Renewal of the Nellis Air Force Range Land Withdrawal

Legislative Environmental Impact Statement

Volume 1

Chapters
1 through 11

March
1999

RENEWAL OF THE NELLIS AIR FORCE RANGE LAND WITHDRAWAL

Department of the Air Force

Legislative Environmental Impact Statement

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NELLIS RANGE RENEWAL

VOLUME 1

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LEIS Purpose

This LEIS responds to the November 6, 1986 Military Lands Withdrawal Act (Public Law [PL] 99-606).

The Air Force proposes to continue the use of Nellis Air Force Range(NAFR) for test and training. The Air Force does not propose to add any lands not currently withdrawn for defense use nor to add any airspace.

Lead Agency & Cooperating Agencies

The lead agency is the Department of the Air Force (Air Force). Cooperating agencies are the Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), and the Department of Energy (DOE).

Frequently Referenced Figures

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Text Changes From Draft LEIS

This LEIS contains vertical lines in the right or left margin on certain pages. These vertical lines are used to indicate text changes made from the Draft LEIS to this version in response to agency and public comments.

LEIS Contents

- **Executive Summary** provides a concise synopsis of the LEIS's analysis and conclusions.
- **Chapter 1.0** discusses the purpose and need for NAFR.
- **Chapter 2.0** describes the four action alternatives that would permit continuation of NAFR test and training missions. The No-Action Alternative is also described. Chapter 2.0 also discusses alternatives considered but not carried forward.
- **Chapter 3.0** provides an overview of the baseline environmental conditions of NAFR and the potentially affected environment.
- **Chapter 4.0** addresses the potential environmental consequences of implementing the alternatives (from Chapter 2.0), within the baseline (from Chapter 3.0).
- **Chapter 5.0** summarizes cumulative effects and irreversible and irretrievable commitment of resources associated with the alternatives.
- **Chapters 6.0, 7.0, 8.0, 9.0, 10.0, and 11.0** present references, persons and agencies contacted, a list of preparers and contributors, consultation information, a list of repositories, and an index.
- **Volume 2** provides comments on the Draft LEIS, responses to the comments, and additional technical support data in the form of appendices.

Acronyms

Acronyms are provided on the last several pages of this volume.

COVER SHEET

Legislative Environmental Impact Statement
Renewal of the Nellis Air Force Range Land Withdrawal

a. *Responsible Agency*: U.S. Air Force

b. *Cooperating Agencies*: Bureau of Land Management, Department of Energy, and U.S. Fish and Wildlife Service

c. *Proposals and Actions*: This Legislative Environmental Impact Statement (LEIS) addresses the potential environmental consequences of the Air Force proposal to continue Nellis Air Force Range (NAFR) land withdrawal for use as a national test and training facility for military equipment and personnel. NAFR is located in southern Nevada and is a key component of the Nellis Range Complex (NRC), which comprises airspace, land, and infrastructure that allows for realistic, secure simulation of a battle area with surface and air defenses, command and control systems, realistic targets, and comprehensive test and training feedback. NAFR enhances national security by preparing air crews for increasingly complex military operations in an exclusive use area that ensures national security and public safety. There are four LEIS action alternatives. Alternative 1A consists of renewal of currently withdrawn military lands as NAFR for an indefinite period. Alternative 1B consists of indefinite renewal of the currently withdrawn military lands, except a portion of the Clarkdale and Wagner Mining Districts; possible jurisdictional adjustments; co-use recreational access to portions of Mud Lake, Kawich Range, and Electronic Combat (EC) South Range; and the administrative realignment of land described in Public Land Order (PLO) 1662, Pahute Mesa, and/or portions of the Desert National Wildlife Range (DNWR). Alternative 2A consists of renewal of currently withdrawn military lands as NAFR for a 25-year period. Alternative 2B consists of renewal for 25 years of the lands as described in 1B. No-Action means no renewal of NAFR. Ground-based military equipment and materials potentially hazardous to the public would be removed to the extent feasible or as required by law. Military overflights would continue to use the NRC airspace.

d. *For Additional Information*: 99th AWFC/Public Affairs, c/o Mike Estrada, 4370 North Washington Blvd., Suite 223, Nellis Air Force Base, NV 89191-7078, (702) 652-2750 or Ms. Sheryl Parker, LEIS Project Manager, HQ ACC/CEVP, 129 Andrews St., Suite 102, Langley AFB, VA 23665-2769, (757) 764-9334.

e. *Designation:* Legislative Environmental Impact Statement.

f. *Abstract*: This LEIS responds to the November 6, 1986, Military Lands Withdrawal Act (Public Law (PL) 99-606 as amended). This LEIS complies with the National Environmental Policy Act (NEPA) and the Federal Land Policy and Management Act (FLPMA). Potential environmental consequences are addressed for environmental resources identified during public and agency scoping. These resources are: airspace, noise, safety, hazardous materials, earth, water, air quality, biology, cultural and traditional, land use and transportation, wilderness, recreation and visual, socioeconomics, and environmental justice. Findings indicate that any of the action alternatives would result in continuation of ground disturbance at targets and facilities, and continuation of noise from aircraft and ground training. Ground disturbance activities directly affect approximately 3 percent of NAFR; the majority of NAFR land is a buffer to protect both public safety and national security. Biological, cultural, and traditional resources within NAFR have received little or no impact from recreational or commercial activities that have affected these resources in public lands outside the exclusive-use area. Although limited access can be arranged, American Indians and others have expressed concern that exclusive use prevents regular access for traditional uses as well as for recreation and mining. The No-Action Alternative would return exclusive-use lands to multiple use management and improve opportunities for recreation and mining but increase potential impacts to biological, cultural, traditional, water, earth, and socioeconomic resources. Alternatives 1A and 1B provide for an indefinite withdrawal with scheduled Congressional review and Air Force accountability. Alternatives 1B or 2B provide for increased multiple use of portions of former exclusive-use military areas and respond to some public, agency, and tribal concerns. Alternatives 1B or 2B potentially have slightly increased environmental impacts than do Alternatives 1A or 2A. Analysis of environmental information and public and agency input determined that selection of any action alternative would have lower potential for consequences to most environmental resources than the No-Action Alternative. The Air Force preferred alternative is Alternative 1B.

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EXECUTIVE SUMMARY

INTRODUCTION

This Legislative Environmental Impact Statement (LEIS) addresses the potential environmental consequences of the proposed renewal of Nellis Air Force Range (NAFR) land withdrawal for use as a national test and training facility for military equipment and personnel. Land withdrawn for NAFR provides a secure, flexible range for large-scale military testing and training. A flexible range can be rapidly adjusted to accurately simulate complex military operations required by the dynamics of world-wide threats to our national security interests. NAFR can be configured to simulate the potential battle area that aircrews would expect to encounter.

NAFR is a key component of the Nellis Range Complex (NRC) also known as the Nevada Test and Training Range (NTTR). The NAFR battlespace environment allows for realistic, secure simulation of a battle area, complete with surface and air defense systems, command and control systems, realistic targets, and defensive threats, as well as training systems and instructional aids that provide almost instantaneous test and training feedback. The testing and training supported by NAFR enhances national security by preparing aircrews for increasingly complex military operations. These test and training activities need to be performed in an exclusive use area to ensure national security and public safety.

This LEIS has been prepared in response to Congressional direction through the November 6, 1986 Military Lands Withdrawal Act (MLWA) (Public Law [PL] 99-606). An LEIS is an environmental evaluation in compliance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality (CEQ) guidelines. This LEIS supports legislation for renewal of land withdrawal to be proposed to Congress.

The U.S. Department of the Air Force (Air Force) is the lead agency for the preparation of the LEIS. Cooperating agencies are the Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), and the Department of Energy (DOE).

Land Withdrawal Renewal Process

The Air Force provides this LEIS and other supporting documentation to the Department of the Interior (DOI). This LEIS includes a classified annex that addresses classified activities within the proposed area of withdrawal. The classified annex will be made available to persons with the appropriate security clearances, a need to know, and in accordance with 40 Code of Federal Regulations (CFR) 1507.3.

The BLM is responsible for the land withdrawal application and is preparing a case file for the DOI to submit to Congress under PL 99-606 as amended by the Groom Mountain Withdrawal (Public Land Order [PLO] 100-338) and the White Sides Safety and Security Buffer (PLO 7131), the Engle Act of 1958, and the Federal Land Policy and Management Act (FLPMA) of 1976. The rules and procedures implementing the

Secretary of the Interior's authority to process federal land withdrawal applications under FLPMA are described in 43 CFR Chapter II, Part 2300. The initial land withdrawal process includes preapplication consultations; application and publication of the application within the *Federal Register*; preparation of a case file, as described in 43 CFR 2310.3-2, to include this LEIS and recommendations; transmittal of the case file to the Director of the BLM and Secretary of the Interior; transmittal of draft legislation and the case file to Congress; and legislative action by Congress.

Nellis Air Force Range

NAFR is located in southern Nevada (see Figure 1). It includes approximately 3 million acres of federal land bounded by U.S. Highway 95 on the west, southwest, and south; the urbanized area of Las Vegas to the southeast; U.S. Highway 93 on the east; Nevada State Highway 375 on the northeast; and U.S. Highway 6 on the north. Approximately 90,000 of the 3 million acres have been disturbed by Air Force activities.

NAFR was originally established by Executive Order (EO) 8578 in 1940 as the Las Vegas Bombing and Gunnery Range. The range operated through numerous EOs and PLOs until 1958 when operating authority was established in compliance with the Engle Act under PL 87-310. The Secretary of the Air Force was given authority for exclusive military use by enactment of the MLWA of 1986, PL 99-606. This land withdrawal for exclusive military use ends if not renewed by Congress.

The NRC is comprised of airspace, land, and infrastructure designated for military uses. The lands dedicated to military uses within the NRC are the withdrawn lands of the NAFR. The airspace of the NRC is comprised of Federal Aviation Administration (FAA)-designated

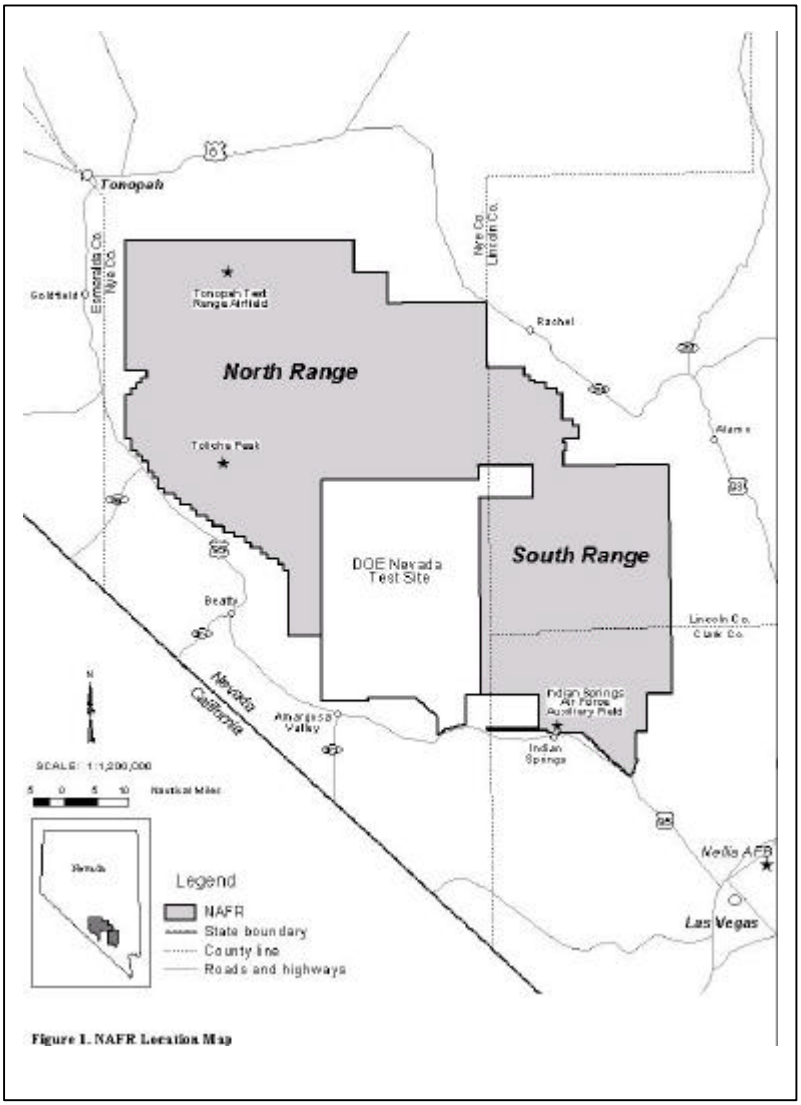


Figure 1. NAFR Location Map

Restricted Areas and Military Operations Areas (MOAs). The infrastructure includes airfields at Indian Springs and Tonopah Test Range (TTR) and simulated targets and threats throughout NAFR, as well as roads, radar installations, communications facilities, electrical power transmission, water supply, and water treatment systems.

NAFR currently includes 163 tactical target complexes containing more than 1,300 simulated targets. Many of these target complexes are defended by threat simulators to provide a realistic arena for operational training and testing of weapons systems, tactics, and combat readiness. Live munitions are delivered on designated targets on the range. NAFR ground equipment includes multiple radar and communications jamming equipment designed to test and improve the quality of aircrew combat training. Many of the threat simulators are equipped with instruments to collect data that can be used to evaluate and score engagements. Extensive monitoring and tracking equipment is deployed throughout NAFR to support testing and training. Data collected on the range and in the supporting airspace are processed by computers located in the Range Control Center at Nellis Air Force Base (AFB).

NAFR is divided into two functional areas: the North Range and the South Range, both of which accommodate live and inert ordnance. The ranges are split to facilitate overall management of Air Force operations and test and training opportunities. This includes operating and maintaining range equipment, safety of personnel, material resources within the boundaries of the range, the range electromagnetic environment, and efficient airspace use through effective scheduling.

NORTH RANGE

The North Range is comprised of approximately 1.8 million acres of withdrawn land. This includes land withdrawn for exclusive military use by PL 99-606 and its amendment (PLO 100-338) of June 17, 1988, which added approximately 89,000 acres to the North Range. An additional withdrawal of approximately 3,972 acres of the Safety and Security Buffer (PLO 7131) along the eastern edge of NAFR was completed in 1995.

The North Range contains the TTR air base and four unmanned weapons delivery subranges (see Figure 2). The four subranges contain approximately 1,025 targets within 129 tactical target complexes. These, along with scoring and tracking systems, simulate tactical targets representing airfields, surface-to-air missile (SAM) sites, truck convoys, missile storage sites, artillery batteries, and other targets. Three Electronic Combat Ranges (ECRs) provide a range of high-to-low electronic threat environments as part of the North Range.

Training and testing on North Range include operations on the TTR, which lie completely within NAFR. Activities on the TTR include projectile firings, ground-launched rockets, air-launched rockets, explosion effects tests, earth penetration tests, cruise missile flights, and many miscellaneous activities requiring a remote location for non-nuclear research and development projects or for other safety or security reasons. The North Range includes Pahute Mesa and other areas, which are used by DOE through mutual agreement.

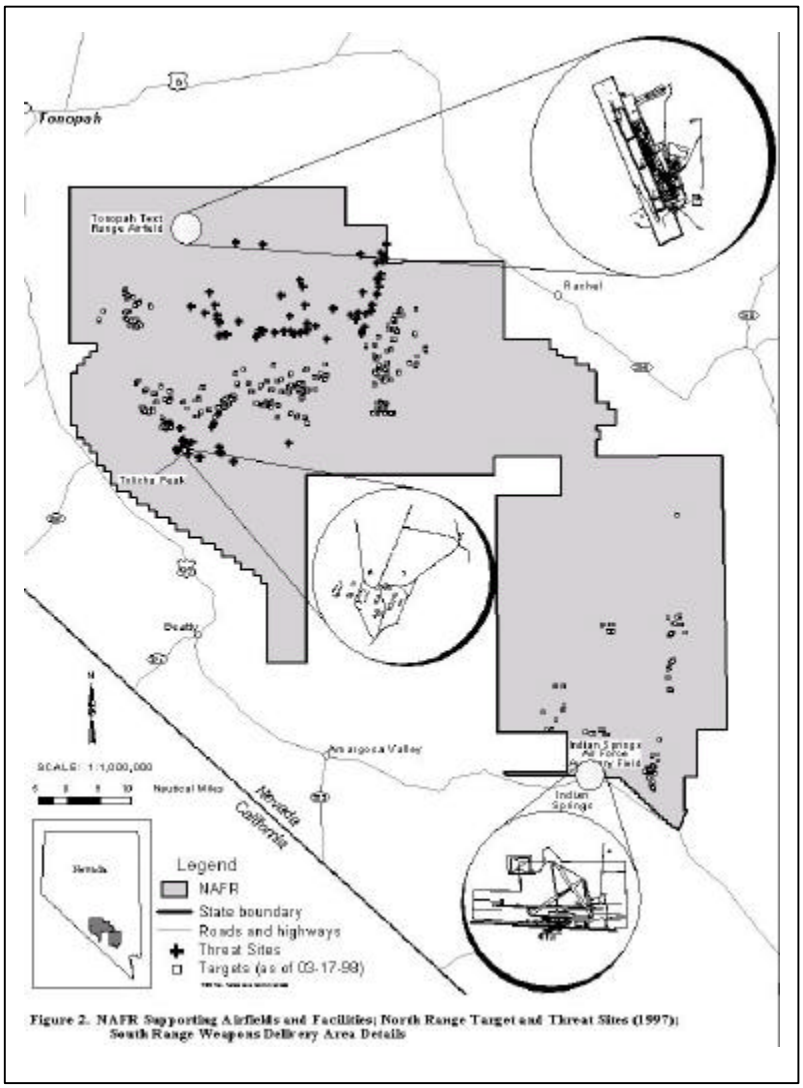


Figure 2. NAFR Supporting Airfields and Facilities; North Range Target and Threat Sites (1997); South Range Weapons Delivery Area Details

SOUTH RANGE

The South Range is comprised of approximately 1.2 million acres of withdrawn land located in the southeastern portion of NAFR. All the South Range lands were withdrawn for military use by PL 99-606. The South Range contains Indian Springs Air Force Auxiliary Field (ISAFAF) and five weapons-delivery areas, which are subdivided into 34 target complexes containing approximately 280 targets (see Figure 2). These areas include two manned subranges and three unmanned subranges. There are also three air-to-air subranges.

Lands within PLO 1662, adjacent to the South Range, are withdrawn for the Nevada Test Site (NTS) by DOE and used through a classified Memorandum of Agreement by the Air Force. Portions of the South Range overlap a portion of the Desert National Wildlife Range (DNWR), which was established in 1936 for the protection and preservation of desert bighorn sheep. Agreements between the Air Force and USFWS have been updated and amended, as necessary, to ensure proper management by the respective agencies.

PURPOSE AND NEED FOR NAFR

The purpose for renewing the land withdrawal for NAFR is to provide a safe and secure location to test equipment and train military personnel to meet nationally directed missions. The missions are to (1) ensure and protect national security; (2) train for the full and integrated spectrum of military operations; and (3) ensure the continued protection of public safety. The following sections describe each of these mission requirements.

National Security

Air Force personnel must protect the technology, information, and equipment

entrusted to them and limit the flow of military technology and information to those who could potentially cause harm to the nation. The military must have a secure place to test new systems, and train with existing ones, free from exploitation by potential adversaries. On NAFR, security is accomplished by various means, including a sufficient buffer zone between publicly accessible areas and sensitive military operations.

Military Operations and Training

The purpose of military activity on NAFR is to enhance U.S. defense capability. Military operations include all activities and infrastructure necessary to keep U.S. forces prepared for confrontation with any military force the United States might reasonably expect to oppose in the future. Military activities on NAFR support training and testing combat tactics, aircraft, their associated weapons systems, and all the activities that support those primary missions. The supporting infrastructure must be able to produce a simulated combat environment that can be securely restructured to resemble anticipated threats to U.S. interests.

Public Safety

Public safety at NAFR is ensured by preventing public access near hazardous weapons detonation areas and from any areas exposed to risks from weapon system malfunction. Public safety includes (1) prevention of public straying into dangerous areas, (2) identification of hazardous areas, and (3) risk minimization through management of potential hazards of military activities. Exclusion of the public from NAFR ensures the public is protected from the dangers of an integrated battlespace environment and of weapons testing and training range activities such as exploding ordnance, unexploded ordnance, unintentional ordnance releases, dropped objects, and electromagnetic radiation.

PROJECT ALTERNATIVES

Alternatives Identified and Evaluated for this LEIS

Numerous agency and public comments have been received regarding alternatives to be addressed as part of this LEIS. The process for receiving input includes the following:

- Six public scoping meetings in communities surrounding NAFR.
- Discussions with American Indian tribes, organizations, and individuals.
- Consultations and informational discussions with BLM, USFWS, DOE State of Nevada, potentially affected counties, interested non-governmental organizations, American Indian tribes and organizations, and others.
- Specific DOI requirements that are part of the land withdrawal application to Congress under PL 99-606, as amended.
- Identification of the current and reasonably foreseeable future military requirements of NAFR lands.
- Desire to allocate funding to enhance environmental resources on NAFR

and expand public interaction programs.

The input, with special emphasis on the LEIS scoping process, identified issues and concerns of other federal agencies, state agencies, county and local governments, and the public. A summary of these issues and concerns includes:

- Co-use access for recreation and other non-consumptive uses.
- Access for consumptive economic activities, specifically mining.
- Review of administration of selected areas of the range where overlap exists between the Air Force and DOE or between the Air Force and the USFWS.
- Increased access to NAFR by the public, American Indian tribal members, and other agency personnel.
- Expanded outside review of NAFR environmental activities by the public, American Indian tribal organizations, and other agencies.

These public, government, and agency concerns were evaluated in view of Air Force requirements to ensure national security, mission test and training requirements, and public safety.

The result of this evaluation is the set of alternatives presented in Table ES-1. These alternatives, identified as part of the NEPA process, are designed to address public, state, county, and other federal agency concerns while concurrently permitting Air Force training and test activities within critical safety / security parameters.

Range Renewal

The alternatives for renewal of NAFR land address a range of potential actions. It is anticipated that Air Force activities at NAFR throughout the duration of the proposed withdrawal would continue at approximately the same level and type as at present. The environmental consequences of the No-Action, or non-renewal of NAFR, are also addressed.

ALTERNATIVE 1A

DURATION

Congress would withdraw the NAFR for an indefinite period of time and would not formally revisit the land withdrawal issues until the national need for NAFR lands changes. This would not be a permanent land withdrawal. Congress would retain the ability to review the withdrawal at their discretion any time during its duration. The Air Force would comply with NEPA, and other applicable regulations, during the duration of the withdrawal by completing project-specific evaluations of proposals that would use NAFR resources or lands. The Air Force would periodically report (e.g., every 15 years) to Congress regarding the need for the lands, management of natural and cultural resources, and public informational programs. Indefinite withdrawal would substantially reduce administrative costs of periodically reproducing the information required for a FLPMA case file and an LEIS. Public

Table ES-1. Summary of NAFR Alternatives

Duration	*Withdrawal Area*	*Access*	*Administration*	*Environmental Procedures & Funding*
ALTERNATIVE 1A				
Indefinite	Approximately 3.035 million acres	Same as under PL 99-606 as amended	Same as under PL 99-606 as amended Five-Party Cooperative Agreement participants used for ongoing natural and cultural resources management	Future resources would be requested for environmental stewardship and public interaction programs rather than for reoccurring legislative withdrawal procedures; periodic report to Congress
ALTERNATIVE 1B				
Indefinite	Approximately 2.911 million acres	Specific permitted co-use activities, based on specific mission requirements; priority scheduling (see text) Non-renewal of approximately 30,000 to 35,000 acres along western border of NAFR	PL 99-606 with: Revision of land management responsibilities with DOE Revision of land management responsibilities with USFWS Five-Party Cooperative Agreement participants used for ongoing natural and cultural resources management	Same as 1A
ALTERNATIVE 2A				
25 years	Approximately 3.035 million acres	Same as under PL 99-606 as amended	Same as under PL 99-606 as amended Five-Party Cooperative Agreement participants used for ongoing natural and cultural resources management	Future resources will be requested for compliance with future FLPMA rules and renewal procedures (see section 1.2.4)
ALTERNATIVE 2B				
25 years	Approximately 2.911 million acres	Specific permitted co-use activities, based on specific mission requirements; priority scheduling (see text) Non-renewal of approximately 30,000 to 35,000 acres along western border of NAFR	PL 99-606 with: Revision of land management responsibilities with DOE Revision of land management responsibilities with USFWS Five-Party Cooperative Agreement participants used for ongoing natural and cultural resources management	Same as 2A
NO-ACTION ALTERNATIVE				
Indefinite	None; no public access to some health and safety areas	BLM multiple use; Specific permitted activities on DNWR	BLM USFWS	BLM USFWS

oversight of ongoing environmental management activities on NAFR would continue to be available via each of the applicable laws, regulations and policies (i.e., NEPA, Integrated Natural Resource Management Program, Resources Conservation and Recovery Act [RCRA]). Further, the Five-Party Cooperative Agreement, used for purposes of exchanging ideas and information between the Air Force, DOE, BLM, USFWS, and State of Nevada, would also provide public oversight opportunities.

LAND AREA

The Air Force would seek to renew a withdrawal of approximately 3 million acres of land currently withdrawn for defense use. This withdrawal would include all lands currently withdrawn by PL 99-606 as amended, and PLO 7131. Overlapping withdrawals of NAFR and DNWR lands would remain.

LAND ACCESS

There would be no change in the process to gain access to NAFR. Access to NAFR would be subject to the same safety and security requirements as it has through the duration of PL 99-606 as amended.

ADMINISTRATION

The Air Force, in association with the other Five-Party Cooperative Agreement signator agencies, would exchange information on NAFR environmental management with special emphasis on management for ecosystem biodiversity. The agencies would meet periodically and include an annual public participation meeting.

No changes to the administration would be considered. Memoranda of Understanding (MOUs) regarding the use of lands by other federal agencies would continue. The public and other agencies would continue to have review of Air Force activities and stewardship programs via the existing Cultural Resources and Natural Resources Management programs and NEPA documents on new weapons systems or other mission modifications.

ALTERNATIVE 1B

DURATION

The duration would be the same as for Alternative 1A, indefinite withdrawal.

LAND AREA

The Air Force would seek a withdrawal of approximately 3 million acres. The Air Force would not renew portions of the Clarkdale and Wagner Mining Districts (as defined in the Nevada Senate Joint Resolution 25, 1995) and additional land along the western border of NAFR not supported by special use airspace. This withdrawal would include all lands currently withdrawn by PLO-1662. Air Force and DOE lands, such as Pahute Mesa, currently withdrawn by one agency but used by the other, would have jurisdictional adjustments to reflect the using agency (see Figure 3).

LAND ACCESS

Non-renewed lands would be subject to BLM management. Potential co-use portions of Mud Lake, Kawich Range, or Electronic Combat (EC) South Range could be made available for mission-compatible environmental resource management, American Indian religious or cultural activities, and recreation (see Figure 4). With Air Force approval, based on the

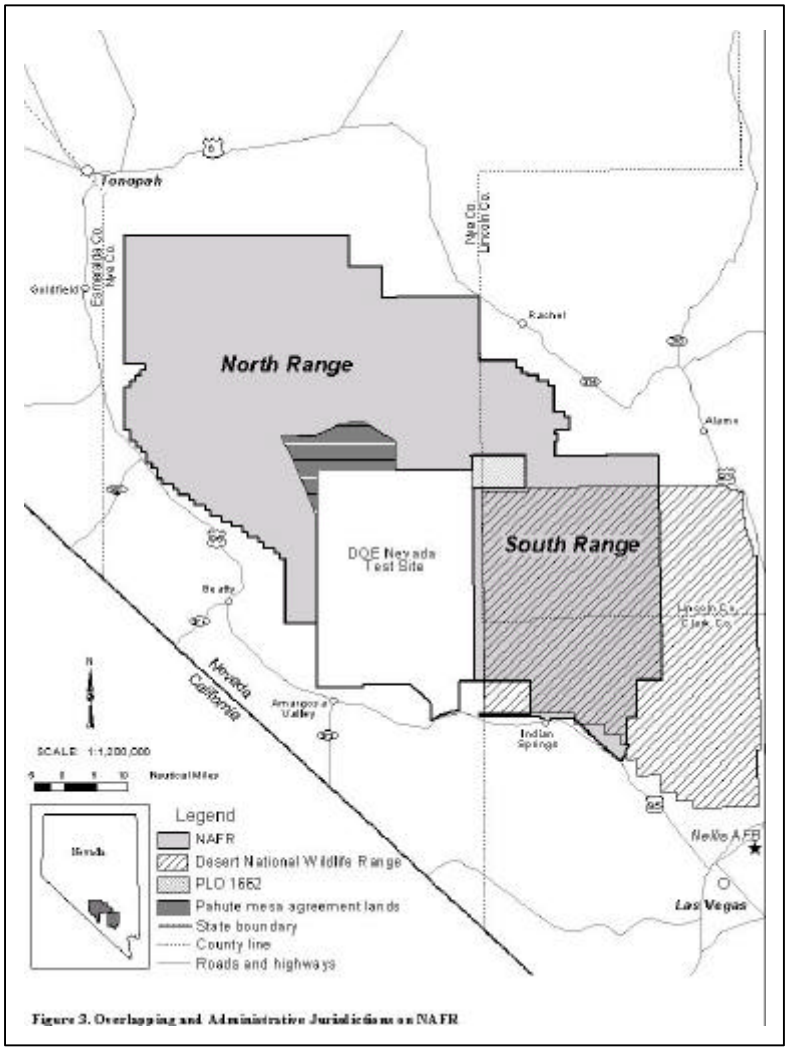


Figure 3. Overlapping and Administrative Jurisdictions on NAFR

range schedule, safety, and security requirements, each of these activities would be managed by the BLM following their normal processes and procedures for these types of uses. Those activities that conflict with Air Force mission, security, and / or safety requirements would not be approved.

Future unknown or undefined changes to Air Force mission, security, and / or safety requirements could negatively or positively affect the amount of land available for co-use. Should future Air Force requirements change, co-use of some or all of the three potential co-use areas may become inconsistent with Air Force mission, security, and / or safety requirements. Should that occur, co-use of that particular area could be further restricted or terminated. Changes to future Air Force requirements could also increase the size of the three potential co-use areas and / or make other locations of the range available for possible co-use.

BLM and USFWS resource management activities on other portions of NAFR would continue as at present. This would include the continuation of annual hunting under the direction of the State of Nevada, wild horse management, wildlife and habitat enhancement activities, and other forms of natural and cultural resource management.

ADMINISTRATION

Agencies signing the Five-Party Cooperative Agreement would meet periodically and include an annual public participation meeting. A series of administrative changes would be implemented to facilitate co-use. Withdrawn lands described as Pahute Mesa, and other lands immediately adjacent to the NTS, including lands withdrawn by PLO 1662, and controlled by the DOE, would be administratively realigned.

Further, lands associated with Pahute Mesa would be administratively realigned from the Air Force to DOE (see Figure 5).

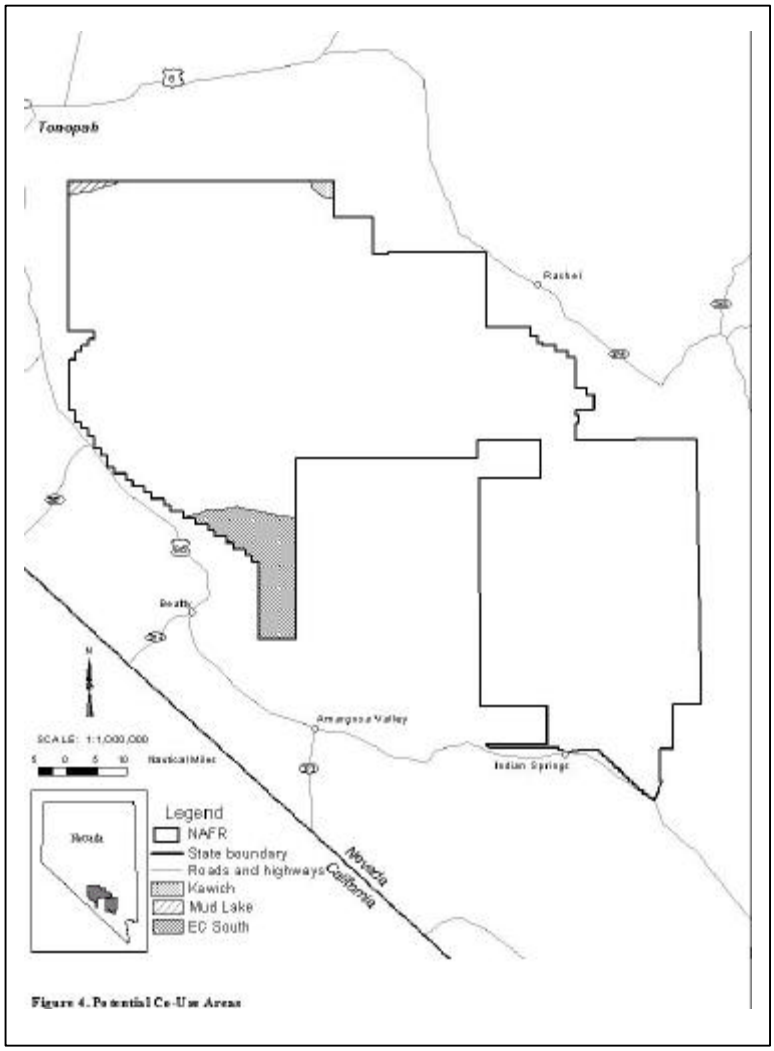


Figure 4. Potential Co-Use Areas

Portions of the NAFR South Range actively used by the Air Force with facilities and targets would continue to be managed by the Air Force for military use. South Range lands required by the Air Force for public safety and national security would remain withdrawn by both the Air Force for NAFR and the USFWS for the DNWR.

ALTERNATIVE 2A

This alternative consists of a land withdrawal renewal of NAFR for 25 years. Subsequent FLPMA land renewal administrative procedures would be followed assuming a continuing military test and training requirement for NAFR. The land area, access, and administration of this alternative would be the same as described under Alternative 1A.

ALTERNATIVE 2B

This alternative is a land withdrawal renewal of NAFR for 25 years. Subsequent FLPMA land renewal administrative procedures would be followed assuming a continuing military test and training requirement for NAFR. Except for duration, Alternative 2B would have the same elements as Alternative 1B.

