



FINAL

**ENVIRONMENTAL ASSESSMENT FOR ARMED MUNITIONS INTEGRATION
TESTING ON THE PRECISION IMPACT RANGE AREA**

May 2005

**95th Air Base Wing
Civil Engineer Directorate
Environmental Management Division
Edwards Air Force Base, California**

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FINDING OF NO SIGNIFICANT IMPACT FOR ARMED MUNITIONS INTEGRATION TESTING ON THE PRECISION IMPACT RANGE AREA

1.0 INTRODUCTION

The U.S. Air Force proposes to designate an armed munition only target at PB-13 site on Edwards AFB, California. The site is located within the West Range of the Precision Impact Range Area (PIRA) and is entirely within the R-2515 restricted area. The Proposed Action is being developed to support the integration testing of armed munitions on aircraft and other delivery platforms which is considered one of the primary functions of the Air Force Flight Test Center, Edwards AFB, California.

2.0 DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES CONSIDERED

The proposed action to conduct up to 100 armed munition weapons delivery events per year was selected as Alternative A. Munitions could be delivered in single or multiple quantities, depending on the approved test plan. Individual armed munitions would be limited to 500 pounds of net explosive weight. The PB-13 target would be cleared after each event by Explosive Ordnance Disposal personnel and before subsequent test missions were initiated. Alternative B would limit the number of events to 50 events per year, and Alternative C would limit the number of events to 10 per year. The No-Action Alternative was also analyzed, in which an armed munition only target would not be established; however routine use of the target for previously approved missions would continue to occur.

3.0 ENVIRONMENTAL CONSEQUENCES

The Region of Influence (ROI) of the proposed project consists primarily of Edwards AFB and the PB-13 target area. The ROI for each alternative is discussed in terms of two distinct regions: (1) on-base region and (2) PIRA, PB-13 target. The on-base region includes all of Edwards AFB. PIRA, PB-13 target includes the 1,000 foot diameter area located at 34 degrees 51.30 minutes North Latitude and 117 degrees 44.17 minutes West Longitude. Airspace and noise issues were reviewed for off-base areas adjacent to Edwards AFB and the PB-13 target.

Resources within the ROI have been identified and evaluated under the following categories: air quality, airspace, cultural resources, environmental justice, geology and soils, hazardous waste/hazardous materials, infrastructure, land use, natural resources, noise, public/emergency services, safety, socioeconomics, and water resources. No potentially significant impacts were identified to any of these areas under the alternatives considered. This finding was based primarily on the fact that:

- The limited number of flights (100 or less per year) would be less than 2 percent of the current activity.
- The noise generated from the detonations of the armed munitions on the PB-13 target would be similar in peak sound levels to the noise from the sonic booms created by the supersonic aircraft.
- After each mission the target area would be cleared of any unexploded ordnance, thus reducing the potential for contamination of any of the resource areas to less than significant.

Decisions regarding the significance of impacts, as defined under National Environmental Policy Act of 1969 (NEPA), are based on a consensus of the interpretation of environmental laws, rules, and regulations by cognizant federal, state, and local agencies; previously certified environmental documentation for similar projects; and trained and experienced professionals in each environmental field.

Cumulative Impacts

Alternatives A, B, or C would have no cumulative impacts to airspace, land use, noise, or to any other issue area analyzed in this Environmental Assessment (EA). To prevent the accumulation of unexploded ordnance at the PB-13 target, the Air Force will establish a procedure to remove fragments and detonate in place any unexploded ordnance before any subsequent mission.

Short-term Versus Long-term Productivity of the Environment

No new construction or other development would be required under the Armed Munitions Integration Testing Program and current Air Force or contractor personnel from other bases would be used for the program. Neither Alternative A, B, nor C would involve any short- or long-term changes in population or productivity of the environment.

Irreversible and Irrecoverable Commitments of Resources

This EA only addresses the use and maintenance of the PB-13 target for armed munitions. Designating the site for armed munitions or integration testing would not require an irreversible or irretrievable commitment of resources. Irreversible or irretrievable commitment of resources that would be involved in other phases of the program (e.g., munition fabrication and transportation to the site) would be addressed in separate environmental documentation. Implementation of Alternative D (No-Action Alternative) would also not require an irreversible or irretrievable commitment of resources.

4.0 CONCLUSION

On the basis of the findings of the EA, no significant impact to human environment would be expected from implementation of the Proposed Action. No mitigation measures are recommended. Therefore, issuance of a Finding of No Significant Impact is warranted, and preparation of an Environmental Impact Statement, pursuant to the NEPA (Public Law 91-190) is not required. Background information that supports the research and development of this FONSI and the EA are on file at Edwards AFB and may be obtained by contacting:

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9 May 05
Date

EXECUTIVE SUMMARY

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This Environmental Assessment (EA) has been prepared to analyze the environmental consequences associated with designating the PB-13 target area in the Precision Impact Range Area (PIRA) at Edwards Air Force Base as an armed munitions only target. Designating and using PB-13 in this capacity would primarily support testing and integration of weapons systems with various new and current aircraft platforms, which is an integral part of the Air Force Flight Test Center (AFFTC) mission. In addition to satisfying the requirements of the National Environmental Policy Act of 1969, this document provides the basis for safeguarding the resources under the protection of the AFFTC that could potentially be affected by the proposed action.

This EA includes four alternatives: Alternative A—Desired Capability—Designate PB-13 as an Armed Munitions Only Target with a Capacity of 100 Weapons Delivery Events per Calendar Year (Proposed Action); Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only Target with a Capacity of 50 Weapons Delivery Events per Calendar Year; Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year; and Alternative D—No-Action Alternative.

The impact of each alternative on 14 resource areas that could potentially be affected was evaluated. The resource areas considered are air quality, airspace, cultural resources, environmental justice and the protection of children, geology and soils, hazardous waste/hazardous materials/solid waste, infrastructure, land use, natural resources, noise and vibration, public/emergency services, safety, socioeconomics, and water resources.

The analysis indicated that none of the impacts would be significant. Measures to protect the various resource areas have been incorporated into the description of each action alternative, and mitigation measures have been included to further address any potential effects on the environment.

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1 **1.0 PURPOSE AND NEED**

2 **1.1 INTRODUCTION**

3 This Environmental Assessment (EA) evaluates the potential environmental effects associated with the
4 proposed use of one target on the Precision Impact Range Area (PIRA) at Edwards Air Force Base (AFB)
5 for testing and evaluation (T&E) of armed munitions integration and delivery.

6 This EA was prepared in accordance with all applicable federal, state, local laws and regulations
7 including the requirements of the National Environmental Policy Act (NEPA) of 1969, as amended (42
8 United States Code [U.S.C.] 4321 *et seq.*); the Council on Environmental Quality (CEQ) Regulations for
9 Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] 1500–1508);
10 and 32 CFR Part 989, *The Environmental Impact Analysis Process*. The U.S. Air Force Flight Test Center
11 (AFFTC) is representing the Department of Defense (DoD) as the lead agency.

12 **1.2 LOCATION OF PROPOSED ACTION**

13 Edwards AFB is located in the Antelope Valley region of the western Mojave Desert in Southern
14 California. It is about 60 miles northeast of Los Angeles, California. The base occupies an area of
15 approximately 301,000 acres or 470 square miles. Portions of the base lie within Kern, Los Angeles, and
16 San Bernardino counties (Figure 1-1).

17 The PIRA is located on the southeastern one-third of Edwards AFB, a portion of which borders the Air
18 Force Research Laboratory. The PIRA occupies approximately 92,160 acres (144 square miles). The site
19 of the Proposed Action, target PB-13 (Figure 1-2), is located in the West Range of the PIRA (Figure 1-3).

20 **1.3 BACKGROUND**

21 The use of Edwards AFB as a bombing and gunnery range began when Lt Col H.H. “Hap” Arnold
22 established a stark and remote training site (Muroc Bombing and Gunnery Range) for his March Field,
23 California, squadrons in September of 1933. It operated in that capacity until 1942 when it was activated
24 as a major bomber-training base for training World War II pilots before they deployed overseas.

25 Munitions integration testing would include the use of inert munitions (munitions missing operational
26 components and/or containing spotter rounds) or fully operational weapons systems containing an armed

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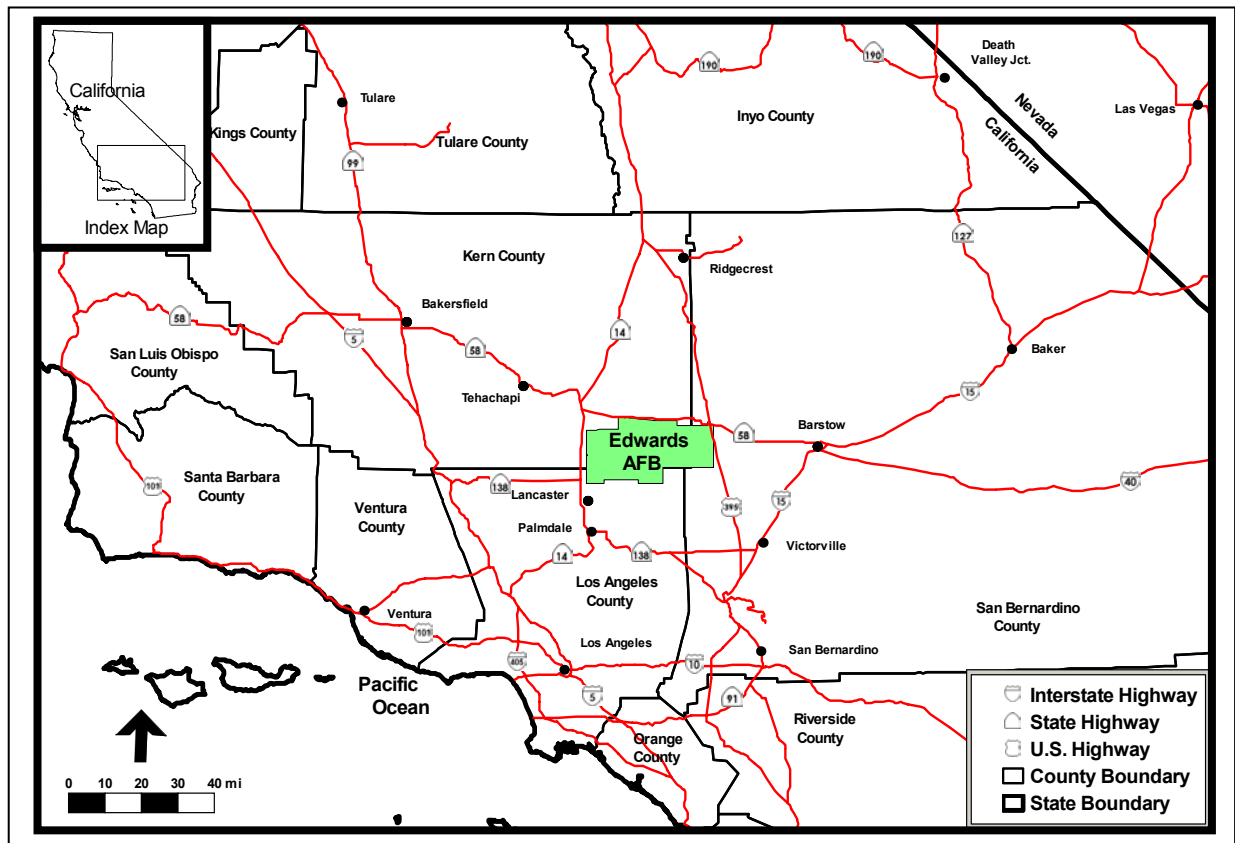
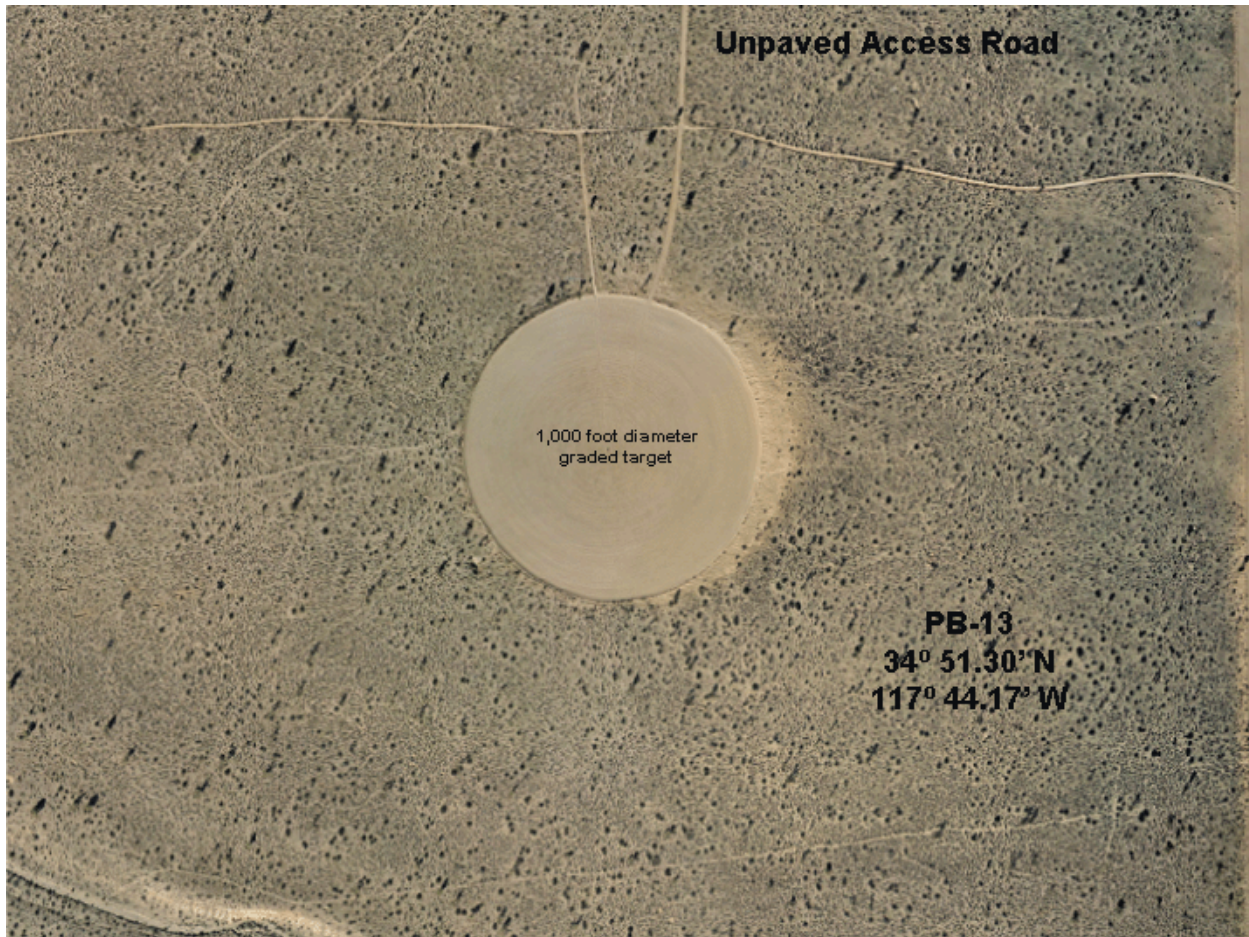


Figure 1-1 Edwards AFB and Vicinity

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2 munition—a fully operational munition containing all components and the full net explosive weight
3 (NEW). Dropping armed munitions—bombs with NEW designed to detonate on impact—on the various
4 targets was an integral part of the base’s new mission. In 1995 the U.S. Fish and Wildlife Service
5 (USFWS) issued a biological opinion allowing AFFTC/Edwards AFB to conduct ten 5,000-pound, ten
6 1,000-pound, and twenty 250-pound detonation tests annually at various locations at the Phillips Lab (Air
7 Force Research Lab [AFRL]).

8 The AFFTC was officially activated at Edwards AFB on June 25, 1951. The AFFTC is tasked to support
9 the Air Force Materiel Command (AFMC) mission by conducting and supporting research, development,
10 T&E of both manned and unmanned aerospace systems, and the operation of the Air Force Test Pilot
11 School. This mission not only involves all aspects of testing aerospace systems, but also includes the
12 flight evaluation and recovery of research vehicles and developmental testing of aerodynamic
13 decelerators. As part of its mission, the AFFTC conducts T&E programs for the Air Force in addition to
14 supporting other T&E customers including the U.S. Army and U.S. Navy, other U.S. government
15 agencies, private contractors, and foreign governments.



1 **Note:** Target circle is 1,000 feet in diameter.

2 **Figure 1-2 Aerial Photo of PB-13**

3 However, the majority of the AFFTC's workload consists of testing total weapon systems, including all
4 major subsystems, as part of the AFMC systems development and support. This includes the complete
5 new weapons systems testing (as with the B-2, C-17, and F-22 programs). Additionally, this extends to
6 testing of major modifications to existing systems, such as the F-16 Block 50 upgrade, and subsystem
7 upgrades such as integration of weapons on the Predator unmanned aerial vehicle (UAV). Each
8 subsystem is evaluated to determine whether it will perform as designed, whether it will perform its
9 function in conjunction with other subsystems in a mission environment, and its effects on the total
10 system performance. One of the most critical phases of T&E is weapons delivery, which is considered an
11 integral part of the mission of the AFFTC.

12 One of the major AFFTC resources is the Edwards Flight Test Range (EFTR). The EFTR consists of
13 multi-environmental test areas, instrumentation, and airborne capability needed for developmental and
14 operational T&E. Low and high altitude supersonic flight profiles can be accommodated over land from

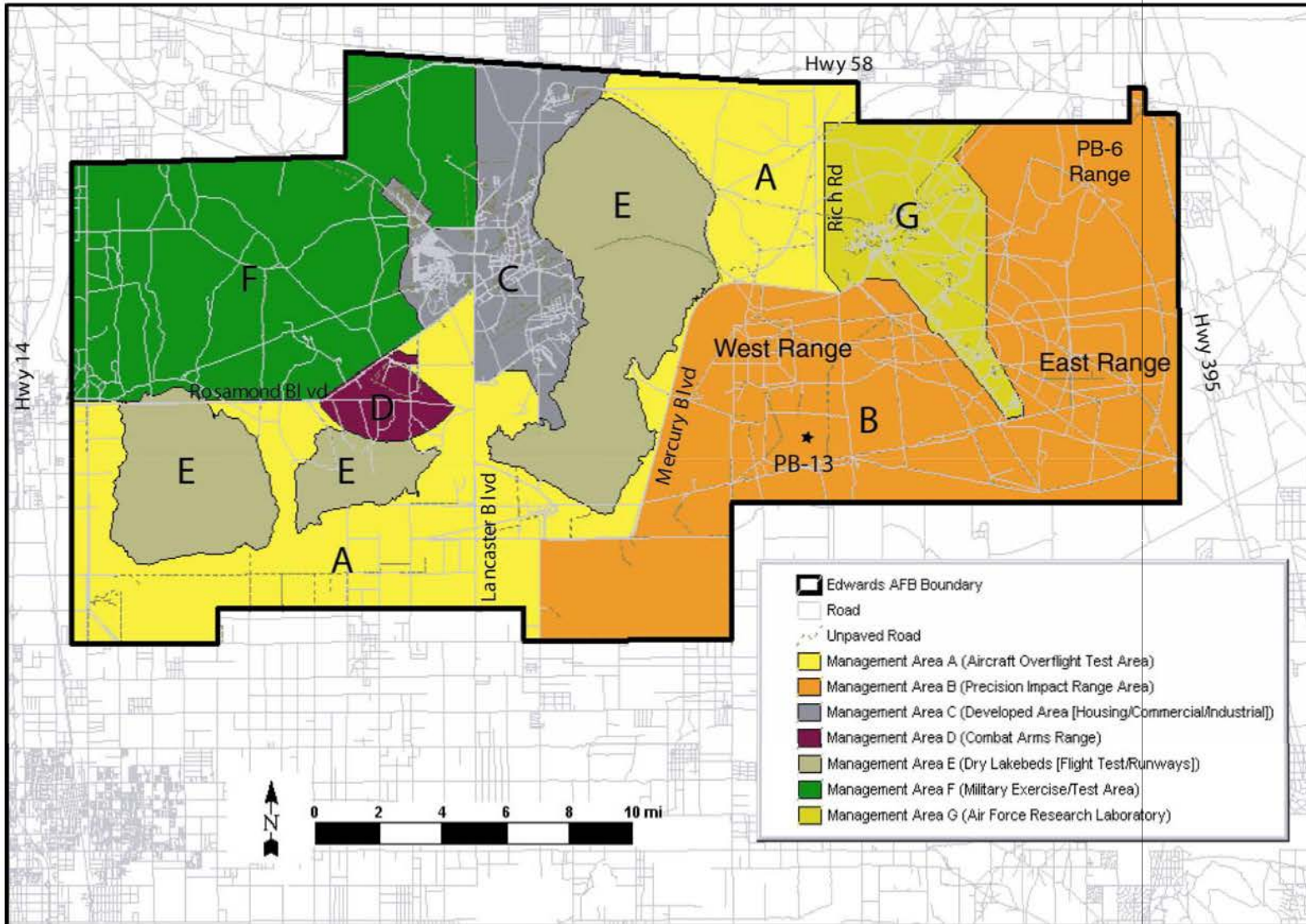


Figure 1-3 Location of PB-13 on the West Range of the PIRA

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1 the surface to unlimited altitudes. The extended range encompasses an instrumented airspace corridor
2 extending from San Nicolas Island in the Pacific Ocean to the Utah Test and Training Range at Hill AFB,
3 Utah. Highly instrumented land test areas, along with access to over-ocean areas, provide the Air Force
4 with a fully capable aircraft/avionics/weapons integration and subsystem-testing environment. The PIRA
5 is one component of the EFTR.

6 Mission facilities for the PIRA include instrumentation radars, optical trackers, telemetry receivers, video
7 and timing instrumentation, infrared (IR) resolution ranges, targets, and reflector arrays. These elements
8 are controlled from Ridley Mission Control Center (RMCC) and can be modified and adjusted to meet
9 mission T&E requirements. The focus of RMCC activities is on real-time collection and display of flight
10 test information, but pretest planning and preparation and post-mission data processing and analysis are
11 also performed. The Range Division operates the PIRA and associated facilities at Edwards AFB and is
12 overseen by the 412th Test Wing (412 TW) and AFFTC Commander.

13 The Proposed Action would occur within the boundaries of the PIRA’s West Range. The scope of the
14 impact analysis performed in this EA is, therefore, limited to armed munitions delivery on the PIRA,
15 specifically to target PB-13. Historically, armed munitions tested at Edwards AFB supported a variety of
16 delivery platforms. No relocation of PIRA facilities or new construction is envisioned as a result of this
17 Proposed Action.

18 **1.4 PURPOSE OF PROPOSED ACTION**

19 The Proposed Action is to designate target PB-13, located on the PIRA’s West Range, as an armed
20 munitions-only target. The objectives of establishing an armed munitions target at Edwards AFB are the
21 following:

- 22 • Support ongoing and future systems integration testing and armed munitions delivery;
- 23 • Support T&E of an armed munitions delivery mission that is independent of the platform
24 delivering the munition; and
- 25 • Complement Edwards AFB and the AFFTC current mission capabilities and facilitate the
26 completion of life-cycle testing of an integrated, armed munitions delivery system.

27

1 **1.5 NEED FOR PROPOSED ACTION**

2 Armed munitions delivery system testing at Edwards AFB is restricted to the use of inert munitions. New
3 armed munition systems are not always available with inert munitions with which to conduct testing.
4 Additionally, the test objectives for the final stage of integration testing may require armed munitions.
5 Current restrictions on the PIRA prevent the use of armed munitions during aircraft system testing.
6 Therefore, the final stage of system integration testing for systems lacking inert munitions must be
7 relocated to an area where armed munitions testing can be performed.

8 Relocating the munitions delivery testing program can result in unnecessary re-testing of armed munitions
9 delivery subsystems, which could be required to ensure test parameters are calibrated and qualified at the
10 new test site. The associated increased cost and time required to relocate the testing program could delay
11 the operational use of an armed munition needed to counter real-world tactical threats.

12 For example, a recent munitions-integration test consisting of firing a Hellfire air-to-ground missile from
13 a Predator UAV could not be conducted on the Edwards AFB range despite the clear advantages to the
14 test program of doing so because the Edwards AFB range is not certified for use of the armed munitions
15 required for the test. The Predator UAV was flown from the General Atomics facility at Mirage Dry
16 Lake, located approximately 20 miles southeast of the Edwards AFB test ranges. The test could have
17 been completed at the company facility with a short flight to the Edwards AFB range for actual missile
18 firing. However an inert Hellfire missile was not available, which meant an armed munition had to be
19 used for the test. Because Edwards AFB is not certified for use of armed munitions, the test program was
20 forced to use the Naval Air Station China Lake range, which is over 80 miles away. This required a
21 complete deployment of the aircraft, ground support personnel, and all test equipment to Naval Air
22 Station China Lake because the distance to the range and other operational considerations precluded
23 flying from the General Atomics facility. The test was in support of a real-time requirement for an anti-
24 terrorism activity. Although it was completed in time to be used by the war fighters, deployment of the
25 test force to Naval Air Station China Lake required extraordinary priority (cost and effort) because of the
26 complex logistics support, planning, and coordination. The test could have been completed at
27 considerable savings of cost and effort if the Edwards AFB range had been certified for use of armed
28 munitions.

1 **1.6 ISSUES AND CONCERNS**

2 During the scoping process representatives from Edwards AFB, AFFTC Environmental Management
3 Office, Explosive Ordnance Disposal Office, Range Safety, and others identified the following issues and
4 concerns as requiring a detailed assessment when considering the potential environmental effects of the
5 Proposed Action and Alternatives.

6 **1.6.1 Issues and Concerns Studied in Detail**

7 ***Air Quality***—Proposed operational air quality impacts and the Proposed Action’s conformity to the
8 Federal Clean Air Act (CAA).

9 ***Airspace***—Impacts of armed munitions on the airspace at the site of the Proposed Action and impacts on
10 the airspace required for the testing of weapons delivery at PB-13.

11 ***Cultural Resources***—Potential to impact cultural resources resulting from weapons delivery and potential
12 impacts upon Native American resources and/or values.

13 ***Geology and Soils***—Soil erosion impacts associated with project implementation.

14 ***Hazardous Materials and Waste***—Potential impacts of hazardous materials and waste associated with
15 live munitions and disposal of dud munitions.

16 ***Land Use***—Potential impact on the use of a designated target site and the impact of designating the
17 Proposed Action site for a limited purpose.

18 ***Natural Resources***—Nature, extent, and impact on biological resources within and around the region of
19 interest.

20 ***Noise***—Potential noise impacts associated with the Proposed Action and Alternatives.

21 ***Safety and Occupational Health***—Potential safety issues associated with the delivery of armed
22 munitions on the Proposed Action site and short-/ long-term impacts on personnel conducting routine
23 cleanup.

24 ***Water Resources***—Impacts of the Proposed Action and Alternatives on local water quality (surface and
25 groundwater).

1 **1.6.2 Issues and Concerns Eliminated From Detailed Study**

2 The following issues and concerns were initially considered, but subsequently eliminated from further
3 consideration in this EA: Socioeconomics, Environmental Justice and Protection of Children,
4 Infrastructure, Energy Resources, and Public/Emergency Services. These issues will only be briefly
5 mentioned, in Chapters 3 and 4.

6 **1.7 ENVIRONMENTAL IMPACT ANALYSIS PROCESS**

7 The NEPA established a national policy to protect the environment and ensure that federal agencies
8 consider the environmental effects of actions in their decision-making. The CEQ is authorized to oversee
9 and recommend national policies to improve the quality of the environment. The CEQ published
10 regulations that describe how NEPA should be implemented. These regulations encourage federal
11 agencies to develop and implement procedures that address the NEPA process in order to avoid or
12 minimize adverse effects on the environment. Title 32 CFR Part 1989 addresses implementation of
13 NEPA as part of the Air Force planning and decision-making process.

14 **1.8 FUTURE OF THIS DOCUMENT**

15 Future proposed projects would be reviewed and evaluated to determine if they fall within the scope of
16 this EA. If so, then these projects may use the analysis presented here for a categorical exclusion
17 (CATEX) or tier off this document. In some cases, a supplement to this EA may be required. If a
18 supplemental EA were required, a new Finding of No Significant Impact (FONSI) would be necessary.
19 Future actions that are found to result in a significant environmental impact that could not be mitigated to
20 a level of insignificance would need to be addressed in an Environmental Impact Statement.

21 **1.9 STRUCTURE OF THIS EA**

22 This EA presents the analysis and description of potential environmental effects that could result from the
23 Proposed Action and Alternatives. As appropriate, the affected environment and environmental
24 consequences of the Proposed Action and Alternatives are presented in terms of regional and site-specific
25 descriptions.

26 Chapter 2.0 contains descriptions of Alternative A (Proposed Action), Alternative B, Alternative C, and
27 Alternative D (No-Action Alternative). Project information and the general parameters associated with
28 the Proposed Action are also described in Chapter 2.0.

1 Chapter 3.0 provides detailed regional and site-specific information related to air quality, airspace,
2 cultural resources, geology and soils, hazardous materials/hazardous waste, land use, natural resources,
3 noise, safety and occupational health, and water resources. The regional information included in this
4 section provides the background for understanding the context of the site-specific information that could
5 affect or be affected by the Proposed Action and Alternatives.

6 Chapter 4.0 addresses the potential effects of the Proposed Action and Alternatives on the resource areas
7 analyzed.

8 Chapters 5.0 through 8.0 identify references, persons and agencies contacted, preparers of this EA, and
9 acronyms and abbreviations, respectively.

10 Appendix A contains the results of an air quality analysis conducted for the proposed project. The
11 distribution list for this EA is included in Appendix B. Appendix C contains the responses to comments
12 received from the public and stakeholders.

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2.0 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This chapter describes the Proposed Action and Alternatives, including the No-Action Alternative. Alternative A, the Proposed Action, is to designate the West Range precision bombing target, PB-13, as an armed munitions only target with a capacity of 100 weapons delivery events per year. Alternatives B and C are similar to Alternative A, except the armed munitions weapons delivery events would be limited to 50 and 10 events per year, respectively. For all three alternatives, armed munitions are defined as a munition with a NEW limited to 500 pounds. The weapons would be delivered in either an air-to-ground or ground-to-ground mode. The residual effects would be cleared from the target site prior to the next armed munition delivery event. Runway 22 would be used for air-to-ground missions. No off-road vehicles would be required for ground-to-ground missions.

Alternative D, the No-Action Alternative, is the status quo with the target remaining as a precision bombing target for inert and practice bombs. Also included in this chapter are the criteria used to select the alternatives and a brief discussion of the alternatives considered but eliminated from further study. The potential environmental effects of each alternative are summarized in table form at the end of this chapter.

2.1 DEVELOPMENT OF ALTERNATIVES

The analysis of the Proposed Action and Alternatives is the cornerstone of the EA. It is intended to provide the decision maker and the public a clear understanding of the relevant issues and the basis of the choice among identified options. A reasonable range of alternatives is required by NEPA. Alternatives that meet the basic Purpose and Need in this EA were developed based on the following guidelines:

- Assessment of current capabilities against projected needs to support the AFFTC mission; capabilities required include:
 - Maximum number of events based on anticipated future requirements; and
 - Alternatives to provide limited and minimum capability.
- Review of applicable guidelines for land use and resource management;
- Identification of public concerns and issues through a public review process.

2.3 ALTERNATIVE A—DESIRED CAPABILITY—DESIGNATE PB-13 AS AN ARMED MUNITIONS ONLY TARGET WITH A CAPACITY OF 100 WEAPONS DELIVERY EVENTS PER CALENDER YEAR (PROPOSED ACTION)

Under Alternative A, target PB-13 would be designated an armed munitions only target with a capacity of 100 weapons delivery events per calendar year. Alternative A represents the Proposed Action and would be consistent with current use of the PIRA.

2.3.1 PB-13 Site Description

Precision bombing target PB-13 is located at T9N, R8W, Sections 20 and 21. The elevation of PB-13 is 2,426 feet above mean sea level (MSL). The target’s center is located at latitude 34 degrees 51.30 minutes N and longitude 117 degrees 44.17 minutes W. The target is located in a remote area of the range that is approximately 8.3 miles from Hi Vista, the closest off-base community (Figure 2-1). The target surface is a 1,000-foot diameter graded surface consisting primarily of loams, sandy loams, and clay soils (Figures 2-2 and 2-3).

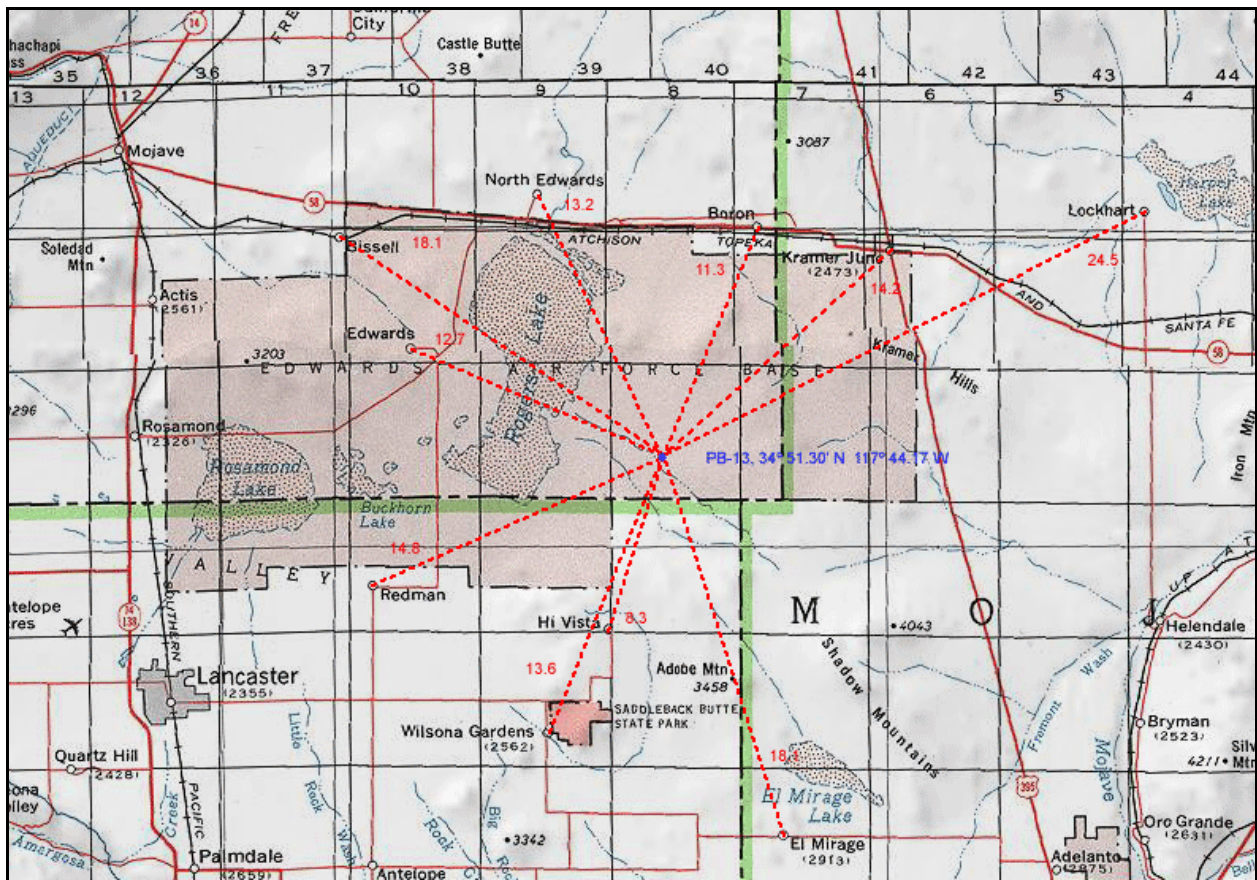


Figure 2-1 Distances from PB-13 to Local Communities in Miles



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Figure 2-2 Aerial View of PB-13



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Figure 2-3 Ground Level View of PB-13

1 **2.3.2 Mission/Flying Operations**

2 Under the Proposed Action, up to 100 weapons delivery events would occur annually. Either single or
3 multiple munitions could be delivered, depending on the integration testing requirements. Mission
4 aircraft would comply with approved flight profiles and weapons delivery procedures per applicable DoD,
5 Air Force, and AFFTC instructions.

6 **2.3.3 Maintenance**

7 Range maintenance would be accomplished in accordance with Air Force Instruction (AFI) 13-212,
8 *Range Operations and Planning*.

9 **2.3.4 Range Clearance/Explosive Ordnance Disposal Operations**

10 The target would be cleared of any duds and/or fragments according to range maintenance policy and AFI
11 13-212. Specific mitigation for this Proposed Action would include clearing the target area of any duds
12 after each mission and before any additional armed munitions are dropped on the target. A written record
13 of the cleanup activities would be kept by the Explosive Ordnance Disposal (EOD).

14 **2.4 ALTERNATIVE B—LIMITED CAPABILITY—DESIGNATE PB-13 AS AN**
15 **ARMED MUNITIONS ONLY TARGET WITH A CAPACITY OF 50 WEAPONS**
16 **DELIVERY EVENTS PER CALENDER YEAR**

17 Under Alternative B, PB-13 would be designated an armed munitions only target with a capacity of 50
18 weapons delivery events per calendar year.

19 **2.4.1 Mission/Flying Operations**

20 Under Alternative B, up to 50 weapons delivery events would occur annually. Either single or multiple
21 munitions could be delivered, depending on the integration testing requirements. Mission aircraft would
22 comply with approved flight profiles and weapons delivery procedures per applicable DoD, Air Force,
23 and AFFTC instructions.

24 **2.4.2 Maintenance**

25 Range maintenance would be accomplished in accordance with AFI 13-212, *Range Operations and*
26 *Planning*.

1 **2.4.3 Range Clearance/Explosive Ordnance Disposal Operations**

2 The target would be cleared of any duds and/or fragments according to range maintenance policy and AFI
3 13-212. Specific mitigation for Alternative B would include clearing the target area of any duds after
4 each mission and before any additional armed munitions are dropped on the target. A written record of
5 the cleanup activities would be kept by EOD.

6 **2.5 ALTERNATIVE C—MINIMUM CAPABILITY—DESIGNATE PB-13 AS AN**
7 **ARMED MUNITIONS ONLY TARGET WITH A CAPACITY OF 10 WEAPONS**
8 **DELIVERY EVENTS PER CALENDER YEAR**

9 Under Alternative C, target PB-13 would be designated as an armed munitions only target with a capacity
10 of 10 weapons delivery events per calendar year.

11 **2.5.1 Mission/Flying Operations**

12 Under Alternative C, up to 10 weapons delivery events would occur annually. Either single or multiple
13 munitions could be delivered, depending on the integration testing requirements. Mission aircraft would
14 comply with approved flight profiles and weapons delivery procedures per applicable DoD, Air Force,
15 and AFFTC instructions.

16 **2.5.2 Maintenance**

17 Range maintenance would be accomplished in accordance with AFI 13-212, *Range Operations and*
18 *Planning*.

19 **2.5.3 Range Clearance/Explosive Ordnance Disposal Operations**

20 The target would be cleared of any duds and/or fragments according to range maintenance policy and AFI
21 13-212. Specific mitigation for Alternative C would include clearing the target area of any duds after
22 each mission and before any additional armed munitions are dropped on the target. A written record of
23 the cleanup activities would be kept by EOD.

24 **2.6 ALTERNATIVE D —NO-ACTION ALTERNATIVE**

25 Under Alternative D, the No-Action Alternative, no armed munitions would be used on the PB-13 target.
26 Mission aircraft would comply with approved flight profiles and inert weapons delivery procedures per
27 applicable DoD, Air Force, and AFFTC instructions.

1 **2.7 ALTERNATIVES CONSIDERED BUT ELIMINATED**

2 Initially the conversion of the entire PIRA to an armed munitions range was considered; however, due to
3 the other T&E requirements, this alternative was eliminated.

4 Within the current PIRA operating areas there are numerous targets that were considered for the Proposed
5 Action, however, they were eliminated from further consideration for the reasons discussed below. These
6 include precision bombing (PB) targets that are presently designated for bombing; visual/photographic
7 support; lighting arrays; bombing and laser; and bombing, laser, and airdrop missions.

8 The current Biological Opinion divides the PIRA into three Desert Tortoise Management Zones based on
9 known densities of the tortoises and level of activities associated with the use of the PIRA.¹ Precision
10 Bombing Target 6 (PB-6), located in the extreme northeastern section of the PIRA, was eliminated as an
11 alternate target location for the following reasons.

- 12 • It is located in desert tortoise (*Gopherus agassizii*) critical habitat in PIRA Management
13 Zone 2, within the Fremont-Kramer Desert Wildlife Management Area (Fremont-Kramer
14 DWMA). The Fremont-Kramer DWMA is one of six critical habitat units established by
15 the USFWS for recovery of the federally threatened desert tortoise.
- 16 • There are known cultural artifacts in the target's vicinity.

17 This decision supports the AFFTC posture for environmental stewardship and protection of irreplaceable
18 resources.

19 Other single and multiple targets on the PIRA failed to meet the anticipated safety requirements needed
20 for armed munitions weapons integration and testing. Review of the infrastructure support requirements
21 for precision targets in the Desert Tortoise Management Zone 1 reduced the list of targets considered to
22 PB-13.

23 Other ranges that were considered failed to meet the purpose and goals of the AFFTC and Edwards AFB.
24 Among those considered but eliminated were:

- 25 • Utah Test and Training Range, Utah;

¹ Zone 1 represents low desert tortoise density in the heaviest use area. Zone 2 represents moderate desert tortoise density and the current rate of activity. Zone 3 represents high desert tortoise density and a minimal level of activity. See Chapter 3 for further discussion.

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- 1 • Nevada Test and Training Range, Nevada;
- 2 • Naval Air Warfare Center, Weapons Division, Point Mugu, California;
- 3 • Naval Air Warfare Center, Weapons Division, China Lake, California;
- 4 • 30th Space Wing, Vandenberg AFB, California; and
- 5 • Air Force Air Armament Center 46th Test Wing, Florida.

6 The funding required to regularly relocate project personnel to other ranges to conduct these tests could
7 impact the timely introduction of the weapons needed to support precision and surgical strike
8 requirements of the warfighter.

9 **2.8 OTHER FUTURE ACTION IN THE REGION**

10 Other actions within the region were evaluated to determine whether cumulative environmental effects
11 could result from implementing the Proposed Action or one of the Alternatives. Cumulative effects result
12 from “the incremental impact of the action when added to other past, present, and reasonably foreseeable
13 future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.
14 Cumulative impacts can result from individually minor but collectively significant actions taking place
15 over a period of time” (40 CFR 1508.7). Other actions within the geographic region of Edwards AFB and
16 the R-2508/R-2515 special use airspace that could be considered to have the potential for cumulative
17 effects include other flight test programs and weapons delivery testing. However, because of the limited
18 number of designated armed munitions targets in the region, the remoteness of the target site, stringent
19 range safety requirements, and the requirement for specific test plan approval prior to each action, these
20 actions are not expected to have any significant cumulative effects.

21 **2.9 COMPARISON OF ENVIRONMENTAL EFFECTS**

22 Table 2-2 provides a summary of anticipated environmental effects for each alternative.

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Table 2-2

Anticipated Environmental Effects for the Affected Environment

Issue	Alternative A	Alternative B	Alternative C	Alternative D
Air Quality	Minimal	Minimal	Minimal	None
Airspace	Minor	Minimal	Minimal	None
Cultural Resources	None	None	None	None
Geology and Soils	Minor	Minimal	Minimal	None
Hazardous Material/Waste	Minimal	Minimal	Minimal	None
Land Use	Minor	Minimal	Minimal	None
Natural Resources	Minor	Minor	Minimal	None
Noise and Vibration	Minor	Minor	Minor	None
Safety	Minor	Minimal	Minimal	None
Water Resources	Minimal	Minimal	Minimal	None

Notes: Rating scale is used within the attribute table only.

Minimal: Impacts that are not expected to be measurable or are measurable but are too small to cause any change in the environment.

Minor: Potential adverse impacts that are measurable, but are within the capacity of the impacted system to absorb the change or the impacts can easily be mitigated with little effort and resources so that they are not significant.

Moderate: Potentially adverse impacts that are measurable, but do not violate any laws or regulations and are within the capacity of the impacted system to absorb the change to impacts, can be mitigated with effort and resources so that they are not significant.

Major: Potentially adverse impacts that individually or cumulatively could be significant.

None: No impacts expected.

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3.0 AFFECTED ENVIRONMENT

This chapter describes existing environmental conditions likely to be affected by Alternatives A, B, and C. The Region of Influence (ROI) consists of Edwards AFB, specifically the PB-13 target on the PIRA. The ROI for each action will be discussed in terms of two distinct regions: (1) on-base region, and (2) PB-13 target on the PIRA. The on-base region comprises all of Edwards AFB.

Resources within the ROI have been identified under the following categories: air quality, airspace, cultural resources, *environmental justice and protection of children*, geology and soils, hazardous waste/hazardous materials, *infrastructure*, *energy resources*, land use, natural resources, noise, *public/emergency services*, safety and occupational health, *socioeconomics*, and water resources. Resource categories shown in italics will be briefly covered in their respective section.

3.1 AIR QUALITY

Air quality in a given location is defined by the concentration of various pollutants in the atmosphere and is typically expressed in parts per million (ppm) or micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). By comparing a pollutant concentration in the atmosphere to federal and/or state ambient air quality standards, the significance of its presence can be determined. These standards represent the maximum allowable atmospheric concentrations that may occur while still protecting public health and welfare with a reasonable margin of safety. The federal standards are established by the U.S. Environmental Protection Agency (U.S. EPA) and are termed the National Ambient Air Quality Standards (NAAQS). The NAAQS are defined as maximum acceptable ground-level concentrations that may not be exceeded more than once per year, with the exception of annual standards that may never be exceeded. These standards include concentrations for ozone, carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter 10 microns or less in diameter (PM_{10}), particulate matter 2.5 microns or less in diameter ($\text{PM}_{2.5}$), and lead. The California Air Resources Board (CARB) has established state standards termed the California Ambient Air Quality Standards (CAAQS). The CAAQS are at least as restrictive as the NAAQS and include pollutants for which there are no national standards. The national and state ambient air quality standards are shown in Table 3-1.

