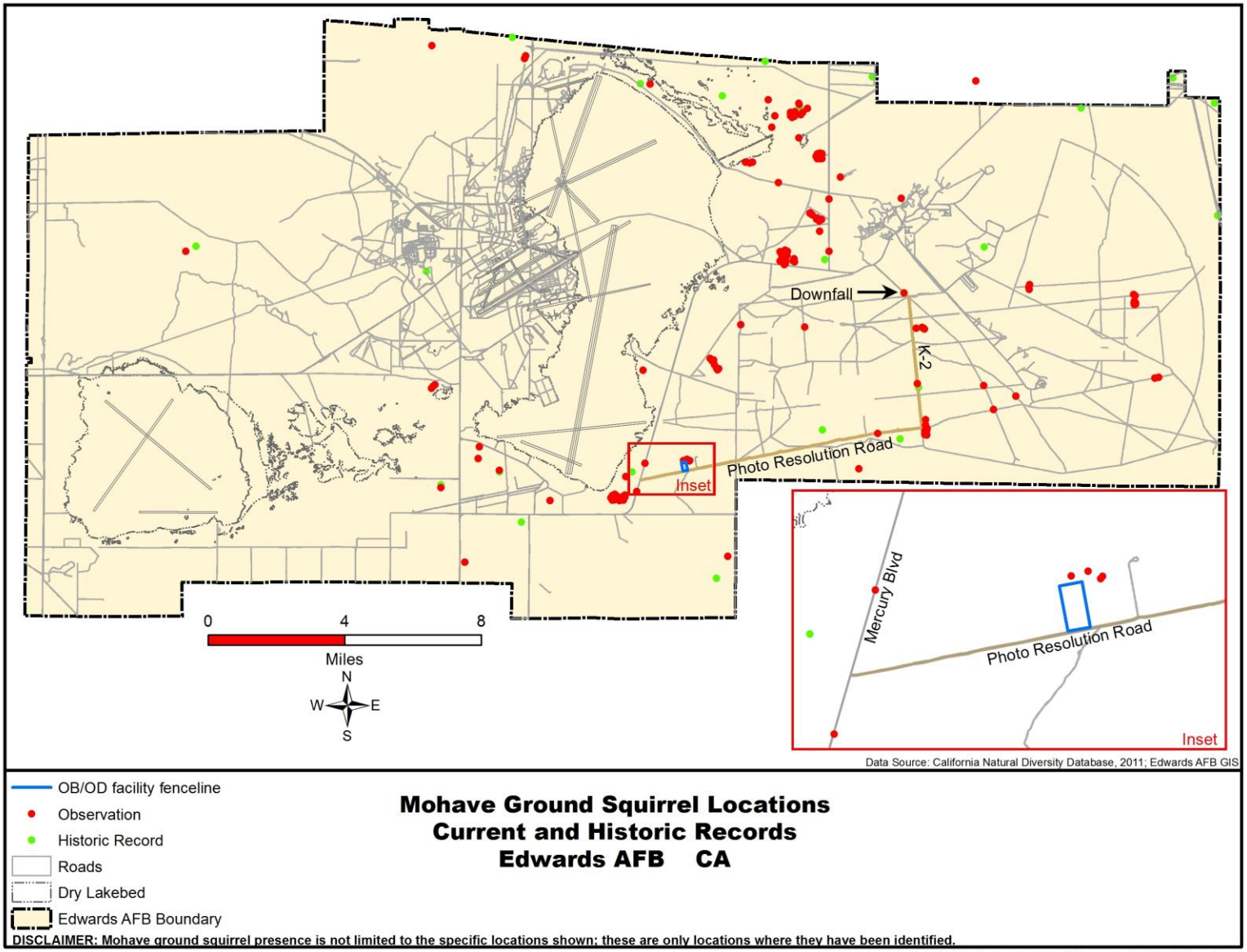
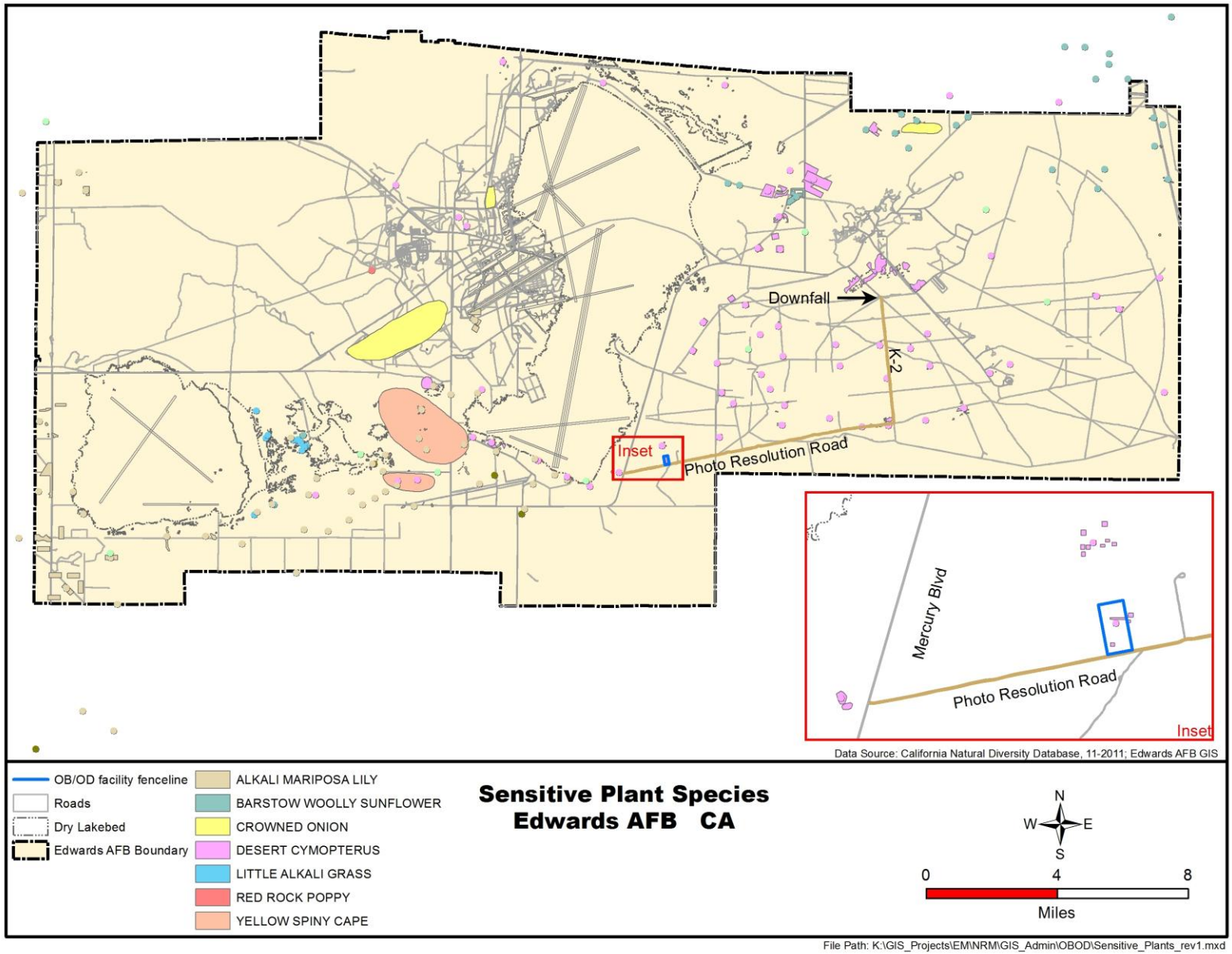


**Figure 4.4-8 Sensitive Plant Species on Edwards Air Force Base**



## 4.5 GEOLOGY AND SOILS

This section describes the physical features of Edwards and its surrounding areas and the project impacts related to seismic activity and soil contamination.

### 4.5.1 Environmental Setting

Edwards is located in the western portion of the Mojave Desert physiographic province within the northern portion of the Antelope Valley (Figure 4.5-1, Physiographic and Floristic Provinces Map). The complex geologic history of the Mojave Desert has created the typical basin and range topography observed in the deserts of the southwest.

The Antelope Valley is a broad alluvial plain lying south of the Sierra Nevada and north of the Transverse Ranges. Low ranges of bedrock hills occasionally interrupt the generally flat terrain of the valley floor. The lower flanks of the hills are covered by Quaternary-aged alluvial fans consisting of water-laid sand and gravel deposits. The low point on the valley floor is the topographic depression that contains the three major playas: Rogers, Rosamond, and Buckhorn Dry Lakes located on Edwards. The three playas are the remnants of Pleistocene Lake Thompson. The present climate is too dry to support a perennial lake, but the playas are seasonally inundated. The drainages within the Antelope Valley generally converge on the three playas but most of the storm water runoff evaporates, seeps into the alluvium, or is captured by drainage facilities in developed areas of Palmdale and Lancaster before it reaches the playas. Only water runoff from the largest storms reach the playas.

The topography of Edwards is marked by broad expanses of flat-to-gently-sloping plains interspersed with broad domes and hills that rise above the surrounding plains. The domes and hills consist mostly of outcrops of granite and quartz monzonite, with volcanic rock forming some of the smaller features. Elevations on base range from 2,267 feet at Rogers Dry Lake to 3,424 feet at Red Buttes near the eastern boundary.

The base can be characterized as having three distinct physiographic areas. The first is an upland area in the northwest portion of the base north of Rosamond Dry Lake and west of Rogers Dry Lake. This area is characterized by low, rounded hills, including the Rosamond and Bissell Hills, with elevations ranging between 2,270 and 3,200 feet.

The second physiographic area occupies the central and southwestern portions of the base. These lowland areas include Rosamond, Buckhorn, and Rogers Dry Lakes and the intervening area. This region extends from the southern to the northern boundary of the base and has a relief of approximately 400 feet, with elevations ranging from 2,270 to 2,675 feet.

The third physiographic area is the highlands east of Rogers Dry Lake and extends to the eastern boundary of Edwards. This upland area is similar to that in the northwestern corner of the base except for two prominent relief features: Leuhman Ridge and Haystack Butte, both over 3,400 feet. Elevations in this area range from approximately 2,400 feet to over 3,400 feet and are the highest of the three physiographic areas on the base (Figure 4.5-2, Topography).

Slope and relief on the PIRA varies from flat to gently sloping plains interspersed with broad domes and hills that rise sharply above the surrounding plains. Slopes range from zero percent near Rogers Dry Lake to greater than 30 percent by Kramer Hills.

The OB/OD Units are located at an elevation of 2,385-2,407 feet. The site slopes from the southeast to the northwest towards Roger Dry Lake. A ridgeline approximately 3.8 miles south-southeast of the PIRA extends to 3,180 feet in elevation.

Land subsidence and aquifer system compaction resulting from declining groundwater levels is a recognized problem in Antelope Valley. At Edwards groundwater extractions have caused more than 4 feet of subsidence. Differential land subsidence has caused sink like depressions and earth fissures and has accelerated erosion of the Rogers playa.

#### 4.5.1.1 Seismic Setting

Presently, the State of California Special Studies Zone - Preliminary Review Maps are considered the most reliable source of Holocene fault delineation. The map series considers “Active Faults” as to have been active during Holocene time (less than 10,000 years before present). The active faults are delineated as Special Studies Zones.

The closest Special Studies Zones to the project area are the San Andreas Fault Zone located in Palmdale approximately 26 miles south of the PIRA and the Garlock Fault Zone located approximately thirty (30) miles northwest of the PIRA (Figure 4.5-3, San Andreas and Garlock Fault Zones). There has been major Holocene and historic seismic activity along these fault lines.

A seismic assessment of the PIRA site was completed for the Permit Modification application. No Special Studies Zones (Holocene faults) have been identified within a 3,000 foot radius from the project site. Several minor faults have been identified on Edwards and within the boundaries of the PIRA (Figure 4.5-4, Edwards Fault Map). The EOD Range is located several hundred feet south of the trends of the Postulated Mirage Valley Fault Extension and several miles west of the Postulated Blake Ranch Fault Extension. These faults indicate evidence of displacement of Quaternary age (between 10,000 and 700,000 years ago).

#### 4.5.1.2 Soils

Surveys conducted in 1996 by the United States Natural Resources Conservation Survey (NRCS) delineated soil types on the entire base. Approximately 50 soil series have been identified on base. This includes a number of soil series combinations made up of more than one soil series, because boundaries were not determined during the soil surveys. These are known as complexes (Figure 4.5-5, Soil Series/Complexes).

Soils at Edwards are typically alkaline (basic), with potential for pH values ranging from 7 to 8 for most soils and greater than 8 on lakebed soils. The high salinity and exchangeable sodium ion content of some soils, particularly soils in the lakebed basins, inhibit plant growth.

The alluvial fans in the areas surrounding the dry lakes are composed primarily of Leuhman, Norob, and Voyager soils. They are deep and moderately-well to well-drained, with textures of fine sand to clay loam. Slopes range from 0 to 5 percent. These soils are saline and sodic (characterized by a disproportionately high concentration of sodium), and subject to wind erosion and flooding.

Dunes and sand sheets around the dry lakes are an intermediate form between the alluvial flats and fan piedmonts. They primarily consist of Cajon soil with smaller proportions of Challenger and other soils. These soils are deep, moderately-well to excessively drained, with textures of sand to loamy sand, subject to wind erosion. Slopes range from 0 to 15 percent.

The PIRA is located on an accumulation of unconsolidated sediments and weathered bedrock and directly overlies a unit of windblown sand of recent age approximately 50 feet thick. This unit of sand is composed of buff, loose, well-sorted, and fine-grained arkosic (rich in feldspar) sand. Chemically, the sand is alkaline in nature. A possible source of the alkalinity may be the alkali deposits on the playa surface, which have been blown eastward by prevailing winds and deposited in the OB/OD Units area. The soils in the area of the OB/OD Units are Cajon Loamy Fine Sand.

A thick sequence of recent age fan alluvium is believed to underlie the sand deposits. The fan alluvium was formed during a wet period in a period of rapid uplift and erosion of the Tehachapi and San Gabriel Mountains. The fan alluvium is composed of fine-grained, unconsolidated, weathered gray loam with mixtures of gray-tan, poorly-sorted sand, silt and clay. The fan alluvium grades into the playa deposits of Rogers Dry Lake.

Older alluvium and Quaternary fanglomerate may underlie the fan alluvium. In the Rogers Lake area, the fanglomerate may vary from less than 20 feet thick on the mountain slopes to over 1,000 feet near the valley floor. The older alluvium

is similar in composition to the younger alluvial sediments and is Quaternary in age.

These units overlie an undifferentiated weathered and fractured bedrock complex comprised of pre-Cenozoic igneous rocks and consolidated Tertiary sedimentary rocks. Quartz monzonite is the predominant igneous rock type. Tertiary sedimentary rocks include an assemblage of rocks of volcanic and clastic sedimentary origin, and localized deposits of fluviatile-lacustrine sediments. Seismic reflection surveys of the general Edwards area identify a thick sedimentary deposit underlying the OB/OD Units. The thickness of the sedimentary units exceeds 500 feet.

## 4.5.2 Applicable Standards

### 4.5.2.1 Siting Standards

CCR Title 22, Section 66264.18 requires that facilities where treatment of hazardous waste will be conducted shall not be located within 61 meters (200 feet) of a fault which has had displacement in Holocene time. Section 66270.14 requires that the facility show that no lineations which suggest the presence of a fault (which have displacement in Holocene time) are present within 3000 feet.

### 4.5.2.2 Other Seismic Standards

Under the Alquist-Priolo Earthquake Fault Zoning Act of 1972, the California Division of Mines and Geology has delineated seismic zones deemed to be "sufficiently active and well-defined as to constitute a potential hazard to structures from surface faulting or fault creep." The state geologist is required to continually review new geologic and seismic data and to revise the earthquake fault zones or to delineate new zones based on new information.

The Air Force requires geotechnical investigations to be performed as part of the design and retrofit of structures. Construction plans are reviewed for conformance with provisions of the Alquist-Priolo Act. However, no structures are associated with this project.

## 4.5.3 Thresholds of Significance

According to Appendix G of the state CEQA Guidelines, a project would normally have a significant adverse impact related to Geology and Soils if it would:

- Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the

State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42)
- Strong seismic ground shaking
- Seismic-related ground failure, including liquefaction
- Landslides

- Result in substantial soil erosion or the loss of topsoil.

- Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction or collapse.

- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

- Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of water.

The significance thresholds are addressed in the following section.

### 4.5.4 Potential Environmental Impacts

Operations at the OB/OD Units have the potential to impact soil at the project area. Factors considered in determining whether an impact would be significant include the potential for substantial change in soil characteristics that would preclude established land uses, or would adversely impact a sensitive environmental resource, such as a threatened or endangered species or their habitats.

The detonations cause disruption and displacement of soil. Detonations will also cause the soil to powder and the area is void of plants to hold the soil. These conditions increase the potential for wind erosion. See Section 4.3, Air Quality, for discussion of wind erosion, and Section 4.7, Hazards and Hazardous Materials, for discussion of deposition. Soil displacement due to water based erosion is minor, as it would only occur during rare, severe flash flood events.

The immediate area has no potential for mineral resource exploitation.

#### 4.5.4.1 Closure Plan

Implementation of the Closure Plan may result in removal of contaminated soil and increased potential for wind erosion. The amount of soil to be removed is not anticipated to result in significant impacts to soil resources.

#### 4.5.4.2 Compliance with Thresholds of Significance

Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

- Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42.);
- Strong seismic ground shaking;
- Seismic-related ground failure, including liquefaction;
- Landslides.

There are no occupied structures (except a small equipment shed), or persons stationed in the area to be affected by seismic events or landslides. Waste for treatment is not stored on the site. Groundwater is located approximately 200 feet below the ground surface; therefore, liquefaction would not occur. The topography consists of a gently sloping alluvial fan with no surface features that could result in a landslide.

Result in substantial soil erosion or the loss of topsoil.

No potential impacts are identified from any construction needed for this project because there are no physical modifications required for operation. The fenced project area is highly disturbed and generally void of surface vegetation. The detonations cause disruption and displacement of soil. Detonations also cause the soil to powder. These conditions increase the potential for wind erosion. Wind erosion from the project is addressed in Section 4.3, Air Quality. The soil disturbance has not impacted existing land uses. Soil erosion could occur during heavy rains due to sheet flow; however the site is designed to prevent runoff. Because ongoing project operations occur within previously disturbed areas, continuation of ground-disturbing activity is expected to have a negligible effect on the rate of soil erosion.

Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on or offsite landslide, lateral spreading, subsidence, liquefaction or collapse.

The units are not located on unstable soil. Therefore, no further analysis is deemed necessary.

Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property.

The units are not located on expansive soil. Therefore, no further analysis is deemed necessary.

Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of water.

The project does not involve waste water disposal systems. Therefore, no further analysis is deemed necessary.

### 4.5.5 Mitigation Measures

Under the terms and conditions of the Permit, potential impacts to geology and soils as a result of the proposed project will be less than significant. Therefore mitigation measures are not required.

### 4.5.6 Level of Impacts After Mitigation

Impacts to geology and soils from the proposed project are less than significant. Mitigation is not required.

### 4.5.7 References

California Department of Conservation website on earthquake fault zones: http://www.quake.ca.gov/gmaps/WH/regulatorymaps.htm

Edwards Air Force Base. 2008. *Integrated Natural Resources Management Plan For Edwards Air Force Base, California, Edwards Air Force Base Plan* 32-7064.

Edwards AFB, May 2012. *RCRA Part B/subpart X Permit Application for the Explosive Ordnance disposal Range at Edwards Air Force Base.*

U. S. Department of Agriculture, Natural Resources Conservation Service. 1996 *Soil Survey of Edwards Air Force Base, California*.

U. S. Geological Survey, Ground Water Branch. 1963. *Geology, Hydrology, and Water Supply of Edwards Air Force Base, Kern County, California*, Open-File Report 63-146.

U. S. Geological Survey, Water Resources Investigations Report 00-4015, *Aquifer-System Compaction and Land Subsidence: Measurements, Analyses, and Simulations - the Holly Site, Edwards Air Force Base, Antelope Valley, California*, Michelle Sneed and D.L. Galloway.