NO-ACTION ALTERNATIVE

The No-Action Alternative means no renewal of NAFR land withdrawal for military use. All military actions on the ground would cease. There would be no test or training missions that depend on ground-based targets, threats, or scoring systems. All ground-based military equipment and other assets would be removed, and materials potentially hazardous to the public would be removed to the extent feasible.

The No-Action Alternative does not mean the end of military aircraft overflights throughout the special use airspace scheduled by Nellis AFB. High-performance military aircraft would continue to use the airspace for air-to-air training, aircraft checkout, supersonic flights, and limited training.

Approximately 3 million acres of what has been NAFR would be returned to DOI

management in accordance with PL 99-606 as amended. If DOI determines that the withdrawn land is contaminated, the Air Force or DOE may not be able to undertake any activities on the land except decontamination. Lands that would not pose a risk to people would be managed under the DOI lands and resource policies.

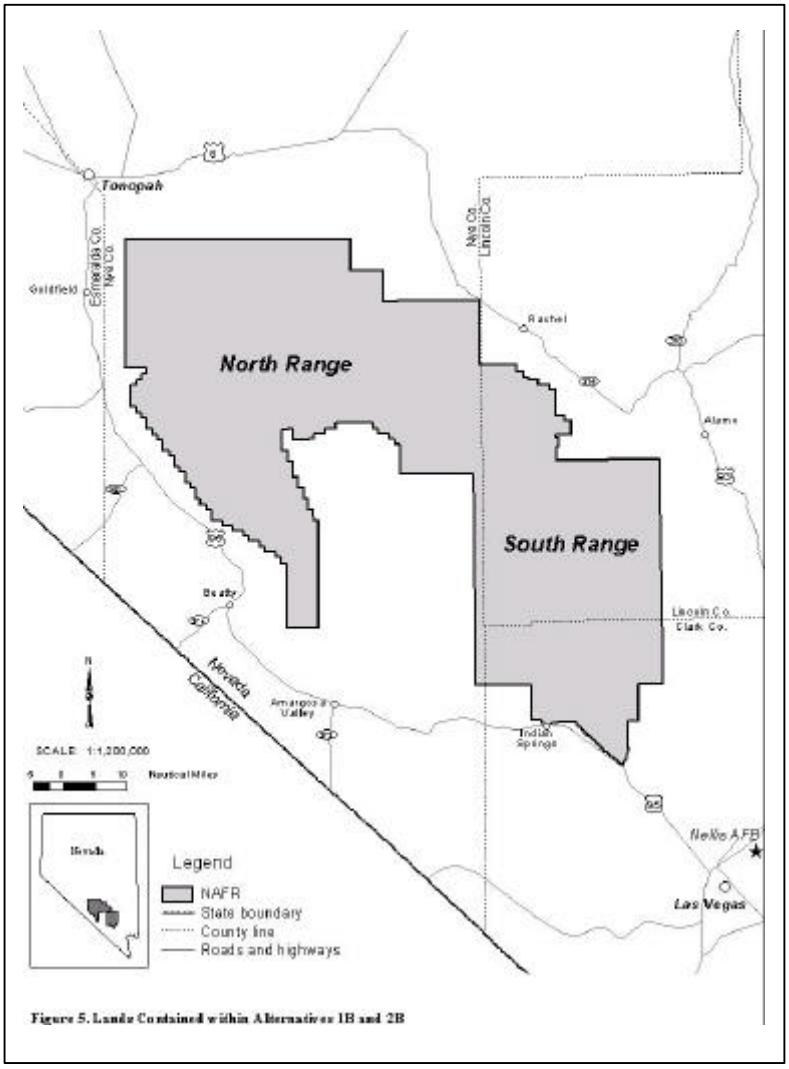


Figure 5. Lands Contained within Alternatives 1B and 2B

Activities, facilities, and capabilities that would be eliminated by the No-Action Alternative include the following:

- Indian Springs and TTR airfields and associated facilities would be closed, all assets removed, and all operations terminated.
- Air Force management of land resources would be terminated. Some MOUs related to cleanup would continue under the No-Action Alternative.
- The Tonopah ECR, the Tolicha Peak ECR, and the EC South Range would be closed, all assets removed, and all operations terminated.
- All ground-based measuring and debriefing systems and aircraft testing requiring any NAFR ground facility would be terminated.
- Operational test and training for all air-to-ground weapons systems or for any air-to-air weapons systems that require ground-based infrastructure would be terminated.
- Weapons systems tactics and training for single-aircraft weapons delivery or multiple-target attack training would be terminated.
- Large-force training exercises that include Red Flag and Green Flag would be terminated.

- Test or training activities that require a secure location would be terminated.

- Other specialized training events that require NAFR lands, including Desert Warfare Training, Combat Rescue School, Air Rescue Squadron, and the 11th and 15th Reconnaissance Squadrons, would be terminated.

The No-Action Alternative would terminate all ground operations on NAFR, reduce aircraft missions in the airspace, and substantially reduce current activities and capabilities as described above. The expected overall effect of no action would be to reduce Nellis AFB missions and personnel by at least 50 percent. The subsequent consequences to Nellis AFB would involve new Air Force planning, mission reassignments, and specific environmental documentation.

AIR FORCE PREFERRED ALTERNATIVE

The Air Force's preferred alternative is Alternative 1B. This alternative would renew NAFR land for an indefinite period of time; not renew approximately 30,000 to 35,000 acres of land on the western portion of the range; establish co-use in specified areas; and execute an administrative realignment that would transfer lands referred to as Pahute Mesa to the DOE, and include the lands withdrawn by PLO 1662 as part of NAFR.

ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

NAFR is a unique national asset that provides a secure area, excellent weather conditions for year-round operation, natural terrain characteristics, and extensive infrastructure that accommodates specialized training and testing requirements. Relocation of these assets could not be accomplished at any other existing Air Force or Department of Defense (DOD) range.

The following alternatives were identified during public and agency scoping and during the evaluation of mission requirements by the Air Force. Each was evaluated in light of military operations, national security, and public safety. Elements of these suggested alternatives that were determined to be operationally feasible were included in the alternatives carried forward for analysis. The alternative actions considered but not carried forward include:

- Full and unlimited access by BLM and USFWS personnel.

- Full and unlimited access for American Indian religious ceremonies.

- Nonrenewal of areas with high to moderate mineral potential.

- Full and unlimited access for non-consumptive or consumptive uses.

- Non-renewal of all of the Clarksdale and Wagner Mining Districts.

- Stonewall Mountain and additional lands.

- Expansion of NAFR to fully meet the existing and projected military operations requirements.

- Combination of NAFR activities with Naval Air Station (NAS) Fallon at either NAFR or NAS Fallon.
- Reduction in the withdrawn area to infrastructure, target, and health risk locations only.
- Relocation of NAFR.

EXISTING ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

Alternatives 1A, 1B, 2A, 2B, and No-Action from the LEIS Chapter 2.0 were overlaid on the existing environment, Chapter 3.0, to produce the environmental consequences in Chapter 4.0. The environmental baseline conditions and environmental consequences for each environmental resource are briefly summarized below.

Airspace

The FAA regulates and manages air traffic control procedures and separation criteria, flight rules, and airspace designations. The FAA worked with the Air Force to design the NRC to meet both civilian and military use requirements. The current airspace designations have been able to accommodate civilian air traffic and military flight training and testing activities in southern Nevada without prompting the FAA to impose any significant restrictions or limitations on either types of activities.

No changes in overall airspace boundaries are anticipated for any of the action alternatives. Airspace boundaries under the No-Action Alternative would remain as at present. The No-Action Alternative could result in the redesignation of restricted airspace.

Noise

Noise from aircraft operations is one of the most identifiable concerns of the public. Cumulative noise levels associated with the historic and projected 200,000 to 300,000 annual aircraft sortie-operations were calculated for the 21 airspace subunits of the NRC. The noise levels on all lands under the NRC were calculated to be 61 decibels (dB) or below. The renewal of the NAFR withdrawal would result in no noticeable change to existing noise levels. Sonic booms would continue similar to current operations. The anticipated reduction in aircraft operations under the No-Action Alternative is calculated to produce a 4-dB reduction in noise within the airspace subunits.

Safety

This LEIS addresses fire, ground, flight, and explosive safety issues. Safety policies for fire, ground, and flight operations would remain in place in each of the action alternatives. Testing and training with more sophisticated ordnance may require expanded safety zones within the NAFR exclusive use area but would not affect areas outside of NAFR.

Potential safety risks would become issues under the No-Action Alternative in areas opened to the public. Unrestricted access to all areas could result in a safety hazard due to 50 years of use as a test and training range. Substantial cleanup would have to precede safe public access to disturbed areas. Some areas may not become accessible to all uses normally permitted on BLM-managed lands.

Hazardous Materials and Solid Waste Management

Military activities use hazardous fuels, oils, and cleaning solvents. The great majority of the non-weapon hazardous materials used by Air Force and contractor personnel on NAFR are controlled through an Air Force pollution prevention process.

Testing of some nuclear devices has caused contamination of NAFR land. The State of Nevada, DOE, and DOD have entered into a Federal Facility Agreement and Consent Order (FFACO) for DOE environmental restoration activities in Nevada (signed in 1996).

Environmental restoration of previously contaminated sites is part of the Air Force Installation Restoration Program (IRP). Ninety-eight IRP sites have been identified on NAFR. Seventy-four of these sites were recommended for no further action. Site investigations were done for the remaining 24 sites. Two sites, a fire training area at Indian Springs and a septic tank at Range 65N, required remedial action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). These actions were completed in 1993. Two landfill sites were recommended for long-term monitoring. Decision Documents (DD) have been accepted and signed by the Nevada Division of Environmental Protection (NDEP).

Use of hazardous materials and wastes would continue within NAFR disturbed areas as a result of land withdrawal renewal. NAFR would continue the cleanup and maintenance of target areas and recycling of materials. DOE procedures, cleanup, and monitoring processes would also continue under applicable regulations.

Selection of Alternatives 1B or 2B would result in the non-renewal of lands including part of the Clarkdale and Wagner Mining Districts. Any future use of this land would undergo DOI/BLM environmental review and permitting.

Under the No-Action Alternative, Air Force hazardous materials and ordnance use would stop. Hazardous materials would be removed from public access parts of NAFR under agreement with DOE and DOI. Any operational activity that would occur in the range after a No-Action decision would be administered by the appropriate DOI agency, and hazardous wastes from these activities would be regulated under the applicable local, state, and federal control rules.

Earth Resources

NAFR is located within the southern part of the Great Basin. Earth resources on NAFR include mineral deposits, soils, significant landforms, tectonic features, and paleontologic (fossil) remains, any of which can have scientific, economic, and recreational value. Mining has occurred on NAFR since the 1860s. Most of the known gold and silver deposits were discovered by the early 1900s. Although mining decreased substantially after these initial discoveries, it continued sporadically until 1942 when NAFR was closed to mining. Minerals discovered at NAFR include gold, silver, copper, lead, zinc, mercury, tungsten, and turquoise. Fossils are present within many sedimentary rock formations at NAFR.

Renewal of the land withdrawal would continue the disturbance of approximately 3 percent of the NAFR exclusive use land. This would result in no change in impacts to geology from Air Force actions. Should Alternatives 1B or 2B be selected, additional acreage could be disturbed in areas opened for recreational co-use and in non-renewal areas. Potential impacts to geology and soils could result if BLM were to permit mining operations on non-renewed lands.

Under the No-Action Alternative, the Air Force disturbance to soils would end except for cleanup activities. Access for mining, off-highway recreation, or agriculture could impact earth resources. Environmental permitting and safeguards would be the responsibility of BLM and the appropriate state and federal agencies.

Water Resources

NAFR water resources include surface water and groundwater. Due to the temporary nature of surface water within this arid region, there are no surface waters designated for specific beneficial uses. With the exception of man-made ponds, the only perennial surface water comes from springs where the groundwater table intersects the surface. A total of 946.37 acre-feet per year (AFY) of surface water on NAFR is currently appropriated for stock, wildlife, domestic, and irrigation purposes. The Air Force is working with BLM to reduce surface water impacts from wild horses on the North Range. This would continue under any action alternative but the Air Force would be expected to cease its participation in this relationship under the No-Action Alternative.

The 21 hydrographic basins entirely or partly included on NAFR represent a water resource potential of over 49 million acre-feet of groundwater storage with a potential perennial yield of 93,000 AFY. Groundwater is appropriated from 25 wells located within the boundaries of NAFR, totaling 1,851.9 AFY. The total average annual groundwater use in these areas is approximately 207 AFY.

Implementation of the land withdrawal renewal alternatives would result in the continuation of existing water usage. Selection of Alternatives 1B or 2B could result in disturbances to the playa at Mud Lake from recreation and to surface and groundwater resources should mining operations on nonrenewed lands be permitted by BLM.

Selection of the No-Action Alternative would end military operations on NAFR. New land uses (mining, recreation, or agriculture) permitted by BLM after a No-Action decision could impact surface or groundwater.

Air Quality

Air quality is defined by the concentration of various pollutants in the atmosphere. The majority of NAFR is on lands that have been designated as "unclassified with reference to state and federal standards for criteria pollutants." However, a small portion of the southeast corner of NAFR is in "serious" nonattainment for carbon monoxide (CO) and particulate matter (PM_{10}).

Short-term air quality impacts from particulates would continue from construction, maintenance, operations, and other sources on NAFR if any renewal alternative were selected. Selection of Alternative 1B or 2B could permit increased

particulates from off-highway vehicle (OHV) recreation on Mud Lake. If permitted by the state and BLM, mining impacts on non-renewed land could produce measurable air quality impacts.

Air quality impacts from ground-based Air Force activities would cease under the No-Action Alternative. Any BLM-permitted recreation or mining development would need to be regulated by applicable local, state, or federal air pollution rules.

Biological Resources

Biological resources include native and naturalized plants and animals and the habitats in which they occur. NAFR is situated along the zone of transition between the Mojave and Great Basin deserts. The Basin-and-Range topography of NAFR includes low-to mid-elevation mountain ranges and valleys that allow plant and animal dispersal between the two deserts. The scarcity of roads across NAFR contributes to a high degree of continuity between habitats. NAFR contains diverse plant and animal communities. The biological importance of NAFR is increased by its isolation from livestock grazing and land development and by the limited extent of land disturbance from military activities. Impacts from wild horses are substantial on the North Range.

As a result of implementation of any renewal alternative, loss of habitat resulting from NAFR-associated activities would be expected to continue but not increase. Native vegetation and species would be expected to continue to dominate on existing NAFR land. Beneficial impacts from exclusive military use would continue for sensitive species, wetlands, and natural habitats within NAFR.

Some new impacts could occur under Alternatives 1B and 2B in local areas of soil and vegetation impact if currently withdrawn lands were permitted by BLM to allow mining, agriculture, or consumptive recreation.

The No-Action Alternative would produce both positive and negative impacts. Ground military activities would end, and noise impacts from military training and disturbance would decrease. Multiple use and public access, including mining, grazing, recreation, and opening of areas for utility corridors, if permitted by DOI/BLM, could have long-term widespread negative impacts that may exceed any short-term benefits of reduced military activity.

Cultural Resources

Cultural resources are any historic district, site, building, structure or object considered to be important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. Potential sources of impacts to cultural resources include ground disturbance, noise, vibrations, visual intrusions and access-related effects. Over 1,800 cultural resources have been identified and recorded on NAFR, including early American Indian village sites, historic mining towns, smaller sites, and isolated artifacts.

Implementation of any renewal alternative would continue NAFR access restrictions. This would protect cultural resources from unauthorized use but could impact researchers and American Indian groups desiring access. Impacts to NAFR disturbed areas and visual and noise intrusions from overflights would continue. Alternatives 1B and 2B could result in additional impacts if BLM opened areas to public or commercial

use on non-renewed lands. Increased access has the potential for impacts from vandalism, new ground disturbance, or reduced protection.

Potential significant impacts could occur under the No-Action Alternative to cultural resources preserved under exclusive use. Access-related impacts potentially include unauthorized collecting or vandalism. Multiple use management could inadvertently expose cultural resources to impacts from both consumptive and nonconsumptive uses.

Land Use & Transportation

Human land uses include residential, commercial, industrial, agricultural, and recreational uses. The majority of NAFR is designated exclusively for military use. The exception to this is portions of the South Range which overlap portions of the DNWR. Prior to the establishment of NAFR, land uses included mining and grazing.

Outside of NAFR, land use consists primarily of federal land managed by BLM for multiple use. Sections of privately owned land that occur outside NAFR boundaries include the northern portions of the Las Vegas metropolitan area and near the small towns that surround NAFR.

Public access onto the range is prohibited. Transportation resources around NAFR consist primarily of Interstate 15 (I-15), oriented in a northeast-southwest direction through Las Vegas. Three U.S. Highways and one state highway surround NAFR.

As a result of implementation of any renewal alternative, land status, land management, transportation, and land use would remain unchanged. Alternatives 1B and 2B would permit short-term mission compatible co-use and site-specific access for recreation and American Indian cultural activities. Potential administrative changes in overlapping DOE and DNWR lands are not expected to impact land access or land uses. Potential land use changes could be approved by BLM for mining or agriculture in non-renewed areas.

Under the No-Action Alternative, land status and land use could be substantially altered. Approximately 3 million acres of NAFR land would be returned to BLM. BLM would be expected to implement multiple-use management including grazing, mining, recreation, and other land uses. These changes to land status and land use could impact natural and cultural resources essentially isolated for 50 years.

Wilderness & Wilderness Study Areas

BLM, U.S. Forest Service (USFS), and USFWS lands under the NRC have been surveyed to determine whether they potentially qualify as Wilderness Areas. Two USFS Wilderness Areas, the majority of the USFWS managed DNWR, and 20 BLM-designated Wilderness Study Areas (WSAs) are wholly or partially under the NRC airspace.

These WSAs are managed to generally prohibit use of mechanized vehicles, landing of aircraft, or construction of structures or roads. WSAs are managed as *de facto* wilderness areas until Congress determines whether the areas should be left unimpaired for future use and enjoyment as wilderness.

The proposed NAFR land withdrawal renewal alternatives are not expected to change from normal military testing or

training on NAFR. This will result in no change in the Air Force agreements with USFWS to recognize management goals for the DNWR and for NAFR. Transitory military and general aviation overflights were not considered a basis for BLM to preclude an area from being proposed as a wilderness. No change is anticipated that could affect wilderness designations of lands under the NRC.

The No-Action Alternative is projected to reduce the number of overflights within the NRC. Neither existing nor a reduction in overflights would change wilderness or WSA designations. Mining exploration, OHV use, transportation corridors, or other forms of intrusive activities could affect future wilderness values on what was essentially protected NAFR land.

Recreation & Visual Resources

The diverse landscape adjacent to NAFR provides a variety of outdoor recreation opportunities ranging from hiking, camping, and nature viewing to OHV use, recreational mining, and hunting. State parks, recreation areas, national forests, and wildlife refuges also provide destinations for visitors. Visual resources consist of natural and man-made features.

As a result of implementation of any renewal alternative, current access restrictions would remain. Limited hunting on NAFR would continue. Little increase in recreation on lands adjacent to NAFR would be expected. No change in visual intrusions would be anticipated. Alternatives 1B and 2B would be expected to have some recreational co-use of selected areas. These enhanced recreation opportunities could include land sailing, hiking, nature viewing, and rockhounding.

The No-Action Alternative would open lands not currently available for recreation to multiple use. Increased non-consumptive recreation could be beneficial to the public. Increased recreation also has the potential for impacts from increased vandalism, OHV damage, conflicts between visitors seeking isolated areas and those who operate vehicles as a recreational activity, and competition with consumptive uses such as mining.

Socioeconomics

Socioeconomics addresses selected characteristics of the social and economic environment in the geographical areas affected by NAFR. The characteristics evaluated include economic development (comprised of employment and earning, with special attention given to the agricultural and mining sectors of the economy), population, housing, public services and facilities (comprised of health care, public schools, law enforcement, and fire protection), and public finance.

No discernible change in socioeconomic activity would result from each of the renewal alternatives. Alternatives 1B and 2B would be expected to have some potential for increased employment if private mining development or limited agriculture were permitted.

The No-Action Alternative is calculated to result in a loss of approximately 7,100 jobs in Clark County and approximately 300 jobs in Nye County by the year 2003. This could be partially offset by approximately 720 new mining jobs, primarily in Lincoln County by 2011 if gold prices returned to

their historic levels, and BLM permitted mining and agriculture in former exclusive use areas of NAFR.

Environmental Justice

Presidential EO 12898 provides that each federal agency makes achieving environmental justice part of its mission by identifying and addressing any disproportionately high and adverse human health or environmental effects of an action on minority or low-income populations. The Air Force has developed an implementation strategy for EO 12898. This is described in the *Interim Guide for Environmental Justice Analysis* with the Environmental Impact Analysis Process (U.S. Air Force 1997h).

In Nye County, 10.3 percent of the population is living below the poverty level. The comparable figures for Lincoln and Clark counties are 13.1 percent and 10.3 percent, respectively. Clark and Nye counties do not have a measurably greater percent of low-income persons than the general population potentially affected by the land withdrawal. Lincoln County has a slightly higher percentage of persons living below the poverty level.

There would not be disproportionately high environmental effects on low-income populations in Nye or Lincoln counties from renewal of NAFR. Neither residents of Lincoln County nor residents of the Moapa Reservation would receive disproportionately high noise effects under the No-Action or action alternatives when compared to other areas within the NRC. Communities under the NRC airspace are protected by no-fly zones that reduce noise to acceptable levels.

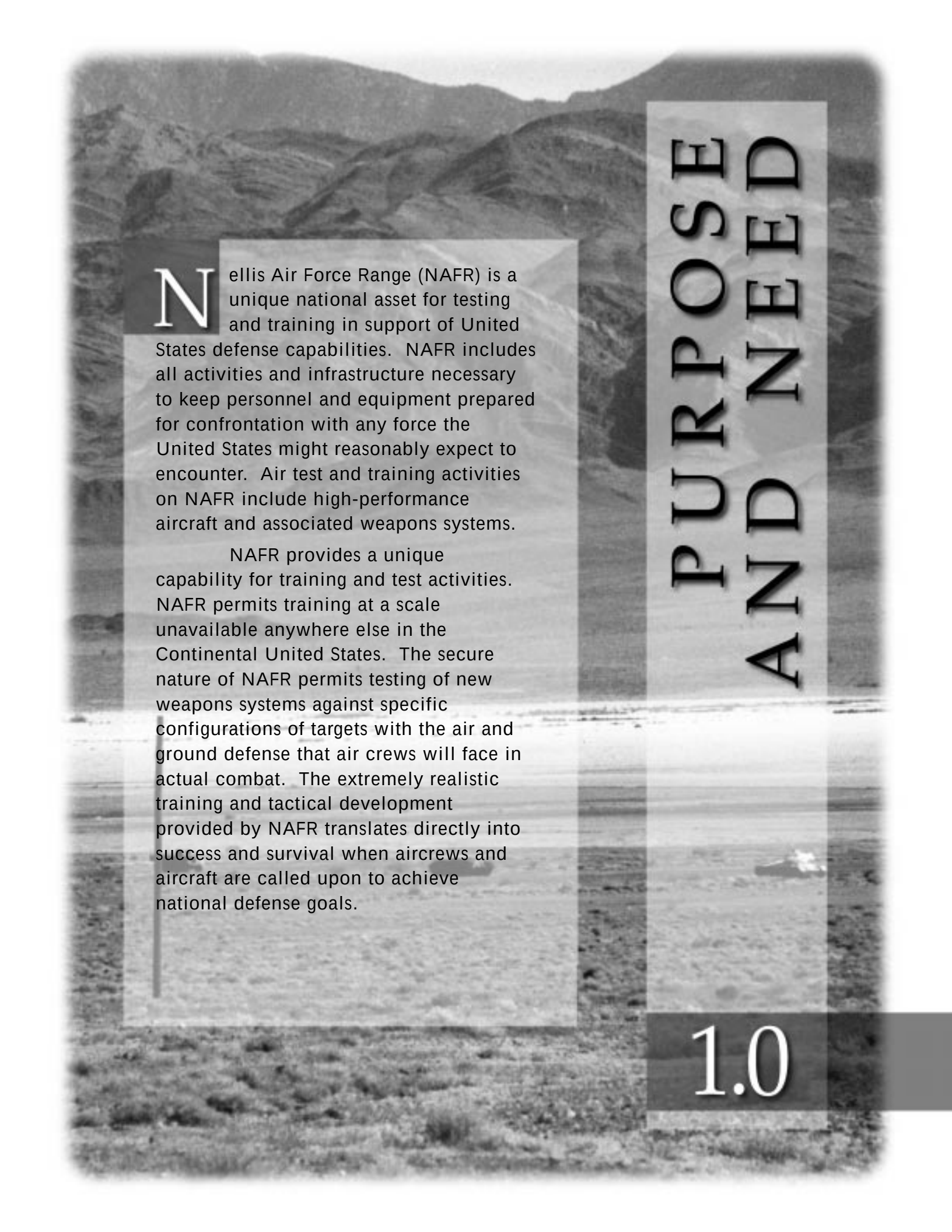
The No-Action Alternative would be expected to have a measurable impact on minority populations in Clark County, although the total impacts are low relative to the employment base. Assuming that the labor force has ethnic characteristics that mirror those of the population at large, implementation of the No-Action Alternative could result in a net loss of approximately 1,700 minority jobs.

American Indians expressed concern that continued restricted access to NAFR results in sacred land violations and cultural survival violations. The Air Force is working with affected tribes and bands to respond to their concerns within operational safety and security requirements.

CUMULATIVE ENVIRONMENTAL CONSEQUENCES

The range of aircraft overflight sorties considered in this LEIS incorporates the environmental consequences of continuing to test and train over NAFR with high performance military equipment.

Also, this LEIS considers the cumulative impacts of anticipated future federal and non-federal projects, specifically F-22 aircraft programs, which may increase noise levels over the NRC and NAFR. Cumulative effects of continued population growth in the Las Vegas Valley may have an additional impact on regional air quality, water resources, transportation, and socioeconomics.



PURPOSE AND NEED

1.0

Nellis Air Force Range (NAFR) is a unique national asset for testing and training in support of United States defense capabilities. NAFR includes all activities and infrastructure necessary to keep personnel and equipment prepared for confrontation with any force the United States might reasonably expect to encounter. Air test and training activities on NAFR include high-performance aircraft and associated weapons systems.

NAFR provides a unique capability for training and test activities. NAFR permits training at a scale unavailable anywhere else in the Continental United States. The secure nature of NAFR permits testing of new weapons systems against specific configurations of targets with the air and ground defense that air crews will face in actual combat. The extremely realistic training and tactical development provided by NAFR translates directly into success and survival when aircrews and aircraft are called upon to achieve national defense goals.



NAFR provides the security to test new weapons systems.

The Air Force must safeguard the technology, information, and equipment entrusted to it and limit the flow of military technology and information to those that could potentially cause harm to the nation. NAFR is an exclusive-use range that provides a secure place to test new systems and train with existing ones, free from exploitation by potential adversaries. On NAFR, safety and security are accomplished by various means, including providing a sufficient buffer zone between military operations and the public.

Operational security and public safety can be best achieved by isolating military activities. This ensures the integrity of classified and essential elements of operations as well as protection for the public.



NAFR is an exclusive use area that provides for public safety by excluding access to areas of potential danger.



The Air Force Thunderbirds, depicted in this display at Nellis AFB, use NAFR for safe training in aerial maneuvers.



NAFR military operations and testing include ample multiple-aircraft battlefield engagements. NAFR is the primary Air Force post-graduate combat teaching and training range.

1.0 PURPOSE AND NEED FOR RENEWAL OF THE NELLIS AIR FORCE RANGE LAND WITHDRAWAL

The U.S. Congress faces a decision that will dramatically affect the ability of the U.S. Air Force (Air Force) and the other armed services to train military aircrews how to fly, fight, and survive in combat. The pending Congressional decision is whether or not to reauthorize any or all of six military reservations authorized by the Military Lands Withdrawal Act (MLWA) of 1986 (Public Law [PL] 99-606 as amended).

As specified in PL 99-606 as amended, authority for each of the six military reservations will expire on November 6, 2001 unless Congress acts to renew the land withdrawal applicable to each reservation. PL 99-606 as amended, also directs that the secretary of the military department concerned shall publish a draft environmental impact statement by November 6, 1998 addressing the proposed renewal of any portion of any of the military reservations authorized by the act for which there is a continuing military need beyond November 6, 2001.

The Nellis Air Force Range (NAFR) is essential to the continuing ability of the Air Force to meet its national defense responsibilities. The Secretary of the Air Force has determined that there is a continuing need for NAFR. NAFR, which is administered by the Air Force, provides a location to:

- ensure and protect national security;
- train for the full and integrated spectrum of military operations; and
- ensure the continued protection of public safety.

1.1 INTRODUCTION

The Air Force is tasked with the primary responsibility for projecting long-range military air power needs. The Air Force is the only branch of the Department of Defense (DOD) with long-range fighters, bombers, tankers, electronic warfare and intelligence aircraft, airlifters, and stealth capabilities that provide the ability to quickly deliver a powerful strike at an enemy over great distances. Air Force missions include space surveillance, tactical battlefield surveillance, aerial transport of troops and materiel, close air support of land forces, all-weather strike, nuclear deterrence, maritime strike, and air superiority. The Air Force works in close concert with other U.S. military services, as well as those of our allies, to carry out missions efficiently.

The Air Force is committed to maintaining a force that is second to none. The important elements of this force structure include the following:

- highly trained and motivated aircrews and ground support personnel;
- state-of-the-art tested aircraft, avionics, and weapons;

- an advanced command, control, electronic warfare, surveillance, and intelligence capability;
- maintenance and logistics (including infrastructure) required by the aircraft, avionics, and weapons systems; and
- the resources and access to airspace and ranges to train aircrews in modern air combat tactics.

Realistic, stressful, and challenging operational training and weapons system testing are the primary means to ensure readiness and prepare the Air Force to apply personnel and assets to meet national policies. This training is central to the way America's Armed Services fight. Training consists of a careful progression of activities and threat complexity, including a balance of programs directed at individuals, crews, and larger organizational units (including multi-national forces) and performance assessments. Whether training is accomplished as an individual-level mission activity or as a full-scale, multi-force field exercise, realistically evaluated training is critical to maintaining military proficiency. Joint coalition and combined training exercises further improve U.S. military operations and understanding of the strengths of each military service, as well as those of allies and coalition partners.

These interests and policies include ensuring strong relationships with our allies, protecting our rights of trade and travel, and deterring aggression. As a key element of U.S. military power, the Air Force has the mission to train for and, when necessary, successfully engage competing military activities of hostile nations and organizations. In addition, the Air Force is currently expected to train for and participate in a broad range of conflict prevention, peacekeeping, and humanitarian activities.

NAFR is a unique national asset that provides the opportunity for weapons system testing combined with the highest level of training available for military personnel. NAFR is the only location in the United States where both individual and large multi-force training is provided in highly sophisticated training exercises that simulate full-scale battlefield scenarios. Such training exercises test tactics, equipment, and personnel. The advanced level of training and testing that NAFR offers is crucial to the survival of U.S. and allied military personnel and the success of the Air Force mission to defend the United States and to secure and enhance U.S. interests and policies around the world.

NAFR provides both efficient testing and training time and realistic opportunities that include threats, operational space, topographic complexity, security, and public safety buffers that ensure U.S. forces are always prepared. U.S. military forces require NAFR to continue to be prepared for known and emerging threats to the nation and its interests and to test and refine innovative concepts, aircraft, weapon systems, and new strategies to deter, compel and, if required, fight and win wars well into the 21st century.

This high level of cost-effective testing and training is performed at NAFR and supported by the people of the United States through investment in NAFR's infrastructure. This

infrastructure includes airfields at the Tonopah Test Range (TTR) and Indian Springs, as well as buildings, roads, communications, tracking equipment, targets, and threats necessary to evaluate the performance of aircrews and larger warfighting units training on NAFR. The Air Force is committed to using this unique testing and training asset efficiently while continuing to be a good steward of the land and its environmental resources.

NAFR is administered by the Air Force, Air Combat Command (ACC), through units of the U.S. Air Warfare Center (AWFC), Range Management Office located at Nellis Air Force Base (AFB). Nellis AFB is the command, communications, and operations center for units using NAFR. Nellis AFB controls restricted areas or numbered ranges and also provides personnel and logistics support for the aircraft and crews using NAFR.

NAFR occupies land withdrawn from public use for the purposes of military testing and training. The original NAFR land withdrawal consisted of approximately 2,945,726 acres of land located between Tonopah and Las Vegas in southwestern Nevada. NAFR today, through Congressional changes in its boundaries, consists of approximately 3,038,698 acres and is divided into two functional areas, the North Range and the South Range.

1.1.1 Intent and Organization of this LEIS

This Legislative Environmental Impact Statement (LEIS) and a classified annex provide input regarding the potential environmental consequences of the proposed continuation of NAFR as the Air Force's premier operational test and training range. This LEIS has been prepared in response to Congressional direction through the November 6, 1986 MLWA PL 99-606 as amended by the Groom Mountain Withdrawal (Public Land Order [PLO] 100-338) and the White Sides Safety and Security Buffer (PLO 7131). An LEIS is an environmental evaluation (in compliance with the National Environmental Policy Act [NEPA] and the Council on Environmental Quality [CEQ] Guidelines) in support of legislation proposed to Congress. An LEIS normally does not include scoping, the preparation of a Final EIS, and the preparation of a Record of Decision (ROD). However, the Air Force has elected to include public scoping and the preparation of a final environmental document in the NAFR Renewal LEIS process.

To meet the need for Congressional decisionmaking, this LEIS is organized as follows:

- Chapter 1.0 discusses the purpose and need for NAFR.
- Chapter 2.0 describes the four action alternatives that would permit continuation of NAFR test and training missions. The No-Action Alternative is described. Chapter 2.0 also discusses alternatives considered but not carried forward and the Air Force's preferred alternative.
- Chapter 3.0 provides an overview of the baseline environmental conditions of NAFR and the potentially affected environment.
- Chapter 4.0 addresses the potential impacts of implementing the alternatives described in Chapter 2.0, when compared to baseline conditions presented in Chapter 3.0.

- Chapter 5.0 summarizes the cumulative effects and the irreversible and irretrievable commitment of resources associated with the alternatives.

- Chapters 6.0, 7.0, 8.0, 9.0, 10.0, and 11.0 present the references, persons and agencies contacted, a list of preparers and contributors, consultation information, a list of document repositories, index, and a list of acronyms (at the back of Volume 1) respectively.