The pollutants considered in the impact analysis of this EA include volatile organic compounds (VOCs), ozone, CO, NO_2 , SO_2 , and PM_{10} . Conformity guidelines do not present threshold levels for particulate matter 2.5 microns or less in diameter ($\text{PM}_{2.5}$) and no known sources of lead are associated with the

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**Table 3-1
National and California Ambient Air Quality Standards**

Pollutant	Averaging Time	California	National Standards ^(a)	
		Standards	Primary ^(b,c)	Secondary ^(b,d)
Ozone	1-hour	0.09 ppm	0.12 ppm	same as primary
	8-hour	---	0.08 ppm	same as primary
Carbon monoxide	1-hour	20 ppm	35 ppm (40 mg/m ³)	none
	8-hour	9.0 ppm	9 ppm (10 mg/m ³)	none
Nitrogen dioxide	1-hour	0.25 ppm	---	---
	Annual (arithmetic mean)	---	0.053 ppm (100 µg/m ³)	same as primary
Sulfur dioxide	1-hour	0.25 ppm	---	---
	3-hour	---	---	0.5 ppm (1,300 µg /m ³)
	24-hour	0.04 ppm	0.14 ppm	---
	Annual (arithmetic mean)	---	0.03 ppm	---
PM ₁₀	24-hour	50 µg /m ³	150 µg /m ³	---
	Annual (arithmetic mean)	20 µg /m ³	50 µg /m ³	same as primary
PM _{2.5}	24-hour	---	65 µg /m ³	---
	Annual (arithmetic mean)	12 µg /m ³	15 µg /m ³	same as primary
Lead	30-day average	1.5 µg /m ³	---	---
	quarterly average	---	1.5 µg /m ³	same as primary

3 **Notes:** a – Other than for ozone and those based upon annual averages, standards are not to be exceeded more than once per
4 year. The ozone standard is attained when the expected number of days per calendar year with maximum hourly
5 average concentrations above the standard is equal to or less than one.
6 b – Concentrations are expressed first in the units in which they were promulgated. Equivalent units are given in
7 parentheses.
8 c – Primary Standards: The levels of air quality necessary, with an adequate margin of safety, to protect the public
9 health. Each state must attain the primary standards no later than 3 years after the U.S. EPA approves the state’s
10 implementation plan.
11 d – Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or
12 anticipated adverse effects of a pollutant. Each state must attain the secondary standards within a “reasonable time”
13 after the EPA approves the implementation plan.
14 EPA – Environmental Protection Agency

Table 3-1 (Continued)

National and California Ambient Air Quality Standards

Notes: (Continued)

$\mu\text{g}/\text{m}^3$ – micrograms per cubic meter

mg/m^3 – milligrams per cubic meter

$\text{PM}_{2.5}$ – particulate matter equal to or less than 2.5 microns in diameter

PM_{10} – particulate matter equal to or less than 10 microns in diameter

ppm – parts per million

Source: California Air Resources Board, www.arb.ca.gov/aqs/aaqs2.pdf, accessed on 8/30/04

proposed project; therefore, $\text{PM}_{2.5}$ and airborne emissions of lead are not considered in this EA. Emission of NO_2 and VOCs is of particular concern, as they are precursors to the formation of ozone.

Ozone concentrations are generally highest during the summer and coincide with the period of maximum insolation, or the maximum amount of solar radiation striking the earth's surface. Maximum ozone concentrations tend to be regionally distributed due to the homogeneous dispersion of precursor emissions in the atmosphere. Concentrations of inert pollutants, such as CO, tend to be the greatest during the cooler months of the year and are often a product of light wind conditions and nighttime/early morning surface-based inversions. Maximum inert pollutant concentrations are usually found near an emission source.

Evaluating impacts to air quality in the ROI requires knowledge of (1) the types of pollutants being emitted, (2) emission rates of the pollutant source, (3) the proximity of project emission sources to other emission sources, (4) topography, and (5) local and regional meteorological conditions. The area of effect for emissions of inert pollutants (pollutants other than ozone and its precursors) is generally limited to a few miles downwind from the source. The area of effect for ozone generally extends much further downwind. In the presence of solar radiation, the maximum effect of precursor emissions on ozone levels usually occurs several hours after their release, and therefore, many miles from the source.

The U.S. EPA designates all areas of the United States as having air quality better than (attainment) or worse than (non-attainment) the NAAQS. The criteria for non-attainment designation vary by pollutant. An area is (1) in non-attainment for ozone if its NAAQS has been exceeded more than three discontinuous times in 3 years at a single monitoring station and an area is (2) in non-attainment for any other pollutant if its NAAQS has been exceeded more than once per year. Pollutants in an area are often designated as unclassified when there are insufficient ambient air quality data for the U.S. EPA to form a

1 basis for attainment status. The CARB considers an area to be in non-attainment of a CAAQS for a
2 particular pollutant if (1) the standards for ozone, CO (except Lake Tahoe), SO₂ (1- and 24-hour), NO₂,
3 PM₁₀, and visibility reducing particles have been exceeded or (2) the standards for the remaining
4 pollutants have been equaled or exceeded.

5 Air quality regulations were first promulgated with the CAA. This Act established the NAAQS and
6 delegated the enforcement of air pollution regulations to the states. In areas where the NAAQS are
7 exceeded, the CAA requires preparation of a State Implementation Plan (SIP) that describes how a state
8 will attain the standards within mandated time frames. The CAA Amendments revised the attainment
9 planning process, basing new requirements and compliance dates for reaching attainment upon the
10 severity of the air quality standard violation.

11 Federal conformity guidelines included in the CAA Amendments state that a federal agency cannot
12 support an activity unless the agency determines that the activity will conform to the state's most recent
13 SIP approved by the U.S. EPA within the region of the proposed action. These guidelines state that
14 federally supported or funded activities must show that the proposed actions will not (1) cause or
15 contribute to any new air quality standard violation in any area, (2) interfere with programs outlined in
16 any SIP for maintenance of any standard, (3) increase the frequency or severity of any existing standard
17 violation in any area, or (4) delay the timely attainment of any standard or any required interim emission
18 reductions or other milestones in any area. The activities proposed herein are considered exempt from
19 this rule as long as there is no increase in emissions above the *de minimis* levels specified in the rule.
20 Therefore, a screening to determine the applicability of the conformance guidelines was performed.
21 Table 3-2 presents the *de minimis* threshold levels presented in the conformity rule for non-attainment
22 areas.

23 Ensuring reasonably foreseeable direct and indirect emissions do not exceed the *de minimis* thresholds
24 comprises only half of the screening process. In addition to this requirement, a federal action must also
25 not be considered regionally significant. A regionally significant action is defined as a federal action for
26 which direct and indirect emissions of any pollutant represent 10 percent or more of a nonattainment or
27 maintenance area's emissions inventory for that pollutant.

28 If a federal action meets both of the abovementioned criteria, it is exempt from further conformity
29 analysis pursuant to 40 CFR Part 93.153. However, although an action may be considered exempt,
30 should it be altered in any way that causes an increase in the reasonably foreseeable emissions, or if

Table 3-2

Conformity Analysis De Minimis Thresholds

Pollutant	Degree of Non-attainment	De Minimis Level (tons/year)
Nonattainment Areas		
Ozone (VOCs or NO ₂)	Serious	50
	Severe	25
	Extreme	10
	Marginal and Moderate (outside an ozone transport region)	100
	Marginal and Moderate (inside an ozone transport region)	50 (VOC) 100 (NO ₂)
	CO	All
PM ₁₀	Moderate	100
	Serious	70
SO ₂ or NO ₂	All	100
Lead	All	25

Notes: CO – carbon monoxide
NO_x – nitrogen oxides
NO₂ – nitrogen dioxide
SO₂ – sulfur dioxide
VOC – volatile organic compound

Source: 40 CFR, Chapter I, Subchapter C, Part 51.853, last updated July 2003

attainment areas are reclassified based on changes to NAAQS or the EPA-approved SIP, a revision to the conformity analysis may be required.

The impact on visibility from air pollutant emission sources is an issue with regard to federally mandated Class 1 areas, such as national parks and wilderness areas, where any appreciable deterioration in air quality is considered significant.

Areas in attainment with the NAAQS are regulated under the Prevention of Significant Deterioration (PSD) program authorized by the CAA Part C, Sections 160–169. PSD areas require owners and/or operators of new or modified sources to obtain a PSD permit prior to construction of a major source (40 CFR Part 5221) in attainment or unclassified areas. A major source is defined by PSD regulations as

1 being a specific type of source listed by the U.S. EPA that has a potential of emitting 100 tons per year of
2 a regulated pollutant. Potential to emit is based on the maximum design capacity of a source and takes
3 into account pollution control efficiency. If the U.S. EPA does not list a source, it may still be considered
4 major if it has the potential to emit 250 tons per year of a regulated pollutant.

5 **3.1.1 On-Base Region**

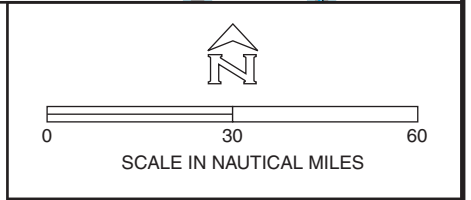
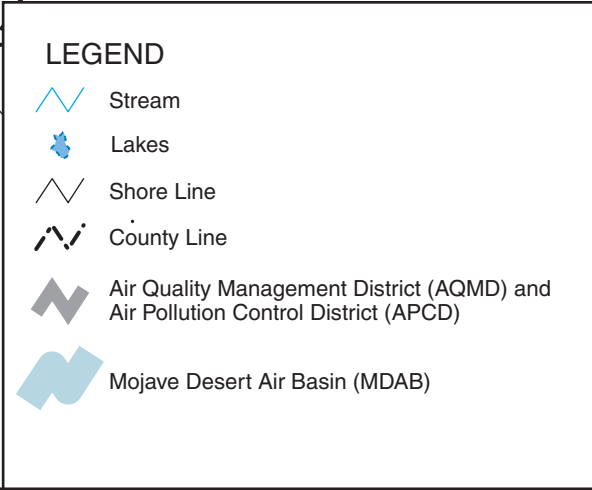
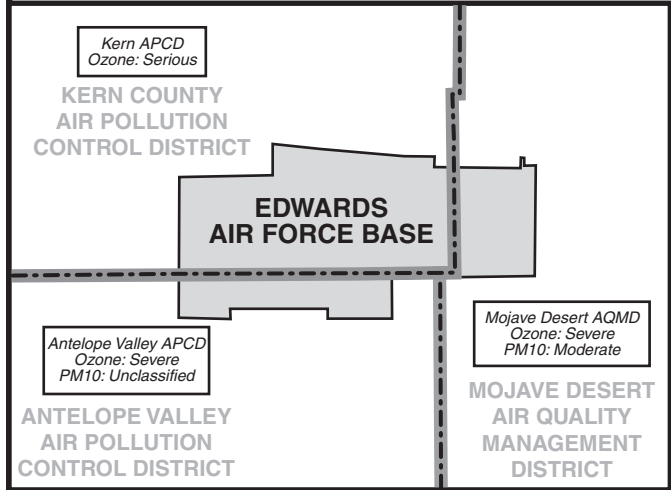
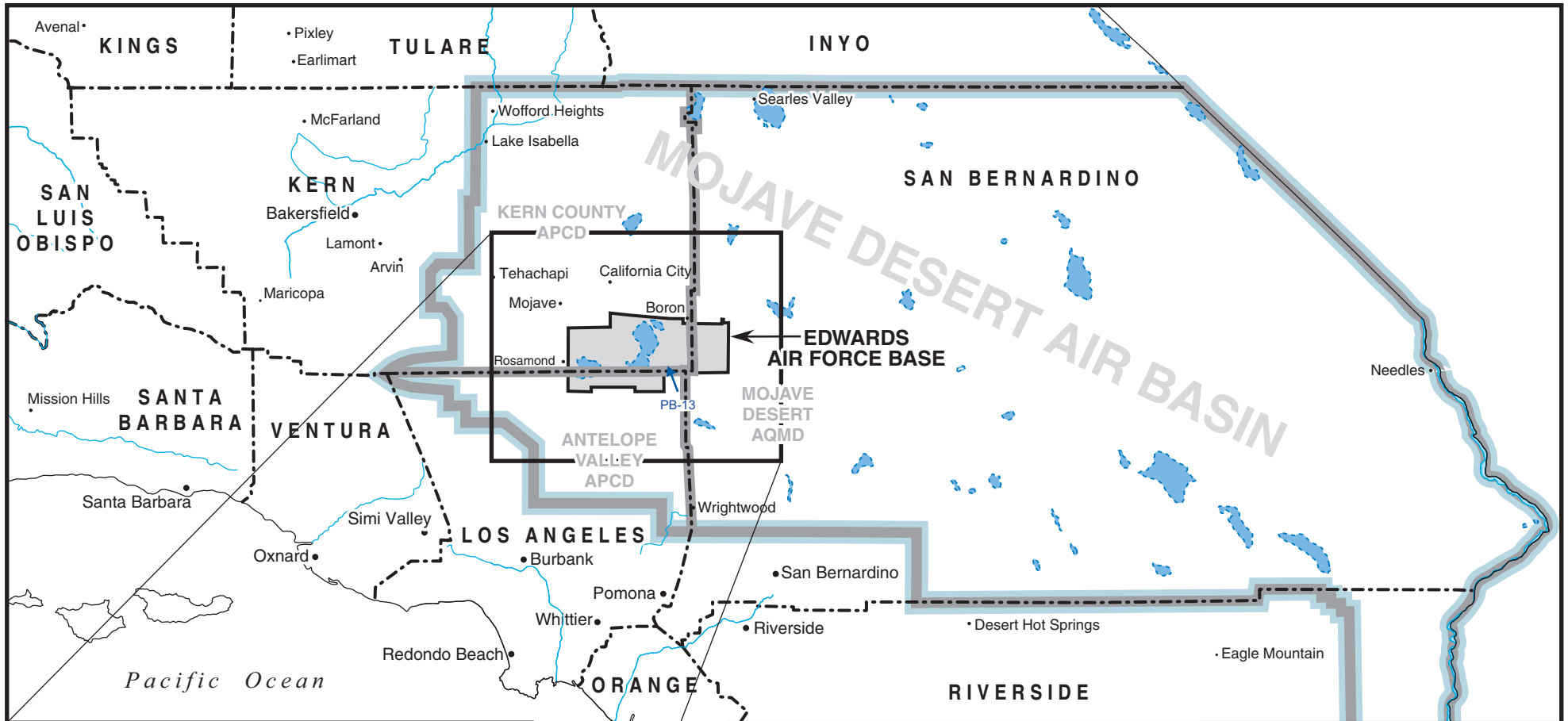
6 The following sections provide a description of the climate, baseline air quality and emissions, and
7 regulatory setting for Edwards AFB. The affected environment for air quality would be identical under
8 Alternatives A, B, and C. Edwards AFB extends into Kern, San Bernardino, and Los Angeles Counties
9 within the Mojave Desert Air Basin (MDAB) of eastern California and is located within the jurisdiction
10 of three local air districts: Kern County Air Pollution Control District (KCAPCD), Mojave Desert Air
11 Quality Management District, and Antelope Valley Air Pollution Control District as shown in Figure 3-1.

12 The main base at Edwards AFB is located in the eastern portion of Kern County, which is under the
13 jurisdiction of the KCAPCD. Because the activities proposed herein that could impact air quality occur
14 on the main base, discussions of environmental effects to air quality are analyzed in relation to baseline
15 air quality in the KCAPCD.

16 ***Climate***

17 Hot summers, cool winters, low rainfall, large diurnal ranges in temperature, and abundant sunshine
18 characterize the climate at Edwards AFB. The arid climate of the region is mainly due to rainshadow
19 effects of the Sierra Nevada and San Gabriel Mountains, where the prevailing westerly winds deposit
20 most of their moisture on the western slopes of these mountain ranges. Data collected at Edwards AFB
21 from 1979 to 1989 are used to describe the climate of the project region (National Oceanic and
22 Atmospheric Administration 2004).

23 The dominant weather feature in the project region is the Eastern Pacific high-pressure system. This
24 system is most prevalent during the summer, when it occupies a northern position over the Pacific Ocean.
25 Concurrent with the presence of high pressure, a low-level, thermal low-pressure system persists over the
26 desert regions due to intense surface heating. The relative strengths and positions of the high-pressure
27 system and the interior thermal trough are largely responsible for the general climatic conditions of the
28 region.



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**AIR BASINS AND AIR DISTRICTS
AT EDWARDS AFB**

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1 ***Precipitation***

2 During the winter, the Eastern Pacific high-pressure system weakens and moves southward, allowing
3 polar storm systems to migrate through the region. Although the systems that reach the region have dried
4 out considerably after traversing the elevated terrain to the west, they are responsible for most of the
5 annual precipitation in the area. The average annual precipitation at Edwards AFB is 4.9 inches. Rainfall
6 during the summer usually occurs from thunderstorms. Moisture from these storms originates from
7 tropical air masses that move into the region from the south-southeast. Snow can occur in the region,
8 although the average total is only about 2 inches per year.

9 ***Temperature***

10 The annual average temperature at Edwards AFB is 62 degrees Fahrenheit (°F). Daily mean high and low
11 temperatures for January are 57° F and 31° F, respectively. Daily mean high and low temperatures for
12 July are 98° F and 66° F, respectively. Extreme temperatures that occurred during the 10-year monitoring
13 period ranged from 4° F to 113° F.

14 ***Prevailing Winds***

15 The combination of the Eastern Pacific high-pressure system over the Pacific Ocean and the thermal low
16 over the interior desert produces a prevailing southwest wind in the region. Strong winds occur during
17 the spring and summer, when the pressure gradient between the offshore Pacific High and the interior
18 thermal trough is the greatest. However, extreme wind gusts can also occur with thunderstorms. Calm
19 conditions increase during the fall and winter, when cold continental air replaces the thermal low and
20 produces weak pressure gradients.

21 ***Baseline Air Quality Emissions***

22 The MDAB is currently impacted by fugitive dust emissions. Table 3-3 presents a summary of the
23 attainment status of the project area in California. These data show that the majority of the region is in
24 non-attainment of both state and national standards for PM₁₀ and ozone. It should be noted that the area
25 was recently designated as in attainment of the national 1-hour ozone standard but remains in
26 nonattainment of both the national 8-hour ozone standard and the state standard. Therefore, this area was
27 still considered a nonattainment area for ozone when conducting the screening process to determine
28 applicability of the conformity guidelines. The area is in attainment or unclassified for the remaining
29 criteria pollutants (CO, NO₂, and SO₂).

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**Table 3-3
National/California Ambient Air Quality Standards
Attainment Designations for the Project Area**

County	Ozone	CO	NO₂	SO₂	PM₁₀
Kern/MDAB ^(a)					
National	N	U*	U*	U	N
California	N	U/A	A	A	U/N
San Bernardino/MDAB ^(b)					
National	N	U*	U*	U	N
California	N	A	A	A	N
Los Angeles County/MDAB					
National	N	U*	U*	U	U
California	N	A	A	A	N

Notes: Designation status: A=attainment, N=non-attainment, U=unclassified, and U*=unclassified/attainment.

a – With regard to the CAAQS for CO, the eastern portion of the county, located in the MDAB, is unclassified while the western portion of the county is in attainment. With regard to the NAAQS for PM₁₀ the entire county within the MDAB is unclassified for the federal standard, except the Searles Valley Planning Area, which is non-attainment.

b – With regard to the NAAQS for ozone, the southwestern portion of San Bernardino County within the MDAB is non-attainment, and the northwestern and eastern portion are considered unclassified/attainment. The area was recently determined to be in attainment for the 1-hour national ozone standard but remains in non-attainment of the 8-hour standard. Therefore, for the purpose of this screening process, the area was considered to remain in non-attainment for ozone.

CO – carbon monoxide

MDAB – Mojave Desert Air Basin

NO₂ – nitrogen dioxide

PM₁₀ – particulate matter equal to or less than 10 microns in diameter

SO₂ – sulfur dioxide

Source: Proposed Amendments to the Area Designation Criteria and Area Designations for State Ambient Air Quality Standards and Maps of Area Designations for State and National Ambient Air Quality Standards, CalEPA ARB, December 5, 2003, available at www.arb.ca.gov/carbis/regact/area04/attachc.pdf, accessed 8/30/04. This information was supplemented with the latest information obtained from the Federal Register, April 22, 2004.

Eastern Kern County is located on the western edge of the Mojave Desert and is separated from populated valleys and coastal areas to the west and south by several mountain ranges. These valleys and coastal areas are the major source of ozone precursor emissions affecting ozone exceedances within Kern County’s part of the MDAB. Although the sources of pollution in eastern Kern County do not by

1 themselves result in exceedances of the federal ozone standards, this region is largely impacted by ozone
 2 transport from both the San Joaquin Valley Air Basin and the South Coast Air Basin.

3 Elevated levels of PM₁₀ are primarily associated with fugitive dust, which is produced through a
 4 combination of high winds, dry soil conditions resulting from an arid climate, and ground-disturbing
 5 activities such as mining, agriculture, and construction.

6 **Regulatory Setting**

7 In California, the CARB is responsible for enforcing air pollution regulations. The CARB has, in turn,
 8 delegated the responsibility of regulating stationary emission sources to local air agencies. There are no
 9 stationary sources of emissions associated with the proposed project. This area is within the eastern
 10 portion of Kern County, which is part of the MDAB. Therefore, the analysis will include only the portion
 11 of Kern County within the MDAB. In-flight aircraft emissions are generally unregulated within the
 12 project region, and are not considered for planning purposes over 3,000 feet above ground level (AGL).

13 As specified in an entry to the *Federal Register* on April 22, 2004, the MDAB region of Kern County is
 14 now in attainment of the national 1-hour NAAQS for ozone but remains in non-attainment for both the 8-
 15 hour national standard and the state standard. Therefore, the area was considered to be a non-attainment
 16 area and the corresponding *de minimis* level was utilized when conducting the conformity analysis
 17 screening presented in Appendix A and summarized in Section 4.1.

18 Table 3-4 provides a summary of aircraft emissions at Edwards AFB in 2003 for comparison to the flights
 19 associated with armed munitions delivery on the PIRA PB-13 target. These are baseline emissions for the
 20 upper atmosphere within the airspace at Edwards AFB.

21 **Table 3-4**
 22 **Summary of Existing Emissions at Edwards AFB (tons/year)**

VOC	CO	NO _x	SO ₂	PM ₁₀
271.6	619.4	205.4	21.7	17.3

23 **Notes:** Represents emissions that occurred in 2003 (U.S. Air Force 2003).
 24 CO – carbon monoxide
 25 NO_x – nitrogen oxides
 26 PM₁₀ – particulate matter equal to or less than 10 microns in diameter
 27 SO₂ – sulfur dioxide
 28 VOC – volatile organic compound
 29

1 Edwards AFB is situated in the MDAB portion of Kern County; therefore, current and forecasted baseline
 2 emissions for this portion of Kern County are listed in Table 3-5.

3 **Table 3-5**
 4 **MDAB Portion of Kern County**
 5 **Baseline and Forecasted Emission Baseline (tons/year)**

Year	VOC	NO _x	PM ₁₀
1985 ^(a)	8,395	9,855	9,855
1990 ^(a)	7,665	14,235	16,060
1995 ^(a)	4,745	10,585	10,585
2000 ^(a)	4,380	11,315	11,315
2005 ^(b)	4,380	10,950	12,410
2010 ^(b)	4,015	10,950	13,505

6 **Notes:** a – Actual.
 7 b – Estimated.
 8 NO_x – nitrogen oxides
 9 PM₁₀ – particulate matter equal to or less than 10 microns in diameter
 10 VOC – volatile organic compound

11 **Source:** California Environmental Protection Agency 2001.
 12

13 **3.1.2 Precision Impact Range Area, PB-13 Target**

14 The affected environment for air quality for the PIRA and the PB-13 target under Alternatives A, B, and
 15 C would be identical to the affected environment described for the on-base region.

16 ***Generic Air Emissions from 500-pound Net Explosive Weight Armed Munitions***

17 Because the nature of the explosives that would be used in the 500-pound bombs, rockets, or mortars has
 18 not been specifically identified, potential emissions were evaluated for generic Composition 4 (C4),
 19 trinitrotoluene (TNT), and Composition B. C4 is a semi-plastic, putty-like material that is used with the
 20 application blocks and for specialized purposes. Composition B is composed primarily of
 21 cyclotrimethylenetrinitramine (RDX) and TNT. Also referred to as cyclonite, or hexogen, RDX is a
 22 white crystalline solid usually used in mixtures with other explosives, oils, or waxes; it is rarely used
 23 alone. It has a high degree of stability in storage and is considered the most powerful and brisant crushing
 24 of the military high explosives. RDX has a greater explosive power than TNT. A discussion of the

1 potential regulatory repercussions of designating PB-13 as an armed munitions only target is included in
2 Section 4.1.1.2.

3 **3.2 AIRSPACE**

4 **3.2.1 Overview**

5 Airspace is defined as the space that lies above a nation and comes under its jurisdiction. Although it is
6 generally viewed as being unlimited, airspace is a finite resource that can be defined vertically and
7 horizontally, as well as temporally, when describing its use for aviation purposes. Under Public Law
8 (P.L.) 85-725, the Federal Aviation Administration (FAA) is charged with the safe and efficient use of the
9 nation's airspace and has therefore established certain criteria and limits for its use. In order to
10 accomplish its task, the FAA utilizes the National Airspace System (NAS).

11 Part of the NAS includes Special Use Airspace (SUA). SUA consists of airspace wherein activities must
12 be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are
13 not a part of those activities, or both (FAA 2000). Except for controlled firing areas, SUA areas are
14 depicted on aeronautical charts. Generally SUA consist of the following:

- 15 • Prohibited Areas— There are no prohibited areas within the region of interest for the
16 alternatives.
- 17 • Restricted Areas—These are areas that denote the existence of unusual, often invisible
18 hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. An aircraft
19 may not enter a restricted area unless permission has been obtained from the controlling
20 agency. Restricted areas are depicted on aeronautical charts and are published in the
21 *Federal Register*.
- 22 • Warning Areas—There are no warning areas within the region of interest for the
23 alternatives.
- 24 • Military Operation Areas (MOAs)—These are areas that consist of airspace of defined
25 vertical and lateral limits established for the purpose of separating certain military
26 training activities from instrument flight rules (IFR) traffic. There is no restriction
27 against a pilot operating in visual flight rules (VFR) in these areas; however, a pilot
28 should be alert since training activities may include acrobatic and abrupt maneuvers.
29 MOAs are depicted on aeronautical charts.

- 1 • Alert Areas—There are no alert areas within the region of interest for the alternatives.
- 2 • Controlled Firing Areas (CFAs)—There are no CFAs within the region of interest for the
- 3 alternatives.

4 Detailed information on the restricted areas R-2515 and R-2508 SUA are available in the *R-2508 Users*
5 *Guide*, which can be found at <http://r2508.edwards.af.mil/>. Armed munitions integration testing will be
6 entirely within SUA restricted areas R-2515 within the R-2508 Complex.

7 **3.2.2 Alternatives A, B, and C**

8 **3.2.2.1 On-Base Region**

9 *Special Use Airspace*

10 Table 3-6 gives the name/number, effective altitude, time of use, and the controlling agency for the
11 special use airspace within Alternatives A, B, and C. Special use airspace within Alternative A is shown
12 in Figure 3-2.

13 There are 1,575 square miles of airspace that have been designated as restricted for use by DoD, National
14 Aeronautics and Space Administration (NASA), and other government agencies. This airspace is over a
15 remote area 40 to 60 miles north of Los Angeles, California. Known by its FAA designation as the
16 R-2515, this airspace is scheduled, monitored, regulated, and controlled to provide safe aircraft test areas.
17 Aircraft operation characteristics and altitudes are regulated in this airspace to minimize ground-based
18 conflicts, which are primarily due to noise. The R-2515 complex encompasses portions of Kern, San
19 Bernardino, and Los Angeles counties in east central California (NASA 1999).

20 Special use airspace within Alternative A includes the restricted area R-2515 over Edwards AFB. The
21 Buckhorn, Panamint, and Isabella MOAs surround the R-2515 restricted area. There are no warning,
22 prohibited, or alert special use airspace areas within Alternatives A, B, and C (National Geospatial-
23 Intelligence Agency 2004).

24

25

26

Table 3-6
Special Use Airspace In and Surrounding Alternatives A, B, and C

Number/Name	Effective Altitude (feet)	Time of Use	Controlling Agency
R-2508 COMPLEX			
R-2508	FL 200 to Unlimited	Continuous	HI-DESERT TRACON
R-2515	Unlimited	Continuous	HI-DESERT TRACON
Buckhorn MOA	200 AGL ^(b)	0600–2200 ^(a) M–F	HI-DESERT TRACON
Isabella MOA	200 AGL ^(b,c)	0600–2200 ^(a) M–F	HI-DESERT TRACON
Panamint MOA	200 AGL ^(b)	0600–2200 ^(a) M–F	HI-DESERT TRACON

- 1 **Notes:** a-Other times by NOTAM.
- 2 b- Up to but not including FL 180.
- 3 c- Excluding 3,000 feet AGL and below over Domeland Wilderness Area.
- 4 AGL- above ground level
- 5 FL- flight level (FL 180 = approximately 18,000 feet above mean sea level)
- 6 MOA- Military Operation Area
- 7 NOTAM- Notice to Airmen
- 8 R- restricted
- 9 TRACON- Terminal Radar Control

10 **Source:** National Aeronautical Charting Office 2004a, b, and c.

11 ***Military Training Routes***

12 Alternatives A, B, and C contain one IR (IR-236), one Visual Route (VR) low-altitude military training route
 13 (VR-1293), and one slow-speed, low-altitude training route (SR-390) (Figure 3-3). All routes within the ROI
 14 that transit the boundaries of the R-2515 are governed by the flight restrictions and requirements to “see and
 15 avoid” other aircraft when operating under VFR. All routes are designated as “military assumes responsibility
 16 for separation of aircraft” (MARSAs) operations, which are established by coordinated scheduling. Hours of
 17 operation are continuous except for IR-236, which operates daily from 0600 to 2200 hours local time (National
 18 Geospatial Intelligence Agency 2004).

19 All integration testing flight profiles for Alternatives A, B, and C are inside the boundaries of the R-2515.

20 ***En Route Victor Airways and Jet Routes***

21 There are no en route victor low-altitude (up to but not including 18,000 feet above MSL) airways or
 22 high-altitude jet routes that transect the airspace within Alternatives A, B, or C (Figures 3-2, 3-4, and
 23 3-5).

1 ***Airports/Airstrips***

2 There are several airports/airstrips within the ROI for Alternatives A, B, and C. These include Edwards
3 AF Aux North Base, Borax Private, and Edwards AFB (Figures 3-2 through 3-5).

4 ***Air Traffic Control***

5 Alternatives A, B, and C lie exclusively within the Los Angeles Air Route Traffic Control Center's
6 (ARTCC's) boundaries (National Aeronautical Charting Office [NACO] 2004 a, b, and c). The
7 controlling agency for the Restricted Areas and MOAs within the R-2515 is TRACON. During the
8 published hours of use (identified in Table 3-6), the using agency is responsible for controlling all
9 military activity within the special use airspace and ensuring that its perimeters are not violated. When
10 scheduled to be inactive the using agency releases the airspace back to the controlling agency (Los
11 Angeles ARTCC), and in effect, the airspace is no longer restricted. If no activity is scheduled during
12 some of the published hours of use, the using agency releases the airspace to the controlling agency for
13 non-military operations for that period of inactivity (Illman 1993).

14 **3.2.2.2 Precision Impact Range Area, PB-13 Target**

15 The airspace above PB-13 is a subset of the area identified for the on-base region discussed in Section
16 3.2.1.1. The affected airspace is the same for Alternatives A, B, and C.

17
18 ***Special Use Airspace***

19 The PB-13 target is located within the R-2508 and R-2515 restricted areas. Table 3-6 gives the
20 name/number, effective altitude, time of use, and the controlling agency for the special use airspace
21 within Alternatives A, B, and C. There are no MOAs associated with the airspace above PB-13.

22 ***En Route Victor Airways and Jet Routes***

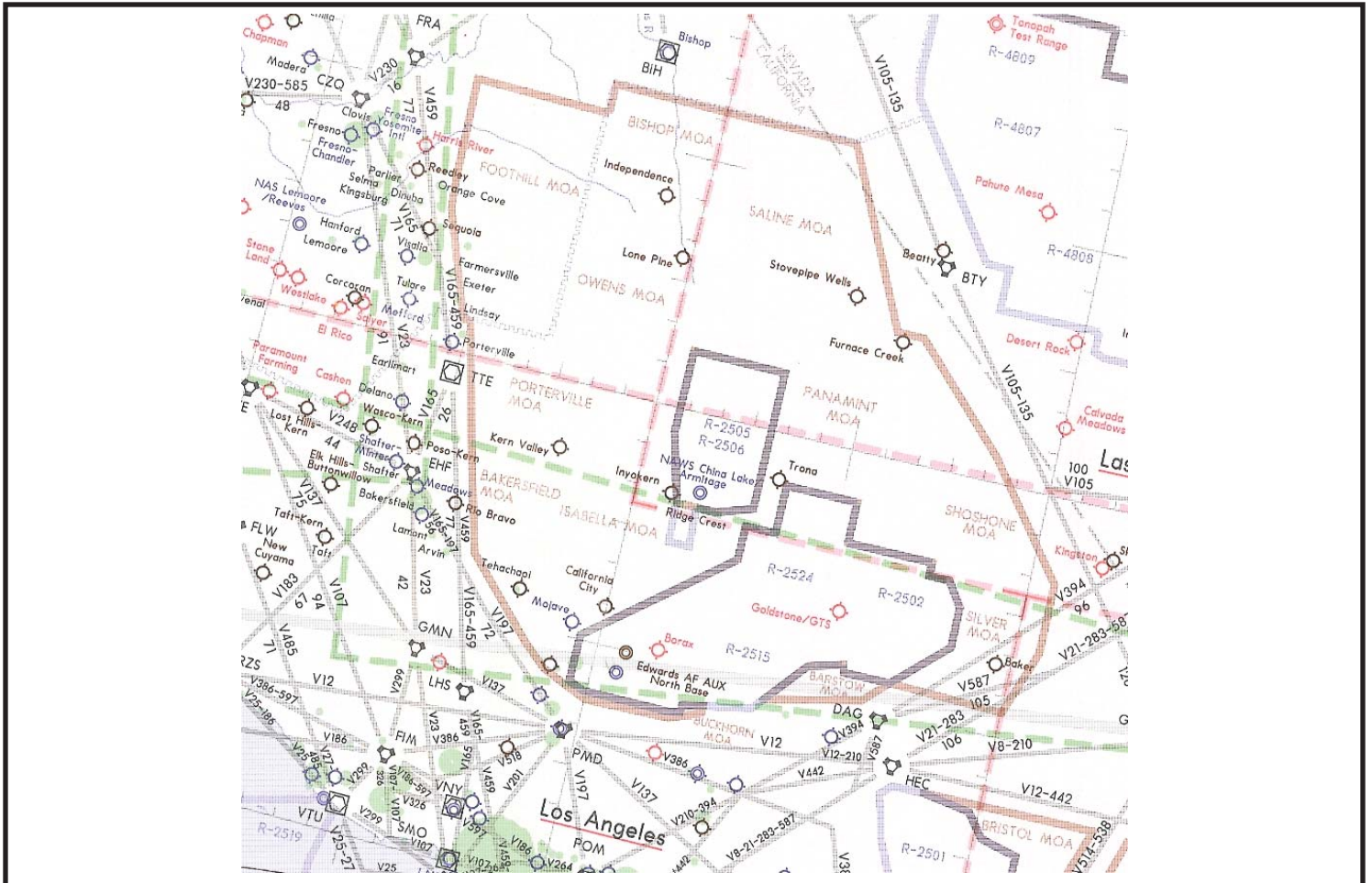
23 There are no en route victor airways or jet routes that overfly the PB-13 target area.

24 ***Airports/Airstrips***

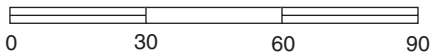
25 There are no airports or airstrips in the PB-13 target area. The approach end of Rogers Dry Lake runway
26 27 is approximately 4 NM from the PB-13 target.

27

28



LEGEND



SCALE IN NAUTICAL MILES

- V32 Victor Routes
- Cities
- Special Use Air Space and Warning Areas
- Civilian Airport (Private [Red])
- Military Airfields
- Military Operating Areas

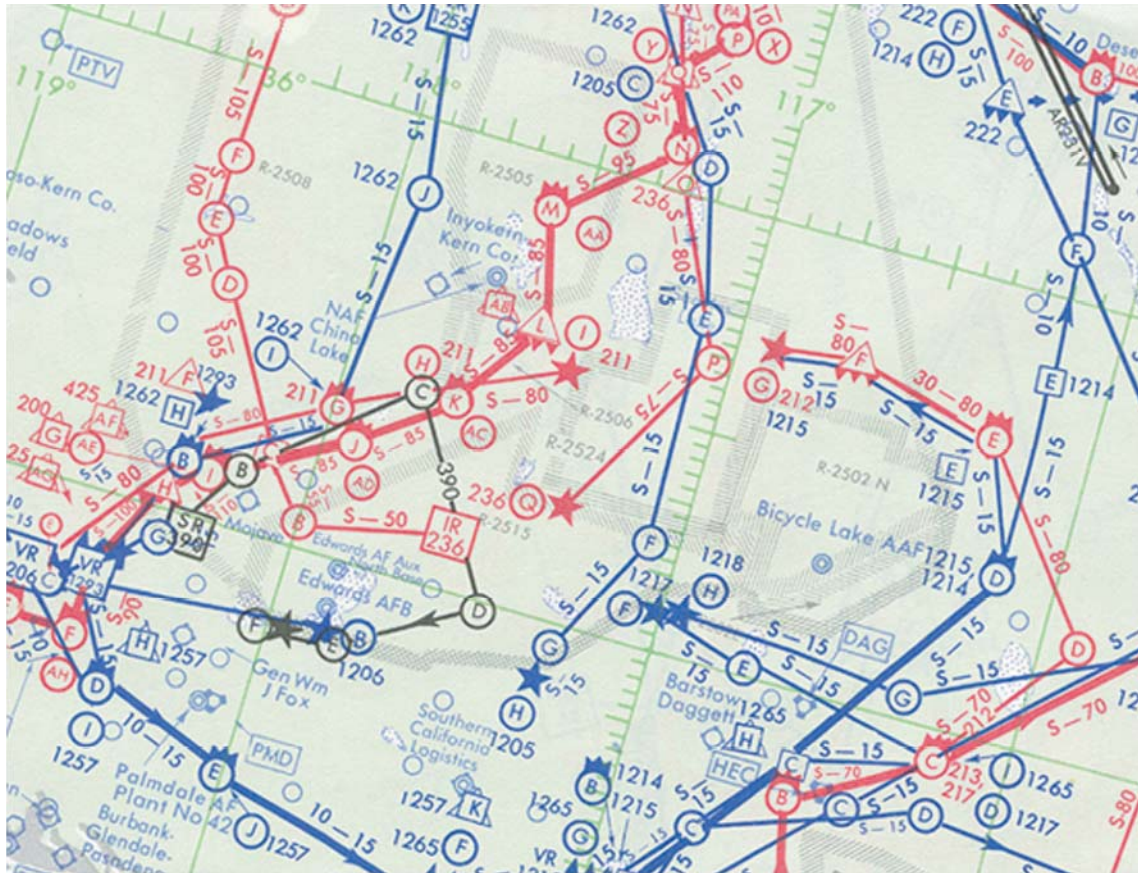
Environmental Assessment for Armed Munitions Integration Testing on the Precision Impact Range Area

SPECIAL USE AIRSPACE, VICTOR EN ROUTE AIRWAYS, AND AIRPORTS UNDER ALTERNATIVES A, B, and C

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LEGEND



SCALE IN NAUTICAL MILES

- ◊○ Civilian Airport
- Military Airfields
- Special Use Airspace and Warning Areas
- Instrument Route (IR) Military Training Route
- Visual Route (VR) Military Training Route
- Slow Route (SR) Military Training Route

Environmental Assessment for
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SPECIAL USE AIRSPACE,
MILITARY TRAINING ROUTES,
AND AIRPORTS
UNDER ALTERNATIVES A, B, and C

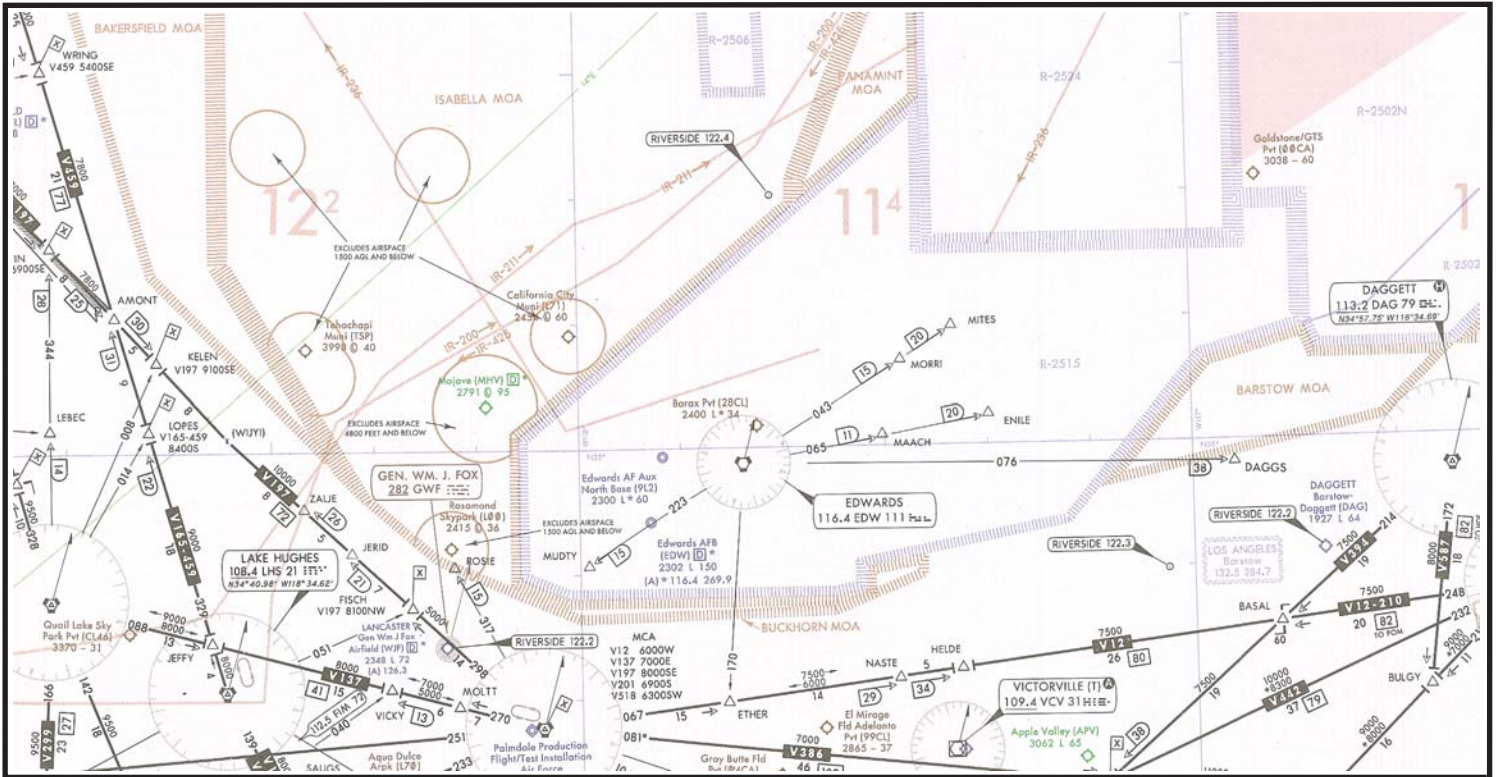
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3-3

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LEGEND



SCALE IN NAUTICAL MILES

- Victor Routes
- Civilian Airport
- Military Airfields
- Special Use Air Space and Warning Areas
- Military Operating Areas

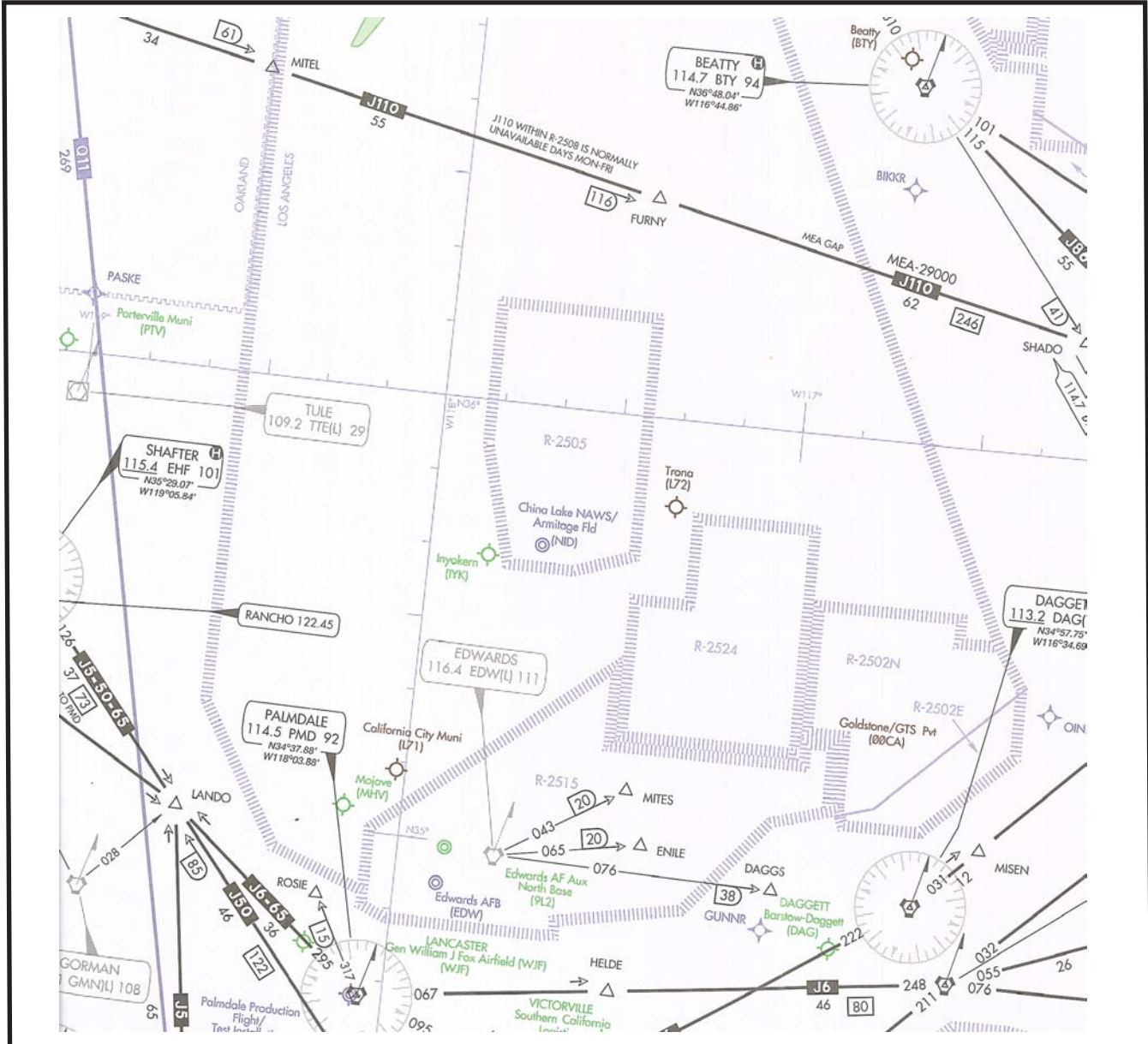
Environmental Assessment for
Armed Munitions Integration Testing
on the Precision Impact Range Area

SPECIAL USE AIRSPACE,
VICTOR ENROUTE AIRWAYS,
AND AIRPORTS
UNDER ALTERNATIVES A, B, and C

DATE 4/26/04	FILE NO. Q238/FIGURES/3-04.ai	FIGURE NO. 3-4
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LEGEND



SCALE IN NAUTICAL MILES

Note: Airports shown have a minimum of 5,000 feet of hard surface runway. Airports and airfields in blue and green have published approaches.