**Figure 4.5-1 Physiographic and Floristic Provinces**

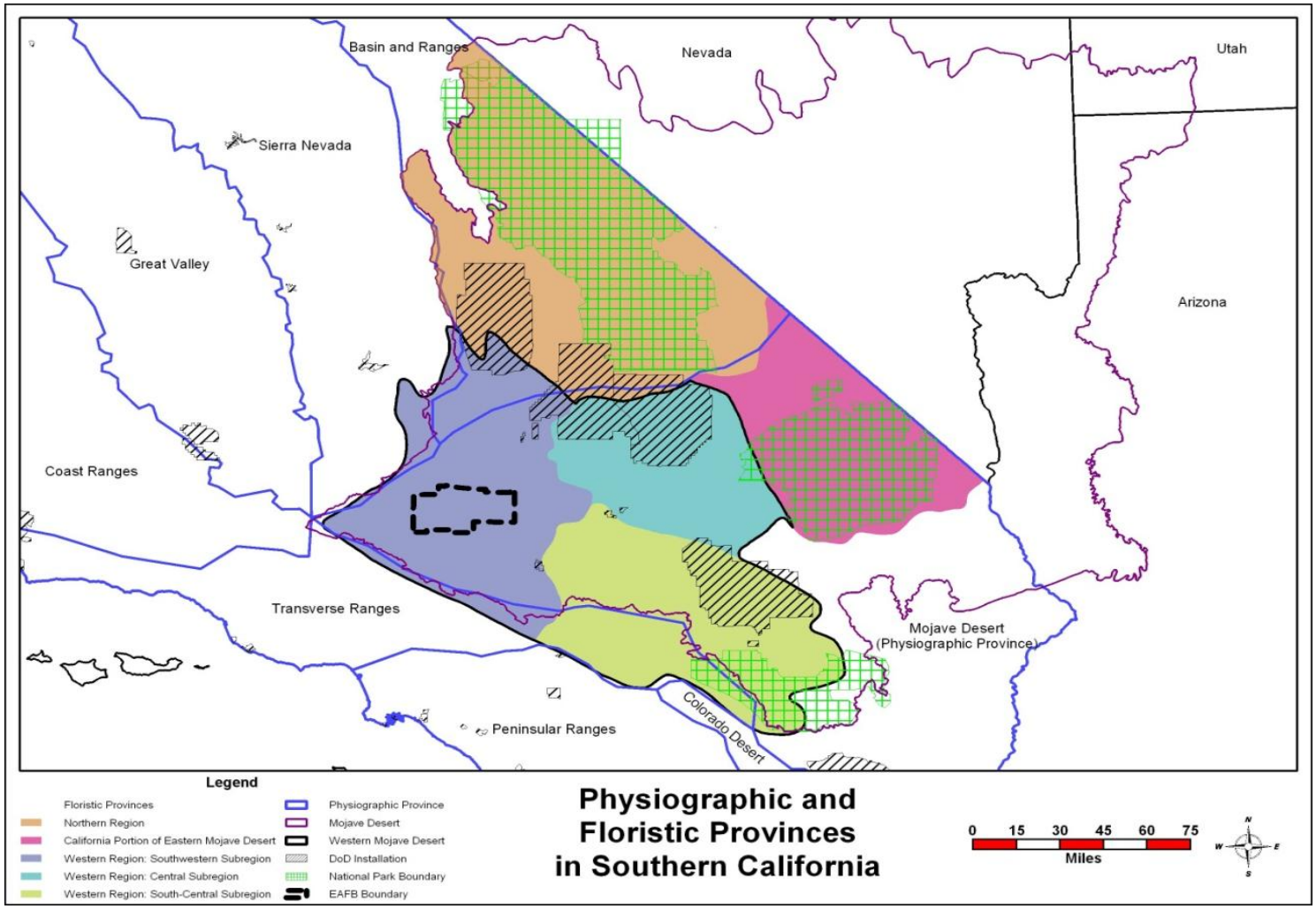


**Figure 4.5-2 Topography**

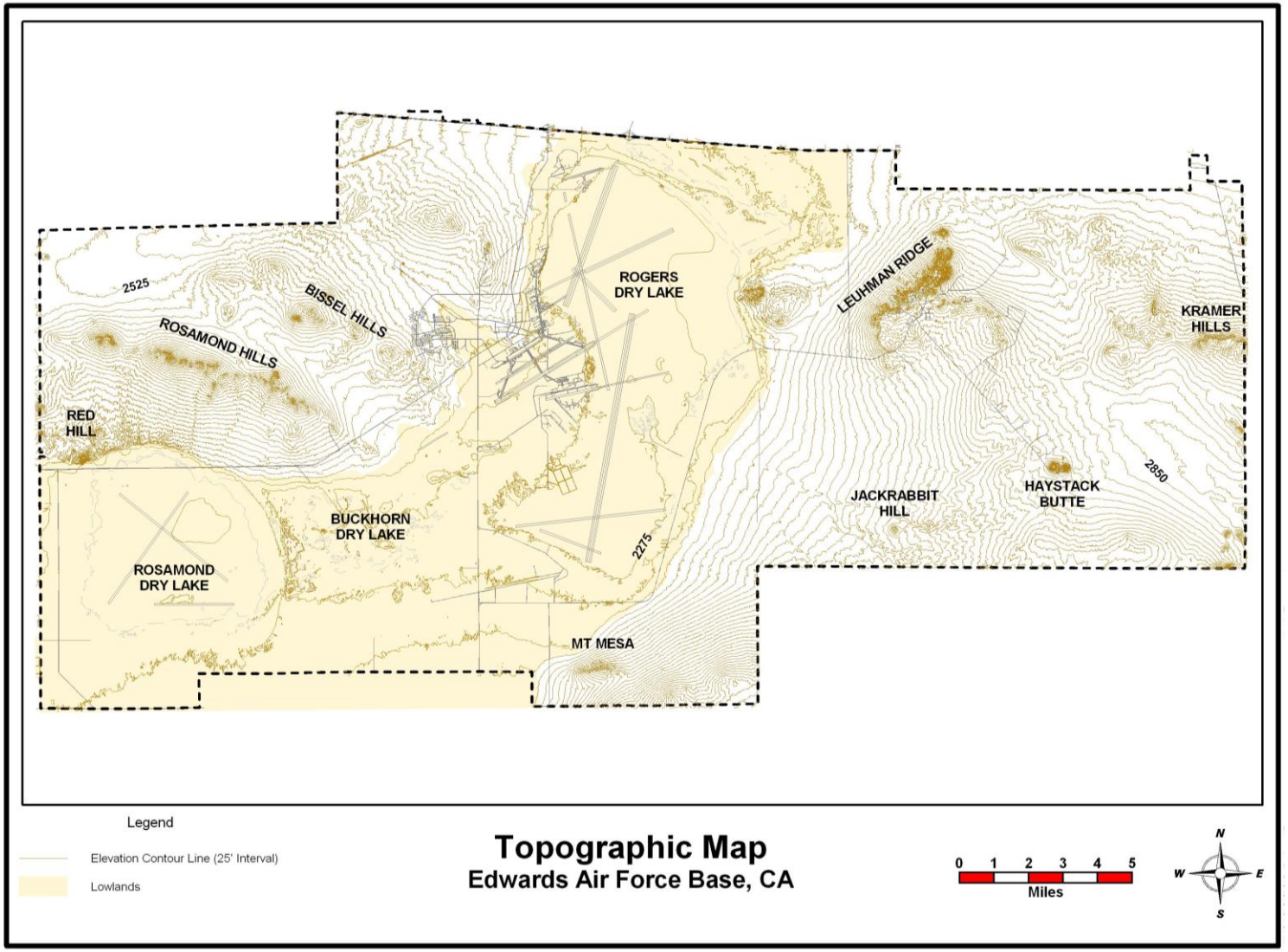


**Figure 4.5-3 San Andreas and Garlock Fault Zones**

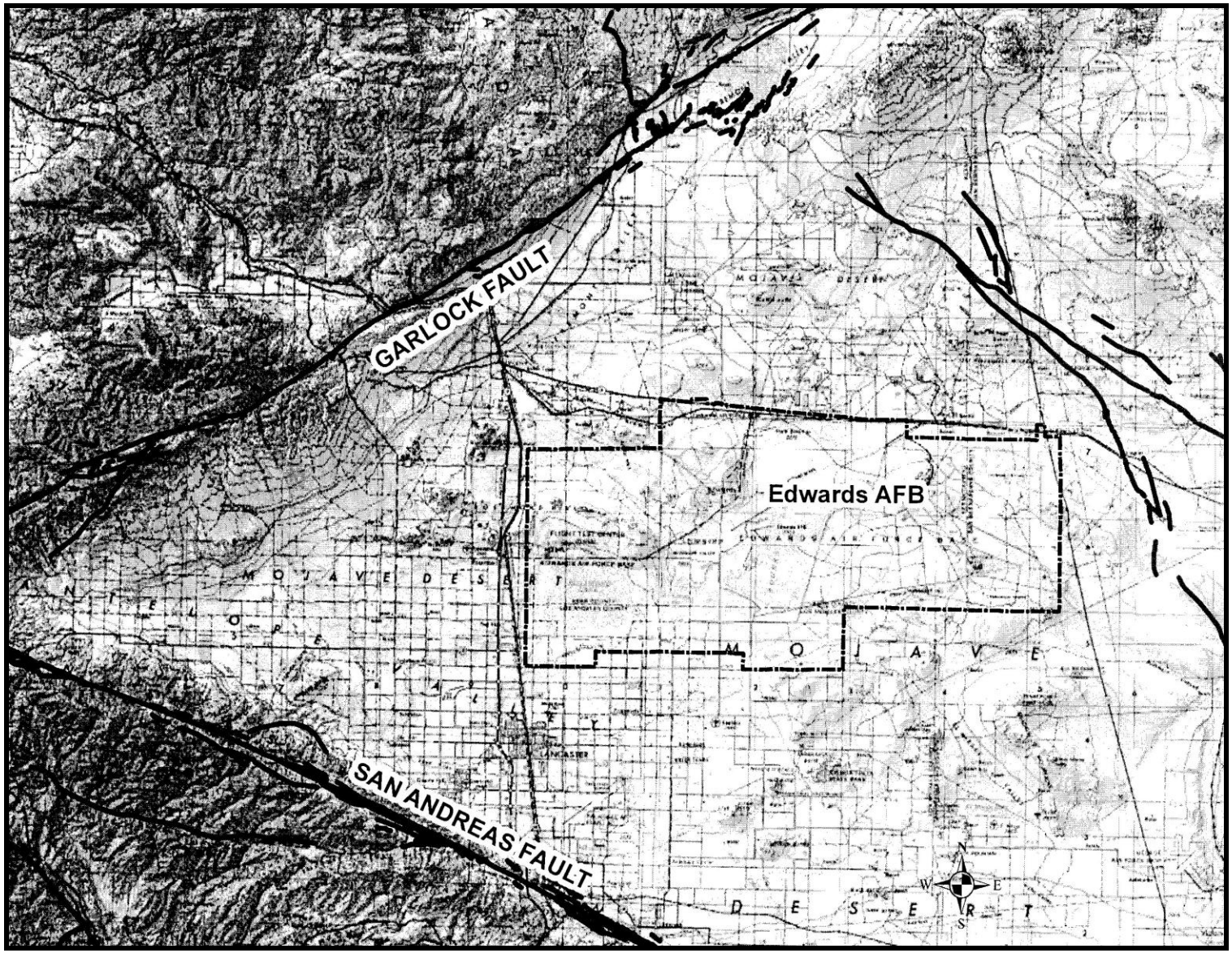


**Figure 4.5-4 Edwards Fault Map**

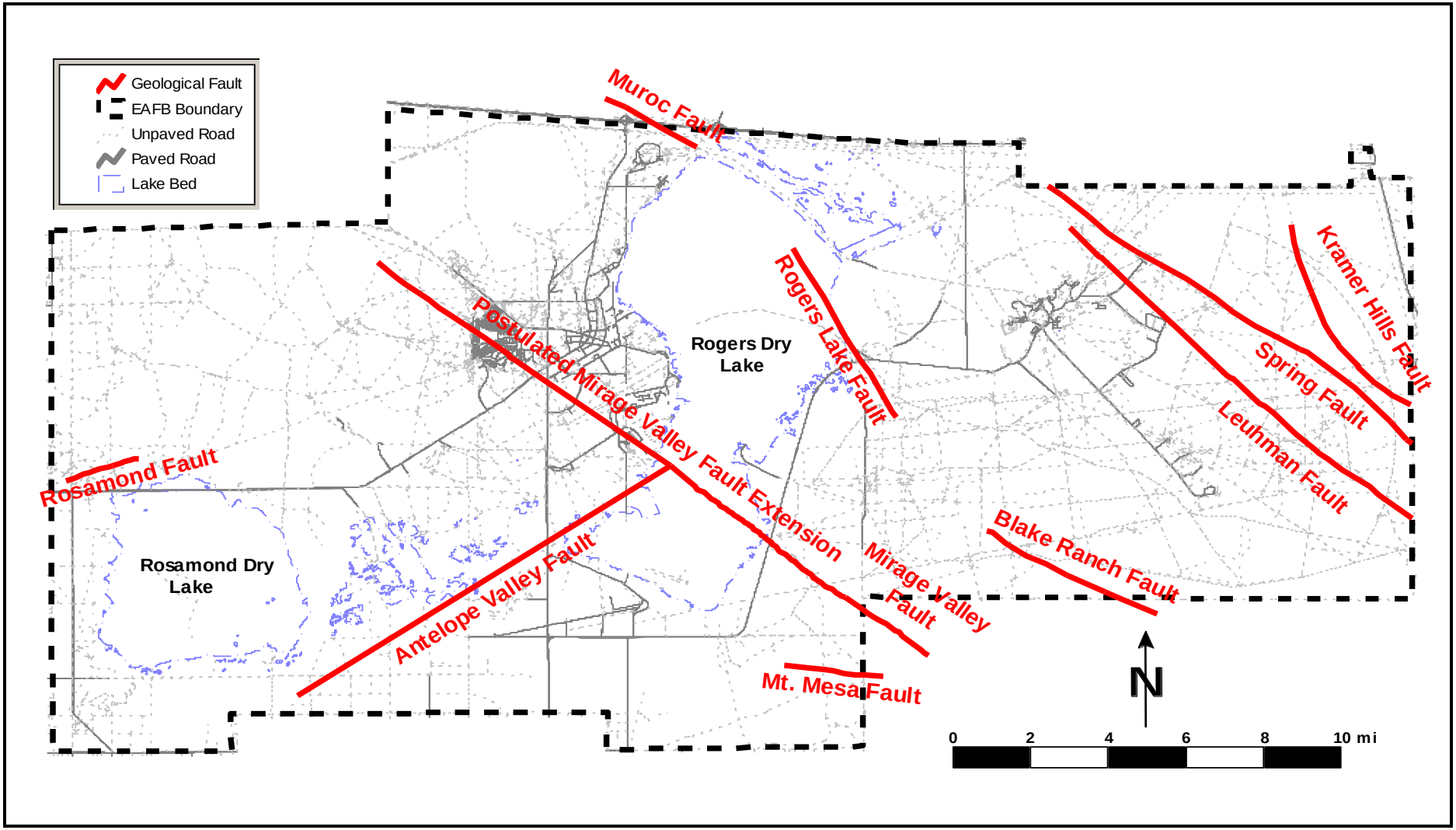
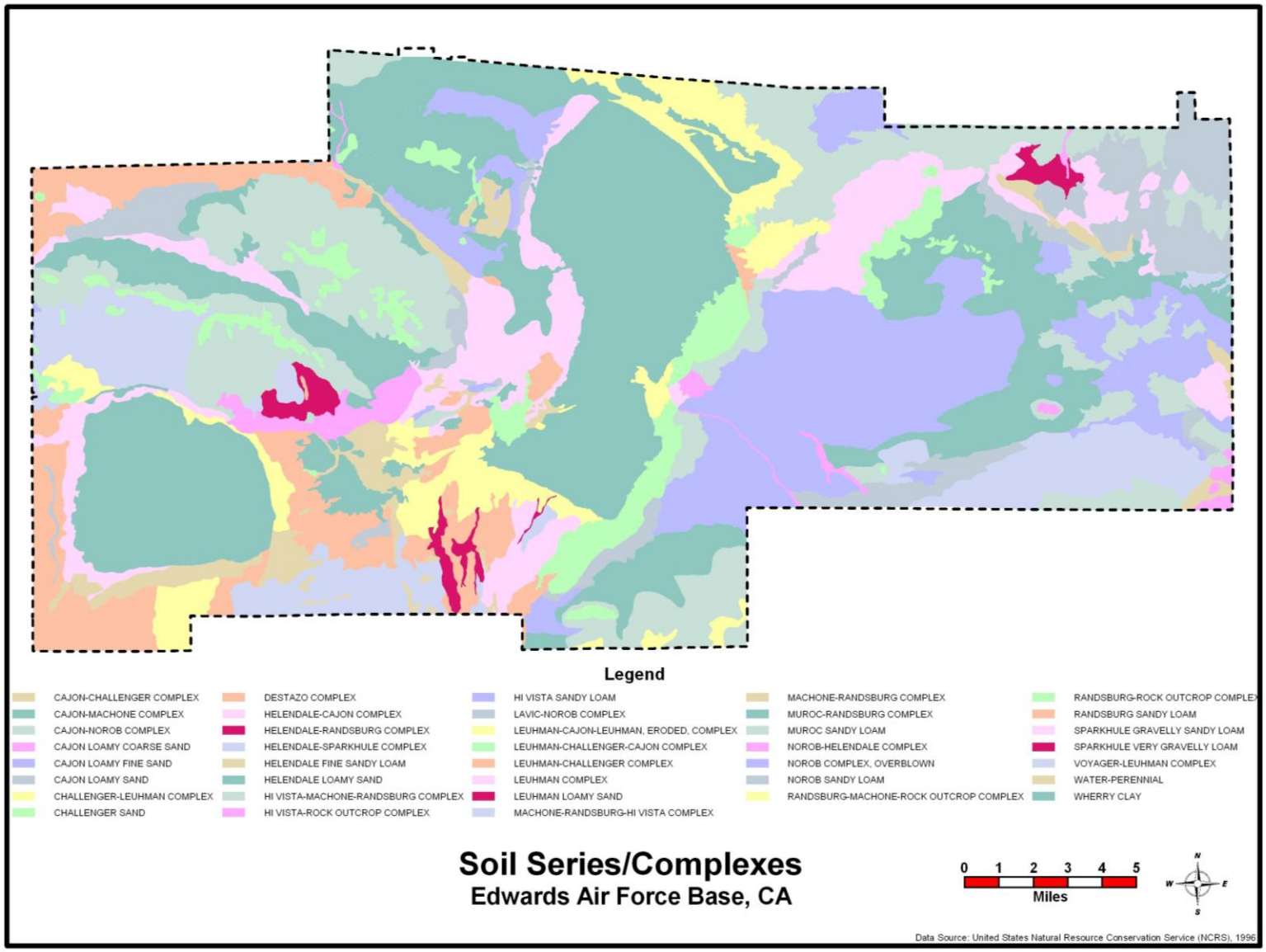


**Figure 4.5-5 Soil Series/Complexes**



## 4.6 GREENHOUSE GAS EMISSIONS

This section describes the greenhouse gas (GHG) emissions conditions at Edwards and the impacts of the OB/OD Units on baseline GHG emission conditions.

### 4.6.1 Environmental Setting

The state of California has recognized climate change as an immediate and growing threat. Climate change refers to long-term changes in temperature, precipitation, wind patterns, and other elements of the earth's climate system. The term climate change has become synonymous with "global warming," which is defined as a gradual increase in the overall near surface temperature of the earth. The potential adverse impacts of global warming include an increase in extreme weather events, more frequent and hotter heat waves which would affect the energy system and threaten public health, the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the declining Sierra snowpack, a rise in sea levels resulting in flooding and erosion of coastal areas and damage to infrastructure and property, and more frequent and higher intensity wildfires resulting in property damage and threat to public safety.

An ever-increasing body of scientific research has reached the consensus that recent climatological changes can be attributed to GHG emissions from human sources, particularly those generated from the production and use of fossil fuels. The California Global Warming Solutions Act of 2006, or Assembly Bill (AB) 32, was passed to establish a GHG reduction program for the state. AB 32 calls for the state to reduce GHG emissions to 1990 levels by 2020, and defines GHGs as carbon dioxide ($CO_2$), methane ($CH_4$), nitrous oxide ($N_2O$), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride ($SF_6$).

Worldwide, California has been estimated to be among the top twenty largest emitters of $CO_2$. The largest source of GHG in California is transportation, followed by electricity generation, and industry. Climate change is the result of the sum total of GHGs emitted globally. It is not possible to quantify impacts that project-specific GHG emissions have on global climatic change. For this reason, cumulative impact is best addressed by requiring all projects subject to CEQA to reduce their GHG emissions through project design elements.

The different GHGs have varying global warming potential (GWP). The GWP is the ability of a gas or aerosol to trap heat in the atmosphere. By convention, $CO_2$ is assigned a GWP of 1. By comparison, $CH_4$ has a GWP of 21, which means that it has a global warming effect 21 times greater than $CO_2$ on an equal-mass basis. $N_2O$ has a GWP of 310, which means that it has a global warming effect 310 times greater than $CO_2$ on an equal-mass basis. To account for their GWPs,

GHG emissions are often reported as a $CO_2$ equivalent ($CO_2e$). The $CO_2e$ is calculated by multiplying the emission of each GHG by its GWP, and adding the results together to produce a single, combined emission rate representing all GHGs.

The cities in the vicinity of Edwards have not completed GHG Inventories or Climate Action Plans. For Kern County the 2005 base year GHG emissions inventory was estimated to be 27 million metric tons (29,760,000 tons) of $CO_2e$. The sectors of the economy included in the inventory are:

- electricity production;
- electricity consumption;
- residential, commercial, industrial combustion;
- transportation;
- fossil fuels industry;
- industrial processes;
- waste management;
- agriculture;
- forestry and land use; and
- other.

For the 2005 base year the fossil fuel industry sector in Kern County represented 40% of the contribution to the overall GHG emissions inventory, followed by the electricity consumption sector at 22%.

Edwards completed a federal fiscal year 2008 baseline GHG emissions inventory. For Edwards the 2008 baseline GHG emissions inventory was estimated to be 41,415 metric tons (45,650 tons) of $CO_2e$ from direct sources that are owned or controlled by Edwards. The source categories included in the baseline inventory are:

- Edwards' landfill emissions;
- fugitive emissions from miscellaneous materials such as solvents, sealants, and surface coatings;
- mobile combustion emissions;
- refrigerant leakage;
- stationary combustion emissions, including the OB/OD Units; and
- Edwards' wastewater treatment plants.

For the 2008 baseline, stationary combustion represented 29,397 metric tons (32,400 tons) of $CO_2e$, or 71% of the contribution to the overall GHG emissions inventory.

In addition, Edwards completed a calendar year 2009 GHG emissions inventory. A major difference between the 2008 baseline and 2009 inventories is the addition of aircraft emissions to the mobile combustion sources category. For

2009, the GHG emissions were estimated to be 204,189 metric tons (225,100 tons) of $CO_2e$ from direct sources that are owned or controlled by Edwards, of which 162,733 metric tons (179,400 tons) of $CO_2e$ or 80% is emissions from aircraft.

### 4.6.2 Applicable Standards

#### 4.6.2.1 Federal Standards

There is no current federal GHG reduction program or federal standards for GHG emissions. However, in 2007 the U.S. Supreme Court found that GHGs are air pollutants. In 2009, the USEPA finalized the Endangerment and Cause or Contribute Findings for Greenhouse Gases determining that GHGs threaten the public health and welfare. In 2010, the USEPA established standards for GHG emissions from new motor vehicles. In 2011, USEPA set thresholds for GHG emissions that define when permits under the New Source Review Prevention of Significant Deterioration (PSD) and Title V Operating Permit programs are required for new and existing industrial facilities. During Phase 1, only sources currently subject to the permitting programs would be subject to permitting requirements for their GHG emissions. During Phase 2, the threshold of 100,000 tons per year (tpy) of $CO_2e$ would be used to determine the applicability of permitting requirements for the first time new source. The USEPA is committed to undertake another rulemaking, Phase 3, and if established, the threshold would be lowered to 50,000 tpy of $CO_2e$.

In addition, Executive Order (EO) 13514, Federal Leadership in Environmental, Energy, and Economic Performance was issued on October 5, 2009. The EO required federal agencies to prepare and implement a *Strategic Sustainability Performance Plan*. Federal agencies are also required to establish and submit a percentage reduction target for GHG emissions. The target emissions include direct GHG emissions from sources that are:

- owned or controlled by the Federal government;
- direct GHG emissions from generation of electricity, heat, or steam purchased by the Federal agency; and
- GHG emissions from sources not owned or directly controlled by a Federal agency but related to agency activities such as vendor supply chains, delivery services, and employee travel and commuting.

The target percentage reductions must be achieved by fiscal year 2020, when compared to a fiscal year 2008 baseline.

#### 4.6.2.2 State Standards

AB 32 mandates a significant reduction in GHGs and sets state GHG emission targets. In compliance with AB 32, CARB has:

- Adopted a scoping plan indicating how emission reductions will be achieved for significant GHG sources via regulations, market mechanisms, or other measures;

- Adopted a list of early action measures, which affect landfills, motor vehicle fuels, refrigerants in cars, tire pressure, port operations and consumer products;

- Established a statewide GHG emission cap for 2020 of 427 million metric tons (469,600,000 tons) of $CO_2e$ per year, equal to the 1990 emission level;

- Adopted mandatory reporting requirements for significant sources. The mandatory annual reporting requirements are effective for the largest facilities in the state, which include electricity generating facilities, electricity retail providers and power marketers, oil refineries, hydrogen plants, cement plants, cogeneration facilities, and industrial sources that emit over 25,000 metric tons (27,560 tons) of $CO_2e$ from on-site stationary source combustions such as large furnaces; and

- Adopted the cap-and-trade program to cover major sources of GHG emissions such as refineries, power plants, industrial facilities, and transportation fuels. The cap-and-trade program includes an enforceable emissions cap that will decline over time. The State will distribute allowances, which are tradable permits, equal to the emissions allowed under the cap. Sources under the cap will need to surrender allowances and offsets equal to their emissions at the end of each compliance period.

#### 4.6.2.3 Local Standards

California public agencies are required to analyze and mitigate GHG emissions for projects they intend to carry out and approve. The applicable local agency for the proposed project is the EKAPCD. The EKAPCD Policy, Addendum to CEQA Guidelines Addressing GHG Emission Impacts for Stationary Source Projects When Serving as Lead CEQA Agency (Policy), March 2012, is used here to obtain information on GHG emissions, thresholds of significance, and applicable mitigation measures. The EKAPCD Policy establishes and details a process for determining individual and cumulative significance of project-specific GHG emissions on climate change when issuing permits for new stationary source projects. The approach is compatible with the San Joaquin Valley APCD, which

is the local air district for western Kern County, ensuring that the GHG review process for new stationary sources would be consistent throughout Kern County.

For new stationary sources significant impacts of GHG emissions will be assessed as follows:

- If the project is exempt from CEQA due to either a statutory or categorical exemption, no further analysis under CEQA is required;

- If the project is not exempt from CEQA, then project-specific GHG emissions must be quantified;

- The project is considered to have a less than significant or cumulatively considerable impact on GHG emissions if it meets one of the following conditions:
  - GHG emissions are less than 25,000 tpy;
  - the project is in compliance with the state GHG reduction plan or future federal GHG reduction plan if it is more stringent than the state plan;
  - project GHG emissions can be reduced by at least 20% below Business-As-Usual through implementation of one or more of the following strategies:
    - compliance with a Best Performance Standard as set forth in the EKAPCD Policy;
    - compliance with GHG offset as detailed in the EKAPCD Policy; or
    - compliance with an alternative GHG reduction strategy as discussed in the EKAPCD Policy;

- If none of the above is met the project will be determined to have significant impacts.

### 4.6.3 Thresholds of Significance

According to Appendix G of the state CEQA Guidelines, a project would normally have a significant adverse impact related to GHG if it would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment.

- Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs.

The significance thresholds are addressed in the following section.

### 4.6.4 Potential Environmental Impacts

Operations at the OB/OD Units would produce an incremental increase in GHGs from the 0.52 metric tons of $CO_2$e reported for 2009, due to the increase in maximum capacity under the proposed project. Project activities that produce emissions would be burning or detonation of hazardous wastes, transportation of materials to the site, and use of heavy equipment to level the detonation area. GHG emissions were calculated for direct emissions from open burning and open detonation of hazardous waste using the emission factors developed for the 2012 HRA. Results are presented in Table 4.6-1, Calculation of Greenhouse Gas (GHG) $CO_2$e Emissions from OB/OD Units. For the maximum annual treatment rate, direct emissions from OB/OD treatment would generate approximately 100.64 metric tpy of $CO_2$e.

Emissions from vehicles were calculated by using emission factors provided by the EKAPCD. The longest distance hazardous waste would have to be transported to the OB/OD units for treatment would be from Area 1-100, located within the AFRL, which is 16.5 miles (33 round trip). This distance was used to provide the most conservative estimate. A typical treatment event would require the use of three diesel trucks to transport the waste munitions. A typical load of waste transported at one time is approximately 550 pounds gross weight, including packaging and casing.

It is uncertain how often treatment events would occur at the OB/OD units. Edwards is restricted by how much waste they can treat annually and are limited to one detonation or burn per day. However, to provide a conservative estimate, the calculation assumes that one event could take place each business day. By using an emission factor of 4.211206 pounds of $CO_2$ per mile provided by EKAPCD, it is estimated that at total of 54 tons of $CO_2$ could be emitted from vehicles transporting waste to the OB/OD units per year.

Environmental impacts from climate change caused by GHG emissions cannot be analyzed on a project basis. Cumulative impacts to global climate could include a decrease in precipitation and increased dryness of vegetation on the PIRA. Changes to precipitation patterns resulting in rainfall occurring in less frequent but more intense storms could result in an increase in sudden, more intense runoff causing increased storm water sheet-flow over the OB/OD site. The increased dryness of vegetation has already resulted in an increase in frequency of wildfires on the PIRA and this increase is expected to continue. The vegetation on the PIRA could be more prone to fire from throwout of fragments during OB/OD operations.

#### 4.6.4.1 Closure Plan

Closure Plan activities would involve additional trips to and from the site. Vehicles used for these trips would generate GHGs, however, these activities would be temporary and trips generated would be few. Thus, no significant

impacts from emission of GHGs would result from implementation of the Closure Plan.

#### 4.6.4.2 Compliance with Thresholds of Significance

Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, based on any applicable threshold of significance.

GHG emissions from proposed project operations were calculated using the emission factors for direct sources from the HRA, e.g. ongoing treatment of hazardous waste by OB/OD, GWP equivalency factors from EKAPCD Rule 102.X and 40 CFR Part 98, Subpart A, Table A-1 and diesel truck emission factors also provided by EKAPCD. The calculation did not include emissions from indirect sources, for example, off-road vehicles (forklifts), off-road heavy-duty equipment used for grading activities. There is no construction associated with the project and employee commute trips would not increase as a result of project activities.

Current OB/OD operations are reported in the Edwards GHG inventory as a stationary source and for 2009 were estimated to generate approximately 0.52 metric tpy of $CO_2$e. The proposed project would expand the facility's maximum capacity for treatment by OB/OD and would generate approximately 100.64 metric tpy of $CO_2$e from direct sources. Mobile sources transporting hazardous waste are estimated to emit 18 tons of $CO_2$ per year .

The maximum capacity imposed by the Permit modification is below the 25,000 tpy threshold of significance for GHG emissions established by the EKAPCD. Therefore, the proposed project is not expected to generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment, contribute to global climate change, or conflict with state goals to reduce greenhouse gas emissions to 1990 levels by 2020.

Conflict with any applicable plan, policy or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

There currently is no federal GHG reduction program. However, in 2010 DoD completed a Strategic Sustainability Performance Plan which is updated annually. The plan includes target reduction goals for non-combat activities as well as actions DoD will undertake throughout its installations to achieve the goals. At Edwards these actions include measures to reduce energy use and reliance on fossil fuels, such as decreasing employee air travel emissions, increasing teleworking, and increasing off-site waste diversion from disposal in landfills. The applicable state plan is the 2008 Scoping Plan developed under AB 32 to meet 1990 levels of GHG emissions by 2020, and the 2011 Supplement to the AB 32 Scoping Plan. The applicable local policy is the EKAPCD Policy

Addendum to CEQA Guidelines Addressing GHG Emission Impacts for Stationary Source Projects when Serving as Lead CEQA Agency.

The proposed project does not conflict with measures adopted to reduce GHG emissions under the DoD Strategic Sustainability Performance Plan, either at military installations in general, or at Edwards specifically. The evaluation of GHG emissions from the proposed project meets the intent of AB 32 by ensuring that GHG emissions are less than significant. In particular, the proposed project complies with the EKAPCD guidelines by ensuring that GHG emissions from the operation of the facility are below the EKAPCD's threshold of significance. Therefore, the proposed project would not conflict with any applicable plan, policy or regulation, and would not have a significant impact on cumulative emissions of GHGs.

### 4.6.5 Mitigation Measures

Potential impacts to GHG emissions as a result of the proposed project will be less than significant. Therefore mitigation measures are not required.

### 4.6.6 Level of Impacts after Mitigation

Emissions of GHG and contribution to climate change from the project are less than significant. Mitigation is not required.

### 4.6.7 References

California Environmental Protection Agency, Air Resources Board Planning and Technical Support Division, 2009. *California's 1990-2004 Greenhouse Gas Emissions Inventory and 1990 Emissions Level Technical Support Document,* May 2009.

California Environmental Protection Agency, Department of Toxic Substances Control, 2010. *California Environmental Quality Act, Informational Bulletin #6, Greenhouse Gas Emission Impact Evaluations in CEQA Documents, November 5, 2010*.

California Governor's Office of Planning and Research, 2008. *CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review*.

California Governor's Office of Planning and Research (OPR). 2009*. Preliminary Draft CEQA Guideline Amendments for Greenhouse Gas Emissions and Public Workshop Announcement*.

Eastern Kern Air Pollution Control District, 2012. *EKAPCD Policy Addendum to CEQA Guidelines Addressing GHG Emission Impacts for Stationary Source Projects when Serving as Lead CEQA Agency*, March 8, 2012.

Edwards Air Force Base, 2011. *Greenhouse Gas Inventory for Edwards Air Force Base*, October 7, 2011.

Edwards AFB, May 2012. *RCRA Part B/Subpart X Permit Application for the Explosive Ordnance Disposal Range at Edwards Air Force Base.*

Office of the President. 2009. Executive Order (EO) 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, October 2009.

San Joaquin Valley Air Pollution Control District, 2012. *Kern County Communitywide Greenhouse Gas Emissions Inventory*, May 2012.

U.S. Department of Defense, 2010. *Strategic Sustainability Performance Plan*.

U.S. Department of Defense, 2011. *Strategic Sustainability Performance Plan* Annual Update.

**Table 4.6-1 Calculation of Greenhouse Gas (GHG) $CO_2e$ Emissions from OB/OD Units**

| GHG[a,b] | Annual Treatment Rate (lb/yr) | GHG Emission Factor[b] | Annual GHG Emissions (lb/yr) | Annual GHG Emissions (metric tpy) | GWP[c] | $CO_2e$[d] (metric tpy) |
|---|---|---|---|---|---|---|
| $CO_2$ | 150,000 | 1.33E+00 | 199,500 | 90.57 | 1 | 90.57 |
| $CH_4$ | 150,000 | 7.04E-03 | 1056 | 0.48 | 21 | 10.07 |
| **Total $CO_2e$** | | | | | | **100.64** |

tpy - tons per year

Footnotes:

a Per EKAPCD Rule 102.W GHGs are:
Carbon Dioxide ($CO_2$)
Methane ($CH_4$)
Nitrous Oxide ($N_2O$)
Hydrofluorocarbons (HFCs)
Perfluorocarbons (PFCs)
Sulfur Hexafluoride ($SF_6$)

b Emission factors (weight of GHG emitted per weight of hazardous waste treated) and applicable GHGs ($CO_2$ and $CH_4$) determined from Edwards Air Force Base Precision Impact Range Area Open Burn/Open Detonation Health Risk Assessment, January 2012

c Global Warming Potential (GWP) per EKAPCD Rule 102.X and 40 CFR Part 98, Subpart A, Table A-1.

d Per EKAPCD Rule 102.H, Carbon Dioxide Equivalent ($CO_2e$) = (GHG emission)(GWP).

## 4.7 HAZARDS AND HAZARDOUS MATERIALS

This section describes the management of hazardous materials and hazardous wastes at Edwards, as well as the hazards and estimated potential risk to the public and the environment from hazardous waste treatment at the OB/OD facility.

### 4.7.1 Environmental Setting

Hazardous materials management refers to the handling of hazardous materials and includes the purchase, storage, and distribution of hazardous materials, such as paints, solvents, lubricants, and batteries. Hazardous waste management refers to the handling of hazardous wastes generated as part of industrial activities. These wastes must be containerized, labeled, stored, transported, and treated in accordance with the USEPA, state, and Air Force requirements. This project involves the treatment of hazardous waste.

A wide variety of hazardous wastes are generated from the diverse locations and activities at Edwards, including, but not limited to, research laboratories, machine shops, vehicle and aircraft maintenance, and aircraft/weapons testing areas. The hazardous wastes consist primarily of waste oil, waste jet fuel, spent absorbent, oily wastewater, contaminated soil, empty containers, photo processing wastes, batteries, miscellaneous laboratory chemicals, paints, solvents, and aerosols. Typically, these wastes are stored at the Hazardous Waste Support Facility (HWSF) located at Edwards. The HWSF operates under Permit No. 05-SAC-07 (effective November 7, 2005 through November 7, 2015) issued by DTSC. The reactive hazardous waste generated from RDT&E activities is a separate category of hazardous waste. Treatment of reactive hazardous waste at the OB/OD Units will be a modification to the existing HWSF Permit, adding two units for OB and OD.

### 4.7.2 Applicable Standards

#### 4.7.2.1 Hazardous Materials

As defined by CERCLA and the Superfund Amendments and Reauthorization Act (SARA), a hazardous material is a substance, pollutant, or contaminant that, due to its quantity, concentration, or physical and chemical characteristics, poses a substantial present or potential hazard to human health and safety or the environment. Hazardous materials are managed in accordance with the EPCRA. EPCRA establishes reporting and planning requirements for businesses that handle, store, or manufacture certain hazardous materials. These plans and reports provide federal, state, and local emergency planning and response agencies with information about the amounts of chemicals that businesses use,

routinely release, and spill. Specific requirements of EPCRA include the following:

- Planning for emergency response (Sections 301-303).
- Reporting chemical inventory (Sections 311 and 312).
- Reporting ongoing releases of toxic chemicals (Section 313).
- Reporting leaks and spills (Section 304).

#### 4.7.2.2 Hazardous Wastes

The RCRA and Hazardous and Solid Waste Amendments define hazardous waste as a waste, or combination of wastes, which due to its quantity, concentration, or physical, chemical, or infectious characteristics, may either (1) cause, or significantly contribute to, an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or (2) pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, disposed of, or otherwise managed. A waste is hazardous if it is not excluded from regulation as a hazardous waste; exhibits any ignitable, corrosive, reactive, or toxic characteristic; or if it is listed in Subpart C of RCRA.

The California Hazardous Waste Control Law provides a separate regulatory framework for hazardous waste management within the state. The state law incorporates all federal RCRA requirements as well as a number of requirements that are stricter than the federal standard. In California, DTSC administers most aspects of RCRA directly. However, beginning in 1997, DTSC delegated oversight of basic generator requirements to the local CUPA. The CUPA having oversight responsibility at Edwards is the Kern County Environmental Health Services Department. Since the adoption of the Federal Facilities Compliance Act of 1992, federal agencies that generate or manage hazardous waste are now subject to fines and penalties under RCRA.

The basic requirement of both the federal and state programs is the “cradle-to-grave” management of hazardous waste. This management system establishes requirements for each of the following:

- Hazardous waste identification which facilitates the proper identification and classification procedures of hazardous waste;

- Hazardous waste generation which ensures proper and safe hazardous waste management at those facilities that generate hazardous waste;

- Hazardous waste transport which governs the transport of hazardous waste between management facilities; and

- Hazardous waste treatment, storage, and disposal which establish generic facility provisions governing hazardous waste management units and additional precautions designed to protect soil, groundwater, and air resources.

#### 4.7.2.3 Energetic Hazardous Waste and Energetic Range Residue

In 1992, the Federal Facility Compliance Act was signed into law. This law required the USEPA, in consultation with DoD and the States, to publish regulations that identify when conventional and chemical military munitions become hazardous waste and subject to Subtitle C of RCRA, and that provide for the safe storage and transportation of such waste. These regulations, entitled the Military Munitions Rule (MMR) (CFR Title 62 Part 6621, February 12, 1997), became effective at the federal level on August 12, 1997. The DoD Policy to Implement the EPA's Military Munitions Rule was published in July 1998. Although California has not adopted the MMR, Edwards is required to comply with the MMR.

#### 4.7.2.4 Corrective Action

Under RCRA Corrective Action owners or operators of treatment, storage or disposal facilities are responsible for investigating and, as necessary, cleaning up releases of hazardous waste or hazardous constituents at or from their facilities. A release may be to soil, groundwater, surface water, or air, and must be investigated and cleaned up regardless of when the release occurred. Typically, investigation and cleanup decisions are made on a case-by-case basis. Soil cleanup levels which may be considered in corrective action include:

- Levels of contaminants that not would exhibit a hazardous waste characteristic in soil as defined by CCR Title 22, Division 4.5, Chapter 11;

- Background soil contaminant levels;

- Risk-based concentrations such as EPA Region 9 Preliminary Remediation Goals; and/or

- Screening or advisory soil contaminant values such as California Human Health Screening Levels (CHHSLs) published by OEHHA or Environmental Screening Levels published by the California Regional Water Quality Board, San Francisco Bay Region.

#### 4.7.2.5 Environmental Restoration Program (ERP)

DoD initiated the Environmental Restoration Program (ERP) to identify, investigate, and clean up or control the release of hazardous substances from

past waste disposal operations and hazardous material spills at military facilities. The ERP provides for compliance with the CERCLA requirements, as amended by SARA, as well as other regulations issued under these acts or by state law. Air Force Instruction 32-7020 provides guidance and procedures for executing the Air Force Installation Restoration Program (IRP), including specific requirements for identifying, investigating, and restoring contaminated sites.

#### 4.7.2.6 Explosive Handling Safety Policies and Procedures

Edwards is required to comply with standard safety procedures outlined in the following regulations and policies:

- EOD Operating Instruction 91-4, *OB/OD Facility Operations*;
- Air Force Instruction 32-3001, *Explosive Ordnance Disposal Program*;
- USAF Manual 91-201, *Explosive Safety Standards*;
- Air Force Instruction 13-212, *Range Planning and Operations*;
- Technical Order 11A-1-42, *General Instruction for Emergency Destruction of Munitions*;
- Technical Order 11A-1-66, *General Instructions, Demolitions*;
- Munitions Specific 60 Series Technical Orders, EO1 Identification, Composition, Render Safe and Disposal Procedures;
- Air Force Flight Test Center Instruction 32-21, *EOD Range Procedures*;
- *Explosive Safety Site Plan*.

#### 4.7.2.7 Human Health Risk Assessment

CCR Title 22, Section 66264.601 requires that miscellaneous units, such as OB/OD Units, be located, designed, constructed, operated, maintained, and closed in a manner that will ensure protection of human health and the environment. Consequently, DTSC required completion of an HRA. In 1996, an HRA was prepared to estimate the air pollutant emissions from the proposed project and to determine the health risk and hazards due to the estimated emissions. The HRA was revised in 2012. For the 2012 HRA, DTSC adopted a lifetime cancer risk threshold of one in one million ($1.0 \times 10^{-6}$) and Hazard Index (HI) of 1.0 for non-carcinogenic chronic and acute health hazards. For lead, the

chronic non-cancer health effects are related to blood levels rather than concentrations in the ambient air. The blood lead level of concern is 1 µg/dl.

Public notification under Proposition 65 requires notification only if the cancer risk from a single pollutant is greater than ten in one million. Regulatory standards of the SCAQMD have not required mitigation measures for a cancer risk of less than 100 in one million for existing sources of air toxic emissions. USEPA Superfund guidance states that the acceptable cancer risk for a contaminated site can range from one to 100 in one million. Therefore, based on regulatory precedent, a cancer risk of one in one million represents an allowable risk to public health.

The HRA methodology and results are described in Section 4.7.4.2. The analysis of potential impacts from hazards is primarily based on the results from the 2012 HRA.

### 4.7.3 Thresholds of Significance

According to Appendix G of the state CEQA Guidelines, a project would normally have a significant adverse impact related to Hazards and Hazardous Materials if it would:

- Create a significant hazard to the public or the environment throughout the routine transport, use or disposal of hazardous materials.
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
- Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.
- Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to public or the environment.
- Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

The significance thresholds are addressed in the following section.

### 4.7.4 Potential Environmental Impacts

Operations at the OB/OD Units have the potential to increase risk and hazards to human health and the environment. Edwards is required to follow all DoD, Air Force, Edwards, and state explosive handling and safety procedures contained in regulations, guidance, and permits. In addition, an HRA was completed to determine all possible sources of exposure to individuals and the environment from operations at the OB/OD Units. Conservative assumptions, which tend to over predict estimates of risk, were used throughout the analysis.