- Volume 2 of the LEIS contains the comments on the Draft LEIS, responses to those comments and appendices providing additional technical support data. Volume 2 also contains letters with comments on the BLM application.

The lead agency for the preparation of the LEIS is the Department of the Air Force. Cooperating agencies are the Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), and the U.S. Department of Energy (DOE).

1.1.2 Decision to be Made

The decision to be made by Congress is whether to renew the land withdrawal[1] for NAFR or allow authorization for the range to expire. The Secretary of the Air Force has identified a continuing military need for NAFR and has prepared this LEIS as one of the required components in the application to Congress to renew the range. An Act of Congress is the anticipated necessary step for renewing authorization for the range. A new act would allow Congress to redefine the size, duration, and terms of the NAFR land withdrawal to fit the current and projected need for the military reservation. Congress could extend the duration of the NAFR land withdrawal by passing a resolution to continue the land withdrawal and reservation terms of PL 99-606 as amended.

Non-renewal of NAFR would occur if Congress elects to allow the land withdrawal to expire as specified in PL 99-606 as amended. In this event, decommissioning NAFR would likely require a period of several years in order to identify training missions to be retained, realigned, or canceled; relocate training missions performed on the range that are to be realigned to other military installations; remove aerial bombing and gunnery targets and other range infrastructure; clean up and restore target sites and other use areas as necessary; and decontaminate the range to the extent possible by removing unexploded live ordnance and toxic and hazardous materials. There would likely be a need to use NAFR to support some continuing testing training missions during this decommissioning period until those missions were canceled or realigned to other training facilities.

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1 "Withdrawing" federal lands means to withhold them by executive or legislative action from settlement, sale, location, or entry under some or all of the general land, mining, and mineral laws in order to limit or prohibit activities normally permitted under those laws. The Defense Withdrawal Act of 1958 (PL 85-337) requires an Act of Congress for land withdrawals for military purposes that are more than 5,000 acres in aggregate.

1.2 ENVIRONMENTAL IMPACT ANALYSIS PROCESS

The Environmental Impact Analysis Process (EIAP) for the proposal to renew the withdrawal of NAFR addresses separate but related requirements.

- NEPA requires federal agencies to consider the environmental consequences of their proposals in deciding whether to proceed with those proposals.
- Federal Land Policy and Management Act (FLPMA) governs administration of public lands by the BLM, including land withdrawals as specified under the Engle Act (refer to Appendix C).
- This LEIS has been prepared to meet the requirements of NEPA and the requirements of FLPMA with respect to documenting the environmental consequences associated with the proposed land withdrawal.

This LEIS provides fundamental information for Congress, BLM, and the Air Force.

The ***Air Force*** intends to make a recommendation regarding NAFR:

- Propose an action from the alternatives described in section 2.2 and evaluated in this LEIS.

If the Air Force recommends renewal of NAFR, this LEIS will be used by the following agencies or government bodies:

The ***Department of Interior (DOI), BLM*** to make recommendations regarding:

- Withdrawal renewal of public lands for the purposes of implementing the proposed action.

Congress to make decisions concerning:

- The content and enactment of legislation withdrawing those specific public lands associated with the proposed action.

The major milestones in this EIAP include the following:

- publication of a Notice of Intent (NOI) to prepare a LEIS by the Air Force;
- publication of a NOI for Proposed Withdrawal and Opportunity for Public Meeting by BLM and the Air Force;
- scoping by inviting public and agency input to determine and define the significant issues to be addressed in the LEIS;

- collecting information on the existing environment, including field studies, to provide a baseline for analyzing the effects of the alternatives;
- assessing the potential impacts of the proposed action and alternatives on the environment;
- preparation and distribution of a LEIS for public review and comment, not later than November 6, 1998;
- a public review period (90 days for FLPMA), including public hearings, to solicit comments on the analysis presented in the LEIS; and
- preparation of comment responses and distribution of an EIS, including comments received and responses to substantive issues raised during the public and agency review.

1.2.1 Requirements of NEPA

NEPA (PL 91-190, 42 United States Code [USC] 4321-4347, as amended) was enacted to establish a national environmental policy. It also established the CEQ to implement the provisions of NEPA and review and appraise federal programs and activities in light of NEPA policy. CEQ promulgated regulations for implementing the procedural provisions of NEPA (40 Code of Federal Regulations [CFR] Parts 1500-1508). These regulations outline the responsibilities of federal agencies under NEPA and provide specific procedures for preparing EISs to comply with NEPA. Air Force Instruction (AFI) 32-7061, which implements the CEQ regulations with regard to Air Force actions, defines the steps and milestones in the EIAP. Part 2300 of 43 CFR 1600 (DOI's NEPA implementing regulations) specifies requirements for land withdrawal, as well as the requirement for environmental analysis.

1.2.2 Lead Agency and Cooperating Agencies

The Air Force is the proponent for the proposal to renew the withdrawal of NAFR and is the lead agency for the preparation of the LEIS, as well as for the FLPMA documentation.

As defined in 40 CFR §1508.5, a cooperating agency

> means any Federal agency other than a lead agency which has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment . . . . A State or local agency of similar qualification . . . may by agreement with the lead agency become a cooperating agency.

The following federal agencies are identified as cooperating agencies in this project:

- *Bureau of Land Management*. The BLM administers most of the public lands within the proposed range alternatives. The BLM is responsible for processing the land withdrawal application and prepares a case file for the DOI to submit to Congress under the Engle Act of 1958 and the FLPMA of 1976.

- *Department of Energy*. DOE is responsible for the Nevada Test Site (NTS). These lands are withdrawn and adjacent to NAFR. The DOE administers (under a classified Memorandum of Agreement with the Air Force) non-nuclear DOE Research and Development projects on the TTR. By a separate agreement with the Air Force, the DOE administers the Pahute Mesa portion of NAFR.

- *U.S. Fish and Wildlife Service*. The USFWS administers the DNWR through a land withdrawal from public lands status.

1.2.3 Public Involvement Process

AFI 32-7061 and CEQ regulations require an early and open process for identifying significant issues related to a proposed action and obtaining input from agencies and the affected public prior to making a decision that could significantly affect the environment. In the spirit of full public and agency input to the EIAP, the Air Force initiated a public involvement process, including public scoping prior to the preparation of the LEIS, and close coordination with cooperating agencies prior to public review of the LEIS.

Several laws and regulations address the requirement of federal agencies to notify or consult with American Indian groups or otherwise consider their interests when planning and implementing federal undertakings.

In particular, on April 29, 1994, the President issued the Memorandum on Government-to-Government Relations with Native American Tribal Governments, which specifies a commitment to developing more effective day-to-day working relationships with sovereign tribal governments. Among the provisions of this memorandum are the following requirements:

- The head of each executive department and agency shall be responsible for ensuring that the department or agency operates within a government-to-government relationship with federally recognized tribal governments.

- Each executive department and agency shall consult, to the greatest extent practicable and to the extent permitted by law, with tribal governments prior to taking actions that affect federally recognized tribal governments. All such consultations are to be open and candid so that all interested parties may evaluate for themselves the potential impact of relevant proposals.

- Each executive department and agency shall assess the impact of federal government plans, projects, programs, and activities on tribal trust resources and assure that tribal

government rights and concerns are considered during their development of such plans, projects, and activities.

- Each executive department and agency shall take appropriate steps to remove any procedural impediments to working directly and effectively with tribal governments on activities that affect the trust property and/or governmental rights of the tribes.

As part of the NEPA process, 18 tribes with historical ties to the land in the NRC vicinity were notified at the initiation of the project, with discussions and consultations among a variety of tribes occurring during the process. A list of the tribes is presented in section 3.9.3.

1.2.3.1 PUBLIC AND AGENCY SCOPING

Extensive public scoping was held in six locations in Nevada from June 17 through June 26, 1996. Scoping for potentially affected American Indian tribes was held on June 28, 1996. Public and agency scoping comments and American Indian perspectives were incorporated into the LEIS and led to the development of two of the four alternatives. The process by which alternatives were developed is discussed in section 2.1. A summary of resource-specific issues identified during scoping is presented in Chapter 4.0.

1.2.3.2 PUBLIC HEARINGS

A 90-day Congressional and public review process began with the publication of the Notice of Availability of the Draft LEIS renewal in the *Federal Register*. The Notice of Availability was also posted on the Internet at http://www.nellis.af.mil/range/renewal. The public review process included public hearings at various locations throughout Nevada. The purpose of the public hearings was to solicit comments relevant to the environmental consequences of the proposal to renew the NAFR land withdrawal or to select no action. Comments on the Draft LEIS were requested from government agencies, Tribal Governments, Tribal organizations, private organizations, and the public.

Local media was used to notify the public of the hearings. An advertisement of the public hearings was published in several local newspapers. Appendix B provides a summary of the public participation efforts associated with the NAFR renewal EIAP.

1.2.4 Requirements of the Federal Land Policy and Management Act

The BLM is responsible for the land withdrawal application and is preparing a case file for the DOI to submit to Congress under PL 99-606 as amended, the Engle Act of 1958, and FLPMA of 1976. The rules and procedures implementing the Secretary of the Interior's authority to process federal land withdrawal applications under FLPMA are described in 43 CFR Chapter II, Part 2300. The initial land withdrawal process includes preapplication consultations; application and publication of the application in the *Federal Register*; preparation of a case file, including this LEIS and recommendations; transmittal of the case file to the Director of the BLM and Secretary of the Interior; transmittal of draft legislation and the case file to Congress; and legislative action by Congress.

The FLPMA case file, as described in 43 CFR Section 2310.3-2, includes the items listed below. Information on the availability of these items is also provided for each case file requirement. These separate reports are available at libraries listed in Chapter 10.0.

- **LAND USES**. The current and proposed land use of the existing NAFR are identified in a separate report – *Land Use Study, Nellis Air Force Range.* This report*:*

  - provides a general description of current land uses at NAFR and shows the authorization for land use as per the MLWA of 1986;

  - provides a legal description of NAFR and shows changes in withdrawn lands since the 1986 withdrawal;

  - describes the Memoranda of Understanding (MOUs) and Rights-of-Way (ROW) as they determine land uses and agency or government jurisdiction;

  - describes the land users and their primary jurisdictions within NAFR;

  - describes areas that qualify for special land status such as wilderness study areas, cultural resource / protection areas, biological habitat areas, etc.;

  - describes land rights and / or uses that have been eliminated, bought-out, or need to be acquired by the Air Force;

  - describes land management practices within NAFR; and

  - maps land uses as an overlay to NAFR.

- **WATER REQUIREMENTS**. The current and proposed water requirements of NAFR are identified in a separate report — *Water Requirements Study of the Nellis Air Force Range*. This report:

  - provides an overview of the hydrogeologic setting within NAFR;

  - provides a summary and evaluation of all known sources, uses, and users of surface and groundwater;

  - summarizes all water rights; and

  - evaluates the future water requirements of activities supported by the renewal of the NAFR land withdrawal.

- **NEPA COMPLIANCE**. The *Renewal of the Nellis Air Force Range Land Withdrawal LEIS* is submitted in compliance with this requirement. The following items are referenced in this LEIS:

- *Public Participation Process.* Included in Appendix B of this LEIS.

- *Contamination Report*. Study of the existing known and potential sources of contamination within the proposed withdrawn lands. This is a separate report — *Nellis Range Final Contamination Study*.

- *Range Final Contamination Study*. Compilation of information about contamination investigations, environmental compliance procedures and material records storage, and potential receptors. It summarizes information from :

  - the Air Force Installation Restoration Program (IRP);
  - the Department of Energy Environmental Restoration Program (ERP);
  - the Resource Conservation and Recovery Act (RCRA) Facility Assessment Report on NAFR;
  - the depleted uranium target assessment;
  - spills and aircraft mishaps records;
  - the recent surface soil sampling investigation of representative bombing targets;
  - explosive ordnance disposal;
  - spills prevention plans;
  - emergency response plans;
  - waste management plans; and
  - other environmental data relating to NAFR.

- *Minerals Resource Analysis*. Potential energy and mineral resources within NAFR are identified in a separate report — *Minerals and Energy Resource Assessment of the Nellis Air Force Range*. The assessment portion of this report reviewed available data on geologic setting, metallic and industrial minerals, gemstones, uranium, geothermal resources, and oil and gas resources on the NAFR lands. From these data, areas of mineral potential were defined and estimates of the types of known and undiscovered mineral and energy resources that may be present within the project area were made.

- *Biological Assessment*. Evaluation of current Air Force operations with respect to protected species is presented in a separate report — *Biological Assessment of the Nellis Air Force Range.*

- *Cultural Resources Report*. Compliance with this requirement is met by two references — sections 3.9 and 4.9 of this LEIS, and the *NAFR Cultural Resource Management Plan*. The latter is a separate report.

- *Roadless Areas.* These areas are discussed in the *Land Use Study*.

- *Economic Impact Report*. Included in sections 3.13 and 4.13 of this LEIS and as a separate report — *Economic Impact Report of the Nellis Air Force Range.* The Economic Impact Report includes:

  - a brief history of NAFR;

  - the existing uses of NAFR;

  - the projected economic consequences of continued withdrawal of NAFR as it is currently configured;

  - the economic consequences of potential changes to the NAFR land withdrawal in response to public and agency comments received during the process implemented for the NAFR Legislative Environmental Impact Statement (LEIS) required by PL 99-606;

  - potential economic consequences of not renewing the NAFR land withdrawal;

  - the cost of nonrenewal to the nation and provides a summary comparison of economic consequences of renewal, renewal with changes, or non-renewal of NAFR.

- **WETLANDS AND FLOODPLAINS**. These resources are identified in separate reports — *Floodplain Inventory Report of the Nellis Air Force Range* and *Nellis Air Force Range Wetlands Survey Report*. The *Floodplain Inventory Report of the Nellis Air force Range* includes:

  - a general description of NAFR and its climate, geology, and surface water hydrology;

  - the methods used to delineate watersheds and hydrographic methods to estimate peak flows and runoff volumes; and

  - floodplain delineation and floodzones.

  The Nellis Air Force Range Wetlands Survey Report provides an inventory for surface water resources, principally springs and intermittent water courses, on NAFR. As part of this inventory, the report provides mapping data and physical parameter data for each resource, a damage assessment, a qualitative assessment of its value to wildlife and potential management strategies for conservation.

- **CONSULTATIONS**. Consultations are included as Chapter 9.0 of this LEIS; persons and agencies contacted are in Chapter 7.0.

- The FLPMA requirements for the NAFR renewal are summarized in Table 1.2-1.

1.2.5 Overview and History of NAFR

NAFR was originally established by Executive Order (EO) in 1940 as the Las Vegas Bombing and Gunnery Range. A training camp was established in 1942 at Indian Springs, Nevada to facilitate air-to-air gunnery training for aircrews. The camp was designated as Indian Springs Auxiliary Air Field on April 1, 1964. This airfield has since been named Indian Springs Air Force Auxiliary Field (ISAFAF), and provides support and maintenance for the NAFR Complex (BLM 1981).

A portion of the NAFR South Range overlaps the DNWR, which was established in 1936 for the protection and preservation of desert bighorn sheep. The Air Force, USFWS, and BLM entered into MOUs in 1951, 1962, and 1997 related to the protection of bighorn sheep. The MOUs have been updated and amended, as necessary, to ensure proper management by the respective agencies.

In 1952, 1958, and 1961, PLOs transferred portions of NAFR to the Atomic Energy Commission (AEC), which later became the U.S. DOE, for the development of the NTS. Pahute Mesa was delegated to DOE through an MOU with the Air Force for the testing of nuclear weapons. In addition, the Air Force permitted 336,665 acres in November 1956 to the Albuquerque Operations Office of the DOE for use as a fully instrumented ballistic test range. This area is now referred to as the TTR (BLM 1981). Table 1.2-2 provides a brief history of land transaction at NAFR.

From 1940 until 1959, co-use of the range was granted to ranchers and farmers. Air Force requirements to test advanced weapons and tactics eventually needed increased security for the range, now called NAFR. The Secretary of the Air Force was given authority for military use by enactment of PL 99-606 as amended, and the MLWA of 1986. The PL 99-606 withdrawal, as amended, terminates on November 6, 2001. In accordance with PL 99-606 as amended, the LEIS addressing the renewal of the withdrawal for continued military use must be published no later than November 6, 1998.

1.3 NELLIS AIR FORCE RANGE

NAFR is located in southern Nevada. It is bounded by U.S. Highway 95 on the west, southwest, and south; the urbanized area of Las Vegas to the southeast; U.S. Highway 93 on the east; Nevada State Highway 375 on the northeast; and U.S. Highway 6 on the north (see Figure 1-1).

Table 1.2-1. FLPMA Requirements as Applied to the NAFR Renewal

FLPMA Requirement	*Documentation Prepared for NAFR Renewal*	*Location of Documentation*
A report on present land uses and the effects of withdrawal on those uses	Land Use Study	Separate report
A statement concerning the requirements for water use and the presence of water rights within the withdrawal area	Water Requirements Study	Separate report
Preparation of an LEIS or EA on the proposed withdrawal area	NAFR Renewal LEIS	NAFR Renewal LEIS
A statement as to the extent and manner in which the public participated in the environmental review process	Statement of Public Participation	NAFR Renewal LEIS Appendix B
Study of the existing known and potential sources of contamination within the proposed withdrawn lands [1]	Contamination Report	Separate report
Analysis of the known and estimated mineral potential and market demands for lands within the proposed withdrawal area	Mineral & Energy Resources Report and Economic Impact Report	Separate reports
A Biological Assessment of threatened or endangered species and their critical habitat within the withdrawal area or in its vicinity	Biological Assessment	Separate report
Identification of cultural resources within the withdrawal area	Nellis AFB Cultural Resources Management Plan	Separate report
Identification of roadless areas or roadless islands within the withdrawal area	Land Use Study	Separate report
Analysis of the associated economic impacts of the proposed uses of the withdrawal area	Economic Impact Report	Separate report
Determination if the proposed withdrawal area includes floodplains or wetlands	Wetlands and Floodplains Report	Separate report
Evidence of consultation with federal, state, and local agencies; nongovernmental groups; and individuals	Persons and Agencies Contacted, Statement of Public Participation, and Consultation Information	Chapters 7.0 and 9.0, LEIS

Note: 1. Required under Engle Act of 1958 and PL 99-606 as amended.

Table 1.2-2. NAFR History

Land Space Designation	*Land Transaction*	*Date*	*Affected Area (Acres)*	*Responsible Agency*
DNWR	PLO 7373	1936	1,588,818	DOI
Las Vegas Bombing Range	EO 8578	1940	N / A	Air Force
Las Vegas Bombing Range	EO 9019	1942	3,200,000	Air Force
ISAFAF	Developed by DOD (Air Force)	1942	N / A	Air Force
DNWR / Air Force Agreement	Air Force, USFWS, BLM - 1951 / 1962 (as updated by PL 94-223)	1951 / 1962	826,000	Air Force / USFWS
NTS, PLO 805, PLO 1662, PLO 2568	Segregated from Las Vegas Bombing Range	1952 / 1958 / 1961	435,000 38,400 318,000	DOE
TTR	Air Force Permitted to DOE	1956	336,665	Air Force
Pahute Mesa	Air Force and DOE MOU	1967	106,240	Air Force
NAFR Withdrawal	PL 99-606	1986	2,945,726	Air Force
Groom Mountain Withdrawal	Withdrawal PLO 100-338	1988	89,000	Air Force
White Sides Safety & Security Buffer	Administrative Withdrawal PLO 7131	1995	3,972	Air Force

NAFR is a key component of the Nellis Range Complex (NRC). The NRC (also known as the Nevada Test and Training Range) includes airspace, land, and infrastructure dedicated to military uses. The lands dedicated to military uses within the NRC are the withdrawn lands of NAFR. The airspace of the NRC includes Federal Aviation Administration (FAA)-designated Restricted Areas and Military Operations Areas (MOAs). The NRC infrastructure includes simulated targets and threats on NAFR, as well as roads, radar installations, communications facilities, electrical power transmission lines, and water supply and treatment systems.

1.3.1 NAFR Ground Equipment

NAFR currently includes 174 tactical target complexes containing more than 1,300 simulated targets. Many of these target complexes are defended by threat simulators to provide a realistic arena for operational testing of weapons systems, tactics, and combat readiness. Live munitions are delivered on designated portions of the range. To improve target complex realism, targets are enhanced with actual or simulated military assets, including a tank

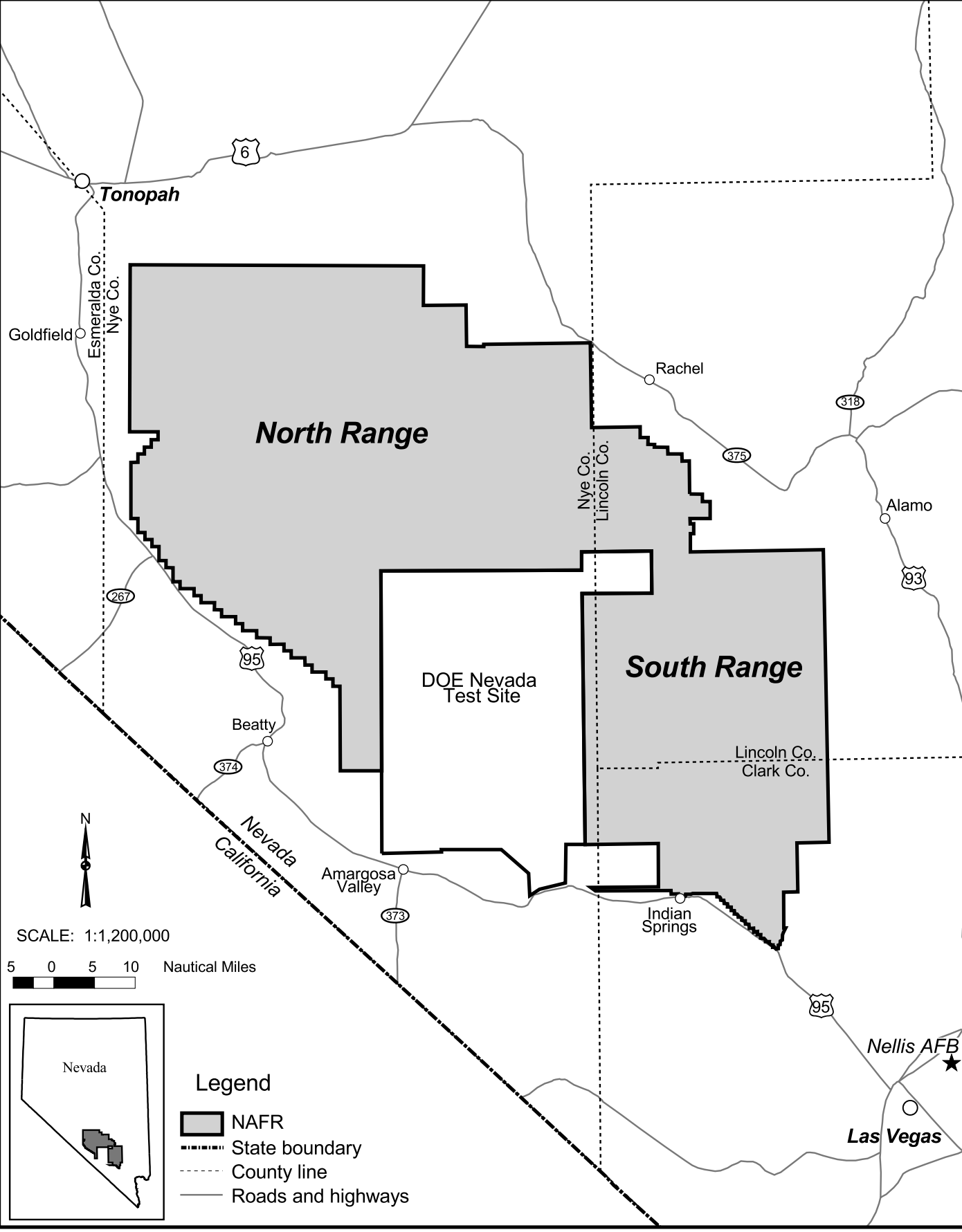


Figure 1-1. NAFR Location Map

battlefront, truck convoys, airfields, industrial complexes, surface-to-air missile sites, and a railroad complete with marshaling yards and a railroad tunnel. Threat simulators are electronically and, in many cases, visually similar to equipment likely to be encountered in actual combat. Radar units simulate early warning, ground control intercept, target acquisition, and surface-to-air and anti-aircraft artillery defenses and guidance.

NAFR ground equipment includes multiple radar and electronic jamming equipment designed to test and improve the quality of aircrew combat training. Many of the threat simulators are equipped with instruments to collect data that can be used to evaluate and score surface-to-air engagements. Extensive monitoring and tracking equipment is deployed throughout NAFR to support testing and training. Data collected on the range and in the supporting airspace are processed by computers located in the Range Control Center at Nellis AFB. The Range Control Center can track a multi-force engagement or a single aircraft's entire mission. Several different kinds of two- and three-dimensional graphic displays from different perspectives are produced for evaluation of performance and rapid feedback for tests and training.

The Air Force has developed other infrastructure to support its use of NAFR withdrawn lands. The three major facilities at Indian Springs, Tolicha Peak, and on the TTR include the two airfields shown in Figure 1-2. Facilities also include roads (see Figure 1-3), radar sites, other communication systems, and range electronic measuring devices. The locations of the radar and communication sites are shown in Figure 1-4.

1.3.2 Range Structure

NAFR is divided into two functional areas, the North Range and the South Range, both of which accommodate live and inert ordnance. The ranges are split to facilitate overall management of Air Force operations and test and training opportunities on the range. Management responsibilities includes operating and maintaining range equipment, safety of personnel, material resources within the boundaries of the range, the range electromagnetic environment, and efficient airspace use through effective scheduling.

NORTH RANGE

The North Range is approximately 1.8 million acres of withdrawn land (see Figure 1-5). This includes land withdrawn for exclusive military use by PL 99-606 and its amendment (PLO 100-338) of June 17, 1988, which added approximately 89,000 acres to the North Range. An additional withdrawal of about 3,972 acres of the Safety and Security Buffer (PLO 7131) along the eastern edge of NAFR was completed in 1995.

The North Range contains four unmanned weapons delivery subranges. The four subranges contain approximately 1,025 targets within 134 tactical target complexes. These impact areas are maintained by NAFR personnel to simulate tactical targets representing airfields, surface-to-air missile (SAM) sites, truck convoys, missile storage sites, artillery batteries and other targets, along with scoring and tracking systems. The type of weapons authorized for delivery