- Jet Routes
- Special Use Airspace and Warning Areas
- Civilian Airport (Blue, Green, Brown)
- Military Airfields (Blue, Green)

Environmental Assessment for
Armed Munitions Integration Testing
on the Precision Impact Range Area

SPECIAL USE AIRSPACE,
JET ROUTES, AND AIRPORTS
UNDER ALTERNATIVES A, B, and C

DATE 4/26/04	FILE NO. Q238FIGURES/3-05.ai	FIGURE NO. 3-5
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1 ***Air Traffic Control***

2 The PB-13 target area lies exclusively within the Los Angeles ARTCC’s boundaries (NACO 2004a). The
3 controlling agency for the R-2515 is TRACON. During the published hours of use (identified in Table
4 3-6), the using agency is responsible for controlling all military activity within the special use airspace
5 and ensuring that its perimeters are not violated. When the airspace is scheduled to be inactive, the using
6 agency releases it back to the controlling agency (Los Angeles ARTCC), and in effect, the airspace is no
7 longer restricted. If no activity is scheduled during some of the published hours of use, the using agency
8 releases the airspace to the controlling agency for non-military operations for that period of inactivity
9 (Illman 1993).

10 **3.3 CULTURAL RESOURCES**

11 **3.3.1 Overview**

12 Cultural resources are defined as historic properties, landscapes, cultural items, archeological resources,
13 sacred sites, or collections subject to protection under the National Historic Preservation Act, the
14 Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act,
15 Executive Order 13007, and the *Guidelines on Curation of Federally Owned and Administered*
16 *Collections* (36 CFR Part 73).

17 Cultural resources are locations of human activity, occupation, or use. They include expressions of human
18 culture and history in the physical environment, such as buildings, structures, objects, districts, or other
19 places. Cultural resources can be natural features, plants, and animals that are considered to be important
20 to a culture, subculture, or community. Cultural resources also include traditional lifeways and practices.
21 For this EA, cultural resources have been organized into the categories of prehistoric resources, historic
22 resources, and traditional cultural properties and practices. These types are not exclusive and a single
23 cultural resource may have multiple components.

24 Prehistoric cultural resources refer to any material remains, structures, and items used or modified by
25 people before Euro-Americans established a presence in the region. In southern California, the earliest
26 direct contact of native populations with Euro-Americans occurred on the coast and Channel Islands and
27 later in inland areas. The earliest brief encounters by explorers began in the mid-sixteenth century
28 followed by colonization and settlement by the late eighteenth century. Examples of prehistoric cultural
29 resources recorded in the region include the archaeological remains of villages, camps, quarries, rock

1 shelters, rock art, milling features, cemeteries, and scatters of prehistoric artifacts, such as stone tool-
2 making debris or groundstone artifacts.

3 Historic cultural resources include the material remains and landscape alterations that have occurred since
4 the arrival of Euro-Americans in the region. Examples of historic cultural resources in the region include
5 homestead and agricultural features, foundations, roads, buildings, scatters of historic artifacts, post-
6 contact Native American villages, and locations or structures that are associated with the historic events
7 or people.

8 Traditional cultural properties are places associated with the cultural practices or beliefs of a living
9 community. These sites are rooted in the community's history and are important in maintaining cultural
10 identity. Examples of traditional cultural properties include natural landscape features; places used for
11 ceremonies and worship; ancestral villages or burial sites; places where plants are gathered that are used
12 in traditional medicines and ceremonies; places where artisan materials are found; places where
13 traditional arts are practiced or passed on; and features of traditional subsistence systems. Impacts to the
14 continued use and maintenance of traditions are considered in NEPA analyses.

15 **3.3.2 Alternatives A, B, and C**

16 **3.3.2.1 On-Base Region**

17 Edwards AFB has the most comprehensive cultural resource identification program in the vicinity of the
18 corridors. Over 450 archaeological surveys covering more than 134,032 acres have been completed on
19 base. As a result of this work, 1,642 prehistoric sites, 1,269 historic sites, and 78 military sites have been
20 recorded on base. Thirteen traditional cultural properties have been recorded (Norwood 2003).

21 The most common prehistoric site types are lithic scatters, temporary camps, hearth features, and milling
22 stations. Common historic archaeological site types include refuse scatters, homestead sites, mining sites,
23 and various agricultural features. Military resources include the sites of inactive military camps, buildings
24 or ruins (Earle *et al.* 1997; Ronning *et al.* 2000).

25 Most of the archaeological sites have not been formally evaluated for the National Register of Historic
26 Places (NRHP). Nineteen prehistoric sites and eight historic archaeological sites have been determined
27 individually eligible for the NRHP with the concurrence of the California Office of Historic Preservation.
28 Another seventy are considered potentially eligible and sixty-eight have been determined as not eligible

1 for the NRHP. There are two archaeological historic districts, one at North Base consisting of five
2 contributing sites and one at the South Base Sled Track.

3 Studies of the built environment on Edwards AFB generally address military buildings and structures
4 associated with three historic themes: World War II, the Cold War, and Man in Space. Many of the
5 military buildings and structures on Edwards AFB are less than 50 years old and must possess
6 “exceptional significance” to be found eligible for the NRHP. To date, 82 buildings or structures have
7 been determined eligible. Another 29 are considered potentially eligible and 229 have been determined
8 not eligible for the NRHP.

9 There are four historic building districts. Jet Propulsion Laboratory (JPL) includes 53 eligible
10 contributing elements. Phillips Laboratory includes 5 eligible contributing elements, 27 potentially
11 eligible structures, and 69 unevaluated structures. The South Sled Track includes 10 eligible buildings and
12 structures. The X-15 Engine Test Complex consists of 7 eligible buildings (Norwood 2003).

13 Rogers Dry Lake is a National Historic Landmark and the primary resource responsible for the
14 establishment of Edwards AFB and the Dryden Flight Research Facility. The lakebed is associated with
15 historic aviation developments including the flight of the Bell X-1, the first plane to break the sound
16 barrier, in 1947, and the first Space Shuttle landing, in 1981 (Earle *et al.* 1998).

17 **3.3.2.2 Precision Impact Range Area, PB-13 Target**

18 There are no known cultural resources at the PB-13 target site. Surveys of the West Range of the PIRA,
19 which includes the PB-13 target site area, have identified over 136 prehistoric and historic sites. The
20 *Phase I Cultural Resources Survey for Precision Impact Range Area (PIRA) Clean-Up* (AFFTC 1995b)
21 describes these sites as to location, type, and mitigation measures necessary to protect the identified sites.

22 **3.4 ENVIRONMENTAL JUSTICE AND THE PROTECTION OF CHILDREN**

23 Executive Order (EO) 12898, *Federal Actions to Address Environmental Justice in Minority Populations*
24 *and Low-Income Populations*, requires federal agencies to develop environmental justice strategies and
25 make environmental justice a part of its mission by identifying and addressing disproportionately high
26 adverse effects of its activities on minority and low-income populations. Agencies are required to ensure
27 that their programs and activities that affect human health or the environment do not directly or indirectly
28 use criteria, methods, or practices that discriminate on the basis of race, color, or national origin.

1 Executive Order 13045, *Protection of Children from Environmental Health and Safety Risks* (April 21,
2 1997) requires federal agencies to address the potential for disproportionately high and adverse
3 environmental effects of their actions on children. The Order further requires federal agencies ensure that
4 their policies, programs, activities, and standards address these risks. This document has been prepared in
5 compliance with EO 13045 to identify and, if necessary, mitigate health and safety risks with the potential
6 to disproportionately affect children.

7 The selection of the PB-13 target for Alternatives A, B, and C did not rely on or factor in the locations of
8 minority or low-income populations or the protection of children.

9 **3.5 GEOLOGY AND SOILS**

10 Geologic resources consist of naturally formed minerals, rocks, and unconsolidated sediments. Soil refers
11 to the uppermost layers of surficial geologic deposits and the weathering of those deposits. Concerns
12 associated with the geologic setting, which could either affect or be affected by a proposed project,
13 include topography and soil erosion on base. Normal military activities at Edwards AFB do not increase
14 exposure to seismic hazards or other geologic hazards including landslides, subsidence, or volcanic
15 eruption.

16 **3.5.1 Topography**

17 Edwards AFB is located in the Antelope Valley, a broad alluvial plain lying southwest of the Tehachapi
18 Mountains and north of the San Gabriel Mountains. Low ranges of bedrock hills occasionally interrupt
19 the generally flat terrain of the valley floor; the lower flanks of the hills are blanketed by Quaternary-aged
20 alluvial fans consisting of water-laid sand and gravel deposits. The valley floor is composed of several
21 closed topographic depressions that contain the three major playas: Rogers, Rosamond, and Buckhorn
22 Dry Lakes. Playa deposits consist of thick, bedded clay and sand, and interfinger with the encroaching
23 alluvial fan deposits. Playa margins have shoreline sand deposits from the wetter middle and late
24 Pleistocene climates when the lakes were filled with water. In the lower elevations, wind-laid deposits
25 form in the dunes and hummocks (AFFTC 2002).

26 The base can be characterized by having the following three physiographic regions:

- 27 • An upland area located in the northwest portion of the base north of Rosamond and west
28 of Rogers Dry Lake. The area is characterized by low rounded hills, including Bissel and
29 Rosamond Hills, with elevations ranging between 2,270 and 3,200 feet above MSL.

- 1 • A lowland area occupying the central and southwestern portions of the base. The lowland
2 area includes Rosamond, Buckhorn, and Rogers Dry Lakes and the intervening area. It
3 extends from the northern boundary of the base to the southern boundary and has a relief
4 of approximately 400 feet, with elevations ranging from 2,270 to 2,675 feet above MSL.
- 5 • An upland area that extends east of Rogers Dry Lake to the eastern boundary of Edwards
6 AFB. Leuhman Ridge and Haystack Butte, both over 3,400 feet above MSL are the two
7 prominent relief features in this area. Elevations in this area range from approximately
8 2,400 to over 3,400 feet above MSL and are the highest of the three physiographic areas
9 on the base.

10 Slope and relief on the PIRA varies from flat to gently sloping plains interspersed with broad domes and,
11 in a few places, more resistant hills that rise sharply above the surrounding plains. Slopes range from zero
12 percent near Rogers Dry Lake to greater than 30 percent by Kramer Hills. PB-13, located in the PIRA's
13 West Range, is situated in an area where the slopes transition from less than one percent to one to five
14 percent. The target has a flat, graded surface with an approximate diameter of 1,000 feet.

15 **3.5.2 Geology**

16 The geologic setting in the vicinity of the Edwards AFB, which is located in the western Mojave Desert
17 region, is characterized by three major rock types or geologic complexes: a basement complex of igneous
18 and metamorphic rocks, an intermediate complex of continental volcanic and sedimentary rocks, and
19 valley fill deposits. The basement complex is of pre-Tertiary age and includes quartz monzonite, granite,
20 gneiss, schist, and other igneous and metamorphic rocks. These rocks crop out in the highlands
21 surrounding the playa areas and occur beneath the unconsolidated deposits of the playa. The intermediate
22 complex, with limited exposure in the Edwards AFB vicinity, is of Tertiary age and includes a variety of
23 sedimentary and volcanic rock types (Dutcher and Worts 1963).

24 **3.5.3 Soils**

25 The U.S. Department of Agriculture (USDA) Natural Resource Conservation Service has completed a
26 soil survey of Edwards AFB for the U.S. Army Corps of Engineers (USACE). The *Grazing and*
27 *Cropland Management Plan* for Edwards AFB describes results of this soil survey (USACE 1997). Based
28 on this survey, the soils at Edwards AFB can be characterized as predominantly alkaline, consisting of
29 loams, sandy loams, and loamy sands, all of which are susceptible to wind and water erosion. Soil pH
30 values range from 7 to 8 for most soils and greater than 8 on lakebed soils. Plant growth is inhibited by

1 the high salinity and exchangeable sodium ion content of some soils, particularly soils in the lakebed
2 basins (AFFTC 2002).

3 The *Grazing and Cropland Management Plan* (USACE 1997) identified five groups of landforms based
4 on soil types that range from playas at the lowest elevation to hills and rock pediments. These landforms
5 are described briefly below.

6 • Dry lakebeds, including Rogers Dry Lakebed, are most often covered by about 95 percent
7 Wherry soils. These soils are deep and poorly drained, with a clay texture and slopes of 0
8 to 1 percent. The soil is barren with high saline and sodic content, and is subject to
9 flooding.

10 • Alluvial fans in the areas surrounding the dry lakes are composed primarily of Leuhman,
11 Norob, and Voyager soils. These soils are deep and moderately well to well drained with
12 slopes of 0 to 5 percent. Textures are of fine sand to clay loam. The soils are saline and
13 sodic, and subject to flooding and wind erosion.

14 • Dunes and sand sheets around the dry lakes are an intermediate form between the alluvial
15 flats and the fan piedmonts. Cajon soils are dominant with smaller proportions of
16 Challenger and other soils. Soils are deep, moderately well drained to excessively drained
17 sands to loamy sands with slopes from 0 to 15 percent. They are subject to wind erosion.

18 • Fan piedmonts contain mostly Helendale soil, with smaller portions of Destazo, Lavic,
19 Helendale Taxadjunct, and Cajon soils. These soils are deep, moderately well to well
20 drained, loamy, coarse sands to fine sandy loams. Slopes range from 0 to 9 percent. The
21 soils are subject to occasional flooding and wind erosion.

22 • Rock pediments and hills consist of Randsburg, Hi Vista, Machone, Muroc, and
23 Sparkhule soils, interspersed with rock outcrops. These soils can be very shallow to
24 moderately deep and are well drained, with textures of sandy loam and gravel. Slopes
25 range from 2 to 50 percent. These soils are subject to water and wind erosion.

26 Alluvial sediments that surround scattered, topographically higher outcrops of granitic rock dominate the
27 surface of the PIRA. In the immediate area of the PB-13 target site the soils are predominantly sandy
28 loam and gravel with a slope of 1 to 5 percent.

1 **3.5.4 Erosion**

2 According to the *Soil Survey of Edwards Air Force Base, California, Interim Report* (USDA, Soil
3 Conservation Service 1998) the soils at Edwards AFB are given erosion hazard ratings of slight to severe
4 for wind erosion and slight to moderate for water erosion.

5 **3.6 HAZARDOUS WASTE/HAZARDOUS MATERIALS**

6 For purposes of this analysis, the terms “hazardous material” and “hazardous waste” are those substances
7 defined by the Comprehensive Environmental Response, Compensation, and Liability Act of 1980
8 (CERCLA) and the Resource Conservation and Recovery Act (RCRA).

9 A hazardous material is any material whose physical, chemical, or biological characteristics, quantity, or
10 concentration may cause or contribute to adverse effects in organisms or their offspring; pose a
11 substantial present or future danger to the environment; or result in damage to or loss of equipment,
12 property, or personnel.

13 Hazardous wastes are substances that have been “abandoned, recycled, or are inherently waste like,” and
14 that (because of their quantity, concentration, or characteristics) may cause increases in mortality or
15 serious irreversible illness, or pose a substantial hazard to human health or environment if improperly
16 treated, stored, transported, or disposed of.

17 Solid waste refers to non-hazardous garbage, refuse, sludge, and any other discarded solid material
18 resulting from residential, commercial, and industrial activities or operations. Solid waste can be
19 classified as construction/demolition waste, non-hazardous recyclable waste, or non-hazardous non-
20 recyclable waste.

21 **3.6.1 Hazardous Materials**

22 Edwards AFB uses a wide variety of hazardous materials in support of research activities on base and its
23 mission requirement to support all types of aircraft. Hazardous materials are used for aircraft repair and
24 maintenance, aircraft launch and recovery, aerospace ground equipment repair and maintenance, building
25 remodeling, and construction. Some of the most commonly used hazardous materials include jet and
26 motor fuel, other types of petroleum products, paints, thinners, adhesives, cleaners, lead-acid batteries,
27 hydraulic fluids, and halogenated and non-halogenated solvents (U.S. Air Force 1995).

1 Hazardous materials are used to support rocket propulsion research and development at the AFRL.
2 Typical hazardous materials used include liquid and solid rocket propellants. Other hazardous materials
3 used at the AFRL include batteries, antifreeze, cleaning/degreasing solvents, and machinery lubricants,
4 which are used in component fabrication, repair, maintenance, and assembly operations (AFFTC 1998a).

5 The types of hazardous materials most commonly used during construction projects include acids,
6 corrosives, caustics, glycol, compressed gases, paints and paint thinners, solvents, sealant, adhesives,
7 cements, caulking, fire retardant, and hot asphalt (140⁰ F or greater). Building and facility maintenance
8 requires the use of heating fuels, paints, aerosols, and fluorescent light bulbs, all of which are hazardous
9 materials.

10 Implementation of the Hazardous Materials Pharmacy approach accomplishes several important
11 management goals, including reducing the volume of hazardous materials purchased and hazardous
12 wastes generated through improved materials management. Edwards AFB uses the pharmacy concept to
13 issue hazardous materials for use by Air Force personnel. The Hazardous Materials Pharmacy monitors
14 shelf life and tracks usage of hazardous materials on base. One common database is used to manage
15 issued hazardous material products. Hazardous materials purchased through the pharmacy are bar code
16 labeled upon their arrival at Supply Central Receiving and distributed to the various satellite issue points
17 or Hazardous Materials Distribution Support Centers located throughout Edwards AFB.

18 All organizations and contractors are required to maintain inventories of all their hazardous materials.
19 Furthermore, organizations are required to reduce the quantity of hazardous materials used or replace
20 them with non-hazardous material, if possible, as a part of the Pollution Prevention Program. Guidelines
21 used by Edwards AFB include AFI 32-7086, *Hazardous Materials Management*; AFI 32-7042, *Solid and*
22 *Hazardous Waste Compliance*; and AFFTC Instruction 23-1, *Hazardous Material Management Program*.

23 Military munitions have been used at Edwards AFB for training, research, and integration with a variety
24 of weapons and weapon systems. These have included air-to-ground munitions deployed from aircraft
25 and helicopters, and ground-to-ground munitions deployed on portable and vehicle-based firing systems.
26 Munitions are also used at the small arms firing range, during explosive ordnance demolition training, and
27 for demolition of propellants. Depending on the munition, a successful combustion will produce small
28 quantities of by-products. Depending on the chemical, over time, small amounts may accumulate in
29 surface soils. The EOD unit routinely detonates unexploded ordnance (UXO) during clearance activities,
30 as detonation in place presents significantly less risk than moving UXO of unknown stability. EOD units
31 also destroy off-specification munitions at permitted open-burning, open-detonation (OB-OD) sites. Over

1 The use of hazardous materials results in generation of hazardous waste (e.g., paint waste, used oil,
2 contaminated rags), which requires proper handling. The U.S. EPA enforces the RCRA (40 CFR 260–
3 272), which provides guidelines for the generation, storage, transportation, and disposal of hazardous
4 waste. The California Environmental Protection Agency (Cal/EPA) enforces hazardous waste laws
5 embodied in 22 CCR Chapters 10–20 and the California Health and Safety Code (Section 25100).
6 Environmental Management at Edwards AFB manages hazardous waste accumulation. Guidelines used
7 by Edwards AFB include the *Edwards Air Force Base Hazardous Waste Management Plan* (AFFTC
8 1998a), which was prepared in accordance with AFI 32-7042, *Solid and Hazardous Waste Compliance*.
9 It establishes procedures to achieve compliance with applicable federal, state, and local regulations for
10 hazardous waste management, except munitions, explosives, biohazard, and radioactive waste.
11 Specifically, it contains requirements for solid and hazardous waste characterization, training,
12 accumulation, turn-in and disposal, as well as procedures for inspections, permits, and record keeping.

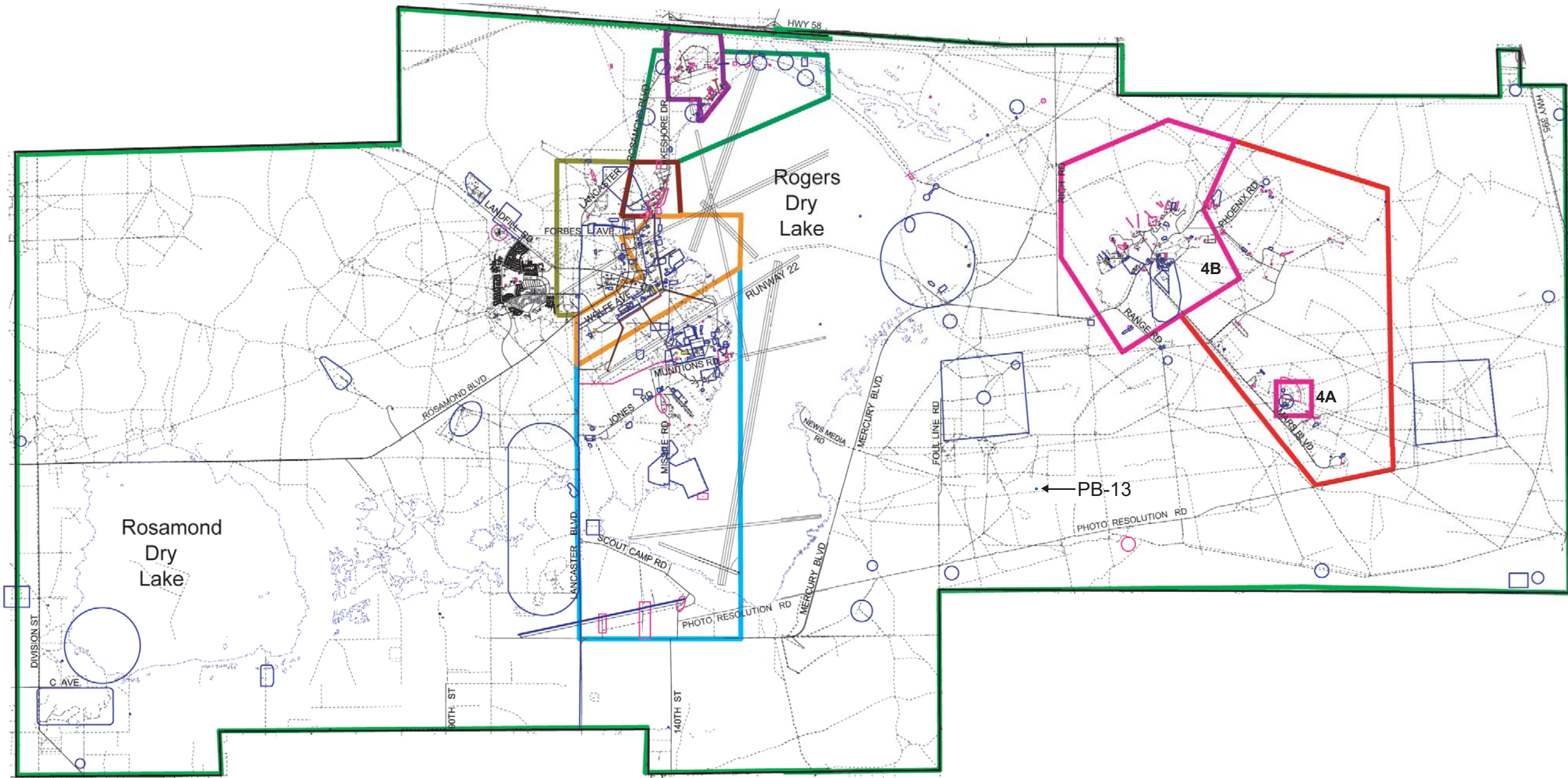
13 Geologic resources (i.e., soil and groundwater) are susceptible to contamination from the surface.
14 Releases of hazardous chemicals such as petroleum products and solvents have resulted in soil
15 contamination at military installations. Contaminated soil or groundwater may require physical removal
16 or extensive remediation to ensure the protection of public health and safety.

17 The Installation Restoration Program (IRP) was established to identify, investigate, assess, and clean up
18 hazardous waste at former disposal sites on the base in compliance with CERCLA. Under the IRP, a
19 Preliminary Assessment was conducted at Edwards AFB to locate potential areas of concern (AOCs) that
20 may have resulted from past activities on the 301,000-acre base.

21 Edwards AFB has identified 471 IRP sites and AOCs with potential contamination. The IRP sites at
22 Edwards AFB are grouped into 10 Operable Units (OUs), generally based on geographic location. IRP
23 sites, AOCs, and OUs are shown in Figure 3-6. Runway 22 lies within OU2, several IRP sites are located
24 adjacent to the runway.

25 **3.6.3 Solid Waste**

26 Edwards AFB operates a non-hazardous (municipal solid) waste landfill within the Main Base area. At
27 current disposal rates, the landfill is expected to reach permitted capacity in the year 2019. Due to the
28 volume of construction/demolition waste generated on base, most current construction contracts require
29 the contractor to dispose of such wastes at an approved off-base landfill in order to reduce the impacts to
30 the Main Base Landfill.



- LEGEND**
- Unpaved Roads
 - Paved Roads
 - Stream and Lakes
 - Taxiways
 - Base Boundary
 - Buildings
 - AOC
 - IRP Site
 - PB-13 (1,000 foot diameter)

- Operable Units (OUs)**
- OU 1
 - OU 2
 - OU 3
 - OU 4A
 - OU 4B
 - OU 5
 - OU 6
 - OU 7
 - OU 8
 - OU 9
 - OU 10



Environmental Assessment for
Armed Munitions Integration Testing
on the Precision Impact Range Area

SITES, AREAS OF CONCERN,
AND OPERABLE UNITS
AT EDWARDS AFB

DATE 4/21/04	FILENAME 0238FIGURES/3-06.ai	FIGURE NO. 3-6
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1 The base actively participates in a recycling program, which is operated by a contractor with program
2 oversight provided by Environmental Management. Some waste metals generated during construction and
3 demolition projects, as well as the routine operations of various base organizations, are diverted to the
4 Defense Reutilization and Marketing Office for resale.

5 **3.7 INFRASTRUCTURE**

6 Infrastructure refers to the physical components that are used to deliver something (e.g., electricity,
7 traffic) to the point of use. Elements of infrastructure typically include energy, water, wastewater,
8 electricity, natural gas, liquid fuel distribution systems, communication lines (e.g., telephone, computer),
9 and circulation systems (streets and railroads).

10 **3.7.1 On-Base Region**

11 **3.7.1.1 Energy Resources**

12 The general policy of the Air Force regarding energy is as follows:

13 Energy is essential to the Air Force's capability to maintain peacetime training, readiness,
14 and credible deterrence; to provide quality of life; and to perform and sustain wartime
15 operations. In short, energy is an integral part of the weapon system. The most
16 fundamental Air Force energy policy goal is to ensure energy support to the national
17 security mission of the Air Force in a manner that emphasizes efficiency of use,
18 effectiveness of costs, and independence from foreign sources for mission-essential
19 operations (AFFTC 1995).

20 Edwards AFB uses electricity, solar power (e.g., photovoltaic panels to run traffic lights and heat water),
21 natural gas/propane and other petroleum-based products (gasoline, jet fuel, and diesel) as sources of
22 energy to operate facilities, vehicles, equipment, and aircraft.

23 Southern California Edison provides electricity to Edwards AFB. The base uses this energy source to
24 operate a variety of systems including lighting, heating and cooling, computers, and pumps for gas and
25 water. Pacific Gas and Electric supplies natural gas to Edwards AFB. The base uses natural gas to run
26 boilers, furnaces, and two standby generators. Propane is used in areas where natural gas services are
27 unavailable and is used to operate one standby generator. Edwards AFB uses solar energy for hot water

1 and forced air heating systems; to provide light (i.e., skylights); and to operate the emergency phone
2 system on major portions of Rosamond, Lancaster, and Mercury Boulevards.

3 Edwards AFB is responsible for approximately 13.4 miles of petroleum pipeline used to transport JP-8 jet
4 fuel to various locations throughout the base. The supply pipeline for the base is the CalNev Pipeline.
5 Edwards AFB receives JP-8 fuel from a spur line from the George AFB terminal.

6 **3.7.1.2 Water Distribution System**

7 The AFFTC purchases potable water from the Antelope Valley East Kern (AVEK) Water Agency. This
8 water is distributed through a system located in Boron, California. The water distribution system for
9 Edwards AFB consists of a series of pipes ranging in size from 4 to 24 inches in diameter, booster pump
10 stations, and storage tanks. Five storage tanks, three at the Main Family Housing area and two at North
11 Base, provide a potable water storage capacity of 4.3 million gallons. Additional storage tanks dedicated
12 to fire suppression are located throughout the base. The distribution system, although presently adequate,
13 requires continuous repairs and replacement to sustain its capacity (AFFTC 1997a).

14 **3.7.1.3 Wastewater/Storm Water**

15 There are two sanitary sewer collection and treatment systems on Edwards AFB. These systems service
16 the Main, North, and South Base areas and the AFRL. The collection network for the existing system is
17 composed of gravity lines, force mains, and pump stations. The Main Base Waste Water Treatment Plant
18 provides tertiary treatment of wastewater.

19 The storm water distribution system at Edwards AFB consists of conveyance structures and drainage
20 ditches (unpaved). Storm water conveyance structures include channels, gutters, drains, and sewers (not
21 tied into the sanitary sewer system) that collect storm water runoff and direct its flow. The storm water
22 system at Main Base conveys storm water to a pretreatment facility, which consists of an oil-water
23 separator and an evaporation pond (AFFTC 1998b). Storm water from the undeveloped portions of the
24 base flow into the nearest dry lake (AFFTC 1994).

25 **3.7.1.4 Communication Systems**

26 Communication systems on Edwards AFB include telephone, microwave, and local area networks. The
27 distribution system for these systems generally consists of copper-pair cable, fiber-optic cable, and a
28 communication manhole/conduit system.

1 **3.7.1.5 Transportation Systems**

2 Edwards AFB is accessed by way of Rosamond Boulevard from the west or north, and by Lancaster
3 Boulevard/120th Street East from the south. Primary access to Edwards AFB from the adjacent roadways
4 is by way of North Gate, West Gate, and South Gate, each of which is in operation 24 hours a day, 7 days
5 a week. All gates contain two inbound and two outbound lanes (USACE and AFFTC 1994).

6 Internal circulation on base is by way of paved and unpaved primary, secondary, and tertiary roads.
7 Primary roads connect Edwards AFB components such as the flightline, Engineering and Administration,
8 and support areas to entry points. Secondary roads connect Edwards AFB components to one another and
9 support facilities such as commercial or housing areas. Tertiary roads are unpaved access roads or
10 residential streets within the housing area (AFFTC 1997b).

11 The primary base streets currently carry all rush-hour traffic without significant congestion problems.
12 The traffic flow at the West Gate is approximately 5,300 vehicles daily or 40 percent of total base traffic
13 volume. The South Gate has a traffic flow of approximately 4,600 vehicles daily or 34 percent of the
14 total base traffic volume. The North Gate services approximately 3,500 vehicles daily or 26 percent of
15 the total. The West Gate provides the best free flow during morning rush-hour traffic, while the South
16 and North Gates allow sufficient flow without exceeding design capacity.

17 Traffic consists of government, contractor, and privately owned vehicles belonging to those who live
18 and/or work on base. In addition, commercial vehicles deliver material to businesses and facilities in the
19 area. Commercial and Air Force vehicles are used for service and construction work done in the area.
20 Emergency vehicles require access to all buildings and roads. In addition to the paved roadways, an
21 extensive network of unimproved, dirt roadways exists, essentially equivalent to the paved network.
22 These roads have posted speed limits and provide access to various installation facilities and sites.

23 Two railroads are adjacent to the base. The Southern Pacific line runs parallel to the base's west
24 boundary and adjacent to Sierra Highway. The north/south main line does not provide service to Edwards
25 AFB. The Atchison, Topeka, and Santa Fe Railroad is located south of California Highway 58 and along
26 the northern boundary of the Base. Two rail spurs, one at Edwards Station and the other at Boron Station
27 connect to the Main Base and AFRL, respectively (AFFTC 1994).

28 **3.7.2 Precision Impact Range Area, PB-13 Target**

29 The infrastructure supporting the PB-13 target area is a subset of the on-base area.

1 **3.8 LAND USE**

2 Land use is described for Edwards AFB and the PIRA including a description of the visual and aesthetic
3 resources. Land may be used for a variety of purposes including residential, industrial, commercial,
4 agricultural, recreational, and military. Specialized land uses may include radio transmission areas,
5 bombing/missile ranges, wildlife preserves, explosive ordnance ranges, and airfields.

6 **3.8.1 Edwards AFB**

7 Edwards AFB is situated in Kern, Los Angeles, and San Bernardino Counties, approximately 60 miles
8 northeast of the city of Los Angeles. The base lands are classified and managed using three land
9 categories: improved, semi-improved, and unimproved. Approximately 290,957 acres of largely
10 undeveloped or semi-improved land are used to support flight-testing of a wide variety of military,
11 civilian, and experimental aircraft. Unimproved lands comprise 95.3 percent of total base lands; semi-
12 improved lands account for about 1.5 percent of the total, and improved land accounts for about 3.2
13 percent. Semi-improved lands include areas that are generally located in proximity to airfields, runways,
14 test facilities, parking ramps, fence lines, some recreational areas, and relatively undeveloped areas such
15 as open storage areas (AFFTC 2002).

16 The developed portion of the base is concentrated on the west side of Rogers Dry Lake. It includes clear
17 areas around test facilities and improved runways (AFFTC 2002). Developed areas include Main Base,
18 North Base, South Base, Family Housing areas, and the AFRL. The *Edwards Air Force Base*
19 *Comprehensive Plan* describes long-range development for Edwards AFB, establishing goals, policies,
20 plans, and anticipated action regarding the physical, social, and economic environment (AFFTC 1994).
21 Land use designations, including total acreage and percent of the base area, are described in Table 3-8
22 (AFFTC 1994).

23 Within these various land use categories, specific areas have been designated for a particular purpose.
24 These include, but are not limited to, the off-road vehicle areas I and II, the Combat Arms Range, hunting
25 and fishing areas, the PIRA, and the AFRL.

26 A portion of Edwards AFB is designated for the NASA Dryden Flight Research Center (DFRC), which is
27 a major installation on base, covering 838 acres. DFRC's existing land-use plan divides its facility into
28 three basic use zones: (1) the flightline, (2) support services, and (3) explosive hazard zones. The
29 flightline zone is adjacent to Rogers Dry Lake, is restricted to flight research activities, and includes
30 aircraft hangars, test facilities, pavement, and runways. Support services are behind the flightline zone

1 and include warehouses, project support complexes, and administrative support. Western Aeronautical
 2 Test Range zones include a remote site and a small triangular section of the facility adjacent to Lily
 3 Avenue that includes a radio tower. The remote site includes the facility’s water tower and several radio
 4 towers. The two explosive hazard zones overlap the flightline and support services zone. These two
 5 circular zones extend for a minimum distance of 1,200 feet from the shuttle loading area (NASA 1999).

6 **Table 3-8**
 7 **Land Use Designations at Edwards AFB**

Land Use Designation	Total Square Miles	Total Acres	Percentage of Total Base Property (%)
Aircraft Clearance, Quantity-Distance	4.86	3,110.40	1.00
Aircraft Pavement, Runways	0.91	582.40	0.20
Lakebed Painted Runways	3.12	1,996.80	0.070
Lakebed Non-maintained Landing Site	61.00	39,040.00	13.00
Aircraft Operations and Maintenance	0.2	128	0.04
Engineering Test	27.83	17,811.20	5.90
Aircraft Test Ranges	336.23	215,187.20	71.50
Industrial	12.18	7,795.20	2.60
Administrative	0.19	121.60	0.04
Community Commercial	0.21	134.60	0.04
Community Service	0.30	192.00	0.10
Medical	0.07	44.80	0.01
Housing	1.52	972.80	0.30
Outdoor Recreation	3.83	2,451.20	0.80
Buffer Zone	17.75	11,360.00	3.80
Water	0.00	0.00	0.00
Total¹	470	300,800	100

8 **Note:** 1- rounded to the nearest whole number

9 **3.8.1.1 Land Use Restrictions**

10 Air Force land use policies and guidance are only applicable to lands under their control. Policies
 11 established by the Air Force for airfields are similar to the criteria established by the FAA for
 12 development of surrounding civilian airports. Air Force Joint Manual 32-1013, *Airfield and Heliport*
 13 *Planning and Design Criteria*, sets the minimum requirements for airfields and applicable land uses for
 14 surrounding areas. As part of the review and approval process, the Edwards AFB Planning and Zoning
 15 Committee grants final siting approval for all construction and activity-related projects. Edwards AFB has
 16 three paved runways that provide the principal landing surfaces for the base. These runways are divided
 17 into two different classes: A and B. The primary difference between class A and B runways is in the type
 18 of aircraft used on the runway. Class A runways are primarily intended for small, light aircraft. Class B
 19 runways are primarily intended for high performance and large, heavy aircraft. The Main Base Runway

AIR FORCE FLIGHT TEST CENTER

1 (Runway 22) is a class B runway and is the primary airstrip on base. The runways North and South Base
2 are class A. In addition, the base has 18 runways painted on dry lakebeds and uses the remaining lakebed
3 areas for emergency landings.

4 Land use controls around airfields and lakebeds are recommended by the air installation compatible use
5 zone (AICUZ). The AICUZ delineates areas at both ends of a runway, called accident potential zones
6 (APZs), where the probability of aircraft accidents is highest based on statistical analysis of past accident
7 data at various bases.

8 A clear zone is an area on the ground or water beginning at the end of the runway and symmetrical about
9 its center. This zone is to be free of obstacles for the purpose of protecting the safety of approaching
10 aircraft. The clear zone for a class A runway is 1,000 feet wide by 3,000 feet long. The clear zone for a
11 class B runway is 3,000 feet wide by 3,000 feet long.

12 Accident potential zones I and II, located beyond the clear zone, possess a significant potential for
13 accidents. Each zone has associated land use restrictions and its size is dependent upon a variety of factors
14 defined in Air Force Joint Manual 32-1013, *Airfield and Heliport Planning and Design Criteria*. The
15 following land uses are generally compatible with APZ 1: industrial, agricultural, recreational, and vacant
16 land. In addition to compatibility with APZ I land uses, APZ II also includes low-intensity residential and
17 nonresidential uses for a maximum of 20 percent building coverage per acre.

18 Explosive hazard or quantity-distance zones are associated with test areas and areas for explosives,
19 munitions, and propellant storage. These zones vary in size depending upon the quantity and type of
20 explosive being used or stored. Zoning ensures the safety of all personnel within a given area. Typical
21 areas where these zones exist include the unconventional fuels area, the explosive ordnance disposal area,
22 the gun-butt and munitions storage area, the arm/de-arm areas, the hot cargo area, the PIRA, and the
23 AFRL. The ROI for the proposed action includes all explosive hazard and quantity distance zones on
24 base, as well as those required in the immediate vicinity of PB-13 for the proposed weapons delivery
25 testing.

26 Numerous active and inactive areas have been used for conventional ordnance. Figure 3-7 shows the land
27 uses for targets that have been historically used or are currently in use throughout the base. Target rings
28 indicate a circular error of 50 percent, meaning that if the radius of the target is 1 mile, 50 percent of the
29 bombs are expected to fall in this defined area.

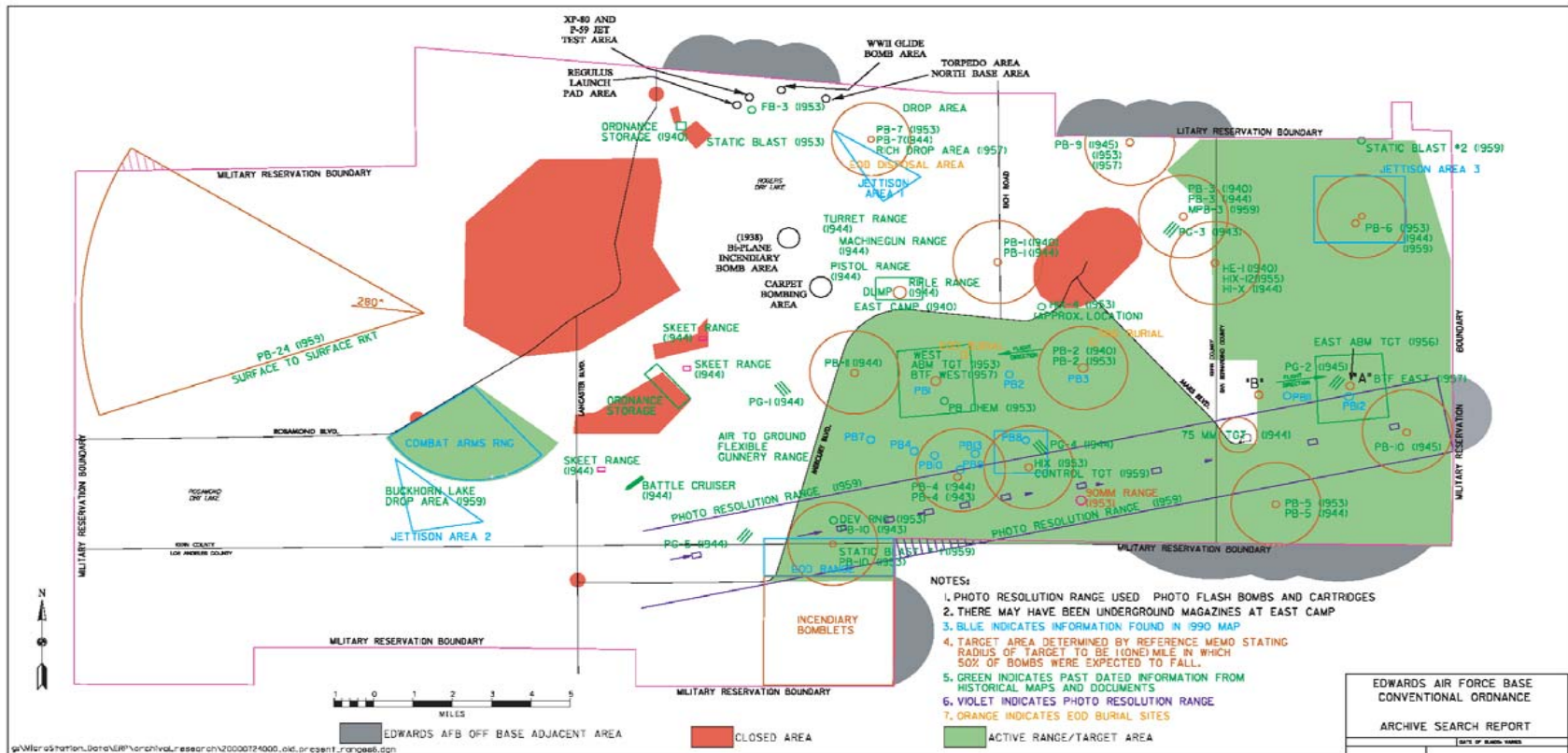


Figure 3-7 Historic and Current Uses of the PIRA

1

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1 **3.8.1.2 Airfield Operations**

2 Flightline operations are carried out by the 412 TW and the 95th Air Base Wing (95 ABW). The 412 TW
3 is the direct mission organization of the AFFTC, which is responsible for testing and evaluating manned
4 and unmanned aerospace vehicles, subsystems, and components. The 95 ABW is the

5 support unit on Edwards AFB responsible for communications; civil engineering; transportation,
6 including loading and unloading armament and supplies; fuel supply; security police; and fire protection.

7 The 412th Operations Group (412 OG) plans and conducts all flight test activities for the 412 TW. The
8 412 OG also advises the 412 TW on air traffic control matters and airfield and airspace management
9 including flight management. Ridley Mission Control Center is the central safety coordination point for
10 all operations affecting the PIRA.

11 **3.8.2 Land Use on the PIRA**

12 The *Edwards Air Force Base Comprehensive Plan* (BCP), adopted in June 1994, characterizes the PIRA
13 as an aircraft test range (AFFTC 1994). This land use category includes all test ranges at Edwards AFB.

14 The PIRA has a quantity distance zone, which is a safety zone located around the EOD Range areas. The
15 use of the PIRA as a bombing range precludes the use of the area for recreational uses (e.g., off-road
16 vehicle, hunting, horseback riding, camping or other recreational uses) due to the hazardous situations
17 found on the PIRA (e.g., unexploded ordnance, laser use, and bombing).

18 The *Edwards Air Force Base Joint Land Use Study* was prepared as part of the base's planning and
19 coordination efforts with local and regional planning agencies (Edwards AFB 1996). The study included
20 four land use categories associated with the base and its operations: Edwards AFB, flight corridors, spin
21 areas, and buffer areas. The only land use category directly related to PIRA operations is the buffer areas.
22 A buffer area of not less than 2 miles has been extended around the base and is divided into the Northwest
23 Buffer Area and the Southeast Buffer Area. The Buffer Area Policy allows the base to minimize the
24 potential for impacting new land uses within this 2-mile area, while enabling the base to adapt to the
25 needs of future AFMC programs (Edwards AFB 1996).