#### 4.7.4.1 Operating Practices

Edwards follows mandated safety protocols for the handling, storage, transportation, and treatment of munitions/explosives. For example, transportation is only on designated hazardous waste hauling routes. The OB/OD Units are operated only during daylight. Detonation events do not occur during unfavorable meteorological conditions at the EOD Range, such as electrical, sand, dust, rain, or snow storms. There must be no electrical storms within 5.75 miles (9.25 km) of the EOD Range. OB/OD events do not occur when wind speeds are in excess of fifteen (15) miles per hour. Also, events do not occur on “no burn” days confirmed by EKAPCD. Most of the propellant and munitions are in solid form, so there are very little or no liquids which may be spilled or dispersed. The number of workers at the site is limited to minimize potential collision and material handling hazards. Personnel participating in an event are trained in basic hazardous waste management and safety, destruction of explosives, transportation of explosives, firing systems, handling of munitions residue, permit requirements, and environmental impacts. An OB event is initiated by a thermite or powder charge ignited by a dual firing system using either two timed-fuses, or two remote activated electric squibs or blasting caps. An OD event is initiated by demolition charges (commonly called a donor charge), placed on the munition items then detonated by a dual firing system using either two timed-fuses, or two remote activated electric blasting caps. Personnel retreat approximately one mile (1.6 km) prior to detonation.

#### 4.7.4.2 Human Health Risk Assessment (HRA)

The 2012 HRA was prepared according to the Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments, Cal/EPA, OEHHA, 2003 (Guidance Manual). The four steps involved in the risk assessment process are 1) hazard identification, 2) exposure assessment, 3) dose-response assessment, and 4) risk characterization.

##### 4.7.4.2.1 Hazard Identification

Hazard identification is identification of the pollutants or COCs and whether the pollutant is a potential human carcinogen (cause of cancer) or is associated with other types of acute or chronic (long-term) adverse health effects. The emission sources of pollutants or COCs evaluated are from:

- Treatment of PEP wastes by OB;
- Treatment of PEP wastes by OD, including metal casings and energetic-contaminated waste;
- Entrainment of dust during OD;
- Fugitive dust from wind erosion of the treatment site;
- Grading during the preparation and maintenance of the site;
- Ash handling subsequent to OB treatment; and
- Ash from wind erosion of the treatment site.

The COCs that were selected were those:

- detected in source tests conducted by combustion of PEP in enclosed chamber (bang box) facilities;
- calculated from the composition of the hazardous waste;
- detected in representative samples of soil and ash taken from existing OB/OD sites; and
- having known health concerns.

The COCs are listed in Table 4.3-3, Chemicals of Concern Analyzed in Health Risk Assessment.

4.7.4.2.2 Exposure Assessment

The purpose of the exposure assessment is to estimate the extent of public exposure for each COC for which potential cancer risk or acute and/or chronic non-cancer effects will be evaluated. This involves emission quantification, modeling of environmental transport and evaluation of environmental fate (dispersion modeling), identification of exposure routes, and identification of exposed populations and estimation of short term and long-term exposure levels (exposure scenarios).

Emission Quantification

Edwards conducted an experimental field measurement program in an attempt to quantify emissions during an actual OB event. A preliminary test burn was conducted in March 2005 in order to capture data to refine and optimize the field measurement. Approximately 800 pounds of solid rocket propellant was burned at a test facility at Edwards. Information was collected through model calculations, thermocouples, tracer gas, and video image studies. The information included plume dispersion/dynamics, meteorological conditions, and radiative heat effect. The field measurement was conducted in August 2005. Approximately 4500 pounds of propellant with approximately 5 pounds of a test surrogate sample of laboratory waste was burned at the test facility. A 40-foot tower was used as the mounting structure for sampling equipment. The burn site was located upwind from the tower. Sampling was conducted in the plume

immediately downwind of the burn site using a vertical array of samplers. An inert tracer gas was released during the burn in order to provide a basis for calculating downwind concentrations based on a known release concentration.

The field measurement program successfully captured emissions from the plume. Pollutant species were positively detected and identified. However, during the test, some sampling equipment and the inert gas delivery line were damaged by the intense flame. The emission source strength and emission factor of each compound could not be calculated as planned. Consequently, the emissions from the proposed project were estimated using a variety of other methods.

For direct emissions from treatment of PEP, emissions were estimated from source test data taken from enclosed chamber (bang box) facilities, engineering analysis, and calculation based on the percentage of COC in the waste item. To simplify the risk assessment process Edwards grouped the wastes into 18 PEP categories based on chemical composition.

For the remaining emission sources, factors provided by various regulatory agencies were used. Emissions from entrained dust from OD events, windblown dust and ash, grading, and ash handling were estimated from emission factors provided by Great Basin APCD, CARB, and EPA. The concentration of COCs in the soil and ash were determined from soil samples from existing OB/OD units and ash residue from OB/OD events.

Dispersion Modeling

The ground-level concentrations for each compound were estimated from air dispersion modeling following the guidelines specified in the Guidance Manual, and in a manner consistent with the Guideline on Air Quality Models (USEPA, 2005) (CFR Title 40, Part 51 Appendix W), and incorporating portions of the Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities (USEPA, 2005).

The USEPA Integrated Puff Model (INPUFF) was used to model the transport and dispersion of the following emission sources:

- Treatment of PEP wastes by OB;
- Treatment of PEP wastes by OD, including metal casings and energetic-contaminated waste; and
- Entrainment of dust during OD.

For the remaining emission sources SCREEN3, the screening version of the USEPA-approved Industrial Source Complex (ISC3) was used. SCREEN3 was used to model the transport and dispersion of the following emission sources;

- Fugitive dust from wind erosion of the treatment site;
- Grading during the preparation and maintenance of the site;
- Ash handling subsequent to OB treatment; and
- Ash from wind erosion of the treatment site.

Each model was used iteratively to determine maximum impacts from a number of likely OB/OD scenarios to ensure a conservative assessment of risk.

Actual meteorological data was used in the dispersion models. The data included windspeed, wind direction, ambient temperature, mixing height, stability class, and anemometer height. The prevailing wind direction is from the west to southwest (approximately 60% of the time). See Figure 4.3-3, Windrose, for the distribution of windspeed and direction.

As noted, Edwards treats different categories of PEP, each having different chemical compositions. The HRA determined the risk and hazards of treatment of each category, as well as indirect sources.

Exposure Routes

Exposure to OB/OD emissions may occur through a variety of direct and indirect exposure routes. The routes or pathways which were considered are:

- Inhalation;
- Soil ingestion;
- Dermal (skin) contact with soil; and
- Human milk ingestion by infants.

Exposure Scenarios

In order to estimate the quantitative human health impacts from OB/OD operations, four exposure scenarios may be applied:

- A hypothetical maximally exposed individual (MEI) assumed to continuously be exposed 24 hours a day for 70 years.

- A reasonable maximum exposure (RME) assumes continuous exposure 24 hours a day for 30 years.

- An average exposed individual (AEI) assumed to continuously be exposed 24 hours a day for 9 years.

- A six year old child, to evaluate the potential risk to children who might be exposed at a higher rate than adults due to a higher intake and lower body weight. (This exposure scenario is used only to

estimate non-cancer health effects assuming one year of continuous exposure.)

For evaluating air toxic impacts of the proposed project, only the MEI exposure was applied. The RME and AEI were not evaluated since these exposures had lower impacts than the MEI. In the model, offsite residential receptors were hypothetically located every 22.5 degrees along the Edwards facility boundary, corresponding to 16 compass points beginning toward the north and rotating clockwise (N, NNE, NE, ENE, E, etc.). These modeled locations are shown on Figure 4.7-1, Receptor Location Map. In actuality, although the nearest boundary is 1.7 miles (2.7 km), the nearest residence is 7.6 miles (12.1 km). Specific on-site receptors would include military family complexes. These receptors were not evaluated because they were further away than the location of the most impacted receptor, or were in a wind direction corridor that had the lowest wind speeds and frequency of occurrence. Specific off-site receptors were also not evaluated, since these were further away and would have lower exposures than fenceline receptors.

#### 4.7.4.2.3 Dose-Response Assessment

Dose-response assessment is the process of characterizing the relationship between exposure to an agent and incidence of an adverse health effect in exposed populations. The toxicity factors used in the HRA to evaluate health effects from toxic air contaminants are cancer potency (or slope) factors for carcinogens and chronic and acute reference dose exposure levels (RELs) for non-carcinogenic substances or for the non-carcinogenic toxicity of carcinogens.

The cancer potency factors and RELs used in this analysis are listed in the HRA. These toxicity factors were taken from the sources listed below, in the following order of priority. Toxicity factors for compounds having more than one published value were taken from the source having the higher priority.

- OEHHA: Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values (CalEPA 2009a); and Toxicity Criteria Database (CalEPA 2009b).

- IRIS: EPA, Integrated Risk Information System (USEPA 2010).

- RAIS: U.S. Department of Energy, Office of Environmental Management, Oak Ridge National Laboratory, Risk Assessment Information System (USDOE 2010). Toxicity values selected from RAIS were selected in accordance with the following reference hierarchy:
  - Provisional Values (PROV);
  - Agency for Toxic Substances and Disease Registry (ATSDR);

- any state EPA value (e.g., NJEPA); and
- Health Effects Assessment Summary Tables (HEAST).

- HHRAP: EPA, Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities - Companion Database (USEPA 2008).

- EPA Region 9: EPA Region 9 Superfund, Regional Screening Level (RSL) Master Table (USEPA 2009).

- NIOSH: National Institute for Occupational Safety and Health, NIOSH Pocket Guide to Chemical Hazards, (NIOSH 2005).

Estimated blood lead levels were derived using the Lead HRA Spreadsheet Model (LeadSpread).

4.7.4.2.4 Risk Characterization

Risk characterization is the final step of risk assessment. In this step, modeled concentrations and public exposure, which are determined through the exposure assessment, are combined with the cancer potency factors and RELs from the dose-response assessment.

Cancer risk was determined at the hypothetical residential receptor at the boundary assuming continuous, residential exposure regardless of existing or zoned land use. The total cancer risk estimates for the OB/OD operations are in addition to the existing background cancer risk from all causes.

Non-cancer effects were evaluated for chronic and acute exposure for each PEP category using a hazard index approach. In this approach, the hazard quotient (i.e., the ratio of the modeled intake rate to an acceptable exposure rate such as an REL) is calculated for each compound for each target organ which may be affected. The hazard index is the sum of the hazard quotients for each affected target organ. For the 2012 HRA, target organs were not evaluated separately as normally required by OEHHA guidelines. Instead, the approach used in the HRA is a worst-case analysis in which the assumption is that all the target organs were affected equally for any COC having an acute or chronic toxicity factor. The acute hazard index is the sum of the hazard quotients for each compound for the inhalation pathway only. If the hazard index is less than 1.0, no adverse impacts are likely. If the hazard index is greater than 1.0, an adverse effect is not necessarily indicated, but a more detailed evaluation is required.

### 4.7.4.3 HRA Results

The annual and event treatment amounts requested in the Permit Modification application are based on logistical limits for the OB and OD Units, safety, risk and hazard as determined by the HRA, and ambient air quality standards for criteria pollutants.

The event treatment amounts are generally limited by logistical and safety limits. Logistical limits would allow treatment of up to 2,000 pounds of hazardous waste per event (OB or OD), with one OB and one OD occurring per day. The annual amount of treatment by OB/OD would be up to 150,000 pounds per year. Following is the risk and hazard determined by the HRA:

- The maximum calculated cancer risk for the MEI is $2.21 \times 10^{-7}$ (0.000000221 or 2 in 10 million), lower than the cancer risk threshold of $1.0 \times 10^{-6}$.

- The maximum calculated chronic non-cancer HI at the MEI is $7.92 \times 10^{-3}$ (0.00792). An HI less than 1.0 indicates that no adverse impacts are likely.

- The maximum calculated acute non-cancer HI would exceed 1.0 at the MEI for a 2000 pound OD event containing mercury. For OD of mercury-containing hazardous wastes, the maximum amount that can be treated in one event must be reduced to 700 pounds. With this condition, the maximum calculated acute non-cancer HI at the MEI is $9.82 \times 10^{-1}$ (0.982). An HI less than 1.0 indicates that no adverse impacts are likely.

- The maximum estimated blood lead level for all emission sources is $8.03 \times 10^{-4}$ (0.000803) µg/dl for the 99$^{th}$ percentile pica child exposure. This result is below the threshold level of concern of 1 µg/dl.

These results are shown on Table 4.7-1, Summary of Maximum Health Risks for Each Emission Category, and Table 4.7-2, Maximum Estimated Blood Lead Levels. The locations of the MEI receptors are shown on Figure 4.7-2, Locations of Maximum Estimated Risks. The receptor at the fenceline in the ESE direction from the OB/OD Units represents the MEI for acute non-cancer impacts from an OB event and for all health impacts from an OD event. This hypothetical receptor is 1.61 miles from the OB/OD Units. The receptor at the fenceline in the NE direction represents the MEI for cancer and chronic non-cancer impacts from OB events. This hypothetical receptor is 15.29 miles from the OB/OD Units in the prevailing wind direction.

The health risk and hazards were calculated for the project for each PEP category independently of one another, as if only one PEP category would be treated during the year or in each event. In fact, Edwards' mission requires that

a wide variety of reactive hazardous waste be treated at the OB/OD Units. Since the calculated impacts of treatment of all categories at the maximum event quantity were below thresholds of concern, any combination of categories and quantities of wastes up to the event limit would not exceed a cancer risk threshold of one in one million or a non-cancer chronic or acute hazard index of 1.0 at the point of maximum impact. The exception is OD of mercury-containing wastes. OD treatment of mercury-containing waste is restricted to a maximum of 700 pounds per event.

#### 4.7.4.4 Site Soil Investigation Results

The project may result in increased deposition of hazardous pollutants. To determine the potential impacts from the proposed project, soil samples were collected within, surrounding, and downwind from OB and OD units that have been used for treatment of energetic waste over many years. Results of soil analyses relevant to OB/OD treatment are provided in Table 4.7-3. Results from background studies are also shown for comparison.

A soil investigation study was undertaken in 1999 as part of a screening level analysis for the Installation Restoration Program under CERCLA, followed by a remedial investigation study in 2003. These studies focused on Site 39, Operable Unit (OU) 9, also known as Area 1-100, the site of the currently operating OB unit; and Site 270, OU 7, the site of an existing OD unit that is no longer operating. Soil samples were also collected and analyzed for the ERA Validation Study in 2002 at the existing OD unit, and for the HRA in 2007 at Area 1-100. Soil samples were collected to determine background concentrations of selected analytes in 1995 at the AFRL (Phillips Laboratory), and during the ERA Validation Study. For some studies, both surface and subsurface samples were collected. The surface and subsurface results were combined to calculate the mean concentration shown in Table 4.7-3.

The procedures for the 1995, 1999, 2002, 2003 and 2007 soil sampling events did not include the same analytes, sample locations, or number of samples. All of the investigations included analysis of soil samples for metals. Perchlorate was only included in the 2003 investigation. Explosives were only included in the investigations at Site 270. Dioxins/furans were included in all the investigations at Area 1-100, but only in the 2003 investigation at Site 270. No attempt was made to discern trends in concentration with depth below surface, with distance downwind from the OB/OD site, or with time between site investigations.

In the ERA Validation Study the results were compared statistically to determine if the downwind concentrations were significantly higher than the background concentrations using the 95%/95% Upper Tolerance Limit (UTL) method, the means comparison method, and the 95% Upper Confidence Limit (UCL) method. Two of the three statistical methods determined that one downwind axes lead in soil concentration result was significantly higher than background. However,

further qualitative review of the data indicates that the lead result is an outlier concentration that can be excluded from consideration. Therefore, the study concluded that downwind concentrations were not significantly higher than background.

California Human Health Screening Levels (CHHSLs), Regional Screening Levels (RSL) for an industrial scenario, Environmental Screening Levels (ESLs), and Total Threshold Limit Concentrations (TTLCs) are also shown on Table 4.7-3 to illustrate concentrations at which contamination of soil may become a concern.

CHHSLs, published by Cal/EPA, residential or industrial scenario RSLs, published by USEPA Region 9, and ESLs, published by San Francisco Bay RWQCB, are concentrations of chemicals in soil that can be used to screen sites for potential human health concerns. These screening levels are agency guidelines, not legally enforceable standards. They are used for site "screening" and as initial cleanup goals if applicable, not cleanup standards. Under most circumstances the presence of a chemical in soil at concentrations below the corresponding screening level is assumed to be below the threshold of concern for risks to human health. If contaminant concentrations in the soil are greater than the associated screening levels, an evaluation should be completed to determine whether additional work at the site may be necessary. The screening levels are generic; they are calculated without site specific information. Active remediation may or may not be required, depending on site-specific conditions and considerations. Screening levels may also be helpful in providing long-term targets to use during the analysis of different remedial alternatives.

Site soil data is sometimes compared to hazardous characteristics levels. The hazardous characteristics levels for solids (TTLCs) are values which, if equaled or exceeded, determine whether the soil exhibits the characteristic of toxicity and is therefore a hazardous waste subject to state hazardous waste control regulations. Rather than screening levels or cleanup standards based on human health and environmental considerations, the TTLC criteria determine the disposition of soil removed in a cleanup action. Where TTLC criteria are exceeded, generally the soil must be sent to a Class I hazardous waste landfill having the most stringent controls to prevent leakage and releases of the waste. In most cases, TTLC values greatly exceed the most conservative environmental screening levels.

In 2007, 2008, and 2009 soil and plant samples were collected and analyzed at the EOD Range. These results will determine a baseline for environmental monitoring which would be required under conditions of the draft Hazardous Waste Facility Permit Modification. The 61 soil sample locations are based on a polar sampling grid 5,000 feet in diameter centered on the EOD Range with two soil sample locations 4.5 miles south near the southern boundary of the base. The sample locations are primarily located downwind of the EOD Range. Two locations were selected to coincide with a wash located along the south to

southeast of the site. The maximum soil concentrations are shown on Table 4.7-4, Baseline Soil Monitoring Results (Proposed OB/OD Units). Although no statistical analysis has been completed, results indicate that baseline concentrations of arsenic are above the CHHSL, the RSL for industrial sites, and the ESL. The 2009 result for arsenic may indicate an outlier or have been recorded inaccurately.

#### 4.7.4.5 Closure Plan

Implementation of the Closure Plan would involve investigation of the site and areas outside the Units' boundaries for untreated items and may involve increased handling and additional treatment of damaged munitions items. These activities would be similar to routine unit maintenance although over a more extensive area. These activities would be temporary and would not endanger the public. Thus, no significant impacts from hazards or hazardous materials would result from implementation of the Closure Plan.

#### 4.7.4.6 Compliance with Thresholds of Significance

<u>Create a significant hazard to the public or the environment through the routine transport, use or disposal of hazardous materials.</u>

The public is not endangered by transportation of hazardous materials or hazardous waste, since the generation, transport, and treatment takes place within facility boundaries.

The following terms and conditions are included in the Burn Plan approved by EKAPCD, the Permit Modification application, and/or the draft Hazardous Waste Facility Permit Modification:

- The types, annual amounts, and single event amounts of hazardous waste, plus the donor charge to initiate the event, shall be limited such that a projected lifetime cancer risk of less than $1x10^{-6}$ and chronic and acute HI of 1.0 shall not be exceeded. If an event is scheduled that will exceed the annual quantity limits, or the event limits, the quantity of munitions/explosives must be adjusted, or the event must be cancelled;

- Risk and hazard impacts on specific receptors are affected by meteorological conditions. The Permit would impose meteorological conditions for operation which will not allow exceedance of risk and hazard thresholds. Specifically, operations will not be conducted during periods of:
  - electrical, sand, dust, rain, or snow storms present at the EOD Range; or
  - electrical storms within 5.75 miles of the EOD Range.

OB operations will not be conducted during periods of winds in excess of fifteen (15) miles per hour. In addition, events will not be conducted on “no burn” days confirmed by EKAPCD;

- DTSC will inspect periodically to verify compliance with limitations; and

- The facility will periodically monitor soil to detect build-up of contaminants.

<u>Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.</u>

Handling, transportation, and treatment of these types of wastes inherently carries some risk. The 1996 HRA contains an accident analysis. A review of the OB/OD operations was conducted to identify the scenario that represents a maximum credible event. The accident scenario selected for analysis, representing the most likely and serious event, was a vehicle accident during transport of energetic waste. The analysis determined that, although emissions resulting from an accident during transport would not be significantly greater than during routine operations, there may be more occupational receptors. The accident scenario assumed that 2,000 pounds NEW of energetic hazardous waste were detonated, with some receptors located at the point of maximum impact, and the worst case meteorological conditions existed. For this scenario two pollutants, cadmium and copper, were emitted with an acute HI which exceeded 1.0. The two metals are considered to be respiratory irritants. At a distance from the accidental detonation, the impacts would not cause significant or irreversible health effects, and would not necessarily impair an individual’s ability to escape the plume. The highest concentration is obtained at approximately 250 meters from the location of the accident. At this distance, the overpressure effects could be much more severe than the acute toxicological effects. At 250 meters the overpressure from this detonation would be sufficient to shatter windows.

The public is not endangered by release of hazardous materials or hazardous waste, since the generation, transport, and treatment takes place within facility boundaries. Edwards follows mandated safety protocols for the handling, storage, transportation, and treatment of munitions/explosives designed to prevent upset or accident conditions and the resulting release of hazardous materials. Transportation is only on designated hazardous waste hauling routes. The units are operated only during daylight. Events will not be conducted during periods of electrical, sand, dust, rain, or snow storms present at the EOD Range, or electrical storms within 5.75 miles of the EOD Range, and OB operations will not be conducted during periods of winds in excess of fifteen (15) miles per hour. In addition, events will not be conducted on “no burn” days confirmed by

EKAPCD. Most of propellant and munitions are in solid form. There are no liquids which may be spilled or dispersed. The number of workers at the site is limited to minimize potential collision and material handling hazards. Personnel participating in an event are trained in basic hazardous waste management and safety, destruction of explosives, transportation of explosives, firing systems, handling of munitions residue, permit requirements and environmental impacts. Personnel retreat approximately 1.4 miles prior to detonation.

Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances or waste within one-quarter mile of an existing or proposed school.

There are no existing or proposed schools in the area potentially impacted by emissions from the project.

Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, it would create a significant hazard to public or the environment.

The facility is on the Site Mitigation Properties, previously Calsites list. Hazardous materials sites are managed by the Air Force under the CERCLA program with oversight by DTSC. Edwards is satisfying its obligations to conduct corrective action and/or remedial actions under the FFA between the USAF, DTSC (previously Department of Health Services), and the RWQCB - Lahontan Region, executed September 25, 1990. The project does not conflict with the provision of the Agreement.

Impair implementation of, or physically interfere with, an adopted emergency response plan or emergency evacuation plan.

The facility has adopted the *Disaster Preparedness Plan* and *On Scene Commander/Disaster Control Group Checklists* related to response to natural disasters and catastrophic events, and the *Oil and Hazardous Substance Spill Prevention and Response Plan*, related to releases of hazardous substances. This project does not conflict with either of these plans.

### 4.7.5 Mitigation Measures

HMPMs listed in table ES-1 will be implemented to protect the public, facility personnel, and the environment .Potential impacts from hazards and hazardous materials as a result of the proposed project will be less than significant. Therefore, further mitigation measures are not required.

### 4.7.6 Level of Impacts After Mitigation

Impacts from hazards and hazardous materials from the proposed project are less than significant. Further mitigation is not required.

### 4.7.7 References

Air Force Flight Test Center (AFFTC). 2002. *Ecological Risk Assessment: Soil and Plant Material Analytical Results and Plant Growth Study Results Precision Impact Range Open Burn/Open Detonation Units Agency Final*.

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California Environmental Protection Agency, Office of Environmental Health Hazard Assessment (OEHHA). 2003. *Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments*. October.

Earth Technologies. 1994. *Installation Restoration Program – Metals, Chloride, Cyanide, and PAH in Soils and Bedrock of Phillips Laboratory, Edwards AFB, CA (OU4 and OU9): Part 1 – Background Concentration Values*.

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EPA Science Policy Council. 1995.*Guidance for Risk Characterization*.

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Radian Corporation. 1997. *Open Burn/Open Detonation Burn Plan – Edwards AFB California*. Revised Draft. March.

## Table 4.7-1 Summary of Maximum Health Risks for Each Emission Category

| PEP Emission Source Category | Treatment Quantity | | Total Cancer Risk[c] | Total Chronic Hazard Index[d] | Total Acute Hazard Index[d] |
|---|---|---|---|---|---|
| | lb/yr | lb/event | | | |
| **Open Burn[a]** | | | | | |
| OBM | 150,000 | 2,000 | 2.21E-07 | 7.92E-03 | 3.72E-02 |
| RPMAX | 150,000 | 2,000 | 2.21E-07 | 7.92E-03 | 1.66E-02 |
| PEPCLW | 150,000 | 2,000 | 2.21E-07 | 7.92E-03 | 1.66E-02 |
| Lead | 150,000 | 2,000 | 2.21E-07 | 7.92E-03 | 1.93E-02 |
| Mercury | 150,000 | 2,000 | 2.21E-07 | 7.92E-03 | 1.91E-01 |
| Phosphorus | 150,000 | 2,000 | 2.21E-07 | 7.92E-03 | 2.66E-02 |
| **Open Detonation[b]** | | | | | |
| C4 | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 3.56E-02 |
| CB | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 6.00E-02 |
| DB | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 1.94E-02 |
| ODM | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 7.90E-01 |
| RDX | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 6.35E-02 |
| RDX/Al | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 1.54E-01 |
| TET | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 5.05E-01 |
| TNT | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 6.05E-02 |
| TR | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 1.54E-01 |
| Lead | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 5.99E-02 |
| Mercury | 150,000 | 700 | 2.18E-07 | 7.91E-03 | 9.82E-01 |
| Phosphorus | 150,000 | 2,000 | 2.18E-07 | 7.91E-03 | 1.76E-01 |

Source: Edwards Air Force Base Precision Impact Range Area Open Burn/Open Detonation Health Risk Assessment, January 2012.

Footnotes:

[a] Includes ash handling and windblown dust and ash.
[b] Includes emissions from the crater and windblown dust.
[c] Applicable risk threshold is 1.0E-06.
[d] Applicable HI threshold is 1.0.

**Table 4.7-2 Maximum Estimated Blood Lead Levels**

| Receptor | Percentile Estimate of Lead Level in Blood (µg/dl) | | | | |
|---|---|---|---|---|---|
| | 50th | 90th | 95th | 98th | 99th |
| Blood Pb, Child | 1.35E-04 | 2.46E-04 | 2.92E-04 | 3.54E-04 | 4.03E-04 |
| Blood Pb, Pica Child | 2.69E-04 | 4.91E-04 | 5.81E-04 | 7.06E-04 | 8.03E-04 |

Source: Edwards Air Force Base Precision Impact Range Area Open Burn/Open Detonation Health Risk Assessment, January 2012.

Maximum estimate is the combined contribution to blood lead from fugitive dust, OD crater, ash and the highest PEP treatment air and soil lead concentration. Blood lead level of concern is 1 µg/dl.

# Table 4.7-3 Soil Investigation Results (Active and Inactive OB/OD Sites and Background Area)

| Study | OB 39[a,b] | | OD 270[a,b] | | Area 1-100[c] 2007 | ERA Validation Study[d] 2002 | | | Phillips Laboratory Background[e] 1995 | Published Screening Levels | | | Hazardous Characteristics Levels |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1999 | 2003 | 1999 | 2003 | | Downwind Axis | Downwind Grid | Background Grid | | CHHSLs[f] | RSLs (industrial)[g] | ESLs[h] | TTLCs[i] |
| **Value Reported** | Mean - 34 samples | Mean – 14 samples | Mean – 33 samples | Mean – 22 samples | Mean – 2 composite samples | Mean - 36 samples | Mean - 33 samples | Mean - 33 samples | | | | | |
| **Metals (mg/kg)** | | | | | | | | | | | | | |
| Aluminum | | 6827.14 | | 5069.55 | | 2810.00 | 3016.67 | 5951.94 | | | 990000 | | |
| Antimony | 1.30 | ND | 1.70 | ND | ND | 19.65 | 24.10 | 43.44 | PQL | 380 | 410 | 40 | 500 |
| Arsenic | 1.57 | 2.86 | 1.14 | 2.66 | ND | ND | ND | | 24.1 | 0.24 | 1.6 | 1.6 | 500 |
| Barium | 58.83 | 44.12 | 75.44 | 38.85 | 39.50 | 35.92 | 27.88 | 53.41 | 590 | 63000 | 190000 | 1500 | 10000 |
| Beryllium | ND | 0.39 | ND | ND | ND | ND | ND | | 0.9 | 190 | 2000 | 8.0 | 75 |
| Boron | 21.85 | | 17.37 | | | | | | PQL | | 200000 | 2.0 | |
| Cadmium | ND | ND | 9.55 | ND | ND | ND | ND | | 0.66 | 7.5 | 800 | 7.4 | 100 |
| Calcium | | 3487.86 | | 2760.45 | | | | | | | | | |
| Chromium | 5.73 | 6.83 | 16.60 | 7.25 | 5.40 | 2.71 | 3.05 | 4.84 | 11.6 | 100000 | | 2500 | 2500 |
| Cobalt | 3.20 | ND | 2.34 | ND | 4.55 | 3.46 | | 3.25 | 6.4 | 3200 | 300 | 80 | 8000 |
| Copper | 7.56 | 7.27 | 80.91 | 6.15 | 8.25 | 3.14 | 2.74 | 2.26 | 35.6 | 38000 | 41000 | 230 | 2500 |
| Iron | | 10663.57 | | 9891.82 | | 4967.50 | 5939.09 | 10203.33 | | | 720000 | | |
| Lead | 4.63 | 2.66 | 15.40 | 2.58 | 3.40 | 10.69 | 8.56 | 18.27 | 11.3 | 320 | 800 | 750 | 1000 |
| Magnesium | | 3157.86 | | 2535.00 | | | | | | | | | |
| Manganese | | 178.75 | | 145.33 | | 83.01 | 58.98 | 130.67 | | | 23000 | | |
| Mercury | 0.15 | ND | 0.02 | ND | ND | | | | PQL | 180 | 43 | 10 | 20 |
| Molybdenum | ND | ND | 1.90 | ND | ND | ND | ND | | PQL | 4800 | 5100 | 40 | 3500 |
| Nickel | 5.41 | 5.76 | 4.60 | 5.56 | 4.35 | 3.39 | 2.67 | 2.97 | 9.9 | 16000 | 20000 | 150 | 2000 |
| Potassium | | 2255.00 | | 1548.73 | | | | | | | | | |
| Selenium | 0.10 | ND | 0.09 | | ND | | | | PQL | 4800 | 5100 | 10 | 100 |
| Silver | ND | ND | ND | | ND | 3.19 | 4.79 | 7.76 | PQL | 4800 | 5100 | 40 | 500 |
| Sodium | | 196.14 | | 217.33 | | | | | | | | | |
| Strontium | | | | | | 15.74 | 13.26 | 21.58 | | | 610000 | | |
| Thallium | ND | ND | ND | ND | ND | | | | PQL | 63 | 10 | 16 | |
| Tin | | | | | | 3.48 | 3.84 | 5.38 | | | 610000 | | |
| Titanium | | | | | | 152.68 | 117.53 | 300.00 | | | 600000 | | |
| Vanadium | 12.87 | 20.11 | 9.53 | 19.94 | 19.00 | 9.36 | 11.75 | 25.26 | 69.7 | 6700 | 5200 | 200 | 2400 |
| Zinc | 19.73 | 24.76 | 65.18 | 19.57 | 27.50 | 17.45 | 15.46 | 26.12 | 66.6 | 100000 | 310000 | 600 | 5000 |
| **Inorganics (mg/kg)** | | | | | | | | | | | | | |
| Perchlorate | | 2.28 | | 1.01 | | | | | | 350 | 720 | 140 | |
| **Explosives (mg/kg)** | | | | | | | | | | | | | |
| 2,4-Dinitrotoluene | | | 1.60 | ND | | | | | | | 5.5 | 0.86 | |
| **Dioxins/Furans (ug/kg)[j]** | | | | | | | | | | | | | |
| 1,2,3,4,6,7,8,9-OCDD | ND | ND | | ND | 0.0085 | | | | | 0.019 | 0.018 | 0.018 | 10 |

ND – non-detect PQL – practical quantification limit

Note: Analytes, including dioxin/furan congeners, that were evaluated but not detected in any samples are not listed. Additional explosives analytes evaluated at Site 270 but not detected include 2-amino-4,6-dinitrotoluene, 4-amino-2,6-dinitrotoluene, 1,3-dinitrobenzene, 2,6-dinitrotoluene, HMX, nitrobenzene, nitrocellulose, nitroglycerin, nitroguanidine, 2-nitrotoluene, 3-nitrotoluene, 4-nitrotoluene, pentaerythriton tetranitrate, RDX, tetryl, 1,3,5-trinitrobenzene, and 2,4,6-trinitrotoluene.