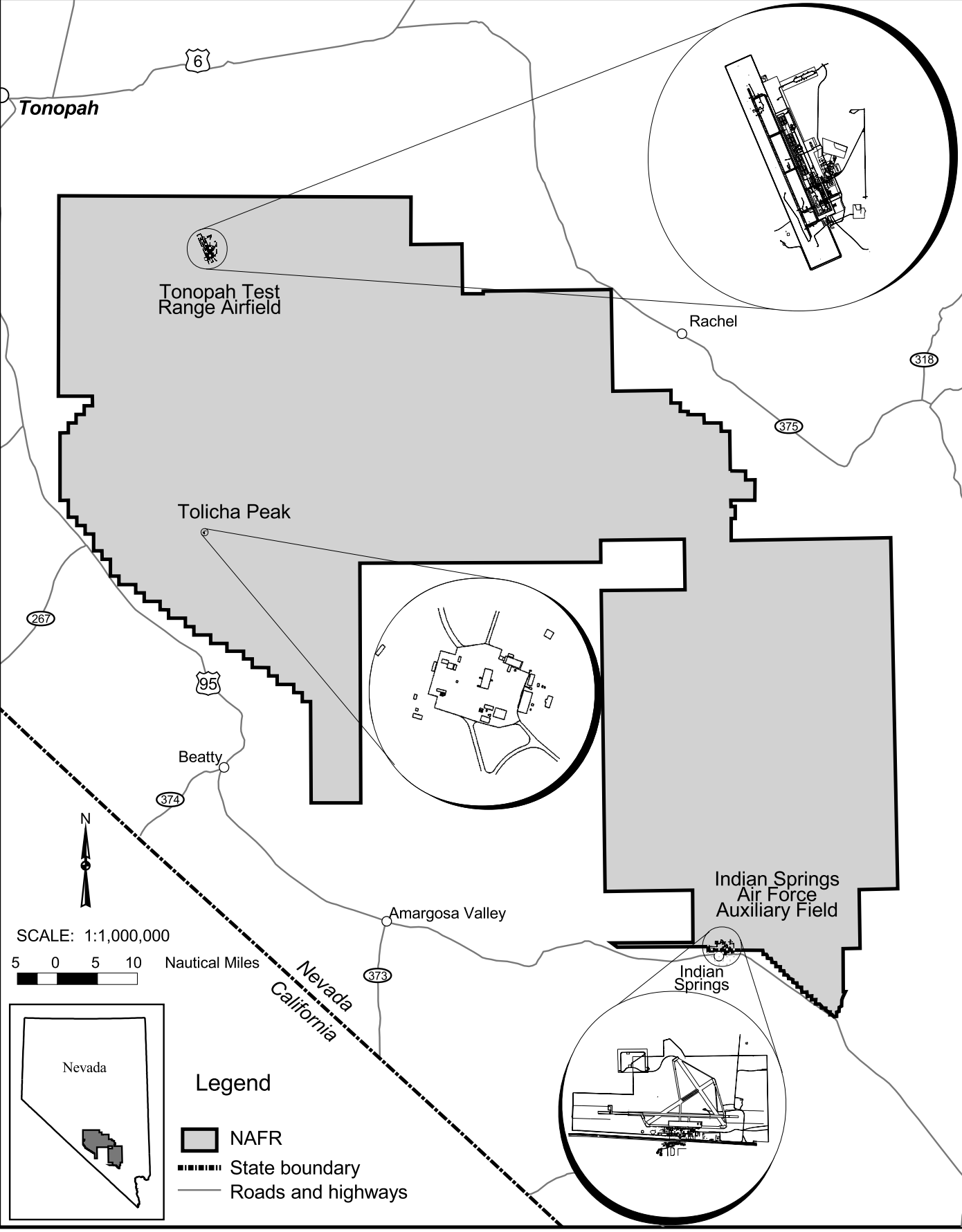


Figure 1-2. NAFR Supporting Airfields and Facilities

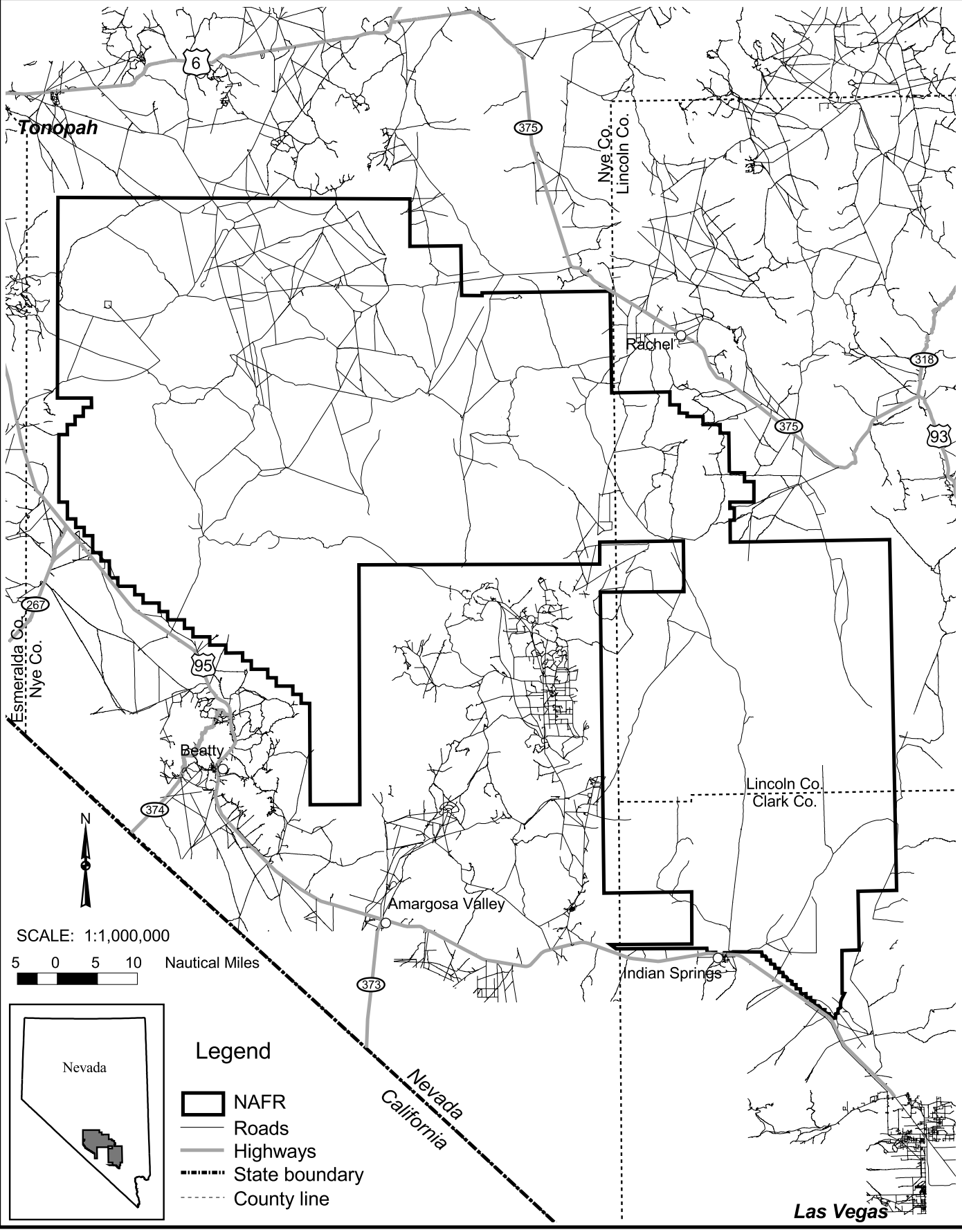


Figure 1-3. Roads on the Nellis Air Force Range and Vicinity

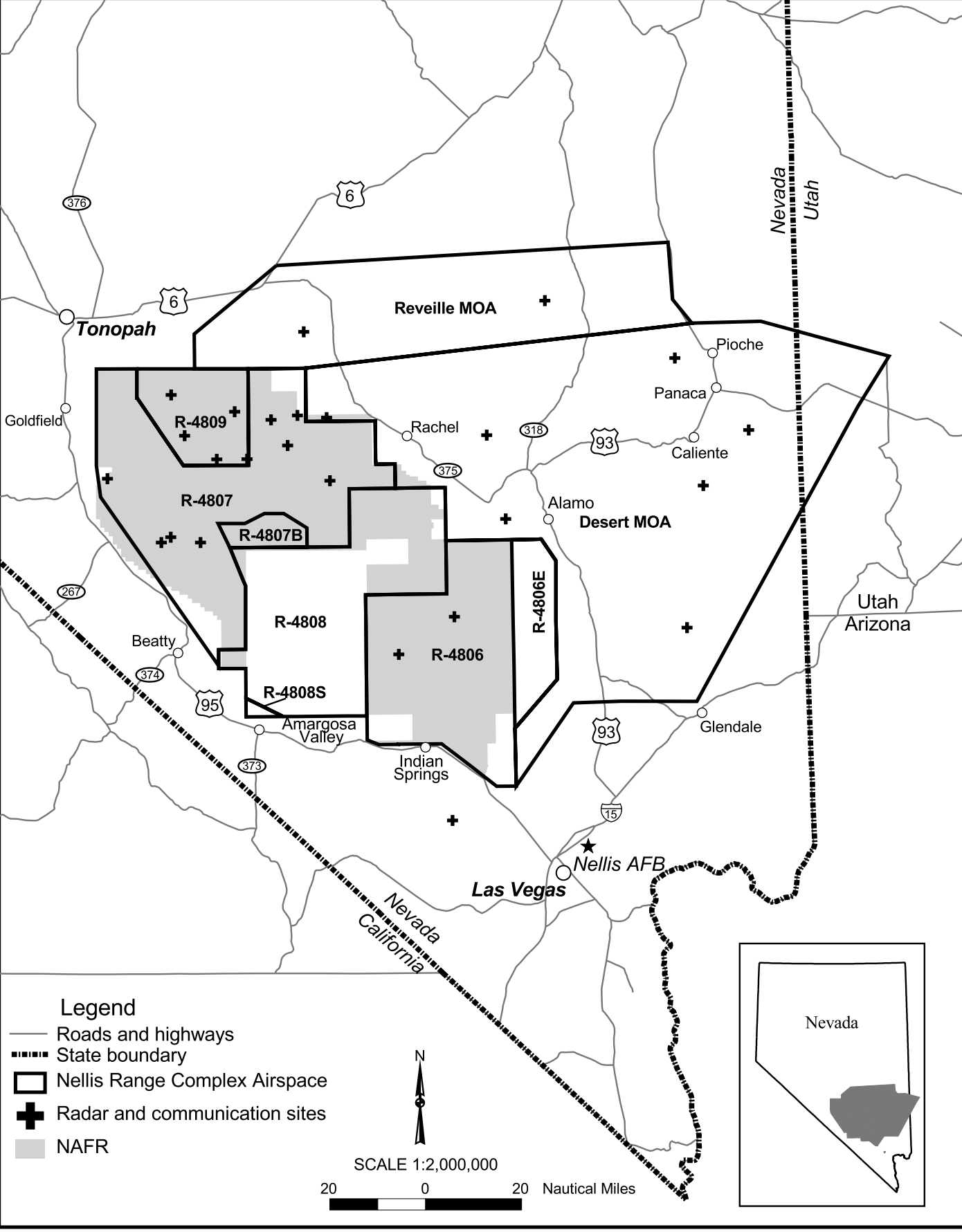


Figure 1-4. Radar and Communication Sites

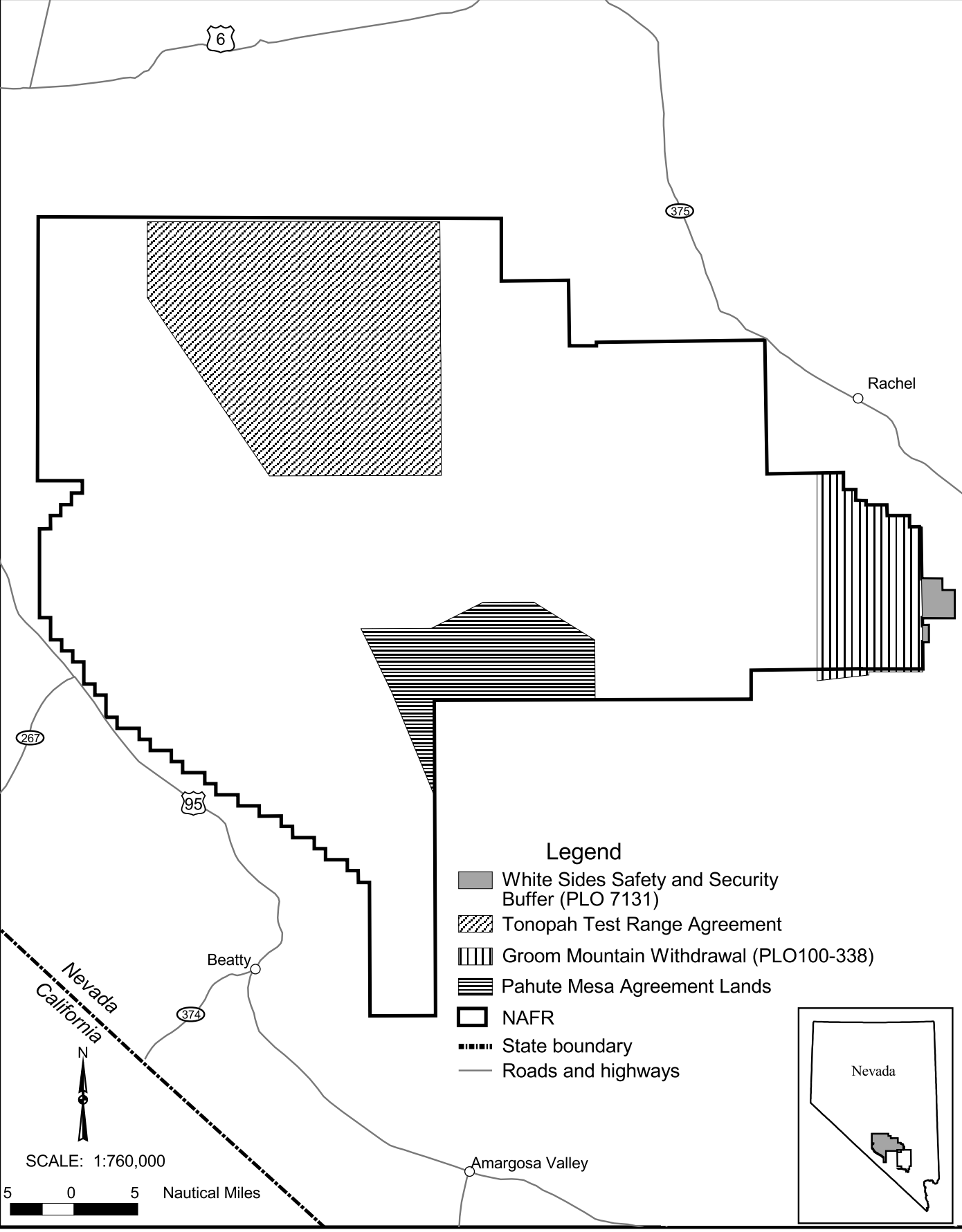


Figure 1-5. North Range and Sub-Areas

depends on the target selected. Figure 1-6 shows the North Range target and simulated threat site locations.

Operating as part of the North Range of NAFR, multiple and dispersed facilities support three Electronic Combat Ranges (ECRs). These ECRs provide a range of high-to-low electronic threat environments: Tonopah ECR (TECR), Tolicha Peak ECR (TPECR), and Electronic Combat (EC) South Range. Training and testing on NAFR include operations on the TTR, which lies entirely within NAFR. The TTR consists of approximately 336,665 acres. Activities on the TTR include projectile firings, ground-launched rockets (both high altitude and low altitude), air-launched rockets, explosion effects tests, earth penetration tests, cruise missile flights, and many miscellaneous activities requiring a remote location for non-nuclear DOE Research and Development projects or for other safety or security reasons. The North Range includes Pahute Mesa, which is used by DOE through mutual agreement (Figure 1-5).

SOUTH RANGE

The South Range is approximately 1.2 million acres of withdrawn land located in the southeastern portion of NAFR. All the South Range lands were withdrawn for military use by PL 99-606. The South Range contains five weapons-delivery areas, which are subdivided into 43 target complexes containing approximately 280 targets. These areas include two manned subranges and three unmanned subranges. There are also three air-to-air subranges. Figure 1-7 shows the South Range weapons delivery areas.

The Air Force has submitted the required documentation for relinquishment of the Cactus Springs "Finger" to BLM. The Air Force and BLM are currently working to complete the relinquishment of this approximately 3,056-acre parcel. This area will not be part of the renewal (Figure 1-8).

The South Range overlaps a portion of the DNWR, which was established in 1936 for the protection and preservation of desert bighorn sheep (Figure 1-9). The MOU between the Air Force and USFWS regarding this "overlap" has been updated and amended, as necessary, to ensure proper management by the respective agencies. The DOE lands segregated by PLO 1662 are adjacent to the northwest corner of the South Range.

1.3.3 NAFR Environmental Programs

The Nellis AFB environmental stewardship program is a priority mission objective in all operations. The Environmental Management Directorate at Nellis AFB conducts an extensive environmental education and protection program on NAFR. Air Force Policy Directive 32-70 states that achieving and maintaining environmental quality is an essential part of the Air Force mission. To meet this mission requirement the Air Force has established a series of programs that:

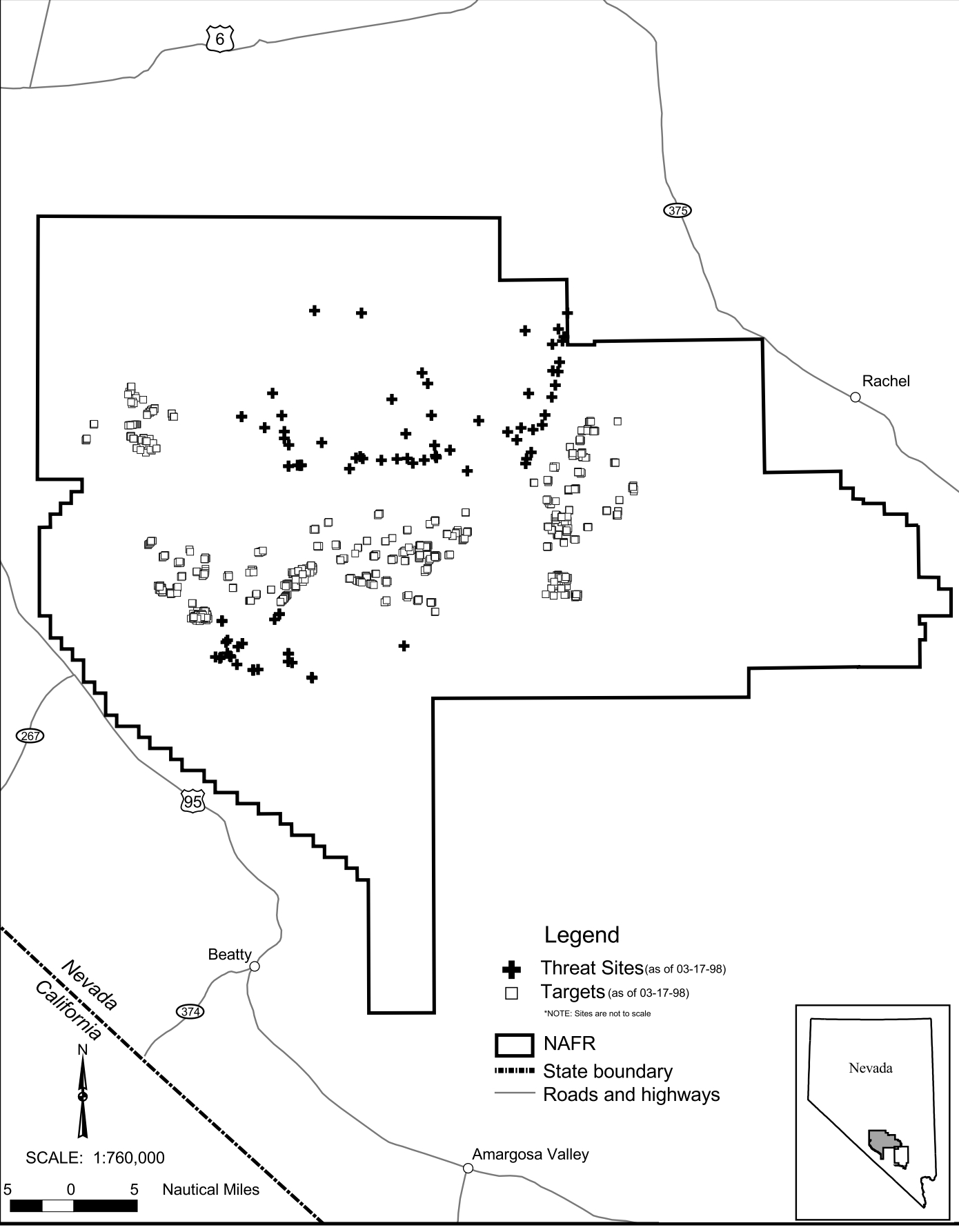


Figure 1-6. North Range Targets and Threat Sites (1997)

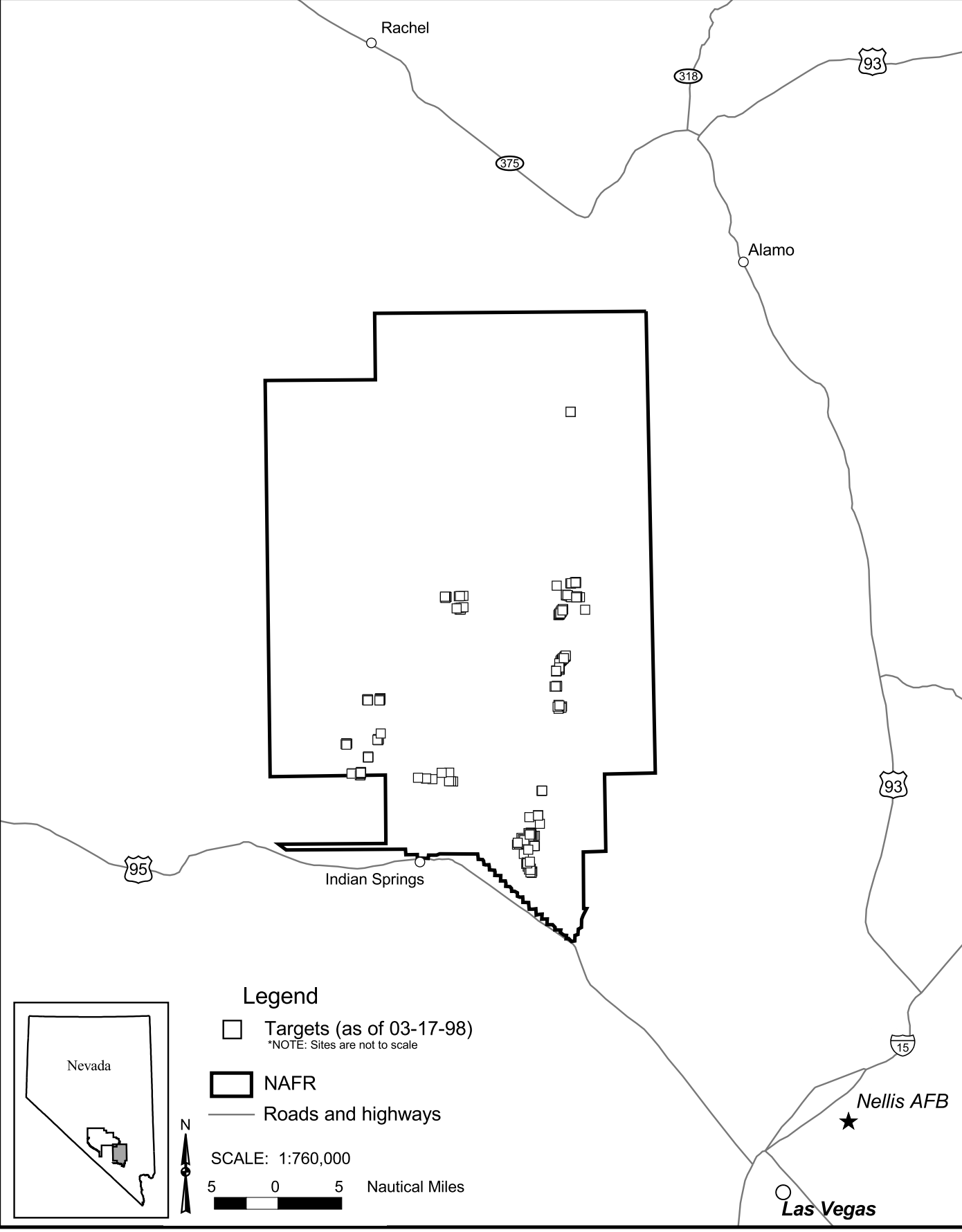


Figure 1-7. South Range Weapons Delivery Area Details

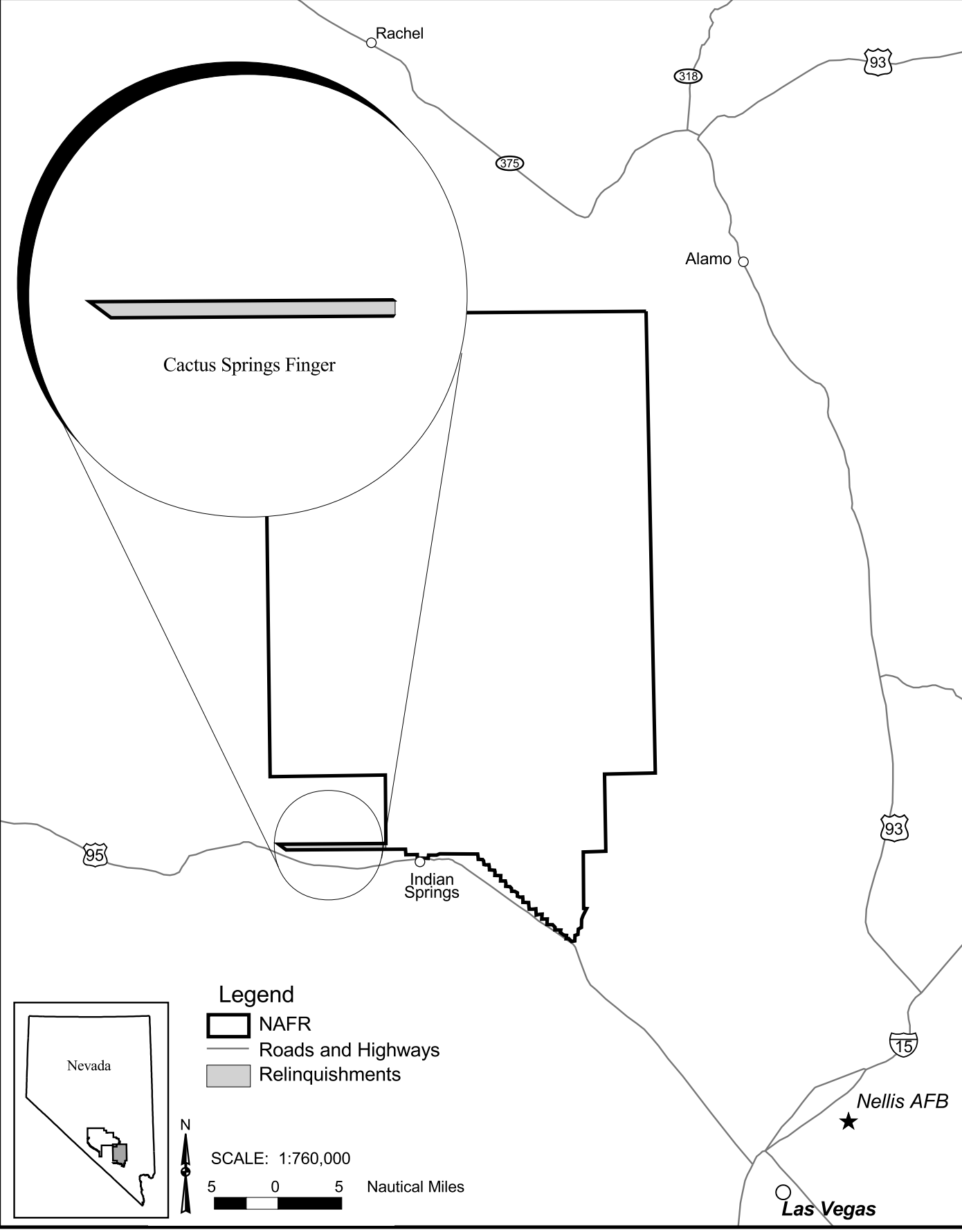


Figure 1-8. Location of the Proposed Cactus Springs "Finger" Relinquishment

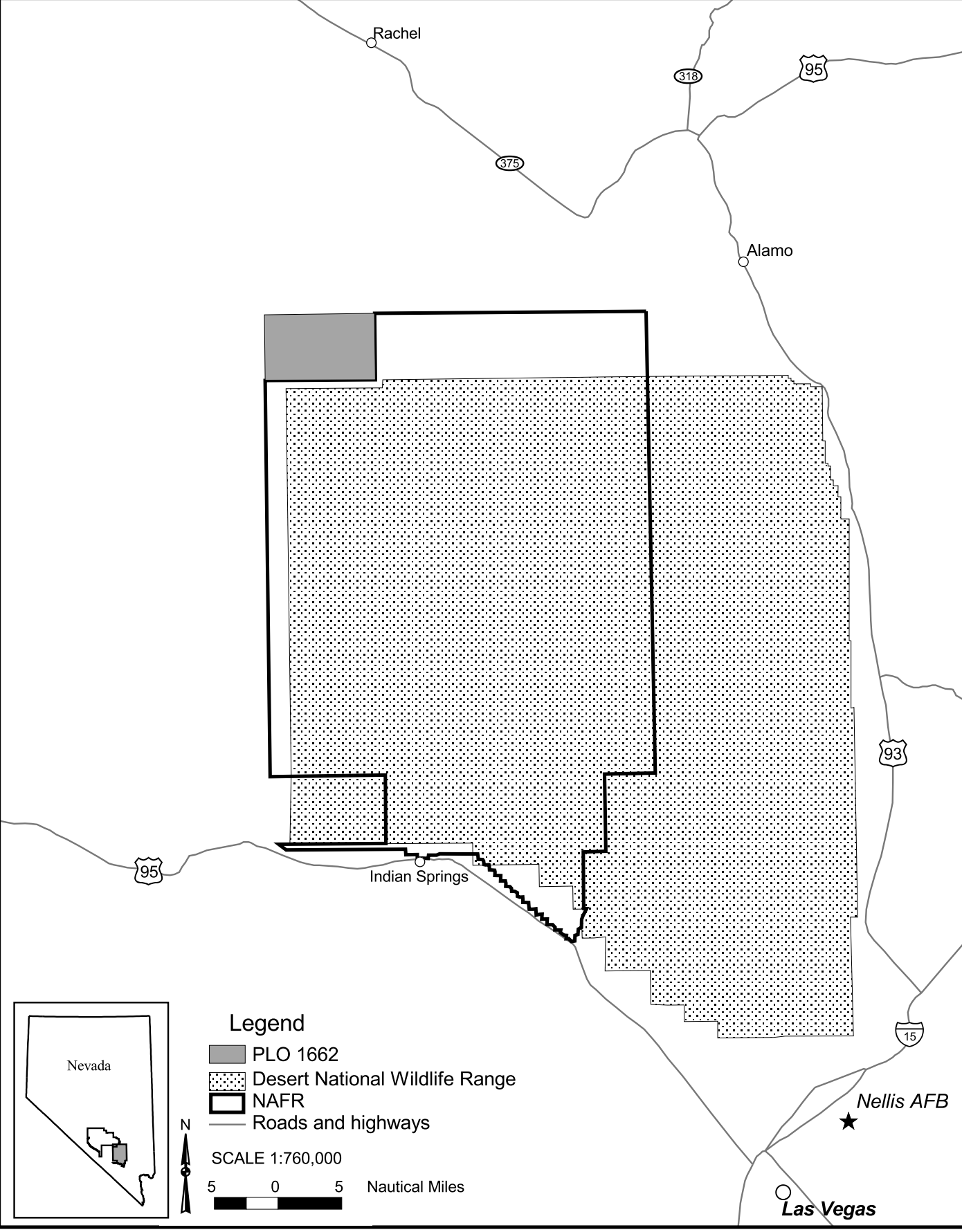


Figure 1-9. NAFR South Range: Desert National Wildlife Range and PLO 1662

- clean up environmental damage from past activities;
- comply with all environmental standards applicable to present operations;
- plan future activities to minimize impacts to the environment while meeting other mission objectives;
- responsibly manage natural and cultural resources on Air Force controlled lands; and
- eliminate pollution from Air Force activities wherever possible.

Within the bounds of available funding, each of these programs has been, or is being, completed on NAFR. The Installation Restoration Program (IRP) has identified and remediated locations of environmental contamination from past practices. Natural resource planning is occurring as part of the Integrated Natural Resource Management Plan (INRMP). Likewise, irreplaceable cultural resources on NAFR are being managed through the Cultural Resources Management Plan (CRMP). The Air Force Pollution Prevention program reduces the use of hazardous materials and the release of pollutants into the environment. Pollution prevention management plans and activities executing these plans address ozone-depleting chemicals, industrial toxics, municipal solid waste, material procurement programs, energy conservation and air and water pollutant reduction. The Air Force also maintains active environmental compliance activities with specific programs for air quality, water quality, solid and hazardous wastes, storage tanks and environmental compliance assessment and management (ECAMP).

Each of these programs is presented below and further described, as applicable in the relevant resources sections of Chapter 3.0.

CULTURAL RESOURCE MANAGEMENT PLAN

DoDI 4715.3 and AFI 32-7065 require the Air Force to prepare a Cultural Resources Management Plan (CRMP), update it annually and submit for approval at least every five years. The Nellis AFB CRMP concisely summarizes NAFR, its physical characteristics, mission, and mission impacts; the history, prehistory, and environment of the region and base locality; cultural resources identified to date; responsibilities of base personnel; standard procedures for each law and regulation; and plans for projects in the near future. Information on sites and other resources is reported separately for confidentiality reasons and only cited in the plan. The CRMP forms part of the composite constraints and opportunities database used to assess each project-specific proposal on NAFR.

INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

AFI 32-7064 requires the Air Force to prepare an Integrated Natural Resources Management Plan (INRMP). This instruction provides detailed guidance on how to implement the broader policies of those regulations. The INRMP, was developed with the participation of all stakeholders: individuals and organizations, both military and civilian, who have an interest in the management of NAFR natural resources. The final draft reflects the mutual agreement of

state and federal natural resources management agencies, and is made available to the public for comments. The INRMP describes the natural resources found on NAFR and the applicable laws such as the Endangered Species Act and the Clean Water Act (Section 404) which may be applicable to overall natural resource management. The Sikes Act Improvement Amendments of 1997 place increased emphasis on implementing the projects identified in the INRMP.

POLLUTION PREVENTION

Current instructions for solid waste management and the recycling of solid waste are outlined in AFI 32-7080, *Pollution Prevention Program*, AFI 32-7042, *Solid and Hazardous Waste Compliance, and* ACC Manual 32-751, *Environmental Quality*. These documents were originally released in 1994. Additional guidance on managing the recycling program is provided in the Air Force Resources Recovery and Recycling Program Guide. AFI 32-7080 requires NAFR to establish an umbrella organization for overseeing and managing solid waste recycling. The Range is required to recycle as much of the waste stream as possible and, as a minimum, recycle metals, plastic, glass, used oil, lead acid batteries, tires, high quality copier paper, cardboard, and newspaper. In addition, NAFR must operate a composting program or participate in a regional composting program.

Recent changes in the Pollution Prevention Program are driving the recycling program toward being self-supporting or at least taking into consideration the costs to operate the program. The shift from traditional P2 to Compliance Through P2 (CTP2) over the past year focuses the program on funding items and activities that solve compliance problems or reduce compliance vulnerability, not just achieve an AF goal. This philosophical change was reflected in the new DoD P2 Measure of Merit (MoM) on solid waste diversion. It states, "By the end of FY2005, ensure the diversion rate for non-hazardous solid waste is greater than 40%, while ensuring integrated non-hazardous solid waste management programs provide an economic benefit when compared with disposal using landfilling and incineration alone." Similarly, the draft of the new AFI 32-7080 states, "increase solid waste diversion rates where economically preferable through a Qualified Recycling Program."

INSTALLATION RESTORATION PROGRAM

The DOD developed IRP to identify and investigate potentially hazardous material disposal sites on DOD property. Suspected hazardous material sites identified in the IRP process were evaluated using a pattern of preliminary assessment (PA), site inspections (SI), remedial investigation/feasibility study (RI/FS) and remedial design/remedial action (RD/RA). Sites determined to not contain hazardous materials or that contain materials that (in consultation with appropriate regulatory agencies) would not be expected to require remediation are designated as requiring "no further action."

Ninety-eight IRP sites have been identified on NAFR since the IRP began at the range in 1982. Seventy-four of these sites were recommended for no further action based upon the initial PA. SIs were done for the remaining 24 sites including four sites on the DNWR. Two sites, a fire training area at ISAFAF and a septic tank at Range 65N, required remedial action under

CERCLA [limited hydrocarbon-contaminated soil removal at the fire training area and the removal of two underground storage tanks (USTs) and a septic tank at the Range 65N site]. These actions were completed in 1993. The field observations, immunoassay, and laboratory test results revealed no evidence of soil contamination at most of the locations sampled on NAFR. Metal concentrations were generally low and not a source of concern. The results of the SIs indicated that these IRP sites were not causing adverse environmental impacts. Two landfill sites at ISAFAF were recommended for long-term monitoring. Decision Documents (DD) for no further action have been accepted and signed by the Nevada Division of Environmental Protection (NDEP).

FIVE-PARTY COOPERATIVE AGREEMENT

The Air Force, USFWS, BLM, DOE, and the State of Nevada-Clearinghouse have established the Five-Party Cooperative Agreement to enhance management of the natural resources on NAFR, DNWR, and NTS. The goal of the working group is to foster a collaborative and complementary approach using a biodiversity conservation and ecosystem-based approach to enhance the management of these lands and their associated natural resources. The foundations of natural resource management of these lands are identified in the BLM NAFR Resource Plan, NAFR INRMP, DNWR Natural Resource Management Plan, and the NTS Resource Management Plan. The Five-Party Cooperative Agreement also delineates the responsibilities of each of the signatories. Meetings of the signatories are held, at least, annually. The annual meeting is open to the public. A representative of the CGTO is also invited to attend the annual meeting.

1.4 PURPOSE OF RENEWAL OF THE WITHDRAWAL

The purpose for proposing to renew the land withdrawal for NAFR is to continue to provide a location to test weapons systems and tactics and train military personnel to meet nationally directed missions. The missions are to (1) ensure and protect national security, (2) train for the full and integrated spectrum of military operations, and (3) ensure the continued protection of public safety. The following sections describe each of these mission requirements.

1.4.1 National Security

A variety of activities that are vital to National Security, some of which are classified, occur throughout NAFR. The range is used for testing technologies and systems, as well as training for operations critical to the effectiveness of U.S. military forces and the security of the United States. Some specific activities and operations conducted on NAFR, both past and present, remain classified and cannot be discussed within this document.

1.4.2 Military Operations and Training

The purpose of all military activity on NAFR is to enhance U.S. defense capability. Military operations (including training, testing, and support activities) include all activities and

infrastructure necessary to keep U.S. forces prepared for confrontation with any military force the United States might reasonably expect to oppose in the future. Military activities on NAFR support training and testing combat tactics, aircraft, their associated weapons systems, and all the activities that support those primary missions. The supporting infrastructure (all ground activities, facilities, equipment, personnel, and supporting airspace) must be able to produce a simulated combat environment that can be securely restructured to resemble anticipated threats to U.S. interests.

The dynamics of air combat have changed dramatically in the 50 years that NAFR has been used as a test and training range. When NAFR was first employed during World War II, airspeeds ranged from 250-400 miles per hour; today, modern fighters fly over 1,200 miles per hour (Mach 2). Missions during World War II and the Korean War usually involved one or two different types of aircraft. Today a multi-force strike mission may involve almost every type of combat aircraft in the Air Force inventory. Further, the weapons and sensors employed today by potential adversaries include a wide range of dispersed, camouflaged, and hardened radar-directed antiaircraft artillery sites, as well as both ground and air-launched radar-directed and heat-seeking missiles. For a mission to succeed, the Air Force must identify and defeat all these threats by simultaneously employing the entire range of available weapons, aircraft, and sensors.

Early in the Vietnam War, unacceptably high losses of aircraft and aircrews convinced the Air Force that enhanced and highly realistic training for aircrews was essential prior to entering combat. The complexity of new weapons and sensors, the speed of modern air combat, and the need to develop appropriate tactics when encountering unfamiliar enemy aircraft and air defenses moved the Air Force into developing training ranges and exercises that would better prepare aircrews for the reality of modern air combat. NAFR offers the Air Force, as well as other military services, an unparalleled opportunity to simulate the dynamics of combat. The training and testing that is ongoing at NAFR realistically simulates the modern combat environment and ensures the maximum potential for combat readiness, survival, and ultimately the best possible military operations capability. While combat results are the only true measure of combat readiness, the safe and secure land that comprises NAFR is essential to the combat-proven training and testing capabilities required by the Air Force and the nation.

1.4.3 Public Safety

The Air Force has established a variety of safety standards due to the hazardous nature of the weapons systems. The purpose of Air Force safety standards is to protect the public, military personnel, and equipment from accidental damage by weapons systems or practices. One NAFR mission requirement is to provide for public safety along with national security and military operations. Over the years, safety considerations at NAFR have resulted in rules, regulations, and operational practices that minimize the possibilities of harm to the public.

Public safety at NAFR is ensured by preventing public access near hazardous weapons detonation areas and to any areas exposed to risks from weapons system malfunction. The Air

Force activities at NAFR must provide for the necessary levels of public safety. Public safety includes (1) prevention of the public straying into dangerous areas, (2) identification of hazardous areas, and (3) risk minimization through management of potential hazards of military activities. Exclusion of the public from NAFR ensures that the public is protected from the dangers of an integrated battlespace environment and weapons testing and training range activities such as exploding ordnance, unexploded ordnance, unintentional ordnance releases, dropped objects, and electromagnetic effects.