26 **3.8.2.1 Visual and Aesthetic Resources**

27 A Scenic Quality Map for Edwards AFB, created by the Bureau of Land Management Visual Resource
28 Management Program, divides the base into sub-units and rates them according to the following factors:

1 landform, vegetation, water, color, influence of adjacent scenery, scarcity, and cultural modification.
2 Class A areas contain a combination of the most outstanding characteristics of each rating factor. There
3 are no Class A areas on base. Class B areas contain a combination of some outstanding features and
4 features fairly common to the physiographic region. Areas with lakebeds, the more scenic and relatively
5 undisturbed hills and ridges, the denser Joshua Tree woodlands, and Leuhman Ridge on base fall into
6 Class B. Class C areas contain features fairly common to the physiographic region and include the
7 remainder of the base, with the exception of the developed areas. Class D areas are so heavily developed
8 and/or extensively disturbed that they lack positive aesthetic attributes, thereby diminishing the visual
9 quality of surrounding areas. These areas include North Base, JPL, NASA, Main Base, South Base,
10 housing, and the AFRL (AFFTC 1994).

11 Class B areas can be found primarily through the central part of the PIRA, from Mercury Boulevard to
12 U.S. Highway 395. Class C areas can be found primarily along the northern, southern, and southeastern
13 boundaries of the PIRA (AFFTC 1996). Landforms on the PIRA consist of claypans, edge playas, flat to
14 rolling terrain, and scattered rugged hills and ridgelines. Unique visual resources on the PIRA include the
15 following:

- 16 • Mount Mesa complex, located on the southwest portion;
- 17 • Jackrabbit Hill and surrounding ridges that mark the southern boundary;
- 18 • Red Buttes, located in the southeast portion;
- 19 • Kramer Hills on the east boundary; and
- 20 • The flat plains that make up the West, East, and PB-6 Ranges.

21 The PIRA is relatively devoid of manmade objects with the exception of the graded areas for the West
22 Range and buildings painted white (e.g., Phillips Laboratory water system, instrumentation and
23 observation buildings). The PIRA contains both Class B and C areas, in approximately equal proportions.

24 Edwards AFB contains two areas with special ecological concerns: desert tortoise critical habitat, and
25 Significant Ecological Areas (SEAs). These areas are discussed further in Section 3.9, Natural Resources.

26 **3.9 NATURAL RESOURCES**

27 Biological resources are defined as terrestrial and aquatic ecosystems with the native plants and animals
28 that occur throughout these ecosystems. This includes plant populations and communities; wildlife
29 populations and their relationship to habitat; and aquatic habitat, and riparian ecosystems. Plant and

1 animal species that are proposed for, candidates for, or are listed as, threatened or endangered by the
2 USFWS, and species having equivalent status at the California state level, are referred to as special-status
3 species and are given special consideration by law for their preservation.

4 Critical habitat for a threatened and endangered species is defined under the federal Endangered Species
5 Act (ESA) as specific areas within the geographical area occupied by the species at the time it is listed
6 that contain the physical or biological features that are essential to the conservation of the species and
7 may require special management considerations or protection, and specific areas outside the geographic
8 area occupied by the species at the time it is listed that are also essential to the conservation of the
9 species.

10 The USFWS identifies primary physical and biological constituent elements of an area designated as
11 critical habitat that are essential to the conservation of the species (50 CFR 424.12). Primary constituent
12 elements may include, but are not limited to, roost sites, nesting grounds, spawning sites, feeding sites,
13 seasonal wetlands or drylands, water quality or quantity, host species or plant pollinators, geological
14 formations, vegetation types, tides, and specific soil types (50 CFR 424.12).

15 Federal agencies are required by Section 7 of the ESA to assess the effect of any project on federally
16 listed threatened and endangered species. Under Section 7, consultation with the USFWS is required for
17 federal projects if such actions could directly or indirectly affect listed species or destroy or adversely
18 modify critical habitat; a conference is required if such action could directly or indirectly affect a
19 proposed listed species or proposed critical habitat. It also is Air Force policy to follow management
20 goals and objectives specified in Integrated Natural Resource Management Plans, and to consider
21 sensitive species, sensitive communities, and habitats recognized by state and local agencies when
22 evaluating impacts of a project.

23 **3.9.1 Plants**

24 **3.9.1.1 Plant Communities**

25 The five major plant communities at Edwards AFB are creosote bush scrub, Joshua tree woodland,
26 halophytic phase saltbrush scrub, xerophytic saltbrush scrub, and mesquite woodland (Figure 3-8). The
27 PIRA contains four of these plant communities not including the lakebeds, claypans, and dunes. The
28 West Range consists of halophytic phase saltbrush scrub, creosote bush scrub, and Joshua tree woodland.
29 Target PB-13 is cleared of vegetation.

1 Creosote bush scrub is dominated by creosote bush (*Larrea divaricata*). At Edwards AFB, there are
2 approximately 103,000 acres of creosote bush scrub, which comprises approximately 34 percent of the
3 base area. Creosote bush scrub is distributed throughout the northwestern and eastern portions of the base
4 and supports the highest plant diversity on base (AFFTC 2002). Common species found in this
5 community include winterfat (*Ceratoides lanata*), cheesebush (*Hymenoclea salsola*), and Nevada tea
6 (*Ephedra nevadensis*).

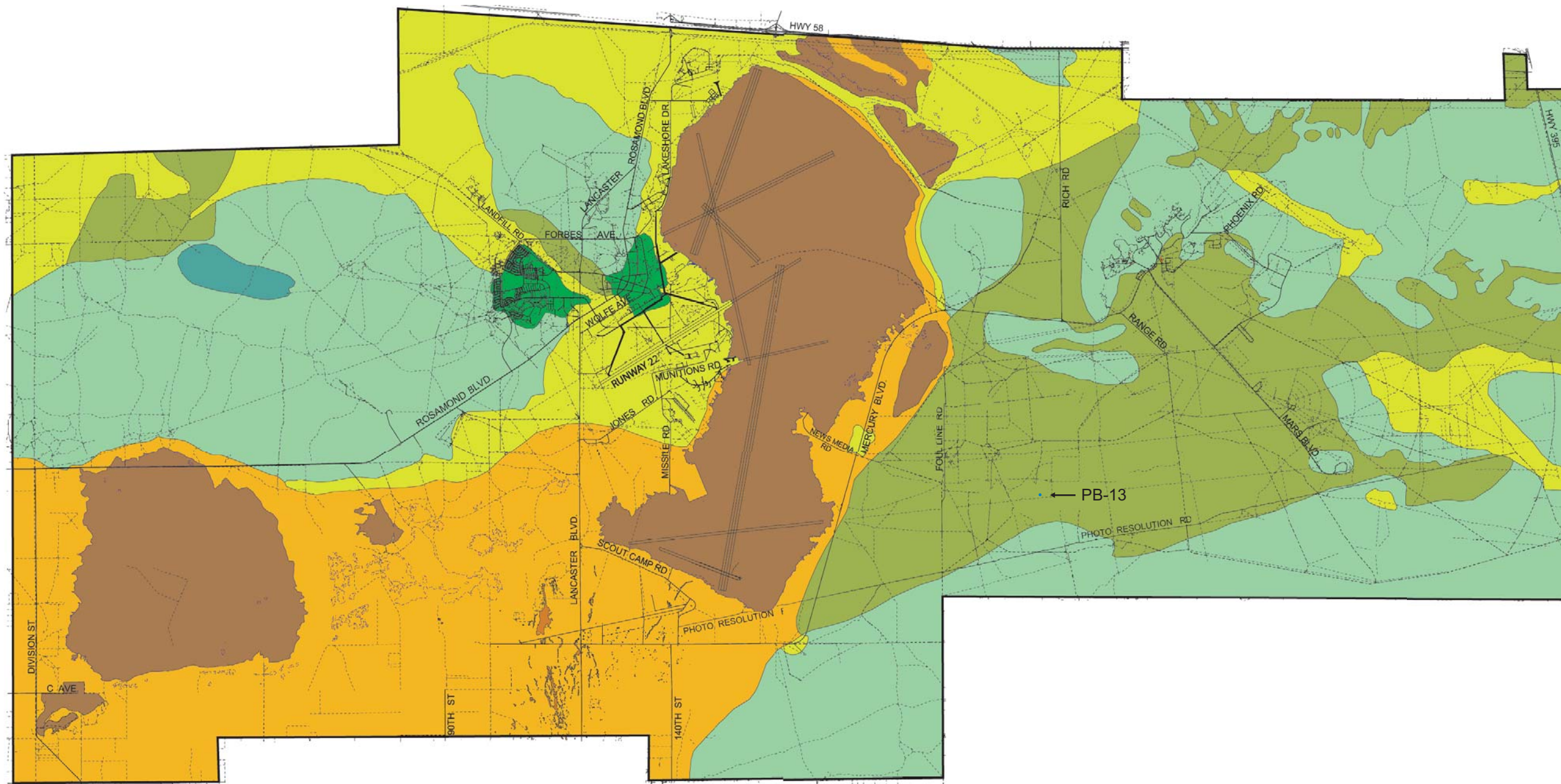
7 Joshua tree woodland is dominated by Joshua trees (*Yucca brevifolia*) and is most prevalent east of
8 Rogers Dry Lake, with small patches occurring in the northwest. At Edwards AFB, there are
9 approximately 52,800 acres of Joshua tree woodland, which comprises approximately 17 percent of the
10 area of the base. Common species found in this community include the native desert dandelion
11 (*Malacothrix glabrata*), pincushion (*Chaenactis* sp.), and fiddleneck (*Amsinckia tessellata*).

12 Halophytic phase saltbrush scrub is dominated by four species of the genus *Atriplex*: spinescale (*A.*
13 *spinifera*), shadescale (*A. confertifolia*), four-wing saltbush (*A. canescens*), and quailbush (*A.*
14 *lentiformes*). At Edwards AFB, there are approximately 55,300 acres of halophytic phase saltbush scrub,
15 which comprises approximately 18 percent of the area of the base. A common species found in this
16 community includes saltgrass (*Distichlis spicata*).

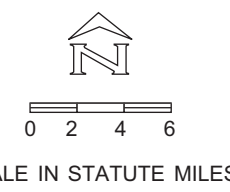
17 Arid phase saltbrush is dominated by allscale (*Atriplex polycarpa*). At Edwards AFB, there are
18 approximately 45,300 acres of arid phase saltbush scrub, which comprises approximately 15 percent of
19 the area of the base. Common species found in this community include burrobrush (*Ambrosia dumosa*),
20 goldenhead (*Acamptopappas sphaerocephalus*), and cheesebush (*Hymenoclea salsola*).

21 **3.9.1.2 Sensitive Plant Species**

22 Studies of sensitive plants at Edwards AFB indicate that no federal or state-listed plant species have been
23 identified on base. Nine species that are listed by the California Native Plant Society (CNPS), however,
24 have been identified on base. Four of these plants are Barstow woolly sunflower (*Eriophyllum*
25 *mohavense*), desert cymopterus (*Cymopterus deserticola*), alkali mariposa lily (*Calochortus striatus*), and
26 yellow spiny cape (*Goodmania luteola*). The desert cymopterus is presently under a 12-month review by
27 the USFWS for listing under the ESA (USFWS 2004). The alkali mariposa lily and desert cymopterus
28 are known to occur on the PIRA (Edwards AFB 1996). Two populations of the alkali mariposa lily have
29 been found south of Avenue B in the northwest corner of the Mount Mesa Complex. Populations of the
30 desert cymopterus are generally located northwest of Haystack Butte, southwest of Haystack Butte,



- Legend**
- Unpaved Roads
 - Paved Roads
 - Taxiways
 - Base Boundary
- Habitats and Plant Communities**
- Xerophytic Saltbush Scrub
 - Urban/Developed Areas
 - Playa
 - Mesquite Woodland
 - Joshua Tree Woodland
 - Halophytic Saltbush Scrub
 - Hymenoclea-Lycium* Scrub
 - Creosote Bush Scrub
- PB-13 (1,000 foot diameter)



Environmental Assessment
for Armed Munitions
Integration Testing on the
Precision Impact Range Area

**HABITATS AND
EIGHT PLANT COMMUNITIES
AT EDWARDS AFB**

DATE	FILENAME	FIGURE NO.
6/10/04	Q238/FIGURES/3-08.ai	3-8

1

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1 northwest of the Downfall Complex, southwest of Kramer Hills, and north of Red Buttes along the
2 eastern boundary of the PIRA. Due to heavy rainfall that occurred during the 1994/1995 rainy season,
3 these plants can now be found throughout the East and West Range, Haystack Butte, Jack Rabbit Hill, and
4 other sites on the PIRA (Edwards AFB 1996).

5 **3.9.2 Wildlife**

6 Five eubranchiopod shrimp species have been identified in Rogers Dry Lake: clam shrimp (*Eocycticus*
7 *digueti*), tadpole shrimp (*Lepidurus lemmoni*), and three species of fairy shrimp (*Branchinecta mackini*,
8 *B. gigas*, and *B. lindahli*) (AFFTC 1992). Eubranchiopods lie dormant in the soil of dry lakebeds until
9 flooding creates the aquatic habitat necessary to complete their life cycles. These shrimp are a food source
10 for a variety of migratory shorebirds that congregate at Rogers Dry Lake when water is present.

11 To date, the only amphibians identified on base include the western toad (*Bufo boreas*), Pacific tree frog
12 (*Hyla regilla*), red-spotted toad (*Bufo punctatus*), and African clawed frog (*Xenopus laevis*). These were
13 identified at Piute Ponds by U.S. Geological Survey biologists during a survey in 1997. The African
14 clawed frog is a problematic introduced species that feeds on native wildlife, including other amphibians,
15 small reptiles, and fish (AFFTC 1997c). Common reptiles on base include the desert spiny lizard
16 (*Sceloporus magister*), side-blotched lizard (*Uta stansburiana*), western whiptail (*Cnemidophorus tigris*),
17 zebra-tailed lizard (*Callisaurus draconoides*), glossy snake (*Arizona elegans*), coachwhip (*Masticophis*
18 *flagellum*), gopher snake (*Pituophis melanoleucus*), and the Mojave green rattlesnake (*Crotalus*
19 *scutulatus*).

20 Common birds include the turkey vulture (*Cathartes aura*), common raven (*Corvus corax*), sage sparrow
21 (*Amphispiza belli*), barn owl (*Tyto alba*), house finch (*Carpodacus mexicanus*), and western meadowlark
22 (*Sturnella neglecta*). Joshua tree woodlands support cactus wren (*Campylorhynchus brunneicapillus*) and
23 ladder-backed woodpecker (*Picoides scalaris*). Common bird species found in creosote scrub include the
24 horned lark (*Eremophila alpestris*), black-throated sparrow (*Amphispiza bilineata*), and sage sparrow. The
25 seasonal inundation of lakebeds and claypans attracts wading bird species, including the black necked stilt
26 (*Himantopus mexicanus*), American avocet (*Recurvirostra americana*), and greater yellowlegs (*Tringa*
27 *melanoleuca*). Birds associated with ponds include the yellow-headed blackbird (*Xanthocephalus*
28 *xanthocephalus*), black-crowned night heron (*Nycticorax nycticorax*), and green heron (*Butorides striatus*).

29 Horned larks are commonly found in open habitat with sparse vegetation or areas of low shrubs (i.e., open
30 field, agricultural areas, desert habitat, prairies, and grassland communities). The main runways on base
31 are surrounded by arid phase saltbush scrub. Combined with open areas along the flightline, this habitat is

1 suitable for horned larks. The vegetation adjacent to the runways is periodically graded, creating a buffer
2 area devoid of vegetation, which also provides additional foraging habitat for horned larks. Methods that
3 have been used at Edwards AFB to control the bird airstrike problem with horned larks include
4 revegetation with native plants and use of a falconer.

5 The storm water retention pond along the flightline attracts other types of birds (e.g., waterfowl and
6 shorebirds) and possibly bats associated with aquatic habitats. Barn owls (*Tyto alba*) are known to inhabit
7 buildings on the flightline. During the evening, owls feed on small rodents adjacent to the runways and in
8 other areas nearby.

9 Common mammals on Edwards EFB include the black-tailed jackrabbit (*Lepus californicus*), desert
10 cottontail (*Sylvilagus audobonii*), and coyote (*Canis latrans*). Common rodents include the deer mouse
11 (*Peromyscus maniculatus*), grasshopper mouse (*Onychomys torridus*), little pocket mouse (*Perognathus*
12 *longimembris*), Merriam's kangaroo rat (*Dipodymus merriami*), and desert woodrat (*Neotoma lepida*).
13 Common bats include the western pipistrelle (*Pipistrellus hesperus*), and little brown bat (*Myotis*
14 *lucifugus*).

15 **3.9.3 Sensitive Wildlife Species**

16 The desert tortoise is listed as threatened by the federal government and by the State of California. It can
17 occur throughout the Colorado and Mojave deserts in elevations up to 4,100 feet, although ideal habitat
18 typically occurs between 1,000 and 3,000 feet (Edwards AFB 2001). The desert tortoise can occur in
19 almost every desert habitat, but is most common in desert washes, desert scrub, creosote bush, and Joshua
20 tree habitats. This species finds cover in burrows that are usually under bushes and requires loose, dry,
21 sandy soil for nest building. The desert tortoise is a herbivorous reptile whose native range includes the
22 Sonoran and Mojave deserts of southern California, southern Nevada, Arizona, extreme southwestern
23 Utah, and Sonora and northern Sinaloa, Mexico.

24 **3.9.4 Migratory Birds**

25 Seasonal migratory birds use both permanent and temporary bodies of water for foraging on shrimp and
26 other food items at Edwards AFB. These birds include ducks and geese such as the ruddy duck (*Oxyura*
27 *jamaicensis*), northern mallard (*Anas platyrhynchos*), northern pintail (*Anas acuta*), Canada goose
28 (*Branta canadensis*), and snow goose (*Chen caerulescens*). Ducks and geese are hunted in designated
29 areas on base.

1 **3.9.5 Sensitive Habitats**

2 Sensitive habitats at Edwards AFB include but are not limited to designated critical habitat for the desert
3 tortoise, sensitive plant populations (Section 3.9.1.2), and SEAs as defined by the County of Los Angeles.
4 The sensitive habitats discussed below are ones most relevant to the Proposed Action and Alternatives.

5 **3.9.5.1 Designated Critical Habitat**

6 In 1994, the USFWS designated portions of the base as desert tortoise critical habitat (USFWS 1994).
7 Approximately 65,000 acres of the base fall within the Fremont-Kramer Desert Tortoise Critical Habitat
8 Unit that includes portions of the PIRA, AFRL, and the Mount Mesa area (Figure 3-9).

9 **3.9.5.2 Desert Tortoise Management Zones**

10 In 1994, the USWFS issued a Biological Opinion for the PIRA that created three Desert Tortoise
11 Management Zones corresponding with mission use in each zone (Edwards AFB 1996). Desert tortoise
12 critical habitat (see Section 3.7.5) is present within the PIRA desert tortoise management zones; however,
13 the zones extend beyond critical habitat areas. Target PB-13 is located in Zone 1, which corresponds to
14 the highest use area with respect to operations at the PIRA. Activities within Zone 1 are not expected to
15 preclude the recovery of the desert tortoise in the Western Mojave Desert. Moderate desert tortoise
16 densities are expected in Zone 2. Zone 3 contains a minimal amount of PIRA support infrastructure and
17 is expected to have minimal improvements and activities. Zone 3 provides the greatest level of protection
18 for desert tortoises because of the high population density of desert tortoises that can be found there.

19 **3.9.5.3 Significant Ecological Areas**

20 The County of Los Angeles General Plan establishes 61 SEAs, which represent a wide variety of
21 biological communities within the county. The SEAs function to preserve this variety to provide a level of
22 protection to the resources within them. The SEAs are intended to be preserved in an ecologically viable
23 condition for the purposes of education, research, and other non-disruptive outdoor users, but are not
24 intended to preclude limited compatible development.

25 Los Angeles County has identified two SEAs on Edwards AFB: Edwards AFB (SEA #47) and Rosamond
26 Lake (SEA #50). The locations of these SEAs are shown on Figure 3-9. SEA #47 contains botanical
27 features that are unique and limited in distribution in Los Angeles County. They include the only good
28 stands of mesquite (*Prosopis glandulosa*) in Los Angeles County. The area contains fine examples of
29 creosote bush scrub, alkali sink, and the transition vegetation between the two. Mesquite woodlands

1 provide habitat for a variety of mammals, birds, and reptiles. The best example of shadscale scrub and
2 alkali sink biotic communities in Los Angeles County are in SEA #50. It also contains Piute Ponds, which
3 are located in the southwestern corner of the base. Piute Ponds support a variety of wildlife, especially
4 birds. An important aspect of these ponds is that they provide a stopover area for migratory birds.

5 **3.10 NOISE AND VIBRATION**

6 **3.10.1 Noise Characteristics**

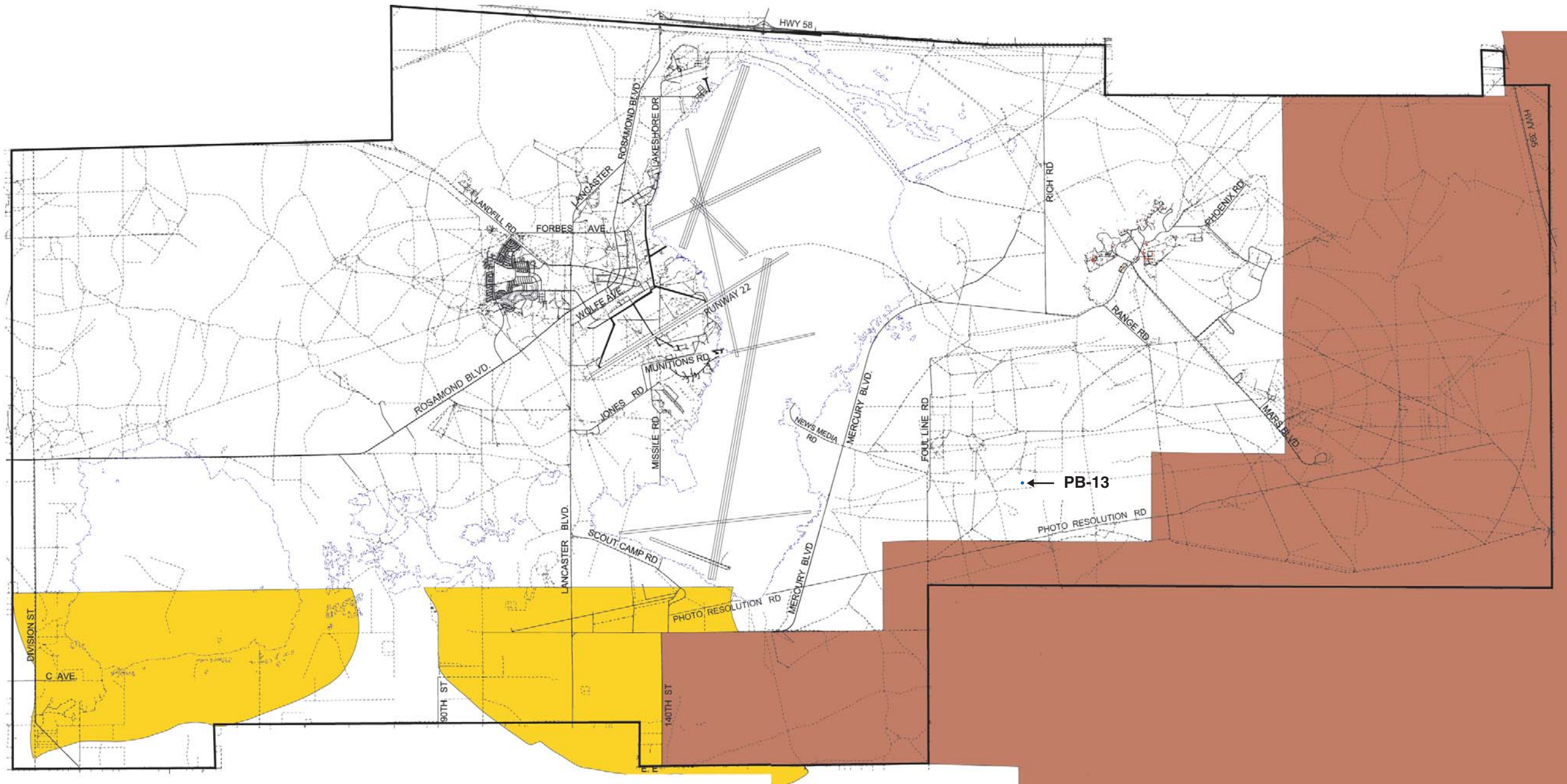
7 In 1972, Congress enacted the Noise Control Act (NCA), Public Law 92-574. Among the requirements
8 under NCA was a directive to the U.S. EPA to "...publish information on the levels of environmental
9 noise, the attainment and maintenance of which in defined areas under various conditions as requisite to
10 protect the public health and welfare with an adequate margin of safety." The U.S. EPA published EPA-
11 550/9-47-004, *Information on Levels of Environmental Noise Requisite to Protect Public Health and*
12 *Welfare with an Adequate Margin of Safety*, in 1974 (Levels Document).

13 The characteristics of sound include parameters such as amplitude, frequency, and duration. The decibel
14 (dB), a logarithmic unit that accounts for the large variations in amplitude, is the accepted standard unit
15 measurement of sound. Different sounds may have different frequency content. When measuring sound
16 to determine its effects on the human population, A-weighted sound levels (dBA) represent adjusted
17 sound levels. The adjustments, created by the American National Standards Institute (1983), are
18 established according to the frequency content of the sound. Examples of typical A-weighted sound
19 levels are shown in Figure 3-10.

20 Noise is usually defined as sound that is undesirable because it interferes with communication and
21 hearing, is intense enough to damage hearing ability, or is otherwise annoying. Noise levels often change
22 with time. Therefore, to compare levels over different time periods, several descriptors were developed to
23 account for the time variances.

24 These descriptors are used to assess and correlate the various effects of noise on humans, including land
25 use compatibility, sleep and speech interference, annoyance, hearing loss, and startle effects.

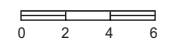
- 26 • A-weighted decibel scale (dBA). This scale simulates the range of sound that is audible
27 by the human ear. The A-weighted scale significantly reduces the measured pressure
28 level for low frequency sounds while slightly increasing the measured pressure levels for



Legend

- Unpaved Roads
- Paved Roads
- Taxiways
- Base Boundary
- PB-13 (1,000 foot diameter)

- Sensitive Wildlife Habitat**
- Desert Tortoise Critical Habitat
 - Los Angeles County Significant Ecological Area (SEA)



SCALE IN STATUTE MILES

Environmental Assessment
for Armed Munitions Integration Testing
on the Precision Impact Range Area

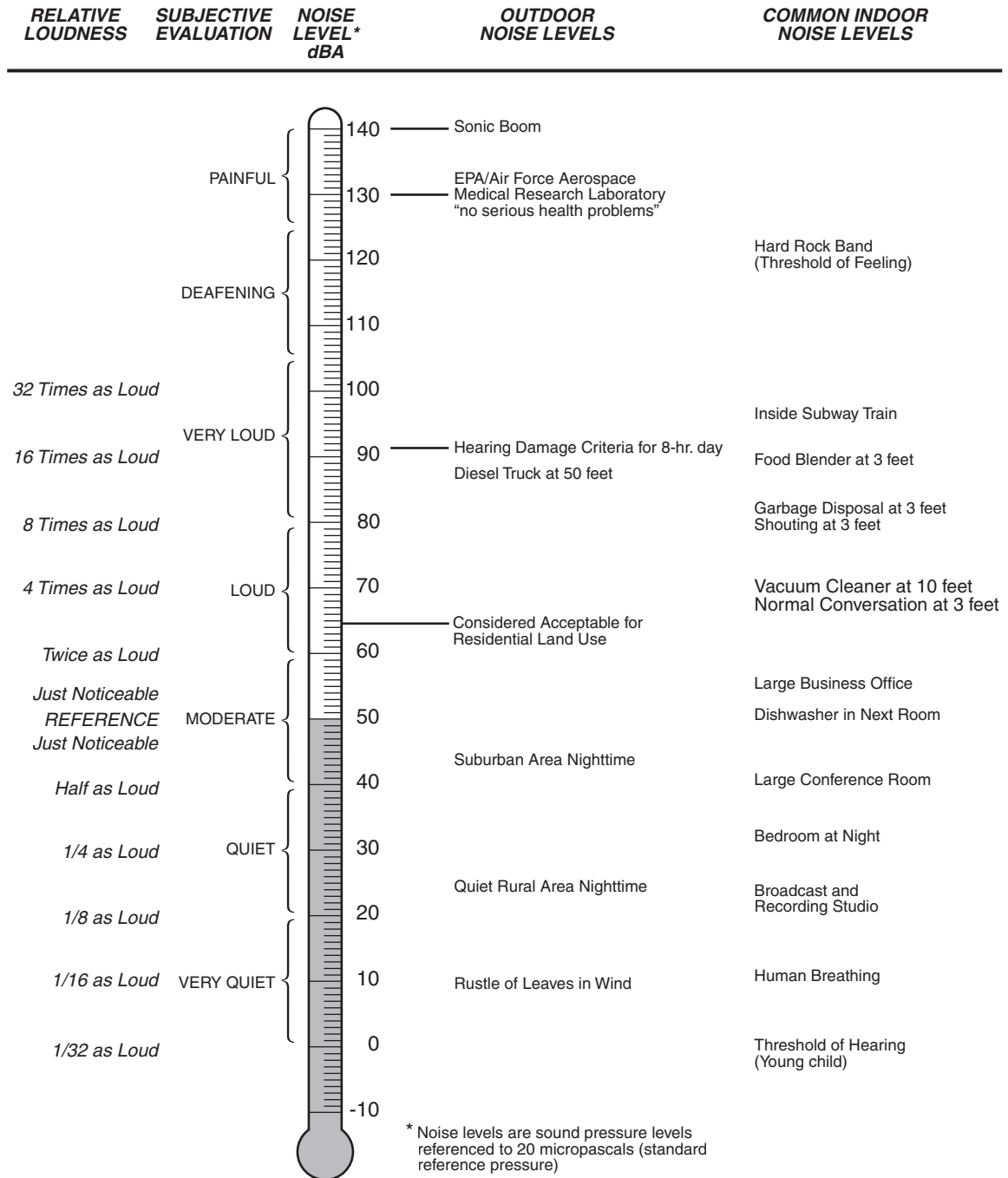
**TWO SENSITIVE WILDLIFE
HABITAT AT EDWARDS AFB**

DATE 08/19/04	FILENAME 0238FIGURES/ 3-09.ai	FIGURE NO. 3-9
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Figure 3-10 Examples of Typical A-Weighted Sound Levels



(SOURCE: U.S. Air Force 1975, 1978, no date [n.d.])

Environmental Assessment for
Armed Munitions Integration Testing
on the Precision Impact Range Area

EXAMPLES OF
TYPICAL A-WEIGHTED
SOUND LEVELS

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1 middle frequency sounds. A-weighted sound levels are typically measured between
2 1,000 to 4,000 hertz (Hz).

- 3 • The long-term equivalent A-weighted sound level (L_{eq}). This describes time-varying
4 noise energy as a steady noise level.

- 5 • Day-night average noise level (DNL). The DNL, often referred to as L_{dn} , has been
6 adopted by federal agencies as the standard for measuring noise. The DNL is an A-
7 weighted, 24-hour average of hourly averages. Each hourly average represents the sound
8 energy of all the disparate sounds that occurred during that hour. The hourly average
9 would be a continuous, uniform sound whose total sound energy would be equal to the
10 sum of the individual sound energies of all the real sounds occurring during that hour.
11 Typically, different hours of the day would have different hourly averages. For this
12 reason, and for standardization, the DNL is defined as the average of the 24 hourly
13 averages of the day.

- 14 • C-weighted sound level. C-weighting measures sound levels in dB, with no adjustment
15 to the noise level over most of the audible frequency range except for a slight de-
16 emphasis of the signal below 100 Hz and above 3,000 Hz. C-weighting is used as a
17 descriptor of low-frequency noise sources, such as blast noise, explosive detonations, and
18 sonic booms.

- 19 • C-weighted day-night level (CDNL) is the C-weighted sound level averaged over a 24-
20 hour period, with a 10-dB penalty added for noise occurring between 10:00 p.m. and 7:00
21 a.m. CDNL is similar to DNL, except that C-weighting is used rather than A-weighting.
22 CDNL is used to evaluate human response or annoyance to noise sources, such as blast
23 noise and sonic booms.

- 24 • Sound exposure level (SEL) considers both the A-weighted sound level (AL) and
25 duration of noise. SEL converts the total A-weighted sound energy in a given noise event
26 with a given duration into a 1-second equivalent and, therefore, allows direct comparison
27 between sounds with varying intensities and durations.

- 28 • C-weighted sound exposure level (CSEL) is an SEL measurement based on the C-
29 weighted level rather than the A-weighted level.

- 1 • Sound pressure level (SPL) is a logarithmic scale, using dB as units, and a reference
2 pressure that corresponds approximately to the minimum audible sound pressure.

- 3 • Community noise equivalent level (CNEL) has been adopted by the State of California as
4 the descriptor for measuring noise levels. The CNEL is similar to the DNL, except that it
5 includes a 5 dB penalty for evening noise (7:00 p.m. to 10:00 p.m.) in addition to the 10
6 dB “penalty” for nighttime noise.

7 In the Levels Document, the U.S. EPA reported that the best metrics to describe the effects of
8 environmental noise in a simple, uniform, and appropriate way were:

- 9 • The Leq; and

- 10 • The DNL or L_{dn} (a variant of Leq that incorporates a 10-dB “penalty” for nighttime
11 noise).

12 Another factor that describes how noise is characterized and analyzed is whether the noise source is
13 continuous or impulsive. Continuous noise sources are from highways, construction sites, and cities with
14 heavy traffic and large airports. Impulsive noise generated from munition and ordnance explosions on
15 the PIRA would be fundamentally different from the continuous noise. For example, permanent damage
16 to unprotected ears due to continuous noise occurs at approximately 85 dB based on an 8-hour-per-day
17 exposure, while the threshold for permanent damage to unprotected ears due to impulsive noise is
18 approximately 140 dB peak noise based on 100 exposures per day (Pater 1976).

19 Thus given the difference between continuous and impulsive noise, the variations in frequency and period
20 of noise exposure, and the fact that the human ear cannot perceive all pitches and frequencies equally
21 well, a number of different measures of noise levels are used in this assessment: the peak sound level
22 (dBP), the SEL, and the DNL.

23 **3.10.2 Peak Sound Levels**

24 Weapon-related impulsive noise is often represented as dB (peak) or dBP, the unweighted peak sound
25 level that is equivalent to the instantaneous peak SPL. Criteria for judging the acceptability of detonation
26 noise in terms of unweighted peak noise levels have been developed in response to complaint data or
27 surveys of residents living near military ranges and quarries. It was reported that no significant public
28 reaction occurs during the day or night for peak levels below 128 dB (U.S. Army 2001). In 1991, the U.S.

1 Army Environmental Health Agency, now the U.S. Army Center for Health Promotion and Preventive
 2 Medicine (USACHPPM) provided guidelines for evaluating peak blast noise levels generated from
 3 military tests and training (Table 3-9). The Army conducted studies to correlate annoyance with
 4 measured dBP and concluded that the dBP criteria are useful for noise complaint management and
 5 investigation and that dBP provides a good estimate of the perceived vibration of typical residential
 6 construction results from blasts.

7 **Table 3-9**

8 **Guidelines for Evaluating Peak Blast Sound Levels**

9 Sound Levels (dB Peak)	Risk of Noise Complaints
<115	Low
115–130	Moderate
130–140	High, and possibility of damage
>140	High risk of physiological and structural damage claims

9 **Source:** Pater 1976.

10 However, when high-intensity impulsive noise is evaluated to determine its effects on a human
 11 population, C-weighted sound levels are used so that the low-frequency effects of the noise are
 12 considered. The low-frequency content of impulsive noise contributes to effects such as window rattle
 13 that influence people’s perception of and reaction to the noise. The CSEL values can be determined by
 14 subtracting 25 dB from the values in Table 3-9 (U.S. Army 2001). Therefore a CSEL value of 90 dB
 15 would equate to a low risk of complaints for high-intensity noise events.

16 **3.10.2.1 Measurements of Aircraft Noise Impact on Human Annoyance**

17 In 1977, at the request of the U.S. EPA, the National Academy of Science's Committee on Hearing,
 18 Bioacoustics and Biomechanics (CHABA) proposed guidelines for the uniform description and
 19 assessment of the various noise environments associated with various projects. In 1982, the U.S. EPA
 20 published *Guidelines for Noise Impact Analysis*, based on the CHABA Guidelines. According to
 21 CHABA Guidelines, the Leq and DNL were selected as the appropriate descriptors for noise because they
 22 reliably correlate with health and welfare effects. From data on community social surveys, DNL has been
 23 found to correlate with community annoyance, as measured in terms of percentage of exposed persons
 24 who are “highly annoyed” (%HA) (Table 3-10).

25 Correlation between DNL and CDNL has been established based on community reaction to impulsive
 26 sounds (CHABA 1981). The DoD has followed the recommendations of CHABA in describing high-
 27 intensity impulsive sounds, such as explosions, in terms of C-weighted sound exposure level. Table 3-10

1 shows the relationship between the percent of the population highly annoyed by sound levels expressed as
2 DNL and CDNL.

3 **Table 3-10**
4 **Relationship Between C-Weighted and A-Weighted Sound Levels**
5 **and Percent of the Population Annoyed**

CDNL (C-weighted)	% Highly Annoyed	DNL (A-weighted)
48	2	50
52	4	55
57	8	60
61	14	65
65	23	70
69	35	75

6 **Note:** CDNL can be interpreted in terms of “equivalent annoyance” DNL.

7 **Source:** CHABA 1981

8 A DNL of 65 dBA or lower is considered to be acceptable (Table 3-10); a DNL above 65 dBA but not
9 exceeding 75 dBA is normally unacceptable unless some form of noise attenuation is provided; a DNL
10 higher than 75 dBA is unacceptable. Daily exposure to explosions with a CDNL of 61 dB or less is
11 comparable to the DNL 65 dBA significance level for non-impulsive noise.

12 Explosion noise levels measured as a CSEL also provide a metric for potential impacts to humans over a
13 short-term duration, rather than averaged over a 24-hour period. For example, CSEL values can be used
14 to evaluate potential physiological startle responses and other short-term annoyance factors. Table 3-11
15 shows the relationship among CSEL, peak SPL, and SEL.

16 **3.10.2.2 Measurements of Noise Impact on Land Use Compatibility**

17 In 1980, the Federal Interagency Committee on Urban Noise (FICUN) published guidelines for
18 considering noise in land use planning (FICUN 1980). Federal agencies have adopted these guidelines as
19 the standard when making recommendations to local communities on land use compatibility issues.
20 Table 3-12 shows the types of land uses that would be appropriate based on a range of DNL values.

21 Again, a DNL of 65 dBA or lower is considered to be acceptable (Table 3-12); a DNL above 65 dBA but
22 not exceeding 75 dBA is normally unacceptable unless some form of noise attenuation is provided; a
23 DNL higher than 75 dBA is unacceptable. Daily exposure to impulsive noise of CDNL of 61 dB or less

1 is comparable to the DNL 65 dBA significance level for non-impulsive noise and is normally considered
 2 compatible with most land uses.

Table 3-11

Relationship Between SEL, Peak dB, and CSEL

CSEL (dB)	Peak SPL (dB)	SEL (dB)
85.4	113.6	75.9
94.0	121.6	84.5
100.4	127.6	90.9
106.9	133.6	97.4
110.7	137.1	101.2
113.4	139.6	103.9
115.5	141.6	106.0
117.2	143.1	107.7
119.9	145.6	110.4
121.9	147.6	112.4
123.6	149.2	114.1
125.1	150.5	115.6
127.4	152.7	117.9
129.3	154.4	119.8
130.9	155.9	121.4
132.2	157.1	122.7

5 **3.10.3 Existing Noise Setting**

6 **3.10.3.1 On-Base Region**

7 Major noise sources at Edwards AFB are aircraft operations that include rotary wing air traffic, engine
 8 testing, sonic booms, and vehicle traffic on streets. The major sources of motor vehicle-related noise at
 9 Edwards AFB are Lancaster Boulevard, Rosamond Boulevard, and primary and secondary streets on the
 10 base.

11 Noise estimates are usually presented as noise contours. Noise contours are lines on a map of an airfield
 12 and its vicinity where the same noise level is predicted to occur. The 5-dB interval chosen to represent
 13 noise contours reflects the Department of Housing and Urban Development (HUD) noise criteria
 14 commonly used for airfield noise. Figure 3-11 shows the CNEL noise contours at Edwards AFB.

15 As shown in Figure 3-11, Runway 22 noise contours for a CNEL of 60 dB and above lie completely
 16 within the boundary of Edwards AFB. Parts of the on-base recreation areas lie between the 65- and 70-
 17 dB contours. These areas include the Edwards AFB Rod and Gun Club (Combat Arms Range), base golf

1 course, off-highway vehicle area number 1, and some of the picnic areas and athletic fields. The Main
2 Base residential area is outside the 60 dB contour.

3 The Main Base has a range of exposure from 65 to 85 dB; the South Base has a range of 70 to 85 dB.
4 On-base land under the 80 dB noise contours is primarily open space and test program support area. The
5 South Base and a portion of the Main Base are currently within the 80 dB noise level; therefore, small
6 areas of administrative, commercial, and industrial land are subject to these noise levels.

7 The area around AFRL is subject to very high levels of noise during rocket engine tests. Test firings
8 occur infrequently during daytime hours for 1 to 3 minutes at a time. Personnel at the test site remain in
9 buildings designed to protect them from high noise levels. Smaller engines are also tested at this location,
10 and noise levels are less than half those produced by the large Titan engines. Approximately 1,750
11 people reside within the 80-dB contours of Titan test firings.

12 **3.10.3.2 Off-Base Region**

13 The off-base regions under R-2515 consist primarily of open space, but include industrial, residential,
14 commercial, and public/recreation centers as well. The MOA Range NOISEMAP (MR_NMAP) noise
15 model was used to develop the ambient noise contours for the R-2515 restricted area. Collectively, the
16 models in MR_NMAP together are representative of the way aircraft fly in military airspace, and there
17 are three general representations: broadly distributed operations that generally occur in MOAs and ranges,
18 distributed parallel tracks that occur along MTRs, and specific tracks that occur in target areas. The noise
19 models contained in MR_NMAP assume operations in MOAs and restricted airspace areas are uniformly
20 distributed which accounts for noise contours following the borders of the airspace (MR_NMAP Manual
21 1997). The total noise contours as shown in Figure 3-12 include the effects of distributed aircraft
22 operations and that of low level and other test routes that lie within R-2515.

23 As shown in Figure 3-12, the day-night sound levels on the A-weighted decibel scale (L_{dn}) noise contours
24 resulting from subsonic aircraft operations in the R-2515 special use airspace show the maximum L_{dn}
25 value of 45 dB along the perimeter of the restricted use airspace. The surface L_{dn} values for most of the
26 interior of the airspace range from 50 to 55 dB. Noise contours for 60 dB and above lie completely within
27 the boundary of Edwards AFB, therefore, ambient noise levels in the off-base regions adjacent to
28 Edwards AFB for Alternatives A, B, and C are anticipated to be below a CNEL of 60 dB under normal
29 conditions (AFFTC 1997). However, there are areas within the off-base region where noise levels exceed
30 60 dB due to freeways, major highways, airports, and other noise-generating operations.

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Table 3-12
Land Use Compatibility

Land Use	Yearly Day-Night Average Sound Level (DNL) in Decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Residential						
Residential, other than mobile homes and transient lodgings	Y	N ¹	N ¹	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N ¹	N ¹	N ¹	N	N
Public Use						
Schools	Y	N ¹	N ¹	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoria, and concert halls	Y	25	30	N	N	N
Government services	Y	Y	25	30	N	N
Transportation	Y	Y	Y ²	Y ³	Y ⁴	Y ⁴
Parking	Y	Y	Y ²	Y ³	Y ⁴	N
Commercial Use						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail—building materials, hardware, and farm equipment	Y	Y	Y ²	Y ³	Y ⁴	N
Retail trade—general	Y	Y	25	30	N	N
Utilities	Y	Y	Y ²	Y ³	Y ⁴	N
Communication	Y	Y	25	30	N	N
Manufacturing and Production						
Manufacturing, general	Y	Y	Y ²	Y ³	Y ⁴	N
Photographic and optical	Y	Y	25	30	N	N

3 Table 3-12, Page 1 of 3

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Table 3-12 (Continued)
Land Use Compatibility

Land Use	Yearly Day-Night Average Sound Level (DNL) in Decibels					
	Below 65	65-70	70-75	75-80	80-85	Over 85
Agriculture (except livestock) and forestry	Y	Y ⁶	Y ⁷	Y ⁸	Y ⁸	Y ⁸
Livestock farming and breeding	Y	Y ⁶	Y ⁷	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
Recreational						
Outdoor sports arenas and spectator sports	Y	Y ⁵	Y ⁵	N	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

Table 3-12, Page 2 of 3

Notes: Numbers refer to notes below.

* - The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise-compatible land uses.

Y (YES) - Land Use and related structures compatible without restrictions.

N (No) - Land Use and related structures are not compatible and should be prohibited.

NLR - Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.

25, 30, or 35 - Land Use and related structures generally compatible; measures to achieve NLR of 25, 30, or 35 dB must be incorporated into design and construction of structures.

Table 3-12 (Continued)
Land Use Compatibility

Notes: (Continued)

1 - Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide an NLR of 20 dB; thus the reduction requirements are often stated as 5, 10, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year-round. However, the use of NLR criteria will not eliminate outdoor noise problems.

2 - Measures to achieve NLR 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas, or where the normal noise level is low.

3 - Measures to achieve NLR 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

4 - Measures to achieve NLR 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.

5 - Land-use compatible provided special sound reinforcement systems are installed.

6 - Residential buildings require an NLR of 25.

7 - Residential buildings require an NLR of 30.