Additional analytes were detected but are not listed here because results are not relevant to OB/OD. These analytes are: extractable fuel hydrocarbons, diethyl phthalate, dimethyl phthalate, di-n-butyl phthalate, and toluene.

Footnotes:

[a] Source: Edwards Air Force Base, Installation Restoration Program, Sampling, Technology Assessment, and Remediation Report, Sites 39 and 270, April 1999. Mean calculated from samples collected at surface and 3 inches below surface.

[b] Source: Edwards Air Force Base, Environmental Restoration Program, Remediation Investigation Site Summary Report, Site 270 Open Detonation Unit, Operable Unit 7 and Site 39 Open Burn Unit, Air Force Research Laboratory, Operable Unit 9, December 2003. Mean calculated from samples collected between surface and 7.5 feet below surface.

[c] Source: Edwards Air Force Base, Test America Laboratory Report, Area 1-100, Sample IQB0991, February, 2007. Mean calculated from composite surface samples.

[d] Source: Ecological Risk Assessment: Soil and Plant Material Analytical Results and Plant Growth Study Results, Open Burn/Open Detonation Units, January 2002. Mean calculated from surface samples.

[e] Source: IRP Metals, Chloride, Cyanide, and pH in Soils and Weathered Bedrock of Phillips Laboratory, Edwards AFB (OU 4 and 9), Earth Tech 1995.

[f] Source: Use of California Human Health Screening Levels (CHHSLs) in Evaluation of Contaminated Properties, January 2005, and Soil Screening Numbers Updated Tables, September 23, 2010.

[g] Source: Regional Screening Levels (RSL) published by U.S. EPA Region 9, May 2012.

[h] Source: Environmental Screening Levels (ESLs) published by SFBRWQCB Region 2, Interim Final November 2007 (Revised May 2008).

i Source: Total Threshold Limit Concentrations (TTLCs), CCR Title 22 Section 66261.24.

[j] Screening and hazardous characteristics levels for dioxins/furans as Toxicity Equivalence Quotient (2,3,7,8-TCDD).

# Table 4.7-4 Baseline Soil Monitoring Results (Proposed OB/OD Units)
## (Maximum Soil Concentrations - mg/kg)

| Monitoring Year | 2007 | 2008 | 2009 |
|---|---|---|---|
| **Metals** | | | |
| Aluminum | NA | 14000 | 88100M-3 |
| Antimony | 0.14Ja | 0.304J | 0.332J |
| Arsenic | 2.81 | 2.09 | 370 |
| Barium | 142 | 108 | 135 |
| Beryllium | 0.17Ja | 0.37 | 0.432 |
| Cadmium | <RL | 2.3 | 4.54 |
| Chromium, total | 28.02 | 24.8 | 22.5 |
| Chromium, hexavalent | NA | 0.0696J | 0.137J |
| Cobalt | 7.18 | 6.96 | 7.49 |
| Copper | 18.3 | 20.4 | 12.3 |
| Lead | 9.85 | 9.39 | 8.91 |
| Mercury | 0.52 | 0.0185 | 0.0328 |
| Molybdenum | 2.0 | 0.96J | 0.790J |
| Nickel | 14.1 | 9.03 | 10.3 |
| Selenium | 54.35 | 0.94J | 0.470J |
| Silver | <RL | <RL | <RL |
| Strontium | NA | 360 | 209 |
| Thallium | 0.12Ja | 0.45J | 0.476J |
| Vanadium | 31.4 | 47.00 | 44.7 |
| Zinc | 128 | 40.00 | 51.2 |
| **Orthophosphate** | 250 | 84.00 | 8.79 |
| **Perchlorate** | 0.190 | 0.0453 | 0.132 |
| **Explosives** | 0.498 | 0.2 | 0.465J |
| **PAHs** | <RL | 0.00424J | 0.012 |
| **Dioxins/Furans** | 7.6E-12J | 1.9E-11 | 6.3E-12Ja |

Source: 2009 Soil and Plant Sampling Report for Open Burn/Open Detonation Area, Final

NA - no sample analyzed RL – Reporting Limit

Data qualifiers:

- J Estimated value. Analyte detected at a level less than the RL and greater than or equal to the method detection limit.
- Ja Estimated result. Result is less than the RL.
- M-3 Result exceeded the linear range in the MS/MSD and, therefore, is not available for reporting. The batch was accepted based on acceptable recovery in the blank spike.

Notes:
Samples were collected at 61 locations. In addition to surface samples, six locations included samples at 1, 3, and 5 feet below ground surface, totaling 73 samples. Highest concentration of molybdenum occurred at 1 foot below ground surface. Maximum concentration for all other analytes occurred at surface.

Explosives detected were 1,3,5-trinitrobenzene, 1,3-dinitrobenzene, 2,4,6-trinitrotoluene, 2,4-dinitrotoluene, 2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene, 2-nitrotoluene, 3-nitrotoluene, 4-amino-2,6-dinitrotoluene, 4-nitrotoluene, HMX, nitrobenzene, RDX, and tetryl.

PAHs detected were acenaphthene, acenaphthylene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(g,h,i)perylene, chrysene, dibenz(a,h)anthracene, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene.

Dioxins/furans are the highest results that were not flagged B or Ba (method blank contamination).
Dioxins/furans detected were:

| | | |
|---|---|---|
| 1,2,3,4,6,7,8-HpCDD | 1,2,3,7,8-PeCDD | Total HpCDD |
| 1,2,3,4,6,7,8-HpCDF | 1,2,3,7,8-PeCDF | Total HpCDF |
| 1,2,3,4,7,8,9-HpCDF | 2,3,4,6,7,8-HxCDF | Total HxCDD |
| 1,2,3,4,7,8-HxCDD | 2,3,4,7,8-PeCDF | Total HxCDF |
| 1,2,3,4,7,8-HxCDF | 2,3,7,8-TCDD | Total PeCDD |
| 1,2,3,6,7,8-HxCDD | 2,3,7,8-TCDF | Total PeCDF |
| 1,2,3,6,7,8-HxCDF | OCDD | Total TCDD |
| 1,2,3,7,8,9-HxCDD | OCDF | Total TCDF |
| 1,2,3,7,8,9-HxCDF | | |

**Figure 4.7-1 Receptor Location Map**

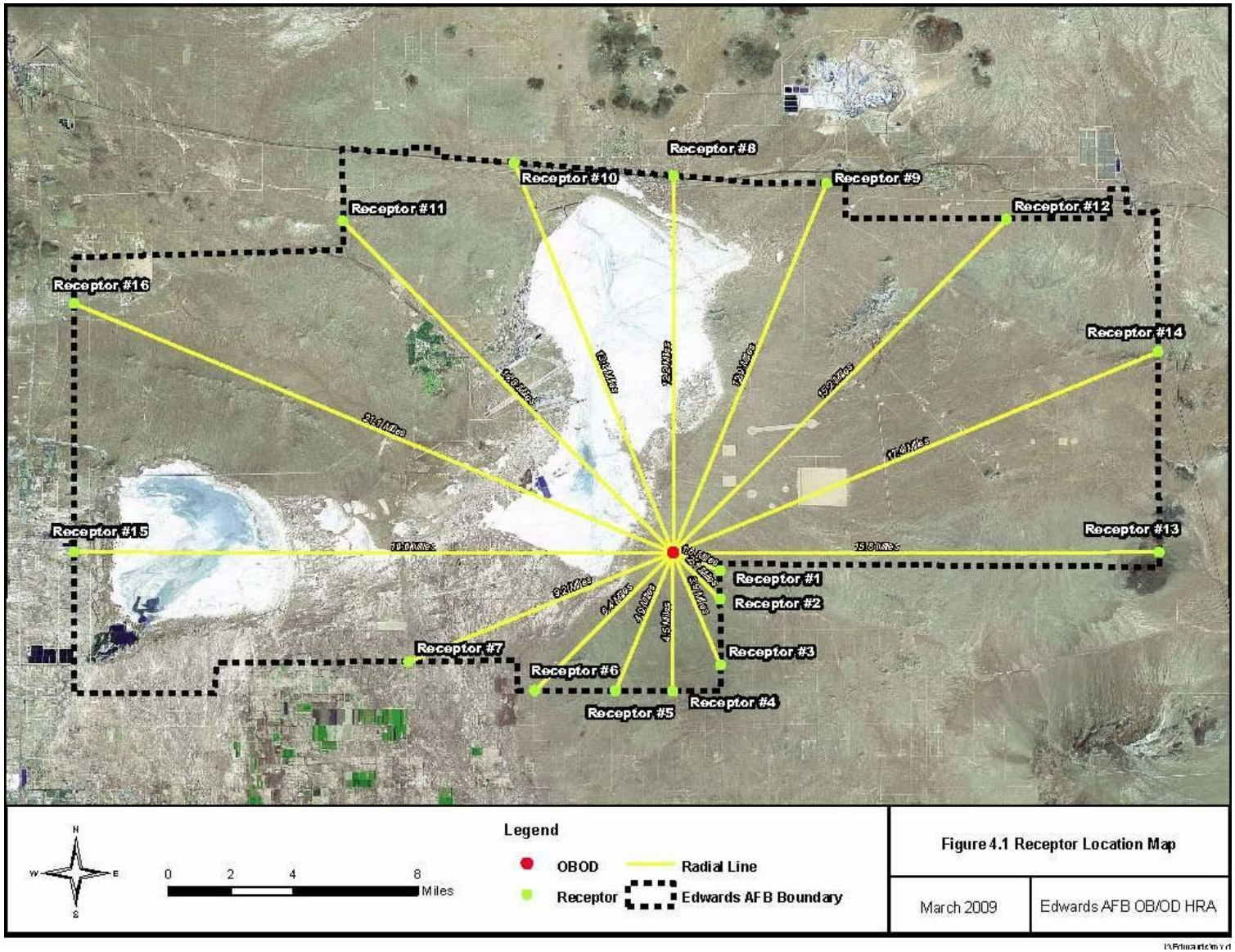
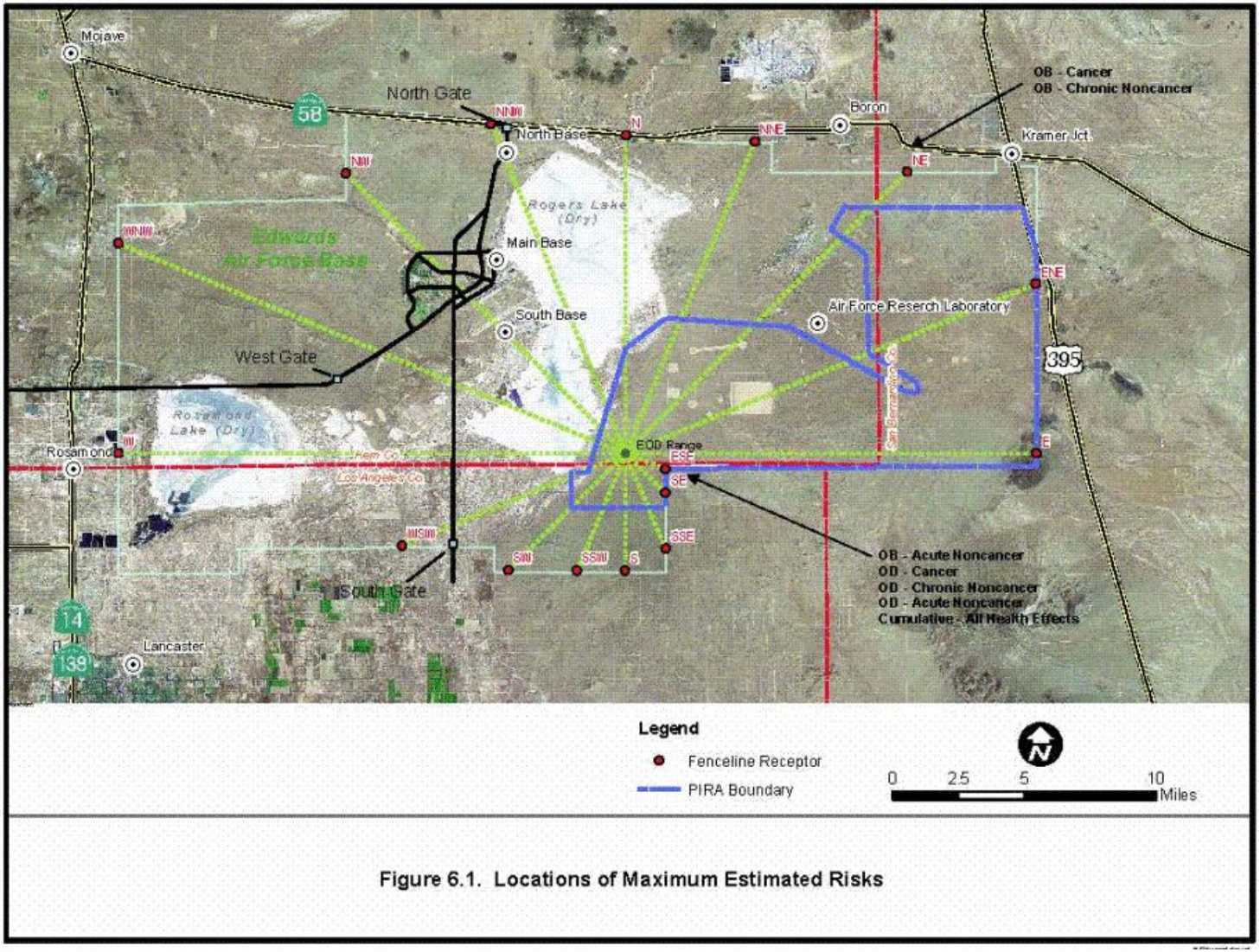


**Figure 4.7-2 Locations of Maximum Estimated Risks**



## 4.8 HYDROLOGY AND WATER QUALITY

This section describes the hydrological characteristics at Edwards and its surrounding areas and the project impacts related to water quality, water supplies, and drainage.

### 4.8.1 Environmental Setting

Edwards overlies the Antelope Valley groundwater basin, a topographically closed basin encompassing approximately 940 square miles. A bedrock complex consisting of pre-Cenozoic igneous rocks and consolidated Tertiary sedimentary rocks forms the margin and base of the groundwater basin and crops out in the highlands that surround the valley. The consolidated rocks of pre-Tertiary and Tertiary age are considered non-water-bearing units except for minor amounts of water present in cracks and weathered zones. The basin fill is composed of a series of unconsolidated deposits of Quaternary age, some more than 5,000 feet thick, overlying consolidated rocks. The unconsolidated younger deposits of Recent and Quaternary age are more porous and permeable and contain most of the groundwater within the valley. The alluvial deposits are composed of gravel, sand, silt, and clay. The lacustrine deposits are composed of clay and silty clay. The lacustrine deposits are up to 300 feet thick in some areas, and are overlain by up to 700 feet of alluvium in the southern basin but are shallower and exposed on the southern edge of Rogers Dry Lake. The basin is divided into an upper, middle, and lower aquifer. These aquifers consist of poorly consolidated, variably sorted beds of clay, silt, sand, and gravel.

The upper aquifer extends from the water table to an elevation of about 1,950 feet and varies from unconfined to confined, depending on the presence and vertical position of the thick lacustrine deposits within the aquifer. In the vicinity of the EOD Range, the lacustrine deposits are exposed at land surface and form the upper part of the upper aquifer. In these areas where the lacustrine deposits are a part of the upper aquifer, the upper aquifer is confined below the lacustrine deposits.

The middle aquifer extends from 1,950 to 1,550 feet above sea level. This aquifer consists of older alluvium and is generally considered to be confined below the lacustrine deposits. The middle aquifer is the primary source of groundwater supply for Edwards.

The lower aquifer extends from 1,550 feet above sea level to the elevation at which bedrock is encountered. This aquifer consists of continental deposits and is only able to store and transmit small quantities of water as it becomes increasingly consolidated with depth.

The Antelope Valley groundwater basin is divided into the Buttes, Chaffee, Finger Buttes, Gloster, Lancaster, Neenach, North Muroc, Oak Creek, Pearland,

Peerless, West Antelope, and Willow Springs subbasins (Figure 4.8-1, Antelope Valley Ground Water Basin and Subbasins). The OB/OD Units on the PIRA overlay the eastern end of the Lancaster subbasin. This is the largest and most developed of the subbasins. The Lancaster subbasin covers approximately 800 square miles and underlies the southern portion of Edwards, including Rosamond, Buckhorn, and Rogers Dry Lakes. Recharge to the Lancaster subbasin is primarily through range front infiltration along the San Gabriel and Tehachapi Mountains. Infiltration within the various drainage areas occurs through the permeable fan and alluvial deposits before reaching the playas.

The Lancaster subbasin supplies about 50 percent of the groundwater used on Edwards. A large percentage of water used on base is supplied by the Antelope Valley East Kern Water Agency (AVEK). The cities of Lancaster and Palmdale are in the southern portion of the Lancaster subbasin and most of the groundwater pumping for urban and agricultural uses occurs there.

Groundwater in the Lancaster subbasin flows from areas of natural recharge toward the major pumping area in Palmdale. There is also a pumping area centered near the primary Edwards' production wells near the south end of Rogers Lake. Groundwater flows from the boundary between the Lancaster and North Muroc subbasin (at the northern end of Rogers Lake) toward this groundwater low. Figure 4.8-2, Groundwater Contours and Flow Direction, shows the groundwater subbasin flow directions within the aquifers in the Antelope Valley.

Groundwater extractions have caused more than 150 feet of water level decline. Seasonal water level fluctuations correspond to steplike reductions in aquifer thickness and groundwater storage capacity. Summer water level drawdowns are associated with larger rates of aquifer compaction. Winter water level recoveries are associated with smaller rates of compaction rather than expansion. The absence of aquifer system expansion during recovery is most likely due to delayed drainage and residual compaction of the aquitards.

The valley floor slopes toward the Rosamond, Rogers, and Buckhorn Dry Lakes where surface water runoff terminates. Cottonwood, Amargosa, Little Rock and Big Rock Creeks are the major ephemeral drainages that terminate in the lakebeds. Surface water collects in the lakebeds during the winter rainy season.

#### 4.8.1.1 Groundwater

Five monitoring wells have been installed on the EOD Range (Figure 4.8-3, OB/OD Units Monitoring Wells). The wells were installed in spring of 2004. One well is located up-gradient on the east of the OB/OD fence, and the other four wells are located down gradient on the west and south sides of the fence. During drilling for the installation of the wells, the sediments underlying the site were identified as fine to coarse grained sand and fine gravel near the groundwater

level. Depth to groundwater at the OB/OD Units is between 202 and 222 feet below the ground surface. Groundwater flow in the vicinity of the OB/OD Units appears to correspond with the surface topography, i.e. sloping to the northwest.

Soils and water removed for drilling of monitoring wells on the site were tested for contamination. No soil or water contamination was identified in the materials.

Since 2004, quarterly sampling takes place to monitor water quality at the site. These results will determine a baseline for environmental monitoring which would be required under conditions of the draft Hazardous Waste Facility Permit Modification. Detected concentrations consistently exceed the applicable maximum contaminant levels for arsenic. Detected concentrations also have exceeded the maximum contaminant levels for total chromium and nickel, although results vary between wells and between sampling events. Results of soil investigations in the area of the PIRA show that naturally occurring concentrations of arsenic are above published screening levels, the concentration that is assumed to be the threshold of concern for risks to human health. Depth to groundwater and groundwater flow direction have not changed appreciably since the beginning of the monitoring program.

Other wells near the OB/OD Units for which there is groundwater quality data are located in the AFRL well field approximately two (2) miles northwest of the EOD Range. Groundwater from this well field is generally of good quality. AFRL draws some drinking water from this field but the majority is obtained from AVEK. Well fields at South Base, South Track (west of Rogers Dry Lake) and Graham Ranch (south of Rogers Dry Lake) are also being pumped (Figure 4.8-4, Edwards' Groundwater Flow).

The area of groundwater contamination nearest the EOD Range is within the upper aquifer beneath the South Base well field, five (5) miles west of the OB/OD Units. There were no wells in the area of the OB/OD Units prior to installation of the monitoring wells.

#### 4.8.1.2 Surface Water

Rainfall in the San Gabriel Mountains southwest of Edwards and in the Tehachapi Mountains northwest of the base drains mostly in well-defined channels toward the Valley floor (Figure 4.8-5, Antelope Valley Drainage Area Map). Rogers Dry Lake receives storm-water runoff from the surrounding areas including western portions of the PIRA. Storm-water usually evaporates from the dry lakebed and clay pan areas, but some infiltration may occur.

No surface water is present on or near the EOD Range. The site slopes from the southeast to the northwest and the runoff from the OB/OD area flows toward Rogers Dry Lake, approximately 1.4 miles to the northwest. Surface drainage follows the slope of the terrain, flowing generally to the west across the range,

except where it is intercepted by both unpaved and paved roads. The majority of surface runoff in the area is diverted away from the EOD Range by sloping topography and incised ephemeral channels.

The closest permanent surface water is located west of Rogers Dry Lake at Branch Park approximately 5.5 miles from the OB/OD Units. Piute Ponds is another source of permanent surface water approximately sixteen (16) miles from the OB/OD Units on the south-western side of Rosamond Dry Lake. In 1961 the Los Angeles County Sanitation District constructed a 1.3 mile long dike along Avenue C to prevent effluent discharged from the District 14 Lancaster Water Reclamation Plant (LWRP) from flowing onto Rosamond Dry Lake. Piute Ponds is a series of interconnected impoundments occupying about 200 acres year round, however the ponds are capable of expanding during the winter months up to 400 acres.

## 4.8.2 Applicable Standards

### 4.8.2.1 Siting Standards

CCR Title 22, Section 66264.18 requires that facilities where treatment of hazardous waste will be conducted shall be designed, constructed, operated, and maintained to prevent washout of any hazardous waste by a 100-year flood. Flood zones are typically delineated on Federal Emergency Management Agency (FEMA) flood maps. However, because of its federal status no flood maps have been generated for Edwards.

A flood assessment for Rogers Dry Lake was completed in October 2003 and revised in 2009 using LiDAR data by the Desert Research Institute. The study defined the Federal Emergency Management Agency (FEMA) 100-year flood zone at an elevation of 2274.15 feet for Rogers Dry Lake (Figure 4.8-6, Floodplains). The EOD Range is located above this level at an elevation of 2384-2407 feet. Edwards received a record 14 inches of precipitation in 1983, the most since recordkeeping began in 1943. As a result, runoff from the surrounding highland areas drained into Rogers Dry Lake, and the ephemeral lake level rose to the approximately 2,270 feet above mean sea level (MSL). This record rainfall year was used to determine the limits of the 100-year floodplain. The EOD Range is located approximately 2,400 feet above MSL, about 130 feet higher than the 100-year flood limits. Floodplains are shown on Figure 4.8-6, Floodplains.

### 4.8.2.2 Discharge and Treatment Standards

NPDES permits are issued for the discharge of treated sewage as well as industrial discharges of hazardous wastes into sewer systems. The Porter-Cologne Act establishes waste discharge requirements for discharges to California waters, including groundwater. Permitted wastewater treatment sites

on base are the Main Base Wastewater Treatment Plant (WWTP), the AFRL WWTP, and AFRL Surface Impoundments. The Main Base WWTP reclaims nearly all of the wastewater it receives for xeriscape landscaping, irrigation for the golf course, and filling of one artificial pond at the golf course. The remaining treated wastewater from the Main Base WWTP is discharged to evaporation ponds adjacent to Rogers Dry Lake. All treated wastewater at the AFRL WWTP is discharged to evaporation ponds located along Mars Boulevard adjacent to the PIRA boundary along Downfall Road. Effluent from the LWRP is transported to Piute Ponds. The LWRP treats sanitary wastewater and storm water generated from Lancaster with secondary treatment and chlorine disinfection before discharging excess effluent into the ponds. Edwards does not discharge into Piute Ponds. Piute Ponds is not managed by the Air Force, but is monitored by the natural resources staff for the use of habitat by wildlife. Piute Ponds are not considered 'waters of the U.S.'.

The storm water collection system at Edwards consists of drainage ditches flowing east to Rogers Dry Lake and storm water retention ponds located on the west edge of Rogers Dry Lake. Nonpoint source pollution transported by storm water runoff includes excess agricultural chemicals, sediments, salts, bacteria, oil and grease, and urban-generated chemical spills. In 1998 Edwards adopted the *Stormwater Pollution Prevention Plan (SWPPP), Edwards AFB, California* to prevent contamination of surface water or degradation of groundwater.

Federal and state regulatory safe drinking water programs establish standards and treatment requirements for drinking water, the control of underground injection of wastes that might contaminate water supplies, and protection of groundwater. In California the Proposition 65 regulations prohibit substantial discharges into sources of drinking water, or onto land from which substances will probably migrate into a source of drinking water, of substances listed under the regulations as carcinogenic or having reproductive toxicity. Edwards imports approximately 40 percent of its domestic potable water from AVEK. There are two potable water systems at Edwards, located at AFRL and Main Base. Edwards uses13 groundwater wells. The South Track wellfield, near the southern boundary of Rogers Dry Lake, has nine wells in production to provide potable and nonpotable water to Main and South Base. Of the nine wells in production, four are currently being used for potable water. The AFRL wellfield has four wells used for potable water. All potable water from these wells is treated using chlorine.

### 4.8.3 Thresholds of Significance

According to Appendix G of the state CEQA Guidelines, a project would normally have a significant adverse impact on Hydrology and Water Quality if it would:

- Violate any water quality standards or waste discharge requirements;

- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted);

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on-or offsite;

- Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite;

- Create or contribute runoff water which would exceed the capacity of existing or planned storm-water drainage systems;

- Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard boundary or Flood Insurance Rate Map or other flood hazard delineation map;

- Place within a 100 year flood hazard area structures which would impede or redirect flows;

- Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam; and

- Inundation by seiche, tsunami or mudflow.

The significance thresholds are addressed in the following section.

### 4.8.4 Potential Environmental Impacts

Operations at the OB/OD Units have the potential to impact water quality at Edwards. Soil contaminants could have the potential to infiltrate the groundwater or to be transported to surface water bodies such as Rogers Dry Lakebed by storm water runoff or airborne deposition. The project could also affect drainage patterns by use and maintenance of access roads, fencing, and periodic grading. Factors considered in determining whether an impact would be significant include the potential for substantial degradation of water quality that would preclude established uses, or the potential for increased erosion or flooding.

Water based transport and airborne deposition of soil contaminants to surface water would be minor, because of the distances from the OB/OD Units to permanent or seasonal surface water bodies. There are no surface water bodies subject to deposition in the prevailing wind direction. Water based transport of contaminants would only occur during rare, severe flash flood events and is unlikely because of the topography in the vicinity of the project. For the same reasons the potential impact on drainage patterns would be minor as well. The nearest ephemeral stream is south of Photo Resolution Road approximately 1000 feet from the OB/OD Units and would not be impacted by the project.

#### 4.8.4.1 Closure Plan

Implementation of the Closure Plan would involve decontamination of the satellite accumulation building and concrete pads by washing and rinsing surfaces. Water for decontamination would be transported to the site. This activity would be temporary. Closure of the Units would not impact groundwater or surface water. Thus, no significant impacts to hydrology or water quality would result from implementation of the Closure Plan.

#### 4.8.4.2 Compliance with Thresholds of Significance

<u>Violate any water quality standards or waste discharge requirements.</u>

There is no indication that operations on the site would impact the water below ground available to wells off-site. The flow of rainwater and below surface groundwater is toward the lakebeds on base, not toward agricultural areas or agricultural wells off-site to the south of the facility. Soil, water, and plant sampling results around the existing OB/OD site indicate that no soil, water, or plant contamination is occurring from the site operations. However, at the request of DTSC, Edwards has already started to monitor water below ground at wells installed around the OB/OD site to ensure that no contamination occurs that might affect the groundwater. In addition, as part of the project operations, Edwards will implement an environmental monitoring plan that will sample soil and plants for deposition over time (in addition to water well monitoring) to ensure that no contamination occurs.

The OB/OD Units would not be expected to violate any water quality standards or waste discharge requirements. No wastewater would be released and no water discharge permits are required. The OB/OD Units are situated at a higher elevation than ephemeral channels that drain the area, thus preventing run-on of storm-water. Soil testing near the prior OB/OD Units found no indications of soil contamination from past operations, therefore it is not expected that operations will result in polluted runoff. No contamination of the groundwater basin is expected since the groundwater is more than 200 feet below the surface and no soil contamination has been identified that might infiltrate the groundwater.

However, a Detection Monitoring Program has been setup to monitor groundwater quality. The Detection Monitoring Program includes five monitoring wells installed around the OB/OD Units. The wells were installed in spring of 2004. One well is located up-gradient on the east of the OB/OD fence, and the other four wells are located down gradient on the west and south sides of the fence (Figure 4.8-3, OB/OD Unit Monitoring Wells). Quarterly sampling takes place to monitor water quality at the site. Review of current monitoring data for the OBOD facility has reported no significant impacts to groundwater from COCs.

Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).

The OB/OD Units operations will not use groundwater; therefore the project would not affect groundwater supplies, recharge, aquifer volume, level of the local groundwater table, or nearby wells. There are no groundwater recharge areas in the vicinity of the OB/OD Units.

Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on-or offsite.

There are no existing streams or rivers on or near the site. The small graded surface of the OB/OD Units and perimeter road would not be great enough to significantly increase graded surfaces and result in increased runoff that could cause substantial erosion or siltation on or off site, or change the existing drainage pattern.

Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or offsite.

There are no streams or rivers in the site area. The graded surface area is small and does not represent a significant change from the natural condition. The grading would not result in a substantial increase in surface runoff that could cause on- or offsite flooding.

Create or contribute runoff water which would exceed the capacity of existing or planned storm-water drainage systems.

There are no existing or planned storm-water drainage systems in the PIRA area

Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard boundary or Flood Insurance Rate Map or other flood hazard delineation map.

There is no housing associated with the project or within eight (8) miles of the project area. The proposed project will have no effect on flood hazard areas.

Place within a 100 year flood hazard area structures which would impede or redirect flows.

There are no structures planned for construction. The small storage shed on the OB/OD site is not located in the 100 year floodplain. The floodplain is 1.4 miles away at Roger Dry Lake.

Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.

There is no increase in flooding due to the project and there are no levees or dams in the area.

Inundation by seiche, tsunami or mudflow.

The site is not near any large bodies of water that could be the source of a seiche or tsunami nor slopes that could produce a mudflow.

### 4.8.5 Mitigation Measures

Potential impacts to hydrology and water quality as a result of the proposed project will be less than significant. Groundwater at the project location will continue to be monitored. A mitigation plan will be required if any indications of contamination are identified.

### 4.8.6 Level of Significance After Mitigation

Impacts to hydrology and water quality from the proposed project are less than significant. Further mitigation is not required.