Military procedures and activities also enhance the safety of military personnel and assets. The principal objective of training and test range safety procedures is to identify potential conflicts between aircraft activities and supporting ground operations. This is accomplished by scheduling compatible aircraft and land-based activities and placing limitations on hazardous activities.

1.5 NEED FOR RENEWAL OF THE NAFR LAND WITHDRAWAL

The Air Force is committed to providing the U.S. aerospace power to deter aggression, and if deterrence fails, to win on terms favorable to the United States. To do this, the Air Force must field the world's best-trained and best-equipped force, ready to immediately respond to any threat, anywhere in the world.

Our nation's airspace and test and training ranges are critical to fielding the world's finest trained aircrews and best equipped airspace force. To operate proficiently in today's dynamic world, the Air Force must provide cost-effective ranges so that our aircrews can realistically test and train the way they and their equipment will operate. This real-world training ensures U.S. aircrews are ready to respond to real-world needs when necessary. The NAFR, a properly sized and located range, is vital to providing such realistic training.

Land withdrawn for NAFR is needed to provide a secure, flexible range for large-scale military testing and training. A flexible range is capable of rapid adjustment to accurately simulate complex military operations required by the dynamics of world-wide threats to our national security interests. The range land and airspace must accurately simulate the potential battle area that aircrews would expect to encounter. NAFR is the most realistic training and test area in the world because our historic national investment has created an integrated battlespace environment.

The NAFR battlespace environment is the land and airspace that allow for realistic simulation of a battle area, complete with surface and air defense systems, command and control systems, realistic targets, and defensive threats, as well as training systems and instructional aids that provide almost instantaneous test and training feedback. The training supported by NAFR enhances national security by preparing aircrews for increasingly complex military operations. These test and training activities are performed in an exclusive use area to ensure national security and public safety.

A historical review of aerial combat shows that most losses occur at the start of aircrew participation in a conflict. In the Korean and Vietnam wars, the greatest losses to U.S. aircraft and aircrew were experienced during the first ten combat missions. These losses were the result of a lack of realistic training and testing. U.S. flyers had no experience with the integrated ground and air threats they encountered in combat. The United States needed to provide a battlespace training experience that simulated the first 10 combat missions to reduce that high initial loss rate. NAFR provides that battlespace experience.

Today, NAFR facilities realistically simulate the conditions aircrews will encounter in air combat. During Desert Storm, U.S. and coalition aircrews, most of whom had trained at NAFR, demonstrated that skillfully applied precision weapons can play a decisive combat role. Many American and allied lives were saved by the destruction of the Iraqi command, control, and communication system and airfields by precise application of air and space forces trained and tested at NAFR.

According to former Secretary of the Air Force Sheila Widnall:

> Advanced, sophisticated airframes are only part of the equation. Fully trained, combat-ready aircrews are an essential ingredient of combat readiness. To maximize economy and efficiency, our aircrews think globally but train locally…. To guarantee that our combat aircrews remain prepared to meet the security needs of our nation,… we train the way we fight, we ensure the highest state of readiness possible, while getting the most capability out of sophisticated weaponry. Technology gives us the cutting edge, but only if aircrews can employ that technology to its fullest. That ability comes only with demanding, realistic, and frequent exercise of all systems — command and control, aircrew, and equipment.

General Charles Horner, who led coalition air forces in Operation Desert Storm, pointed out in March 1996 that Nellis AFB and Range played a key role in the victory in the Gulf War:

> If you're going to look to things that made our successes in the Gulf War, you have to look at things like Blue Flag and Red Flag. Red Flag is fundamental to our learning to fight together, not only in the Air Force but also with the other joint services and in the future when coalition forces assemble. So Nellis is fundamental to the future warfare, particularly airpower.

The development, exercise, and validation of systems is crucial to the continuation of military capabilities. New ideas, equipment, and technologies are introduced and tested for operational suitability and effectiveness. As these systems are proven effective or suitable, tactics are developed to integrate and improve their operational employment. These tactics are tried and perfected to maximize combat capability. Then, before aircrews are sent into combat, they are trained to use these tactics and technologies against the targets and defensive threats that they can expect to encounter. New technology requirements come back to this process through actual employment or through extensive training in the simulated combat environment. These requirements then start a new development and testing cycle.

NAFR currently provides the realistic combat conditions needed for military testing and aircrew training on the use of new ideas, equipment, and technology. The capabilities provided by NAFR include the following:

- Weapons systems tactics and training for single-aircraft weapons delivery and multiple-aircraft target attack training.
- Large-force training exercises (Red Flag, Green Flag).
- Other specialized training events, such as Gunsmoke, Longshot, JSEAD, Capstone, and Weapons School Mission Employment.
- Comprehensive operational test and training as part of new weapons system development.

The Air Force needs land to accomplish the missions described in section 1.3. The three NAFR missions described — national security, testing and training for military operations, and ensuring public safety — are segregated into operational requirements in this section. The extent to which NAFR lands meet the operational requirements has been evaluated by the Air Force and is detailed for each of the three missions below.

1.5.1 National Security

Preservation of national security can best be achieved by isolating sensitive military activities. The Air Force limits exposure to classified and essential elements of military operations. This isolation is accomplished at NAFR by providing a buffer between sensitive military operations and unauthorized individuals.

1.5.2 Military Operations (Testing, Training, Tactics Development)

The withdrawn land at NAFR and associated airspace supports weapons system operational testing and evaluation, tactics development, and training capability to meet the needs of U.S. and allied tactical air forces. The Air Warfare Center (AWFC) at Nellis AFB is responsible for NAFR and its use. AWFC coordinates training, testing tactics development, and all ground-based support activities associated with maintaining and using NAFR. AWFC strives to provide the most capable training and testing asset in the world for the United States and its allies.

The capabilities made available by NAFR are in extremely high demand. Tactics and training missions on NAFR annually expend over 70 percent of ACC live ordnance and over 40 percent of the total Air Force practice ordnance expended worldwide. Most of the U.S. and some of the coalition aircrews received their first “combat” missions at NAFR’s simulated battlespace before fighting the 1991 Gulf War.

Military use of NAFR and associated airspace in the NRC varies from year-to-year, depending on many factors. These factors include Congressional funding levels, weapons testing requirements, aircrew training requirements, and the actions of the international community that may pose a threat to the security interests of the United States or our allies. The range of

aircraft use of the NRC was estimated based on an evaluation of historic use of the NRC by aircraft associated with NAFR. This evaluation is summarized in Appendix A. Tables 1.5-1 and 1.5-2 summarize the test and training operations using NAFR and associated airspace. These tables present data for aircraft that historically have been used in testing and training using assets of NAFR. It is anticipated that the aircraft and weapons systems described here, or upgraded versions, or replacements, will be tested and used in training at NAFR in the foreseeable future.

LARGE FORCE TRAINING EXERCISES: RED FLAG/GREEN FLAG OPERATIONS

Red Flag and Green Flag are special, high-priority use, multi-force training exercises that realistically simulate large-scale multiple aircraft engagements. Red Flag exercises not only increase the combat capability of U.S. and allied armed forces, they enhance the ability to integrate these forces to meet the dynamic challenges of future conflicts. The highest mortality rate among fighter pilots occurs within the first ten missions of combat. By providing realistic combat training scenarios, new fighter pilots receive their first ten missions during Red Flag and Green Flag. As a result, the survivability rate is substantially increased. To ensure realism, these exercises require large blocks of airspace in addition to large exclusive use areas and the infrastructure that is only offered by NAFR and its surrounding airspace.

Each Flag exercise is a multi-week, complex, full-scale, simulated war game, complete with aggressor aircraft simulating potential adversary tactics, ground threats, emitters, and target arrays. These exercises are designed to teach air and ground units how to deploy and operate together in an integrated manner. Air units from all military branches and many allied foreign air forces participate. In a typical year, five Red Flag exercises are planned at NAFR.

Most of the aircraft and personnel deployed to Nellis AFB for Red Flag make up the exercise's "Blue" forces. These forces use various tactics to attack targets on NAFR such as mock airfields, vehicle convoys, tanks, parked aircraft, bunkered defensive positions, and missile sites. These targets are defended by a variety of "Red" forces that simulate ground and air threats to give participating aircrews the most realistic combat training possible.

The adversary or "Red" force ground assets include simulated surface-to-air missiles, anti-aircraft artillery, actual communications, and other electronic jamming forces. These ground forces are supported by an opposing enemy air force composed of Red Flag's Adversary Tactics Division pilots. These pilots fly the F-16C and are specially trained to replicate the tactics and techniques of potential adversaries. Their mission is to attack the "Blue" forces and prevent penetration into the target area.

A typical Red Flag exercise involves a realistic variety of attack, fighter, and bomber aircraft (F-16s, A-10s, B-1s, etc.), reconnaissance aircraft, electronic countermeasures suppression aircraft

Table 1.5-1. Projected Minimum Annual Sortie-Operations[2] within the NRC by Aircraft Type

Aircraft Type	TEST AND TRAINING		*Military Operations Area*	*Test & Training Total[1]*	*Large Force Exercises Total Sortie Operations*	*NAFR Total[2]*
	North Range	*South Range*				
AV-8B	205	451	145	801	797	1,598
A-10	2,512	6,779	284	9,575	78	9,653
B-1	331	40	172	543	3,303	3,846
B-2	6	9	0	15	69	84
B-52H	190	133	106	429	428	857
C-130	8	34	8	50	2,085	2,135
C-141	0	0	0	0	251	251
E-3	2	0	5	7	160	167
EA-6B	2	0	2	4	1,174	1,178
F-14	418	8	293	719	1,283	2,002
F-15	13,853	4,060	9,916	27,829	21,601	49,430
F-16	28,105	10,377	15,805	54,287	37,767	92,054
F/A-18	1,006	226	936	2,168	3,892	6,060
F-117	3	11	3	17	165	182
KC-10	0	0	0	0	65	65
KC-135[3]	17	10	6	33	2,206	2,239
Mirage	18	0	5	23	2,219	2,242
Small props	1,737	10	11	1,758	126	1,884
Tornado	359	0	101	460	0	460
Helicopters	4,108	1,082	307	5,497	477	5,974
Other	12,466	4,825	72	17,356	282	17,639
Total	65,340	28,055	28,177	121,571	78,428	200,000

Notes: 1. Test and training total consists of the North Range, South Range, and MOA values.
2. NAFR total consists of the test and training total plus the large force exercises total sortie operations values.
3. Includes other variants (e.g., E-8C).

2 A sortie-operation is the use of one airspace area or subdivision by one aircraft during the course of a sortie mission.

Table 1.5-2. Projected Maximum Annual Sortie-Operations within the NRC by Aircraft Type

Aircraft Type	TEST AND TRAINING		*Military Operations Area*	*Test & Training Total*[1]	*Large Force Exercises Total Sortie Operations*	*NAFR Total*[2]
	North Range	*South Range*				
AV-8B	307	676	217	1,200	1,196	2,396
A-10	3,768	10,168	426	14,362	117	14,479
B-1	497	60	257	814	4,954	5,768
B-2	9	13	0	22	104	126
B-52H	285	200	159	644	637	1,281
C-130	12	51	8	71	3,127	3,198
C-141	0	0	0	0	377	377
E-3	3	0	8	11	240	251
EA-6B	3	0	3	6	1,762	1,768
F-14	627	12	439	1,078	1,924	3,002
F-15	20,779	6,090	14,875	41,744	32,402	74,146
F-16	42,157	15,565	23,707	81,429	56,651	138,080
F/A-18	1,510	339	1,404	3,253	5,838	9,091
F-117	4	17	5	26	247	273
KC-10	0	0	0	0	98	98
KC-135	26	14	9	49	3,309	3,358
Mirage	27	0	8	35	3,329	3,364
Small props	2,606	14	17	2,637	188	2,825
Tornado	538	0	151	689	0	689
Helicopters	6,162	1,623	460	8,245	715	8,960
Other	18,783	7,161	103	26,047	423	26,470
Total	98,103	42,003	42,256	182,362	117,638	300,000

Notes: 1. Test and training total consists of the North Range, South Range, and MOA values.

2. NAFR total consists of the test and training total plus the large force exercises total sortie operations values.

(EA-6Bs, and F-16s, etc.), air superiority aircraft (F-15s, F-16s, etc.), airlift support (C-130s, C-141s, etc.), search and rescue aircraft (HH-60s, HC-130s, etc.), and aerial refueling aircraft (KC-130s, KC-135s, KC-10s, etc.) and ground operations. The E-3A Airborne Warning and Control System (AWACS) aircraft plays a significant role in the training by using its unique radar capabilities to monitor and support many aspects of the "Blue" force effort.

NAFR electronic infrastructure provides mission assessment debriefings that form the basis for aircrew lessons learned. The Red Flag Measurement and Debriefing System (RFMDS), along with Television Ordnance Scoring and threat video replays, provides accurate re-creations of the Red Flag missions. The RFMDS is a computerized tracking system currently capable of displaying real-time interaction and information on multiple aircraft, threats, and ground targets.

Green Flag, the Air Force's premier electronic warfare flying exercise, is held once a year and usually involves about 400 people drawn from Air Force units from around the world. The event is subdivided into three consecutive two-week programs, with new units involved in each. In addition to aircraft, threats, and targets, the focus of Green Flag is on military intelligence, which is gathered, analyzed, and distributed during the exercise. Each two-week segment is normally commanded by a general officer functioning as a joint-force, air-component commander and also involves air and ground operations and battle planning staffs. In addition to aircraft used in Red Flag exercises, intelligence-gathering aircraft, such as the RC-135 Rivet Joint, play a key role in these events.

DESERT WARFARE TRAINING CENTER

The Desert Warfare Training Center, known as Silver Flag Alpha, is the ACC's air base defense school at Nellis AFB. Approximately 3,600 Air Force security police, law enforcement personnel, and Army, Navy, and Marine units are trained annually in desert combat tactics and in providing security for air bases. A wide variety of small arms munitions and ordnance, from rifle and machine gun ammunition to anti-tank rockets, are expended on live-fire ranges on Range 63A, where Silver Flag Alpha is based (see Appendix A).

GUNSMOKE

Gunsmoke is the ACC gunnery and bombing competitive training exercise held at Nellis AFB every other year.

LONG SHOT

Long Shot is a global power projection competitive exercise held at NAFR every other year. Long Shot tests units' ability to both deploy and attack targets.

GROUND ACTIVITIES AND TARGETS

In addition to achieving air superiority, the Air Force is tasked with identifying and destroying the enemy's assets on the ground. Targets range from fixed, heavily defended sites such as

airfields, bridges, and command and control bunkers, to mobile air defenses, tanks, and troop concentrations. At NAFR, targets or impact areas are required to provide weapons delivery and air combat training for all types of ground targets. Targets provide the greatest challenge to air combatants when they are present in large quantities, concentrated at a distance from the combatant, and locally dispersed. To ensure test and training realism, some targets are attacked from the air and/or by ground forces. Ground tactics are tested and forces trained to ensure their ability to perform their assigned missions, which integrate Air Force assets with Army, Navy, and Marine Corps forces. Targets are attacked using small-scale ground assault, ground/air-launched cruise missiles, Multiple Launch Rocket Systems, and/or light artillery. An air combatant will be most challenged when defensive systems, both airborne and on the ground, are at the same lethal distance at the same time and all around in three dimensions. The capability to provide as many of those conditions as possible is the goal of any quality training range. At NAFR, the 440 air-to-ground impact areas are dispersed and of sufficient quantity to push the limits of personnel and weapons system capability.

The distance between targets is a major component of training realism. Limitations to target separation, type, or quantity diminish training effectiveness and combat readiness. Potential adversaries do not arrange their assets for convenient destruction. In reality, various military targets are dispersed, camouflaged, defended, and hardened depending on the type of asset and its resource requirements. Further, they are frequently mobile (such as the SCUD missiles encountered in Operation Desert Storm). NAFR distances between targets are a tremendous asset to training effectiveness and combat readiness.

NAFR infrastructure supports the purpose of providing realistic training and testing capability that simulate combat conditions and characteristics. Target arrays accommodate a wide variety of training and test requirements. Infrastructure designed to provide realistic targets (including infrared signatures and moving targets) and threat presentations (SAM sites), as well as prolonging target life, are examples of innovative new training and testing target development. The exclusive use of NAFR also supports unique military forces testing capability for missile launch and recovery, robotics, nuclear materials handling, and stockpile management practice in realistic conditions.

The annual cleanup of target areas is called “Coronet Clean.” In addition to partial range clearances, Coronet Clean was instituted in 1975 to further reduce hazards associated with unexploded ordnance (UXO). This process of range decontamination includes removing and disposing of UXO, inert ordnance residue, training projectile ammunition, and other range material. Explosive ordnance disposal (EOD) personnel inspect ordnance residue and render UXO safe by detonation. Non-EOD range or contractor personnel then remove safe and/or inert ordnance residue, training projectile ammunition, and other range material. The interval and clearance areas are dependent upon the class of range involved.

Class A, B[3], and C[4] Conventional Ranges: Each year the area surrounding the targets used for missile, rocket, and bomb training is cleared of all unexploded ordnance and inert residue to a radius of 2,000 feet from each tactical target. At the same time, the roads into targets are cleared out to 100 feet on both sides of the roads.

Five-Year Clearance: All hazard impact areas on the entire range for which the Air Force is responsible are cleared every five years (20 percent of the range per year). This clearance includes inspection, removal, and disposal of munitions and unusable debris.

WEAPONS AND SELF-PROTECTION SYSTEMS USE

The use of ordnance and self-protection systems (chaff and flares) are essential for realistic training. Aircrews must be skilled in the use of the full range of conventional Air Force weapons, from unguided ordnance to laser-guided bombs to air-to-ground missiles and self-protection systems. Section 1.6.3 details ordnance used on NAFR. Table 1.5-3 displays a summary of munitions use on NAFR from 1991-1995 (nuclear, chemical, and biological weapons are not used on NAFR). A more complete listing of the types and amounts of ordnance and self-protection units expended while using the NRC is presented in Appendix A. The use of these materials varies from year-to-year according to the particular testing and training requirements. The expenditure of these materials is not directly tied to the number of sortie operations flown in the NRC. It would be expected that chaff use would range from approximately 270,000 to 405,000 bundles per year. Likewise, flare use would vary from approximately 60,000 to 95,000 units per year.

Table 1.5-3. Ordnance Use (tons/year) on NAFR 1991-1995

Year	*Inert (Non-Explosive)*	*Live (Explosive)*	*Total*
1991	1,998	1,692	3,690
1992	1,948	1,662	3,610
1993	1,779	1,636	3,415
1994	1,641	1,393	3,034
1995	2,401	2,103	4,504

Note: 1991-1993 are estimated data.

NAFR provides for safe training, testing, and evaluation of weapons and self-protection systems in support of potential technological improvements in hardware, software, tactics, and

3 This range may be either manned or unmanned and has a scoring capability from the ground but does not have a Range Control Officer on the ground controlling aircraft. The flight lead, forward air controller, or other personnel as briefed will have Range Control Officer responsibilities.

4 This range is unmanned, with no scoring or aircraft control from the ground. The Range Control Officer function may be performed by the flight lead, forward air controller, or other person as briefed.

training. Weapons system and live ordnance testing capabilities are prime purposes of exclusive military use of large land areas. Ordnance testing, particularly of live rocket-propelled ordnance, requires that large areas within the range of the ordnance be under exclusive control for safety and security.

SUPPORTING AIRSPACE

There is a direct relationship between size of the available airspace and training effectiveness. Airspace that supports NAFR permits simulation of a modern air combat environment. These requirements are dictated by the operational characteristics of modern military aircraft (e.g., speed, rate of turn, climb).

Airspace size affects training effectiveness by the number of aircraft and types of missions that can be supported. Available special-use airspace is large enough for air-to-air combat that permits radar intercepts beyond visual range. NAFR's airspace (shown on Figure 1-10) produces large gains in training effectiveness and combat readiness by accommodating many missions and types of aircraft. NRC airspace, including the airspace above NAFR lands, is described in section 3.1.

Military units must train and test as close to full capability as possible. To achieve their full capability, aircrew and weapons systems need airspace, land, and infrastructure as close as possible to a realistic battlespace environment. This type of environment ideally involves a minimum of an 80-by-150 nautical mile (NM) airspace for a single-attack axis, a circle of 300 NM in diameter for all-around attacks, or a 150-by-300 NM oblong shape for two target areas and simultaneous attacks. The airspace associated with NAFR provides minimum support to the mission with an 80-by-150 NM corridor for a single-attack axis. Figure 1-11 depicts the single-axis, single target area requirement.

OPERATIONAL TESTING REQUIREMENTS

NAFR is a key to U.S. military test activities and tactics development for new weapons systems. As such it is part of the DOD's Major Range and Test Facility Base (MRTFB). An MRTFB is defined as a national asset that shall be sized, operated, and maintained primarily for DOD test and evaluation support missions but is also available to all users having a valid requirement for its capabilities. The acquisition or sustainment of a weapon system requires specific research developmental test and operational test activities to reduce risk and ensure the system is suitable and effective. Developmental Test and Evaluation (DT&E) is test and attack evaluation conducted to evaluate design approaches, validate analytical models, quantify technical performance, measure progress in system design and development, minimize design risks, predict integrated system operational performance (effectiveness and suitability) in the intended environment, and identify system problems to allow for early correction. Operational Test and Evaluation (OT&E) is testing and evaluation conducted in as realistic an operational environment as possible to estimate the prospective system's operational effectiveness and operational capability. Note that each form of test and evaluation (T&E) requires exercising the

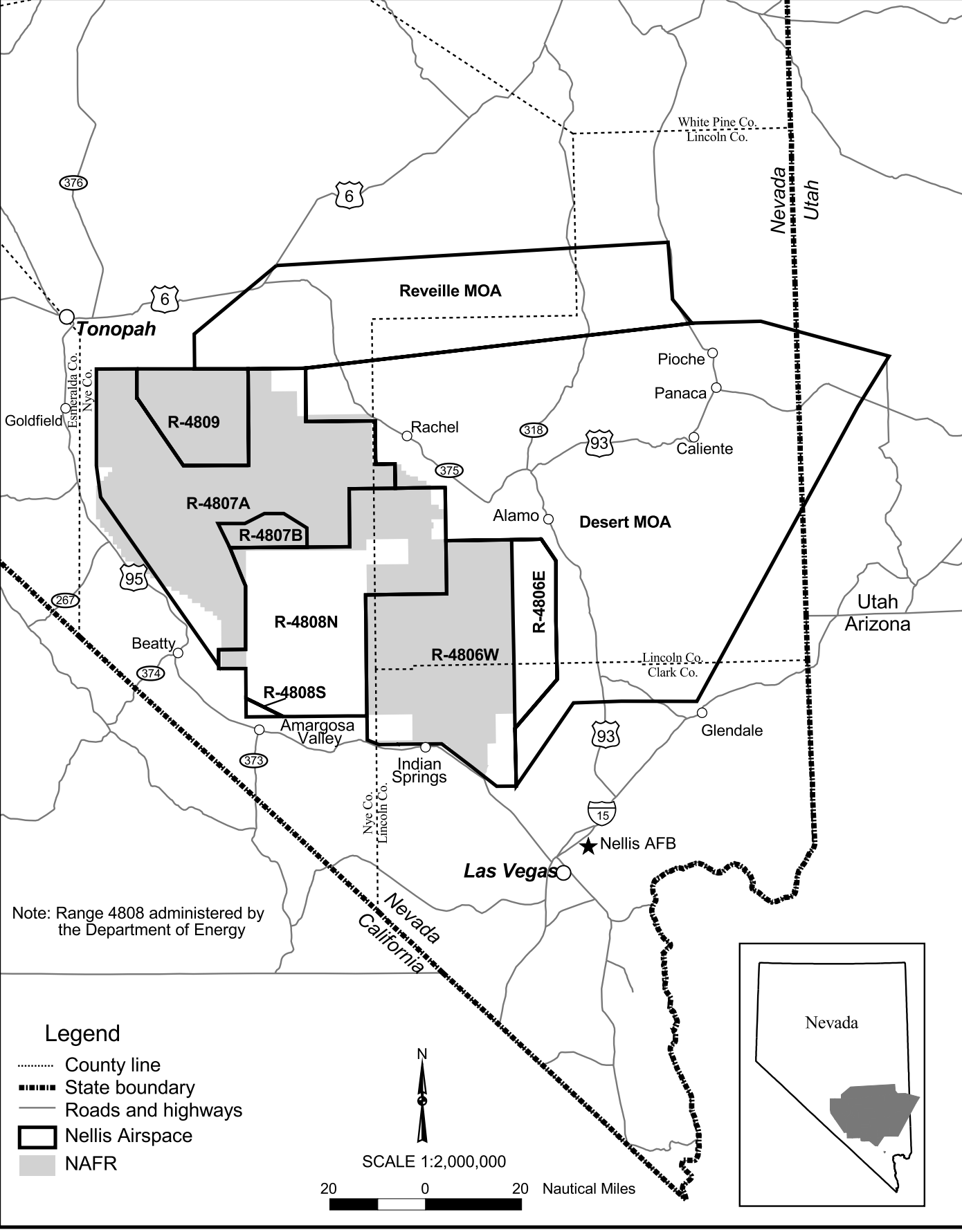


Figure 1-10. Nellis Range Complex Airspace

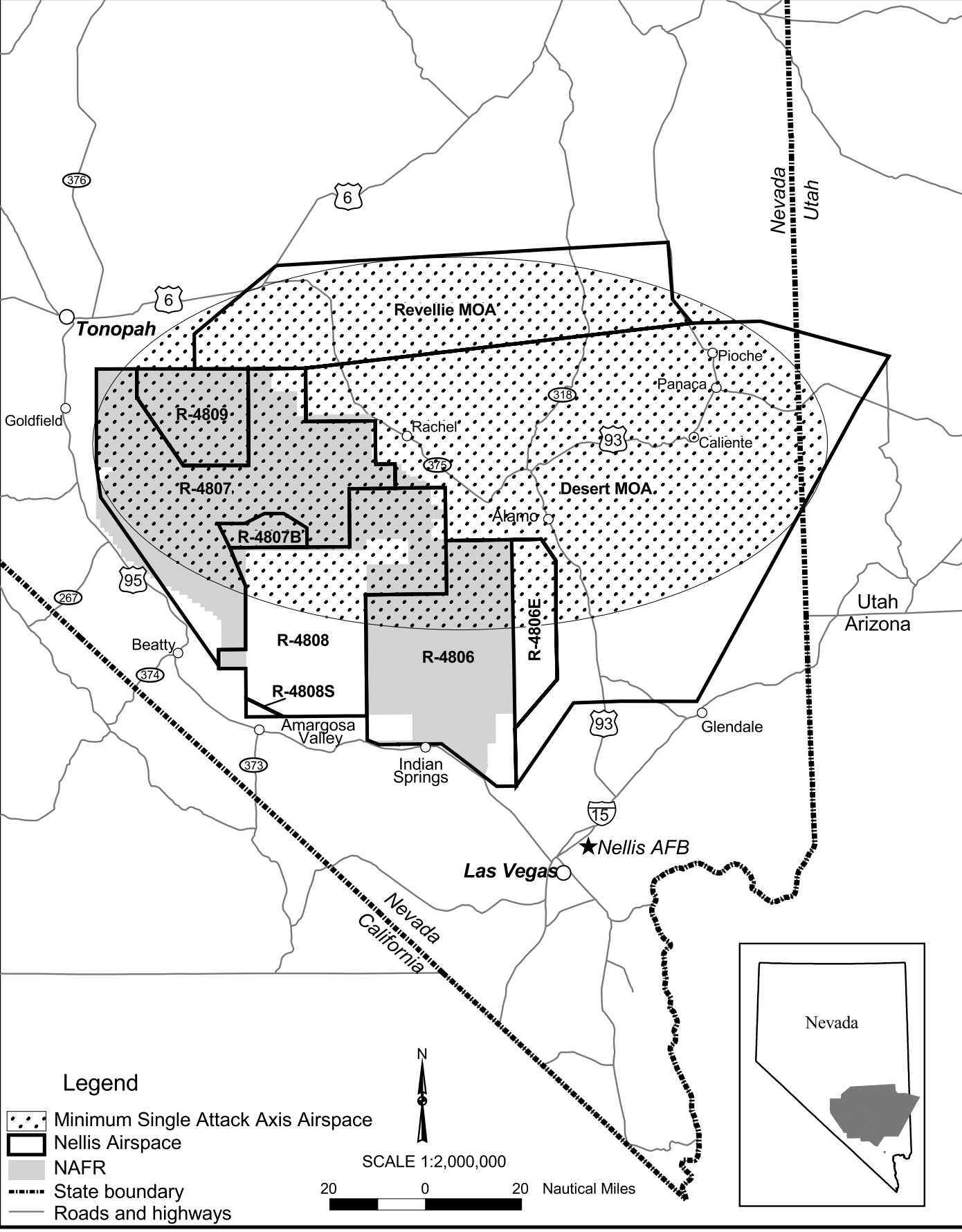


Figure 1-11. Idealized, Unrestricted Single Attack Axis, Airspace Requirement

system in a realistic operational environment. Open-Air Ranges (OARs) are used to evaluate systems in realistic backgrounds, clutter, noise, and dynamic environments. Additionally, research projects frequently require an OAR environment due to the large potentially affected area of the immature weapon concept being tried or the need to protect the security of the emerging weapon concept. Each of the aircraft and their associated systems and weapons discussed in section 1.6 has been tested on NAFR. Future aircraft and projected systems discussed in this section are similarly already scheduled for testing at NAFR.

These research or T&E activities require special infrastructure on NAFR to support specific objectives. NAFR infrastructure provides for the following:

- evaluation of new technology systems that must be understood completely across a wide spectrum of capabilities;
- advanced level testing of upgrades and enhancements to existing systems; and
- treaty compliance technologies and other nuclear stewardship practices, robotics, missile shot and recovery tests, and experimentation.

Weapons testing in the safe and secure NAFR environment is an integral part of the constant improvement cycle of weapons systems. The testing supports DT&E for air-to-air, air-to-ground, EC, and ground-to-ground combat capabilities as follows.

- Air-to-air testing includes the following ground instrumentation to measure for air combat maneuvering instrumentation (ACMI) ranges with the RFMDS facility; air-to-air gunnery range for aircraft gun / gunsight testing; aircraft and missile targets testing; and dynamic and static infra-red targets testing, and avionics software testing.
- Air-to-ground test capability includes ground-based Command and Control (C2) evaluation; open-air weapons evaluation; serial targets evaluation; ground, fixed, and mobile targets evaluation; radio frequency and sensor targets (nondestructive) evaluation; cruise missile flight tests; ballistic flight test weapons evaluation; operational test of weapons launch, release and separation; bombing (separation and accuracy) testing and evaluation; end game scoring system testing; multi-mode missiles and munitions testing; weapons system dispensing (submunitions) testing and evaluation; aircraft and missile targets use and dynamic and static infra-red targets use and testing.
- Ground-to-ground testing includes launch and recovery of surface-launched missiles, recovery of components, and ground shooting of large weapons for testing and training.

EC testing at NAFR uses ground-based instrumentation and is mostly tactics development and countermeasures testing. The final OAR component of the testing cycle is preceded by a series of other components at other Air Force test facilities, primarily operated by the Electronic Warfare Directorate at Edwards AFB, California. NAFR is a unique asset for weapons system OT&E. NAFR provides a unique realistic combat environment that permits employment of a large combat force in land and airspace for OT&E. NAFR includes extensive capability for air

combat maneuvering instrumentation, EC infrastructure, and large-force tactics development capabilities.

The NAFR tests are supported by the ground-based infrastructure throughout the ranges. NAFR supports testing and evaluation of U.S. and its allies' military systems and uses the same test resources to provide training capability.

1.5.3 Public Safety

The implementation of safety measures ensures public protection from the inadvertent consequences of a realistic battlefield environment. This protection is ensured at NAFR by excluding the public and non-required military personnel from locations simulating an active, high-stress battlefield environment. Air Force control of NAFR enables flight and ground operations to train and test equipment for the defense of national security interests while minimizing risks to the public. The Air Force uses Operational Risk Management (ORM) for making decisions that promote safe operations. ORM produces standards used to identify and avoid land use conflicts and minimize hazards to the public, military personnel and equipment from ordnance impacts. Long-range weapons present hazards from the point of intended release or firing of missiles to the maximum distance possible (based on any malfunction). For live-fire air-to-ground missiles, the distance traveled could be in excess of 60 NM. Figure 1-12 shows the ideal air-to-ground safety requirement with a 15-NM circle around each potential NAFR target impact area. Ground-to-ground missiles have the potential to travel long distances but have more reliable accuracy characteristics. Some newer air-to-ground ordnance may require a 30-NM safety buffer.

The use of live ordnance is necessary for testing and training. All firing or release of weapons must be conducted in a manner that ensures impact within the hazard area (see section 3.3.3). For air-to-ground missiles and free-fall guided weapons, the land area and airspace must be large enough to contain the entire flight envelope of the weapon from launch / release to impact. Weapons safety buffers are developed for all aircraft, weapons, and delivery systems employed in training / testing. For example, the safety buffer for the AGM-65 Maverick is 9.6 miles beyond the target, 6.3 miles short of the target, and 4.8 miles across the release path. In the foreseeable future, training and testing for the newly developed Joint Direct Attack Munition (JDAM) may increase the safety buffer needs to approximately 27 by 26 miles.

Unmanned aerial vehicles (UAVs) may require safety buffers during testing. As the largest exclusive-use, land-based range in the continental United States, NAFR can accommodate existing and projected future safety buffers.