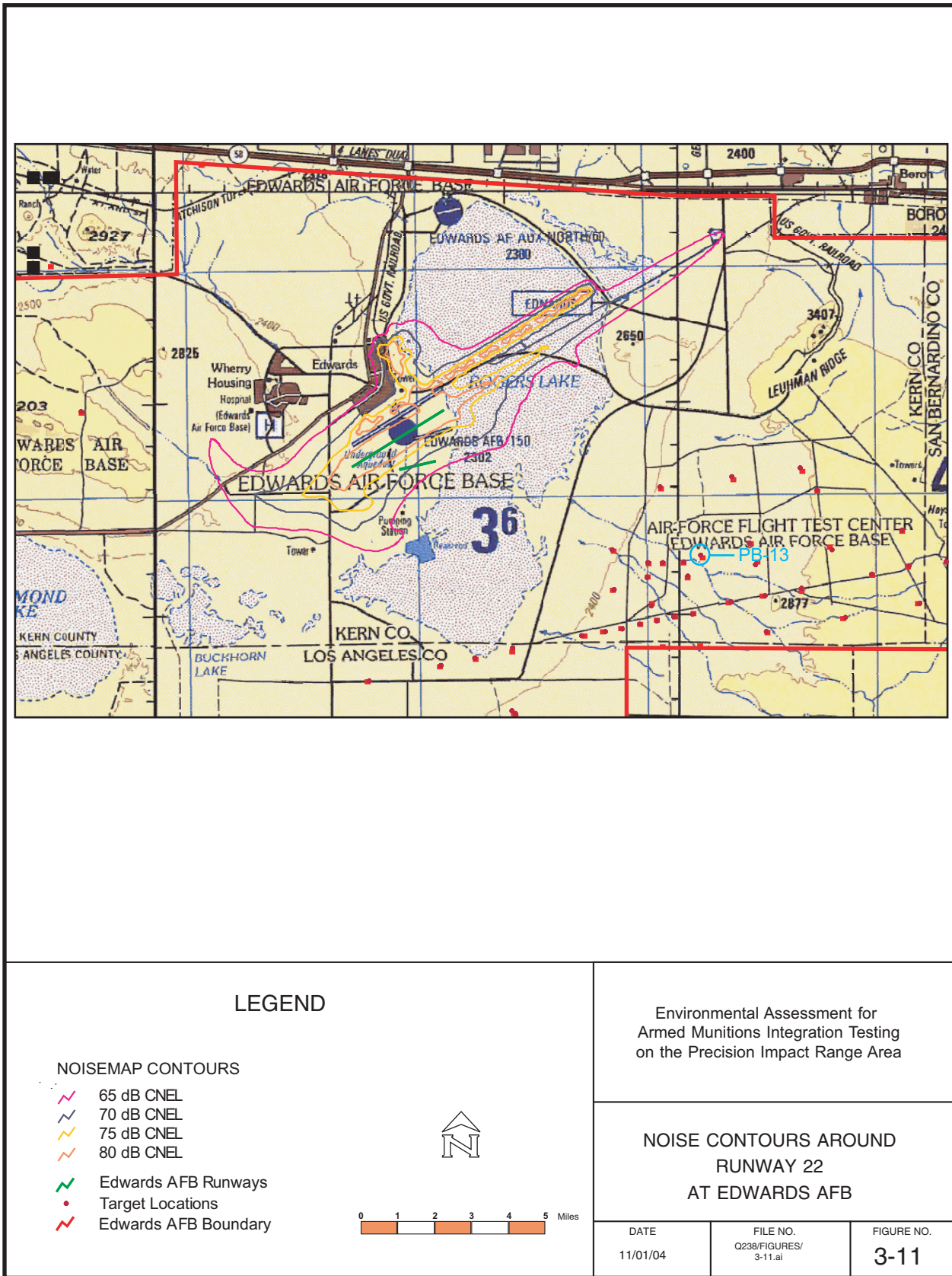
8 - Residential buildings not permitted.

Source: 14 CFR Part 150

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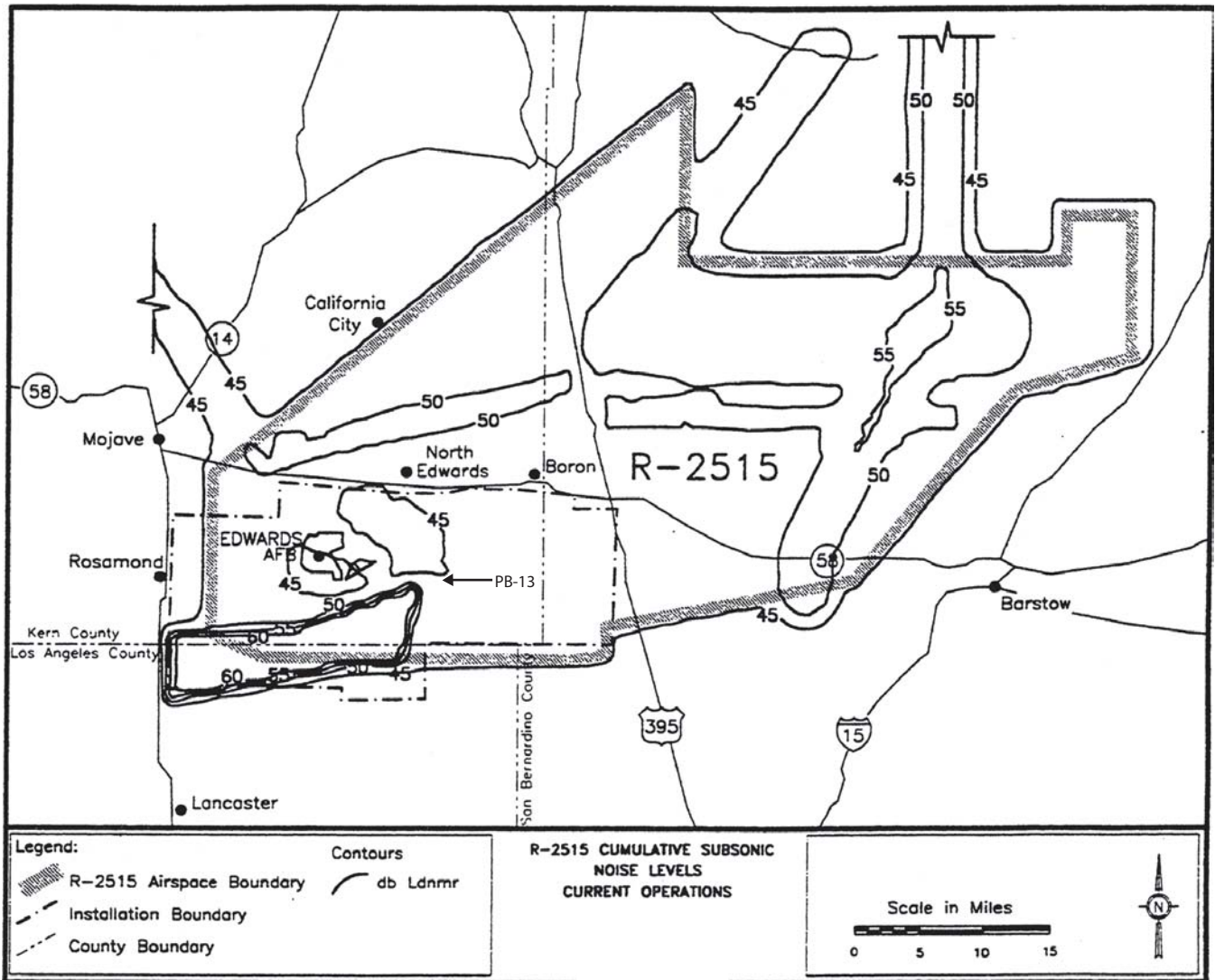
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Figure 3-11 Noise Contours around Runway 22 at Edwards AFB



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Source: AFFTC 1995b and Spectrum Sciences

Figure 3-12 Cumulative Subsonic Noise Levels for R-2515

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3.10.3.3 Precision Impact Range Area, PB-13 Target

Aircraft Noise

For on-base regions Figure 3-13 shows the noise contours resulting from aircraft operations using the conventional bombing pattern flown to target PB-10, which lies approximately 1.5 miles west of PB-13.

Armed Munitions Noise

The PIRA PB-13 target area is open space that is restricted from public/recreational use. As shown in Figure 3-14 the A-weighted dB scale (L_{dn}) noise contours resulting from simulated 445-pound NEW detonation (MK 83 General Purpose [GP] bomb) show a maximum “day focus” L_{dn} value of 60 dBA at 1,060 feet from ground zero and 1.7 nautical miles (NM) from the base boundary. The L_{dn} value at the base boundary is 24 dBA. These values were calculated using the BNOISE2 program developed by the Army’s Construction Engineering Research Lab (CERL). The BNOISE2 program characterizes the noise impacts resulting from detonations of various munitions. The day focus propagation produces a cluster of converging sound rays and thus a higher sound level at a given distance. The cluster condition producing the highest sound level at a given distance is called “focus.”

The unweighted peak values (dBP) for the MK 83 are shown in Table 3-13 as compared to the MK 82 and MK 84 GP bombs.

Table 3-13

Sound Levels for Various General Purpose Bombs

Type of General Purpose Bomb	MK 82	MK 83	MK 84
Total Bomb Weight (pounds)	500	1,000	2,000
Net Explosive Weight (pounds)	192	445	970
Range from Target (feet)	Sound Level (dB Peak)		
6,561.5	148.5	150	153
13,123.2	138.0	141	143
26,246.4	130.5	133	135.5
52,492.8	123.0	125.5	128
78,739.2	118.5	121	123
118,108.8	113.5	116	118.5

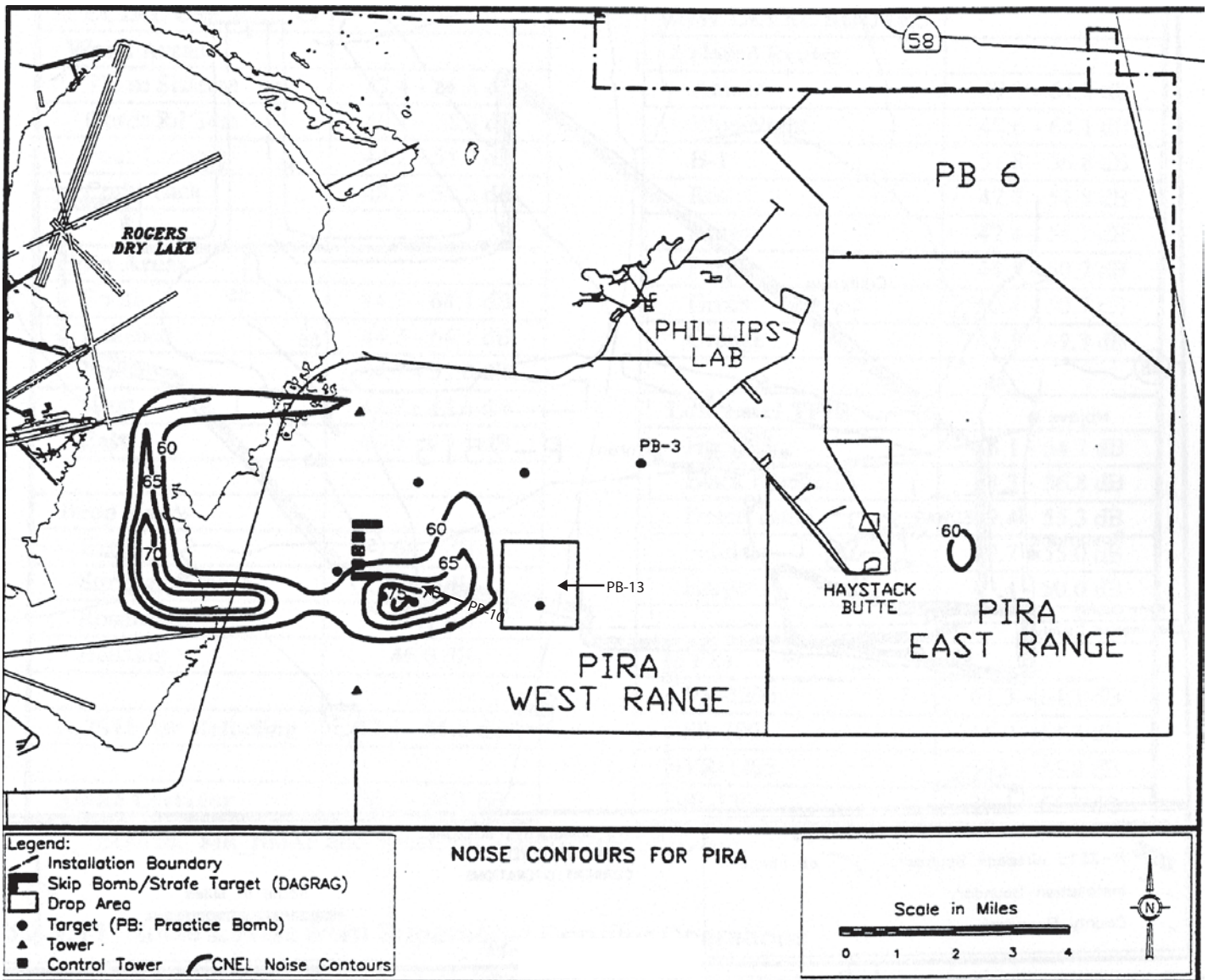
Source: Russell 2004.

3.10.4 Vibrations

The impulsive sound pressure from the detonation of explosive charges can cause structures to vibrate. This vibration is generally perceived by the occupants as the rattling of windows and objects on shelves. House shaking is commonly blamed on ground-borne vibrations. Studies of coal mine detonations (Fort

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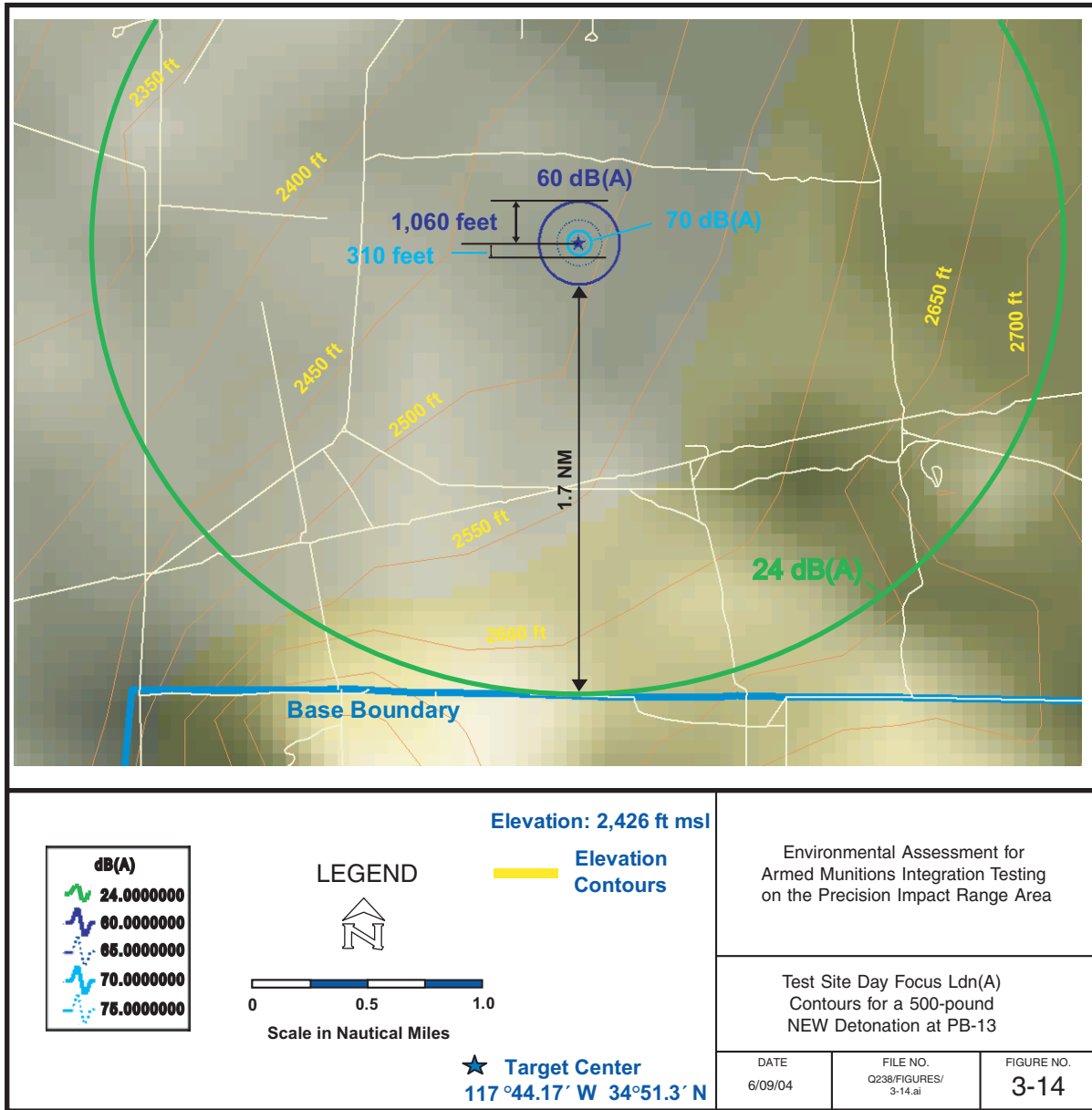


Source: AFFTC 1995b and Spectrum Sciences

Figure 3-13 Noise Contours on the PIRA

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1 McCoy 2003) indicate that the ground-borne vibration dominates house vibration at scaled distances of
 2 less than 50 feet. At scaled distances greater than 50 feet, airborne vibrations dominate. For a 100-pound
 3 charge, the ground-borne vibration is the dominant cause of house vibration if the house is less than 500
 4 feet from the detonation point. At distances greater than 500 feet, the airborne sound wave is the
 5 dominant cause of vibration (U.S. Army 2003). Humans can typically perceive ground-borne vibrations
 6 as low as 0.08 to 0.20 inches per second (U.S. Army 2003). A summary of typical vibration levels is
 7 listed in Table 3-14.

8 **Table 3-14**
 9 **Typical Vibration Levels**

Type of Response	Ground Vibration (inches/second)
Human:	
Perceptible	0.08
Noticeable	0.2
Unpleasant	0.38
Disturbing	0.8
Objectionable	1.3
Structure:	
Minor damage (fine cracks in plaster)	5.4
Major damage	7.6

10 **Source:** U.S. Army 2003

11 The maximum threshold for ground-borne vibration level recommended by the U.S. Bureau of Mines to
 12 prevent threshold damage is 0.5 inch per second. The threshold level at which minor structural damage
 13 may begin to occur in 0.01 percent of structures is set at 2.0 inches per second.

14 The maximum predicted ground vibration at 1.25 mile, 2.5 miles, and 5 miles for the detonation of a 500-
 15 pound NEW charge is 0.00926, 0.00333, and 0.00119 inch per second.

16 **3.10.4.1 Vibration from Airborne Sound**

17 Airborne sound is the dominant cause of vibration on structures on and off Edwards AFB and within the
 18 PIRA. Most of the studies of airborne vibration and damage guidelines are derived from studies using
 19 sonic booms as the airborne sound source. The vibration from the detonation of bombs, rockets, and
 20 mortars is similar to the vibration from the sonic booms. Structural shaking or window rattling by
 21 airborne sound can annoy the occupants and cause possible structural damage. The vibration levels and
 22 corresponding unweighted peak sound pressure levels for annoyance and damage (Fort McCoy 2003) are

1 listed in Table 3-15. The probability of windows breaking as a result of airborne sound levels as
 2 summarized in Table 3-16.

3 **Table 3-15**
 4 **Airborne Vibration Levels**

Response	Vibration Level (inches/second)	Sound Level (dB peak)
Concern by homeowner about structural rattling and possible damage	0.1	120
Glass and plaster cracks under worse case conditions	0.5	134
Structural damage to lightweight superstructures	>2.0	175

5
 6 **Table 3-16**
 7 **Probability of Window Breakage**

Pressure (pounds/foot²)	Sound Level (dB Peak)	Probability of Breakage (per million pane events^a)
1	128	0.28
10	148	5,000
100	168	380,000

8 **Note:** a – Number of windowpanes broken for each million panes exposed to a blast event.

9 **Source:** U.S. Army 2003

10 **3.11 PUBLIC/EMERGENCY SERVICES**

11 Public/emergency services refer to the capability of ensuring protection of people and property.
 12 Public/emergency services at Edwards AFB ensure the protection of base personnel and property. The
 13 public/emergency service umbrella at Edwards AFB consists of the Fire Department, Security Forces, and
 14 the Medical Group.

15 **3.11.1 Fire Protection/Prevention**

16 Fire protection on base comprises personnel and equipment that are organized and trained to respond to
 17 emergencies. The emergency response time of the Fire Protection Division is contingent upon the
 18 distance to the emergency site and the availability of personnel, support equipment, and supplies. All
 19 areas of the base are currently covered.

20 The weapons delivery aircraft for Alternatives A, B, and C would utilize Runway 22 for takeoff and
 21 landing. This area is located near and serviced by Fire Station No. 1. The fire station is a 26,200-square-
 22 foot facility providing fire protection and emergency medical service as needed for the entire base.

23 Vehicles assigned to this fire station include two engines, five Aircraft Rescue Fire Fighting vehicles, one

1 rescue vehicle, a 5,000- and a 2,000-gallon water tender, and two airfield surveillance vehicles. A
2 maximum of 35 firefighters are housed in this facility.

3 **3.11.2 Security**

4 Security forces provide general law enforcement on Edwards AFB. Law enforcement duties include
5 traffic stops, domestic disputes, and police investigations. Security forces (police) on base comprise
6 personnel and equipment organized and trained to respond to a series of emergencies, as well as to
7 provide a daily security presence. Security programs provide the means to counter threats during
8 peacetime, mobilization, or wartime.

9 **3.11.3 Medical Services**

10 Medical services on-base comprise personnel and equipment that are organized and trained to respond to
11 a series of emergencies. Air Force Instruction 41-106, *Medical Readiness Planning and Training*,
12 establishes procedures for medical readiness, planning, and training during peacetime and wartime
13 operations.

14 **3.12 SAFETY**

15 Safety is defined as the protection of workers and the public from hazards. The total accident spectrum
16 encompasses not only injury to personnel, but also damage or destruction of property or products. For
17 worker safety, the boundary of the immediate work area defines the ROI. For public safety, a much
18 larger area must be considered. This area varies depending upon the nature of the operation, but may
19 extend for miles beyond the source of the hazard.

20 Potential health and safety issues on Edwards AFB include radiological, biological, chemical, and
21 physical hazards, as well as weapons, flight, ground, range, and test [systems] safety.

22 The AFFTC's institutional safety program is intended to minimize accidental injury, illness, and loss of
23 property. AFFTC's Safety Office is responsible for monitoring the safety programs through a system of
24 inspections, surveys, audits, and follow-up investigations. Elements of the safety program include
25 accident and injury prevention and reporting, fire prevention and protection, emergency preparedness, and
26 hazardous material and waste management. An Emergency Response Plan is in place to address
27 emergencies such as earthquakes, aircraft accidents, fires and explosions, bomb threats, civil disturbances,
28 nuclear emergencies, and toxic vapor releases or chemical spills. A base-wide safety reporting system
29 encourages employees to report their concerns about workplace safety.

1 The AFFTC's occupational health program is intended to recognize, evaluate, and control workplace
2 factors or stresses that may cause sickness, impaired health, or significant discomfort to employees. To
3 protect AFFTC personnel from noise hazards, hearing protection is used if personnel are exposed to noise
4 levels exceeding 85 dBA. The program identifies and quantifies worker exposure to hazardous
5 chemicals, noise, and radiation. Through AFFTC's Hazardous Communication Program, employees are
6 educated regarding proper chemical management principles and procedures.

7 **3.12.1 Range Safety**

8 The national range system, established by P.L. 81-60, was originally sited based on two primary
9 concerns: location and public safety. Thus, range safety, in the context of national range activities, is
10 rooted in P.L. 81-60 and Department of Defense Directive 3200.11, *Use Management, and Operation of*
11 *Department of Defense Major Range and Test Facilities*; both provide the framework under which the
12 national ranges operate and provide services to range users. To provide for the public safety, the ranges,
13 using a Range Safety Program, ensure that the weapons delivery testing presents no greater risk to the
14 general public than that imposed by overflight of conventional aircraft.

15 It is the policy of the Edwards AFB Range to ensure that the risk to the public, military personnel,
16 government civilian workforce, contractors, and to national resources is minimized to the greatest degree
17 possible. This policy is implemented by using risk management in the areas of public safety; launch area
18 safety, and landing area safety. Range users are required by Edwards AFB to demonstrate, through risk
19 modeling, that the lowest possible risk is achieved, consistent with AFFTC mission requirements and risk
20 guidance. The AFFTC Chief of Safety has responsibility for approving the proposed flight plans and
21 flight safety criteria. The AFFTC Commander has final authority and responsibility for the safety of the
22 proposed action. The Range Commander may deviate from these mission criteria based on geography,
23 weather, and national need; however, the basic standard is no more risk than that voluntarily accepted by
24 the general public in normal day-to-day activities (NASA 1997).

25 Health and safety issues related to aircraft operations (both routine and emergency management)
26 involving ground personnel working near operating aircraft during taxiing and inspection activities,
27 aircrews using runways (lakebed and non-lakebed surfaces), and personnel present during emergency
28 operations, aircraft malfunction, or other mishap are specifically addressed in Air Force Flight Test
29 Center Instruction (AFFTCI) 11-1, *Air Operations*, and AFFTCI 11-2, *Ground Operations*. These
30 instructions address in-flight operations, flight preparation, and ground procedures directly related to the

1 safety of personnel on the ground, as well as emergency procedures for the protection of all personnel at
2 Edwards AFB.

3 A fundamental requirement of the Edwards AFB Flight Safety Program is that each unit conducting or
4 supporting flight operations has a flight safety program as well as a Midair Collision Avoidance Program.

5 **3.12.2 Exposure Hazards**

6 ***Non-ionizing Electromagnetic Radiation***

7 Non-ionizing electromagnetic radiation (EMR) comes from two major sources on base: radio frequency
8 emitters (i.e., radar, radar-jamming transmitters, and radio communication equipment), which are
9 regulated in accordance with the Air Force Occupational Safety and Health (AFOSH) Standard 48-9,
10 *Radio Frequency Radiation Safety Program* and laser emitters (lasers), which are regulated by AFOSH
11 Standard 48-10, *Laser Radiation Protection Program*. Sources of EMR at Edwards AFB exist
12 throughout flightline areas, and include fixed location radar, airfield management equipment, and aircraft
13 equipment/instrumentation. Electromagnetic radiation can cause thermal and photochemical injuries to
14 humans, particularly to the eyes and skin. Standards and practices are in place to shield and isolate
15 workers from operational hazards surrounding existing EMR sources.

16 The Bioenvironmental Engineering Office periodically visits and evaluates the operations of all known
17 AFFTC industrial radiation users as a part of the Industrial Hygiene Surveillance Program. This office
18 also annually verifies the list of on-base radio frequency radiation emitters. Any proposed use of emitters
19 is evaluated using a preliminary radiation hazard analysis. Using a permissible exposure limit (PEL), a
20 proper hazard analysis is accomplished. This PEL is expressed in terms of safe distance limits from the
21 emitting source. Compliance with these limits is required as a Standard Operating Procedure (AFFTC
22 1997d).

23 ***Lasers***

24 There are many laser-based systems used in Edwards AFB operations, most of which are used on aircraft
25 during flight operations as target-range finders and target designators. Laser weapons are used for test
26 and training activities at approved locations on Edwards AFB under scheduled and controlled conditions
27 (i.e., Integrated Facility for Avionics Testing, Benefield Anechoic Facility).

1 Lasers produce narrow beams of light that may or may not be in the range of light visible to humans.
2 Edwards AFB tests about four types of American National Standards Institute Class 3 lasers, which are
3 mainly used for range operations (Cogan 1995).

4 ***Explosives and Propellants***

5 Explosives and propellants are used and stored in a number of locations throughout Edwards AFB. An
6 inhabited building separation distance (or clear zone) has been established around each of the existing
7 explosives and/or propellant use/storage locations. The size of the clear zone varies based on the quantity
8 and type of explosive used, or propellant stored. Clear zones ensure the safety of all personnel in the area
9 from the potential overpressure hazard associated with use and storage of these materials.

10 **3.13 SOCIOECONOMICS**

11 Socioeconomic resources are the economic, demographic, and social assets of a community. Key
12 elements include fiscal growth, population, labor force and employment, housing stock and demand, and
13 school enrollment.

14 Edwards AFB makes a substantial contribution to the economic status of the surrounding communities
15 within the Antelope Valley.

16 The Antelope Valley has a labor force of approximately 161,031 persons with an unemployment rate of
17 13.6 percent. The labor force is employed in a variety of industries including services, manufacturing,
18 construction/mining, retail, government, and agriculture. The military labor force comprised two percent
19 and the government labor force comprised six percent of those employed in the Antelope Valley in 1997
20 (Alfred Gobar Associates 1997). As of March 31, 1999, Edwards AFB employed approximately 10,920
21 military, civilians, and contractor personnel.

22 Edwards AFB provides permanent party housing for military members in the form of dormitories,
23 military family housing, and mobile home park spaces. Edwards AFB has an approximate total of 1,741
24 housing units with an occupancy rate goal of 98 percent. The number of housing units fluctuates due to
25 the demolition of older units and construction of new units. The number of units ranges from 1,640 to
26 1,777. Edwards AFB also maintains a 188-space mobile home park for privately owned mobile homes.
27 Personnel with families and unaccompanied members are allowed to reside in the park (MARCOA
28 Publishing, Inc. 1998).

1 Unaccompanied enlisted members and designated key and essential personnel are required to live on
2 base. Edwards AFB has two- and three-story dormitories, each housing from 32 to 84 members in single
3 and double rooms. A new complex with single rooms has recently been opened. Transient quarters are
4 available through the Billeting Office.

5 Edwards AFB has three elementary schools and one junior/senior high school, both under the jurisdiction
6 of the Muroc Unified School District. The 1998 to 1999 school year enrollment for these schools was
7 385, 346, and 457, respectively. The 1998 to 1999 school year enrollment for Desert Junior/Senior High
8 School was 626.

9 Several additional school districts exist within the Antelope Valley. For the 1998 to 1999 school year,
10 total enrollment in these school districts was 128,029 (California Department of Education). Numerous
11 private schools also exist within this region.

12 In fiscal year 1998, Edwards AFB expended \$3,186,230 for training and education of active duty
13 personnel and civilians. Impact Aid provided by the Department of Education to school districts that are
14 associated with Edwards AFB was \$4,631,541 for fiscal year 1998. This aid is provided to schools that
15 have children who reside on base or whose parents work on base, or both. These parents may be active
16 duty military or civilians (Levell 1999).

17 **3.14 WATER RESOURCES**

18 This section describes the surface water and groundwater resources for Edwards AFB including their
19 source, quantity, and quality.

20 **3.14.1 Water Quantity and Source**

21 Jurisdictional waters of the United States do not occur within Edwards AFB (USACE 1996). Non-
22 jurisdictional water resources at Edwards AFB include groundwater, water from the AVEK Water
23 Agency, storm water drainage/flood prone areas, treated wastewater effluent, artificial ponds supporting
24 aquatic habitat and recreation, dry lakes, and ephemeral streams. The AFFTC purchases potable water
25 from the AVEK Water Agency through a water distribution system located in Boron, California. Treated
26 wastewater effluent is used for some urban landscape irrigation and feeds some artificial ponds (AFFTC
27 2002).

28 The PIRA is located within three water basins; the western two-thirds of the PIRA is within the Antelope
29 Valley Basin. The Antelope Valley is a single, undrained, closed basin. The principal source of recharge

1 to the aquifer system in the Lancaster subbasin is infiltration of rainfall runoff through alluvial fans of
2 creeks flowing off the San Gabriel Mountains on the southern boundary of the Antelope Valley (AFFTC
3 2002). Recharge from infiltration in the hills on the eastern and northwestern parts of the Edwards AFB
4 area is minimal because precipitation is low and evaporation is high. Major faults that cut through the
5 alluvial deposits in the Antelope Valley act as partial barriers to the movement of groundwater. Water-
6 level differences of more than 300 feet in the same aquifer may be present. Storm water may enter the
7 groundwater directly through giant desiccation cracks and fissures, but this is considered to be a small
8 source of recharge because of the low permeability of the lakebed surface (AFFTC 2002).

9 Groundwater has been an important source of water for the Antelope Valley since development began
10 there in the late 1800s, and for the base since 1947. In recent years of rapid urban growth and drought,
11 between 50 and 90 percent of all water demands in the Valley were satisfied by groundwater.
12 Groundwater pumping and irrigation of crops began to decrease when water levels declined. Groundwater
13 depth has declined approximately 90 feet since 1947 (AFFTC 1999). Edwards AFB uses 15 groundwater
14 wells, 10 of which are reserved for drinking water purposes (AFFTC 2002). South Track, near the
15 southern boundary of Rogers Dry Lake, has eight of the wells in production and taps the deep aquifer to
16 provide potable water to the main Base. The 10 potable water wells have a maximum combined
17 production capability of 15.6 million gallons per day (AFFTC 2002).

18 Static groundwater in the vicinity of PB-13 is estimated to be at 191 to 210 feet below ground level as
19 measured by monitoring wells 442/1-MW01 and 442/2-MW01 in March 2003, and monitoring well 270-
20 MW01 as measured in May 2002.

21 **3.14.2 Water Quality**

22 The U.S. EPA's Office of Water establishes the groundwater and drinking water quality standards found
23 in the National Primary Drinking Water Regulations (or primary standards) that are legally enforceable
24 and apply to public water systems. Edwards AFB must also conform to standards for clean water set by
25 the California Department of Health Services. The Lahontan Regional Water Quality Control Board and
26 California Department of Health Services, Southern California Field Operations Branch, Tehachapi
27 District, administer these standards locally. Primary standards protect drinking water quality by limiting
28 the levels of specific contaminants that can adversely affect public health and are known or anticipated to
29 occur in public water systems. The Bioenvironmental Engineering Office monitors base groundwater
30 quality and compliance with drinking water standards.

1 Because of the history of the PIRA and its size, past practices may have contributed to soil and/or
2 groundwater contamination. In the past, ranches, homesteads, and mining operations were prevalent in
3 the Antelope Valley including the area that is now within PIRA boundaries. Past activities on the PIRA
4 may have included improper storage, disposal, and/or burial of solid or hazardous materials. Section 3.6
5 describes the environment with respect to identified hazardous materials that have the potential to
6 contribute to soil or groundwater contamination.

7 **3.14.3 Storm Water Drainage/Flood-Prone Areas**

8 Edwards AFB is situated at the bottom of Antelope Valley Watershed Basin, roughly a 2,400 square mile
9 watershed with no outlet. Rainfall in the San Gabriel Mountains southwest of Edwards AFB, and in the
10 Techapi Mountains northwest of the Base, drains in relatively well-defined streams toward the valley. The
11 streams flow to the valley floor and transition to an overland sheet flow pattern. Sediment deposition has
12 resulted in the following landforms:

- 13 • Transitional alluvial fans nearest the mountains with loamy, sandy, and gravelly
14 sediments of high permeability;
- 15 • Desert plateaus toward the middle of the valley with sandy and silty sediments of
16 intermediate permeability; and
- 17 • Playa lakebeds at the central low points of the valley with silty and clayey sediments of
18 low permeability.

19 There are no perennial streams on Edwards AFB. Storm water runoff for the entire watershed is directed
20 toward three large playa lakebeds: Rogers, Rosamond, and Buckhorn Dry Lakes. Playas are expansive,
21 ancient dry lakes that fill with water during the rainy season. Water may be retained in these playas for
22 several months due to mostly impermeable, alkaline, saline soils that contain high levels of solute,
23 sodium, and total dissolved solids. Any water reaching these lakebeds is trapped and subsequently
24 evaporates (AFFTC 2002; U.S. Geological Survey [USGS] 1998).

25 In general, drainage tends to flow toward the nearest dry lakebed. Rosamond and Buckhorn Dry Lakes, in
26 turn, drain toward Rogers Dry Lake (AFFTC 1993). Water level elevations (above MSL) for Rosamond
27 Dry Lake during flood conditions are described in Table 3-17 (AFFTC 1993).

Table 3-17

Water Level for Rosamond Dry Lake Flooding Events

Flood Level	Lake Elevation (feet above MSL)
50-year	2,280.9
100-year	2,282.2
200-year	2,283.4

Despite the apparent potential for the formation of a sizable lake, the playa lakebeds remain dry most of the time due to arid climate conditions. The average annual rainfall at the base is approximately 5 inches; the maximum recorded 1-year rainfall was 15.5 inches, which occurred in 1983. The average annual evaporation, as measured by a nearby Mojave pan evaporation gauge from 1939 to 1959, is 11.4 inches.

The Mojave Creek Floodplain is a well-defined drainage that runs southeast along the north and east of the residential area of Main Base along Lancaster Boulevard, and crosses Rosamond Boulevard where it runs southward just west of South Base and empties into Rogers Dry Lake. Mojave Creek is dry for most of the year, but periodic flooding does occur during above-normal rainfall (AFFTC 1993). As discussed in the base *Stormwater Pollution Prevention Plan* (September 1998), the storm water collection system consists of drainage ditches (flowing east to Rogers Dry Lake) and storm water retention ponds (located on the west edge of Rogers Dry Lake) (AFFTC 2002).

In 1993, a flood study of the base was conducted to determine floodplain constraints (AFFTC 1993). Rogers Dry Lake, Rosamond Dry Lake, and Mojave Creek (which empties into Rogers Dry Lake) were identified as the most critical flood-prone areas. A small portion of Rogers Dry Lakebed extends into the PIRA along the Mercury Boulevard/West Range boundary in the North Flank areas. Other flood-prone areas on-base occur in the residential area where no channels are present to divert heavy storm water runoff.

The AFFTC 1993 flood study estimated a flood-of-record inundation elevation to be used for planning purposes and performed a risk of flooding analysis of existing base facilities near Rogers Dry Lake. This level represents the maximum water surface elevation that would occur during a flood of reasonably high return interval (e.g., 50 years, 100 years). The level of flooding that occurred in 1943 was estimated to be the flood-of-record-level. Most development on Edwards AFB is above this estimated flood-of-record-level of 2,277.4 feet (North American Vertical Datum [NAVD] of 1988). Only a small portion of the NASA ramp and North Base are affected. Relatively high flooding in 1993 remained more than 3 feet below the estimated flood-of-record level (AFFTC 1993).

- 1 Target PB-13 is not located in a flood-prone area (AFFTC 2002). There are 20 surface drainage basins
- 2 delineated on Edwards AFB and target PB-13 is located within the El Mirage-Leuhman Ridge surface
- 3 water drainage basin.

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1 **4.0 ENVIRONMENTAL CONSEQUENCES**

2 This chapter discusses the potential environmental consequences or impacts associated with Alternatives
3 A, B, C, and D. Changes to the natural and human environment that could result from Alternatives A, B,
4 and C were evaluated relative to the existing environmental conditions described within Chapter 3.0. The
5 first paragraph or discussion under each of the environmental disciplines presents a description of what
6 would constitute a significant impact for that discipline.

7 This EA only addresses the impacts associated with armed munitions delivery on the PIRA target PB-13.
8 While this analysis looks at the effects of up to 500 pounds of NEW armed munitions, in all probability
9 many of the munitions tested would contain less NEW and the number of missions would be less than
10 requested; therefore this analysis looks at a worst case scenario for the Proposed Action and Alternatives.
11 Analysis of other phases (e.g., weapons development, transportation) will be the responsibility of the
12 intended weapons delivery test program office; separate environmental documentation would be required
13 under these phases of the program.

14 In general, potential impacts associated with the proposed project fall under one of two categories: (1)
15 impacts associated with normal delivery of the weapons on the target, or (2) impacts associated with off-
16 target impacts.

17 **4.1 AIR QUALITY**

18 Air quality impacts include both policy and physical air quality changes. Air quality impacts are typically
19 judged to be significant if the action being evaluated causes or contributes to a violation of federal or state
20 ambient air quality standards; increases exposure of people to air pollution in concentrations in violation
21 of ambient air quality standards; causes pollutant or pollutant precursor emissions in excess of local air
22 quality management agency impact significance thresholds; or violates federal, state, or local emission
23 limitations for specific pollutants or emission sources.

24 Kern County is in attainment or unclassified for most air quality standards with the exception of the
25 federal 8-hour and state 1-hour ozone standards and the federal and state PM₁₀ standard in one portion of
26 the county, outside the on-base region. The proposed project would have a significant impact on regional
27 air quality if the estimate of total long-term and short-term, direct and indirect project emissions exceeds
28 current air quality standards and/or KCAPCD conformity thresholds within the MDAB.

1 This evaluation analyzes the maximum emission impacts based on 100 missions per year.

2 **4.1.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
3 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
4 **(Proposed Action)**

5 **4.1.1.1 On-Base Region**

6 Sources of emissions generated under Alternative A include (1) privately owned vehicles of current on- or
7 off-base Air Force or contractor personnel required for temporary duty for weapons support, (2) one
8 landing and takeoff (LTO) for two aircraft (one delivery aircraft and one chase aircraft) during the
9 weapons delivery event, (3) aerospace ground equipment (AGE), and (4) ground support equipment
10 (GSE) used for unloading weapons to the delivery aircraft (consisting of one light-duty gasoline vehicle
11 [LDGV], one light-duty gasoline truck [LDGT], one heavy-duty gasoline truck [HDGT], one light-duty
12 diesel truck [LDDT], and one backhoe/loader). Emissions from B-52G/H, F-15, F-16, and T-38 aircraft
13 were used in the conformity calculations. The B-52G/H, F-15, and F-16 aircraft would be used to deliver
14 the armed munition to the PB-13 target and the F-16 and T-38 would be used as a chase aircraft
15 (primarily for data collection). Projected aircraft utilization for the armed munition delivery events is
16 shown in Table 4-1.

17 **Table 4-1**

18 **Project Aircraft Utilization for Armed Munitions Delivery Events**

Type of Event Support	Percent Utilized
Delivery Aircraft	
B-52G/H	10
F-15	68
F-16	22
Chase Aircraft	
F-16	70
T-38	30

19 **Source:** Hagenauer 2004

20 Since there would be no new construction or specialty equipment required, the actual emissions resulting
21 from and assessed under Alternative A primarily would occur from privately owned vehicles, armed
22 munitions delivery, delivery and chase aircraft, AGE, and GSE.

23 Weapons delivery aircraft flights are anticipated to be 1 hour in duration with approximately 25 percent of
24 that time spent below 3,000 feet AGL. Emissions from weapons delivery aircraft LTOs and flights were

1 calculated using engine emission factors specific to each potential engine-operating mode as obtained
2 from the Air Force Engineering and Services Center, *Aircraft Engine Emissions Estimator* (Air Force
3 Engineering and Services Center 1985). Engine emission factors were multiplied by:

- 4 • The total number of operations expected to occur per weapons delivery event;
- 5 • The number of engines operating during a particular operation;
- 6 • The time duration in each engine mode for the particular operation; and
- 7 • The estimated amount of time the flights are expected to be below 3,000 feet AGL.

8 The AGE/GSE emissions were calculated using emission factors obtained from *AP-42: Compilation of*
9 *Emission Air Pollutant Factors* (U.S. EPA 2000), equipment manufacturers, the South Coast Air Quality
10 Management District's *CEQA Air Quality Handbook* (1993), and the CARB's EMFAC7G modeling
11 software. AGE emissions were calculated based on the number of missions per year at 2 hours per
12 mission. GSE emission calculations were performed utilizing duration of activity or miles driven and
13 vehicle engine emissions for the given size ground transport vehicles.

14 The vehicle emissions from current on- or off-base Air Force or contractor personnel required for
15 temporary duty for 5 days per armed munition delivery event are not evaluated in this analysis because
16 they are exempt under 40 CFR 51.853(c)(2)(vii) and (x). Only vehicle emissions generated as a direct
17 result of project activities were considered. The routine, recurring transportation of personnel and the
18 future activities conducted would be similar in scope to those currently being conducted at existing
19 facilities. This would result in no emissions increase or emissions that are clearly *de minimis*. Therefore,
20 those actions (transportation of personnel in this case) are exempt.

21 The total project emissions for aircraft, AGE, and GSE for Alternatives A, B, and C for typical weapons
22 delivery events are summarized in Table 4-2. Details of the emission calculations from each activity are
23 provided in Appendix A.

24 An air conformity applicability analysis was conducted for the proposed project. Although the Kern
25 County portion of Edwards AFB is now in attainment of the federal 1-hour ozone standard, the area
26 remains in non-attainment for both the state 1-hour standard and the federal 8-hour standard. Therefore,
27 the proposed project would conform to the most recent EPA-approved SIP if the total direct and indirect
28 emissions remained below *de minimis* thresholds established in the U.S. EPA's conformity rule for
29 general federal actions. Because the area is considered to be in "serious" nonattainment of the federal 8-

1 hour ozone standard, the *de minimis* emission thresholds are 50 tons per year of NO₂ and VOCs. In
 2 addition, because Kern County is also in “serious” nonattainment of the NAAQS and the CAAQS for
 3 PM₁₀, the *de minimis* emissions threshold for PM₁₀ is 70 tons per year. Because the area is in attainment
 4 for the remaining criteria pollutants, no screening analysis was necessary.

5 Emissions subject to conformity applicability analysis from aircraft LTOs and flights and AGE/GSE
 6 sources are summarized in Table 4-2. Emissions from aircraft operating in airspace above 3,000 feet
 7 AGL were not included because these emissions would (1) be released above the mixing height and
 8 effectively blocked from dispersion to the surface, or (2) be released from such a height and over such a
 9 vast area that ground-level concentrations resulting from downward dispersion would be negligible.