### 4.8.7 References

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## Table 4.8-1 Maximum Concentrations at EOD Range Groundwater Monitoring Wells (µg/L)

| Study | MCL | 2004 | | 2005 | | | | 2006 | | | | 2007 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | May | October | January | April | August | November | February | May | July | November | February | May | July | October |
| **Metals** | | | | | | | | | | | | | | | |
| Antimony | 6 | NDR | NDR | NDR/NA | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Arsenic | 10 | 22.9 | 89.8 | 70.4 | 256 | 29 | 25 | 22 | 21 | 38 | 25 | 23 | 23 | 27 | 27 |
| Barium | 1000 | 20.7 | 37.4 | 22.2 | 53.5 | 34.6 | 26 | 25 | 24 | 23 | 130 | 24 | 26 | 35 | 37 |
| Beryllium | 4 | NDR | NDR | NDR/NA | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Cadmium | 5 | NDR | NDR | NDR/NA | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Chromium, total | 50 | 674 | 2580 | 1020 | 3480 | 724 | 390 | 150 | 63 | 1200 | 25 | 33 | 29 | 640 | 75 |
| Chromium, hexavalent | [a] | NA | NA | NA | NA | NA | NA | NA | NA | NA | NA | NDR/NA | 5.6 | 4.3 | 4.6 |
| Cobalt | | 6.41 | 13.7 | NDR | 12.5 | 10 | 3.2 | 1.5 | 1.3 | 4.3 | 1.2 | NDR | 1.3 | 3.3 | 1.6 |
| Copper | 1300 | 23.3 | 32.1 | 19 | 58.7 | 46.1 | 7.9 | 4.2 | 3.1 | 12 | 6.8 | 2.2 | 3.8 | 9.6 | NDR |
| Lead | 15[b] | NDR | NDR | NDR/NA | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Mercury | 2 | NDR | NDR | NDR/NA | NDR | NDR/NA | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Molybdenum | | 107 | 120 | 110 | 115 | 114 | 120 | 110 | 98 | 100 | 100 | 110 | 110 | 99 | 96 |
| Nickel | 100 | 640 | 976 | 519 | 572 | 710 | 450 | 320 | 350 | 570 | 260 | 140 | 260 | 530 | 320 |
| Selenium | 50 | NDR | NDR | NDR/NA | NDR | NDR | 2.9 | 3.5 | 2.3 | 3.2 | 11 | 3.2 | 2.1 | NDR | 3.3 |
| Silver | | NDR | NDR | NDR/NA | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Thallium | 2 | NDR | NDR | 11.9 | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Vanadium | 50 | 59.8 | 219 | 155 | 509 | 71.4 | 54 | 43 | 36 | 97 | 38 | 40 | 34 | 73 | 44 |
| Zinc | | 12 | 19.5 | 30.5 | 99.4 | 510 | 34 | 30 | NDR | 24 | NDR | NDR | 2.9 | NDR | NDR |
| **VOCs** | varies | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | 5.9 | NDR | NDR | NDR |
| **Perchlorate** | 6 | NDR | 3.46 | NDR/NA | NDR | NDR | NDR | NDR | NDR | NDR | NDR | 0.54 | 0.5 | 0.8 | 0.7 |
| **Explosives** | 350[c] | NDR | NDR | NDR/NA | NDR | NDR | 1.14 | NDR | NDR | NDR | NDR | NDR | NDR | 11.2 | NDR |
| **PAHs** | | NA | NA | NA | NA | NA | NA | NA | NA | NA | 2.5 | NDR | NDR | NDR | NDR |
| **Phosphate, total** | | NDR | NDR | 241 | 564 | NDR | 151 | 520 | 150 | 170 | 140 | 110 | 130 | 170 | 140 |

NDR - not detected to reporting limits NA - no sample analyzed

## Table 4.8-1 Maximum Concentrations at EOD Range Groundwater Monitoring Wells (µg/L) (contd.)

| Study | MCL | 2008 | | | | 2009 | | | | 2010 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | January | April | July | October | January | April | July | October | January | April | July |
| **Metals** | | | | | | | | | | | | |
| Antimony | 6 | NDR | NDR | 0.68 | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Arsenic | 10 | 27 | 28 | 24 | 27 | 25 | 28 | 31 | 33.9 | 31.6 | 37 | 33.3 |
| Barium | 1000 | 33 | 34 | 37 | 52 | 30 | 39 | 42 | 38.7 | 30.7 | 30.4 | 35.1 |
| Beryllium | 4 | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Cadmium | 5 | 0.14 | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | 0.155Ja |
| Chromium, total | 50 | 68 | 390B-1 | 42 | 600 | 28 | 130B-1 | 77 | 102 | 132 | 29.3 | 94.1 |
| Chromium, hexavalent | [a] | 2.6 | 3.4 | 5.4 | 4.2 | 3.6 | 3.5 | 3.9 | 3.2 | 3.8 | 4.2 | 4.3 |
| Cobalt | | 1.5 | 2.5 | 1.5 | 4.7 | 1.4 | 1.8 | 1 | 1.16 | 1.5 | 2.7 | 0.979Ja |
| Copper | 1300 | 2.4 | 4.5 | 2.3 | 3.8 | 4.1 | 8 | 2.4 | NDR | NDR | NDR | 2.17 |
| Lead | 15[b] | 2.5 | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Mercury | 2 | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Molybdenum | | 110 | 100 | 95 | 100 | 95 | 100 | 84 | 99.4 | 92.6 | 92.1 | 94.4 |
| Nickel | 100 | 380 | 390 | 360 | 650 | 390 | 310 | 330 | 306 | 414 | 410 | 366 |
| Selenium | 50 | 2 | 2.3 | NDR | NDR | NDR | 2 | NDR | 4.77 | 4.9 | 3.5 | 2.66 |
| Silver | | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Thallium | 2 | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR |
| Vanadium | 50 | 46 | 44 | 39 | 42 | 45 | 49 | 40 | 48.9 | 51.4 | 62 | 51.5 |
| Zinc | | 9.6 | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | 6.70Ja |
| **VOCs** | varies | NDR | 2.4 | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | 5.90Ja |
| **Perchlorate** | 6 | 0.2 | 0.3 | NDR/NA | 0.85 | 0.89 | 0.31 | 0.23 | 0.484 | 1.01 | 0.86 | 0.321 |
| **Explosives** | 350[c] | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | NDR | 127B,CF6 | 0.340B,Ja |
| **PAHs** | | NDR | NDR | NDR | NDR | 0.25 | NDR | NDR | NDR | NDR | NDR | 0.076Ja |
| **Phosphate, total** | | 100 | 120 | 130 | 70 | 110 | 56 | 120 | 86.9 | 154 | 82.7 | 130 |

NDR - not detected to reporting limits NA - no sample analyzed

Footnotes:

[a] regulated under total chromium notification level
[b] regulatory action level
[c] notification level

Data qualifiers

B – Analyte was detected in the associated method blank. These results are only included in Table 4.8-1 if there are no results without the qualifier.
B-1 – Analyte was detected in the associated method blank. Analyte concentration in the sample is greater than 10 times the concentration found in the method blank.
CF6 – Results confirmed by reanalysis
Ja – Analyte detected at a level less than the reporting limit and greater than or equal to the method detection limit. Concentrations within this range are estimated.

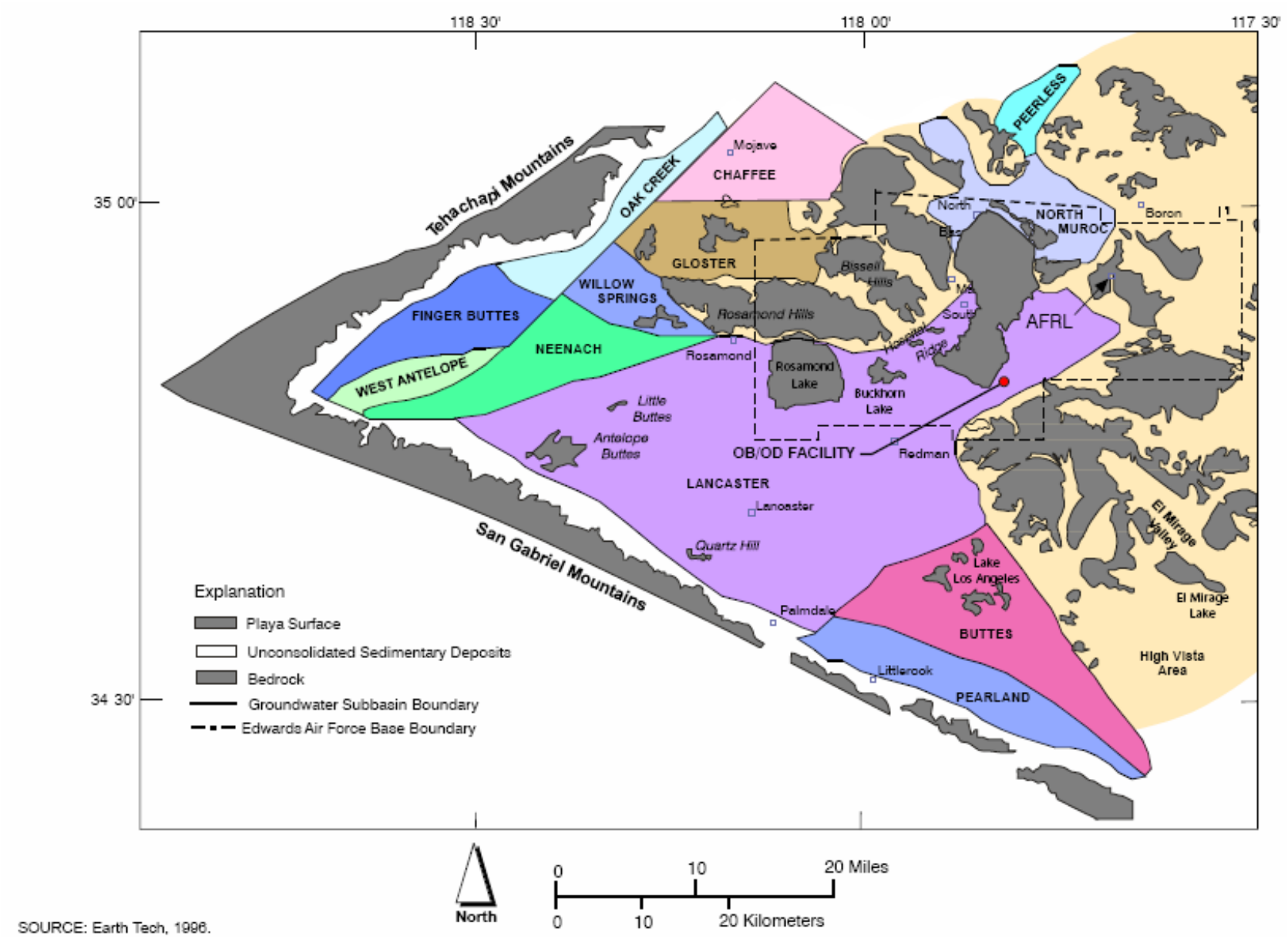
VOCs detected were acetone, chloromethane, and naphthalene.

Explosives analysis included tetrazene. Explosives detected were:

1,3-dinitrobenzene
hexahydro-1,3,5-trinitro-1,3,5-triazine
1,3,5-nitrobenzene
3-nitrotoluene
octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
octogen
1,3,5-trinitrobenzene

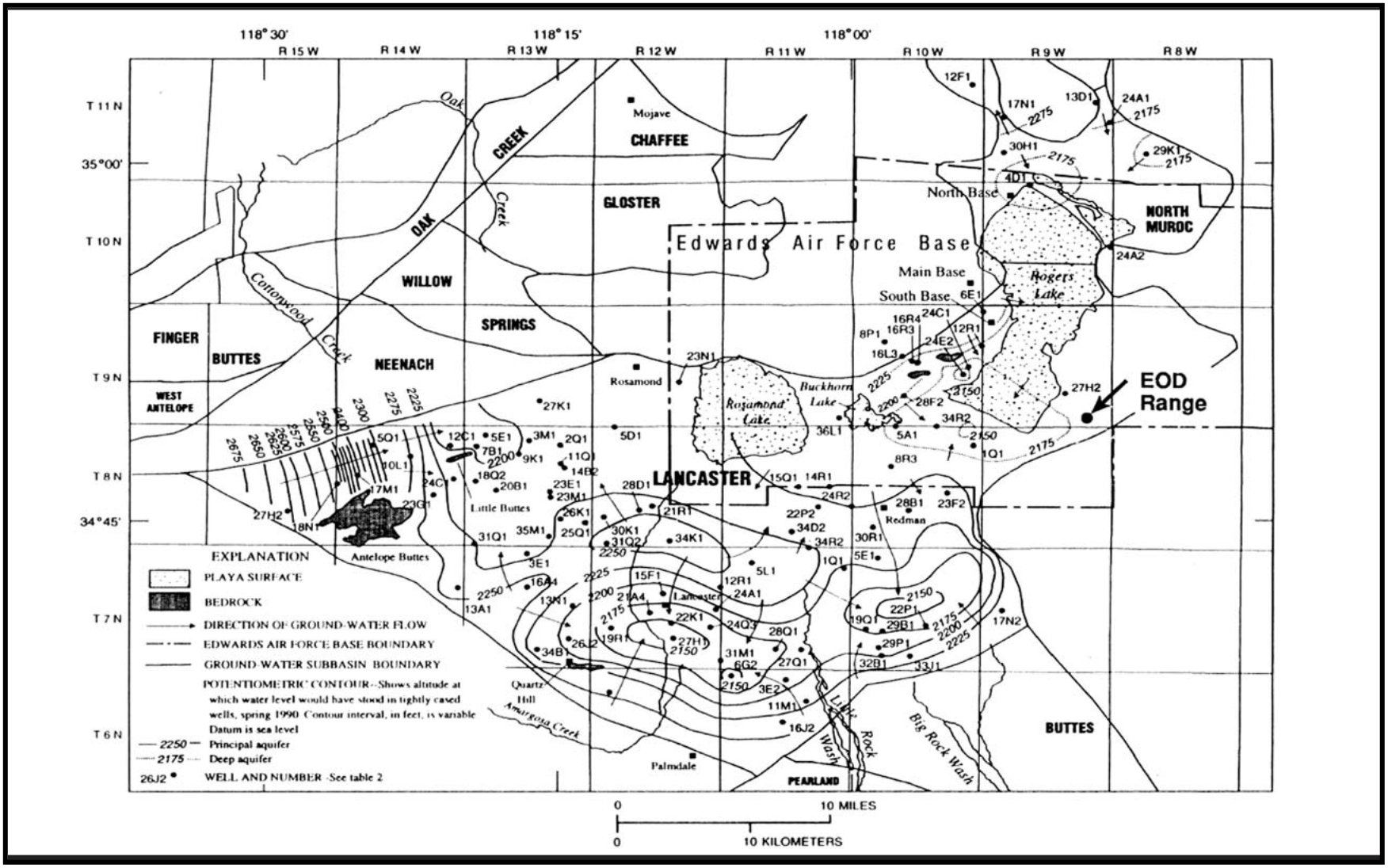
PAHs detected were acenaphthene, chrysene, fluoranthene, and phenanthrene.

**Figure 4.8-1 Antelope Valley Groundwater Basin and Subbasins**




SOURCE: Earth Tech, 1996.

**Figure 4.8-2 Groundwater Contours and Flow Direction**



# Figure 4.8-3 OB/OD Units Monitoring Wells

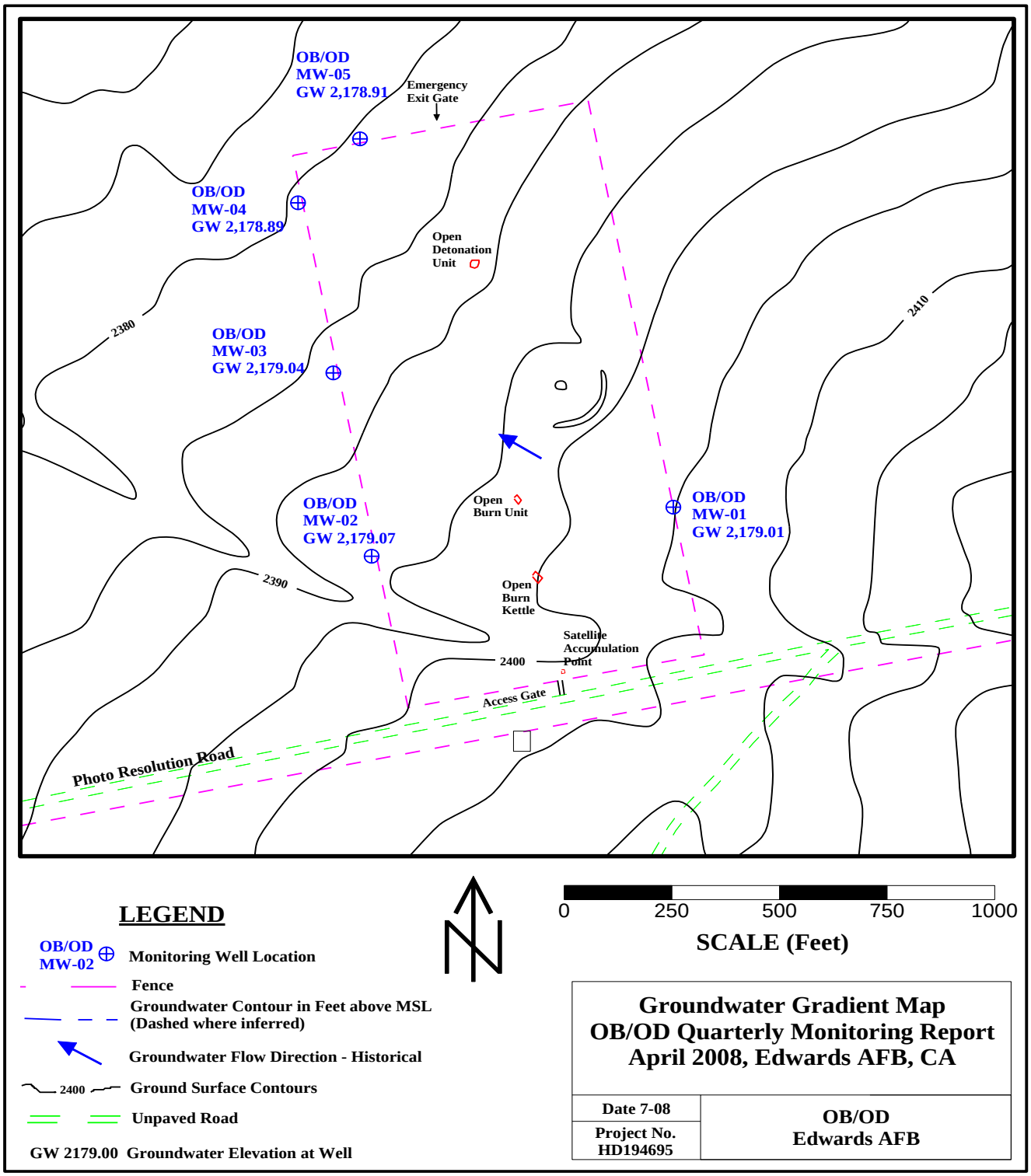


**Figure 4.8-4 Edwards' Groundwater Flow**

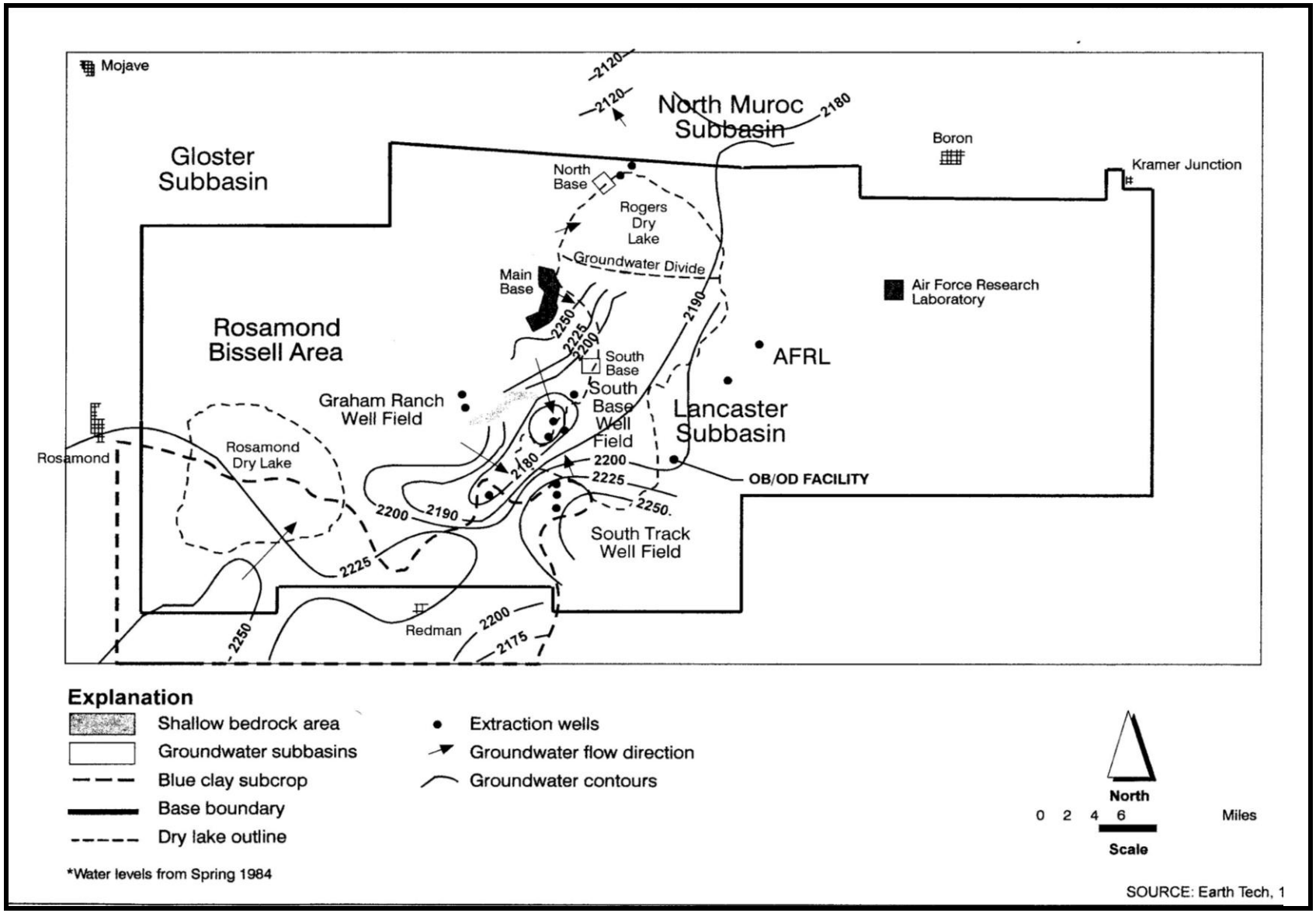
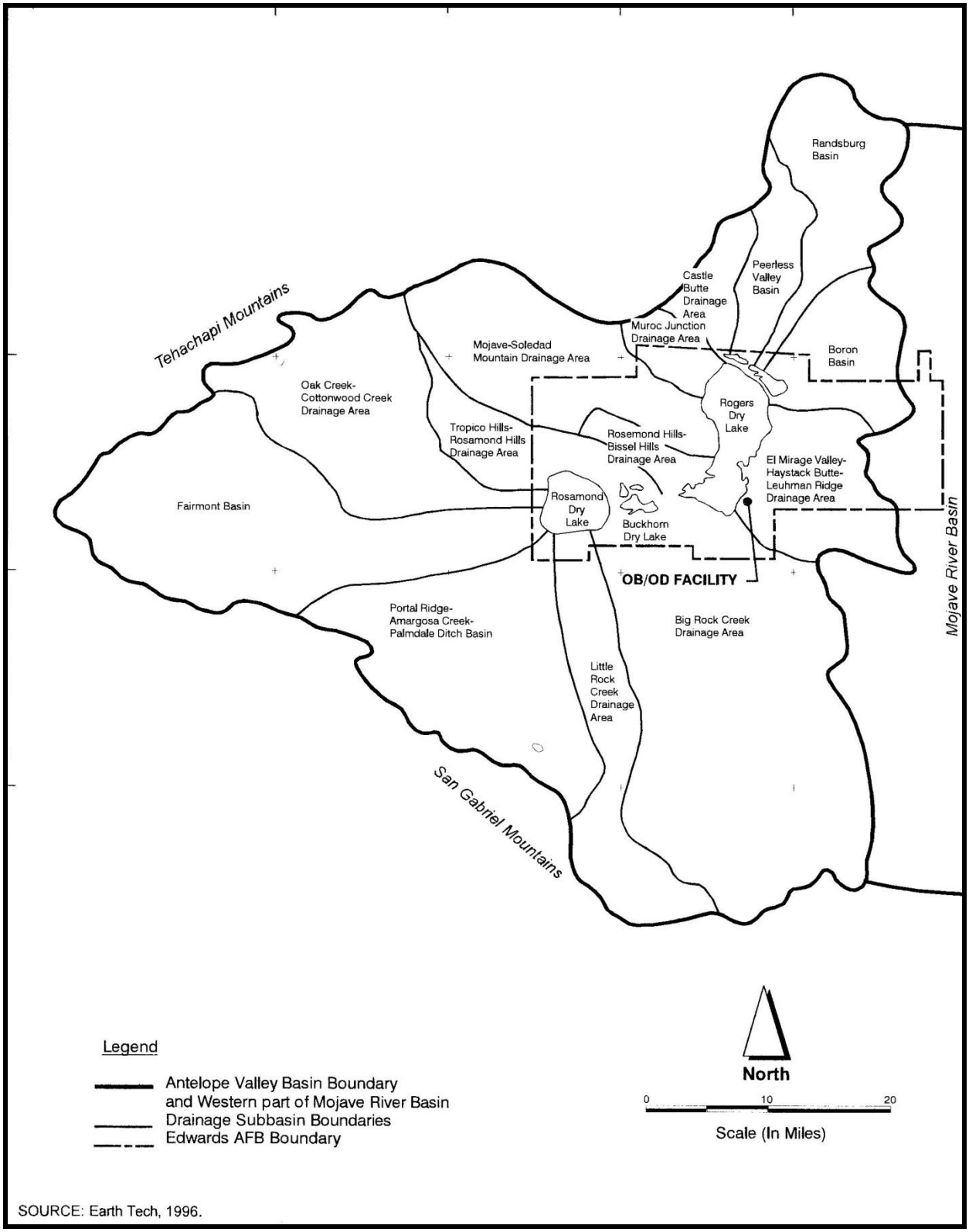
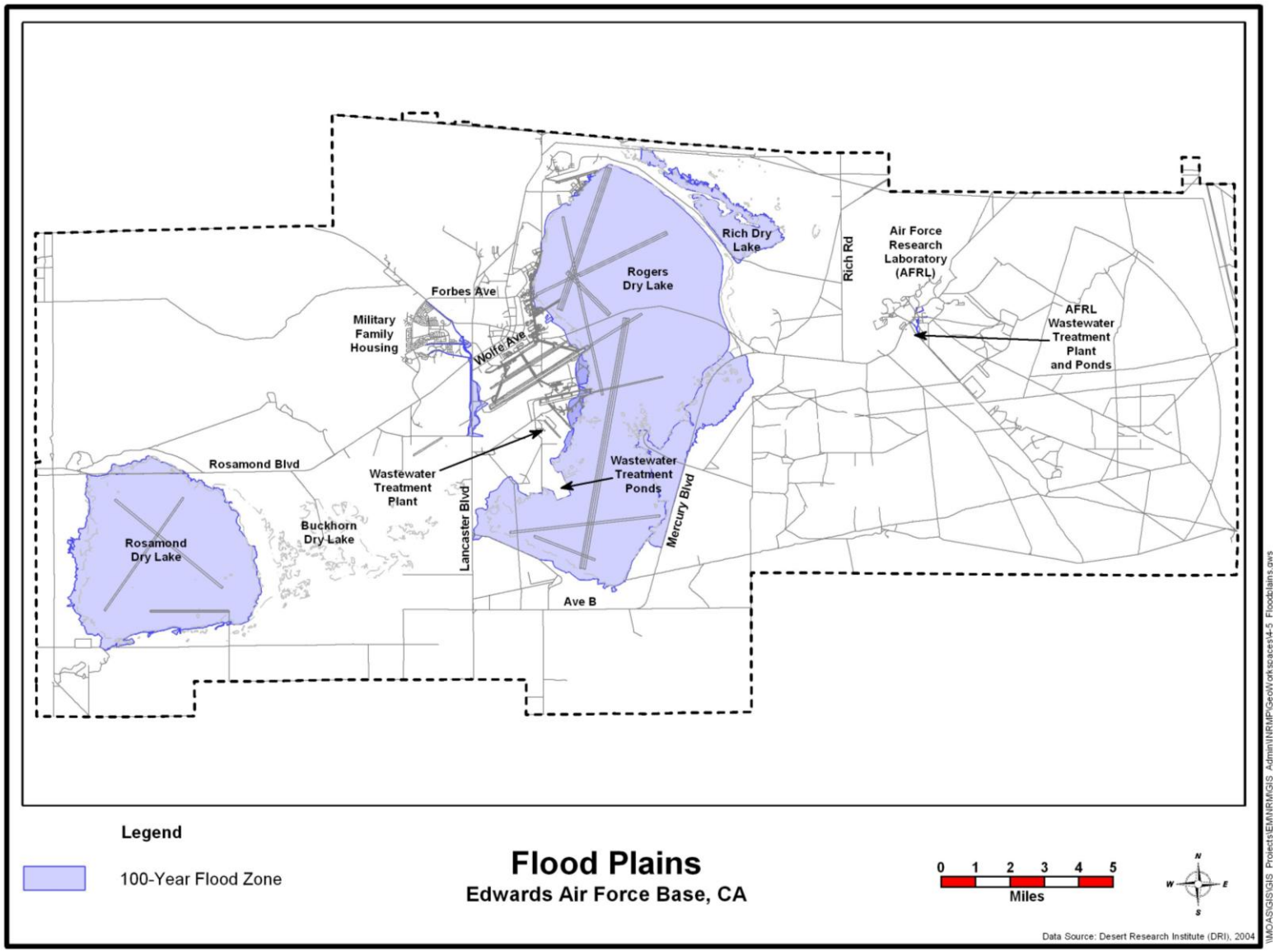


**Figure 4.8-5 Antelope Valley Drainage Area Map**




SOURCE: Earth Tech, 1996.

**Figure 4.8-6 Floodplains**



## 4.9 NOISE/VIBRATION

This section describes the noise environment at Edwards and the estimated noise and vibration impacts to the public from OB/OD operations.

### 4.9.1 Environmental Setting

Sources of noise at Edwards include operation of the airfield, subsonic and supersonic aircraft flights, and sonic booms; flight line operations such as engine run-ups; weapons firing and ordnance detonation at targets on the PIRA; traffic; rocket test firing at the AFRL; and OB/OD treatment.

The DoD has an Air Installation Compatible Use Zones (AICUZ) Program that identifies noise related activities, locations, and methods for managing noise. The purpose of the AICUZ program is to achieve compatibility between military air installations and neighboring communities by protecting the health, safety, and welfare of civilian and military personnel, and also protecting the operational capabilities of military air installations. The Edwards AICUZ noise contours were updated in 2005 by a team from the Air Force Center for Environmental Excellence (AFCEE). The noise sources included in the study were airfield flight operations, range air operations by aircraft, range land-based operations, supersonic air operations, and single event sonic booms. The study produced a noise map for Edwards with contours showing noise levels generated by aircraft operations. Using the results of this study the Air Force determined that Edwards' aircraft-generated noise contours lie entirely within the installation boundaries, Figure 4.9-1 AICUZ Noise Contours.

As a requirement for obtaining the Permit Modification, Edwards completed a noise assessment to predict noise and vibration for OD activities conducted at the EOD Range. Noise sound level readings were measured for two events at five locations on and offsite. Study results are discussed in the following sections.

Edwards maintains a program for logging and addressing noise complaints. Records at Edwards indicate that an average of 55 noise complaints were received per year over a 5 year period (from 2000-2004). Low level aircraft flights generated an average of 17 percent of the complaints, and sonic booms accounted for the rest. The low-level complaints include one complaint which may have been generated by noise from a rocket test at the AFRL and several general aircraft noise complaints. The complaints came from residents in an area northwest of the base. No complaints were received from residents in the area south of the OB/OD Units location and none were related to detonation events on the PIRA.

### 4.9.2 Applicable Standards

#### 4.9.2.1 Measurement of Sound

Measurement and human perception of sound involves two basic physical characteristics:

*Sound intensity* is a measure of sound vibration energy expressed in terms of sound pressure. Sound intensity is also known as volume. The higher the sound pressure, the more energy carried by the sound and the louder the perception of that sound. Because there are a vast range of sounds the human ear can detect, sound intensities are described by a logarithmic scale. Decibel (dB), a logarithmic unit, represents sound intensity.

*Sound frequency* is the number of times per second air vibrates or oscillates. Sound frequency is also known as pitch. Low frequency sounds are characterized by rumbles or roars, while high frequency sounds are typified by sirens or screeches. Frequency is reported as hertz (Hz), which is the same as the number of cycles per second. Humans are most sensitive to sound frequencies between 800 and 8000 Hz and least sensitive to low frequencies below 400 Hz and high frequencies above 12,500 Hz.

Sound exposure level, measured in dB, takes into account the amplitude of a sound and the length of time during which each noise event occurs. When interpreting noise level standards, it is necessary to define the type of noise measurement reported. Single (discrete) noise events expressed in dB may be weighted to consider specific noise aspects. The logarithmic nature of dB scales is such that numerical dB ratings for different noise sources cannot be added directly to give the dB rating of the combination of these sources, nor can these numerical dB ratings be subtracted directly to derive the dB rating for one of the noise sources. The dB values must be converted into pressure or energy equivalents before being added, and then converted back into a composite dB rating. For example, two noises producing equal dB ratings at a given location will produce a composite noise level 3 dBs greater than either sound alone. The minimum change in sound level that an average human ear can detect is about 3 dBs. In general, a 10 dB increase in noise level is perceived as a doubling in loudness. For comparison of sound intensity levels see Table 4.9-1, Common Sounds in Decibels.

Most sounds consist of a broad range of sound frequencies. Because the human ear is not equally sensitive to all frequencies, frequency weighting schemes are used to develop scales that approximate the way the human ear responds to noise levels. The most common weighting scheme for measuring continuous noise is the A-weighting frequency network. The A-weighted scale significantly reduces the measured level of low frequency sounds, while slightly increasing the measured level of some high frequency sounds to approximate the human ear's response to the noise. The sound pressure levels measured using the A weighting network are expressed as dBA. The dBA scale is the most widely

used for adjusting community noise. Unweighted dB measurements, peak overpressure, and the “C-weighted” decibel scale (dBC) are used to characterize low frequency sounds, such as blast noise or sonic booms. High intensity, low-frequency sounds are capable of inducing vibrations in buildings or other structures.