Realistic training on NAFR includes realistic threats. Electronic threat emitters are deployed throughout NAFR. Many of these threat systems are mobile. Ground-launched threats, such as Smokey SAMs (simulated surface-to-air missiles), also present a falling object hazard and require exclusive-use land to ensure public safety. Exclusive-use land to the limit of the hazard

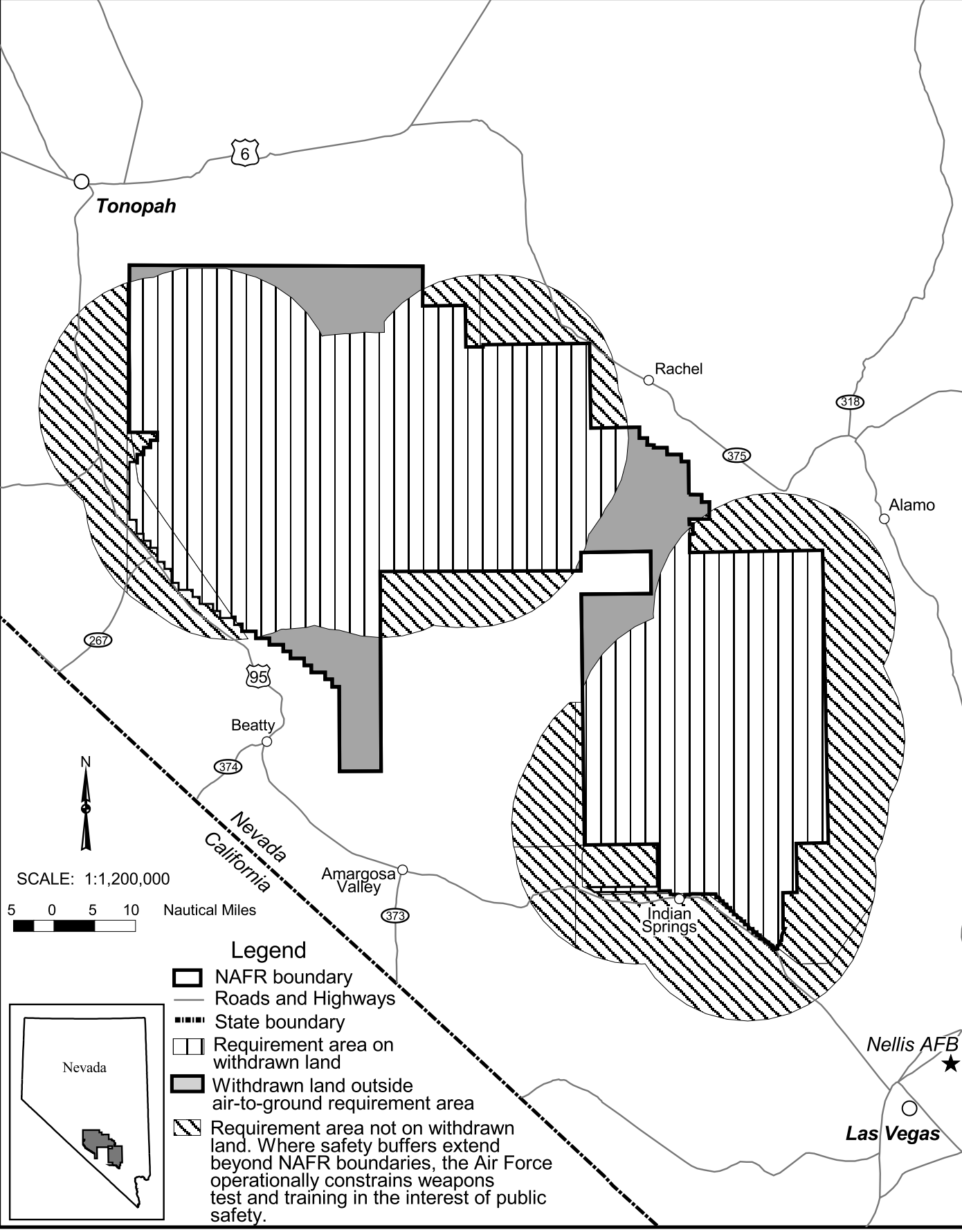


Figure 1-12. Unrestricted 15 Nautical Mile Air-to-Ground Safety Requirements

is provided at NAFR. Some of these systems pose hazards to personnel, who are directed to maintain a safe distance from operating systems. The AN / MPS-14 emitter / receiver has the largest electromagnetic hazard distance of nearly 785 feet.

Isolation of hazardous materials and dangerous operations from the public and unauthorized military personnel provides the greatest safety margin. Each weapon system is evaluated for hazards associated with operations, maintenance, and military capability. Operational rules, regulations, and practices minimize the chance of personnel injuries.

1.6 AIRCRAFT OPERATING AT THE NELLIS RANGE

In more than 50 years of operation, a wide variety of aircraft, both U.S. and foreign, have been tested and used for training on NAFR. This section describes typical aircraft and their missions that are currently or projected to be operational.

1.6.1 Current Aircraft and Weapons Systems

F-15C EAGLE

The premier air-to-air fighter in the Air Force inventory, the F-15 was first produced in 1972 as an air-superiority aircraft. Weighing over 20 tons, it carries both heat-seeking and radar-guided missiles, a cannon, and an array of complex avionics centered around a powerful radar capable of tracking small, high-speed objects as low as tree-top level. While in service with four air forces around the world, it has been credited with shooting down 96.5 enemy aircraft to no losses in aerial combat .

F-15E STRIKE EAGLE

A variation of the F-15 fighter, the F-15E is the world's most capable all-weather strike fighter. With the addition of a weapons systems officer located behind the pilot; large fuel tanks molded to the fuselage for added range; sophisticated avionics that permit low-altitude, all-weather precision strikes; and an impressive bomb load (including precision-guided munitions), this aircraft, which played a leading role in the Gulf War, can accurately strike targets day or night.

F-16C/D FIGHTING FALCON

The F-16, designed originally as a relatively low-cost lightweight fighter, has become the backbone of the fighter force. A highly maneuverable, single-engine aircraft, it is flown by many of the world's air forces. It has evolved into a highly capable strike fighter and, during the Gulf War, flew more missions than any other aircraft. With an attached LANTIRN (low-altitude navigation tracking infrared for night) pod, it can fly low-altitude night attack missions. It has also been equipped to replace the F-4G Phantom in the suppression of enemy air defenses (SEAD). By the time production ends, over 4,000 F-16s will have been delivered.

A-10 THUNDERBOLT II

The A-10 was designed specifically to defeat enemy armored vehicles. Built around a large 30 millimeter (mm) GAU-8/A Gatling gun, it attacks armored vehicles and pierces their armored tops with heavy, armor-piercing projectiles. The aircraft is heavily protected against ground fire with titanium armor, two engines, and redundant control systems. Designed to fly at low altitudes for long periods and to be highly maneuverable, it carries a wide range of electronic warfare pods and external weapons, including air-to-air missiles. A variant, the OA-10, has entered service in the forward air controller mission, providing coordination and control of close air support aircraft.

B-1B LANCER

Originally built as a supersonic low-altitude bomber for strategic (nuclear) missions, the B-1B is a swing-wing aircraft, faster than its predecessor, the B-52, and harder to detect on radar. The B-1B carries a large internal bomb load and can fly at low altitude in all weather. It carries an impressive array of electronic countermeasures to elude enemy defenses and is being equipped to carry precision-guided conventional munitions. The B-1B flies at NAFR when participating in large-force exercises such as Red Flag/Green Flag and during B-1B units' Mission Employment phase of Weapons School.

B-52H STRATOFORTRESS

Based on a design from the 1950s, the B-52H is the last variant of the design flying today. Designed as a long-range, high-altitude strategic bomber, the changing geopolitical and technological environment has led to its taking on a variety of new roles: high-altitude conventional attack (as in Vietnam and in the Gulf War), maritime interdiction (using mines and anti-shipping missiles), and standoff attack (using cruise missiles). Capable of carrying a large load of virtually all Air Force weapons over great distances, the eight-engine bomber is expected to fly well into the next century. B-52s fly in NAFR when participating in large-force exercises such as Red Flag/Green Flag and the Mission Employment/Strike phases of B-52 Weapons School.

B-2 SPIRIT

The B-2 provides the Air Force with state-of-the-art stealth technology for a heavy, long-range, penetrating bomber. Originally conceived as a highly survivable strategic bomber with a large nuclear bomb load, the Air Force is now focusing on the B-2's conventional capabilities. The Air Force views the B-2 as a weapons system capable of attacking heavily defended targets and neutralizing enemy defenses early in any conflict, permitting follow-on attacks by less-stealthy Air Force aircraft.

KC-135R STRATOTANKER AND MCDONNELL DOUGLAS KC-10A EXTENDER

High-performance jet aircraft use large amounts of jet fuel. The KC-135R and more modern KC-10A, through airborne refueling, provide the additional range and endurance needed by combat aircraft. Based on the Boeing 707 airframe, the KC-135R carries up to 83,000 pounds of cargo and fuel. The KC-10A is based on the DC-10 airframe, and while its primary mission is aerial refueling, it can combine the tasks of tanker and cargo aircraft by refueling fighters while carrying the fighters' support personnel and equipment during deployments. The KC-10A can transport up to 75 personnel and about 170,000 pounds of cargo and fuel a distance of about 4,400 miles. Both aircraft are an important part of Air Force capabilities in projecting air power over great distances.

C-141 STARLIFTER

The long-range, four-engined C-141 is the backbone of the Air Force's airlifter fleet, although it is approaching the end of its service life with retirement expected by 2006. These transports are used for cargo, as troop carriers, for air assault with paratroopers, and medical evacuation missions.

C-17A GLOBEMASTER III

The C-17 will replace the C-141 fleet. The C-17 was designed to meet the Air Force requirement for a long-range, heavy-lift cargo transport capable of carrying all classes of military cargo, including the Army's 65-ton M1A2 tank. It will be able to operate out of relatively austere airfields formerly restricted to the smaller C-130 transport.

E-3 SENTRY

The E-3C Sentry is the Air Force's AWACS. Based on the Boeing 707 airframe, the E-3C is packed with complex avionics and sensors, permitting it to electronically monitor airspace up to 200 NM. Carrying a basic crew of 24, it has an unrefueled endurance of 11 hours and up to 22 hours with in-flight refueling. It is used for airspace command and control of aircraft using NAFR.

E-8C JOINT-STARS

The Joint Surveillance and Target Attack Radar System (J-STARS) was developed to undertake ground surveillance, targeting, and battle management missions. The aircraft is a four-engine Boeing 707 airframe modified with a side-looking radar that can locate small objects, such as vehicles, at very long ranges.

RC-135 RIVET JOINT

The RC-135 Rivet Joint is a surveillance aircraft equipped with an extensive array of sophisticated intelligence-gathering equipment that enables the Air Force to monitor enemy

electronic activity. Like the E-3C Sentry, this aircraft carries a large crew of electronic and intelligence specialists that can locate, identify, and determine the status of enemy emitters on land, in aircraft, or on board ships.

HH-60G PAVE HAWK

A variant of the Black Hawk utility helicopter, this aircraft is configured to provide combat search and rescue and other support missions. It is equipped with sophisticated navigational gear, as well as an air refueling system and removable long-range internal fuel tanks that make it very well suited for rapid-response, long-range rescue missions.

C-130 HERCULES

The C-130 Hercules is a four-engine turboprop transport originally designed to operate from austere bases in support of Army units. A highly versatile aircraft, it is operated by the Air Force in transport, tanker, gunship, special operations, and command, control, and communication interface variants. A new, upgraded version, the C-130J, is now entering service.

F-117A NIGHT HAWK (STEALTH FIGHTER)

The F-117A is a subsonic light aircraft capable of carrying two 2,000-pound laser-guided bombs. It was designed expressly to minimize its radar reflections and infrared signature, enabling it to penetrate strong enemy air defenses at night without detection.

EA-6B PROWLER

The EA-6B is a Navy all-weather electronic warfare aircraft capable of detecting, locating, jamming, and destroying enemy air defense radars. It was designed to protect carrier battle groups and associated aircraft by jamming enemy radar and electronic equipment. It is being employed by the Air Force to replace the EF-111 electronic warfare aircraft.

F/A-18C/D HORNET

This capable twin-engine aircraft currently forms the backbone of Navy and Marine fighter air wings and is also in service with numerous foreign air forces. It also has attack capabilities. The Navy will soon be bringing to service a larger and more capable version, the F/A-18E/F Super Hornet.

AV-8B HARRIER

The short takeoff and vertical landing Harrier is a close-support attack aircraft used by the Marine Corps. Its unique takeoff and landing capability (it also has a vertical takeoff capability with a reduced payload) permits the Marine Corps to operate it off small austere fields near

Marine ground units. Versions of this subsonic aircraft are flown by a number of foreign services, primarily navies, because of its capability to take off and land on small decks.

F-14 TOMCAT

The F-14 was designed to be the Navy's frontline interceptor. A fast, swing-wing fighter with long range, powerful radar, and long-range air-to-air missiles, it is expected to engage enemy aircraft long before they could attack the Navy's carriers. Recent versions of the F-14 have been upgraded to provide a ground-attack capability.

F-4 PHANTOM

While the twin-engined F-4 fighter-bomber, which saw extensive service during the Vietnam War, has been retired from the active Air Force inventory, this still-capable aircraft is in service with many foreign air forces.

TORNADO

The Tornado is a supersonic swing-wing aircraft flown by the air forces of the United Kingdom, Italy, Germany, and Saudi Arabia. It is produced in interceptor, attack, and reconnaissance versions.

MIRAGE 2000

The Mirage 2000 is a high-performance, delta-winged, French-built fighter-bomber produced by France's Dassault Aviation and is in service with a number of foreign air forces.

UNMANNED AERIAL VEHICLES

UAVs provide long endurance, unmanned aerial reconnaissance, surveillance, and target acquisition that produce approximately real-time intelligence. Operating aircraft include the Predator UAV. Several versions of UAVs are now in development, each differing in size, endurance, altitude, and sensors.

1.6.2 Expected Aircraft and Weapons Systems

F-22 RAPTOR

This aircraft will combine stealth, high speed, and sophisticated avionics to eventually replace many functions of the F-15. The F-22 is designed to penetrate enemy airspace and achieve air superiority with a first-look, first-kill capability against multiple targets. It will employ a advanced radar that can be used without revealing its location; the active transmitter can be on an off-board platform such as an AWACS. It is able to cruise at supersonic speeds without the use of afterburners.

JOINT STRIKE FIGHTER

The Joint Strike Fighter (JSF) is a next-generation design that constitutes a family of air superiority and strike fighters. It is a relatively low-cost, stealthy strike fighter that is being developed to replace the F-16 for the Air Force, the F/A-18 and the AV-8B for the Navy and Marines, and the Sea Harrier for the British Royal Navy. The Marine and Royal Navy variations will have short take-off and vertical landing (STOVL) capabilities. The Air Force is also considering acquiring a number of the STOVL variants to equip several squadrons for a fast-reaction contingency force. Australia, Belgium, Denmark, and the Netherlands have also expressed interest in co-producing the JSF.

UNMANNED COMBAT AERIAL VEHICLES

Conceptual analysis is underway to develop a family of aircraft capable of undertaking combat operations while being electronically "flown" by a pilot in a remote location. Such aircraft offer a number of advantages: they could be flown into heavily defended areas without fear of losing a pilot; the weight saved by eliminating the pilot and life support equipment, such as an ejection seat, permits increased fuel and weapons capacity; and such aircraft could perform high-G maneuvers that a human pilot could not withstand. Some Unmanned Combat Aerial Vehicle (UCAV) concepts involve radical new aerodynamic designs while others consider the rebuilding of older fighters, such as the F-16A, with new wings, more fuel and weapons capacity, and the removal of all pilot support equipment.

1.6.3 Ordnance

The Air Force currently uses an extensive inventory of conventional live and inert ordnance on NAFR. These include both air-to-air heat-seeking and radar-guided missiles and a wide range of air-to-ground weapons: so-called "iron" (unguided) bombs, guided bombs and missiles, cluster bombs, rockets, and cannon, and soon, a new generation of guided bombs and missiles, some of which contain packages of guided sub-munitions. Table 1.5-3 displays the annual use of munitions on NAFR. A brief description of these weapons follows.

AIR-TO-GROUND ORDNANCE

GENERAL PURPOSE BOMBS

Unguided weapons are relatively unchanged from their World War II ancestors, except for a basic low-drag design. Produced in a variety of sizes, they are steel cases filled with high explosive, fuses at each end, and fins for stabilization in flight. Different tail cones allow them to be released in either a basic, low-drag or high drag configuration.

CLUSTER BOMBS

Highly effective against area targets such as convoys, supply dumps, troop concentrations, and air-defense sites, cluster bombs break up in mid-air, spreading sub-munitions over wide areas. These weapons are produced in a variety of sizes and with a range of submunitions (anti-

personnel, incendiary, fragmentation, time-delay, and anti-tank). Development is underway to produce submunitions that can detect and guide themselves to targets (so-called "brilliant" munitions).

GUIDED BOMBS

The so-called "smart bombs" first used in the Vietnam War and then with success in the Gulf War are general-purpose, iron-bomb warheads fitted with a Glide Bomb Unit (GBU) kit. The kit is composed of a laser seeker and control section attached to the front of the warhead and a set of steerable fins attached to the end of the weapon. A laser beam directed from the attacking aircraft (or a sister aircraft or a soldier on the ground) at the target is used to guide the weapon; the bomb tracks the reflected laser light from the target.

GBU kits can be attached to a wide range of bomb sizes. These weapons now include thick, high-tensile, steel-cased penetration bombs and are designed to penetrate hardened aircraft shelters, underground bunkers, etc. Using delayed-action fuses, these bombs were successful against state-of-the-art concrete and steel fortifications during the Gulf War.

The range of a GBU can be extended by adding a rocket motor and digital control system. The AGM-130, which is tested on NAFR, is an improvement of the GBU-15 glide bomb. The attached rocket motor triples the standoff range of the GBU-15.

AIR-TO-GROUND MISSILES AND ROCKETS

AGM-65 MAVERICK

This missile, with its 300-pound warhead, is designed to be used against armored vehicles, fortifications, and ships. Originally designed with television guidance, current versions use an infrared seeker that sees the infrared energy (heat) emitted by a target (such as an engine). Mavericks were used against armored vehicles in the Gulf War.

2.75- AND 5.0-INCH ROCKETS

Unguided rockets, which can be fired in salvos from underwing pods, are used by helicopters and attack aircraft.

CRUISE MISSILES

Bombers are equipped to launch cruise missiles, which are long-range, subsonic missiles that are programmed for precision attack on surface targets. Small radar signatures and low-altitude flight make cruise missiles difficult to detect and destroy.

AIR-TO-AIR MISSILES

Air-to-air missile training occurs with a variety of captive missiles, including Sidewinder missiles, AIM-120, and AMRAAM. Due to safety concerns, NAFR does not support the actual

launching of air-to-air missiles. NAFR does support high-fidelity simulated missile employment.

AMMUNITION

A wide variety of cannon, machine gun, and small-arms ammunition is expended on NAFR. Strafing pits and small-arms ranges with safety buffers are provided for training.

105 MM AND 40 MM

The AC-130H Spectre gunship carries a 105-mm howitzer as well as a 40-mm and 20-mm cannon. The new AC-130U replaces the 20-mm cannon with a 25-mm gun.

30 MM

The A-10 Thunderbolt II was designed to destroy heavily armored vehicles, such as main battle tanks, with its 30-mm cannon. This gun fires three types of ammunition: Target Practice (TP), which is a non-explosive steel slug; Armor-Piercing Incendiary (API), a steel slug encasing a heavy armor-piercing dart composed of depleted uranium (DU) (see section 3.4.3.4); and High-Explosive Incendiary (HEI), a steel projectile encasing an explosive charge.

25 MM

The AC-130U gunship and the AV-8B Harrier, a STOVL attack aircraft operated by the U.S. Marines, use 25-mm ammunition.

20 MM

The gun carried by most of the fighter aircraft in the Air Force and Navy inventory (F-14, F-15, F-16, F/A-18, and eventually the F-22 and JSF) is a General Electric Gatling gun that fires 20-mm ammunition, both TP and HEI.

50 CAL

The 50-caliber heavy machine gun is employed primarily on security vehicles and helicopters.

7.62 MM

The 7.62-mm machine gun is used by security forces on a bipod or tripod mounts on vehicles, and also used by helicopter door gunners.

NEXT-GENERATION ORDNANCE

JOINT DIRECT ATTACK MUNITIONS

Built around a variety of current conventional bomb warheads, this weapon is guided to its target by an on-board Global Positioning System (GPS) receiver. Once the target position has been provided in GPS coordinates, the JDAM can be dropped from standoff ranges in any weather and strike its target without the laser designation required of current laser-guided ordnance.

JOINT STANDOFF WEAPON

Joint Standoff Weapon (JSOW) is a glide bomb designed to deliver a variety of cluster munitions from standoff ranges of up to 40 NM into heavy air defense environments. It employs small wings that deploy after launch and GPS-based guidance.

JOINT AIR-TO-SURFACE STANDOFF MISSILE

The Joint Air-to-Surface Standoff Missile (JASSM) is a long range (more than 100 miles), stealthy, precision strike weapon designed to evade or defeat all threats en route to its target. It can be carried either internally or externally on a wide range of aircraft, from the F-16 to the B-2. It uses GPS guidance to reach its target and is highly resistant to GPS jamming. It carries a 1,000-lb. class multipurpose warhead capable of penetrating underground targets.

SMALL SMART BOMB

Precision targeting permits smaller warheads. A lighter smart bomb is currently under development. A small bomb with precision strike capability means that aircraft such as the F-117, which is limited to a 4,000 pound bomb load, can carry more bombs and strike more targets in one mission.

LOW-COST AUTONOMOUS ATTACK SYSTEM

Development is underway on a low-cost autonomous attack system (LOCAS), or "smart" submunition that can distinguish between different targets and shape its warhead to inflict the most damage. Deployable from underwing, bomb bays, or munitions dispensers, these small, winged weapons use LADAR (laser detection and ranging) and advanced detection technologies to detect and distinguish targets and then to strike them.

WIND CORRECTED MUNITION DISPENSER

The Air Force plans to adapt standard tactical munition dispensers with inertial navigation system guidance units that will compensate for wind drift when dropped from high altitudes. Wind Corrected Munition Dispenser (WCMD) kits will provide precision accuracy.

1.6.4 Self Protection Systems

Chaff and flares are the principal defensive mechanism dispensed from military aircraft to avoid detection and/or attack by adversary air defense systems. Chaff consists of small fibers that reflect radar signals and, when dispensed in sufficient quantities from aircraft, form a "cloud" that breaks the radar signal and temporarily hides the aircraft from radar detection. Flares provide high-temperature heat sources ejected from aircraft that mislead heat-sensitive or heat-seeking targeting systems. Chaff and flares are used to keep aircraft from being targeted by weapons such as SAMs, anti-aircraft artillery (AAA), and other aircraft.

The effective use of chaff and flares in combat requires training and frequent use by aircrews to master the timing of deployment, the capabilities of the devices, and to ensure safe and efficient handling by ground crews.

Chaff and flare deployment throughout NAFR and in approved complex airspace is governed by a series of regulations that are based on safety and environmental considerations and limitations. Among these regulations are the following.

- AFI 13-201 establishes practices to decrease disturbances from flight operations and protect the public from the hazards and effects associated with flight operations.

- AFI 11-206 prohibits Air Force pilots from intentionally allowing any object to be dropped from an aircraft, except in an emergency, without prior approval. Approval is only given when the dropped object will not create a hazard to people, property, or other air traffic.

- AFI 13-212 and Nellis Supplement 1 outline procedures governing weapons range use of chaff and flares.

- AFI 11-214 delineates procedures for chaff and flare employment.

The public often raises concerns that the use of chaff constitutes littering. There are no federal laws or regulations that specifically identify chaff as litter, or that even indicate that the use of chaff constitutes littering. The U.S. Environmental Protection Agency (USEPA) defines litter as "The highly visible portion of solid waste carelessly discarded outside the regular garbage and trash collection and disposal system." Chaff fibers, because of their small size, while detectable in some circumstances, are not "highly visible." Furthermore, when chaff is ejected from an aircraft, it is being used for its intended purpose and is not being "carelessly discarded." A field study of two locations where chaff is used intensively (one of which was NAFR) examined the potential for chaff to accumulate and create land use or visual impacts. Chaff was found to dispense and settle over broad areas, thus being unnoticeable under most conditions. Occasionally, clumps of chaff that had not dispersed properly were found to be visible at short distances, generally less than 25 feet away. Findings indicate that adverse effects on land use or visual resources are unlikely (Air Force 1997d).

In accordance with Nellis AFB Supplement 1 to AFI 13-212, chaff may be deployed in all numbered ranges and MOAs between 300 feet above ground level (AGL) and 10,000 feet AGL except in Range 63, Range 65, Range 74A, Wilderness Areas, Wilderness Study Areas (WSAs), National Parks and populated areas. Chaff drops are authorized to 25,000 feet AGL in R-4807, EC West, the Coyote subdivision of the Desert MOA and Reveille / ATCCA and up to 20,000 feet AGL in the Caliente and Elgin subdivisions of the Desert MOA and R-4806. Additional restrictions may be imposed depending on weather conditions.

Air Combat Command Supplement 1 to AFI 11-214 (February 25, 1997) prescribes a minimum flare release altitude of 2,000 feet AGL over non-government-owned or controlled areas. Flare deployment restrictions over government-owned and controlled areas are shown in Table 1.6-1.

Table 1.6-1. ACC Flare Restrictions over Government Land by Aircraft Type

Aircraft Type	*Minimum Altitude (AGL)*
OA / A-10	400 feet*
F-4	600 feet
F-15, F-16, B-1	700 feet
B-52	1,000 feet

*depends on flare type
Source: AFI 11-214ACC1

Flares are authorized for use in the numbered and EC ranges of the NRC. Flares may not be dropped over manned sites, ground parties, or within 3 NM of forested areas within the NRC. Approved deployment altitudes allow the flares to burn out 100 feet above the ground. The minimum flare release altitude in the MOAs is 5,000 AGL. The minimum flare release altitude for the numbered ranges and EC ranges is 700 feet for all aircraft except B-52s (900 feet AGL). Flares are not authorized during the dry season when the fire code is “extreme.”

1.6.5 Other Systems

1.6.5.1 LASERS

Laser targeting systems are an essential part of some modern aircraft. Laser operations in the combat mode are limited to those targets and target areas that have been specifically approved for those operations.

When the laser targeting system is used in the combat mode, it has the potential to be hazardous to the eyes. Laser targeting in the combat mode is restricted to DOD-controlled land, and under specific safety precautions. Procedures have been established to minimize any adverse impacts on the health and safety of either aircrew or observers during the use of lasers in designated target areas. These procedures require that a certification of the laser operations

be completed by the base Bioenvironmental Engineers with assistance from Armstrong Laboratories, Brooks AFB, Texas. This certification describes what hazard control measures, if any, would be required for a target area based on the flight profile and resulting laser safety footprint for each target area. Such evaluations have been performed at NAFR. All safety procedures are implemented prior to the use of lasers at the NAFR targets, including assurance that the laser safety buffers remain within NAFR.

1.6.5.2 RADIO FREQUENCY EMISSIONS

Radio frequency (RF) emissions consist of the transmission of non-ionizing energy through space to receptive objects (see section 3.3.1). The types of RF-emitting equipment presently used by NAFR include radio communications systems, electronic emitters, and scoring systems. DOD and Air Force safety instructions provide guidance for the safe operation of RF-emitting equipment as well as the training requirements for personnel who operate the equipment. All RF emitters are considered nonhazardous as long as applicable safety precautions and calculated hazard distances are followed. For each piece of equipment producing RF, separation distances between the equipment and a receptor have been calculated so that a person beyond that distance will not receive RF energy that exceeds permissible exposure limits (PEL). All RF-producing equipment is oriented so that the RF energy is directed away from personnel, and safe separation distances are maintained.

2.0 DESCRIPTION OF ALTERNATIVES

The Air Force proposes to renew land withdrawal of the Nellis Air Force Range for exclusive military use. This LEIS addresses four action alternatives for this continued use and the No-Action Alternative. Alternatives 1A and 1B would be continued withdrawal for an indefinite period with periodic reports to Congress regarding land stewardship. Alternatives 2A and 2B would be continued withdrawal for 25 years.

- Under Alternatives 1A or 2A, the Air Force would renew currently withdrawn lands and continue to use NAFR. Memoranda of Understanding (MOUs) addressing the use of lands by other federal, state, and local agencies would continue in effect. There would be no change in the process to gain access to NAFR.

- Under Alternatives 1B and 2B, the Air Force would withdraw an adjusted NAFR. Boundary, jurisdictional overlap, and limited access adjustments would reflect safe and secure test and training operations and answer federal, state, and local agency and public comments received during the LEIS process.

Under the No-Action Alternative special use airspace would continue to be accessible to flight activities. All military ground activities would cease. Without ground activities on NAFR, all of the following would also stop: air-to-ground training missions; Red Flag and other Flag exercises; air-to-air training that requires ground-based tracking, threats, or scoring; operational testing and evaluation; and security-related activities.



Red Flag and other Flag exercises would continue under a land withdrawal alternative but would stop under the No-Action Alternative.



Under range renewal the Air Force would continue exclusive use of NAFR. This would include live ordnance use and restricted access to NAFR for security and public safety.

The No-Action Alternative would result in no renewal of withdrawal of NAFR for military purposes. All Air Force ground activities would terminate, air-to-ground targets would be removed, and the Air Force would cease to use any public lands in the current NAFR.



2.0 DESCRIPTION OF ALTERNATIVES

This description of alternatives is the basis for analyzing potential environmental consequences from a renewal of the Nellis Air Force Range (NAFR) land withdrawal. This information is based on the statement of purpose and the current and anticipated needs, requirements, and activities of NAFR. Appendix A provides additional information on aircraft use and operation within the Nellis Range Complex (NRC).

2.1 PROCESS FOR IDENTIFICATION OF ALTERNATIVES

The U.S. Air Force (Air Force) identified alternatives for the renewal of NAFR that would satisfy the national security, military operations, and public safety purposes and needs, as identified in Chapter 1.0, while complying with the requirements of Public Law (PL) 99-606 as amended by the Groom Mountain Withdrawal (Public Land Order [PLO] 100-338) and the White Sides Safety and Security Buffer (PLO 7131). The identification process of the alternatives drew upon agency and public comments received by the Air Force during scoping for this Legislative Environmental Impact Statement (LEIS). Steps that were taken to assist with the development of appropriate alternatives included the following:

- participation in six public scoping meetings to receive public and agency input;
- identification of the current and reasonably foreseeable future military requirements of NAFR lands;
- desire to reallocate funding to enhance environmental resources on NAFR and expand public interaction programs;
- consultation and informational discussions with the Bureau of Land Management (BLM), U.S. Fish and Wildlife Service (USFWS), State of Nevada, potentially affected counties, interested non-governmental organizations;
- discussions with American Indian tribes, organizations, and individuals; and
- identification of specific Department of the Interior (DOI) requirements that are part of the land withdrawal application to Congress under PL 99-606 as amended.

The process of acquiring input, with special emphasis on the LEIS scoping process, identified issues and concerns raised by other federal agencies, state agencies, and the public. These issues and concerns are summarized as follows:

- access for recreation and non-consumptive uses, through co-use of lands;
- access for consumptive economic activities, specifically mining;

- change in administration of selected range areas where overlap exists between the Air Force and Department of Energy (DOE) or between the Air Force and the USFWS; and

- expanded outside review of NAFR environmental activities by the public, tribal organizations, and other agencies.

These public, state, and agency concerns were evaluated in view of Air Force requirements to ensure public safety, mission test and training requirements, and national security. This evaluation resulted in a set of four potential action alternatives and the No-Action Alternative that are carried forward for detailed analysis. The action alternatives, described in section 2.2, are designed to address public, state, and federal concerns while permitting Air Force training and test activities within critical safety/security parameters. Air Force activities at NAFR throughout the duration of the proposed withdrawal are projected to continue at approximately the same level and type as those described in section 1.5.2. Other alternatives were considered but do not fully meet the purpose and need underlying the renewal of the NAFR withdrawal. These alternatives are described in section 2.3, along with the reasons they were not carried forward.

2.2 ALTERNATIVES

Key sections of the four action alternatives and the No-Action Alternative are summarized in Table 2.2-1. This table is a matrix that describes the duration of the withdrawal, focus and extent of environmental programs during the withdrawal period, extent of co-use of current NAFR lands, potential relinquishment of selected areas, and administrative management actions. Each alternative is explained in detail below. Components of each alternative were derived from comments provided during public scoping (see Table 2.2-2).

Each of the action alternatives (Alternatives 1A, 1B, 2A, or 2B) include the continued military use of NAFR in the manner of its historic use. All existing facilities would remain and would be operated as they have in the past. This would include major facilities associated with the Indian Springs Air Force Auxiliary Field (ISAFAF), Tolicha Peak, and Tonopah Test Range (TTR). The Air Force also would continue to operate target complexes and simulated threat sites to support its testing and training needs. Aircraft operations in the Nellis Range Complex (NRC) would be expected to vary from 200,000 to 300,000 sortie-operations annually. Safety and security buffers would be maintained as they currently exist.

The alternatives address a broad range of potential actions. Although the alternatives group actions for analysis in the LEIS, Congress is not limited to select an individual alternative. Rather, Congress retains the flexibility to select a combination of actions that are evaluated in this LEIS. For example, Congressional decisionmakers could select most of Alternative 1B, with recreational co-use, environmental procedures and funding, resolution of administrative responsibilities between the Air Force and USFWS, but exclude administrative actions

Table 2.2-1. Summary of NAFR Alternatives

Duration	*Withdrawal Area*	*Access*	*Administration*	*Environmental Procedures & Funding*
ALTERNATIVE 1A				
Indefinite	Approximately 3.035 million acres	Same as under PL 99-606 as amended	Same as under PL 99-606 as amended Five-Party Cooperative Agreement participants used for ongoing natural and cultural resources management	Future resources would be requested for environmental stewardship and public interaction programs rather than for reoccurring legislative withdrawal procedures; periodic report to Congress
ALTERNATIVE 1B				
Indefinite	Approximately 2.911 million acres	Specific permitted co-use activities, based on specific mission requirements; priority scheduling (see text) Non-renewal of approximately 30,000-35,000 acres along western border of NAFR	PL 99-606 with: Revision of land management responsibilities with DOE Revision of land management responsibilities with USFWS Five-Party Cooperative Agreement participants used for ongoing natural and cultural resources management	Same as 1A
ALTERNATIVE 2A				
25 years	Approximately 3.035 million acres	Same as under PL 99-606 as amended	Same as under PL 99-606 as amended Five-Party Cooperative Agreement participants used for ongoing natural and cultural resources management	Future resources will be requested for compliance with future FLPMA rules and renewal procedures (see section 1.2.4)
ALTERNATIVE 2B				
25 years	Approximately 2.911 million acres	Specific permitted co-use activities, based on specific mission requirements; priority scheduling (see text) Non-renewal of approximately 30,000-35,000 acres along western border of NAFR	PL 99-606 with: Revision of land management responsibilities with DOE Revision of land management responsibilities with USFWS Five-Party Cooperative Agreement participants used for ongoing natural and cultural resources management	Same as 2A
NO-ACTION ALTERNATIVE				
Indefinite	None; no public access to some health and safety areas	BLM multiple use; Specific permitted activities on DNWR	BLM USFWS	BLM USFWS

Table 2.2-2. Alternatives Identified

	ALTERNATIVES				
Components	***1A***	***1B***	***2A***	***2B***	***NA***
DURATION OF WITHDRAWAL					
Indefinite period	●	●			
25 years			●	●	
No action; no land withdrawal renewal					●
AREA WITHDRAWN					
Continue withdrawal of existing NAFR	●		●		
Non-renewal of western portion of Clarkdale and Wagner Mining Districts and neighboring area		●		●	
Resolution of Air Force and USFWS joint withdrawal		●		●	
Resolution of Air Force and DOE land uses		●		●	
No action; no land withdrawal					●
NONCONSUMPTIVE CO-USE					
Current MOUs and Agreements in effect; no other changes	●		●		
Co-use within national security, military operations, and public safety goals at:		●		●	
• Mud Lake		●		●	
• Kawich Range		●		●	
• Southern portion of EC South		●		●	
No action; no land withdrawal renewal					●
ADMINISTRATION					
Air Force administers NAFR land under existing MOUs	●		●		
Air Force administers NAFR; USFWS administers DNWR lands		●		●	
Resolve land management responsibility; Air Force administers revised NAFR; DOE administers Pahute Mesa		●		●	
Resolve land management responsibility; Air Force administers revised NAFR with PLO 1662		●		●	
Air Force administers revised NAFR; BLM administers non-renewal lands		●		●	
Air Force administers NAFR with co-uses reviewed under the Five-Party Cooperative Agreement		●		●	
No action; no land withdrawal renewal					●
ENVIRONMENTAL PROCEDURES AND FUNDING					
Environmental review via existing cultural resources and natural resource management programs; NEPA documentation on mission modifications	●	●	●	●	
Future funding/resources would be requested for environmental stewardship and public interaction programs rather than with reoccurring legislative withdrawal procedures.	●	●			
Future resources will be required for compliance with FLPMA rules and renewal procedures (see section 1.2.4).			●	●	
No action; BLM responsible for North Range land management, BLM & USFWS responsible for South Range land management; Air Force and DOE responsible for environmental cleanup of non-renewal lands					●

affecting DOE. This flexibility in making decisions is possible because the potential environmental consequences of all potential actions are evaluated in the LEIS.