10 **Table 4-2**
 11 **Conformity Applicability for Total Emissions Sources Associated with**
 12 **Weapons Delivery Testing Program at Edwards AFB, California (tons/year)**

Emissions Source	NO₂	VOC	PM₁₀	SO₂	CO
Aircraft LTOs/flights ^a					
Mission Aircraft (B-52G/H, F-15, F-16)					
Alternative A (100 flights)	0.792	2.469	0.060	0.123	4.042
Alternative B (50 flights)	0.396	1.234	0.030	0.061	2.021
Alternative C (10 flights)	0.078	0.247	0.006	0.012	0.402
Chase Aircraft (F-16, T-38) ^a					
Alternative A (100 flights)	0.351	0.284	0.009	0.052	1.898
Alternative B (50 flights)	0.176	0.142	0.004	0.026	0.949
Alternative C (10 flights)	0.035	0.028	0.001	0.005	0.190
Aerospace Ground Equipment					
Alternative A (100 flights)	0.247	0.006	0.022	0.018	0.017
Alternative B (50 flights)	0.124	0.003	0.011	0.009	0.009
Alternative C (10 flights)	0.025	0.001	0.002	0.002	0.002
Ground Support Equipment					
Alternative A (100 flights)	0.345	0.286	3.809	0.018	2.021
Alternative B (50 flights)	0.172	0.143	1.905	0.009	1.010
Alternative C (10 flights)	0.034	0.029	0.381	0.002	0.202
Detonations ^b					
Alternative A (100 flights)	15.181	0.043	17.685	N/A	10.787
Alternative B (50 flights)	7.590	0.022	8.843	N/A	5.394
Alternative C (10 flights)	1.518	0.004	1.768	N/A	1.079

13 Table 4-2, Page 1 of 2

1 **Table 4-2 (Continued)**
 2 **Conformity Applicability for Total Emissions Sources Associated with**
 3 **Weapons Delivery Testing Program at Edwards AFB, California (tons/year)**

Emissions Source	NO ₂	VOC	PM ₁₀ (tons/year)	SO ₂	CO
Totals					
Alternative A (100 flights)	16.916	3.088	21.585	0.211	18.765
Alternative B (50 flights)	8.458	1.544	10.793	0.105	9.383
Alternative C (10 flights)	1.690	0.309	2.158	0.021	1.875
<i>De minimis</i> thresholds	50	50	70	N/A	N/A
Kern County, MDAB portion of inventory ^c	10,950	4,380	12,410	N/A	N/A
Percentage of Inventory					
Alternative A (100 flights)	0.2	0.1	0.2	N/A	N/A
Alternative B (50 flights)	0.1	<0.1	0.1	N/A	N/A
Alternative C (10 flights)	<0.1	<0.1	<0.1	N/A	N/A

4 Table 4-2, Page 2 of 2

- 5 **Notes:** a – Does not include emissions above 3,000 feet AGL.
 6 b – When comparing the emissions from the various types of energetic material, the highest one for each criteria
 7 pollutant was chosen when calculating the totals. Therefore, CO and NO₂ emissions were taken from the
 8 detonation of TNT while the PM₁₀ and VOC emissions were taken from the detonation of C4. Particulate emission
 9 from the soil displacement and backfilling are also included in these totals.
 10 c – Expected inventory for 2005 based on previous data.
 11 CO – carbon monoxide
 12 LTO – landing and takeoff
 13 N/A – not applicable
 14 NA – not available
 15 NO_x – nitrogen oxides
 16 PM₁₀ – particulate matter 10 microns or less in diameter
 17 SO_x – sulfur oxides
 18 VOC – volatile organic compound

19 The area that would be affected by the emissions shown in Table 4-2 is the immediate area around
 20 Edwards AFB, situated in the MDAB portion of Kern County. The Valley portion of Kern County,
 21 situated in the San Joaquin Valley Unified Air Pollution Control District, is not included in the
 22 conformity applicability analysis because the Valley portion is not anticipated to be affected by the
 23 proposed project. Table 4-2 indicates that for all areas the ozone precursor emissions (NO₂ and VOC)

1 and PM₁₀ emissions would be less than the *de minimis* thresholds of 50 tons per year for a serious ozone
2 nonattainment area and 70 tons per year for a serious PM₁₀ nonattainment area such as the current MDAB
3 portion of Kern County (40 CFR Part 93 Subpart 153[b][2]). In addition, the emissions of ozone
4 precursors and PM₁₀ would not exceed 10 percent of the total Kern County inventories (40 CFR Part 93
5 Subpart 153[i]). Based on the conformity applicability criteria, the proposed project conforms to the most
6 recent EPA-approved SIP, and no further detailed conformity analysis is required.

7 In addition, there are no local concerns for CO within the ROI for the proposed project. Emissions from
8 the proposed project would not result in any CO hot spots since traffic congestion and CO nonattainment
9 in the ROI are not local issues.

10 The proposed project would conform to the most recent U.S. EPA-approved SIP, and emissions from the
11 proposed project would not result in any CO hot spots.

12 **4.1.1.2 Precision Impact Range Area, PB-13 Target**

13 All emissions generated through implementation of the proposed project would be released in the on-base
14 region of Edwards AFB. The emissions generated from the detonation of C4, TNT, Composition B, or
15 similar explosives with a NEW of 500 pounds would not result in significant releases to the atmosphere
16 and would not result in a significant impact to air quality in the region. The emissions would be 0.2
17 percent or less of the total emissions inventory (NO₂, VOC, and PM₁₀) for Kern County and the MDAB.
18 The detonations would be considered normal operations and not part of OB/OD Plan activities. During
19 range maintenance activities, which would occur after each mission, the detonation in place of a dud or
20 residual explosives by EOD personnel would be conducted as an emergency action, not an activity
21 requiring changes to the OB/OD Plan (Reinke 2004).

22 **4.1.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only** 23 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

24 **4.1.2.1 On-Base Region**

25 On-base impacts under Alternative B would be 50 percent less than those identified under Alternative A.

26 **4.1.2.2 Precision Impact Range Area, PB-13 Target**

27 Air quality impacts generated on the PIRA at the PB-13 target area would be 50 percent less than the
28 impacts identified for Alternative A. Similar to Alternative A, air emissions would be less than

1 significant. The emissions would be 0.1 percent or less of the total emissions inventory (NO₂, VOC, and
2 PM₁₀) for Kern County and the MDAB. The detonations would be considered normal operations and not
3 part of OB/OD Plan activities. During range maintenance activities, which would occur after each
4 mission, the detonation in place of a dud or residual explosives by EOD personnel would be conducted as
5 an emergency action, not an activity requiring changes to the OB/OD Plan (Reinke 2004).

6 **4.1.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
7 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

8 **4.1.3.1 On-Base Region**

9 On-base air quality impacts under Alternative C would be 10 percent of those identified under Alternative
10 A.

11 **4.1.3.2 Precision Impact Range Area, PB-13 Target**

12 Air quality impacts generated on the PIRA PB-13 target area would be only 10 percent of the impacts
13 identified for Alternative A. Similar to Alternatives A and B, air emissions would be less than
14 significant. The emissions would be less than 0.1 percent of the total emissions inventory (NO₂, VOC,
15 and PM₁₀) for Kern County and the MDAB. The detonations would be considered normal operations and
16 not part of OB/OD Plan activities. During range maintenance activities, which would occur after each
17 mission, the detonation in place of a dud or residual explosives by EOD personnel would be conducted as
18 an emergency action, not an activity requiring changes to the OB/OD Plan (Reinke 2004).

19 **4.1.4 Alternative D (No-Action Alternative)**

20 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
21 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
22 DoD, Air Force, and AFFTC instructions. There would be no impacts on air quality on or near the PB-13
23 target resulting from the No-Action Alternative.

24 **4.2 AIRSPACE**

25 Any proposed airspace use that requires operating in airspace not approved for that type of activity would
26 result in a significant impact. Impacts would also be considered significant if they resulted in increased
27 risk of aircraft mishaps, permanent changes to flight routes, or restriction of operations at airports.

1 **4.2.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
2 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
3 **(Proposed Action)**

4 **4.2.1.1 Controlled and Uncontrolled Airspace**

5 Use of the PB-13 target for the delivery of armed munitions with a NEW of 500 pounds that detonates on
6 impact would not significantly affect the existing controlled and uncontrolled, or navigable, airspace over
7 Edwards AFB because the airspace is a dedicated asset for the use of military and test and evaluation
8 aircraft performing their assigned missions. If an aircraft used to deliver the weapon experienced an
9 emergency situation there could be a temporary reduction in navigable controlled and uncontrolled
10 airspace. In the event of an emergency the pilot would relay requests for assistance to the TRACON via
11 the Central Coordinating Facility (CCF) for controlled and uncontrolled airspace. Emergency situations
12 are evaluated and handled by ATC on a case-by-case basis, with any aircraft experiencing an emergency
13 being afforded priority handling over all other air traffic.

14 Therefore, impacts on controlled and uncontrolled, or navigable, airspace would not be anticipated under
15 normal conditions.

16 **4.2.1.2 Special Use Airspace**

17 Use of the PB-13 target for the delivery of armed munitions with a NEW of 500 pounds that detonates on
18 impact would not have any impact on the existing special use airspace.

19 The weapons delivery aircraft would remain in the R-2515 restricted area in the R-2508 Complex,
20 however, this area would not be adversely affected since accommodating weapons testing aircraft would
21 be considered a matter of routine operations in that special use airspace. The agency using the restricted
22 areas coordinates with the CCF who has the autonomous authority for the R-2508 Complex shared-use
23 airspace. The CCF acts as the single point for coordination of activities with High Desert TRACON and
24 other ATC/mission control facilities. In addition, the flight weapons test represents precisely the kind of
25 activities for which the Restricted Area special use airspace was created in the early 1960s: namely, to
26 accommodate national security and necessary military activities, and to confine or segregate activities
27 considered to be hazardous to nonparticipating aircraft.

28 Any additional demands that would be placed on existing special use airspace could be accommodated by
29 airspace schedulers. Alternative A would not require assignment of new special use airspace or

1 modification of existing special use airspace. Consequently, there would be no adverse impacts to special
2 use airspace.

3 The scheduling office for each special use airspace area (CCF within the R-2515 restricted area) regulates
4 the real-time activity schedule for any Restricted Area, MOA, or Warning Area that would be affected by
5 an emergency. Special use airspace activities may be temporarily affected, but would be readily
6 accommodated by airspace schedulers.

7 In the event of an emergency, the pilot would relay requests for assistance to TRACON via the CCF for
8 special use airspace. Emergency situations are evaluated and handled by ATC on a case-by-case basis,
9 with an emergency aircraft experiencing an emergency being afforded priority handling over all other air
10 traffic.

11 **4.2.1.3 Military Training Routes**

12 Use of the PB-13 target for the delivery of armed munitions with a NEW of 500 pounds that detonates on
13 impact would not affect military training routes in the target area. Scheduling the use of R-2508 and the
14 military training routes that transit that airspace is a normal function for the CCF. Therefore, no impacts
15 would occur.

16 Use of R-2515 restricted area in the R-2508 Complex for weapons delivery testing would not have an
17 adverse impact on military training routes within the complex. Each military training route's
18 "Origination Activity" or home base, which is responsible for communications and coordination with the
19 military aircraft scheduled to use the affected routes, would be notified of the weapons test schedule, and
20 military training would be scheduled to ensure the appropriate separation between aircraft using the
21 military training routes and weapons delivery aircraft. Thus, there would be short-term reductions in the
22 availability of entire training routes, or individual segments. However, the rescheduling of military
23 training route exercises is routine and would not constitute an adverse impact.

24 During emergency conditions military aircraft would be re-scheduled, or routed around the airspace on a
25 case-by-case basis, whereby an aircraft experiencing an emergency would be afforded priority handling
26 over all other air traffic. Thus, there would be a temporary reduction in the availability of entire training
27 routes, or individual segments.

1 **4.2.1.4 En Route Victor Airways and Jet Routes**

2 Use of the PB-13 target for the delivery of armed munitions with a NEW of 500 pounds that detonates on
3 impact would not adversely affect the en route airways and jet routes, or general aviation VFR traffic.
4 There are no en route victor airways or jet routes that transect the R-2515 restricted areas in the R-2508
5 Complex.

6 General aviation VFR traffic below the R-2508 restricted area (which extends from flight level [FL] 200
7 to an unlimited altitude) could potentially be affected by weapons delivery testing within the R-2515
8 Complex. However, as noted above, the impacts would be short-lived and temporary with adequate
9 notification provided by TRACON and local flight service stations. Consequently, there would be no
10 adverse impacts to victor en route airways, jet routes, or general aviation VFR traffic.

11 **4.2.1.5 Airports/Airfields**

12 Use of the PB-13 target for the delivery of armed munitions with a NEW of 500 pounds that detonates on
13 impact would not adversely affect airports and airfields in the vicinity of the target area. Edwards AFB
14 and Edwards AF Auxiliary North Base are DoD airfields that routinely support military aircraft that carry
15 weapons for training and systems testing and are 8 NM and 10 NM, respectively, from the target site.
16 Borax Private airfield is also 10 NM from the target site. These airfields would be outside the impact
17 area; therefore, no significant impact would result from use of the PB-13 target.

18 In the event of an emergency the pilot would relay requests for assistance to the TRACON. Emergency
19 situations affecting airports and airfields would be evaluated and handled by ATC on a case-by-case
20 basis. The aircraft experiencing an emergency would be afforded priority handling over all other traffic.
21 Under these emergency conditions there could be a temporary reduction in access to airports and airfields
22 while the emergency aircraft maneuvered to an emergency landing site.

23 **4.2.1.6 Air Traffic Control**

24 Due to the small number of flights anticipated per year, no potential impacts on ATC are anticipated.

25 **4.2.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only**
26 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

27 The potential for impacts on controlled and uncontrolled airspace, special use airspace, military training
28 routes, en route airways and jet routes, airports/airfields, and air traffic control are discussed below.

1 **4.2.2.1 Controlled and Uncontrolled Airspace**

2 Similar to Alternative A, the use of the PB-13 target for the delivery of armed munitions with a NEW of
3 500 pounds that detonates on impact would not significantly affect the existing controlled and
4 uncontrolled, or navigable, airspace over Edwards AFB for the 50 missions proposed under Alternative B.
5 The effect of using controlled and uncontrolled, or navigable, airspace under Alternative B would be 50
6 percent less than Alternative A. Since there would be no anticipated effect under Alternative A, the effect
7 under Alternative B would also be less than significant under normal conditions.

8 **4.2.2.2 Special Use Airspace**

9 Similar to Alternative A, the use of the PB-13 target for the delivery of armed munitions with a NEW of
10 500 pounds that detonates on impact would not significantly affect the existing special use airspace over
11 Edwards AFB for the 50 missions proposed under Alternative B.

12 The R-2508 and R-2515 restricted areas in the R-2508 Complex would not be adversely affected since
13 accommodating mission aircraft would be considered a matter of routine operations for that special use
14 airspace. The agency using the restricted areas coordinates with the CCF, which has autonomous
15 authority for the R-2508 Complex shared-use airspace. The CCF acts as the single point for coordination
16 of activities with High Desert TRACON and other ATC/mission control facilities.

17 Any additional demands that would be placed on existing special use airspace could be accommodated by
18 airspace schedulers. Utilization of the PB-13 would not require the assignment of new special use
19 airspace or require the modification of existing special use airspace. Consequently, there would be no
20 adverse impacts to special use airspace.

21 **4.2.2.3 Military Training Routes**

22 Similar to Alternative A, the use of the PB-13 target for the delivery of armed munitions with a NEW of
23 500 pounds that detonates on impact would not significantly affect the military training routes that transit
24 the R-2515 restricted area in the R-2508 Complex for the 50 missions proposed under Alternative B.
25 Scheduling the use of R-2508 and the military training routes that transit that airspace is a normal
26 function for TRACON. Therefore, no impacts would occur.

1 Use of R-2515 and R-2508 restricted areas in the R-2508 Complex for the proposed 50 missions would
2 not have an adverse impact on military training routes within the complex because rescheduling of
3 military training route exercises is routine and would not constitute an adverse impact.

4 In the event of an emergency landing, each military training route's "Origination Activity" or home base,
5 would be responsible for communications and coordination with the military aircraft using, or scheduled
6 to use, the affected routes. There would be a temporary reduction in the availability of entire training
7 routes, or individual segments.

8 **4.2.2.4 En Route Victor Airways and Jet Routes**

9 There are no en route victor airways or jet routes that transit the region of concern for Alternative B.

10 **4.2.2.5 Airports/Airfields**

11 Similar to Alternative A, the use of the PB-13 target for the delivery of armed munitions with a NEW of
12 500 pounds that detonates on impact would not significantly affect airports and airfields in the target area
13 for the 50 missions proposed under Alternative B.

14 Use of the PB-13 target for the delivery of armed munitions with a NEW of 500 pounds that detonates on
15 impact would not adversely affect airports and airfields in the vicinity of the target area. Edwards AFB
16 and Edwards AF Auxiliary North Base, DoD airfields that routinely support military aircraft that carry
17 weapons for training and systems testing, located 8 NM and 10 NM from the target site. Borax Private
18 airfield is also 10 NM from the target site. These airfields would be outside the impact area; therefore, no
19 significant impact would result from use of the PB-13 target.

20 In the event of an emergency the pilot would relay requests for assistance to the TRACON. Emergency
21 situations affecting airports and airfields would be evaluated and handled by ATC on a case-by-case
22 basis, whereby an aircraft experiencing an emergency would be afforded priority handling over all other
23 traffic. Under these emergency conditions there could be a temporary reduction in access to airports and
24 airfields while the emergency aircraft maneuvered to an emergency-landing site.

25 **4.2.2.6 Air Traffic Control**

26 Impacts to air traffic control under Alternative B would be similar to those under Alternative A, but with
27 fewer scheduling requirements due to the reduced number of missions.

1 **4.2.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
2 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

3 The use of the PB-13 target for the delivery of armed munitions with a NEW of 500 pounds that detonates
4 on impact during each of the 10 missions proposed by Alternative C would equate to 10 percent of the
5 impacts associated with Alternative A and 20 percent of the impacts associated with Alternative B. Since
6 neither Alternative A nor Alternative B would result in any significant impacts to airspace, and
7 Alternative C would have lower overall impacts than Alternative A or Alternative B, no significant
8 impacts to airspace use would result from implementing Alternative C.

9 **4.2.4 Alternative D (No-Action Alternative)**

10 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
11 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
12 DoD, Air Force, and AFFTC instructions. There would be no impacts on airspace on or near the PB-13
13 target resulting from the No-Action Alternative.

14 **4.3 CULTURAL RESOURCES**

15 Cultural resources are limited, nonrenewable resources whose potential for scientific research or value as
16 a traditional resource may be easily diminished by actions that significantly impact the integrity of the
17 property. Potential impacts to historic properties are assessed by applying the Criteria of Adverse Effect
18 as defined in 36 CFR 800.5a. “An adverse effect is found when an action may alter the characteristics of
19 a historic property that qualify it for inclusion in the National Register in a manner that would diminish
20 the integrity of the property’s location, design, setting, workmanship, feeling, or association. Adverse
21 effects may include reasonably foreseeable effects caused by the action that may occur later in time, be
22 farther removed in distance, or be cumulative.” The Criteria of Adverse Effect provide a general
23 framework for identifying and determining the context and intensity of potential impacts to other
24 categories of cultural resources, as well, if these are present. Assessment of effects involving Native
25 American or other traditional community, cultural, or religious practices or resources requires focused
26 consultation with the affected group.

27 Potential impacts to cultural resources associated generally with airspace use include physical damage to
28 buildings, structures, or rock features through accident or vibration, visual or audible impacts to the
29 setting of cultural resources, and disturbance of traditional activities such as religious ceremonies or

1 subsistence hunting. Impacts to cultural resources from airspace use are most likely to be related to
2 alterations in setting from visual or aural disturbance and the extremely remote possibility of off target
3 detonations or test aircraft crashes.

4 **4.3.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
5 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
6 **(Proposed Action)**

7 **4.3.1.1 On-Base Region**

8 The Rogers Dry Lake, a National Historic Landmark, is the closest significant cultural resource to the PB-
9 13 target site. The continued use of the landmark in assessing leading-edge space technology enhances its
10 role in the history of technological advances in aviation and aerospace. This asset has been used to
11 support weapons delivery missions for over 50 years. Figure 3-7 identifies a radius of 1 mile from the
12 target where—based on historic uses of the targets—50 percent of the weapons that miss the target are
13 expected to fall. If the target zone is expanded to a 2-mile radius, a 2-mile buffer between the target site
14 and the lakebed is still provided. Considering the improvement in targeting accuracy, weapons delivery
15 techniques, and arming procedures identified by AFFTC and required for all testing and evaluation
16 flights; the probability of weapons landing outside the target zone is extremely remote. Therefore, there
17 would be no adverse effects on this landmark or other known cultural resources in the vicinity of the
18 target area.

19 **4.3.1.2 Precision Impact Range Area, PB-13 Target**

20 Noise levels generated during weapons delivery events would not be anticipated to impact historic
21 buildings, structures, or rock features. The closest non-range building or structure is over 4 NM from the
22 target area.

23 ***Effects of Shock Waves on Underground Cultural Resources***

24 In December 2000, approximately 500 pounds of C4 explosive was detonated at the Edwards AFB
25 OB/OD unit of the EOD Range. The soils, vegetation, and wildlife in the test area are consistent with
26 those in the PB-13 target area. The disturbance created by the explosion was consistent with the theory
27 regarding the propagation of shock waves. Shock waves generated from an explosion of this type expend
28 most of the generated energy in an upward direction. As the pressure wave propagates from the point of
29 origin, the amplitude of each wave decreases as $1/r$, where r = radius (consistent with conservation of

1 energy law) (Chorin and Majda 1987). Based on the calculations derived from the software *Calculating*
2 *Damage and Casualty Areas*, pressure variances from the leading edge shock wave ranges from 200
3 pounds per square inch (psi) at 10 feet from the detonation to less than 1 psi at 400 feet. The study
4 evaluated the effects of the detonations on the burrows of small mammals and concluded that subsurface
5 damage to the burrows was limited to within 10 feet of the detonation point (for a 500-pound NEW
6 charge) and burrow conditions changed out to 400 feet from the detonation point. The study also
7 concluded that for a 2,000-pound charge, subsurface damage would extend to approximately 20 feet and
8 there would be a change in burrow conditions out to 650 feet. Figure 4-1, created by the software
9 *Calculating Damage and Casualty Areas*, correlates the effects of the shock wave created by the
10 detonation of 500, 1,000, 1,500 and 2,000 pounds of C4. These additional data shows that any shock
11 outside the immediate detonation point would not create a significant impact even for detonations 4 times
12 the maximum NEW of the armed munitions proposed. Since there are no known cultural resources or
13 artifacts in the target area and damage from the shock wave or the detonation is not expected to extend
14 beyond the 500-foot radius of the PB-13 target under normal conditions, impacts to cultural resources are
15 considered to be less than significant.

16 **4.3.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only**
17 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

18 **4.3.2.1 On-Base Region**

19 Opportunities for impacts on the base’s cultural resources under Alternative B would be 50 percent less
20 than those identified under Alternative A.

21 **4.3.2.2 Precision Impact Range Area, PB-13 Target**

22 The potential for impacts on cultural resources under Alternative B would be 50 percent of those
23 described for Alternative A. Therefore, impacts on cultural resources under Alternative B as a result of
24 weapons delivery and detonation of bombs, rockets, or mortars containing up to 500 pounds of NEW on
25 PB-13 would not be anticipated.

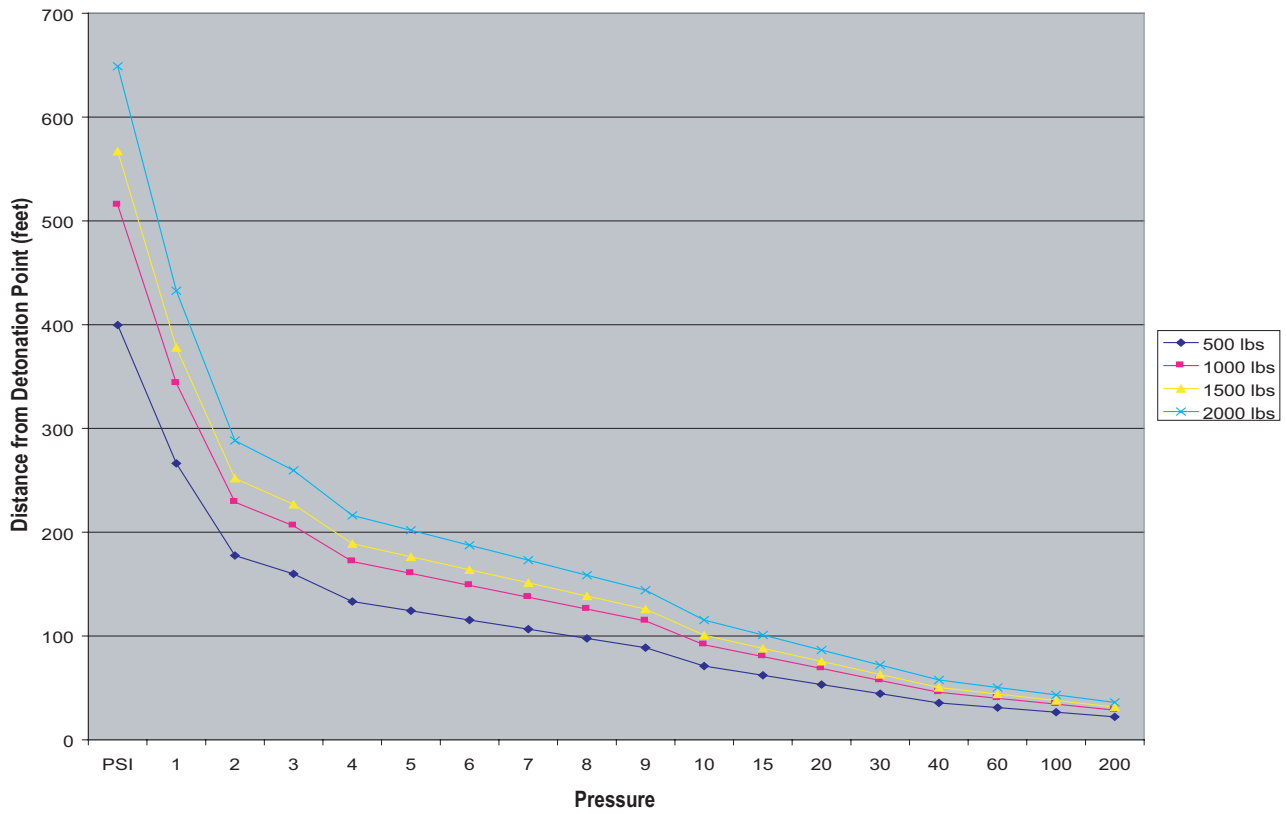


Figure 4-1 Ground Vibration from the Detonation of 500 Pounds of C4

1 **4.3.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
2 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

3 **4.3.3.1 On-Base Region**

4 Opportunities for impacts on the base’s cultural resources under Alternative C would be 90 percent less
5 than those identified under Alternative A.

6 **4.3.3.2 Precision Impact Range Area, PB-13 Target**

7 The potential for impacts on cultural resources under Alternative C would be 10 percent of those
8 described for Alternative A. Therefore, impacts to cultural resources under Alternative C as a result of a
9 weapons delivery and detonation of bombs, rockets, or mortars containing up to 500 pounds of NEW on
10 PB-13 would not be anticipated.

11 **4.3.4 Alternative D (No-Action Alternative)**

12 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
13 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
14 DoD, Air Force, and AFFTC instructions. There would be no impacts on cultural resources on or near the
15 PB-13 target resulting from the No-Action Alternative.

16 **4.4 ENVIRONMENTAL JUSTICE**

17 The Environmental Justice Interagency Working Group, mandated by EO 12898, developed guidance for
18 determining whether an impact to human health or the environment would result in disproportionately
19 high and adverse impacts to minority and/or low income populations. The Working Group recommends
20 considering the following six factors to the extent practicable.

- 21 1. Whether there is or will be an impact on the natural or physical environment that
22 significantly and adversely affects a minority or low-income population. Such effects
23 may include ecological, cultural, human health, economic, or social impacts on minority
24 communities or low-income communities when those impacts are interrelated to impacts
25 on the natural or physical environment.

- 1 2. Whether environmental effects are significant and are or may be having an adverse
2 impact on minority populations that appreciably exceeds or are likely to appreciably
3 exceed those on the general population or other appropriate comparison group.

- 4 3. Whether the environmental effects occur or would occur in a minority and/or low-income
5 population affected by cumulative or multiple adverse exposures from environmental
6 hazards.

- 7 4. Whether the health effects, which may be measured in risks and rates, are significant, or
8 above generally accepted norms. Adverse health effects may include bodily impairment,
9 infirmity, illness, or death.

- 10 5. Whether the risk or rate of hazard exposure by a minority population or low-income
11 population to an environmental hazard is significant and appreciably exceeds or is likely
12 to appreciably exceed those on the general population or other appropriate comparison
13 group.

- 14 6. Whether health effects occur in a minority population or low-income population affected
15 by cumulative or multiple adverse exposures from environmental hazards.

16 The analysis of this EA supports the conclusion that using PB-13 for testing of weapons delivery systems
17 for bombs, rockets, or mortars containing up to 500 pounds of NEW would have no significant
18 environmental effects. No new development would be required and current Air Force and contractor
19 personnel at Edwards AFB would be used for the program. Thus there would be no disproportionately
20 high or adverse environmental health or safety impacts to minority or low-income populations.

21 Similarly, the potential to generate disproportionately high environmental health and safety risks
22 (including noise) to children, which must be addressed as required by EO 13045, is less than significant.

23 **4.5 GEOLOGY AND SOILS**

24 A project may result in a significant geologic impact if it increases the likelihood of, or results in
25 exposure to earthquake damage, slope failure, foundation instability, land subsidence, or other severe
26 geologic hazards. It may also be considered a significant geologic impact if it results in the loss of the use
27 of soil for habitat, the loss of aesthetic value from a unique landform, loss of mineral resources,
28 substantially affects the contaminant distribution and fate and transport in soils, or severe erosion, or

1 sedimentation. Normal military T&E activities conducted at Edwards AFB do not contribute to exposure
2 to earthquakes or other severe geologic hazards. The region of influence for soils and geology includes
3 PB-13 and the area immediately surrounding the target.

4 **4.5.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
5 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
6 **(Proposed Action)**

7 Under Alternative A, PB-13 would be a designated an armed munition only target with a capacity of 100
8 weapons delivery events per year. No construction activities or relocation of existing PIRA facilities
9 would be required. Armed munitions T&E would be conducted using air-to-ground and ground-to-ground
10 missions. No off-road use of vehicles would occur while conducting ground-to-ground T&E of armed
11 munitions.

12 There would be no adverse, significant impacts on soils or geology on or near the PB-13 target from the
13 proposed testing. The use of PB-13 for armed munitions testing would not increase the likelihood of—or
14 result in exposure to—earthquake damage, slope failure, foundation instability, land subsidence, or other
15 severe geologic hazards. The proposed testing would not result in the loss of soil used for habitat, loss of
16 aesthetic value from a unique landform, loss of mineral resources, severe erosion, or sedimentation.
17 Potential soil contamination would be reduced to a level that is less than significant through current range
18 maintenance practices. Additionally, fragments and debris would be removed from the target prior to
19 backfilling the crater that would be formed from the detonation of armed munitions. Specific mitigation
20 for the Proposed Action will include clearing the target area of any duds after each mission and before
21 any additional armed munitions are dropped on the target. Therefore, no significant impacts on soil
22 contamination and fate and transport would be anticipated.

23 The PB-13 target and the land area surrounding it are highly disturbed and lack surface vegetation. The
24 area is subject to wind erosion. The target has not been used since July 2000 when a total of 18 weapons
25 hit the ground. The proposed testing would be a continuation of ground disturbing activity that has
26 occurred in the past, although the proposed testing is with armed munitions. The shape of the crater
27 formed (e.g., the width and depth) on detonation will vary with the type of armed munition tested.

28 In December 2000, 487.5 pounds of C4 explosive were detonated at the Edwards AFB OB/OD site of the
29 EOD Range. The detonation was conducted to provide data as part of obtaining a RCRA Part B/Subpart
30 X permit to operate the site. The C4 detonation created two concentric craters: one approximately 7 feet

1 in diameter and 1 foot deep was formed and was surrounded by an outer crater 20 feet in diameter and 2
2 inches deep with a 3-inch sandy berm. Subsurface damage was limited to an area within a 9.8-foot radius
3 directly around detonation point. Pressure calculations derived from EOD software show that detonations
4 of up to 2,000 pounds would create subsurface damage directly under the detonation point and extend
5 outwardly approximately 19.8 feet (Anton and Ronning 2000).

6 Craters formed at the PB-13 from the 500-pound NEW detonation would be backfilled following the
7 completion of a weapons delivery test and the surface would be graded. The target area would be cleared
8 of any duds after each mission and before any additional weapons were dropped on the target. Therefore,
9 the proposed testing is expected to have a negligible effect on the rate of soil erosion.

10 When an armed munition is detonated, it produces physical effects as well as chemical by-products. The
11 physical effects are noise, overpressure, and seismic vibration (see Sections 3.10 and 4.10). Detonation of
12 a 500-pound NEW armed munition would result in fragmentation and dissemination of the casing as
13 shrapnel over an approximately 2,000-foot radius from the detonation point; fragments would go outside
14 the 1,000-foot diameter graded surface of PB-13. The shrapnel produced by the blast fragmentation of an
15 armed munition has the potential for greater physical damage (to humans and other biological receptors)
16 than chemical effects, although the fragments would undergo chemical changes after reaching the surface.
17 The fragments corrode and create oxides over time. The combustion of explosives results in chemical and
18 air emissions as identified in Section 4.1. The potential also exists that the explosive material would not
19 undergo complete combustion (due to malfunction) and could reach the environment as the unaltered
20 explosive material.

21 Missiles/rockets are much more complex, but have less NEW than armed munitions. Missiles are
22 powered by some form of propellant and equipped with guidance systems to improve precision and
23 accuracy. This results in slightly more debris and no changes in chemicals that could potentially enter the
24 environment. The combustion of the missile/rocket fuel produces the same products (carbon dioxide, CO,
25 and NO_x) that are produced by the combustion of explosive material. The products of missile/rocket use
26 are debris, metal fragments, carbon dioxide, carbon monoxide, and nitrogen oxide.

27 The use of explosives in armed munitions and other devices will release only minimal amounts of the
28 original, unaltered explosive into the environment if the munition functions properly, resulting in
29 complete combustion (Becker 1995). However, if the explosive is not fully combusted due to a
30 malfunction (e.g., duds) then explosives can reach the environment.

1 Explosives that are commonly used include TNT, HMX, and RDX and their derivatives (refer to Table
2 3-10). The derivatives are either combinations of these explosives or are altered through the addition of
3 plastic binder or aluminum. Literature studies clearly demonstrate that when an explosive is detonated
4 and undergoes complete combustion, the major chemical products that are generated are carbon dioxide,
5 carbon, CO, water, and NO_x. None of these combustion products is expected to have detrimental effects
6 on the environment. They are dispersed in the atmosphere and may be dissolved in atmospheric water.
7 They are carried by wind off the base and may be deposited on soil, plants, and surface water by rainfall.

8 The mobility of TNT, HMX, and RDX in soils is dependent on soil characteristics such as texture (e.g.,
9 percent clay), percent organic carbon, and cation exchange capacity. TNT is highly water-soluble and
10 degrades rapidly into by-products (including 2,4-dinitrotoluene and 4,6-dinitrotoluene) in air and water.
11 TNT does not adsorb (chemically bind) to most soils and with sufficient rainfall and moves rapidly
12 through the soil column (U.S. Army 2003). Microbial degradation does not proceed rapidly (Marine
13 Environmental Support Office 1999). RDX is not highly water soluble and does not absorb (chemically
14 bind) to most soils. The adsorption of RDX is directly related to the clay content. With sufficient rainfall,
15 residual nondegraded RDX and secondary products will move rapidly through soils and into the ground
16 water (U.S. Army 2003). The photolysis of RDX is rapid with a half-life of photolysis of about 17 days.
17 HMX is not considered as potentially toxic as other explosives and is less mobile in water and soils
18 (Marine Environmental Support Office 1999; U.S. Army 2003).

19 Ammonium perchlorate and potassium perchlorate have been used in a variety of munitions and
20 pyrotechnics. Only small amounts of perchlorate are found in weapons systems. Perchlorate is a highly
21 mobile and persistent compound with high solubility and chemical stability in groundwater (U.S. Army
22 2003).

23 Previous tests conducted at PB-13 have resulted in the contamination of soils by explosives. Specific
24 mitigation for the Proposed Action would include clearing the target of any duds after each mission and
25 before any additional weapons are dropped on the target. Additionally, fragments would be periodically
26 cleared according to range maintenance policy and AFI 13-212, minimizing environmental contamination
27 from corrosion and degradation of fragments and debris. Fragments and debris will be cleared from the
28 target area prior to backfilling the crater. With implementation of these procedures, impacts on soil
29 contamination will be mitigated to a level that is less than significant.

1 **4.5.2 Mitigation Measures**

2 Specific mitigation for the Proposed Action will include clearing the target of any duds after each mission
3 and before any additional armed munitions are dropped on the target. Fragments and debris will be
4 cleared from the target area prior to backfilling the crater.

5 **4.5.3 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only**
6 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

7 The potential impacts on soils and geology from implementation of Alternative B would be similar to
8 those described for Alternative A. The impacts would be reduced under Alternative B because there
9 would be fewer armed munitions delivery events. Mitigation would be the same as that described for
10 Alternative A.

11 **4.5.4 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
12 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

13 The potential impacts on soils and geology from implementation of Alternative C would be similar to
14 those described for Alternative A. The impacts would be reduced under Alternative C because there
15 would be fewer armed munitions delivery events. Mitigation would be the same as that described for
16 Alternative A.

17 **4.5.5 Alternative D (No-Action Alternative)**

18 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
19 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
20 DoD, Air Force, and AFFTC instructions. There would be no impacts on soils or geology on or near the
21 PB-13 target resulting from implementing the No-Action Alternative.

22 **4.6 HAZARDOUS WASTE/HAZARDOUS MATERIALS**

23 A project may result in a significant hazardous waste/hazardous materials impact if it increases the
24 potential for exposure to hazardous waste/hazardous materials or increases the likelihood of a hazardous
25 materials release to the environment. Impacts to hazardous materials and waste management would also
26 be considered significant if they resulted in noncompliance with applicable regulatory guidelines or
27 increased the amounts generated beyond available waste management capacities.

1 Impacts to solid waste would be considered significant if they resulted in noncompliance with applicable
2 regulatory guidelines or increased the amounts generated beyond available waste management capacities.

3 **4.6.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
4 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
5 **(Proposed Action)**

6 The primary hazardous materials required for the weapons delivery aircraft include JP-8 and other
7 petroleum, oils, and lubricants. Management of these materials associated with weapons delivery aircraft
8 launches, recoveries, and servicing are governed by Air Force instructions. When the delivery aircraft are
9 on the runway and flightline hazardous materials and hazardous waste are managed per the requirements
10 of the AFFTC Hazardous Waste Management Plan. If a spill occurred, the hazardous waste would be
11 cleaned up in accordance with the AFFTC SPR Plan 32-4002, *AFFTC Oil and Hazardous Substance Spill*
12 *Prevention and Response Plan*. The handling and storage of the weapons is conducted in accordance
13 with the explosive safety procedures contained in Air Force Manual 91-201, *Explosive Safety Standards*.
14 Munitions are stored and handled on the flightline in specified areas subject to strict management. Each
15 location where live ordnance is stored or handled has a clear zone. The minimum clear zone for a 500-
16 pound NEW armed munition in an aircraft parking area is approximately 240 feet (DoD Directive
17 6055.9).

18 The Air Force's Class A flight mishap rating for 2003 was 1.39 mishaps per 100,000 flight hours (Air
19 Force Association Magazine 2004). The probability of a crash of the weapons delivery aircraft is
20 extremely remote. Since the probability of a crash is remote, impacts to on-base hazardous waste within
21 IRP sites are not anticipated. If a crash occurred, Edwards AFB would be responsible for disposing of the
22 debris and a less than significant impact to solid waste would occur; however, because the probability of a
23 crash is low, impacts to solid waste are not anticipated.

24 There would be no adverse, significant impacts on hazardous waste or hazardous materials resulting from
25 the use of the PB-13 target for weapons delivery of bombs, rockets, or mortars containing up to 500
26 pounds of NEW fill. The primary hazardous contaminants likely to be released include TNT and RDX.
27 Lesser amounts of a number of other nitroaromatic compounds found in other munitions may be used as
28 fuses and primers (see Table 3-10). It is important to note that the detonation process, including the
29 continued combustion that occurs in the plume immediately after the initial detonation, results in nearly
30 complete combustion of these explosive compounds to form oxides of carbon, nitrogen, and water.
31 Thus, it is unlikely that significant quantities of the parent explosives compounds or the combustion

1 products (as shown by the small volume of emissions in Table 4-2) would be released to the environment
2 from armed munitions delivery events.

3 Additional materials such as shrapnel and other debris (solid waste) would be left on the PB-13 target
4 area. Range maintenance procedures dictate that range personnel remove pieces of shrapnel and debris
5 from the target area as part of regularly scheduled cleanup activities (AFFTC 2001). These pieces of
6 debris would be recycled through the Defense Reutilization and Marketing Office or sent to the landfill
7 for disposal and would not be considered a significant impact to solid waste management activities.

8 **4.6.1.1 Mitigation Measures**

9 Although the detonation process results in nearly complete combustion of the NEW fill, EOD personnel
10 will sweep the target area after each armed munitions delivery event to ensure any remaining explosives
11 are removed or are fully detonated prior to the next armed munitions delivery event. As a result of these
12 actions and the continued implementation of standardized hazardous waste/hazardous material/solid waste
13 management procedures, no significant impacts are likely to occur.

14 **4.6.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only** 15 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

16 Impacts to hazardous waste/hazardous materials and solid waste under Alternative B would be identical to
17 those described under Alternative A.

18 **4.6.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions** 19 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

20 Impacts to hazardous waste/hazardous materials and solid waste under Alternative B would be identical to
21 those described under Alternative A.

22 **4.6.4 Alternative D (No-Action Alternative)**

23 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
24 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
25 DoD, Air Force, and AFFTC instructions. There would be no impacts on hazardous waste/hazardous
26 materials on or near the PB-13 target resulting from the No-Action Alternative.

1 **4.7 INFRASTRUCTURE**

2 A project may have significant effects on a public utility if it increases demand in excess of utility system
3 capacity to the point that substantial expansion becomes necessary. Significant environmental impacts
4 could also result from system deterioration due to improper maintenance or extension of service beyond
5 its useful life. Destruction or damage of infrastructure would also be considered a significant impact.

6 Up to 10 additional personnel may be required to provide support for weapons testing activities on a
7 temporary basis. As such there would not be any demand on the infrastructure that could not be met by
8 the capacities of the current systems. No additional expansion would be required to support the Proposed
9 Action or Alternative B or C.

10 There would be no impacts to the utility systems (energy resources, water supply, wastewater treatment,
11 stormwater treatment, electrical distribution, natural gas, communication, or transportation) from
12 implementation of Alternative A, B, or C.

13 **4.8 LAND USE**

14 An impact to land use would be considered significant if the project resulted in nonconformance with
15 approved land use plans; a decrease in visual or aesthetic resources; or a conflict with environmental
16 plans or goals, permit requirements, or existing uses of the project area or other properties.

17 **4.8.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
18 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
19 **(Proposed Action)**

20 Use of PB-13 for armed munitions testing as proposed in this EA would not result in adverse, significant
21 impacts on land use. The proposed testing would not conflict with approved land use plans,
22 environmental plans or goals or other testing programs conducted on the PIRA. There would be no effects
23 on visual or aesthetic resources on the PIRA or the flat plains that make up the West Range where PB-13
24 is located. The target area would continue to be maintained in accordance with AFI 13-212, *Range*
25 *Operations and Planning*. Consequently, implementation of Alternative A would have no significant
26 impacts on land-use and no mitigation would be required.

1 **4.8.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only**
2 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

3 Impacts on land use and visual and aesthetic resources under Alternative B would be similar to those
4 under Alternative A. Disturbance near the target would be less frequent with a limited capability of 50
5 weapons delivery events per calendar year rather than 100 events. Under Alternative B, there would be no
6 adverse, significant impacts on land use or visual and aesthetic resources from the proposed armed
7 munitions testing.

8 **4.8.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
9 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

10 Impacts on land use and visual and aesthetic resources under Alternative C would be similar to those
11 under Alternative A. Disturbance near the target would be less frequent with a minimum capability of 10
12 weapons delivery events per calendar year rather than 100 events. Under Alternative C, there would be no
13 adverse, significant impacts on land use or visual and aesthetic resources from the proposed armed
14 munitions testing.

15 **4.8.4 Alternative D (No-Action Alternative)**

16 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
17 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
18 DoD, Air Force, and AFFTC instructions. There would be no impacts on land use or on visual or aesthetic
19 resources on the area near PB-13 or on the PIRA from the proposed armed munitions testing.

20 **4.9 NATURAL RESOURCES**

21 Impacts to natural resources would be considered significant if they resulted in harm, harassment, or
22 destruction of any endangered, threatened, or rare species including a species proposed for listing,
23 candidate species, or species considered sensitive by resource agencies or organizations (e.g., California
24 Department of Fish and Game, CNPS). This would include impacts to designated critical habitat,
25 migratory birds, wildlife migration corridors, or breeding areas. The loss of a substantial number of
26 individuals of any native plant or animal species that could affect abundance or diversity of that species
27 beyond normal variability is also considered significant. Any impacts to sensitive habitats may be
28 considered significant. The region of influence for impacts on natural resources from the proposed armed
29 munitions testing would be Runway 22 and the area immediately surrounding target PB-13. The Air

1 Force is undergoing formal consultation with the USFWS to prepare a Biological Opinion for the
2 proposed testing of armed munitions.

3 Wildlife response to noise can be physiological or behavioral. Physiological effects can be mild, such as
4 an increase in heart rate, to more severe, such as effects on metabolism and hormone balance. Mild
5 behavioral responses include head raising or body shifting, and more severe responses are typified by nest
6 abandonment. Long-term exposure to noise can cause excessive stimulation to the nervous system and
7 chronic stress that is harmful to the health of wildlife species and their reproductive fitness (Fletcher
8 1980, 1988).

9 **4.9.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
10 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
11 **(Proposed Action)**

12 Alternative A would use Runway 22, which is a hard surface runway. No construction activities would be
13 required for use of the runway or use of the target. The runway is routinely used and is the Main Runway
14 on base. No loss of habitat would be anticipated. Rogers Dry Lake is not within designated critical
15 habitat for the desert tortoise or within any SEA. Target PB-13 is a clear, graded surface that is devoid of
16 vegetation. It is not within designated critical habitat for the desert tortoise or within any SEA. There are
17 no associated wetlands or riparian areas. Sensitive species and their habitat, including desert tortoise and
18 its designated critical habitat and SEAs, would not be impacted by Alternative A.

19 The major mechanisms of chemical transfer to biota are through direct contact (e.g., deposition of
20 particulates onto the fur and feathers of animals or the leaves and canopies of plants), inhalation or
21 absorption (dermal, root, or foliar) of gases and particulates, and ingestion (e.g., contaminated soil
22 particles, contaminated water, or contaminated vegetation). Target PB-13 and the area immediately
23 surrounding the target are devoid of surface water and vegetation. Detonation of armed munitions would
24 result in the deposition of explosives on soil particles around the target area. Direct contact with and
25 ingestion of explosives-contaminated soil is the main exposure mechanism for ecological receptors near
26 PB-13. Some soil particles would be transported from the target area during periods of surface runoff.

27 The releases of air emissions identified in Table 4-2 are not considered significant. If explosives are
28 properly detonated and full combustion occurs, the amount of explosives that would enter the
29 environment are insignificant. Carbon dioxide, CO, and NO_x produced by the combustion of munitions
30 are dispersed in the atmosphere and are not distinguishable from the carbon dioxide, CO, and NO_x

1 produced by other sources. A small fraction of these gases dissolves in atmospheric moisture and is
2 transported by weather patterns, eventually being deposited on the earth's surface by precipitation.