Unweighted dB measurements and peak overpressure make no adjustments to the measured pressure fluctuations. The most common weighing scheme used to measure impulsive noise is the peak sound level (dBP), which applies a linear weighting network. The peak sound pressure level is the maximum instantaneous level that occurs during a blast. This weighs the sound energy contained in all frequencies equally.

The dBC scale may also be used to express impulsive noise. The dBC scale makes only minor reductions to the measured pressure level for low-frequency components of a sound while making slightly greater reductions to high frequency components than does the dBA scale. Since this scale emphasizes the lower frequency portion of the noise spectrum, it also addresses the additional annoyance caused by low frequency vibration of structures.

Varying noise levels are described in terms of the equivalent constant dB level. Equivalent sound levels (Leq) are used to describe average noise exposure over various periods of time. Such average noise exposure ratings often include additional weighting factors for potential annoyance due to time of day or other considerations. The Leq data used for these average noise exposure descriptors are generally based on dBA sound level measurements.

Average noise exposure over a 24-hour period is presented as a day-night average sound level (Ldn) or as a community noise equivalent level (CNEL). Ldn values are calculated from hourly Leq values, with the Leq values for the nighttime period (10 PM to 7 AM) increased by 10 dB to reflect the greater disturbance potential from nighttime noises. CNEL values are very similar to Ldn values but include a 5 dB annoyance adjustment for evening (7 PM to 10 PM) Leq values, in addition to the 10 dB adjustment for nighttime Leq values. Unless specifically noted otherwise, Ldn and CNEL values are assumed to be based on dBA measurements.

For high-energy impulsive sounds, such as single blast events, sound exposure levels may also be expressed in terms of the C-weighted Sound Exposure Level (CSEL) and C-weighted Energy-Equivalent Sound Level. For an individual noise event, the CSEL takes into account the amplitude of the signal and the length of time during which the event occurred. The CSEL represents the sound level of the constant sound that would, in one second, generate the same acoustic energy as did the actual time-varying noise. The C-weighted Energy-Equivalent Sound Level is the level of the continuous constant sound that would contribute

to the environment the same amount of C-weighted acoustic energy as did the actual time-varying source.

#### 4.9.2.2 Occupational Safety and Health Administration (OSHA)

OSHA guidance from CFR Title 40, Part 1910.95 stipulates protection against the occupational effects of noise exposure. It requires the implementation of administrative or engineering controls to reduce noise levels when the noise exposure to employees exceeds those levels listed below.

Permissible Noise Exposures

| Duration per Day (hours) | Sound Level (dBA slow response) |
|---|---|
| 8 | 90 |
| 6 | 92 |
| 4 | 95 |
| 3 | 97 |
| 2 | 100 |
| 1 ½ | 102 |
| 1 | 105 |
| ½ | 110 |
| ¼ or less | 115 |

#### 4.9.2.3 Noise Control Act

The federal Noise Control Act, adopted in 1972, required the USEPA to publish information on the levels of environmental noise that would be protective of the public health and welfare with an adequate margin of safety, and required federal agencies to comply with federal, interstate, and local requirements. Subsequently, USEPA established the Leq and Ldn to describe environmental noise. These standards have been adopted by most federal agencies for measuring noise including DoD. DoD uses guidelines developed by the Federal Interagency Committee on Urban Noise (FICUN) when evaluating land use compatibility with prevailing noise levels. The guidelines recommend building design considerations according to three outdoor noise-level categories:

- Zone 1 = CNEL or Ldn levels below 65 dB
- Zone 2 = CNEL or Ldn levels of 65 to 75 dB
- Zone 3 = CNEL or Ldn levels above 75 dB

The guidelines indicate that all land uses are compatible with Zone 1 noise conditions. Educational and residential land uses generally are not compatible with Zone 2 noise levels unless special acoustic treatments and designs are used to ensure acceptable interior noise levels. Residential and educational land uses are not compatible with Zone 3 noise conditions. Industrial and

manufacturing land uses may be acceptable in Zone 3 areas if special building designs and other measures are implemented.

#### 4.9.2.4 Local General Plan

In California, cities and counties are required to include a noise element in the local general plan. The California Department of Health Services has published guidelines for the noise element of local general plans. These guidelines include a noise level/land use compatibility chart that categorizes various outdoor Ldn ranges into as many as four compatibility categories (normally acceptable, conditionally acceptable, normally unacceptable, and clearly unacceptable), depending on land use.

The state noise element guidelines identify normally acceptable noise levels for low-density residential uses as Ldn values below 60 dB. The normally acceptable range for high density residential uses is identified as Ldn values below 65 dB. For educational and medical facilities, Ldn values of 50 to 70 dB are identified as normally acceptable, as are office and commercial land uses.

The noise element of the City of Lancaster 2030 General Plan (2009) identifies the Antelope Valley Freeway and the arterial roadway system, aircraft operations related to Air Force Plant 42 (Palmdale Regional Airport), Fox Field, Edwards, and the Union Pacific Railroad line as major sources of noise. The City of Lancaster established maximum exterior and interior noise levels for land uses in the City to be utilized for design purposes in new development, and which promote noise compatible land use relationships. These objectives are listed below.

Noise-Compatible Land Use Objectives

| Land Use | Maximum Exterior CNEL | Maximum Interior CNEL |
|---|---|---|
| Rural, Single-, and Multiple-Family Residential Dwellings | 65 dBA | 45 dBA |
| Schools: | | |
| Classrooms | 65 dBA | 45 dBA |
| Playgrounds | 70 dBA | - |
| Libraries | - | 50 dBA |
| Hospitals and Convalescent Facilities: | | |
| Living Areas | - | 50 dBA |
| Sleeping Areas | - | 40 dBA |
| Commercial and Industrial | 70 dBA | - |
| Office Areas | - | 50 dBA |

In addition, the County of Los Angles Antelope Valley Areawide Plan is applicable to the area adjacent to the base boundary. The plan designates 60 CNEL as acceptable in rural residential areas.

#### 4.9.2.5 Vibration

Detonations cause a temporary increase in pressure over standard atmospheric pressure, lasting for two to ten seconds. The over-pressure consists of primarily low frequencies (less that 200 Hz) and is often felt rather than heard. The strength of the over-pressure depends on the strength of the detonation, weather conditions and distance to the receiver. When the detonation and receiver are in a direct line of sight, the over-pressure can cause an impulsive force that may cause elements of a structure to vibrate, and with strong over-pressure may cause cracks or breakage. Detonation also causes ground vibration. Humans typically perceive ground-borne vibrations as low as 0.08 to 0.20 inches/second. A summary of typical vibration levels and corresponding responses is shown below.

| Ground Vibration (inch/second) | Response |
|---|---|
| | Human |
| 0.08 | Perceptible |
| 0.20 | Noticeable |
| 0.38 | Unpleasant |
| 0.80 | Disturbing |
| 1.30 | Objectionable |
| | Structural |
| 5.40 | Minor damage (cracking plaster) |
| 7.60 | Major damage |

Source: Argonne National Laboratory, 1993, Ground Vibrations at Harris Farm, Kent County, MD, from Test Firings on September 13, 1993, at Aberdeen Proving Grounds

Studies of vibration caused by coal mine detonations in strip mines and quarries in 1981 by Northwestern University, indicate that ground-borne vibration dominates structural shaking when the distance (in feet) from the source to the receptor divided by the square root of the explosive weight (in pounds) is less than 50. At values greater than 50, airborne vibration dominates.

Safe vibration levels for residential structures have been recommended in many studies covering a variety of structural types and vibration sources. Various criteria have been established depending on the type or historical importance of the structure. The criteria are mainly based on particle velocity, which was recommended by the U.S. Bureau of Mines as the best single ground motion descriptor. Acceleration and displacement may be used as well.

The safe particle velocity for structures of typical current construction is 0.2 to 0.8 inches/second. The maximum ground-borne vibration level recommended by the U.S. Bureau of Mines to prevent threshold damage is 0.5 inches/second. Federal regulation 30 CFR 816.67(d)(2) relates ground vibration and airblast values that produce an equivalent structural response. In order not to exceed the ground vibration criteria of 0.5 inches/second, the airblast overpressure must be less than about 128 dB. There are no established standards for avoiding vibration damage. However, data are available for a wide range of experience. A report for the U.S. Bureau of Mines finds the threshold for superficial damage in residential structures is 134 dB, and the lowest documented threshold for concern about structural damage is 128 dB. The lower of these values (128 dB) is recommended as a criterion.

#### 4.9.2.6 Noise Assessment Report

As a requirement for obtaining the Permit Modification, Edwards commissioned a noise assessment for the OB/OD Units. The study methodology and results are discussed in the following sections.

### 4.9.3 Thresholds of Significance

According to Appendix G of the state CEQA Guidelines, a project would normally have a significant adverse impact related to Noise/Vibration if it would cause:

- Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.
- Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.
- A substantial permanent increase in ambient noise levels in the vicinity above levels existing without the project.
- A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

The significance thresholds are addressed in the following section.

### 4.9.4 Potential Environmental Impacts

Noise is one of the most common environmental issues associated with OB/OD. Potential concerns related to noise associated with OB/OD operations include potential impacts to people on and off base and sensitive animals.

Operations at the OB/OD Units have the potential to increase the exposure of the public to noise. Studies have shown that human exposure to extensive noise may have adverse physical impacts, with hearing impairment the most prominent effect. Damage to hearing may occur to those who experience extended noise levels of 100 dB and greater. The threshold for pain occurs at 140 dB. With noise of short duration, as with detonation of ordnance, damage to hearing may occur at noise levels above 140 dBP.

Other direct physiological effects that may occur due to extensive noise exposure include increased cholesterol and blood sugar, dilation of blood vessels and pupils, and gastrointestinal and kidney effects. Noise is also found to heighten fear, anxiety, and irritation, especially in the elderly, sick, and hypersensitive populations. Non-physiological effects of noise exposure include annoyance, speech and sleep interference, and interruption of daily activities.

Low frequency sound can be directly absorbed through the surface of the body and can excite sense organs other than the ears. The effect is similar to the effect of mechanical vibration on the body, causing the internal organs to vibrate and disturbing the nervous system, digestion, and sight. Very intense low frequency noise (0-20 Hertz) can cause a sensation of vibration, disequilibrium, and motion sickness.

Noise impacts on animals vary between species, age, sex, season, situation, previous exposure to noise (habituation), sound intensity, and sound frequency. Noise has the greatest effect on animals which rely heavily on auditory signals for survival. Potential noise effects on animals include auditory damage, physiological changes, and behavioral alterations. Auditory effects are associated with very high noise levels, in excess of 90 dB. These effects involve hearing loss or threshold shifts, a reduced sensitivity to sound similar to a partial hearing loss. Threshold shifts have the potential to interfere with communication and reduce an animal's functioning ability. Physiological effects, such as metabolic and hormonal changes, are often associated with stress. Inappropriate stress reactions, such as fleeing from a non-threatening noise, unnecessarily deplete an animal's energy resources which can increase susceptibility to predators, disease, and starvation. Changes in normal behavioral patterns are the most apparent effects of noise on animals. These changes include alterations in habitat locations and migration patterns. Changes in background noise levels and the sound frequency can interfere or mask communication signals used in mating or survival, which consequently could influence mating activity, population distributions, and detection of predators or prey. Vibration may impact burrowing animals in the event that a shockwave collapses a burrow.

#### 4.9.4.1 Noise Assessment Results

A noise assessment was conducted for the OB/OD Units in 2006. Ambient sound level measurements were conducted near 19 off-site sensitive receptors. Ambient sound levels were measured over two minutes at the sensitive receptor locations shown on Figure 4.9-2, Receptor Locations. Sensitive receptors generally include residential dwellings, mobile homes, hotels, motels, hospitals, nursing homes, educational facilities, and libraries. Industrial, commercial, agricultural, and urban reserve land uses are not considered sensitive to ambient noise. The measured peak sound levels ranged from 85 to 112 dB and resulted from natural and man-made sound sources, primarily wind and vehicle noise. Ambient sound level results are shown on Table 4.9-2.

Measurements were taken during two OD events at four of the sensitive receptor locations within five (5) miles of the EOD Range and at an onsite location in the PIRA. Event results are shown on Tables 4.9-3 and 4.9-4. Noise from the events could not be distinguished from background noise. The treatment events were found to be within standards for noise and vibration.

Peak sound-pressure levels were then modeled at each sensitive receptor. Models predict noise from proposed actions and calculate sound levels at any specific point so that noise impacts at representative locations can be obtained. Impacts from the detonation of 100, 500, 1000, and 2,000 pounds of explosives were modeled at each sensitive receptor location. The peak sound-pressure levels were modeled using the Peakest Ordnance Model developed by the U.S. Army Construction Engineering Research Laboratory. The model has an extensive database of explosives used by the military and is currently used by the U. S. Army Center for Health Promotion and Preventive Medicine (USACHPPM) at the Army's Aberdeen Proving Grounds in Maryland and others to evaluate ordnance detonation noise.

Weather conditions affect the propagation of sound; therefore, the Peakest Ordnance Model calculates peak sound pressure levels using weather condition criteria and in daylight versus nighttime hours. The weather condition criteria include:

- the Negative Gradient (sunny day, cumulus clouds, midday, and windy);
- Base Conditions (low winds, clouds, fall and winter, daytime);
- Focus Conditions (low and stable clouds, very low winds [<2 m/s], nighttime to two hours after sunrise, winter and fall); and,
- the Maximum Possible Overpressure (rare, but levels will sometimes occur under extreme focus conditions).

The model predicts the peak sound pressure level for the direct line of sight between the noise source and receptor.

For the study, significance of the noise impact is based on noise guidelines developed by the Dahlgren Naval Surface Warfare Center, including damage criteria and annoyance criteria. According to the guideline, sound levels less than 115 dBP are unlikely to produce complaints; sound levels between 115 and 130 dBP have a moderate possibility of complaints; and sound levels of 130 to 140 dBP have a high possibility of noise complaints and possibility of damage to buildings. Above 140 dBP the threshold for permanent physiological damage to unprotected human ears is exceeded and high risk of structural damage to buildings is present. Model results are shown on Table 4.9-5.

The study found that an event at the permit maximum limit of 2,000 pounds under Negative Gradient conditions resulted in noise levels between 115-118 dBP at receptors 5-8. Noise contours for Negative Gradient conditions for a 2,000 pound event are shown on Figure 4.9-3.

Under Base conditions, the 2,000 pound event resulted in noise levels of between 115-130 dBP for all receptors. Noise contours for Base conditions for a 2,000 pound event are shown on Figure 4.9-4.

Under Focus conditions, the 2,000 pound event resulted in noise levels between 115-130 dBP, except receptors 3-10 and 18, where noise levels could be between 130-133 dBP. Operations under Focus conditions, as well as Maximum Possible Overpressure (extreme Focus conditions), would not occur because no nighttime operations would be permitted. Conditions placed on the project by the proposed Permit Modification application, the draft Hazardous Waste Facility Permit modification and OSHA regulations limit the operations to daytime hours (½ hour after sunrise to ½ before sunset, typically 8:00 am - 4:00 pm) and/or the wind and weather conditions under which the operations will take place. Explosives must be transported to the site on the day of the treatment, and the movement of explosives to the site is not permitted during morning rush hour. Therefore, it is expected that operations will take place more than 2 hours after sunrise. Noise contours for Focus conditions for a 2,000 pound event are shown on Figure 4.9-5.

In addition, the OD Unit and off-site receptors are separated by intervening topography. The elevation at the OD site is approximately 2,300 feet. The closest receptors range in elevation from approximately 2,435 to 3,100 feet. The elevation of the intervening topography ranges up to approximately 3,175 feet. Acoustical calculations using the Fresnel Diffraction method for 200 HZ noise sources were performed to estimate the attenuating effects of intervening topography. The calculations yielded a maximum theoretical attenuation of 20 dB. Therefore, under optimum weather conditions, sound levels at the modeled receptor locations may be as much as 20 dBP less than predicted.

#### 4.9.4.2 Animal Impact Studies

The U.S. Air Force has supported a number of studies to gain information pertaining to animal hearing and the effects of aircraft noise and sonic booms on domestic animals and wildlife. These studies can provide information on the potential impacts to animals from the noise of open detonations. The impacts of noise on listed species are of particular concern. Information is available for the desert tortoise and the kangaroo rat. The desert tortoise is a federally-listed threatened species. The kangaroo rat is a small mammal similar to the Mohave ground squirrel, a state-listed threatened species. The kangaroo rat was also used as an indicator species for the Ecological Risk Assessment.

The effects on desert tortoises from jet aircraft flight noise and sonic booms was studied as part of the development of the F-22 at Edwards. The goals of the study were to measure the auditory sensitivity of desert tortoises including the influence of vibration, to determine whether tortoises suffered temporary loss of hearing after exposure to simulated aircraft noise, to measure behavioral and cardiac responses to aircraft noise, to measure the relationship between heart rate and metabolic rate, and to estimate changes in energy consumption after noise exposure. The possible damaging effects of noise that were identified include: dehydration if an animal is frightened into urinating; long-term changes in normal activity patterns; energy expenditures resulting from increases in heart rate or activity; inappropriate behavioral responses (e.g., emerging from the burrow in the heat of summer); masking of biologically important sounds; and damage to hearing.

Although many species of reptiles exhibit little response to sounds, the desert tortoise has acoustic social signals, and is known to react to sounds. In the experiment auditory sensitivity was measured to determine the tortoise hearing range. The tortoises were tested before and after exposure to simulated aircraft noise at a range of sound levels and sonic booms at two energy levels. After the sonic booms, no temporary threshold shift was detected at the lower energy level. A temporary threshold shift occurred in five of nine tortoises at the higher energy level. Four of the five recovered within one hour. Tortoises were also subjected to simulated aircraft noise and sonic booms while connected to a heart rate monitor. The tortoises exhibited a startle response (muscular flinching, increases in heart rate, abrupt movements) in reaction to being touched, but not to the noise. Instead, at the first exposure to aircraft noise, some of the tortoises froze without withdrawing into the shell, while others withdrew. During subsequent exposures, the freezing behavior ceased, but the withdrawal did not. Because of the decreased activity, the average heart rate of the tortoises declined. These behaviors did not occur during exposure to simulated sonic booms. Typically, the tortoises looked around briefly, then returned to their previous activity. There was no detectable relationship between change in activity level before and after the sonic boom. In relation to exposure to high peak noise levels, such as sonic booms or open detonation, the study concludes that, because a temporary threshold shift occurred, permanent effects on hearing

may be possible with frequent exposure. None of the other damaging effects of noise are likely to occur.

Several studies have been conducted on the hearing ability of wild rodents. Considerable variation in hearing ability was found. A study in 1980 found that kangaroo rats have unusual low-frequency sensitivity, while retaining an ability to localize brief sounds. A study in 1983 found that off-road vehicle noise affected hearing physiology of the desert kangaroo rat. The kangaroo rats suffered a temporary threshold shift in their hearing sensitivity when dune buggy sounds were played to the animals through an amplifier. At least three weeks were required for their hearing thresholds to recover. Because the ears of kangaroo rats possess anatomical adaptations to promote amplification of low-frequency sounds, the rats have little means of preventing full amplification in their ears of high-intensity, low-frequency sounds of dune buggies. This could seriously affect their ability to avoid approaching predators. It is not known whether Mohave ground squirrels have similar physiology.

Studies to determine effects of aircraft noise were conducted on house mice and on cotton rats. In a 1975 study noise-exposed mice had significantly greater adrenal gland weights than the control mice. After ruling out stress factors, such as population density, the study concluded that noise was the dominant stressful factor causing the adrenal weight differences between the two feral populations. In a study of cotton rats in 1978 noise-exposed animals showed significantly greater body weights than the control group; however, noise exposure did not significantly alter adrenal weight. When the adrenals were exposed to a hormone that in turn stimulates the production of another hormone secreted in response to stress, the secretions of the stress-response hormone decreased as the level of exposure to the first hormone increased. The study suggests that the noise exposure may have caused a decrease in the functional reserve capacity of the adrenal cortex, affecting the animal's ability to respond to stress.

#### 4.9.4.3 Closure Plan

Implementation of the Closure Plan would result in noise from an increased number of vehicle trips. These activities would be temporary and result in significantly decreased noise levels from operations at the Units. No significant impacts to noise and vibration would result from implementation of the Closure Plan.

#### 4.9.4.4 Compliance with Thresholds of Significance

<u>Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies.</u>

The project has the potential to temporarily increase noise levels. Due to the remoteness of the proposed project area, noise impacts of the proposed project will only be to Edwards' personnel near the OD Unit on base. The project area is located 7.6 miles from the nearest residential receptor. Noise levels at residential areas currently do not exceed the California standard of CNEL of 60 dB. The addition of OD events will not change existing CNEL levels and will not exceed OSHA federal occupational standards. Terms and conditions of the draft Hazardous Waste Facility Permit Modification require that the facility demonstrate compliance with state noise element guidelines. The instantaneous noise levels from OD would not exceed 130 dBP under Permit conditions.

In addition, the Edwards Public Affairs Office (PAO) maintains a program for logging and addressing noise complaints. Any public complaint related to treatment events at the OB/OD Units would be included in the noise complaint program and complaints addressed accordingly.

Animal species that are on federal or state endangered, threatened, or protected lists are not impacted by noise from the proposed project. Under the Reasonable and Prudent Measures of the 2009 BO, operational procedures are in place to avoid harming listed species and to minimize loss of their habitat.

<u>Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.</u>

The project has the potential to cause vibration impacts in the immediate vicinity of the project area. Application of the formula for structural shaking from Section 4.9.2.5 (distance in feet from the source to the receptor divided by the square root of the explosive weight in pounds), gives a value greater than 50 for the maximum event (2,000 pounds) at the nearest boundary (1.7 miles). At values greater than 50, airborne vibration dominates. Vibration from ground-borne shaking would not be felt. By this formula in order for ground-borne vibrations to be dominant at Edwards, where the nearest receptor is 7.6 miles away, a single OD event would have to be over 600,000 pounds.

Therefore, the project does not generate excessive vibration or ground-borne noise levels.

<u>A substantial permanent increase in ambient noise levels in the vicinity above levels existing without the project.</u>

Operations at the EOD Range would contribute minimally to the existing ambient noise levels at Edwards. Ambient sound level measurements were conducted near nineteen (19) off-site sensitive receptors. The measured ambient average noise exposure ($L_{eq}$) did not exceed 60 dBA. The existing noise contours for current operations do not show impacts above 60 dB offsite.

The OB/OD operations are short term, lasting ten (10) seconds to thirty (30) minutes, and will occur infrequently. Therefore, a substantial permanent increase in average ambient noise levels will not result from an increase in OB/OD operations.

A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Operations at the EOD Range would contribute minimally to the existing ambient noise levels at Edwards. Noise levels are temporarily increased in the immediate vicinity of the project area; however, the noise is not perceived by the public. Measurements were taken during two OD events at four of the sensitive receptor locations within five (5) miles of the EOD Range and at an onsite location in the PIRA. The measured ambient peak noise exposure ($L_{pk}$) did not exceed 117 dBP. Also, modeled peak noise level results from OB/OD events did not exceed 130 dBP. Therefore, the project will not create a substantial temporary or periodic increase in ambient noise levels.

### 4.9.5 Mitigation Measures

Under the terms and conditions of the Permit, potential impacts from noise as a result of the proposed project will be less than significant. Therefore, mitigation measures are not required.

### 4.9.6 Level of Impacts After Mitigation

Impacts from noise from the proposed project are less than significant. Mitigation is not required.

### 4.9.7 References

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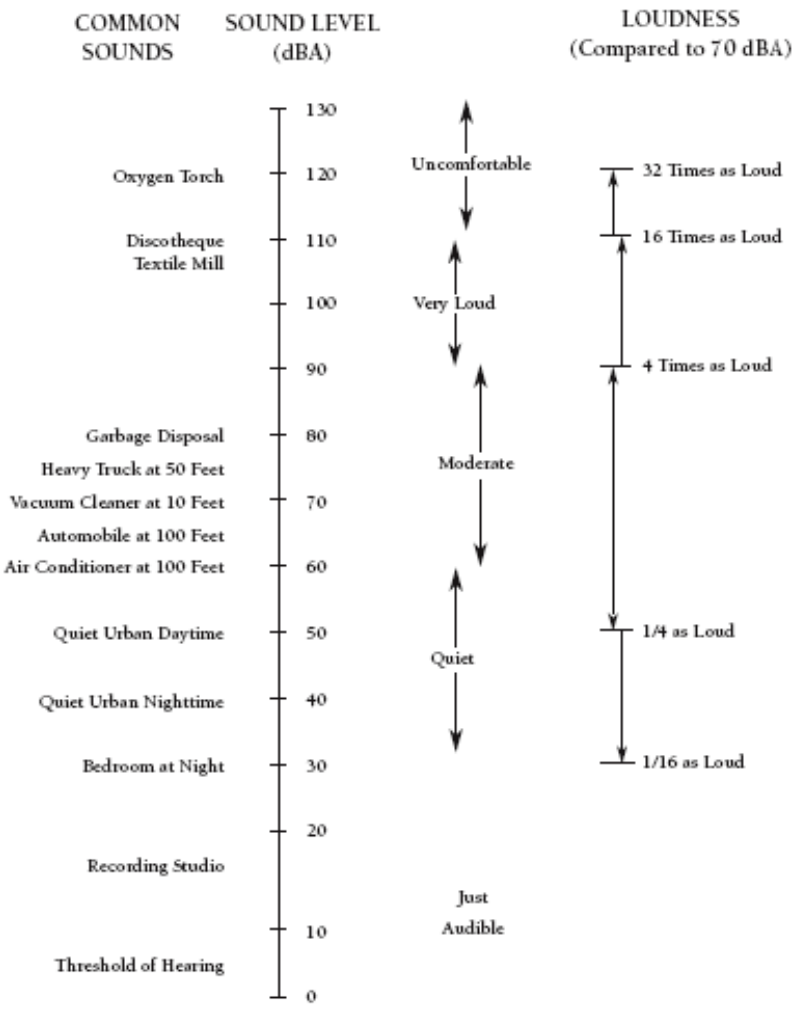
United States Environmental Protection Agency, Federal Interagency Committee on Urban Noise (FICUN). 1980. Report Number 550/9-81-423, *Guidelines for Considering Noise in Land Use Planning and Control*.

United States Environmental Protection Agency, Office of Noise Abatement and Control. 1974. Report Number 550/9-74-004, *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (Levels Document)*.

## Table 4.9-1 Common Sounds in Decibels




SOURCE: Handbook of Noise Control, C.M. Harris 1979

## Table 4.9-2 Ambient Sound Level Measurements at Receptors

| Receptor Identification | Location | Leq (dBA) | Lmin (dBA) | Lmax (dBA) | Lpk (unweighted) | Noise Sources |
|---|---|---|---|---|---|---|
| 1 | N 260th & Ave C | 25.0 | 20.3 | 41.6 | 87.5 | Wind, insects |
| 2 | N 260th & Ave **G** | 36.2 | 32.1 | 39.8 | 93.5 | Wind, distant plane |
| 3 | 23210 Ave G | 28.9 | 24.8 | 33.8 | 94.5 | Wind, tarp, paper |
| 4 | 23733 Ave. F | 25.4 | 21.9 | 34.4 | 89.4 | Wind |
| 5 | 47403 N 195th | 31.5 | 24.4 | 38.9 | 99.5 | Wind |
| 6 | N 195th & Ave F-8 | 32.6 | 26.5 | 36.9 | 92.3 | Wind, distant planes |
| 7 | 47137 N 190th E | 27.7 | 25.2 | 34.2 | 85.0 | Wind, distant plane, junk |
| 8 | 17413 Ave G | 26.7 | 22.7 | 36.9 | 95.4 | Wind, distant vehicle |
| 9 | N 150th & Ave F-10 | 26.8 | 24.0 | 30.1 | 85.0 | Wind, distant bus |
| 10 | 47605 N 140th | 34.6 | 27.4 | 39.5 | 93.5 | Wind, distant cars |
| 11 | N 100th & Ave E | 48.6 | 39.3 | 55.5 | 106.8 | Wind, livestock |
| 12 | 46716 N l20th | 38.1 | 32.8 | 46.8 | 94.5 | Wind, power lines |
| 13 | N 120th & Ave H | 47.7 | 39.6 | 54.3 | 106.1 | Wind, trees |
| 14 | N 140th & Ave G-4 | 43.6 | 39.8 | 49.4 | 101.0 | Wind, trees |
| 15 | N 165th & Ave J | 51.2 | 44.7 | 56.2 | 104.9 | Wind |
| 16 | N 200th & Ave J | 36.7 | 36.7 | 47.9 | 100.1 | Wind, trees |
| 17 | N 200th & Ave H8-16 | 47.4 | 39.9 | 54.4 | 108.7 | Wind, trees |
| 18 | 46205 N 200th (High Vista?) | 47.8 | 38.0 | 55.1 | 108.0 | Wind |
| 19 | 45660 N 185th | 51.9 | 45.5 | 59.3 | 111.8 | Wind, trees, livestock |

## Table 4.9-3 Event Sound Level Measurements on 12/16/2004

| Receptor Identification | Condition | Time | $L_{pk}$ | Temperature (°F) | Windspeed (mph) | Sky condition |
|---|---|---|---|---|---|---|
| 4 | Ambient | 10:15-10:20 | 95.7 | 50.0 | 10 | clear |
| | Blast | 11:09-11:10 | 105.2 | | | |
| | Ambient | 12:55-12:59 | 104.7 | 58.0 | 10-12 | high clouds |
| | Blast | 13:05-13:09 | 106.9 | | | |
| 5 | Ambient | 10:20-10:35 | 112.6 | 54.6 | 8-16 | clear |
| | Blast | 11:09-11:10 | 110.7 | | | |
| | Ambient | 12:30-12:45 | 109.5 | 58.6 | 8-12 | high clouds |
| | Blast | 13:05-13:06 | 109.3 | | | |
| 8 | Ambient | 10:05-10:10 | 107.8 | 56.3 | 6 | clear |
| | Blast | 11:08-11:12 | 107.4 | | | |
| | Ambient | 12:45-12:50 | 109.5 | 57.6 | 10 | high clouds |
| | Blast | 13:04-13:09 | 108.4 | | | |
| 10 | Ambient | 10:10-10:16 | 105.5 | 56.0 | 8-12 | clear |
| | Blast | 11:10-11:11 | 111.0 | | | |
| | Ambient | 12:03-12:07 | 104.2 | 62.0 | 8-14 | high clouds |
| | Blast | 13:07-13:08 | 104.0 | | | |

Note: $L_{pk}$ sound level measured at the safe zone during the first and second blasts were 108.4 and 115.3 dB, respectively.

## Table 4.9-4 Event Sound Level Measurements on 3/29/2005

| Receptor Identification | Condition | Time | Lpk | Temperature (°F) | Windspeed (mph) | Sky condition |
|---|---|---|---|---|---|---|
| 4 | Ambient | 08:35-08:40 | 115.7 | 47.0 | 5-10 | high clouds |
| | Blast | 09:50-09:55 | 117.0 | | | |
| 5 | Ambient | 08:30-08:45 | 105.9 | 52.0 | 6-9 | high clouds |
| | Blast | 09:52-09:55 | 115.4 | | | |
| 8 | Ambient | 07:58-08:08 | 89.8 | 53.0 | 7-10 | high clouds |
| | Blast | 09:48-09:56 | 114.7 | | | |
| 10 | Ambient | 08:42-08:57 | 109.6 | 58.0 | 10-15 | clear |
| | Blast | 09:51-09:55 | 110.1 | | | |

Note: $L_{pk}$ sound level measured at the safe zone during the blast was 134.5 dB.