2.2.1 Alternative 1A — Indefinite Withdrawal

Under this alternative, Congress would renew the land withdrawal for NAFR and reserve these lands for military use for an indefinite period of time. The withdrawal would remain in effect until Congress, through consultation with the secretaries of the military department(s) concerned, determined that there is no further military need for the withdrawn land. This would not be a permanent land withdrawal. Congress would retain the ability to review the withdrawal at their discretion any time during its duration. The Air Force would comply with NEPA, and other applicable regulation, during the duration of the withdrawal by completing project-specific evaluations of proposals that would use NAFR resources or lands. A periodic Congressional review would validate the continued military need for the withdrawn land, review environmental issues associated with previous and continued uses, and examine the effectiveness of the public interaction process. Public oversight of ongoing environmental management activities on the NAFR would continue to be available via each of the applicable laws, regulations and policies (i.e. NEPA, Natural Resource Management, RCRA). Further, the i.e., Five-Party Cooperative Agreement, used for purposes of exchanging ideas and information between the Air Force, DOE, BLM, USFWS, and State of Nevada, would also provide public oversight opportunities.

The military need for realistic range environments to train military aircrews is projected for the foreseeable future, and the NAFR is essential to meet the Air Force's national defense responsibilities. A withdrawal of indefinite duration would support safe, efficient, and secure testing and aircrew training needed to utilize weapons systems for their expected life. It also would sustain the combat readiness of aircrews and support personnel in the future. Maintaining long-term access to the NAFR is crucial because its capabilities and capacities cannot be duplicated.

The conservation and management of natural and cultural resources of the NAFR could be best served by implementing long-term environmental programs that promote understanding, protection, and improvement of these resources. Resources required for a recurring renewal process could be better attributed to implementation of NAFR environmental and public interaction programs. Therefore, under this alternative the Air Force could periodically report (e.g., every 15 years) to Congress the results of range stewardship. This report, subject to public comment, could include:

- validation of continued military need for the range;
- a summary of environmental / public involvement programs and results;
- projection of environmental programs for the next period;

- environmental enhancement activities with cooperative agencies;
- government-to-government relations with American Indian tribal representatives; and
- status of permitted nonmilitary land use.

An indefinite withdrawal with scheduled Congressional review and Air Force accountability, rather than a recurring renewal process, would facilitate more effective planning for and management of resources used to support military activities, and promote more effective management and conservation of natural and cultural resources.

LAND AREA

The Air Force would seek to renew a withdrawal of approximately 3,035,642 acres. This withdrawal would include all lands currently withdrawn by PL 99-606 as amended, and PLO 7131. Since the Air Force is attempting to relinquish the Cactus Springs "Finger" of land, this finger would not be included in the renewal application and is not included in any alternative. Overlapping withdrawals of NAFR and Desert National Wildlife Range (DNWR) lands would remain. The lands included in this alternative are shown in Figure 2-1.

LAND USE

The land use would be identical to that allowed under PL 99-606 as amended. Lands withdrawn would be used for exclusive military activities. This would include the expenditure of munitions and self-protection systems at levels comparable to historic uses. During the proposed withdrawals, aircraft using the NRC airspace are projected to fly between 200,000 to 300,000 sortie-operations per year. Each sortie-operation represents the use of one defined airspace subrange by one aircraft.

LAND ACCESS

There would be no change in the process to gain access to NAFR. Access to NAFR would be subject to the same safety and security requirements as it has through the duration of the current withdrawal.

LAND ADMINISTRATION

No change in land administration is included in this alternative. The public and other agencies would continue to have review of Air Force activities and stewardship programs via the existing cultural resources and natural resources management programs and NEPA documents prepared for new weapons systems or other mission modifications. No other changes to land administration would be contemplated.

Portions of the NAFR South Range actively used by the Air Force for air-to-ground activities that are part of the DNWR would continue to be withdrawn for military use. Other NAFR

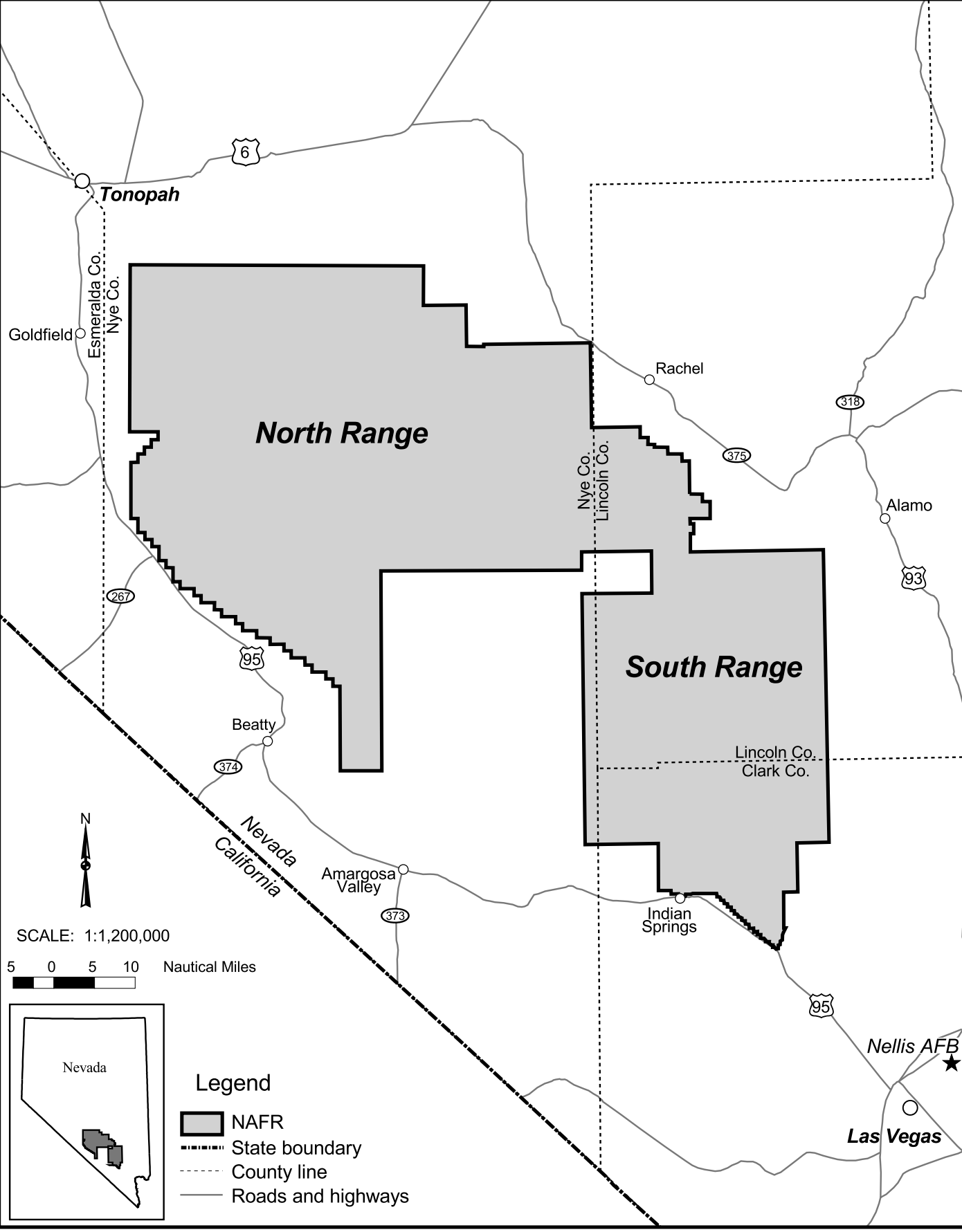


Figure 2-1. Lands Contained within Alternatives 1A and 2A

lands not containing NAFR facilities but required for public safety and national security purposes would remain withdrawn by both the USFWS for the DNWR and the Air Force for NAFR.

2.2.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

WITHDRAWAL DURATION

The duration would be the same as for Alternative 1A.

LAND AREA

The Air Force would seek to withdraw approximately 2,911,000 acres and to transfer responsibility for approximately 38,400 acres currently withdrawn for use by DOE (under PLO 1662) to the Air Force. The Air Force would seek to transfer administrative responsibility to DOE for approximately 127,620 acres of land generally described as Pahute Mesa. The Air Force would not request the renewal of approximately 30,000 to 35,000 acres of land along the western border of the current NAFR not supported by special use airspace (Figure 2-2). This land includes a portion of the mining districts defined in the Nevada Senate Joint Resolution 25 of 1995. Lands included in this alternative are shown in Figure 2-3.

LAND USE

The land use would be identical to that allowed under PL 99-606 as amended. Lands would be withdrawn for exclusive military activities. The level of military activity would be the same as described in Alternative 1A.

LAND ACCESS

In certain areas, additional short-term co-use opportunities may be available for mission-compatible environmental resource management, American Indian religious or cultural activities, or recreation. With Air Force approval including a safety and security review, each of these activities would be planned and managed by the BLM following their normal land use processes and procedures, and be subject to change based on the range schedule. Those activities that conflict with Air Force mission, security, and/or safety requirements would not be approved. The following locations, shown in Figure 2-4, have been identified for potential co-use:

- *Mud Lake* — Non-consumptive co-use recreation activities, such as land sailing, may be permitted on the lakebed south of the northern border of R-71 in the northwestern corner of NAFR.

- *Kawich Range* — Non-consumptive co-use activities, such as hiking, may be permitted north and east of the Kawich Range ridgeline in the northeastern corner of NAFR.

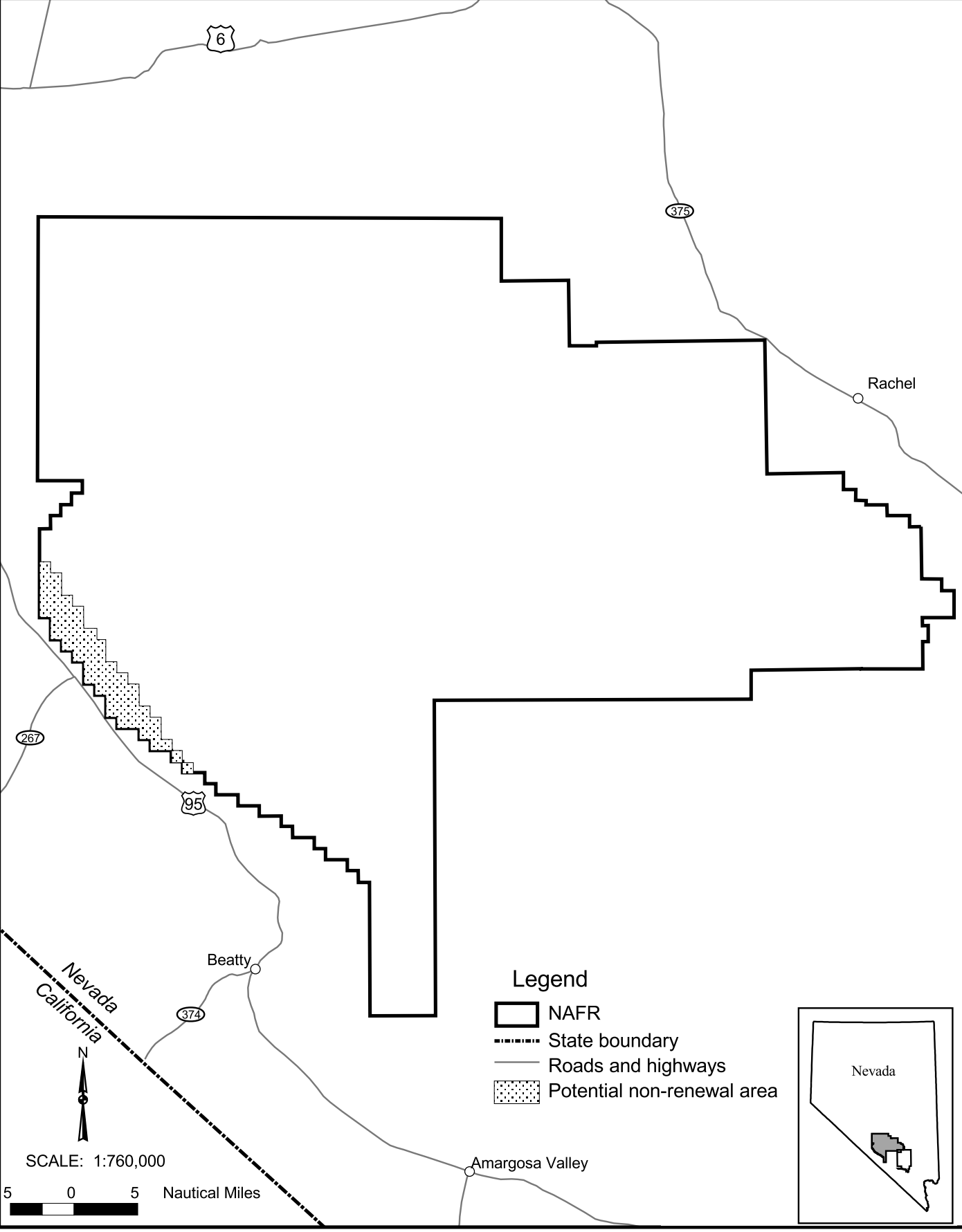


Figure 2-2. Potential Non-Renewal Locations

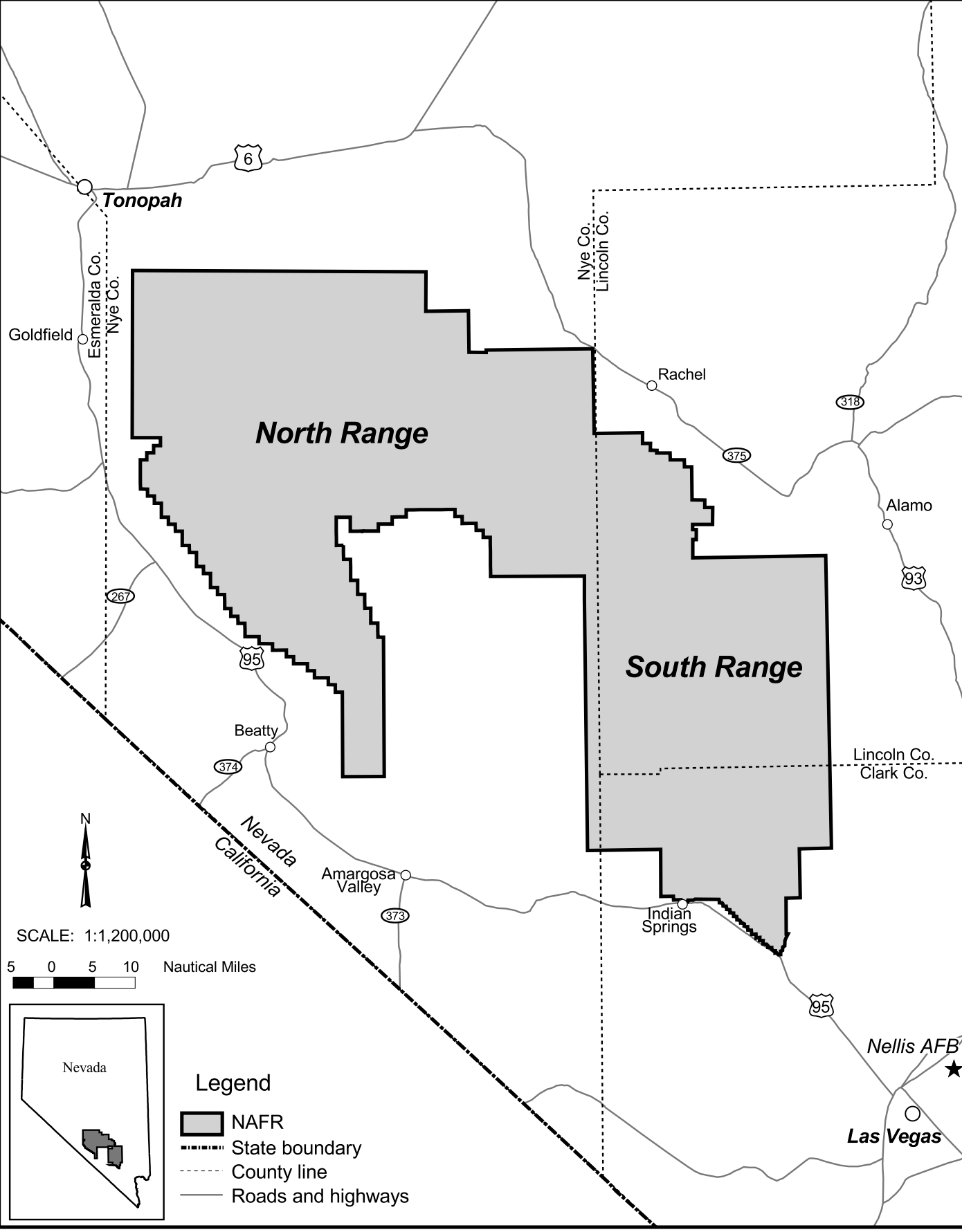


Figure 2-3. Lands Contained within Alternatives 1B and 2B

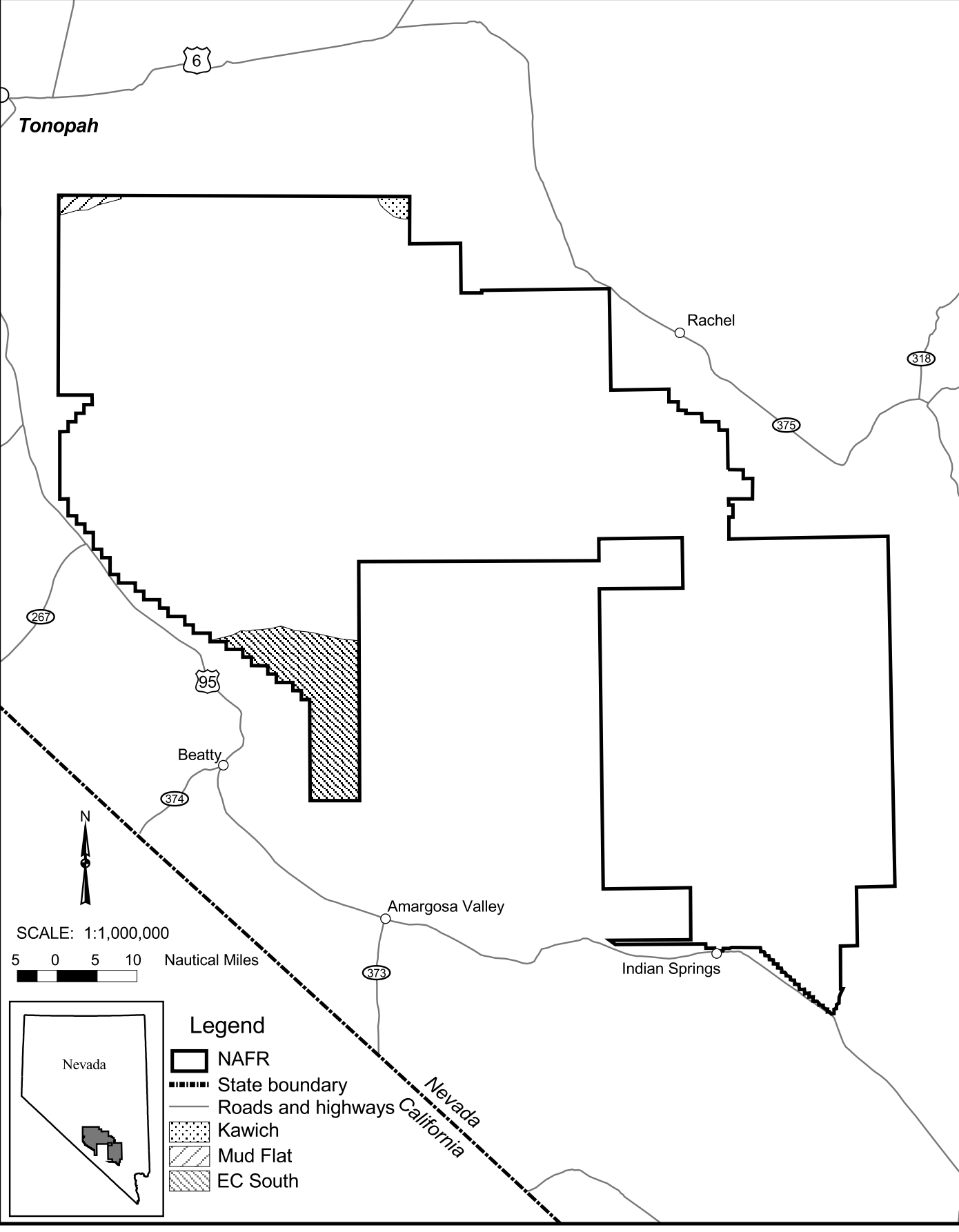


Figure 2-4. Potential New Co-Use Areas

- *EC South* — Non-consumptive co-use public access, such as hiking, may be permitted in the southern portion of this range, south of Timber Mountain.

Future unknown or undefined changes to Air Force mission, security, and/or safety requirements could negatively or positively affect the amount of land available for co-use. Should future Air Force requirements change, co-use of some or all of the three potential co-use areas may become inconsistent with Air Force mission, security, and/or safety requirements. Should that occur, co-use of that particular area could be further restricted or terminated. Changes to future Air Force requirements could increase or decrease the size of the three potential co-use areas.

BLM and USFWS resource management activities on other portions of NAFR would continue as at present. This includes annual hunting, wild horse management, wildlife and habitat enhancement activities, and other forms of natural and cultural resource management.

LAND ADMINISTRATION

A series of administrative changes would be implemented to facilitate co-use. The Air Force and BLM would develop specific administrative procedures to manage access and approve uses for lands designated for co-use.

The renewal of the South Range lands could be accomplished without a change in administration. South Range lands required for public safety and national security, would remain withdrawn by both the USFWS for the DNWR and the Air Force for NAFR. Management of environmental resources on portions of the South Range actively used for air-to-ground activities is described in a Memorandum of Understanding (MOU) dated December 1997 signed by the USFWS and the Air Force. Congressional decisions could be made regarding management of those overlapping DNWR and South Range areas affected by Air Force activities.

The lands described as Pahute Mesa used by the DOE, and lands withdrawn by PLO 1662, used by the Air Force, could be realigned and withdrawn as part of this Congressional action. The administration of Air Force and DOE lands currently withdrawn by one agency but used by the other would be changed to reflect the using agency.

The Air Force, in association with the other Five-Party Cooperative Agreement signatory agencies, would exchange information on environmental management issues on NAFR. The agencies would meet periodically with an annual public meeting.

2.2.3 Alternative 2A — 25-Year Withdrawal

Except for duration and administrative requirements, this alternative would be the same as Alternative 1A. Lands included in this alternative are shown in Figure 2-1. This alternative would require completion of a land withdrawal renewal process for NAFR within 25 years. The Air Force would prepare all of the reports required by the Federal Land Policy and Management Act (FLPMA) and Engle Act, including an LEIS, as part of this process.

2.2.4 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

Except for duration and administrative requirements, Alternative 2B would be the same as Alternative 1B. Lands included in this alternative are shown in Figure 2-3. This alternative requires a full land withdrawal renewal for NAFR within 25 years. Expenses for adhering to renewing withdrawals would be the same as Alternative 2A.

2.2.5 No-Action Alternative

The No-Action Alternative is defined as no Congressional renewal of NAFR land withdrawn for military use and the end of all military actions on the ground. Lands identified for renewal in Figure 2-1 would not be withdrawn. No air-to-ground flight missions would occur, nor would test or training missions that depend on ground-based targets, threats, or scoring systems. All ground-based military equipment and other assets would be removed.

The No-Action Alternative does not mean the end of military aircraft overflights throughout the special use airspace scheduled by Nellis Air Force Base (AFB). High-performance military aircraft would continue to use the airspace for air-to-air training, aircraft check-out, supersonic flights, and limited training events.

This No-Action Alternative assumes that approximately 3.0 million acres of what is now NAFR would be returned to DOI management in accordance with PL 99-606 as amended. Once a Congressional determination of No-Action has been implemented, and if DOI determines (in consultation with the Secretary of the Air Force), that the withdrawn land is contaminated, the Air Force, DOE, or other federal agencies activities would be limited to those associated with decontamination. Lands that would not pose a risk to humans would be managed under the DOI land and resource policies.

Multiple military missions and activities currently use NAFR, but they would no longer be able to perform some of their missions without ground-based infrastructure. The activities, facilities, and capabilities that would be eliminated by the No-Action Alternative are described in the following.

- ISAFAF and the TTR Airfield and associated complex would be closed, all assets removed, and all operations stopped.
- Applicable terms of the existing MOUs between the Air Force and other agencies, including DOE, BLM, and USFWS would be evaluated and amended, as necessary.
- The Tonopah Electronic Combat Range (TECR), the Tolicha Peak Electronic Combat Range (TPECR), and the EC South Range would be closed, all assets removed, and all operations terminated.

- All ground-based measuring and debrief systems and aircraft testing requiring a NAFR facility would be terminated. Approximately half of the Air Combat Maneuvering Instrumentation (ACMI) capability would be lost.
- Operational test and training for all air-to-ground weapons systems or for any air-to-air weapons systems that require ground-based infrastructure would be stopped.
- Weapons systems tactics and training for single-aircraft weapons delivery or multiple-target attack training would be stopped.
- Large-force training exercises that include Red Flag and Green Flag would be stopped.
- Other specialized training events that require NAFR lands, including Desert Warfare Training, Combat Rescue School, Air Rescue Squadron, and the 11th and 15th Reconnaissance Squadrons, would be stopped.
- Air Force protection and management of natural and cultural resources through funded programs and restricting access would end.

The No-Action Alternative would close NAFR, reduce aircraft missions in the airspace, and substantially reduce current activities and capabilities at Nellis AFB. To estimate the full implications of this loss, the Nellis AFB missions that currently use NAFR were evaluated to determine which missions could continue with no ground-based support and which missions and activities could not continue without that support. The overall effect of the No-Action Alternative is estimated to reduce Nellis AFB missions and personnel by at least 50 percent. Aircraft operations in the NRC would be expected to decline to approximately 100,000 to 150,000 sortie-operations per year. Chaff use would be expected to decline to between 135,000 and 200,000 bundles per year, while flare use would range from 30,000 to 46,000 units per year.

The analysis of environmental consequences of selecting the No-Action Alternative addresses the environmental resources identified as important by public and agency comments during the scoping process.

This LEIS fully recognizes that there may be indirect impacts upon Nellis AFB operations and environmental resources if the No-Action Alternative for NAFR land withdrawal were selected. Fully studying and exploring potential indirect operational and subsequent environmental consequences upon Nellis AFB from a NAFR non-withdrawal decision would first involve defining the indirect consequences. This process would include planning the use of Nellis AFB without NAFR and identification of any secure and safe test or training locations for Air Force and allied aircraft. If such locations could be developed or expanded to meet mission requirements, a redistribution of a portion of Nellis AFB assets to such locations would be associated with a decision to not renew NAFR.

Evaluating such potential indirect effects of non-withdrawal of NAFR to Nellis AFB and secondary impacts at all other bases and ranges in both operational and environmental terms is speculative at this time and beyond the scope of this LEIS. Specific environmental

consequences of non-renewal to NAFR are addressed in this LEIS. Where quantifiable consequences to Nellis AFB are predictable, such as in socioeconomics, these consequences are also addressed in Chapter 4.0.

LAND AREA

The approximately 3,056,030 acres of lands withdrawn under PL 99-606 as amended would no longer be segregated for military use. Much of the South Range that overlaps DNWR would be under the jurisdiction of USFWS. Most of the North Range would be returned to BLM. Areas that could pose a health or safety risk after cleanup would be precluded from public access.

LAND USE

The DOI, through the USFWS, would continue to manage the DNWR to protect and preserve desert bighorn sheep and other species of wildlife. It is anticipated that the DOI through the BLM would employ multiple use concepts on lands that do not pose a health threat to potential users. A detailed estimation of the former NAFR areas requiring remedial actions prior to final release or a determination of actions required would follow a Congressional selection of the No-Action Alternative. Such evaluations and characterizations are not included in this analysis. The most likely land uses for the former NAFR would be dispersed recreation, rockhounding, off-highway vehicle (OHV) use, and mineral exploration.

LAND ACCESS

Access to the DNWR would be under the jurisdiction of the USFWS. Access to all other lands would be under the jurisdiction of the BLM.

LAND ADMINISTRATION

The lands withdrawn by the USFWS for the DNWR would be administered by that agency. Lands that DOI does not consider contaminated would be administered by BLM. Lands considered to be contaminated would remain the responsibility of the Air Force or the DOE until sufficiently decontaminated to allow for the transfer to DOI, as described in PL 99-606 as amended.

2.2.6 Air Force Preferred Alternative

The fundamental purpose for the renewal of the NAFR land withdrawal is to preserve an essential component of the national defense training and testing base that is indispensable to the continued and future readiness of U.S. forces. The NAFR is the nation's largest military reservation. It provides a safe and secure location to realistically test equipment and train military personnel to protect U.S. interests. Furthermore, the NAFR provides the most realistic and challenging aerial combat training and testing in the world.

The CEQ regulations for implementing NEPA requires that the agency's preferred alternative be identified in a Final EIS. A series of alternatives and sub-alternatives were evaluated in the

Draft LEIS based upon comments received from the public, American Indians, and reviewing and cooperating agencies. These comments were balanced with environmental, technical, and other factors to identify a preferred alternative which best fulfills the Air Force's statutory missions and responsibilities.

The Air Force considered various alternatives during the NEPA process and identified Alternative 1B as the Air Force's Preferred Alternative. The Air Force believes that Alternative 1B ensures long-term stability, predictability, and accountability needed for efficient management of the lands entrusted to support the military mission.

The following is a discussion of the elements of Alternative 1B:

- **Duration** - Renew the land withdrawal of the NAFR for an indefinite period of time.

  The military need for the NAFR to train aircrews and test equipment is projected for the foreseeable future. The Air Force believes an indefinite withdrawal with Congressional oversight and periodic review would enhance its ability to accomplish the military mission, exercise sound environmental stewardship, and interact more effectively with the public and agency stakeholders.

- **Non-renewed Lands –** Do not renew the 30,000 to 35,000 acre parcel of land on the western portion of the range as delineated in Figure 2-2.

  The Air Force has reviewed current readiness requirements for the present and foreseeable future. This review identified lands outside of restricted airspace for which the Air Force no longer has an operational need. Even though the Air Force is currently proposing to return lands to the public domain, the ever evolving nature of national security interests may require additional land withdrawals to meet future unforeseen changes in test and training requirements.

- **Land Access –** The Air Force has identified co-use opportunities that may be available for mission compatible recreation and American Indian religious or cultural activities. These co-use opportunities would be short-term in nature, dependent upon mission safety and security considerations, and subject to Air Force approval. The areas identified are Mud Lake, Kawich Range, and EC South on Figure 2-4.

- **Jurisdictional Realignment –** Change jurisdiction to reflect the using agency's control.

  The administration of Air Force and DOE lands currently withdrawan by one agency but used by the other would be changed to reflect the using agency's control.

  The lands described as Pahute Mesa are withdrawn for the Air Force, but used by the DOE. DOE lands withdrawn by PLO 1662 are used by the Air Force. Both areas would be realigned as part of this land withdrawal renewal.

2.3 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

The following alternatives were identified during public scoping and during the evaluation of mission requirements by the Air Force. Each alternative was evaluated with respect to public safety, military operations, and national security. Individual components of these alternatives that were determined to be operationally feasible were included in the alternatives described above. The alternative actions discussed below were considered but not carried forward.

Withdrawal for Air Force Use with Full BLM and USFWS Access

All alternatives presented in section 2.2 include continuation of Air Force agreements to work with BLM and the USFWS to provide scheduled access for research, planning, and management activities. In addition, the Air Force annually funds multiple environmental projects to enhance the understanding and protection of the NAFR environment. Full and unlimited access by agency personnel would severely compromise safety and security aspects of the NAFR mission. This alternative was not considered compatible with NAFR operations and missions.

Withdrawal and Full American Indian Access for Religious Ceremonies

The Air Force currently makes every effort to support access to NAFR lands for American Indian religious ceremonies. Full and unlimited access conflicts with mission requirements, safety, and security. Scheduled limited access for American Indian groups consistent with test and training missions is included in all action alternatives. Full and unlimited access is not considered feasible.