3 The possibility of incomplete combustion and malfunction (i.e., duds) could result in the release of raw
4 materials into the environment immediately surrounding PB-13. However, specific mitigation for the
5 proposed armed munitions testing is the clearance of any duds following each test and before any
6 additional weapons are dropped on the target. Therefore, impacts on natural resources from the potential
7 air emissions or chemical releases generated by armed munitions testing are considered to be less than
8 significant.

9 Aircraft generate noise and visual disturbance. The heights from which armed munitions would be
10 dropped and flight patterns used during testing operations would be variable as would the type of aircraft
11 used. The weapons delivery aircraft would remain in the R-2515 restricted area in the R-2508 Complex
12 (see Sections 3.2 and 4.2). Methods that have been used at Edwards AFB to control the bird air strike
13 problem with horned larks include revegetation with native plants and use of a falconer.

14 Testing-related noise, particularly armed munitions testing, would be a source of disturbance to wildlife.
15 PB-13 is an established target and a disturbed area, and the PIRA is an established bombing range. The
16 armed munitions testing would create a sporadic rather than continual disturbance near PB-13. There is a
17 strong tendency for species to acclimate or habituate to a repetitive noise disturbance.

18 Studies on the effects of noise on wildlife caused by aircraft overflights and impulse noise such as sonic
19 booms have been focused on birds, including raptors, bighorn sheep, and small mammals (Oak Ridge
20 National Laboratory 2000). It has been shown that occasional, low-altitude overflights can produce
21 increased heart rates in hoofed mammals, but the effect was not found to be detrimental. Low-altitude
22 military overflights have the potential to impact the hearing thresholds of some rodent species. Birds, on
23 the other hand, appear to be unaffected by both the low-level aircraft overflight noise and sonic booms.
24 In one study, a researcher observed a raptor species hunting on a bombing range in Mississippi. The
25 species appeared to be unaffected by the military exercises, even when a bomb exploded within
26 approximately 200 feet. In another study, raptors were found to rapidly habituate to aircraft overflights.
27 No significant noise impacts on wildlife are expected from weapons delivery on the PB-13 target area
28 (Oak Ridge National Laboratory 2000).

29 Anthropogenic noise can impact desert tortoises in several ways including damage to the auditory system
30 and disruption of communication. Noise studies on tortoises have shown very little behavioral or

1 physiological effect on tortoises from loud noises that simulated jet overflights and sonic booms. Two
2 threshold values (i.e., lowest observed adverse effects level) available for the effects of sound on desert
3 tortoises are 95 dB CSEL and 115 dB CSEL (Oak Ridge National Laboratory 2000). These values were
4 obtained through repeated, continuous noise exposures up to 40 minutes in length rather than infrequent
5 blast noise. The changes in behavior were exhibited by a decrease in activity.

6 The desert tortoise can occur in almost every desert habitat, but is most common in desert washes, desert
7 scrub, creosote bush, and Joshua tree habitats. Because target PB-13 is generally devoid of vegetation,
8 tortoises are not expected to be present on the target but could occasionally transit through the area.
9 Desert tortoises mate in the late spring and the early summer (usually April to July). The tortoises are
10 most active in California during the spring and early summer when annual plants are most common.
11 Additional activity occurs during the warmer fall months and occasionally after summer rainstorms. They
12 spend the remainder of the year in burrows, escaping extreme desert conditions (AFFTC 2002). Tortoise
13 densities were found to be low to very low throughout Edwards AFB and approximately 80 percent of the
14 base has densities at or below 20 tortoises per 1 square mile (AFFTC 2002). Desert tortoises also appear
15 to be unaffected by noise even up to levels over 100 dBA (U.S. Army 2004). Target PB-13 is located
16 within Zone 1 of the desert tortoise management area; activities within this zone are not expected to
17 preclude the recovery of the desert tortoise in the Western Mojave Desert. Since tortoise density is low in
18 the area surrounding PB-13, direct impacts to the desert tortoise from armed munitions testing would be
19 very unlikely.

20 **4.9.1.1 Mitigation Measures**

21 Specific mitigation for the proposed armed munitions testing will include clearing the target of any duds
22 after each mission, and before any additional weapons are dropped on the target. Fragments and debris
23 will be cleared from the target area prior to backfilling the crater.

24

25

26

27

1 **4.9.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only**
2 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

3 Impacts under Alternative B would be similar to those described for Alternative A. However, there
4 would be reduced impacts from ground disturbances, noise, and aircraft due to the reduced number of
5 missions.

6 **4.9.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
7 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

8 Impacts under Alternative C would be similar to those under Alternative A and B. However, there would
9 be reduced impacts from ground disturbances, noise, and aircraft because there would be only 10
10 missions per year.

11 **4.9.4 Alternative D (No-Action Alternative)**

12 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
13 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
14 DoD, Air Force, and AFFTC instructions. There would be no impacts on natural resources on the area
15 near PB-13 or on the PIRA from the proposed armed munitions testing.

16 **4.9.5 Mitigation Measures**

17 Since impacts to natural resources would be less than significant under Alternative A, B, or C, no
18 mitigation would be required.

19 **4.10 NOISE AND VIBRATION**

20 Noise impact criteria are based on land use compatibility guidelines and on factors related to the duration
21 and magnitude of noise level changes. Annoyance effects are the primary consideration for most noise
22 impact assessments. Because the reaction to noise level changes involves both physiological and
23 psychological factors, the magnitude of a noise level change can be as important as the resulting overall
24 noise level. The local residents would often consider a readily noticeable increase in noise levels a
25 significant effect, even if the overall noise level was still within land use compatibility guidelines. On the
26 other hand, noise level increases that are unnoticed by most people are not considered a significant
27 change, even if the overall noise level is somewhat above land use compatibility guidelines. Some
28 potentially significant thresholds include the following:

- 1 • An L_{DN} of 65 dBA, or a CDNL of 61 C-weighted decibels (dBC) for sonic booms, is the
2 generally accepted limit for outdoor noise levels in residential areas for land use planning
3 and long-term annoyance factors (U.S. Army 2001). Project-related noise levels 5 dB or
4 more above 65 dBA or above 61 dBC would be considered a significant impact.
- 5 • Frequent occurrence of a CSEL greater than the generally accepted limit for outdoor
6 noise levels of 61 dBC.
- 7 • Weapons related dBP sound levels above 130 dBP pose a high risk of noise complaints
8 with the possibility of damage to windows, bric-a-brac, and plaster.

9 If the vibration levels exceed the recommended levels set by the U.S. Bureau of Mines of 0.5 inch per
10 second at the receiver site as a result of the 500-pound NEW detonation it would be considered a
11 significant impact (Fort McCoy 2003).

12 **4.10.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
13 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
14 **(Proposed Action)**

15 **4.10.1.1 Noise**

16 While the proposed action would establish a limit of 100 detonations per year for armed munitions with
17 500-pounds of NEW at PB-13, it is unlikely that all 100 armed munitions tested would contain 500
18 pounds NEW fill (Hagenauer 2004). Advances in modern warfare capabilities have made it possible for
19 surgical strikes to take out specific targets while reducing collateral damage and civilian casualties. With
20 this focus on the use of precision armed munitions like the Hellfire missile with a NEW of 34.4 pounds,
21 referred to in Section 1.5, many of the armed munitions to be tested would probably contain lower NEW
22 with lower dBP and a lower probability of complaints.

23 The BNOISE2 program was used to analyze and determine the effect of noise that would result from the
24 detonation of 500 pounds of NEW fill. The MK 83 general-purpose bomb was used because it is the only
25 bomb in the current DoD inventory that contains the amount of explosive material that approximates the
26 maximum NEW test parameters. The MK 83 weights approximately 1,000 pounds and contains
27 approximately 445 pounds of NEW (TNT equivalent). Five meteorological (acoustic propagation) cases
28 were evaluated. A DNL (L_{dn} [A]) of 65 dBA or lower is considered to be acceptable (Table 4-3); a DNL
29 above 65 dBA but not exceeding 75 dBA is normally unacceptable unless some form of noise attenuation

1 is provided. Daily exposure to CDNL of 61-dB or less is compatible to the DNL 65 dBA significance
 2 level for non-impulsive noise and is normally considered compatible with most land uses.

3 The Day Focus (Ldn [A]) contours shown in Figure 4-2 provides the 60 dBA Ldn and 70 dBA Ldn, the
 4 condition that results in the largest area affected by the noise from the detonation. The 70 dBA contour
 5 extends to 310 feet, the 60 dBA contour extends to 1,060 feet, and 24 dBA contour extends to 1.7 miles
 6 (Base boundary) from the detonation point, well within the limits of the land use compatibility guidelines
 7 for noise.

8 Different weather conditions affect sound propagation. The distances from the detonation point for other
 9 weather conditions are provided in Table 4-4.

10 **Table 4-3**
 11 **Relationship Between C-Weighted and A-Weighted Sound Levels**
 12 **and Percent of the Population Highly Annoyed**

CDNL (C-weighted)	% Highly Annoyed	DNL (A-weighted)
48	2	50
52	4	55
57	8	60
61	14	65
65	23	70
69	35	75

13 **Note:** CDNL can be interpreted in terms of “equivalent annoyance” DNL.

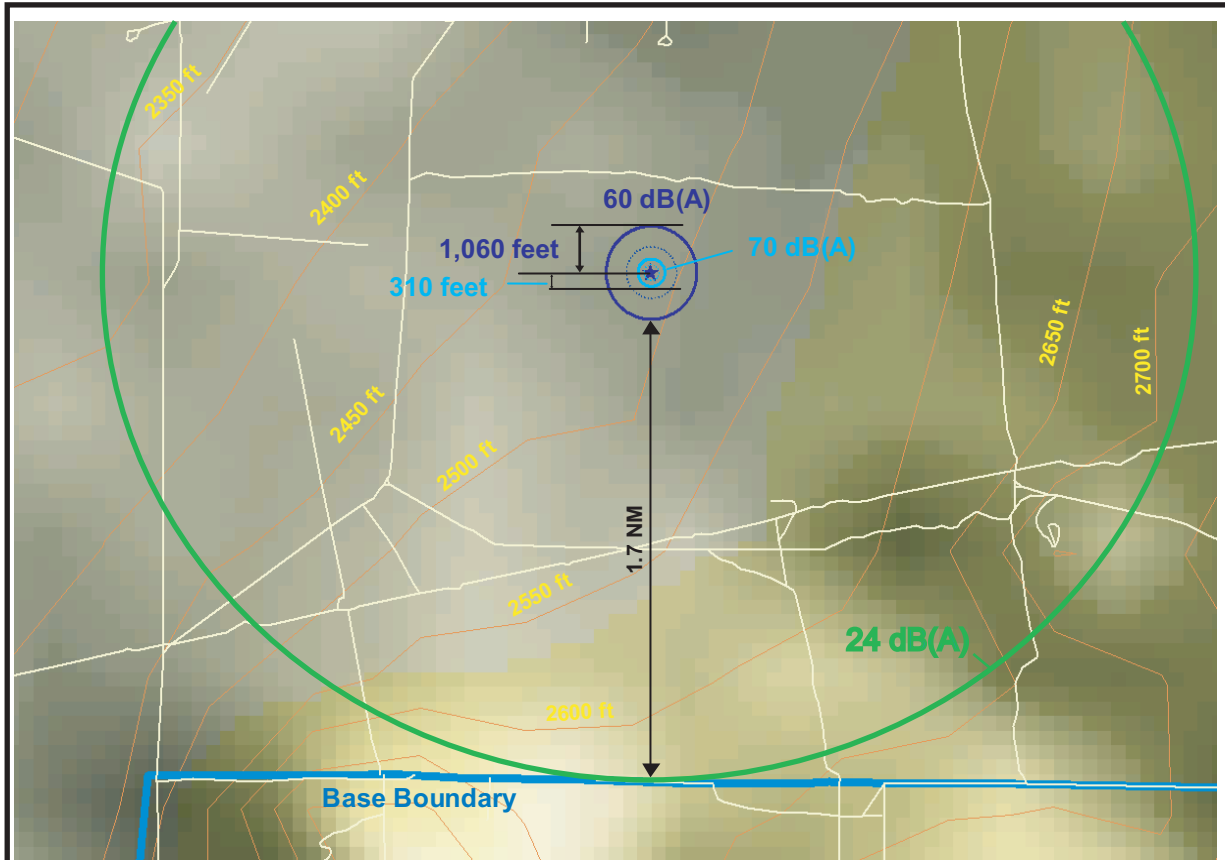
14 **Table 4-4**
 15 **Ldn (A) Contours for Different Weather Conditions**

Weather Condition	60 dBA Radius (feet)	70 dBA Radius (feet)
Day focus	1,060	310
Day base	600	200
Desert	500	160
Day negative gradient	320	100
Excess day negative gradient	60	20

16 **Source:** ACTA 2004

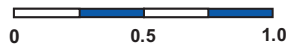
17 The sound levels (dBP) created from the detonation of the MK 83 general-purpose bomb are shown in
 18 Table 4-5.

19



dB(A)
24.0000000
60.0000000
65.0000000
70.0000000
75.0000000

LEGEND



Scale in Nautical Miles

Elevation: 2,426 ft msl

Elevation Contours

★ Target Center
117°44.17' W 34°51.3' N

Environmental Assessment for
Armed Munitions Integration Testing
on the Precision Impact Range Area

Test Site Day Focus Ldn(A)
Contours for a 500-pound
NEW Detonation at PB-13

DATE
6/09/04

FILE NO.
0238/FIGURES/
3-14.ai

FIGURE NO.
4-2

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Table 4-5
Sound Levels for Various General Purpose Bombs

Type of General Purpose Bomb	MK 82	MK 83	MK 84
Total Bomb Weight (pounds)	500	1,000	2,000
Net Explosive Weight (pounds)	192	445	970
Range from Target (feet)	Sound Level (dB Peak)		
6,561.5	148.5	150	153
13,123.2	138.0	141	143
26,246.4	130.5	133	135.5
52,492.8	123.0	125.5	128
78,739.2	118.5	121	123
118,108.8	113.5	116	118.5

Source: Russell 2004

These unweighted peak values show that the sound levels at 52,492 feet (8.7 NM) to 118,109 feet (19.78 NM) could result in a moderate risk of noise complaints (Table 4-6) for the MK83 general-purpose bomb, which contains 445 pounds of NEW.

Table 4-6
Guidelines for Evaluating Peak Blast Sound Levels

Sound Levels (dB Peak)	Risk of Noise Complaints
<115	Low
115–130	Moderate
130–140	High, and possibility of damage
>140	High risk of physiological and structural damage claims

Source: Pater 1976.

Peak sound levels resulting from blasts (detonations) are similar to sound levels created by sonic booms. Annually over 600 supersonic flights and associated sonic booms with peak overpressure in the 1.31 to 2.54 psf range, as shown in Table 4-7 (calculated by USAF Boom 10C, *Sonic Boom Calculations for Steady State Flight Conditions* 2003) occur in the local Edwards AFB area (AFFTC 2001).

Table 4-8 shows a comparison of the SEL values (dBA and dBC) in relation to peak overpressure and unweighted peak sound power level (dB). Examination of the data in Table 4-8 shows that the CSEL values for sonic booms overpressures that occur at 1.0 to 2.0 psf produce an unweighted peak SPL that is equivalent to the moderate risk of noise complaint shown in Table 4-6.

Table 4-7

Peak Overpressures and Sound Levels for Test Aircraft at FL 300 at Mach 1.5

Aircraft	Peak Overpressure (psf)	CSEL (dBC)
F-15 C/D	2.43	109.3
F15E	2.54	109.7
F-16	1.79	106.6
F-18	2.20	108.4
T-38	1.31	103.9
F-22	2.38	109.1

Source: Boom 10C 2003

Table 4-8

Relationship between Sonic Boom Overpressure and Sound Levels

Peak Overpressure (psf)	CSEL (dBC)	Peak SPL (dB)	SEL (dBA)
0.2	85.4	113.6	75.9
0.5	94.0	121.6	84.5
1.0	100.4	127.6	90.9
2.0	106.9	133.6	97.4
3.0	110.7	137.1	101.2
4.0	113.4	139.6	103.9

Source: AFFTC 2003

The CSEL values for the sonic booms created by supersonic aircraft operating in and around Edwards AFB (Table 4-7) would produce an equivalent risk of noise complaints in the moderate to high range. Results from the actual monitoring of noise complaints (which are often just inquiries) show that Edwards AFB averages less than 15 noise complaints per year.

The noise values SEL (dBA) created from the simulated detonation of the MK-83 general-purpose bomb were calculated to be 60 dBA at 7.4 miles, 70 dBA at 4.3 miles, and 80 dBA at 2.8 miles from PB-13. These values would equate to peak SPL values and CSEL values similar to those produced by sonic booms from test aircraft.

Small communities located within 20 miles of PB-13 include: Hi Vista, Boron, Edwards, North Edwards, Wilsona Gardens, Kramer Junction, Redman, Bissell, and El Mirage; however the expected sound levels for the detonations do not exceed 130 dBP for any of these communities. Many of the residents in these small communities work on the base. The closest industrial or residential buildings are 19,800 feet (3.3 NM) from the impact area. The personnel in the buildings at Downfall (Range Control Station) directly support range operations and would be involved in ongoing missions. It is unlikely that any noise

1 complaints would come from this on base area or the residents in the local communities. However, to
2 preclude and minimize the occurrence of any noise complaints mitigation measures would be
3 implemented as identified in Section 4.10.1.3.

4
5 **4.10.1.2 Noise Impacts on Wildlife**

6 No significant noise impacts on wildlife are expected from weapons delivery on the PB-13 target area
7 (see Section 4.9).

8 **4.10.1.3 Mitigation Measures**

9 Although there is a moderate risk of complaints that could result from detonation of bombs, rockets, or
10 mortars containing 500 pounds of NEW, the local communities are acclimated to the noise related to
11 testing that occurs at Edwards AFB. Edwards AFB will continue to monitor noise complaints and will
12 provide a general notification of impending detonations if a substantial increase of complaints occurs.

13 **4.10.1.4 Vibration**

14 There are no structures or buildings within 2.5 miles of the PB-13 target. Based on an Army study (Fort
15 McCoy 2003), the maximum ground vibration for a 500-pound NEW bomb at 2.5 miles from the
16 detonation would be 0.00333 inch per second—well below the level that would be considered significant
17 and below 0.08 inch per second, the level where vibration would be perceived by humans (Table 3-16).
18 Detonation tests of 500 pounds of C4 at the OB/OD site on North Base showed that the ground vibration
19 effect ended at approximately 400 feet from the detonation site (Figure 4-1); and had no effect on the
20 habitat of small mammals.

21 Therefore, vibrations resulting from the implementation of Alternative A would result in less than
22 significant impacts; no mitigation would be required.

23 **4.10.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only**
24 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

25 The environmental effects of noise and vibration as a result of implementing Alternative B would be half
26 that of Alternative A. Therefore, no significant impact would result from implementing this alternative.

1 **4.10.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
2 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

3 The environmental effects of noise and vibration as a result of implementing Alternative C would be 10
4 percent of the effects resulting from Alternative A. Therefore no significant impact would result from
5 implementing this alternative.

6 **4.10.4 Alternative D (No-Action Alternative)**

7 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
8 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
9 DoD, Air Force, and AFFTC instructions. There would be no noise related impacts on the area near PB-
10 13 or on the PIRA from the proposed armed munitions testing.

11 **4.11 PUBLIC/EMERGENCY SERVICES**

12 An impact to public/emergency services would be considered significant if it resulted in slower response
13 times by fire protection services, security services, or medical services or failure of these services.

14 Under normal test conditions there would be no environmental effects or significant impacts on
15 public/emergency services as a result of implementing any of the proposed alternatives. All activities
16 would occur on base. If simultaneous emergencies occurred there could be a slower response by fire
17 protective services, security services, or medical services; however the organizations that provide these
18 services routinely evaluate and practice responding to multiple emergency situations. Because test plans
19 would only allow for single events, the opportunity for simultaneous events to occur would be minimized.
20 As a result, the probability of an environmental effect that would impact public and emergency services if
21 the proposed actions were implemented would be less than significant.

22 **4.12 SAFETY**

23 A safety impact would be considered significant if it created a potential public health hazard or involved
24 the use, production, or disposal of materials that pose a hazard to people.

1 **4.12.1 Alternative A—Desired Capability—Designate PB-13 as an Armed Munitions Only**
2 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
3 **(Proposed Action)**

4 The AFFTC's Hazardous Communication Program and Institutional Safety and Occupational Health
5 programs would be followed to reduce the potential for any risk to health and safety from Weapons
6 Delivery on the PIRA Program activities. Because construction of new facilities, including facilities
7 emitting electromagnetic radiation (EMR) or lasers, would not be required for the program, impacts to on-
8 base health and safety under normal conditions would not occur.

9 In the event of an accident, AFFTC would be required to comply with Occupational Safety and Health
10 and Administration regulations and AFFTC's Emergency Response Plan. The crash of the weapons
11 delivery aircraft or unintentional dropping of the weapons off target could cause casualties and loss of
12 property. However, strict guidelines and flight procedures have shown the probability of such an
13 occurrence is extremely rare for this type of preplanned event. Historically, there is no information on
14 mission-related aircraft accidents that may have taken place on the PIRA, however an estimation of
15 aircraft mishap rates in 1996 suggested that a Class A mishap (a mishap that resulted in at least
16 \$1,000,000 loss or the loss of one life) would occur every 4.28 years. Test aircraft like the F-15, F-16, F-
17 18, and T-38 have annual Air Force wide Class A mishap rates of 2.53, 4.5, 3.45, and 1.58 per 100,000
18 flight hours, respectively. Then last recorded Class A mishap occurred at Edwards AFB in 2001 and
19 involved an F-16 aircraft. These accident rates are not considered significant (AFFTC 1996).

20 Prior to each weapons delivery event the Range Safety Office (412 TW/ENROR) is required to complete
21 a weapons safety footprint analysis. Where appropriate the Range Safety Office uses the SAFE-RANGE
22 program for computing safety footprints on standard weapons delivered from standard platforms under
23 standard release conditions. The Chief, Range Safety is the approval authority for all weapons delivered
24 on the PIRA. This approval is embedded as an integral part of the safety review process (AFFTC 2004).
25 Subsequently, the probability of an environmental effect occurring that would impact safety if Alternative
26 A were implemented would be less than significant; no mitigation would be required.

1 **4.12.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only**
2 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

3 The safety related effects of armed munitions testing under Alternative B would be similar to those
4 described under Alternative A. However, there would be fewer opportunities for impacts to occur because
5 there would be fewer weapons delivery events per calendar year.

6 **4.12.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
7 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

8 The safety related effects of armed munitions testing under Alternative C would be similar to those
9 described under Alternative A. However, there would be fewer opportunities for impacts to occur because
10 there would be fewer weapons delivery events per calendar year.

11 **4.12.4 Alternative D (No-Action Alternative)**

12 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
13 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
14 DoD, Air Force, and AFFTC instructions. There would be no safety related impacts on the area near PB-
15 13 or on the PIRA from the proposed armed munitions testing because this type of testing would not
16 occur at Edwards AFB.

17 **4.12.5 Mitigation Measures**

18 Since no significant impacts to Safety would be anticipated under Alternative A, B, or C, no mitigation is
19 required.

20 **4.13 SOCIOECONOMICS**

21 Socioeconomic impacts would be considered significant if they substantially altered the location and
22 distribution of the population within the ROI, caused the population to exceed historic growth rates,
23 decreased jobs so as to substantially raise the regional unemployment rates or reduce income generation,
24 substantially affected the local housing market and vacancy rates, or resulted in the need for new social
25 services and support facilities.

1 **4.13.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
2 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
3 **(Proposed Action)**

4 Since no new development would be required under Alternative A and current Air Force and contractor
5 personnel from Edwards AFB would be used for the program, Alternative A would not impact the
6 socioeconomics of on-base populations.

7 **4.13.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only**
8 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

9 Since no new development would be required under Alternative B and current Air Force and contractor
10 personnel from Edwards AFB would be used for the program, Alternative B would not impact the
11 socioeconomics of on-base populations.

12 **4.13.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
13 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

14 Since no new development would be required under Alternative C and current Air Force and contractor
15 personnel from Edwards AFB would be used for the program, Alternative C would not impact the
16 socioeconomics of on-base populations.

17 **4.13.4 Alternative D (No-Action Alternative)**

18 Under the No-Action Alternative, the armed munitions program would not be established at Edwards
19 AFB for PB-13. Therefore, no socioeconomic impacts would occur to populations located on-base.

20 **4.13.5 Mitigation Measures**

21 Since no significant impacts to socioeconomics would be anticipated under Alternative A, B, or C, no
22 mitigation is required.

23 **4.14 WATER RESOURCES**

24 A project would have a significant impact on water resources if it caused substantial flooding or erosion;
25 substantially affected any significant water body, such as an ocean, stream, lake, or bay; exposed people
26 to reasonably foreseeable hydrologic hazards such as flooding or tsunamis; or substantially affected
27 surface or groundwater quality or quantity.

1 **4.14.1 Alternative A— Desired Capability—Designate PB-13 as an Armed Munitions Only**
2 **Target with a Capacity of 100 Weapons Delivery Events per Calendar Year**
3 **(Proposed Action)**

4 The Proposed Action would designate PB-13 as an Armed Munitions Only target with a capacity of 100
5 weapons delivery events per year. No construction activities or relocation of existing PIRA facilities
6 would be required. Armed munitions T&E would be conducted using air-to-ground and ground-to-ground
7 missions. No off-road use of vehicles would occur while conducting ground-to-ground T&E of armed
8 munitions.

9 There would be no adverse, significant impacts on water resources on or near PB-13 from the proposed
10 testing. There are no perennial streams on Edwards AFB and storm water for the entire watershed is
11 directed toward the three large playa lakebeds. Target PB-13 is not located in a flood-prone area nor is it
12 located adjacent to surface water resources such as wetlands, springs, seeps, or riparian areas. Since the
13 proposed testing activities would not take place in proximity to surface water resources, the proposed
14 testing of armed munitions on the existing target would not affect surface water quality or supply.
15 Therefore, impacts to these resources would be less than significant.

16 The proposed testing would have no effect on groundwater supply, as the testing of armed munitions does
17 not require the consumption of water. The following three factors help decrease the potential for the by-
18 products of armed munitions testing to affect groundwater sources (Naval Air Weapons Station and
19 Bureau of Land Management 2002):

- 20 • Cleanup of residue in target impact areas;
- 21 • A limited physical mechanism to deliver residual materials to water bearing strata; and
- 22 • The rapid degradation of chemical residues in arid environments.

23 The target would be cleared of any duds after each mission and before any additional weapons were
24 dropped on the target. Fragments and debris would be cleaned up on a routine basis per the range
25 maintenance policy and AFI 13-212.

26 Detonation of a bomb results in fragmentation and dissemination of the casing as shrapnel. Over time, the
27 fragments corrode and create oxides. Detonation of missiles results in slightly more debris but no changes
28 in chemicals that could potentially enter the environment. The products of missile use are debris, metal

1 fragments, carbon dioxide, CO, and NO_x. The combustion of rocket fuel produces the same products
2 (carbon dioxide, CO, and NO_x) that are produced by the combustion of explosive material. The
3 combustion of the explosives results in chemical and air emissions as identified in Section 4.1. The
4 potential also exists that the explosive material would not undergo complete combustion (due to
5 malfunction) and would reach the environment as the unaltered explosive material.

6 The use of explosives in ordnance and other devices will release only minimal amounts of the original,
7 unaltered explosive into the environment if the munitions function properly, resulting in complete
8 combustion (Becker 1995). However, if the explosive is not fully combusted due to a malfunction (e.g.,
9 duds) then explosives can reach the environment.

10 The transport of ordnance residue to groundwater strata is dependent on a number of factors, including
11 the physical and chemical properties of the residue, local climate (e.g., amount of precipitation), soil
12 characteristics, and depth to groundwater. The climate at Edwards AFB is arid (high temperatures and
13 low precipitation) and the distance to groundwater is estimated to be 191 to 210 feet below ground
14 surface (bgs) based on the EMR groundwater monitoring wells closest to PB-13. Static groundwater
15 measured at wells located approximately 1.1 miles north-northwest of PB-13 occurred at 191 feet bgs at
16 groundwater monitoring well 442/2-MW01 and at 209 feet bgs at well 442/1-MW01 in March 2003
17 (Edwards AFB 2003b). At approximately 1.7 miles west of PB-13, static groundwater occurred at 210
18 feet bgs in May 2002.

19 Studies conducted by the U.S. Army at the Yuma Proving Grounds in Arizona concentrated on the
20 migration of ordnance residue from high explosive impact areas. The study concluded that ordnance
21 residue is not accumulating in soil or groundwater in the target vicinity and that the residue did not appear
22 to be migrating through surface wash areas. The climatic conditions at Edwards AFB are similar to those
23 at the Yuma ranges.

24 Target PB-13 is not located in an area where groundwater recharge occurs. Currently, there are no
25 available data describing the ground water quality at PB-13, however analytical data on water quality
26 obtained from monitoring wells up slope of the target site do not indicate that contamination from the use
27 of explosives has affected the groundwater. The proposed weapons testing would be a continuation of
28 past ground-disturbing activity that is expected to have a negligible effect on future groundwater quality.
29 Therefore, the proposed testing of armed munitions would have no direct effect on groundwater provided
30 that target maintenance is conducted as proposed.

1 **4.14.2 Alternative B—Limited Capability—Designate PB-13 as an Armed Munitions Only**
2 **Target with a Capacity of 50 Weapons Delivery Events per Calendar Year**

3 The effects of armed munitions testing on surface water and groundwater under Alternative B would be
4 similar to those described under Alternative A. However, the potential impacts would be less due to the
5 fewer number of weapons delivery events per calendar year.

6 **4.14.3 Alternative C—Minimum Capability—Designate PB-13 as an Armed Munitions**
7 **Only Target with a Capacity of 10 Weapons Delivery Events per Calendar Year**

8 The effects of armed munitions testing on surface water and groundwater under Alternative C would be
9 similar to those described under Alternative A. However, the potential impacts would be less due to the
10 fewer number of weapons delivery events per calendar year.

11 **4.14.4 Alternative D (No-Action Alternative)**

12 Under the No-Action Alternative, no armed munitions would be used on the PB-13 target. Mission
13 aircraft would comply with approved flight profiles and inert weapons delivery procedures per applicable
14 DoD, Air Force, and AFFTC instructions. There would be no impacts on soils or geology on or near the
15 PB-13 target resulting from the No-Action Alternative.

16 **4.14.5 Mitigation Measures**

17 Specific mitigation for the Proposed Action will include clearing the target of any duds after each
18 mission, and before any additional weapons are dropped on the target. Fragments and debris will be
19 cleared from the target area prior to backfilling the crater.

20 **4.15 CUMULATIVE IMPACTS**

21 The CEQ Regulations define “cumulative impact” as the impact on the environment from the incremental
22 impact of the action when added to other past, present, and reasonably foreseeable future actions
23 regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative
24 impacts can result from individually minor but collectively significant actions taking place over a period
25 of time.

26 The ROI for cumulative impacts analysis includes Edwards AFB, PB-13 target area, and West Range of
27 the PIRA. The areas with potential cumulative impacts include air quality, land use, and noise.

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Table 4-9 (Continued)
Sortie Summary by Aircraft and Year at AFFTC

Aircraft Type	Year				Notes
	2000	2001	2002	2003	
BE-200	50	66	75	49	NASA
Boeing	14	12	14	46	NASA/Contractor
C-5	0	0	3	34	
C-12	451	483	494	600	
C-130	106	163	92	84	
C/KC-135	674	653	784	837	
C-141	10	0	0	0	
C-17	194	139	223	194	
CH-46	275	266	326	346	USMC
CH-53	133	227	319	220	USMC
DC-8	12	19	44	34	NASA
ER-2	74	95	78	34	NASA
F-117	391	312	337	274	
F-15	1,088	920	843	820	
F-16	3,128	2,706	2782	3,035	
F-18	624	479	463	349	NASA
F-22	154	337	565	909	
KC-10	24	55	65	67	
T/AT-38	2,773	2,315	1,926	1,894	
T-39 ¹	289	318	212	171	
Other	616	608	547	472	
Totals	11,252	10,407	10,450	10,695	

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Table 4-9, Page 2 of 2
Note: 1 – The T-39 is no longer in the AFFTC inventory.
Source: AFFTC 2004

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- Current programs recently evaluated and shown to have no significant impact include:
- *Environmental Impact Statement for the Program Definition and Risk Reduction Phase of the Airborne Laser Program;*
 - *Environmental Assessment for the Orbital Reentry Corridor for the Generic Unmanned Lifting Entry Vehicles Landing at Edwards Air Force Base; and*
 - *Environmental Assessment for Hypersonic Corridors.*

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Collectively the sorties for these three programs (Airborne Laser, Lifting Entry Vehicle, and Hypersonic Corridors) and this Armed Munitions Integration Testing on the PIRA program, could add up to 299 sorties annually (Table 4-10), less than a 2 percent increase in activity, which is well within the support

1 capacity of Edwards AFB and the AFFTC. The total sorties for the chase and support aircraft are
2 expected to be routine flights that are included as part of the normal operational commitment, and
3 therefore would not create any additional cumulative impacts.

4 **Table 4-10**
5 **Projected Sorties for New Programs**

New Programs (Project Sorties)				
Year	Airborne Laser	Lifting Entry Vehicles	Hypersonic Corridors	Armed Munitions Integration Testing
2005	67	2	0	200
2006	72	2	0	200
2007	72	5	0	200
2008	69	5	24	200

6 **Sources:** AFFTC 2002; Wilson 2004

7 These projects are all flight-related and have been identified individually as resulting in no significant
8 impacts to the environment. Like this EA, each of these programs deal with airspace, noise, and land use
9 concerns that also result in minimal individual impacts. Detailed information and analysis of these
10 projects is available on the Worldwide Web at <http://www.ealev.com>, [www.edwards-](http://www.edwards-hypersoniccorridors-ea.com)
11 [hypersoniccorridors-ea.com](http://www.edwards-hypersoniccorridors-ea.com), and <http://www.boeing.com/defense-space/military/abl/flash.html>.

12 Another future program being evaluated is the next phase of the F-35 flight test program. Cumulative
13 impacts of this program will be addressed in a separate EA.

14 **4.15.2 Areas with Potential Cumulative Impacts**

15 This section addresses the potential additive effects of implementing the Proposed Action (Designate PB-
16 13 as an Armed Munitions Only Target with a Capacity of 100 Weapons Delivery Events per Calendar
17 Year) in combination with projects identified in Section 14.5. No significant impacts have been identified
18 for the Proposed Action or the other alternatives presented in this EA. The effects of using PB-13 as an
19 armed munitions only target would result in cumulative impacts in the following areas.

20 **4.15.2.1 Air Quality**

21 The projects identified in Section 14.5 would be implemented during the same time frame as this action.
22 They are not expected to have any significant cumulative air quality impacts. Air quality impacts from
23 these projects do not individually result in any significant long-term impacts although they may result in
24 localized impacts of short duration. Since these projects are primarily aircraft related, the air quality

1 impacts would occur as a result of aircraft launch and recovery operations and while the aircraft are
2 operating below 3,000 feet AGL. Other air quality impacts would result from permitted OB/OD events
3 that detonate 50 to 150 pounds of explosives each month. Due to the nature of the detonation process the
4 chemicals in these emissions are consumed as part of the process. However, these actions when combined
5 are still below the *de minimis* thresholds for criteria pollutants.

6 **4.15.2.2 Natural Resources**

7 The cumulative effects of the wind blown soils and contaminates on plants in the target area would be
8 considered less than significant. The immediate target area is devoid of plants, and the area outside the
9 immediate target area is sparsely populated with plants. Plant species in this area are typical for the PIRA
10 as well as the other parts of the Mojave Desert area. Naval Air Station China Lake (located in the Mojave
11 Desert area) routinely uses its' target sites for detonation of NEW armed munitions. There are no records
12 of direct impacts to plants or sensitive species resulting from the use of their targets and test sites.
13 Because natural resources are similar and there are a large number of these plants scattered throughout the
14 ranges combined with the lack of any identified impacts, the use of the target site would have a less than
15 significant impact on the plant species surrounding the target area.

16 **4.15.2.3 Geology and Soils**

17 The designation and use of the PB-13 target for armed munitions only integration testing would not result
18 in a significant cumulative change in the geology and soils of the target area. The target area is graded
19 soil classified as typically sandy loam and gravel. The gravel would undergo shattering/pulverizing and
20 would generate fine sand and PM10 (approximately 11.36 tons per year based on 100 – 500 NEW
21 detonations) as a result of the detonations. The soils at Edwards AFB are given an erosion hazard of
22 slight to severe for wind erosion. Since the target site would be backfilled after each mission, the fines
23 and silt would be mixed with the sandy loam and gravel, thus minimizing the potential effects of wind
24 erosion on an open crater.

25 **4.15.2.4 Land Use**

26 The ROI for this Proposed Action is within the base boundary of Edwards AFB; therefore, only
27 cumulative effects occurring on Edwards AFB will be addressed. The PB-13 target area is on a
28 designated Air Force range and is designated for primary use as a bombing and laser target. Past military
29 test and evaluation activities do not present any further or additional environmental impacts when
30 combined with this Proposed Action. Weapons delivery activities have routinely occurred on this target

1 in the past, as well as other targets on the West Range, East Range, and PB-6 target area. Range
2 management activities include routine inspection and cleanup of all range target sites. The cleanup of the
3 PB-13 target site after each event would prove to be beneficial because this action would further minimize
4 the opportunity for any environmental impacts. Minor cumulative impacts on the land use would result
5 from restricting use of PB-13 to Armed Munitions Only; bombs with spotting charges and inert rounds
6 would have to use other designed targets. Because there are at least eight other bombing targets on the
7 PIRA there would be no significant impact.

8 **4.15.2.5 Noise**

9 Several sources of noise were evaluated to determine if, when considered comprehensively, they would
10 result in cumulative noise impacts. These include aircraft, transportation, construction, and detonation-
11 related noise. The noise impacts of the detonations and sonic booms can result in a similar response.
12 Both are measured in pound per square foot and are impulsive. As such, these impacts are considered
13 together.

14 The aircraft that generate sonic booms which impact the ROI operate in the High Altitude Supersonic
15 Corridor, which lies directly above Edwards AFB. These aircraft are primarily the T-38, F-15, F-16, F-
16 18, and F-22; they are flown at altitudes above 30,000 feet above MSL and speeds that range from Mach
17 1.0 to 2.0 [678 to 1,356 mph]. These flights generate sonic booms with intensities up to approximately
18 2.5 psf which is of the same general intensity as the loudest expected from an armed munitions
19 detonation. In the *EA to Extend the Supersonic Speed Waiver for Continued Operations in the Black*
20 *Mountain Supersonic Corridor and Alpha Corridor/Precision Impact Range* (AFFTC 2001) it was
21 estimated that over 600 supersonic flights were conducted through this area annually. From 1997 through
22 April of 2001, only 56 noise complaints were received from persons within 50 miles of the corridors. Use
23 of the local supersonic corridor by these aircraft does create additional noise impacts; however analysis
24 has shown these noise levels do not create a significant adverse impact (AFFTC 2002). The addition of up
25 to 100 events resulting from detonations would also create additional noise impacts; however based on
26 past experience this would not create a significant adverse impact.

27 The noise created from other off-base transportation sources is expected to increase as a result of an
28 increase in area population. The programs (Airborne Laser, Lifting Entry Vehicle, Armed Munitions
29 Integration and Testing) would use existing vehicles and equipment. Noise created from these sources
30 would not add to the current noise levels. Because construction activities are not anticipated in support of

1 these new programs, additional construction-related noise would not have a cumulative environmental
2 impact.

3 The addition of noise generated from up to 100 armed munition detonations per year resulting from
4 weapons delivery testing of bombs, rockets, or mortars would increase the noise in the region of interest;
5 however, this additional increase would add to the noise in the ROI only for very brief periods of time and
6 would be less than significant. Figure 4-2 shows the noise contours for the 500-pound NEW detonation
7 at PB-13 target. At the base boundary (1.7 miles from the target) the DNL (Ldn [A]) value is 24 dBA. A
8 dBA value less than 65 dBA is within the accepted guidelines (FICUN 1980). The U.S. Army found that
9 notifying the public in the surrounding areas when the detonations were planned could minimize the
10 number of complaints. It must be noted, however, that the PB-13 target area is in an extremely remote
11 area and the closest off-base inhabitants (in Hi Vista, California) are approximately 9 miles from the
12 target. At this distance the noise values that would result from these flights are lower than ambient noise
13 created from other civilian noise sources. Therefore, less than significant cumulative noise impacts are
14 anticipated under the Armed Munitions Integration Testing on the PIRA Program.

15 **4.16 UNAVOIDABLE ADVERSE IMPACTS**

16 Unavoidable adverse impacts include those impacts that are negative, occurring regardless of any
17 identified minimization measures.

18 **4.16.1 Ecological Resources**

19 The proposed action would likely prevent the re-growth of small areas of terrestrial plant communities
20 and reintroduction of any wildlife habitat to the PB-13 target site. The land routinely graded for this
21 project was previously disturbed, so the plant communities are of marginal quality for wildlife.

22 **4.16.2 Land Use**

23 Under the proposed action, land use for the PB-13 target would only be used for armed munitions testing
24 missions. This target site would not be available for other uses including inert munitions testing missions.

25 **4.16.3 Safety**

26 A crash of the weapons delivery aircraft or an off-target impact of an armed munition would result in
27 unavoidable adverse impacts. However, because test procedures and safety criteria will be strictly

1 adhered to there is a low probability of a crash. The whole purpose of this program is to aid in the
2 development of weapons and weapon systems with improved accuracy that work on a variety of
3 platforms. Accuracy of the Air Force weapons over the years has improved dramatically. For example
4 the Eighth Air Force in 1944 only 7 percent of all bombs hit within 1,000 feet of their aim point. The
5 circular error of probability for World War II was 3,300 feet, 1,000 feet in Korea, and 400 feet in
6 Vietnam. By the Gulf War the “smart airplane” dropping dumb bombs from low altitude could place an
7 unguided munition within 30 feet of a target. Hellfire missiles fired by an Apache helicopter reported 102
8 direct hits out of 107 missiles expended (a hit rate of better than 95 percent). By following the strict test
9 procedures establishing PB-13 as an Armed Munitions Only target would not result in any significant
10 unavoidable adverse impacts.

11 **4.17 SHORT-TERM VERSUS LONG-TERM PRODUCTIVITY OF THE**
12 **ENVIRONMENT**

13 Examples of short-term uses of the environment include direct, construction-related disturbances and
14 direct impacts associated with an increase in population and activity that occurs over a period typically
15 less than 5 years. Long-term uses of the environment include impacts occurring over a period of more
16 than 5 years, including permanent resource loss.

17 Since no new development would be required under the Armed Munitions Integration Testing on the
18 PIRA Program and current Air Force or contractor personnel from other bases would be used for the
19 program, neither Alternative A, B, nor C would involve any short- or long-term changes in population or
20 productivity of the environment.

21 **4.18 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

22 Irreversible and irretreivable resource commitments are related to the use of nonrenewable natural
23 resources and the effects that the use of those resources will have on future generations. Irreversible
24 effects primarily result from the use or destruction of a specific resource (e.g., energy and minerals) that
25 cannot be replaced within a reasonable time frame. Irretreivable resource commitments involve the loss
26 in value of an affected resource that cannot be restored as a result of implementing an action (e.g.,
27 extinction of a rare or threatened species, or the disturbance of an important cultural resource site). In
28 accordance with NEPA (40 CFR 1502.16), this section includes a discussion of any irreversible and
29 irretreivable commitment of resources associated with the proposed project.

1 This programmatic EA only addresses the launch and delivery of weapons that would impact and
2 detonate on the PIRA PB-13 target area. Implementing any of these proposed actions would not require
3 an irreversible or irretrievable commitment of resources. Irreversible or irretrievable commitment of
4 resources that would be involved in other phases of the program (e.g., weapon fabrication, transportation
5 to Edwards AFB, flights with specific payloads) would be addressed in separate environmental
6 documentation. Implementation of Alternative D (No-Action Alternative) would also not require an
7 irreversible or irretrievable commitment of resources.