## Table 4.9-5 Noise Modeling Results

| Weather Condition | Sound Levels | Possibility of Complaints |
|---|---|---|
| **100 – Pound OD Events** | | |
| Negative Gradient | Less than 115 dBP for all receptors | Low |
| Base Conditions | Less than 115 dBP for Receptors 1 - 4 and 11 – 19 and greater than 115 dBP but less than 130 dBP for all other receptors | Low to Moderate |
| Focus Conditions | Greater than 115 dBP for all receptors but less than 130 dBP | Moderate |
| **500 – Pound OD Events** | | |
| Negative Gradient | Less than 115 dBP for all receptors | Low |
| Base Conditions | Greater than 115 dBP for all receptors but less than 130 dBP | Moderate |
| Focus Conditions | Greater than 115 dBP for all receptors but less than 130 dBP | Moderate |
| **1000 – Pound OD Events** | | |
| Negative Gradient | Less than 115 dBP for all receptors | Low |
| Base Conditions | Greater than 115 dBP for all receptors but less than 130 dBP | Moderate |
| Focus Conditions | Greater than 115 dBP for all receptors but less than 130 dBP at all receptors except receptors 5-7 where it would be approximately 1 dBP greater | Moderate (variations of less than 3 dB are not detectable by the typical human ear) |
| **2000 – Pound OD Events** | | |
| Negative Gradient | Less than 115 dBP for all receptors except 5-8 which are less than 118 dBP. | Low |
| Base Conditions | Greater than 115 dBP for all receptors but less than 130 dBP | Moderate |
| Focus Conditions | Greater than 115 dBP for all receptors but less than 130 dBP at receptors 1, 2, 11-17 and 19, and slightly greater (by 3 dB or less) at receptors 3-10 and 18. | Moderate (variations of less than 3 dB are not detectable by the typical human ear) |

Notes: Negative gradient - Sunny day, cumulus clouds, midday, and windy
Base Conditions - Low winds, clouds, fall and winter, daytime
Focus Conditions - Low and stable clouds, very low winds, nighttime, winter, and fall

**Figure 4.9-1 Edwards AICUZ Noise Contours**

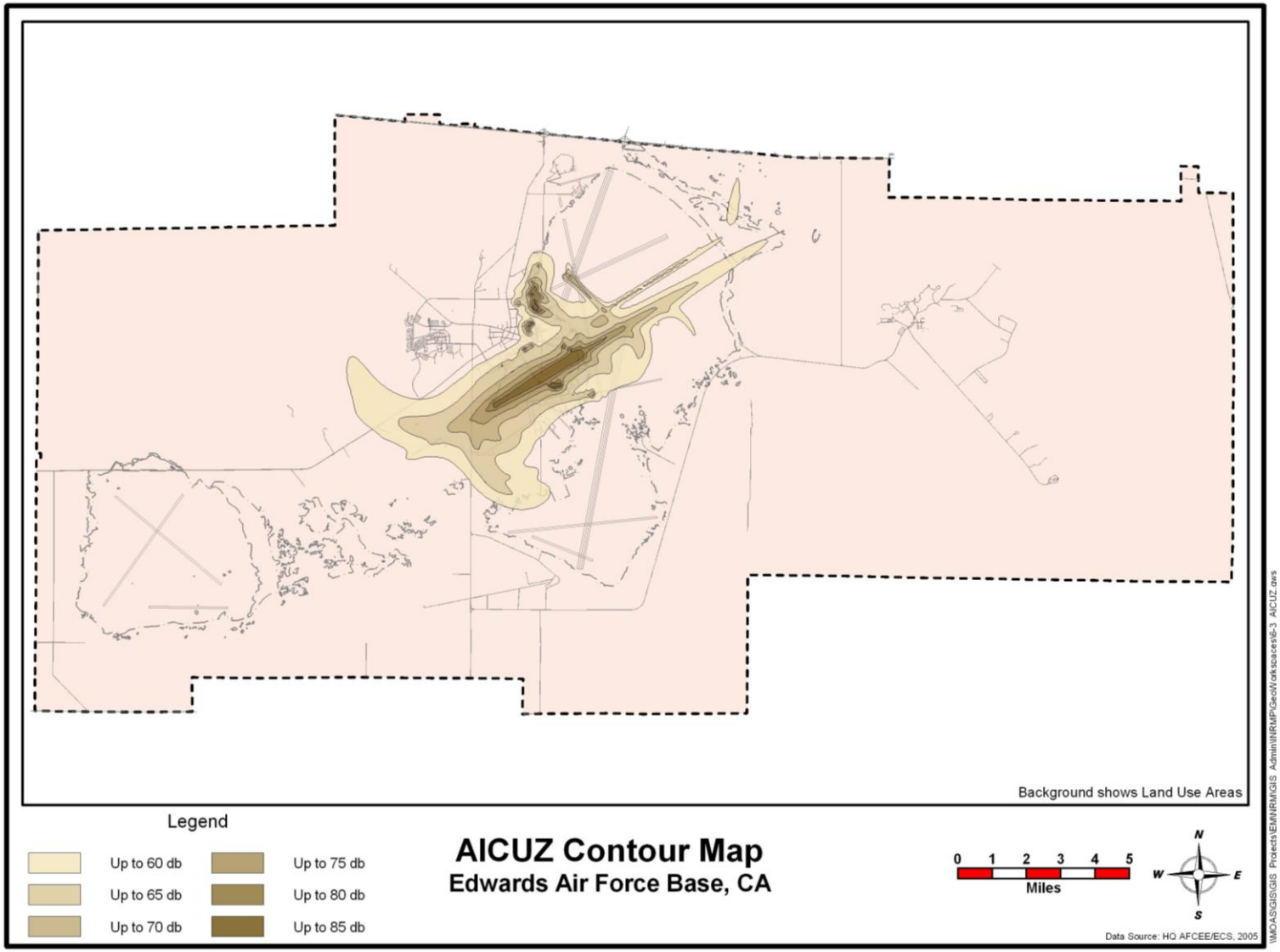


**Figure 4.9-2 Receptor Locations**

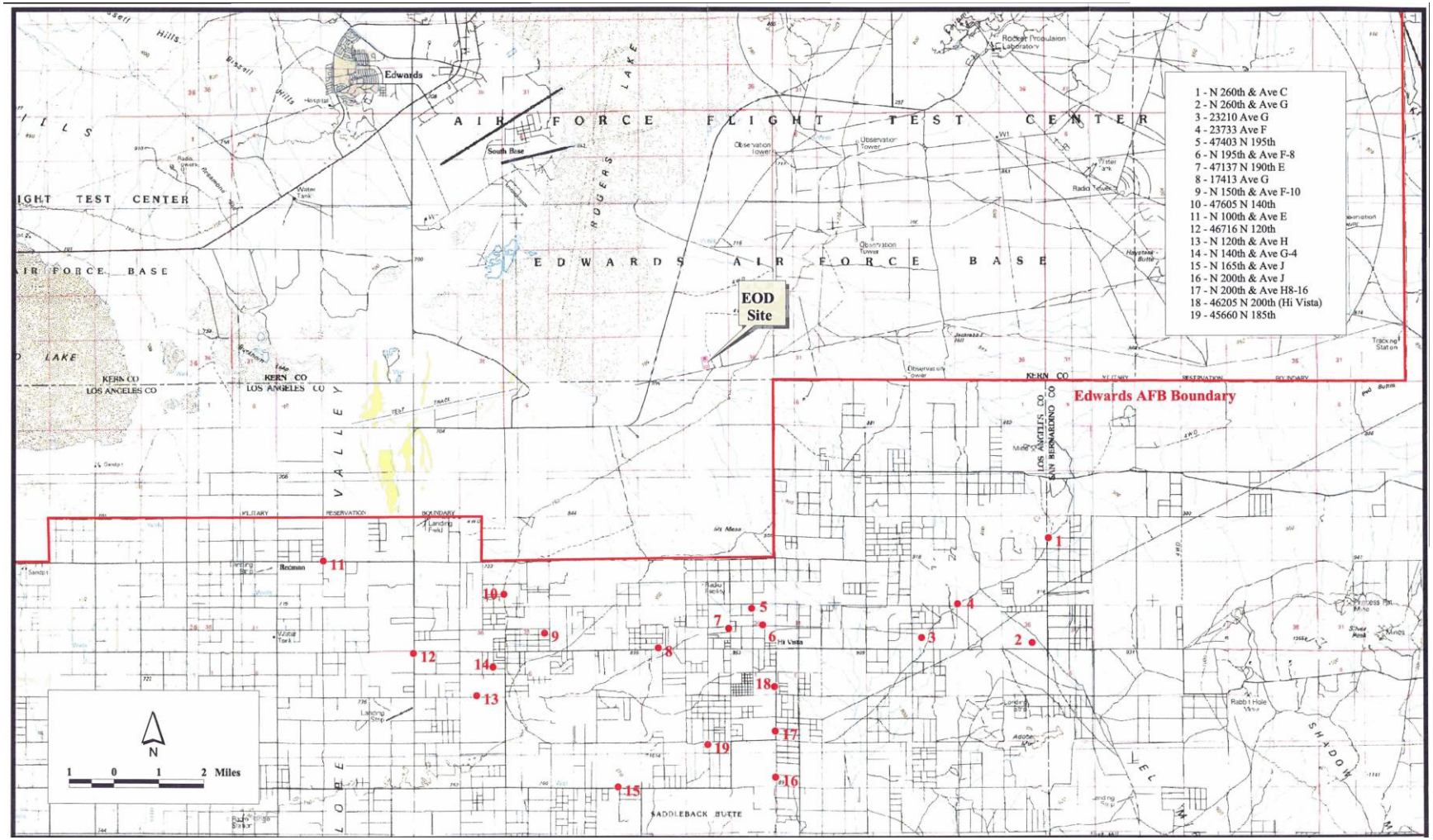
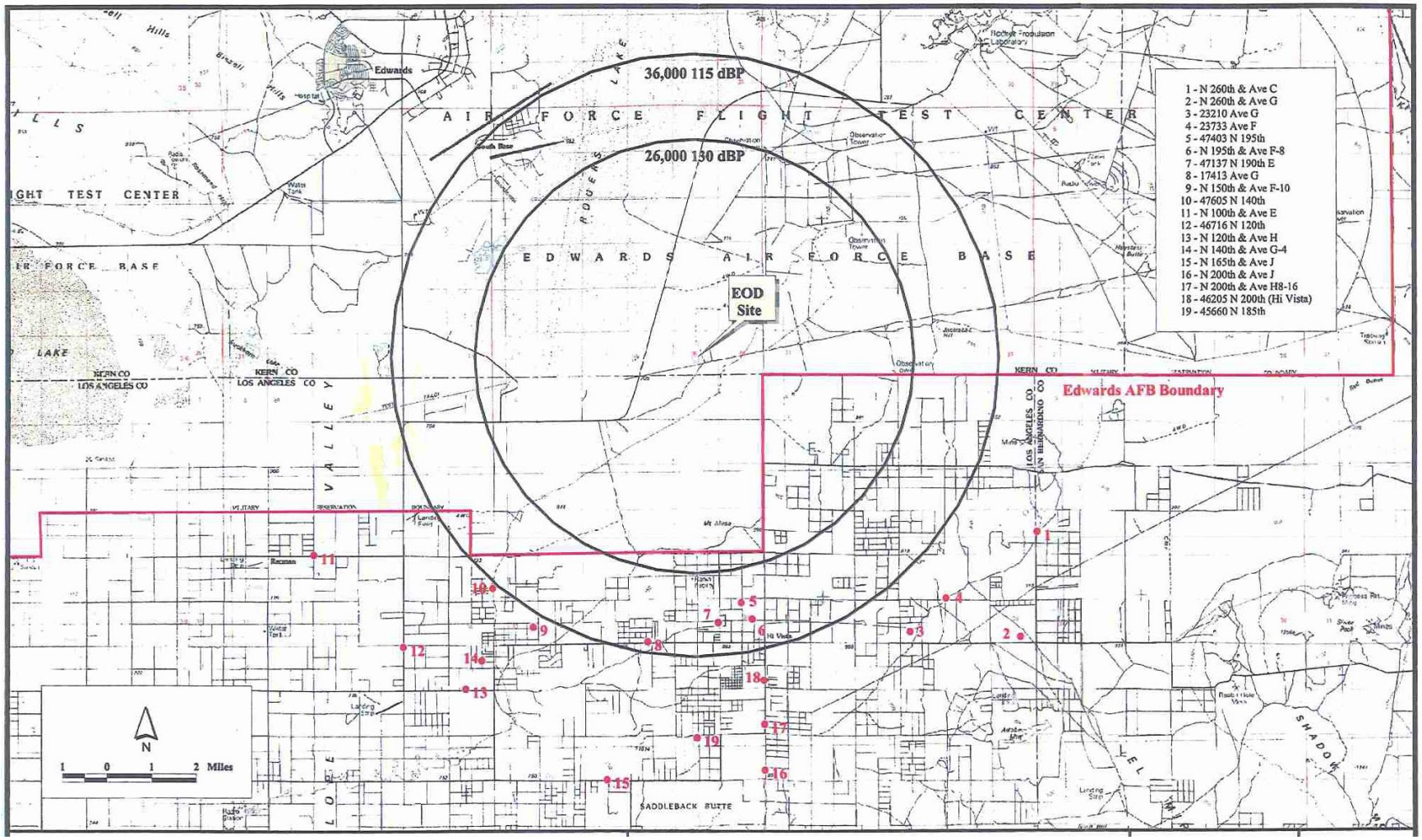


**Figure 4.9-3 Negative Gradient 2000 Pounds**



# Figure 4.9-4 Base Gradient 2000 Pounds

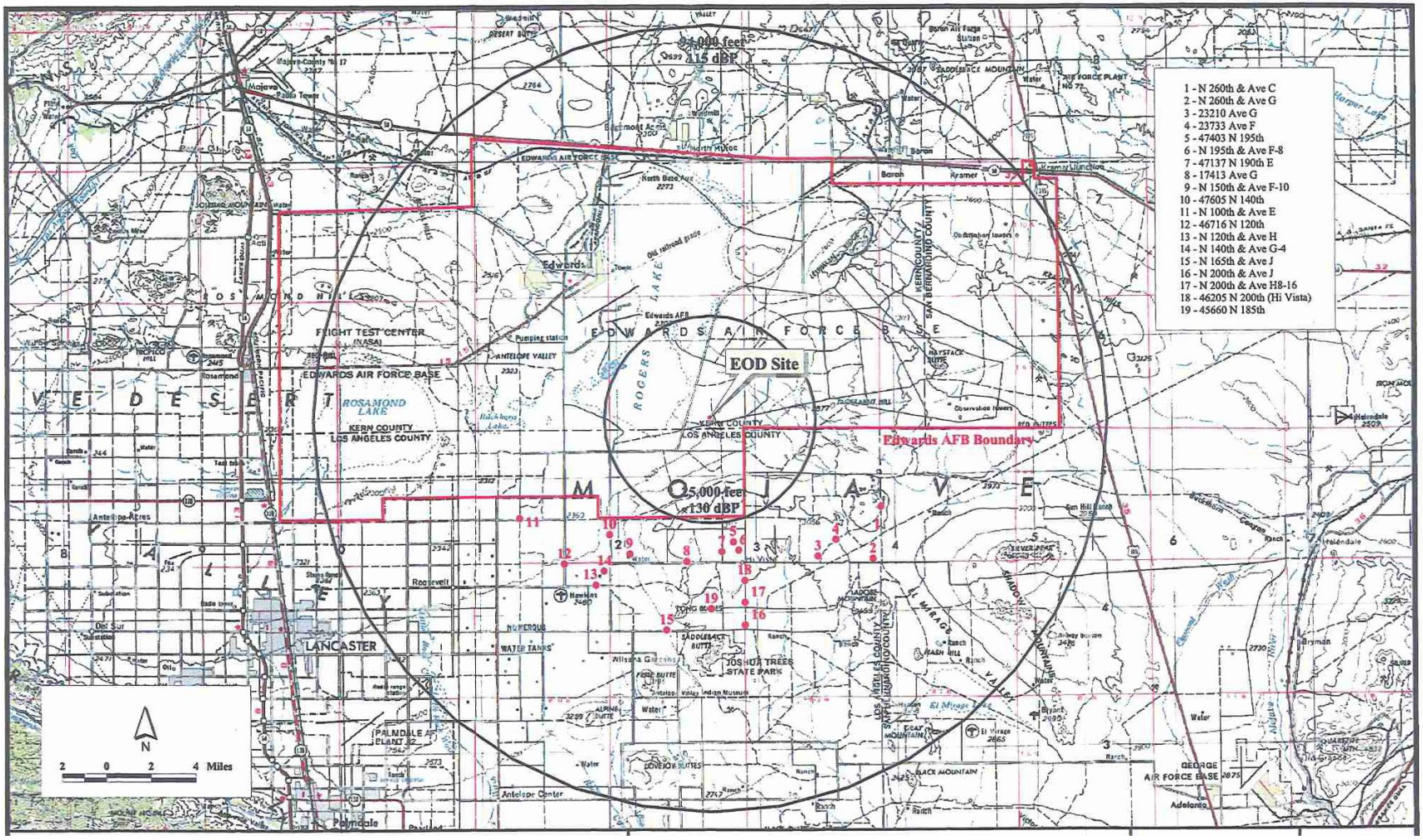
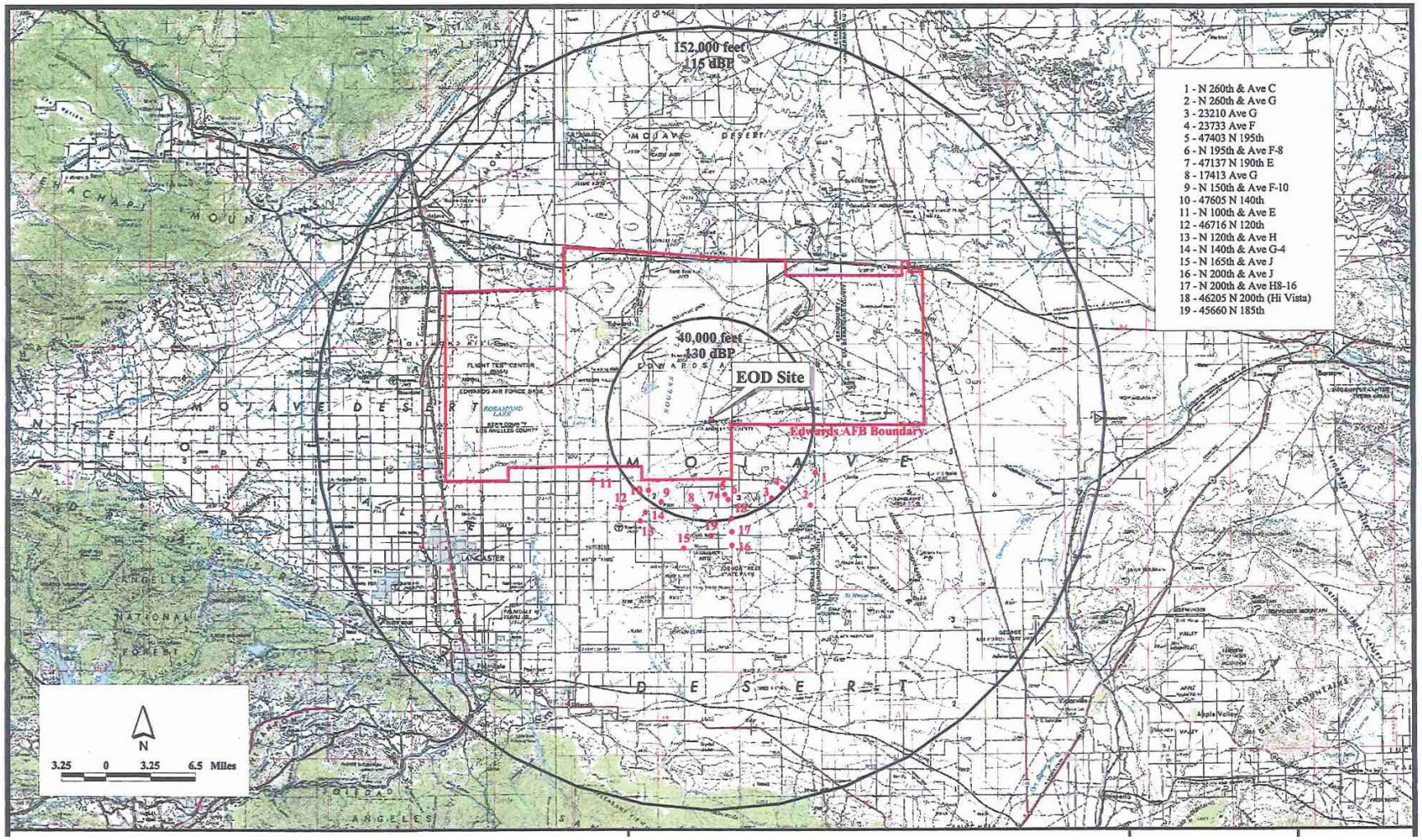


**Figure 4.9-5 Focus Gradient 2000 Pounds**



# *SECTION 5.0 - CUMULATIVE IMPACT ANALYSIS*

Cumulative impacts are the impacts of the proposed action viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future actions. Any single action in itself may cause insignificant effects, but when taken together with other actions the outcome may become cumulatively significant. A cumulative impact is, therefore, the additive effect of all projects in the same geographic area. In general, effects of a particular action or group of actions must meet all of the following criteria to be considered cumulative impacts:

- Effects of several actions occur in a common locale (i.e., action can contribute to effects of an action in a different location).
- Effects on a particular resource are similar in nature (i.e., affects the same specific element of a resource).
- Effects are long term (short-term impacts dissipate over time and cease to contribute to cumulative impacts).

## 5.1 CUMULATIVE SETTING

This section discusses relevant past, present, and reasonably foreseeable future actions at Edwards or in the vicinity of the facility. The actions were identified from DTSC actions and the Edwards Air Force Base Comprehensive Plan.

### 5.1.1 Current Activities

Current onsite activities in the vicinity of the project are associated with flight operations, target and test sites, and military ground operations. Offsite activities are associated with agriculture, rural residential and future ecological conservation efforts.

Flight operations may have an impact on noise due to aircraft flights and infrequent sonic booms. Test and training activities involve the combustion or detonation of ordnance, producing noise and air emissions, including soil and debris from the impact area. Military ground operations generate air emissions and noise from vehicular travel over paved and unpaved roads and small- and large-caliber weapons firing. The current onsite activities may also impact biological, geological, soil, and surface and groundwater resources. Offsite activities from agriculture and rural residential uses generate air emissions from tilling and noise from vehicles.

### 5.1.2 DTSC Projects

RCRA Program Projects

Edwards holds a Hazardous Waste Facility Permit for storage of hazardous waste at the HWSF issued by DTSC in November 2005 and effective until November 2015. The proposed project will be a modification to the Permit by adding two hazardous waste treatment units at the EOD Range for OB and OD. Under the proposed project ash and debris from the EOD Range would be stored at the HWSF before final disposal.

Under the current authorization there are two areas on base where Edwards may treat hazardous waste by OB/OD, the OB Unit at Area 1-100 at the AFRL and the OB/OD Units at the EOD Range. Upon completion of the Permit Modification determination, the current authorization to operate will be terminated. The currently authorized OB Unit at Area 1-100 at the AFRL will be closed when the Permit Modification determination is finalized. Additionally, hazardous waste was treated by OB/OD at sites south of the EOD Range in Los Angeles County beginning in 1974. These sites ceased operating when operations were authorized at the EOD Range and have been managed under Edwards' CERCLA response obligation. Closure of these sites will be integrated with the base Environmental Restoration Program (ERP).

Corrective action addresses existing and future releases of hazardous waste and hazardous constituents from hazardous waste management units. Edwards' RCRA corrective action obligations are detailed in the FFA. The parties to the FFA intend to integrate CERCLA response obligations and RCRA corrective action obligations. The FFA governs the simultaneous conduct of contaminated site identification, investigation and remediation, if applicable, under each program.

CERCLA Program Projects

Site identification, investigation and remediation are ongoing at Edwards under the ERP. The closest identified ERP sites to the OB/OD Units are former OB/OD sites in Los Angeles County associated with the former target PB-10/Static Blast Area No. 1. No Further Investigation (NFI) status was granted in 2003 for Site 444, the open burn pit west of the former target PB-10/Static Blast Area No. 1. Investigation focusing on Site 270, the detonation area, has been completed. No significant contaminants of concern were found in the soil or groundwater, therefore in 2006 No Further Action (NFA) status was proposed for Site 270.

### 5.1.3 Future Projects

The following organizations have responsibilities for land management in the vicinity of the OB/OD Units and were consulted for projects in the area:

- U.S. Air Force;
- U.S. BLM;
- Counties of Kern, Los Angeles, and San Bernardino and;
- Caltrans

No future projects having impacts in the vicinity of the EOD Range, including operation of the OB/OD units, were identified. Future projects identified at Edwards include:

- Lease of a portion of the base for a renewable energy generation project. The project would be located on 6,000 acres on the northwest part of the base.

- Installation of a new 35,000 square foot jet engine test cell facility with a 15,000 square foot storage barn. The new facility would be located on the Main Base near the existing maintenance facility (Building 3810).

## 5.2 CUMULATIVE ANALYSIS

### 5.2.1 Air Quality

Edwards' has Title V operating permits from EKAPCD for many stationary sources, including:

- Industrial boilers;
- Process heaters;
- Water heaters;
- Space heaters;
- Diesel, gasoline, propane, and natural gas-fired backup generators;
- Laboratory testing equipment;
- Other miscellaneous fossil fuel-fired equipment; and
- Portable equipment.

There are also many mobile sources associated with Edwards. There are no stationary sources in the vicinity of the EOD Range.

Investigation of the EOD Range for closure and corrective action would cause air emissions from additional vehicle trips, soil sampling and possible soil removal. These activities would have a temporary impact on air quality. Closure and remediation of the EOD Range and the nearby ERP sites is not scheduled at this time.

The proposed project is not expected to significantly impact the cumulative ambient air quality of the area. The proposed project would comply with all applicable air emission regulations for air pollutants, in particular the DTSC, CARB and EKAPCD restrictions on toxic air contaminants and the EKAPCD restrictions for particulate matter and allowable burn days. Cumulative vehicle emission impacts are expected to be inconsequential. Fugitive dust due to traffic and grading would cause an insignificant impact to ambient air quality and visibility, and would be intermittent and short-term.

### 5.2.2 Biological Resources

There are no current operations or proposed projects that impact biological resources. The roads in the vicinity of the EOD Range are used infrequently to conduct operations on the PIRA. Investigation of the EOD Range for closure and corrective action would involve additional vehicle trips, soil sampling and possible soil removal. These activities would temporarily disturb animals. Closure and remediation of the EOD Range and the nearby ERP sites is not scheduled at this time.

The proposed project is not expected to significantly impact the cumulative biological resources of the area. No additional land area will be impacted. The site may be subjected to more frequent, but not greater disturbance. The proposed project complies with the facility's INRMP and is consistent with the West Mojave Coordinated Management Plan. These plans assess the cumulative impacts of Edwards' actions in the context of the entire Mojave ecosystem. In addition to endangered and threatened species, the Edwards INRPMP addresses protection of non-listed species.

### 5.2.3 Geology and Soils

The proposed project would not significantly impact the geology or cumulative soil resources in the area. Since the site has been previously disturbed, no additional land area will be subject to soil erosion from the proposed project. The levels of some toxic contaminants in the soil may increase, however, monitoring as a condition of the Permit will ensure that soil contamination does not become significant. Given the large land area occupied by Edwards, the impacts of potential toxic contamination of the soil from the project is cumulatively insignificant. There will be no regional change to soil characteristics or quality.

### 5.2.4 Greenhouse Gas Emissions

The proposed project would produce an incremental increase in GHG emissions due to the increase in maximum capacity under the proposed project. Project activities that produce emissions would be burning or detonation of hazardous wastes, transportation of materials to the site, and use of heavy equipment to level the detonation area. Edwards is required to comply with the EKAPCD Policy. Under the EKAPCD Policy, the amount of GHGs that would be emitted per year from the proposed project is considered to have a less than significant or cumulatively considerable impact on GHG emissions.

### 5.2.5 Hazards and Hazardous Materials

The proposed project would involve an increase in the amounts of reactive hazardous wastes that may be treated at Edwards. Since the project would provide a method of local treatment of reactive hazardous waste, the project may also contribute to an increase in the amounts of reactive hazardous wastes generated. The additional amounts of hazardous waste generated cannot be predicted due to the RDT&E nature of Edwards' mission. Although the amounts of additional reactive hazardous waste generated may be cumulatively considerable, the risks and hazards involved in more

treatment events and greater annual treatment quantities have been addressed in the HRA, and are not cumulatively significant. The hazards posed by treatment of reactive wastes are offset by the risks and hazards in handling and long-term storage of reactive hazardous waste. The proposed project does not impact the amount or management of non-reactive hazardous waste generated at Edwards.

### 5.2.6 Hydrology and Water Quality

There are no current operations or proposed projects that impact hydrology or water quality in the vicinity of the EOD Range. The proposed project does not involve use or extraction of water. The levels of some toxic contaminants in the soil may increase, however, monitoring results to date have not identified contaminates from operations. The proposed project includes requirements for continued monitoring and reporting. Operational changes would be required if indications of contamination are identified.

Decontamination and closure of the OB/OD Units might involve use of water. The water would be brought to the site for that purpose, and removed for disposal. These activities would have no significant cumulative impact on water resources. Closure and remediation of the EOD Range is not scheduled at this time.

### 5.2.7 Noise/Vibration

The proposed project would produce an incremental increase in average sound levels due to the increase in maximum capacity under the proposed project. The average sound levels for Edwards are substantially driven by noise from flight operations on the runways, air operations by aircraft, single event sonic booms, RDT&E operations on the PIRA, vehicle noise, and wind. Because OB/OD treatment events are short-term and infrequent, the noise contribution does not impact the cumulative average sound levels.

# *SECTION 6.0 – OTHER REQUIRED SECTIONS*

This section provides a discussion of other categories of environmental impact that are required to be evaluated in an EIR/EA in addition to those addressed in Section 4.0. This discussion is required by CEQA Guidelines (CCR Title 14, Section 15126.2), and CEQ Implementing Regulations for NEPA (CFR Title 40 Section 1502.16). This section also contains mandatory findings of significance pursuant to the CEQA Guidelines (CCR Title 14, Section 15065). A discussion of Environmental Justice and Protection of Children from Environmental Health Risks and Safety Risks is included under the other required sections under NEPA. While not legally required under NEPA, the DoD has directed that federal facilities address these issues in their NEPA evaluations.

## 6.1 CEQA

### 6.1.1 Significant Unavoidable Environmental Effects

No significant and unavoidable impacts were found for the project under CEQA.

Less than significant potential environmental impacts are expected to result from the proposed project. Emissions from the OB/OD Units include VOCs, SVOCs, metals, acid gases, and dust disturbed by detonation. Emissions have the potential to contribute to a decline in air quality, increase the risks and hazards for humans and biological resources, and contribute to climate change. Emissions may cause soil contamination and degradation of groundwater. Detonations increase ambient noise levels. Studies were undertaken to determine the impacts from these factors, and the protective measures needed to ensure that the impacts are less than significant. The Draft EIR/EA contains analysis of these anticipated impacts and protective measures.

The environmental analysis in this Draft EIR/EA finds no significant unavoidable adverse impacts with the implementation of the proposed action including the Permit conditions. No unique or irreplaceable resources are anticipated to be significantly impacted by the proposed action. The measures associated with air quality, biological resources, human health risks, groundwater and noise that are being implemented under the terms and conditions of the Permit will reduce the impacts to a minimal or insignificant level.

### 6.1.2 Significant Irreversible Environmental Changes

No significant and irreversible impacts are expected for the project.

Impacts to air quality, biological resources, risk and hazards, and noise would occur temporarily, during events at the OB/OD Units, and would not be significant irreversible effects. Toxic contamination of soil may occur and may require remediation during the lifetime of the Permit and/or at closure of the units.

Impacts to the soil would not be significant irreversible effects. The potential impacts to groundwater would be detected by ongoing monitoring, with preventive measures taken before groundwater is impacted. Under the conditions of the Permit, levels of impacts for the above resources would not be significant.

### 6.1.3 Growth Inducing Impacts

Since the proposed project would provide a method of local treatment of reactive hazardous waste, the project may potentially contribute to an expansion of Edwards' missions. The environmental impacts of future Edwards missions cannot be predicted at this time. The proposed project does not involve activities that would result in increases in housing needs, recreational facilities, or infrastructure development. No increase in need from current fire, security or health services is expected. Consequently, the proposed project will not create growth-inducing impacts.

### 6.1.4 Mandatory Findings of Significance

The CEQA Guidelines require the following discussion in an EIR.

Describe to what extent the project would:

a. Have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal, or eliminate important examples of the major periods of California history or prehistory.

Potential environmental impacts to wildlife populations and habitat, plant and animal communities, and rare, threatened, and endangered species, are discussed in Section 4.4, Biological Resources. The proposed project does not provide for, or require disturbance of, additional land areas. Compliance with the Permit operating conditions, and the facility's INRMP will result in no impacts or minimal impacts to these resources. Cultural resources are discussed in Section 1.2, Scope of the Draft EIR/EA. The proposed project does not have the potential to have an impact on cultural resources because, following a survey of the site which identified locations having research potential, the locations were examined and an archaeological data recovery was completed to retrieve all information about the locations. In addition, the facility will comply with the ICRMP to assure that there will be no impacts or minimal impacts to these resources. There would be no potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal,

or eliminate important examples of the major periods of California history or prehistory.

b. Have impacts that are individually limited but cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects.

Cumulative impacts of the project are discussed in Section 5.0. The proposed project will not significantly impact the cumulative ambient air quality, biological resources, geology or soils, GHG emissions, risk and hazards, hydrology or water quality, or average noise exposure of the area.

c. Have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly.

When considering this Draft EIR/EA and the supporting documentation, there is no evidence before DTSC or Edwards that the proposed project will have any potential to cause substantial adverse effects on human beings, either directly or indirectly.

## 6.2 NEPA

### 6.2.1 Unavoidable Adverse Environmental Effects

CEQA Guidelines require a discussion of significant unavoidable environmental effects, similar to the NEPA requirement. This requirement was addressed in Section 6.1.1 and is repeated below.

Potential environmental impacts were expected to result from the proposed project. Emissions from the OB/OD Units include VOCs, SVOCs, metals, acid gases, and dust disturbed by detonation. Emissions have the potential to contribute to a decline in air quality, increase the risks and hazards for humans and biological resources, and contribute to climate change. Emissions may cause soil contamination and degradation of groundwater. Detonations increase ambient noise levels. Studies were undertaken to determine the impacts from these factors, and the protective measures needed to ensure that the impacts are less than significant. The Draft EIR/EA contains analysis of these anticipated impacts and protective measures.

The environmental analysis in this Draft EIR/EA finds no significant unavoidable adverse impacts with the implementation of the proposed action including the Permit conditions. No unique or irreplaceable resources are anticipated to be significantly impacted by the proposed action. The measures associated with air quality, biological resources, human health risks, groundwater and noise that are

being implemented under the terms and conditions of the Permit will reduce the impacts to a minimal or insignificant level.

### 6.2.2 Relationship Between Short-Term Uses and Long-Term Productivity

The CEQ Implementing Regulations require a discussion of the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity of all resources. The analyses in Section 4 of this Draft EIR/EA identified potential short-term impacts due to air emissions, natural resources (vegetation and animal life), and noise. These potential impacts would be very short-term, lasting a few seconds or minutes. Explosive noise and blast danger to staff and wildlife would last a few seconds. Air emissions would last a few minutes. Potential longer-term impacts include soil contamination, soil erosion, GHG emissions, and degradation of water quality. Measures incorporated into the project and enforced by the project conditions ensure that short-term impacts remain below significance thresholds and that maintenance and enhancement of the long-term productivity of the environment is implemented. For instance, air emissions and noise occur only during project operations and will cease with closure of the facility. Water quality will be tested through monitoring wells during the project life and any contamination prevented. Soils and equipment will be sampled, analyzed, and decontaminated or remediated at closure. All equipment will be removed from the site at closure and the site will be allowed to return to its natural conditions. Thus, this short-term use of man's environment will not affect the maintenance and enhancement of long-term productivity of resources.

### 6.2.3 Irreversible and Irretrievable Commitment of Resources

Irreversible commitment of resources entails the consumption of resources or the adverse effect upon resources that cannot be reversed or that persists for an extremely long period of time. Irreversible and irretrievable commitment of resources would result from the implementation of the proposed action. Training and exercise activities would require the commitment of labor, capital, energy, and land resources. Short-term commitments include labor, capital, and fossil fuels. No long-term commitments are anticipated.

### 6.2.4 Environmental Justice and Protection of Children from Environmental Health Risks and Safety Risks

Executive Order (EO) 12898, Environmental Justice, was issued by the President on February 11, 1994. On April 21, 1997 the President issued EO 13045, Protection of Children from Environmental Health Risks and Safety Risks. The EOs on environmental justice and the protection of children require federal agencies to identify and address disproportionately high adverse effects of its activities on minority and low-income populations and children.

This DEIR/DEA has performed a thorough analysis of potential impacts from the proposed project, including a detailed HRA and noise analysis. The analyses concluded that the proposed project would have no significant adverse impacts; therefore, there would not be any substantial disproportionate impacts to minority and low-income populations and children.

# *SECTION 7.0 - PROJECT ALTERNATIVE ANALYSIS*

The State CEQA Guidelines (CCR Title 14, Section 15126.6) require an EIR to:

> "describe a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives."

CEQA also requires that a "No Project" alternative be evaluated and compared to the proposed project.

Key provisions of the CEQA Guidelines pertaining to the alternatives analysis are:

- The discussion of alternatives shall focus on alternatives to the project that are capable of avoiding or substantially lessening any significant impacts of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

- The range of alternatives required in an EIR is governed by a "rule of reason" that requires the EIR to set forth only those alternatives necessary to allow a reasoned choice. The alternatives must be limited to ones that would avoid or substantially lessen any of the significant impacts of the project. Of those alternatives, the EIR need examine in detail only the ones that the Lead Agency determines could feasibly attain most of the basic objectives of the project.

- An EIR need not consider an alternative whose impacts cannot reasonably be determined, whose implementation is remote and speculative, or if it would not achieve the basic project objectives.

- If the "No Project" alternative is identified as the environmentally superior alternative, the EIR must also identify an environmentally superior alternative among the other alternatives.

The CEQ Implementing Regulations require that an EA include:

> "brief discussions of the need for the proposal, of alternatives as required by section 102(2)(E), of the environmental impacts of the proposed action and alternatives."

Section 102(2)(E) (42 USC Section 4332) states that every recommendation or report on proposals for legislation and other major Federal actions significantly

affecting the quality of the human environment include a detailed statement by the responsible official on alternatives to the proposed action.

As described in Section 4.0, Environmental Impact Analysis: Environmental Setting, Impacts, and Mitigation Measures, the project has the potential to impact environmental resources. Although the impacts were not found to be significant, an examination of alternatives was nevertheless completed.

## 7.1 CONSISTENCY WITH PROJECT OBJECTIVES

As stated above, pursuant to CEQA, one of the criteria for defining alternatives to the proposed project is the potential for the alternatives to meet the project objectives. The objectives of the proposed Edwards Class 3 Permit Modification, as outlined in Section 2.0, Project Description, are as follows:

- To allow Edwards to continue its mission to conduct weapons RDT&E for the Air Force at current or increased levels.
- To render reactive hazardous wastes generated at the facility by RDT&E work non-hazardous.
- To treat reactive hazardous waste in an environmentally protective manner using standard operating practices that are protective of the safety of employees handling the waste and consistent with current provisions of the HSC Division 20, Chapter 6.5, and CCR Title 22, Chapter 14, for management of hazardous waste, HSC Section 39000 *et seq*., for compliance with the CCAA, and CCR Title 29 for occupational health and safety.
- To avoid or limit potential offsite environmental impacts from the generation, transport, storage, treatment, and/or disposal of reactive hazardous wastes, consistent with the provisions of CCR Title 22, Section 66264.31.
- To treat reactive hazardous waste efficiently and economically by a method or process that would eliminate or reduce the need for further handling, remediation, or consideration in the future.
- To close the treatment units in a manner that will ensure future protection of human health and the environment and will be consistent with the closure performance standard specified in CCR Title 22, Section 66264.111.

## 7.2 PROJECT ALTERNATIVES

Although no impacts were identified that would be individually or cumulatively significant, the following were identified as potential alternatives to the project. These potential alternatives were identified as those whose impacts could reasonably be determined, and where implementation is possible and not speculative.

### 7.2.1 Alternative 1 - No Project Alternative

Under this alternative DTSC would deny the application for a Permit Modification. Edwards would lose interim status for the OB/OD Units and would discontinue treatment of reactive hazardous waste by OB/OD. Non-reactive hazardous wastes would continue to be managed at the HWSF under the conditions of the existing Permit. Edwards would continue to generate reactive hazardous wastes. Edwards would be required to evaluate the reactive hazardous waste to determine if it could be transported to an offsite treatment facility, either DoD or commercially managed and operated, in California or out of state. Laboratory wastes and those munitions items that are impossible to transport would be treated at Edwards under emergency permits issued for each situation. This alternative would also require implementation of the Closure Plan for the OB/OD Units, although closure may be delayed because of the need to use the units for emergency events.

In the event that a feasible alternative treatment technology is identified for some or all of its reactive hazardous waste, and funding can be obtained, Edwards would be required to apply for a permit modification to implement the alternative technology at the facility.

### 7.2.2 Alternative 2 - Disposal or Treatment Offsite

Under this alternative Edwards would identify an offsite facility (either DoD or commercially managed, in California or out of state) to treat and/or dispose of the reactive hazardous waste. Treatment would be by OB/OD or other means. Edwards would be required to determine or obtain a shipping classification for all the hazardous waste transported.

Edwards would lose authorization to operate the OB/OD Units and would discontinue treatment of reactive hazardous waste by OB/OD. Non-reactive hazardous wastes would continue to be managed at the HWSF under the conditions of the existing Permit. Edwards would continue to generate reactive hazardous wastes. Those munitions items that are impossible to transport would be treated at Edwards under an emergency permit.

Because over 90 percent of Edwards' reactive hazardous waste comes from the AFRL facilities, it is not possible to classify the waste for transportation on public roads. If it could be classified and shipped on public roads, the danger to the public would be greatly increased due to the extreme hazard that would result

from an accident. The transport of the waste on base is in a remote area of the base where danger to the public and base staff is minimized. Transport of the waste on public roads also has the potential for greater impacts on air quality, natural resources, and water resources if an accidental release occurs in a more sensitive location.

This alternative would also require implementation of the Closure Plan for the OB/OD Units, although closure may be delayed because of the need to use the units for emergency events. Impacts from the emergency events and the closure plan would be similar to those of the proposed permit application.

### 7.2.3 Alternative 3 - Treatment by Alternative Technologies Onsite

Under this alternative Edwards would identify and install a hazardous waste unit for treatment of reactive hazardous waste by means other than OB/OD. Edwards would be required to apply for a permit modification to the existing Permit to implement the technology. HSC Section 41801 prohibits open outdoor fires for the purpose of disposal or burning of solid waste unless the fire is necessary for the prevention of a fire hazard which cannot be abated by any other means. To satisfy these requirements DTSC required that Edwards prepare a study to evaluate the feasibility of using technologies other than OB/OD for treating the many and varied reactive wastes generated by the facility. A report prepared by Edwards documents the identification, screening, and initial evaluation of potential alternatives to the treatment of reactive hazardous wastes by OB/OD at Edwards. This document describes Edwards' reactive waste streams and potential alternatives to OB/OD treatment, and evaluates the applicability of these alternative technologies to Edwards' reactive waste streams. The study, *Laboratory Treatment Technologies Evaluation for Waste Propellant*, is included as Appendix E of this Draft EIR/EA.

Two initial screening criteria were applied to the identified technologies: (1) basic applicability of the technology to Edwards' waste streams, and (2) maturity of the technology. In addition, all technologies were analyzed for protection of worker safety.

Based on the screening factors, the Status Quo (current OB/OD treatment), Contained Burn Batch Feed System, Contained Burn Semi-Continuous Feed System, Actodemil® by ARCHTECH were analyzed and compared in the evaluation report.

### 7.2.4 Alternative 4 - Approval of Permit Modification with Special Conditions

Under this alternative, DTSC would issue the Permit Modification, with special Permit conditions designed to alleviate the potential environmental impacts of the

proposed project, in addition to or instead of the procedures in the operating plan submitted by Edwards. Such special conditions may include:

- reductions in the requested amount of hazardous waste to be treated either annually or for a single event to reduce emissions;
- increased monitoring for air emissions, soil contamination, animal species, or noise levels, in addition to monitoring required by regulations; and/or
- requirements for further research, study and reporting on health risks, air emissions, or alternative technologies.

### 7.2.5 Alternative 5 - Approval of the Permit Modification as Requested

Under this alternative, DTSC would issue the Permit Modification under the conditions requested in the operating plan submitted by Edwards with their application.

## 7.3 EVALUATION OF ALTERNATIVES TO THE PROPOSED PROJECT

The Draft EIR/EA must include sufficient information about each alternative to allow for meaningful evaluation, analysis, and comparison with the proposed project. The environmental impacts of the alternative must be discussed. Evaluation of the ability of the alternatives to meet the objectives is contained in Table 7.3-1, Evaluation of Project Alternatives.

Alternative 1 - No Project

An analysis of this alternative found that it has the potential to result in significant impacts from hazards and hazardous materials due to the potential need to store reactive hazardous waste for extended periods of time and the risk inherent in offsite transportation of this type of waste. This alternative may potentially pose extreme safety hazards. This alternative does not meet the project objectives. Therefore, the No Project Alternative is not a viable alternative, and is eliminated from further discussion.

Alternative 2 - Disposal or Treatment Offsite

An analysis of this alternative found that, at present, there are no offsite locations for treatment or disposal of this type of hazardous waste available to Edwards. Munitions are stored at the MSA. These munitions are tracked via a computer database used to maintain records on the type, specified use, and age of

munitions. If it is determined during physical inspection of the munitions or database review, that a munition does not meet inspection criteria, a decision must be made as to whether the munition is still serviceable. The decisions as to the serviceability of munitions are the responsibility of the Designated Disposition Authority (DDA) located at Hill AFB. If materials can be used, the DDA sends a response to the munitions custodians at MSA with specific instruction for packaging and transporting munitions for off-base treatment, R3, or use by another organization.

Unserviceable munitions and propellants are treated at the Edwards OB/OD Units only after other reuse, and treatment alternatives, are considered and dismissed by the DDA. If no other options exist, the Air Force provides disposition authority to Edwards to treat standard items by OD. The waste minimization strategies in place at the MSA include strict administrative guidance, enabling 99.99% of the MSA inventory to be managed without entering the OB/OD waste stream.

In addition, the AFRL has a Branch Operating Instruction (BOI) 1-30-51 *Propellant Waste Collection, Storage and Disposal*. The BOI contains procedures for reducing the volume of materials related to waste handling during testing procedures. The waste minimization strategies in place at AFRL include efforts to control the size of the batches prepared, minimize the plastics entering the waste stream, employ equipment cleaning procedures and equipment modifications, identify alternative uses for the experimental propellants, and adhere to administrative requirements.

An assessment was completed to identify any opportunities to reduce wastes at the MSA and AFRL, *Munition Propellant Process Specific Opportunity Assessment* (January 2009). The assessment concluded that due to the current effective management practices of the MSA and AFRL, no opportunities were identified that would present the potential to reduce the quantity of munitions or waste propellant requiring OB/OD treatment at Edwards. Maintaining these processes will continue to minimize the amount of munitions requiring OB/OD treatment.

The hazardous waste treated at the EOD Range consists almost entirely of non-standard items. This alternative has the potential to result in significant impacts from hazards and hazardous materials due to the risk inherent in offsite transportation of non-standard munition items. This alternative does not meet the project objectives.

Alternative 3 - Treatment by Alternative Technologies Onsite

DTSC's examination of alternatives to OB/OD focused on treatments applicable to the AFRL waste streams. DTSC's examination of alternatives to OB/OD

focused on treatments applicable to the AFRL waste streams. Analysis of data on materials treated at Edwards OB/OD units in the six years between 1997 and 2002 determined that over 90 percent of materials treated were waste PEP materials from the AFRL. The study, conducted by Edwards and approved by DTSC, reached the conclusions summarized below.

Based on the screening factors, the Status Quo (current OB/OD treatment), Contained Burn Batch Feed System, Contained Burn Semi-Continuous Feed System, Actodemil® by ARCHTECH were analyzed and compared in the evaluation report.

The evaluation report concluded that the Status Quo was the best alternative (based on safety and cost) but recommended that Edwards conduct a feasibility study of the Contained Burn Batch Feed System alternative.

It is recognized that there are ongoing research and development activities in the area of OB/OD alternative technologies, and the conclusions of this document should be re-evaluated at periodic intervals. The Air Force will continue to examine, consider, and implement new technologies, as they become available and prove to be feasible, and as funding is available.

If the Contained Burn Batch Feed System alternative was determined to be feasible it would involve completion of the Permit Modification for OB/OD as well as permit modification to add alternative treatment and a separate CEQA determination. This alternative may require implementation of the Closure Plan for the OB/OD Units, although closure may be partial or delayed because of the need to use a unit for emergency events. This alternative does not meet the project objectives.

Alternative 4 - Approval of Permit Modification with Special Conditions

The proposed project is not expected to have significant impacts that would require special conditions beyond the conditions contained in the Burn Plan and Edwards Operation Plan except for impacts to $PM_{10}$. Because the project is located in an area designated non-attainment for $PM_{10}$ under the state standard, the project contributes to exceedance of the state $PM_{10}$ standard on a cumulative basis. However, impacts to $PM_{10}$ are less than significant on a project-specific and cumulative basis due to the project not exceeding the annual emissions limit of 15 tons annually, the limited number of events per year, and the special conditions that apply to planned OB/OD events (see Section 4 above), and the Burn Plan. The annual estimated emissions of $PM_{10}$ from the facility are 3.9 tons. Special conditions in the Draft Permit would further reduce the chances of any significant impacts by requiring monitoring for soil and groundwater contamination, and ecological receptors (pre-event biological surveys for

species), and require further reporting on air emission sampling, and alternative technologies. Alternative 4 would meet project objectives.

Alternative 5 - Approval of Permit Modification as Requested

Alternative 5 would not be expected to have significant adverse impacts that would require special conditions beyond the conditions contained in the Burn Permit and Edwards Operation Plan, except for impacts to $PM_{10}$. Because the project is located in an area designated non-attainment for $PM_{10}$ under the state standard, the project contributes to exceedance of the state $PM_{10}$ standard on a cumulative basis. However, project impacts to $PM_{10}$ are less than significant on a project-specific and cumulative basis due to the Alternative 5 not exceeding the annual emissions limit of 15 tons annually, the limited number of events per year, and compliance with the burn plan. Under Alternative 5, the annual estimated emissions of $PM_{10}$ from the facility are also 3.9 tons. Alternative 5 would meet project objectives.

## 7.4 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

Alternatives may be eliminated from detailed consideration in the EIR if they fail to meet most of the project objectives, are infeasible, or do not avoid any significant impacts. Alternative 1, No Project Alternative (denial of the Permit Modification application), was eliminated from further consideration because it does not meet the project objectives and has the potential to result in significant impacts. Alternative 2, Disposal or Treatment Offsite, and Alternative 3, Treatment by Alternative Technologies Onsite, were eliminated from further consideration because these alternatives are not technically and/or economically feasible at this time.

## 7.5 ENVIRONMENTALLY SUPERIOR ALTERNATIVE

The main purpose of evaluating alternatives is to determine whether an alternative to the project would substantially meet the project objectives while reducing or eliminating significant environmental impacts. An EIR must identify an environmentally superior alternative. In addition, if the No Project alternative is chosen as the environmentally superior alternative, then the EIR must also identify an environmentally superior alternative among the other evaluated alternatives.

In evaluating the alternatives, Alternative 4, Approval of Permit Modification with special conditions, is considered to be the environmentally superior alternative because this alternative has the least amount of significant adverse

environmental impacts and aims to further reduce the chance of any significant impacts occurring.

Continued use of the OB/OD Units would meet the objectives of the project, including:

- Reduce prolonged periods of potentially unsafe storage of reactive hazardous waste;
- Use of an available method of treatment for reactive hazardous waste while waiting for the development of alternative technologies;
- Use of an inexpensive treatment method for the destruction of reactive hazardous waste.

## 7.6 REFERENCES

Edwards Air Force Base, 95 ABW/CEV Environmental Management Division. 2009. *Draft Laboratory Treatment Technologies Evaluation for Waste Propellant.*

Edwards Air Force Base, 95 ABW/CEV Environmental Management Division. 2009. Draft *Munition Propellant Process Specific Opportunity Assessment*.

Edwards Air Force Base, 95 ABW/CEV Environmental Management Division. 2012. *Revised Laboratory Treatment Technologies Evaluation for Waste Propellant.*

| Objective: To allow Edwards to continue its mission to conduct weapons research, development, testing and evaluation (RDT&E) for the Air Force at current or increased levels. | | |
|---|---|---|
| Alternative | Ability to Meet the Objective | Impacts |
| Alternative 1 No Project | Generation of reactive hazardous wastes and the need to manage it will be an inherent part of the Edwards RDT&E mission for the foreseeable future. This alternative would meet the objective only if alternative technologies to OB/OD or offsite locations for treatment are available. Some military facilities have OB/OD capabilities for emergencies, testing and training, however, few are permitted for treatment of hazardous waste, particularly wastes generated at other installations. No commercial treatment facilities are currently in operation within California to receive, store, and treat the variety of waste munitions and propellants generated at Edwards. At present, this alternative does not meet this objective. | This alternative would have no adverse impacts to air quality, biological resources, geology and soils, and noise/vibration at Edwards. This alternative may have impacts from hazards and hazardous materials due to the possible need to store hazardous waste onsite for extended periods of time. This alternative would have adverse impacts offsite due to the risk inherent in offsite transportation of these RDT&E hazardous wastes. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. Closure of the Edwards EOD Range units may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. |
| Alternative 2 Disposal or Treatment Offsite | This alternative would meet the objective if offsite locations for treatment are available. Some military facilities have OB/OD capabilities for emergencies, testing and training, however, few are permitted for treatment of hazardous waste, particularly wastes generated at other installations. No commercial treatment facilities are currently in operation within California to receive, store, and treat the variety of waste munitions and propellants generated at Edwards. At present, this alternative does not meet this objective. | This alternative would have no adverse impacts to environmental resources at Edwards. This alternative would have adverse impacts from hazards and hazardous materials offsite due to the risk inherent in offsite transportation of these RDT&E hazardous wastes. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. |
| Alternative 3 Treatment by Alternative Technologies Onsite | This alternative would meet the objective if alternative technologies to OB/OD are available. There is no alternative technology, or combination of technologies, currently in production that is appropriate for all of the facility's waste streams. At present this alternative does not meet the objective for all the wastes at Edwards. | Impacts cannot be evaluated from this alternative at this time. This alternative would require a permit modification and separate CEQA determination. |

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| Alternative 4 Approval of Permit Modification with Special Conditions | For special conditions related to reduction in treatment amounts, such as to reduce air emissions or noise, this alternative may meet the objective for treatment amounts similar to current needs, but may not allow for a large increase in treatment amounts. For special conditions related to prohibition of treatment of certain types of hazardous waste, this alternative may or may not meet the alternative, depending on the criticality of the prohibited reactive waste to Edwards mission**.** For other special conditions, such as further research, study, or reporting, this alternative would meet the objective. | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |
| Alternative 5 Approval of the Permit Modification as Requested | This alternative would meet the objective. | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |

| Objective: To render reactive hazardous wastes generated at the facility by RDT&E work non-hazardous. | | |
|---|---|---|
| Alternative | Ability to Meet the Objective | Impacts |
| Alternative 1 No Project | Generation of reactive hazardous wastes and the need to manage it will be an inherent part of the Edwards RDT&E mission for the foreseeable future. This alternative would meet the objective only if alternative technologies to OB/OD or offsite locations for treatment are available. Some military facilities have OB/OD capabilities for emergencies, testing and training, however, few are permitted for treatment of hazardous waste, particularly wastes generated at other installations. No commercial treatment facilities are currently in operation within California to receive, store, and treat the variety of waste munitions and propellants generated at Edwards. At present, this alternative does not meet this objective. | This alternative would have no adverse impacts to air quality, biological resources, geology and soils, and noise/vibration at Edwards. This alternative may have impacts from hazards and hazardous materials due to the possible need to store hazardous waste onsite for extended periods of time. This alternative would have adverse impacts offsite due to the risk inherent in offsite transportation of these RDT&E hazardous wastes. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. Closure of the EOD Range units may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. |

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| Alternative 2 Disposal or Treatment Offsite | This alternative would meet the objective if offsite locations for treatment are available. Some military facilities have OB/OD capabilities for emergencies, testing and training, however, few are permitted for treatment of hazardous waste, particularly wastes generated at other installations. No commercial treatment facilities are currently in operation within California to receive, store, and treat the variety of waste munitions and propellants generated at Edwards. At present, this alternative does not meet this objective. | This alternative would have no adverse impacts to environmental resources at Edwards. This alternative would have adverse impacts from hazards and hazardous materials offsite due to the risk inherent in offsite transportation of this type of hazardous waste. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. |
| Alternative 3 Treatment by Alternative Technologies Onsite | This alternative would only meet the objective if alternative technologies are available for all the reactive hazardous wastes at Edwards. There is no alternative technology, or combination of technologies, currently in production that is appropriate for all of the facility's waste streams. A permit modification would be required for treatment at Edwards. At present, this alternative does not meet this objective. | Impacts cannot be evaluated from this alternative at this time. This alternative would require a permit modification and separate CEQA determination. |
| Alternative 4 Approval of Permit Modification with Special Conditions | For special conditions related to reduction in treatment amounts, such as to reduce air emissions or noise, this alternative may meet the objective for treatment amounts similar to current needs, but may not allow for a large increase in treatment amounts. For special conditions related to prohibition of treatment of certain types of hazardous waste, this alternative may or may not meet the alternative, depending on the criticality of the prohibited reactive waste to Edwards's mission. **For other special conditions, such as further research, study, or reporting, this alternative would meet the objective.** | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |
| Alternative 5 Approval of the Permit Modification as Requested | This alternative would meet the objective. | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |

| Objective: To treat reactive hazardous waste in an environmentally protective manner using standard operating practices that are protective of the safety of employees handling the waste and consistent with current provisions of the HSC Division 20, Chapter 6.5, and CCR Title 22, Chapter 14, for management of hazardous waste, HSC Section 39000 et seq., for compliance with the California Clean Air Act (CCAA), and CCR Title 29 for occupational health and safety. | | |
|---|---|---|
| Alternative | Ability to Meet the Objective | Impacts |

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|---|---|---|
| Alternative 1 No Project | Generation of reactive hazardous wastes and the need to manage it will be an inherent part of the Edwards RDT&E mission for the foreseeable future. This alternative would meet the objective only if alternative technologies to OB/OD or offsite locations for treatment are available. Some military facilities have OB/OD capabilities for emergencies, testing and training, however, few are permitted for treatment of hazardous waste, particularly wastes generated at other installations. No commercial treatment facilities are currently in operation within California to receive, store, and treat the variety of waste munitions and propellants generated at Edwards. At present, this alternative does not meet this objective. | This alternative would have no adverse impacts to air quality, biological resources, geology and soils, and noise/vibration at Edwards. This alternative may have impacts from hazards and hazardous materials due to the possible need to store hazardous waste onsite for extended periods of time. This alternative would have adverse impacts offsite due to the risk inherent in offsite transportation of these RDT&E hazardous wastes. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. Closure of the EOD Range units may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. |
| Alternative 2 Disposal or Treatment Offsite | This alternative would meet the objective if offsite locations for treatment are available, and the offsite locations are in compliance with the applicable laws and regulations. This alternative may involve long-term storage of reactive hazardous wastes until a treatment solution is identified. Storage only temporarily resolves the need to treat these hazardous wastes. Prolonged storage can result in potential adverse consequences. The reactive components of the munitions age and may eventually become unstable, increasing the safety hazard. The waste would require immediate treatment under an emergency permit. A permit modification would be required for storage longer than 90 days. At present, this alternative does not meet this objective. | This alternative would have no adverse impacts to environmental resources at Edwards. This alternative would have adverse impacts from hazards and hazardous materials offsite due to the risk inherent in offsite transportation of this type of hazardous waste. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. |
| Alternative 3 Treatment by Alternative Technologies Onsite | This alternative would only meet the objective if alternative technologies are available for all the reactive hazardous wastes at Edwards. There is no alternative technology, or combination of technologies, currently in production that is appropriate for all of the facility's waste streams. A permit modification would be required for treatment at Edwards. At present, this alternative does not meet this objective. | Impacts cannot be evaluated from this alternative at this time. This alternative would require a permit modification and separate CEQA determination. |
| Alternative 4 Approval of Permit Modification with Special Conditions | This alternative would meet the objective provided that the special conditions do not impose any restrictions that would compromise safety, such as need for prolonged storage or excess handling of reactive hazardous waste due to limitations of treatment amounts. | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |

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| Alternative 5 Approval of the Permit Modification as Requested | According to the evaluation of potential environmental impacts in Section 4, this alternative would meet the objectives. | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |

| Objective: To avoid or limit potential offsite environmental impacts from the generation, transport, storage, treatment, and/or disposal of reactive hazardous wastes, consistent with the provisions of CCR Title 22, Section 66264.31. | | |
|---|---|---|
| Alternative | Ability to Meet the Objective | Impacts |
| Alternative 1 No Project | This alternative would meet the objective if alternative technologies are available at Edwards. There is no alternative technology, or combination of technologies, currently in production that is appropriate for all of the facility's waste streams. At present, this alternative does not meet this objective. | This alternative would have no adverse impacts to air quality, biological resources, geology and soils, and noise/vibration at Edwards. This alternative may have impacts from hazards and hazardous materials due to the possible need to store hazardous waste onsite for extended periods of time. This alternative would have adverse impacts offsite due to the risk inherent in offsite transportation of these RDT&E hazardous wastes. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. Closure of the EOD Range units may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. |
| Alternative 2 Disposal or Treatment Offsite | This alternative would not meet the objective. | This alternative would have no adverse impacts to environmental resources at Edwards. This alternative would have adverse impacts from hazards and hazardous materials offsite due to the risk inherent in offsite transportation of this type of hazardous waste. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. |
| Alternative 3 Treatment by Alternative Technologies Onsite | This alternative would meet the objective if alternative technologies are available at Edwards. There is no alternative technology, or combination of technologies, currently in production that is appropriate for all of the facility's waste streams. At present, this alternative does not meet this objective. | Impacts cannot be evaluated from this alternative at this time. This alternative would require a permit modification and separate CEQA determination. |

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| Alternative 4 Approval of Permit Modification with Special Conditions | This alternative would meet the objective except for special conditions prohibiting treatment of certain wastes, which may require shipment to an offsite location. | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |
| Alternative 5 Approval of the Permit Modification as Requested | This alternative would meet the objective. | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |

| Objective: To treat reactive hazardous waste efficiently and economically by a method or process that would eliminate or reduce the need for further handling, remediation, or consideration in the future. | | |
|---|---|---|
| Alternative | Ability to Meet the Objective | Impacts |
| Alternative 1 No Project | This alternative would not meet the objective. | This alternative would have no adverse impacts to air quality, biological resources, geology and soils, and noise/vibration at Edwards. This alternative may have impacts from hazards and hazardous materials due to the possible need to store hazardous waste onsite for extended periods of time. This alternative would have adverse impacts offsite due to the risk inherent in offsite transportation of these RDT&E hazardous wastes. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. Closure of the EOD Range units may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. |
| Alternative 2 Disposal or Treatment Offsite | This alternative would meet the objective only if an offsite military or commercial facility is available. At present, this alternative does not meet this objective. | This alternative would have no adverse impacts to environmental resources at Edwards. This alternative would have adverse impacts from hazards and hazardous materials offsite due to the risk inherent in offsite transportation of this type of hazardous waste. This alternative may cause adverse environmental impacts at offsite treatment or disposal locations to environmental resources evaluated in this EIR, as well as those not evaluated in this EIR. |

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| Alternative 3 Treatment by Alternative Technologies Onsite | This alternative would meet the objective if alternative technologies are available at Edwards. There is no alternative technology, or combination of technologies, currently in production that is appropriate for all of the facility's waste streams. At present, this alternative does not meet this objective. | Impacts cannot be evaluated from this alternative at this time. This alternative would require a permit modification and separate CEQA determination. |
| Alternative 4 Approval of Permit Modification with Special Conditions | This alternative would meet the objective. | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |
| Alternative 5 Approval of the Permit Modification as Requested | This alternative would meet the objective. | This alternative would have no significant adverse impacts due to compliance with the Burn Plan and operations that do not exceed 15 tons of $PM_{10}$ emissions annually. |

| Objective: To close the treatment units in a manner that will ensure future protection of human health and the environment and will be consistent with the closure performance standard specified in CCR Title 22, Section 66264.111. | | |
|---|---|---|
| Alternative | Ability to Meet the Objective | Impacts |
| Alternative 1 No Project | This alternative would meet the objective. The Closure Plan included in the Permit Modification application would be implemented, although closure may be delayed because of the need to use the units for emergency events. | This alternative may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. |
| Alternative 2 Disposal or Treatment Offsite | This alternative would meet the objective. The Closure Plan included in the Permit Modification application would be implemented, although closure may be delayed because of the need to use the units for emergency events. | This alternative may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. |
| Alternative 3 Treatment by Alternative Technologies Onsite | This alternative would meet the objective. The Closure Plan included in the Permit Modification application would be implemented, although closure may be partial or delayed because of the need to use a unit for emergency events. Partial closure may involve closure of either the OB or OD unit separately while retaining the other unit. | This alternative may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. |

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| Alternative 4 Approval of Permit Modification with Special Conditions | This alternative would meet the objective. | This alternative may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. | |
| Alternative 5 Approval of the Permit Modification as Requested | This alternative would meet the objective. | This alternative may cause temporary, but not significant, impacts to air quality, biological resources, and geology and soils, due to increased vehicle trips, human activity, and fugitive dust. | |
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# *SECTION 8.0 - REFERENCES AND PERSONAL COMMUNICATIONS*

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## 8.2 PERSONAL COMMUNICATIONS

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