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1 **8.0 ACRONYMS AND ABBREVIATIONS**

2	412 OG	412th Operations Group
3	412 TW	412th Test Wing
4	412 TW/ENROR	Range Safety Office
5	AFB	Air Force Base
6	AFFTC	U.S. Air Force Flight Test Center
7	AFI	Air Force Instruction
8	AFMC	Air Force Mobility Command
9	AFOOSH	Air Force Occupational Safety and Health
10	AFRL	Air Force Research Lab
11	AGE	aerospace ground equipment
12	AGL	above ground level
13	AICUZ	air installation compatible use zone
14	AL	A-weighted sound level
15	AOC	area of concern
16	APZ	accident potential zone
17	ARTCC	Air Route Traffic Control Center
18	ATC	air traffic control
19	AVEK	Antelope Valley East Kern
20	BCP	Base Comprehensive Plan
21	bgs	below ground surface
22	CAA	Clean Air Act
23	CAAQS	California Ambient Air Quality Standards
24	Cal/EPA	California Environmental Protection Agency
25	CARB	California Air Resources Board
26	CATEX	categorical exclusion
27	CCF	Central Coordinating Facility
28	CCR	California Code of Regulations
29	CDNL	C-weighted day-night level
30	CEQ	Council on Environmental Quality

AIR FORCE FLIGHT TEST CENTER

1	CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
2	CFA	controlled firing area
3	CFR	Code of Federal Regulations
4	CHABA	Committee on Hearing, Bioacoustics and Biomechanics
5	CNEL	Community Noise Equivalent Level
6	CNPS	California Native Plant Society
7	CO	carbon monoxide
8	CSEL	C-weighted sound exposure level
9	dB	decibels
10	dBA	A-weighted decibels
11	dBc	C-weighted decibels
12	dBp	peak sound level
13	DFRC	Dryden Flight Research Center
14	DNL	day-night average noise level
15	DoD	Department of Defense
16	DWMA	Desert Wildlife Management Area
17		
18	EA	Environmental Assessment
19	EFTR	Edwards Flight Test Range
20	EMR	electromagnetic radiation
21	EO	Executive Order
22	EOD	explosive ordnance disposal
23	ESA	Endangered Species Act
24	°F	degrees Fahrenheit
25	FAA	Federal Aviation Administration
26	FICUN	Federal Interagency Committee on Urban Noise
27	FL	flight level
28	FONSI	Finding of No Significant Impact
29	GP	general purpose
30	GSE	ground support equipment

1	% HA	percentage of exposed persons who are highly annoyed
2	HMX	High Melt Explosive
3	HUD	U.S. Department of Housing and Urban Development
4	Hz	hertz
5	IFR	instrument flight rules
6	IR	Instrument Route
7	IRP	Installation Restoration Program
8	JPL	Jet Propulsion Laboratory
9		
10	KCAPCD	Kern County Air Pollution Control District
11	L _{dn}	day/night average noise level
12	L _{eq}	long-term equivalent A-weighted sound level
13	LTO	landing and takeoff
14	MARSA	military assumes responsibility for separation of aircraft
15	MDAB	Mojave Desert Air Basin
16	µg/m ³	micrograms per cubic meter
17	MOA	Military Operation Area
18	MSL	mean sea level
19	NAAQS	National Ambient Air Quality Standards
20	NACO	National Aeronautical Charting Office
21	NAS	National Airspace System
22	NASA	National Aeronautics and Space Administration
23	NAVD	North American Vertical Datum
24	NCA	Noise Control Act
25	NEPA	National Environmental Policy Act
26	NEW	net explosive weight
27	NM	nautical miles
28	NO ₂	nitrogen dioxide

AIR FORCE FLIGHT TEST CENTER

1	NRHP	National Register of Historic Places
2	OB/OD	openburn/open detonation
3	OU	Operable Unit
4	PB	precision bombing
5	PETN	pentaerythritol tetranitrate
6	PIRA	Precision Impact Range Area
7	PL	Public Law
8	PM ₁₀	particulate matter 10 microns or less in diameter
9	PM _{2.5}	particulate matter 2.5 microns or less in diameter
10	ppm	parts per million
11	PSD	Prevention of Significant Deterioration
12	psf	pounds per square foot
13	psi	pounds per square inch
14	RCRA	Resource Conservation and Recovery Act
15	RDX	cyclotrimethylenetrinitramine
16	RMCC	Ridley Mission Control Center
17	ROI	Region of Influence
18	SEA	Significant Ecological Area
19	SEL	sound exposure level
20	SIP	State Implementation Plan
21	SO ₂	sulfur dioxide
22	SPL	sound pressure level
23	SUA	special use airspace
24	T&E	test and evaluation
25	TNT	trinitrotoluene
26	TRACON	terminal radar approach
27	UAV	unmanned aerial vehicle
28	USACE	U.S. Army Corps of Engineers

1	USACHPPM	U.S. Army Center for Health Promotion and Preventive Medicine
2	U.S.C.	United States Code
3	USDA	U.S. Department of Agriculture
4	U.S. EPA	U.S. Environmental Protection Agency
5	USFWS	U.S. Fish and Wildlife Service
6	USGS	U.S. Geological Survey
7	UXO	unexploded ordnance
8	VFR	visual flight rules
9	VOC	volatile organic compound
10	VR	Visual Route
11		

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B-52 G-H Aircraft Activity and Emissions for Edwards AFB

Aircraft Type	Engine Type	Number of Engines	Operation Cycle	Mode of Operation	Fuel Flow (lb/min)	Emission Factors (lb/1,000 lb of fuel)				
						ROGs	NOx	CO	SOx	PM
B-52G/H	TF33-3	8	LTO	Take Off	124.00	0.60	10.00	1.70	1.00	1.73
				Climb Out	104.00	0.70	8.50	2.30	1.00	1.88
				Approach	63.33	2.60	5.80	6.30	1.00	0.99
				Idle (Taxi-in)	15.00	84.00	1.80	107.00	1.00	0.23
			TGO	Idle (Taxi-out)	15.00	84.00	1.80	107.00	1.00	0.23
				Take Off	124.00	0.60	10.00	1.70	1.00	1.73
				Climb Out	104.00	0.70	8.50	2.30	1.00	1.88
				Approach	63.30	2.60	5.80	6.30	1.00	0.99

	Number of Operations	Operation Cycle	Time in Mode (minutes)	Emissions (tpy)					
				ROGs	NOx	CO	SOx	PM	
	100	LTO	1.00	0.03	0.50	0.08	0.05	0.09	
			2.00	0.06	0.71	0.19	0.08	0.16	
			6.00	0.40	0.88	0.96	0.15	0.15	
			15.00	7.56	0.16	9.63	0.09	0.02	
		30.00	15.12	0.32	19.26	0.18	0.04		
		TGO	1.00	-	-	-	-	-	
			1.50	-	-	-	-	-	
			7.50	-	-	-	-	-	
		Emissions (tpy)			23.16	2.57	30.12	0.55	0.45

F-16 Aircraft Activity and Emissions for Edwards AFB

Aircraft Type	Engine Type	Number of Engines	Operation Cycle	Mode of Operation	Fuel Flow (lb/min)	Emission Factors (lb/1,000 lb of fuel)				
						ROGs	NOx	CO	SOx	PM
F-16	F100-220	1	LTO	Take Off (Mil)	176.33	0.10	27.00	0.90	1.00	0.34
				Climb Out	85.17	0.10	9.80	1.60	1.00	0.47
				Approach	50.00	1.90	6.70	5.80	1.00	0.27
				Idle (Taxi-in)	17.33	3.20	3.30	24.00	1.00	0.12
				Idle (Taxi-out)	17.33	3.20	3.30	24.00	1.00	0.12
				Afterburner	862.17	0.01	3.10	4.00	1.00	0.15
			TGO	Take Off	176.33	0.10	27.00	0.90	1.00	0.34
				Climb Out	85.17	0.10	9.80	1.60	1.00	0.47
				Approach	50.00	1.90	6.70	5.80	1.00	0.27

	Number of Operations	Operation Cycle	Time in Mode (minutes)	Emissions (tpy)				
				ROGs	NOx	CO	SOx	PM
	100	LTO	1.00	0.00	0.24	0.01	0.01	0.00
			1.00	0.00	0.04	0.01	0.00	0.00
			5.00	0.02	0.08	0.07	0.01	0.00
			15.00	0.04	0.04	0.31	0.01	0.00
			25.00	0.07	0.07	0.52	0.02	0.00
	0	TGO	-	-	-	-	-	-
			1.00	-	-	-	-	-
			0.50	-	-	-	-	-
			4.00	-	-	-	-	-
<i>Emissions (tpy)</i>				<i>0.14</i>	<i>0.48</i>	<i>0.92</i>	<i>0.06</i>	<i>0.01</i>

F-15 Aircraft Activity and Emissions for Edwards AFB

Aircraft Type	Engine Type	Number of Engines	Operation Cycle	Mode of Operation	Fuel Flow (lb/min)	Emission Factors (lb/1,000 lb of fuel)				
						ROGs	NOx	CO	SOx	PM
F-15	F100-220	2	LTO	Take Off (Mil)	176.33	0.10	27.00	0.90	1.00	0.34
				Climb Out	85.17	0.10	9.80	1.60	1.00	0.47
				Approach	50.00	1.90	6.70	5.80	1.00	0.27
				Idle (Taxi-in)	17.33	3.20	3.30	24.00	1.00	0.12
				Idle (Taxi-out)	17.33	3.20	3.30	24.00	1.00	0.12
				Afterburner	862.17	0.01	3.10	4.00	1.00	0.15
			TGO	Take Off	176.33	0.10	27.00	0.90	1.00	0.34
				Climb Out	85.17	0.10	9.80	1.60	1.00	0.47
				Approach	50.00	1.90	6.70	5.80	1.00	0.27

	Number of Operations	Operation Cycle	Time in Mode (minutes)	Emissions (tpy)				
				ROGs	NOx	CO	SOx	PM
	100	LTO	1.00	0.00	0.48	0.02	0.02	0.01
			1.00	0.00	0.08	0.01	0.01	0.00
			5.00	0.05	0.17	0.15	0.03	0.01
			15.00	0.08	0.09	0.62	0.03	0.00
			25.00	0.14	0.14	1.04	0.04	0.01
	0	TGO	-	-	-	-	-	-
			1.00	-	-	-	-	-
			1.50	-	-	-	-	-
			7.50	-	-	-	-	-
Emissions (tpy)				0.27	0.96	1.84	0.12	0.03

T-38 Aircraft Activity and Emissions for Edwards AFB

Aircraft Type	Engine Type	Number of Engines	Operation Cycle	Mode of Operation	Fuel Flow (lb/min)	Emission Factors (lb/1,000 lb of fuel)				
						ROGs	NOx	CO	SOx	PM
T-38	J85-5A	2	LTO	Take Off	43.83	0.80	2.60	29.00	1.00	0.01
				Climb Out	24.33	3.50	2.30	43.00	1.00	0.01
				Approach	16.67	6.40	1.80	73.60	1.00	0.01
				Idle (Taxi-in)	7.50	30.00	1.30	178.00	1.00	-
			TGO	Idle (Taxi-out)	7.50	30.00	1.30	178.00	1.00	-
				Take Off	43.83	0.80	2.60	29.00	1.00	0.01
				Climb Out	24.33	3.50	2.30	43.00	1.00	0.01
				Approach	16.67	6.40	1.80	73.60	1.00	0.01

	Number of Operations	Operation Cycle	Time in Mode (minutes)	Emissions (tpy)				
				ROGs	NOx	CO	SOx	PM
			1.00	0.00	0.01	0.13	0.00	0.00
	100	LTO	1.00	0.01	0.01	0.10	0.00	0.00
			5.00	0.05	0.02	0.61	0.01	0.00
			10.00	0.23	0.01	1.34	0.01	-
			15.00	0.34	0.01	2.00	0.01	-
	0	TGO	1.00	-	-	-	-	-
			0.50	-	-	-	-	-
			4.00	-	-	-	-	-
	<i>Emissions (tpy)</i>			<i>0.63</i>	<i>0.06</i>	<i>4.18</i>	<i>0.03</i>	<i>0.00</i>

**Appendix A Air Emission Analysis for Environmental Assessment for Armed Munitions Integration
Testing on the PIRA**

Total Expected Aircraft Emissions

		Emissions (tons/yr)				
		VOC	NO ₂	CO	SO ₂	PM ₁₀
Alternative A						
Mission Aircraft	Flights					
B-52 G-H	10	2.32E+00	2.57E-01	3.01E+00	5.55E-02	4.55E-02
F-16	68	9.25E-02	3.25E-01	6.25E-01	4.10E-02	8.52E-03
F-15	22	5.98E-02	2.10E-01	4.04E-01	2.65E-02	5.51E-03
	<i>total</i>	<i>2.469</i>	<i>0.792</i>	<i>4.042</i>	<i>0.123</i>	<i>0.060</i>
Chase Aircraft						
F-16	70	9.52E-02	3.35E-01	6.43E-01	4.22E-02	8.77E-03
T-38	30	1.88E-01	1.69E-02	1.25E+00	1.02E-02	4.55E-05
	<i>total</i>	<i>0.284</i>	<i>0.351</i>	<i>1.898</i>	<i>0.052</i>	<i>0.009</i>
Total		2.752	1.144	5.940	0.175	0.068
Alternative B						
Mission Aircraft	Flights					
B-52 G-H	5	1.16E+00	1.29E-01	1.51E+00	2.77E-02	2.27E-02
F-16	34	4.62E-02	1.62E-01	3.12E-01	2.05E-02	4.26E-03
F-15	11	2.99E-02	1.05E-01	2.02E-01	1.33E-02	2.76E-03
	<i>total</i>	<i>1.234</i>	<i>0.396</i>	<i>2.021</i>	<i>0.061</i>	<i>0.030</i>
Chase Aircraft						
F-16	35	4.76E-02	1.67E-01	3.22E-01	2.11E-02	4.39E-03
T-38	15	9.42E-02	8.46E-03	6.27E-01	5.09E-03	2.27E-05
	<i>total</i>	<i>0.142</i>	<i>0.176</i>	<i>0.949</i>	<i>0.026</i>	<i>0.004</i>
Total		1.376	0.572	2.970	0.088	0.034
Alternative C						
Mission Aircraft	Flights					
B-52 G-H	1	2.32E-01	2.57E-02	3.01E-01	5.55E-03	4.55E-03
F-16	7	9.52E-03	3.35E-02	6.43E-02	4.22E-03	8.77E-04
F-15	2	5.44E-03	1.91E-02	3.68E-02	2.41E-03	5.01E-04
	<i>total</i>	<i>0.247</i>	<i>0.078</i>	<i>0.402</i>	<i>0.012</i>	<i>0.006</i>
Chase Aircraft						
F-16	7	9.52E-03	3.35E-02	6.43E-02	4.22E-03	8.77E-04
T-38	3	1.88E-02	1.69E-03	1.25E-01	1.02E-03	4.55E-06
	<i>total</i>	<i>0.028</i>	<i>0.035</i>	<i>0.190</i>	<i>0.005</i>	<i>0.001</i>
Total		0.275	0.113	0.592	0.017	0.007

Appendix A Air Emission Analysis for Environmental Assessment for Armed Munitions Integration Testing on the PIRA

Related Mobile Source Emissions (on ground)

Alternative A

Equipment or Vehicle Type	Rate of Emissions	Number of Equipment or Vehicles	HP	Vehicle Miles Traveled		Number of Missions	Hours per Day	Emission Type	NO ₂ Emission Factor ¹	Total NO ₂ Emissions (tons/yr)	SO ₂ Emission Factor ¹	Total SO ₂ Emissions (tons/yr)	CO Emission Factor ¹	Total CO Emissions (tons/yr)	VOC Emission Factor ¹	Total VOC Emissions (tons/yr)	PM ₁₀ Emission Factor ¹	Total PM ₁₀ Emissions (tons/yr)	Entrained PM ₁₀ Emission Factor ^{2,3}		Total Entrained PM ₁₀ Emissions (tons/yr)
				Paved	Unpaved														Paved	Unpaved	
LDGV, LDGT, & HDGT	g/VMT	3	N/A	40	10	100	N/A	Travel	0.90	1.49E-02	0.00	0.00E+00	8.87	1.47E-01	0.91	1.50E-02	0.11	1.82E-03	0.016	0.781	1.15E-01
	g/VMT							Cold Start	2.77	4.58E-02	0.00	0.00E+00	93.49	1.55E+00	5.21	8.61E-02	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Hot Start	1.76	2.91E-02	0.00	0.00E+00	12.74	2.11E-01	1.38	2.28E-02	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Hot Soak	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	2.11	3.49E-02	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Diurnal	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	5.01	8.28E-02	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Travel	12.01	6.62E-02	0.00	0.00E+00	11.03	6.08E-02	2.78	1.53E-02	2.63	1.45E-02	0.016	0.781	3.91E-01
	g/VMT							Cold Start	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
LDDT	g/VMT	1	N/A	40	10	100	N/A	Hot Soak	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Hot Soak	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Diurnal	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
Backhoe Loader	lb/hour	1	N/A	N/A	10	100	2	N/A	1.89	1.89E-01	0.18	1.80E-02	0.57	5.70E-02	0.29	2.90E-02	0.17	1.70E-02	N/A	6.540	3.27E+00
TOTAL Emissions in tons/year									0.345	0.018	2.021	0.286	0.033	3.776							

Alternative B

Equipment or Vehicle Type	Rate of Emissions	Number of Equipment or Vehicles	HP	Vehicle Miles Traveled		Number of Missions	Hours per Day	Emission Type	NO ₂ Emission Factor ¹	Total NO ₂ Emissions (tons/yr)	SO ₂ Emission Factor ¹	Total SO ₂ Emissions (tons/yr)	CO Emission Factor ¹	Total CO Emissions (tons/yr)	VOC Emission Factor ¹	Total VOC Emissions (tons/yr)	PM ₁₀ Emission Factor ¹	Total PM ₁₀ Emissions (tons/yr)	Entrained PM ₁₀ Emission Factor ^{2,3}		Total Entrained PM ₁₀ Emissions (tons/yr)
				Paved	Unpaved														Paved	Unpaved	
LDGV, LDGT, & HDGT	g/VMT	3	N/A	40	10	50	N/A	Travel	0.90	7.44E-03	0.00	0.00E+00	8.87	7.33E-02	0.91	7.52E-03	0.11	9.09E-04	0.016	0.781	5.74E-02
	g/VMT							Cold Start	2.77	2.29E-02	0.00	0.00E+00	93.49	7.73E-01	5.21	4.31E-02	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Hot Start	1.76	1.46E-02	0.00	0.00E+00	12.74	1.05E-01	1.38	1.14E-02	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Hot Soak	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	2.11	1.74E-02	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Diurnal	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	5.01	4.14E-02	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Travel	12.01	3.31E-02	0.00	0.00E+00	11.03	3.04E-02	2.78	7.66E-03	2.63	7.25E-03	0.016	0.781	1.96E-01
	g/VMT							Cold Start	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
LDDT	g/VMT	1	N/A	40	10	50	N/A	Hot Soak	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Hot Soak	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Diurnal	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
Backhoe Loader	lb/hour	1	N/A	N/A	10	50	2	N/A	1.89	9.45E-02	0.18	9.00E-03	0.57	2.85E-02	0.29	1.45E-02	0.17	8.50E-03	N/A	6.540	1.64E+00
TOTAL Emissions in tons/year									0.172	0.009	1.010	0.143	0.017	1.888							

Alternative C

Equipment or Vehicle Type	Rate of Emissions	Number of Equipment or Vehicles	HP	Vehicle Miles Traveled		Number of Missions	Hours per Day	Emission Type	NO ₂ Emission Factor ¹	Total NO ₂ Emissions (tons/yr)	SO ₂ Emission Factor ¹	Total SO ₂ Emissions (tons/yr)	CO Emission Factor ¹	Total CO Emissions (tons/yr)	VOC Emission Factor ¹	Total VOC Emissions (tons/yr)	PM ₁₀ Emission Factor ¹	Total PM ₁₀ Emissions (tons/yr)	Entrained PM ₁₀ Emission Factor ^{2,3}		Total Entrained PM ₁₀ Emissions (tons/yr)
				Paved	Unpaved														Paved	Unpaved	
LDGV, LDGT, & HDGT	g/VMT	3	N/A	40	10	10	N/A	Travel	0.90	1.49E-03	0.00	0.00E+00	8.87	1.47E-02	0.91	1.50E-03	0.11	1.82E-04	0.016	0.781	1.15E-02
	g/VMT							Cold Start	2.77	4.58E-03	0.00	0.00E+00	93.49	1.55E-01	5.21	8.61E-03	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Hot Start	1.76	2.91E-03	0.00	0.00E+00	12.74	2.11E-02	1.38	2.28E-03	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Hot Soak	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	2.11	3.49E-03	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Diurnal	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	5.01	8.28E-03	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Travel	12.01	6.62E-03	0.00	0.00E+00	11.03	6.08E-03	2.78	1.53E-03	2.63	1.45E-03	0.016	0.781	3.94E-02
	g/VMT							Cold Start	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
LDDT	g/VMT	1	N/A	40	10	10	N/A	Hot Soak	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Hot Soak	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
	g/VMT							Diurnal	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	0.00	0.00E+00	N/A	N/A	N/A
Backhoe Loader	lb/hour	1	N/A	N/A	10	10	2	N/A	1.89	1.89E-02	0.18	1.80E-03	0.57	5.70E-03	0.29	2.90E-03	0.17	1.70E-03	N/A	6.540	3.27E-01
TOTAL Emissions in tons/year									0.034	0.002	0.202	0.029	0.003	0.378							

Notes:
 1 - Emission factors were obtained using EMFAC 7G
 2 - Emission factors for the Backhoe Loader were obtained from SCAQMD CEQA Air Quality Handbook 1993, Table A9-9D with average mean vehicle weight of 13 to 2
 3 - Emission factors for the LDGV, LDGT, HDGT, and LDDT were obtained from AP-42 Emission Factors, December 2002
 CO - carbon monoxide
 LDDT - light-duty diesel truck
 LDGV - light-duty gasoline vehicle
 N/A - not applicable
 NO₂ - nitrogen dioxide
 PM₁₀ - particulate matter equal to or below 10 microns
 SO₂ - sulfur dioxide
 VOC - volatile organic compounds

Appendix A Air Emission Analysis for Environmental Assessment for Armed Munitions Integration Testing on the PIRA

Related Stationary Source Emissions (on ground)

Alternative A

Process Description	Fuel Type	Power Rating (BTU/hr)	Operation (hrs/det)	Flights (per year)	NO ₂ (lb/MMBtu)	NO ₂	CO	CO	SO ₂	SO ₂	PM ₁₀	PM ₁₀	VOC	VOC
						Emission Rate (tons/year)	(lb/MMBtu)	Emission Rate (ton/year)	(lb/MMBtu)	Emission Rate (ton/year)	(lb/MMBtu)	Emission Rate (ton/year)	(lb/MMBtu)	Emission Rate (ton/year)
A/M32A-60B (Generator)	JP-8	3,543,300	2	100	0.698	0.247	0.048	0.017	0.0505	0.018	0.061	0.022	0.017	0.006

Alternative B

Process Description	Fuel Type	Power Rating BTU/hr	Operation (hrs/flight)	Flights (per year)	NO ₂ (lb/MMBtu)	NO ₂	CO	CO	SO ₂	SO ₂	PM 10	PM 10	VOC	VOC
						Emission Rate (tons/year)	(lb/MMBtu)	Emission Rate (ton/year)	(lb/MMBtu)	Emission Rate (ton/year)	(lb/MMBtu)	Emission Rate (ton/year)	(lb/MMBtu)	Emission Rate (ton/year)
A/M32A-60B (Generator)	JP-8	3,543,300	2	50	0.698	0.124	0.048	0.009	0.0505	0.009	0.061	0.011	0.017	0.003

Alternative C

Process Description	Fuel Type	Power Rating BTU/hr	Operation (hrs/flight)	Flights (per year)	NO ₂ (lb/MMBtu)	NO ₂	CO	CO	SO ₂	SO ₂	PM 10	PM 10	VOC	VOC
						Emission Rate (tons/year)	(lb/MMBtu)	Emission Rate (ton/year)	(lb/MMBtu)	Emission Rate (ton/year)	(lb/MMBtu)	Emission Rate (ton/year)	(lb/MMBtu)	Emission Rate (ton/year)
A/M32A-60B (Generator)	JP-8	3,543,300	2	10	0.698	0.025	0.048	0.002	0.0505	0.002	0.061	0.002	0.017	0.001

Note: Emission Factors were obtained from the Enterprize Environmental, Safety, and Occupational Health, Comman Core System, APIMS Database, available at www.eesoh.com/site/do/ccs/overview, accessed in August 19, 2004.

Appendix A Air Emission Analysis for Environmental Assessment for Armed Munitions Integration Testing on the PIRA

Related Energetic Material Detonation Emissions

Speciation for Detonation of Comp B and C4

Amount (lbs)	Comp B ₁		Comp C4 ₁	
	500		500	
Emissions	Emission Factor (lbs/lb)	Amount Released (lbs/detonation)	Emission Factor (lbs/lb)	Amount Released (lbs/detonation)
CO	3.72E-02	18.620	2.49E-02	12.464
CO ₂	1.26E+00	631.510	1.26E+00	629.683
NO ₂	2.95E-02	14.746	3.73E-02	18.660
PM ₁₀	2.20E-01	110.026	2.20E-01	110.231
NMHC	1.30E-03	0.651	1.30E-03	0.650
C ₄ H ₆	7.81E-06	0.004	7.84E-06	0.004
C ₆ H ₁₄	4.55E-06	0.002	4.55E-06	0.002
CH ₃ Cl	2.52E-06	0.001	2.52E-06	0.001
C ₆ H ₆	9.38E-05	0.047	9.37E-05	0.047
C ₆ H ₅ CH ₃	3.48E-05	0.017	3.49E-05	0.017
CH ₂ =CHCl	5.79E-06	0.003	5.79E-06	0.003
Cl ₂ =CCl ₂	9.57E-06	0.005	9.60E-06	0.005
CCl ₄	2.03E-06	0.001	2.03E-06	0.001
CH ₂ Cl ₂	2.63E-04	0.132	2.64E-04	0.132
TEQ _{DF}	1.80E-09	0.000	1.80E-09	0.000
C ₃ H ₆ N ₆ O ₆ (RDX)	1.61E-03	0.804	1.61E-03	0.807
C ₇ H ₅ N ₃ O ₆ (TNT)	1.76E-07	0.000	N/A	N/A

Speciation for Detonation of TNT

Amount (lbs)	TNT ₂	
	500	
Emissions	Emission Factor (lbs/lb)	Amount Released (lbs/detonation)
CO	4.31E-01	215.745
N ₂ *	1.85E-01	92.450
H ₂ O	1.98E-01	99.000
C _(s)	1.85E-01	92.540

* - 1 mole N₂ = 2 moles NO₂

1 mole N ₂ = 28.02	grams,	1 mole NO ₂ =	46.01	grams
	1 lb =	453.59	grams	
9.25E+01	lbs N ₂ =	1496.588	mol N ₂	
1.50E+03	mol N ₂ =	2993.176	mol NO ₂	
2.99E+03	mol NO ₂ =	303.613	lbs NO ₂	

Emissions (lbs) per 500-lb Detonation

	PM ₁₀	CO	NO _x	VOCs
Comp B ¹	110.830	18.620	14.746	0.863
Comp C4 ¹	111.037	12.464	18.660	0.862
TNT ²	92.540	215.745	303.613	N/A

Note: Uncombusted energetic material (TNT and RDX) were included in PM₁₀ emissions.

Appendix A Air Emission Analysis for Environmental Assessment for Armed Munitions Integration Testing on the PIRA

Total Yearly Emissions per Alternative

		PM₁₀	CO	NO₂	VOCs
Comp B₁	Alternative A 100 det/year	5.542	0.931	0.737	0.043
	Alternative B 50 det/year	2.771	0.465	0.369	0.022
	Alternative C 10 det/year	0.554	0.093	0.074	0.004
Comp C₄	Alternative A 100 det/year	5.552	0.623	0.933	0.043
	Alternative B 50 det/year	2.776	0.312	0.466	0.022
	Alternative C 10 det/year	0.555	0.062	0.093	0.004
TNT₂	Alternative A 100 det/year	4.627	10.787	15.181	N/A
	Alternative B 50 det/year	2.776	5.394	7.590	N/A
	Alternative C 10 det/year	0.463	1.079	1.518	N/A

Notes:

1 - Emission Factors were obtained from the Technical Memorandum, Air Emissions from Incidental Ordnance Detonation During a Prescribed Burn on Ranges 43 through 48, Former Fort Ord, California. Harding ESE Project No. 46310 00117. November 9, 2001.

2 - Emissions factors were determined based on a mass balance calculation for 100% combustion of TNT, see attached. It should be noted that all N₂ was assumed to be converted to NO₂ and was reported as such in the Total Emissions (1 mole N₂ = 2 moles NO₂). In addition, the carbon formed (soot) was considered particulate matter.

NMHC - Non-Methane Hydrocarbons

TEQ_{DF} - Dioxin/Furan Toxicity Equivalent

TEQ_{DF} - Dioxin/Furan Toxicity Equivalent

Appendix A

Air Emission Analysis for Environmental Assessment for Armed Munitions Integration Testing on the PIRA

PM₁₀ Emissions from Soil Displacement During Detonation

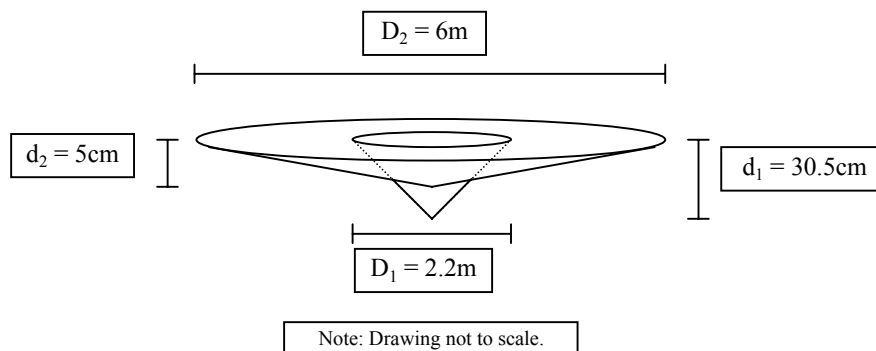
Based on information obtained from the *Small Mammal Burrow Entrance Collapse Study at the Open Burn Open Detonation Facility, Precision Impact Range Area, Edwards Air Force Base, California*, prepared by Linda Anton and Carolyn Ronning in 2000, detonation of a 500-pound explosive generates two distinct craters in the immediate area of impact. The first, and deepest, is 2.2 meters (m) in diameter and 30.5 centimeters (cm) deep. The second, and wider, is 6 m in diameter and only 5 cm deep. The first crater displaces an amount of soil that we will call volume 1 (V₁) and the second an amount we will call volume 2 (V₂). It should be noted that by simply adding these two volumes, a given volume (V_{overlap}) included in both craters would be counted twice. Therefore V_{overlap}, the volume of overlap by the two craters, should only be counted once and will therefore be subtracted from the volume of the second crater. The resulting equation for the total volume (V_{total}) then becomes:

$$V_{total} = V_1 + (V_2 - V_{overlap})$$

Where,

- V_{total} = Total volume of soil displaced from the detonation of 500-pounds of energetic material.
- V₁ = Volume of the inner, deeper crater generated from detonation of the explosive.
- V₂ = Volume of the outer, wider crater generated from the detonation of the explosive.
- V_{overlap} = Volume of overlap between the two craters.

It was assumed that the craters generated would be most closely mimicked by the shape of a cone. Therefore, the equation for calculating the volume of a cone was used to calculate the volume of soil displaced. See below.



$$V_1 = (1/3)\pi(D_1/2)^2 d_1$$

$$V_2 = (1/3)\pi(D_2/2)^2 d_2$$

$$V_{overlap} = (1/3)\pi(D_1/2)^2 d_2$$

So,

$$V_1 = 13.6 \text{ ft}^3$$

$$V_2 = 16.6 \text{ ft}^3$$

$$V_{overlap} = 2.2 \text{ ft}^3$$

Ultimately,

$$V_{total} = 28.1 \text{ ft}^3$$

Convert volume to weight assuming a 90 lb/ft³ density for sand. Convert to tons, 2,000 lbs/ton.

$$V_{total} = 1.3 \text{ tons}$$

Appendix A

Air Emission Analysis for Environmental Assessment for Armed Munitions Integration Testing on the PIRA

Determination of PM₁₀ generated as a result of detonation,

	<i>Alternative A</i>	<i>Alternative B</i>	<i>Alternative C</i>
<i>Detonations</i>			
(per year)	100	50	10
<i>Tons Displaced</i>			
(per detonation)	1.3	1.3	1.3
<i>PM10</i>			
Emission Factor ₁	0.09	0.09	0.09
(pounds per pound)			
<i>Emissions</i>			
(tons per year)	<i>11.361</i>	<i>5.681</i>	<i>1.136</i>

Notes:

1 - Emission factors were obtained from a phone conversation with Mr. Tom Paxson at the Kern County Air Pollution Control District on August 30, 2004. Mr. Paxson provided guidance on estimating particulate emissions from weapons detonation. He indicated that PM₁₀ emissions would be approximately equal to the silt content of the overburden and that the silt content of soil in that area is typically between 8% and 10%. Therefore, an average of 9% was used.

Appendix A

Air Emission Analysis for Environmental Assessment for Armed Munitions Integration Testing on the PIRA

PM₁₀ Emissions from Backfilling Using a Backhoe Loader

$$E=0.45*(G^{1.5}/H^{1.4})*I*J$$

Where,

- E = PM₁₀ Emissions from Dirt Pushing
- G = Silt content of aggregate in percent
- H = Moisture Content of the surface material
- I = 2.2046; a conversion factor to convert kilograms per hour to pounds per hour
- J = Hours of Pushing Operation

So if,

- G = 7.5 %
- H = 2.0 %
- I = 2.2046 lbs/kg
- J = 2.0 hrs, assume two hours of backfilling per detonation

Then,

$$E = 15.4 \quad \text{lbs/detonation PM}_{10}$$

So, annual emission totals per alternative would be as follows,

	<i>Alternative A</i>	<i>Alternative B</i>	<i>Alternative C</i>
<i>Detonations</i>	100	50	10
(per year)			
Emissions	15.4	15.4	15.4
(pounds per detonation)			
<i>Emissions</i>			
(tons per year)	<i>0.772</i>	<i>0.386</i>	<i>0.077</i>

Notes:

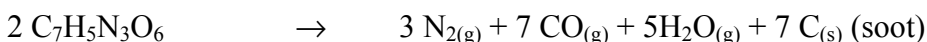
Calculations based on methodology presented in the CEQA Air Quality Handbook, Prepared by South Coast Air Quality Management District, April 1993. Calculations are based on use of a bulldozer, expected to closely mimic those generated by use of a backhoe loader.

COMBUSTION OF TNT-TRINITROTOLUENE



$$\text{MW} = 227.13 \text{ g/mol}$$

The balanced chemical equation for the combustion reaction (spontaneous, in air) is



If you begin with 1 gram of TNT you will produce about 800 mL of the three gases at a temperature of 298 K, 1 atmosphere pressure. Below is a sample calculation:

$$1 \text{ g TNT (1 mole/227.13 g)} = 0.004403 \text{ mole TNT.}$$

$$0.004403 \text{ mole TNT (3 mole N}_2\text{/2 mole TNT)(28 g N}_2\text{/ 1 mole N}_2\text{)} = 0.1849 \text{ g N}_2$$

$PV = nRT$; so V (volume of gas) = nRT/P . $R = .082058 \text{ L-atm/mol-K}$, $P = 1 \text{ atm}$, $T = 298 \text{ K (25 }^\circ\text{C)}$.

$$\text{Volume Nitrogen gas} = (0.1849 \text{ g N}_2\text{/28 g/mol})(.082058 \text{ L-atm./mol-K})(298 \text{ K})/1 \text{ atm} = .161 \text{ Liters N}_2$$

$$\text{Volume CO gas} = .004403 \text{ mol TNT (7 mol CO/2 mol TNT)(28 g CO/mol CO)} = 0.43149 \text{ g CO.}$$

$$\text{Volume CO gas} = (0.43149 \text{ g CO/28 g/mol})(.082058 \text{ L-atm./mol-K})(298 \text{ K})/1 \text{ atm} = 0.3768 \text{ Liters CO.}$$

$$\text{Volume of water vapor produced} = .004403 \text{ mol TNT (5mol H}_2\text{O/2 mol TNT)(18 g H}_2\text{O/1mole H}_2\text{O)} = 0.198 \text{ g H}_2\text{O}$$

$$\text{Volume water} = (\text{this part is not accurate because the heat of reaction will make the water vaporize so I should use a gas density of water}) = (0.198 \text{ g H}_2\text{O/18 g/mole})(.082058 \text{ L-atm/mol-K})(298 \text{ K})/1 \text{ atm} = 0.2689 \text{ Liters H}_2\text{O}$$

Adding the three volumes together:

1 g TNT produces 0.807 Liters of gas (806 mL). This is about an 800 times increase in volume.

B DISTRIBUTION LIST

**APPENDIX B
DISTRIBUTION LIST**

AFFTC Technical Library
412 TW/TSDL
Edwards AFB, CA 93524

Antelope Valley Air Pollution Control District
43201 Division St., Ste. 206
Lancaster, CA 93639-4409
Attn: Charles L. Fryxell, APCO
(Or) Bret Banks, Operations Manager

Bureau of Land Management
Barstow Area Office
2601 Barstow Road
Barstow, CA 92311-3221

Bureau of Land Management
Ridgecrest Area Office
300 S. Richmond Road
Ridgecrest, CA 93555-4436

California Department of Fish and Game
1416 Ninth Street
Sacramento, CA 95814

CALTRANS
Department of Transportation
District 9
500 South Main Street
Bishop, CA 93514

City of Lancaster
Planning Department
44933 N. Fern Ave.
Lancaster, CA 93534

City of Palmdale
Planning Department
38250 N. Sierra Highway
Palmdale, CA 93550-4798

Edwards AFB Base Library
95 SPTG/SVMG
5 West Yeager Blvd.
Building 2665
Edwards AFB, CA 93524-1295

Kern River Valley Library
7054 Lake Isabella Boulevard
Lake Isabella, CA 93240
Attn: Karen Leifeld, Branch Supervisor

Kern County Library
Wanda Kirk Branch (Rosamond)
3611 Rosamond Boulevard
Rosamond, CA 93560

Lahonton Regional Water Quality Control Board
15428 Civic Drive Suite 100
Victorville, CA 92392

Los Angeles County Library
Quartz Hill Branch
42018 N. 50th Street W.
Quartz Hill, CA 93536

Los Angeles County Library
Lake Los Angeles Branch,
16921 E. Avenue O, Suite A,
Palmdale, CA 93591

Muhammad Bari
Director of Public Works
HQ NTC Ft. Irwin
Attn: AFZJ-PW-EV
PO Box 105097
Building 285
Fort Irwin, CA 92310-5097

Mojave Desert AQMD
14306 Park Ave.
Victorville, CA 92392-2310
Attn: Charles L. Fryxell, APCO
Native American Heritage Commission
915 Capital Mall, Room 364
Sacramento, CA 95814

AIR FORCE FLIGHT TEST CENTER

John O'gara
Head of Environmental Planning
Environmental Office
Code 8G0000D
#1 Administration Circle
Naval Air Weapons Station
China Lake, CA 93555

Office of Planning and Research
California State Clearinghouse
PO Box 3044
Sacramento, CA 95812-3044

Palmdale City Library
700 E. Palmdale Boulevard
Palmdale, CA 93550

San Bernardino County
Land Use Services Department
Planning Division
385 N. Arrowhead Ave., 1st Floor
San Bernardino, CA 92415-0182

US Department of the Interior
Fish and Wildlife Service
Ventura Field Office
2493 Portola Road, Suite B
Ventura, CA 93003-7726

US Department of the Interior
National Park Service
Death Valley National Park
PO Box 579
Death Valley, CA 92328

Environmental Protection Agency
Region IX
EIS Review Section
75 Hawthorne Street
San Francisco, CA 94105

Federal Aviation Administration
Western Pacific Region
Attn: Charles Lieber
Airspace Management Branch
15000 Aviation Boulevard
Lawndale, CA 90261

HQ AFMC/CEV
4225 Logistics Avenue, Suite 8
Wright Patterson AFB, OH 45433-5747

Kern County APCD
Attn: Thomas Paxson, P.E.
2700 M Street, Suite 302
Bakersfield, CA 93301-2370

Kern County Library
Boron Branch
26967 20 Mule Team road
Boron, CA 93516

Kern County
Department of Planning and Development
Services
2700 M Street, Suite 100
Bakersfield, CA 93301-2323

Kern County Library
California City Branch
9507 California City Boulevard
California City, CA 93505

Kern County Library
Tehachapi Branch
450 West F Street
Tehachapi, CA 93561

Los Angeles County Library
Lancaster Branch
601 W. Lancaster Boulevard
Lancaster, CA 93534

Kern County Library
Mojave Branch
16916-1/2 Highway 14
Mojave, CA 93501

US Senator Diane Feinstein
525 Market Street, Suite 3670
San Francisco, CA 94105

US Senator Barbara Boxer
501 I Street, Suite 7-600
Sacramento CA 95814

Congressman McKeon
Antelope Valley Field Office
1008 W. Avenue M-14 #E-1
Palmdale, CA 93551

Office of Historic Preservation
State Historic Preservation Officer
PO Box 942896
Sacramento, CA 94296-0001

Angeles National Forest
Supervisor's Office
701 N. Santa Anita Ave.
Arcadia, CA 91006

USDA Forest Service
Regional Office R-5
1323 Club Drive
Vallejo, CA 94592

USDA Forest Service
Pacific Southwest Region
Sequoia National Forest
900 West Grand Avenue
Porterville, CA 93257

California Department of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94296

Sierra Club
Antelope Valley Group
P.O. Box 901875
Palmdale, CA 93590

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APPENDIX C – RESPONSE TO COMMENTS

Response to Comments from the ARG

The following comments are provided:

1. Page 2-3, fig 2-1: Does not show the distances to the towns.

Response: The distances to the towns are in red on the dashed line leading to the town or adjacent to the town name.

2. Page 3-88, Line 25 should read ".....flood-of-record-level of"

Response: Will change to read -- flood-of-record-level....

3. Page 3-88, Line 26 says the flood-of-record-level was 2,277.4. The table 3-17 shows the 50, 100, and 200 year levels above the flood-of-record-level. How can this be?

Response: This data in the table is quoted directly from the "Model EA" provided by 95 ABW/CEV, page 118/119. The 2,277.4 feet MSL flood-of-record-level is estimated. The point is that the development on Edwards AFB is physically located above the flooding level.

4. Page 3-27, Line 19 says that Surveys of the West Range of the PIRA, which includes the PB-13 target site area, have identified over 136 prehistoric and historic sites. However Page 4-15, Line 11, says that there are no known cultural resources or artifacts in the target area.

Response: This is a correct statement. The 136 prehistoric and historic sites are located in the West Range of the PIRA; however there are no known cultural resources at the PB-13 target (1,000 foot diameter circle).

5. Page 4-14, Line 12 says only 50% are expected fall within 1 mile. Page 4-49, states that the weapons have improved in accuracy and the circular error was 400 ft in Vietnam.

Response: For the purpose of potential impact on cultural resources historic uses of the targets on the PIRA the circular error is based on the probability that the 50 percent of bombs that don't land on the target will be within the 1 mile radius. Will reword. The statement on page 4-49 reflects that we have improved on the historic circular error.

6. Page 4-20, Line 21 Missiles and rockets are armed munitions.

Response: This is true if the warhead contains NEW vice a spotting charge.

7. Page 4-41, Line 5 States that the proposed testing would have no effect on the groundwater supply. However P4-21 lines 11 states that the TNT residue moves rapidly through the soil (also what about the cumulative effect?). Line 15 states RDX and secondary products will move rapidly through the soils and into the ground water.

Response: Page 4-20, lines 27-30 state that if device functions as designed it results in complete combustion. If complete combustion (fully exploded ordnance) does not occur, the potential for movement of secondary products to the ground water could occur; but since the cleanup after each mission as indicated on page 4-21, lines 24 – 29, and the fact that target PB-13 is not located in an area where groundwater recharging occurs; impact would be less than significant.

8. Page 4-42, Line 13/14 says there is no data describing the ground water quality at the PIRA. What about the 3 water wells just to the North of the area and one less than one mile away at target 14.

Response: The data from 2 of the 3 wells referenced are 1.1 miles NNW of the target site up gradient of the target. Analytical data shows no significant contamination that would have resulted from the explosive residues. The third monitoring well 270-MW01 located 1.7 miles W of the PB-13 is down slope of the target site. As these wells are the closest to the target and no additional wells are specifically at the PB-13 target there is insufficient data to characterize the water quality at the target site. The statement in lines 13/14 will be changed to read: Currently there is no available data describing the water quality at PB-13, however analytical data on water quality obtained from monitoring wells up slope of the target site do not indicate that contamination from the use of explosives has affected the groundwater.

9. Page 4-47, Line 2 thru 4 states that there will be a cleanup of all range targets after each event. This should be changed to read that the cleanup will only involve removal of the duds. The remaining metals and residue will remain and could impact the environment.

Response: Lines 2-4 state that current management activities include routine inspection and cleanup of all range target sites. (No reference to after each event). The additional cleanup management procedure will be beneficial. Recommend statement remain as stated.

10. Page 4-48, Add to cumulative effects.

Geology and soils: What effect will the continued dropping of bombs have on the shattering/pulverizing of the rocks?

Wind blown soils: What will be the cumulative effect of wind blown soils/contaminates on the downwind plants?

Response: Add the following to Cumulative Effects:

4.15.2.2 Natural Resources

The cumulative effects of the wind blown soils and contaminates on plants in the target area would be considered less than significant. The immediate target area is devoid of plants, and the area outside the immediate target area is sparsely populated with plants. Plant species in this area are typical for the PIRA as well as the other parts of the Mojave Desert area. Naval Air Station China Lake (located in the Mojave Desert area) routinely uses its' target sites for detonation of NEW armed munitions. There are no records of direct impacts to plants or sensitive species resulting from the use of their targets and test sites. Because natural resources are similar and there are a large number of these plants scattered throughout the ranges combined with the lack of any

identified impacts, the use of the target site would have a less than significant impact on the plant species surrounding the target area.

4.15.2.3 Geology and Soils

The designation and use of the PB-13 target for armed munitions only integration testing would not result in a significant cumulative change in the geology and soils of the target area. The target area is graded soil classified as typically sandy loam and gravel. The gravel would undergo shattering/pulverizing and would generate fine sand and PM₁₀ (approximately 11.36 tons per year based on 100 – 500 NEW detonations) as a result of the detonations. The soils at Edwards AFB are given an erosion hazard of slight to severe for wind erosion. Since the target site would be backfilled after each mission, the fines and silt would be mixed with the sandy loam and gravel, thus minimizing the potential effects of wind erosion on an open crater.

Response to Glenn Arola Comments

-----Original Message-----

From: Arola Glenn W Civ 412 MX/MXFP
Sent: Thursday, January 06, 2005 11:29 AM
To: Reinke Danny C Contr 95 ABW/EM
Cc: Bare Michelle P Contr 95 ABW/CEV
Subject: Comments to DEA Weapons delivery

I reviewed this EA were thoroughly and enjoyed it--another good job. Just have some questions and/or recommendations:

How did we come up with 100 tests for Alternative A? Is that a calculation off of some data?

Answer:

The 100 tests for Alternative A were identified and established by Steve Cronk, 412TW/ENRO.

What would the process entail for Edwards to become certified to handle armed munitions?

Answer:

EOD personnel are trained to handle armed munitions. Standard operating procedures would apply.

Chap 2, Line 7, the definition of NEW. I believe it is the first time this is mentioned, but it was not spelled out; it is in the glossary; may want to add it the first time it is used.

Answer:

The first occasion of NEW can be found on page 1-2.

Who will clear the targets of the duds after a test? Is it certified and trained munitions folks or someone else? Range personnel?

Answer:

Trained EOD personnel would be responsible for clearing the target (the only target is PB-13).

AIR FORCE FLIGHT TEST CENTER

Toward the end of the document there are Munitions Integrated Tests to be performed in 2005 on. The first few years it lists 200. Does that conflict with Alternative A?

Answer:

A total of 100 missions are indicated for Alternative A. A single mission could have more than one aircraft involved. The number of sorties referred to would include the chase aircraft. Thus the 200 sorties are appropriate.

These were just a few thoughts or things to think about or list to make the EA flow a little easier. Any questions, please email or call!!!!!!!!!!!!!!!!!!!!!!

Happy New Year

Glenn Arola