Non-Renewal of Areas with High to Moderate Mineral Potential for Mineral Entry, Mineral Leasing, and Disposal of Mineral Material

Following review of the Minerals and Energy Resources Assessment, a portion of the Case File for this action, BLM suggested the analysis of an alternative that would not include the renewal of areas along the outer perimeter of NAFR that have a high or moderate mineral potential. Twelve areas were identified that are expected to have such a potential to contain base or precious metals. Additionally, six of those twelve areas, plus five other areas were identified as having a moderate potential for industrial minerals, stone, or aggregate.

Non-renewal of all areas with moderate to high mineral potential on the perimeter of NAFR for mineral entry, mineral leasing, and disposal of mineral material in remaining portions of NAFR would substantially affect test and training capabilities of NAFR. Public safety and mission security require highly limited access to NAFR. Electronic warfare testing and training may endanger mineral exploration and extraction personnel. Access for exploration or mineral extraction of all perimeter areas with moderate to high mineral potential conflicts with NAFR mission requirements, safety, and security. Non-renewal of a portion of the Clarkdale and Wagner Mining Districts has been included in the 1B and 2B alternatives.

Withdrawal and Full Access for Non-Consumptive or Consumptive Uses

Public safety and mission security require highly limited access to NAFR. Electronic warfare radio transmissions may endanger mineral exploration and extraction personnel. Munitions delivery would endanger personnel on the ground. Visual access to target placements and tactics could be used by potential adversaries to compromise national security and future military missions. For these reasons, full and unlimited access for non-consumptive or consumptive uses was not considered as a viable alternative. Limited access in specific areas has been included in the 1B and 2B alternatives.

Withdrawal of the Majority of NAFR with Limited Land Relinquishment

Scoping identified limited areas of the current NAFR withdrawn lands where other uses could occur. These locations include the following:

- The Clarkdale and Wagner Mining Districts (as defined by Nevada Senate Joint Resolution 25). Portions of the mining districts are required for operations and safety, including the ridgeline. Inclusion of all of both districts was not compatible with military uses.
- Stonewall Mountain. The current withdrawal is required for national security and public safety. Access to this area is not compatible with safety and security requirements.
- Additional Lands. The 1B and 2B alternatives include lands that could be returned without substantially affecting existing or anticipated NAFR missions. No additional currently withdrawn lands have been identified as unused or excess.

Withdraw Additional Land to Fully Meet the Mission Requirements

The lands withdrawn by PL 99-606 as amended do not fully meet the land requirements of the Department of Defense (DOD) missions on NAFR. Examples of mission-derived land requirements are discussed in section 1.5. To maximize its ability to perform the mission requirements while ensuring public safety and the preservation of national security, the Air Force limits its operations within the NRC and on NAFR to conform to the current capabilities and constraints of the land and airspace. Expansion of NAFR to fully meet the existing and projected military operations requirements was considered as an alternative but not carried forward since it was considered infeasible in light of the various environmental and socio-political concerns of other federal agencies, the State of Nevada, local governments, and the public.

Combine NAFR Activities with NAS Fallon at Either NAFR or NAS Fallon

During the scoping process, a few public participants suggested that the activities on NAFR be combined with Naval Air Station (NAS) Fallon. As described in Chapter 1.0 of this document, NAFR is unique in many aspects. It is the largest safe and secure air-to-ground range in the

DOD inventory and supports large multi-force operations in a realistic combat environment. NAS Fallon does not have the same degree of size and exclusive use as NAFR. NAFR's capability is in direct support of national priorities in fulfillment of DOD mission statements. Air Force support of these national priorities has created the establishment of local use (activities) priorities. Large-scale test efforts and Red Flag exercises lead the list of eight to ten priority activities. NAFR large force exercises occur between 6 A.M. and 10 P.M. During both Flag and non-Flag exercise days, NAFR is saturated by established priority users. The intense use of the Range demonstrates the lack of NAFR time to accommodate another large user such as NAS Fallon. Since the combination of activities is operationally infeasible, this is not included as an alternative.

Withdrawal of Range Infrastructure, Target, and Health Risk Locations Only

Withdrawal of selected sites that include targets, simulated threats, required infrastructure and areas that could pose a health risk was considered as an alternative. The purpose of all military activity on NAFR is to maintain U.S. defense capabilities. NAFR could not meet its national test and training requirements if it were to consist of a patchwork range. NAFR requires exclusive use of the land for both safety and security.

The realistic military activity on NAFR includes all activities and infrastructure necessary to keep U.S. forces prepared for confrontation with any military force the United States might reasonably oppose in the future. To maintain this capability, our military units need a location to train and test as close to full capability as possible. Aircrews and weapons systems need land and airspace that is free of constraints comparable to a combat environment. It would be impossible for aircrews to realistically train in a full, warfighting capability with live air-to-ground weapon systems if public access were allowed in the current range.

The secure, exclusive use of NAFR is also key to the protection of U.S. aircrews and aircraft. The United States must be able to simulate potential real-world targets and test tactics against those targets without access to the area by potential adversaries.

Military operations must ensure the safety of military personnel and the public while training, testing, and evaluating weapons systems in support of potential technological improvements in hardware, software, tactics, and training. Exclusive use of NAFR has provided sufficient safety for most of the military missions in the past and is expected to do so in the future. Lands currently withdrawn and proposed to be withdrawn under the alternatives are the minimum needed for support of the current and anticipated mission requirements. Reduction in the withdrawn area would limit the capability of NAFR to test equipment and train personnel with respect to the current threats and potential future adversaries.

This alternative would withdraw only those areas that contain targets, threat sites, communication structures and other range infrastructure facilities. Such a range would significantly degrade the current capabilities of the NAFR so as not to support the current and anticipated future requirements. As a result of the need to protect national security interests, many NAFR activities, including some portions of the multi-force exercises (Red Flag) would

be precluded from using this limited range. Without the ability to restrict access, many NAFR activities would be restricted by health and safety considerations. This alternative was not considered compatible with NAFR operations and missions.

Relocation of NAFR

During the scoping process, a few public participants suggested that the activities on NAFR be relocated to other existing Air Force or DOD ranges. No other specific locations were suggested.

NAFR provides unique capabilities to the Air Force because of its large, exclusive-use air-to-ground range and adequate military use airspace overlying and adjacent to the exclusive use land. The existing infrastructure (including target and simulated threat arrays, communications and debriefing systems, security systems, and other facilities) developed over the past 50 years to support the Air Force mission would be extremely expensive to replace or move and would require many years to construct and make operational.

NAFR is a nationally unique resource that permits a secure area for testing equipment and tactics as well as multi-force exercises. NAFR facilities (targets and threat simulators) can be rapidly reconfigured to accurately reflect battlespace conditions and threat scenarios. Based on this analysis it is not anticipated that relocation of these assets could be accomplished within the United States.

2.4 MANAGEMENT ACTIONS TO REDUCE THE POTENTIAL FOR ENVIRONMENTAL IMPACTS

Air Force management of NAFR has included a series of actions designed to reduce environmental consequences of use of NAFR for test and training of weapons systems and personnel. These actions fall in the following three categories.

- *Avoidance Actions.* These management practices use environmental data collected on the range to identify areas known to contain sensitive environmental or cultural resources and to avoid those areas to the extent possible during test and training activities.
- *Design Actions***.** Project design elements are integrated into test and training activities to reduce potential impacts to a resource or suite of resources to the extent possible. Because of operational and fiscal requirements, not all possible design elements can be incorporated into every action.
- *Operational Actions.* These specific actions are taken to reduce the potential for environmental impacts. Operational mitigations usually reflect some modification to, or restrictions on, certain aspects of the Air Force's use of NAFR for test and training activities.

2.4.1 Range Resource Plan

The Nellis Air Force Range Resource Plan directs the management level for natural and cultural resources on the approximately 2.2 million acres of withdrawn land on NAFR, which is not part of the DNWR. The Range Resource Plan was developed by BLM, in cooperation with the Air Force and with extensive involvement by the public. The Range Resource Plan provides resource-specific objectives, management direction, and management actions. Environmental resources specifically described in the plan are vegetation, wildlife habitat, wild horses, visual resources, areas of critical environmental concern, lands program, access, minerals, soil, water and air resources, forestry, livestock grazing, cultural and paleontological resources, recreation, wilderness, natural areas and fire. As a result of the Resource Plan process, the BLM selected a resource management alternative to be implemented over a 20 year period starting in 1992. These management actions are:

- improve the rangeland vegetation conditions;
- maintain wildlife habitat;
- achieve a thriving ecological balance for wild horses;
- protect visual resource values;
- designate the Timber Mountain Caldera National Natural Landmark as an Area of Critical Environmental Concern (ACEC); and
- continue with valid existing management practices.

2.4.2 Integrated Natural Resource Management Plan

The Integrated Natural Resource Management Plan (INRMP), Nellis Air Force Base / Nellis Air Force Range was prepared by the Air Force (in compliance with AFI 32-7064) to consolidate information on the natural resources of NAFR and recommend direction for natural resource management on NAFR. The primary goal of natural resource management on NAFR is to maintain ecosystem integrity (naturally functioning systems, where they exist), and to restore ecosystem integrity where feasible. The maintenance of ecosystem integrity is important to the Air Force because such management promotes good stewardship by protecting biodiversity, ensures sustainability of NAFR, and minimizes management costs and activities.

The INRMP identifies natural resource constraints to NAFR planning and missions. These include areas which should be avoided, or where special precautions should be taken to limit the impact of military activities on the fragile or protected natural resources on NAFR. For example, the INRMP identifies:

- the presence of desert tortoises that may limit new construction, including new targets, in NAFR South Range valleys,

- areas containing Merriam's bearpaw poppy that should be kept free of human influence,

- sensitive spring and wetlands habitats that should be protected by fencing to make them accessible to indigenous wildlife but inaccessible to introduced species such as wild horses, and

- cantonment ground maintenance that should include efforts to reduce negative environmental effects of herbicides / pesticide use, eliminate exotic species, and seek opportunities to replace traditional landscaping with xeriscape.

2.4.3 Avoidance, Design, and Operational Management Actions

The following list details Air Force actions ongoing or proposed to reduce potential environmental consequences associated with NAFR activities.

Airspace: One concern expressed in public and agency comments during scoping was that new high-performance aircraft and stand-off weapons would require the Air Force to expand airspace associated with NAFR. The Air Force has taken the following steps to operate within the overall airspace boundaries that have historically applied to NAFR operations.

- *Design Action*. The Air Force proposal for renewal of NAFR land withdrawal includes no changes to external airspace boundaries. This permits the Air Force to make minor adjustments for efficient airspace management within the overall boundaries while providing commercial and general aviation users with no impacts upon their established routes.

- *Operational Action*. The Air Force has adapted missions for training and weapons systems testing programs to fit within the proposed NAFR land renewal boundaries. This requires that certain weapons systems, such as air to air missions, be tested at locations other than NAFR. This action to adapt missions ensures public safety and permits the Air Force to achieve nearly all test and training within the existing NAFR boundaries.

Noise: Public concern was expressed during scoping regarding noise from aircraft overflights on both east and west sides of NAFR. The Air Force has integrated a series of actions into flight training profiles to reduce those concerns.

- *Avoidance Actions.* The Air Force has identified a series of locations and established flight avoidance rules and overflight restrictions for those locations to reduce noise to communities on the periphery of NAFR. Nellis personnel work closely with local communities to identify any lack of adherence to such avoidance criteria and with aircrews to reduce the potential for environmental impacts. In addition, the Air Force continues to cooperate with state and federal agencies to identify areas of potential biological impact and establish criteria to reduce the potential for impacts from noise in these habitats.

- *Operational Actions.* Each aircrew operating in airspace that uses NAFR is given detailed briefings identifying areas to avoid, to ensure consistency with Air Force policies regarding noise reduction.

Safety: State and federal agencies responsible for environmental resources expressed concern that fires on NAFR could damage environmental resources. Flight safety from low level missions was also identified as a concern. The Air Force has taken action to reduce potential safety impacts.

- *Design Actions.* The Air Force has established fire response teams at Indian Springs and TTR. In addition, the Air Force has established agreements with DOE and other organizations with fire suppression capabilities to provide back-up teams and equipment that can respond rapidly to wildfires. Air Force personnel and policies also work to ensure flight safety. Arming of live ordnance occurs after entering NAFR, and flight procedures are closely followed so that lives and equipment are protected.

- *Operational Actions.* To reduce the potential for fire risk associated with Air Force action, NAFR has adopted more restrictive aircraft-specific release altitudes for defensive flares than required by Air Combat Command (ACC) regulations. This operational action ensures that flares burn out prior to reaching the surface.

Hazardous Materials and Solid Waste: Concern was expressed during scoping that hazardous materials exist on parts of NAFR as a result of past test and training activities. The Air Force has taken the following steps to reduce potential environmental consequences associated with activities under its control.

- *Design Actions.* The Air Force has implemented an Installation Restoration Program (IRP) on NAFR that has identified all sites with potential hazardous materials. Steps have been instituted to reduce the potential for environmental impacts on these sites. Section 3.4 describes these actions.

- *Operational Actions.* Air Force training operations are scheduled to clean up hazardous materials resulting from munitions use from target areas. This is part of the Coronet Clean program that clears unexploded ordnance, refurbishes targets, and removes debris for recycling or disposal. Air Force and contractor personnel on NAFR also work through an Air Force pollution prevention process called HAZMART that records and manages the procurement, handling, storage, and issuance of hazardous materials and the return, recovery, reuse, recycling, or disposal via Defense Reutilization and Marketing Office (DRMO) of hazardous wastes. These operational procedures are designed to reduce the potential for environmental impacts from use of hazardous materials such as fuels or cleaning equipment.

Earth Resources: The primary areas of potential environmental consequences associated with earth resources are wind-caused soil erosion and access for exploitation of mineral resources. The following actions are being taken or have been incorporated into the proposal for NAFR land withdrawal renewal.

- *Design Actions.* Access to potential mineral resources within NAFR is not consistent with security and safety requirements associated with high performance aircraft performing rapid maneuvers with live ordnance. In addition, radio frequency transmissions from surface threat emitters and from aircraft could pose a risk to mining operations using explosive devices. A design mitigation in two NAFR land withdrawal renewal alternatives is the non-renewal of a portion of the Clarkdale Mining District and the Wagner Mining District in Nye County. This would permit DOI/BLM to determine whether the mining district could be made available for mining operations.

- *Operational Actions.* The primary sources of particulate matter on NAFR are vehicle traffic on unpaved roads, weapons delivery, and wind erosion. Unpaved roads are regularly graveled to reduce surface erosion, and the Coronet Clean program cleans and grooms target areas to reduce the amount of disturbed soil. These steps help reduce wind erosion.

Water Resources: Comments regarding surface water resources on NAFR focused on the conflict between wild horse management and native animals and vegetation. An additional comment dealt with the availability of subsurface water resources for potential agricultural use. The following steps are being taken to protect surface waters and groundwater migration.

- *Avoidance Actions.* Surface and subsurface testing by DOE has resulted in substantial concern by off-range residents that materials could migrate into off-range groundwater resources. DOE 1996a contains steps to address those concerns.

- *Design Actions.* The Air Force is working with BLM and other state and federal agencies to reduce the impacts of overuse to water resources by wild horses. This includes identifying water resources outside the wild horse range and establishing fencing to permit access by native species while preventing access by expanding wild horse populations.

Air Quality: Potential sources of degradation of air quality on NAFR include ordnance use, vehicular traffic, and wildfires. Wildfires could result in increased surface areas and increased particulates.

- *Design Actions.* The Air Force incorporates scheduled maintenance of range assets, including roads and targets, to reduce the potential for wind erosion.

- *Operational Actions.* The Air Force has instituted altitude restrictions for defensive flare use and has established response capabilities to reduce surface disturbance from fire. These actions protect soils from wind erosion, reduce fire potential, and reduce air-borne particulates.

Biological Resources: Public and agency commentors expressed concern that adequate information was not available regarding NAFR biological resources to determine the best steps for managing those resources. Management for biodiversity is expected to be a key to

protecting biological resources. Access restrictions were identified as the basic reason for the inability to conduct biological surveys.

- *Avoidance Actions.* The Air Force has funded a series of biological surveys and the preparation of a biological inventory to identify species type and abundance on portions of NAFR. These surveys have included focused surveys in natural, undisturbed habitats as well as random surveys in areas that include both disturbed and undisturbed resources. Areas of sensitive resources have been identified and, where possible, avoidance measures have been taken in the siting of targets, road construction or improvement, and siting of other facilities. Most targets are sited in low vegetation playas and avoid impacts to sensitive biological resources.

- *Design Actions.* Nellis AFB personnel have actively participated with federal and state agencies and other stakeholders in the biodiversity initiative to design measures that would support species and habitat management for biodiversity. This initiative is expected to result in additional guidance for habitat improvement, species monitoring, and resource habitat protection. The Air Force is committed to support management for biodiversity to the extent that biodiversity and mission requirements, safety, security, and funding can be managed to achieve compatibility on NAFR.

- *Operational Actions.* The Air Force has worked with state and federal agencies responsible for biological resources to take actions designed to reduce the potential for environmental impacts. These actions have included protection of desert tortoises from ordnance delivery areas, mapping of sensitive species, and protection of water resources from destruction by wild horses.

Cultural Resources: Commentors during scoping expressed concern that NAFR exclusive use prevented American Indians from accessing traditional resources, including important cultural resources. Exclusive use was also cited as an obstacle to recreational use of cultural resources and obtaining cultural resource information on prehistoric and historic sites.

- *Avoidance Actions.* The Air Force has used data collected on the range to identify areas known to contain sensitive cultural and historical resources and to avoid potential impacts to those areas. Information briefings are given to personnel associated with NAFR to ensure their sensitivity to the value of cultural resources. These briefings specifically direct personnel to remain on the roads, to avoid known cultural resources, and to refrain from touching or moving any artifacts.

- *Design Actions.* Nellis AFB personnel have participated with American Indian governments and tribal groups to identify their concerns and to institutionalize Air Force activities that would respond to those concerns. Participation in the biodiversity initiative and inclusion of tribal information for Air Force and other decisionmakers are examples of this participation.

- *Operational Actions.* The Air Force has taken specific actions to reduce the potential for environmental impacts to cultural resources. These measures include rapid response to American Indian concerns regarding the value of traditional resources at particular locations on NAFR, scheduling support for American Indian access to traditional sites compatible with safety and security, and inclusion of alternatives in the application for NAFR withdrawal renewal to provide increased access in selected locations. Recreational use of cultural resources is not considered compatible with Air Force missions, Air Force directives, or American Indian goals to protect traditional resources.

Land Use and Transportation: Exclusive use of NAFR for safety and security prevents access by unauthorized personnel for multiple land uses or for transportation. The Air Force works within mission constraints to coordinate with other federal and state agencies in support of their land use management responsibilities.

- *Design Actions.* Overlapping resource management areas include the wild horse management area on the North Range, the DNWR on the South Range, and USFWS resource management responsibility on the withdrawn lands. The Air Force has designed procedures to permit access for management of these resources while meeting operational safety and security requirements. It is recognized that these procedures are not always consistent with agency access requests.

- *Operational Actions.* The Air Force has established altitude restrictions over sensitive wildlife habitat and is working to support wild horse management and associated protection of native species. The land withdrawal renewal alternatives provide for BLM to permit varied land use on areas not withdrawn by the Air Force and on potential co-use areas within the withdrawn land.

Wilderness and Wilderness Study Areas: Agency commentors expressed the desire to identify wilderness and WSAs under the NRC. These lands have been surveyed and recommended for designation as WSAs by the responsible federal agencies. The wilderness values of these lands can be protected by not using motorized or mechanized equipment, not landing aircraft, and not constructing roads or structures, such as transmission lines. The current military overflights were evaluated by BLM prior to designation of each WSA. The consequences of overflight were not considered to be sufficient to warrant a nonsuitable recommendation for any WSA.

- *Avoidance Action*. The Air Force has worked with BLM, U.S. Forest Service (USFS), and USFWS to avoid establishment of facilities outside NAFR that could impair the future use or enjoyment of areas as wilderness. The Air Force has an MOU with the USFWS that states that the Air Force will avoid actions that would preclude the USFWS from managing the DNWR wilderness recommendation area as a de facto wilderness.

- *Operational Action.* On the South Range, the Air Force has targets within overlapping DNWR and NAFR management areas. The Air Force has an MOU with the USFWS that states that aircraft operations, except for special training missions, will generally not go

below 2,000 feet above ground level (AGL) over overlapping DNWR and NAFR areas that meet wilderness recommendation criteria.

Recreational and Visual Resources: Public and agency commentors during scoping expressed the desire to have increased access to NAFR for recreation, including recreational hunting and trapping, recreational use of cultural and historic sites, hiking and camping, and rock collecting. The visual resources within Nellis AFB could be protected by maintaining facilities in built-up areas and limiting construction and operations reducing facilities in non-built-up areas.

- *Design Actions.* The Air Force has designed alternatives in the land withdrawal renewal process to address public desires for increased recreational access. These alternatives provide for non-renewal of some lands and possible access to specific co-use areas on the periphery of the range that could permit low-impact recreational use consistent with safety and security requirements.

- *Operational Actions.* The Air Force schedules missions to permit access to NAFR for several annual recreational hunts. The Air Force has been funded and is in the process of removing towers used for tracking aircraft in NAFR and replacing them with lower visibility Global Positioning System (GPS)-based tracking systems. This will result in fewer visible facilities within NAFR.

Socioeconomics: Public and agency interests in access to the range included exploration for mineral resources and potential extraction of economically viable mineral resource deposits. This was particularly identified as a potential economic benefit on the west side of NAFR.

- *Avoidance Actions.* Potential mineral resource areas are identified as part of the land withdrawal renewal environmental process. Operation of high performance aircraft with electronic countermeasures, live ordnance, and security needs requires exclusive use throughout most of NAFR.

- *Design Actions.* Alternatives have been identified that do not include renewal of portions of the Clarkdale and Wagner Mining Districts. If such an alternative were selected, if economically viable mineral resources exist, and if DOI/BLM permits were issued, this land could be used for mineral extraction.

- *Operational Actions.* If alternatives to land withdrawal renewal were selected that provided for co-use of specific areas, the Air Force would, to the extent possible, conduct operations to support these co-use activities.

Environmental Justice: Commentors on environmental justice expressed concern that exclusive use prevented American Indians from accessing traditional resources. Additional questions were raised regarding federal procedures for ensuring minority or local participation in procurements for goods and services used by personnel at Nellis AFB and on NAFR. Federal procurement policies were explained during scoping. In addition, the Air Force has identified the following actions.

- *Avoidance Actions.* Full access to traditional resource areas is not compatible with operation of high performance aircraft with live ordnance. Security and safety needs require exclusive use throughout most of NAFR. Alternatives have been identified that permit increased access to co-use portions of NAFR. Air Force mitigation by avoidance and restricted access practices have served to protect traditional properties and resources from unauthorized access.

- *Design Actions.* Nellis AFB and ACC personnel have supported government-to-government relations to identify American Indian concerns and to implement Air Force activities responsive to those concerns. Steps have included supporting the biodiversity initiative and tribal information for decisionmakers.

- *Operational Actions.* In response to concerns regarding noise, the Air Force has identified areas for avoidance of low-altitude overflight during test and training activities in the military operations areas (MOAs) adjacent to NAFR. The Air Force has identified alternatives in the land withdrawal renewal that provide for American Indians and others to access limited co-use areas on NAFR.

2.4.4 Results of Air Force Management Actions

The management actions described in section 2.4.3 have limited the impact of the military activities on the environmental resources of the NAFR. Existing management practices have been found to be effective in limiting new impacts and mitigating past impacts. Although not specifically prepared for this purpose, the Keystone Dialogue on Nellis Air Force Range Stewardship brought together over 65 individuals representing many agencies and individuals interested in the NAFR. This dialogue found that "Many areas on NAFR are in a relatively pristine ecological condition". This is primarily because "the overwhelming majority of the land is used for buffer zones to provide safety and security when conducting military activities. Consequently, NAFR serves as an ecological island that provides refuge-like conditions for animals, plants, and natural communities indigenous to the Great Basin and Mojave ecosystems". The dialogue recommended continuing stewardship of NAFR "to preserve and sustain NAFR's ecological values for future military and civilian use".

2.5 COMPARISON OF ALTERNATIVES

Table 2.5-1 summarizes the findings and environmental consequences of the alternatives.

Table 2.5-1. Comparison of Alternatives by Resource and Potential Impact (page 1 of 4)		
Alternative 1A	***Alternative 1B***	***Alternative 2A***
AIRSPACE		
No change to airspace boundaries or uses	Same as 1A	Same as 1A
NOISE		
Continuation of aircraft and ground noise and distribution. Sonic booms to continue at current levels.	Same as 1A	Same as 1A
SAFETY (Ground, Ordnance, Flight)		
Safety policies for ground and flight operations to remain in place. Testing and training with more sophisticated ordnance require expanded safety zones within exclusive use areas.	Same as 1A plus limited access to specific areas within safety and security restrictions. Administrative changes not expected to alter access or management of areas.	Same as 1A
HAZARDOUS MATERIALS and SOLID WASTE MANAGEMENT		
Use of hazardous materials to continue in NAFR disturbed area. Types and amounts of waste for disposal to continue. Cleanup and maintenance of target areas and recycling of materials to continue. All DOD and DOE procedures, cleanup, and monitoring to continue.	Same as 1A plus non-renewal of lands including part of mining district defined by Nevada State Senate Joint Resolution 25 could result in increased hazardous wastes if BLM permits mining operation.	Same as 1A
EARTH RESOURCES (Soils, Geology, Minerals)		
Approximately 3% of 3-million-acre total to continue to be disturbed. No change in impacts to geology from Air Force actions. Mineral extraction on NAFR is currently excluded under land withdrawal.	Same as 1A plus potential for additional acreage disturbed in areas opened for recreational co-use and in non-renewal areas. Potential impacts to geology and soils if BLM permits mining operations.	Same as 1A
WATER RESOURCES (Floodplains, Water Quality, Water Rights)		
Continuation of existing water resource impacts. Continuation of existing water usage, quality, or flow.	Potential increased impacts to playa at Mud Lake from recreation and to surface and groundwater from mining operations on non-renewal lands if permitted by BLM.	Same as 1A.
AIR QUALITY		
Short-term air quality impacts from particulates to continue from construction, maintenance, operation activities, and wildland fire. Impacts would not be significant.	Same as 1A plus increased off-road vehicle recreation could increase dust in disturbed areas; impacts not significant. Impacts from mining could be discernible but would depend on state and federal permitting agencies.	Same as 1A
BIOLOGICAL RESOURCES (Vegetation, Wetlands, Wildlife Habitat, Threatened & Endangered Species)		
NAFR disturbed area impacts to continue; native vegetation and species expected to dominate throughout NAFR. Beneficial protection from exclusive use to continue for sensitive species, wetlands, and habitat.	Similar to 1A except local areas of soil and vegetation to be impacted if currently excluded lands become available for mining, agriculture, and/or recreation.	Same as 1A

Table 2.5-1. Comparison of Alternatives by Resource and Potential Impact (page 2 of 4)

Alternative 2B	*No-Action Alternative*
AIRSPACE	
Same as 1A	Airspace boundaries remain unchanged. Restricted areas likely to be redesignated.
NOISE	
Same as 1A	Limited air-to-air missions produce a 3-5 dB reduction in both subsonic and supersonic noise.
SAFETY (Ground, Ordnance, Flight)	
Same as 1B	Potential public safety risks in areas opened to the public; unrestricted access could become a hazard due to 50 years of use as a test and training range. Substantial cleanup would have to precede public access to some areas.
HAZARDOUS MATERIALS and SOLID WASTE MANAGEMENT	
Same as 1B	Air Force hazardous materials and ordnance use would stop. Where possible, hazardous materials would be removed from public access parts of NAFR disturbed areas and parts of affected airspace under agreement with DOE and DOI. Potential hazardous materials use and waste generated by future mining operations on NAFR would receive separate environmental review and would be administered by DOI and BLM.
EARTH RESOURCES (Soils, Geology, Minerals)	
Same as 1B	Air Force disturbance to soils would cease except for cleanup. If BLM permits, access for mining, off-road recreation, and agriculture could impact soils through erosion and mining. Environmental permitting and safeguards would be the responsibility of BLM and the appropriate state and federal agencies.
WATER RESOURCES (Floodplains, Water Quality, Water Rights)	
Same as 1B	Air Force actions cease. Any new land uses as authorized by BLM may affect surface water and groundwater. The Nevada State Water Engineer would be responsible for water appropriation.
AIR QUALITY	
Same as 1B	Air quality impacts from ground-based military activities would cease except for cleanup. Potential for increased impacts from recreation or mining development would be regulated by applicable local, state, or federal air pollution rules.
BIOLOGICAL RESOURCES (Vegetation, Wetlands, Wildlife Habitat, Threatened & Endangered Species)	
Same as 1B	Positive and negative impacts. Military training and disturbance would cease. Multiple use and public access including mining, grazing, recreation, and opening of areas for utility and related corridors could have long-term widespread negative impacts that would be expected to offset short-term benefits of reduced military activity.

Table 2.5-1. Comparison of Alternatives by Resource and Potential Impact (page 3 of 4)

Alternative 1A	*Alternative 1B*	*Alternative 2A*
CULTURAL RESOURCES (Archaeological, Architectural, American Indian Traditional)		
Continuation of NAFR access restrictions protect cultural and traditional resources, but impact researchers and American Indian groups desiring to access resources. Impacts from ground disturbance in NAFR disturbed areas and visual and noise intrusions from overflights to continue.	Similar to 1A except local areas opened to public access and co-use from non-renewal to BLM increase potential for impacts from vandalism, ground disturbance, or reduced protection.	Same as 1A
LAND USE and TRANSPORTATION (Ownership/Management; Transportation)		
Land status, land management, transportation and land use unchanged. Overlapping withdrawals and MOUs to continue. No change in impacts to disturbed areas on NAFR.	Short-term mission compatible co-use would permit site-specific access for recreation and American Indian activities. Potential administrative changes in overlapping DOE and DNWR not expected to impact land access or land uses. Potential mining or agriculture, if permitted by BLM in non-renewal areas, could impact land resources.	Same as 1A
WILDERNESS and WILDERNESS STUDY AREAS		
Continued military activity on NAFR and in the NRC is not projected to materially differ from the past, resulting in no change in wilderness quality, recommenda-tions, designations, or management.	Essentially the same as Alternative 1A. Potential increased access through co-use or nonrenewed lands is not expected to result in any change to wilderness resources.	Same as 1A
RECREATION and VISUAL RESOURCES		
Current access restrictions would remain. Limited hunting would continue. Increased access would occur on the Cactus Spring "finger" of NAFR but little increase in recreation is expected. No change in visual intrusions anticipated.	Similar to 1A and including short-term co-use of selected areas, based on safety and security requirements. Recreation benefits include land sailing, hiking, nature viewing, and rock hounding.	Same as 1A
SOCIOECONOMICS		
Continuation of existing socioeconomic effects and no discernible change in socioeconomic impacts.	Similar to 1A except potential for increased employment from private mining development in non-renewal portion of mining district defined by Nevada State Senate Joint Resolution 25 and from limited agriculture and recreation in non-renewal or co-use areas if permitted by BLM.	Same as 1A
ENVIRONMENTAL JUSTICE		
Continuation of ongoing economic activity with no disproportionate impacts on minority or low-income populations. American Indians have stated that NAFR access restrictions interfere with traditional activities.	Similar to 1A except that increased access to local co-use areas could benefit American Indians seeking to use those areas; cultural and traditional resources could also be exposed to unauthorized collectors.	Same as 1A

Table 2.5-1. Comparison of Alternatives by Resource and Potential Impact (page 4 of 4)	
Alternative 2B	***No-Action Alternative***
CULTURAL RESOURCES (Archaeological, Architectural, American Indian Traditional)	
Same as 1B	No Action has the potential for significant impacts to preserved cultural and American Indian traditional resources. Access-related impacts include changes to land status that place cultural resource protection in other resource agencies and multiple use management policies that expose cultural and American Indian traditional resources to impacts from consumptive (mining, collecting) and nonconsumptive (recreational) uses.
LAND USE and TRANSPORTATION (Ownership/Management; Transportation)	
Same as 1B	Land status substantially altered. Approximately 3 million acres would not be withdrawn for military use and would be transferred to BLM and USFWS management. Multiple-use of BLM managed land would be expected to include grazing, mining, and recreation. These changes to land status and land use would impact current land use with natural and cultural resources essentially isolated for 50 years. Management of the DNWR will continue to be for the benefit of bighorn sheep, desert tortoise, and other wildlife species.
WILDERNESS and WILDERNESS STUDY AREAS	
Same as 1B	Reduction in overflights is not expected to change wilderness resources under the NRC. Potential wilderness resources currently protected in what was NAFR cold be impacted by increased access for ORV recreation, mineral exploration, transmission lines, or other intrusions.
RECREATION and VISUAL RESOURCES	
Same as 1B	Since the No-Action alternative would not be expected to result in additional access to the DNWR, no change in recreational opportunities or visual resources would be expected.
SOCIOECONOMICS	
Same as 1B	Substantially reduced missions at NAFR are calculated to reduce employment in Clark County by 7,100 jobs and Nye County by 300 jobs. Subject to BLM approval and the price of gold, increased mining and agriculture could create a net of nearly 400 jobs in Nye County. If growth in Las Vegas continues at present rates, the impact of No-Action could be significant to individuals but not to the region.
ENVIRONMENTAL JUSTICE	
Same as 1B	Minority job losses are calculated to be at least 1,700 in Clark County. This absolute loss from No-Action is not expected to have a disproportionate impact upon minority or low-income populations. Increased access for American Indian traditional activities could be offset by public access impacts to traditional American Indian resources.

3.0 AFFECTED ENVIRONMENT

The public scoping for this environmental impact analysis process focused on those environmental resources that could potentially be affected by the proposal to renew land withdrawn from NAFR. This chapter presents the current or baseline conditions of 14 environmental resources identified by agencies or the public as important.

Most of these resources include subcategories to provide a better understanding of the specific aspects of the environment that might be affected by one or more of the alternatives. For example, Biological Resources, section 3.8, includes vegetation, wildlife, special status species, and other special interest species.

The process of collecting scientifically researched and up-to-date information involves reviewing previous studies, talking to agencies and others with responsibility for information on specific resources, reviewing public input during the public comment process, and evaluating numerous field studies.

The interrelationship of environmental resources is why the LEIS is prepared by an interdisciplinary team of scientists who describe each resource in the context of how it relates to other relevant resources.

Each environmental resource has a region of influence (ROI). The ROIs used in this LEIS permit examination of the 14 interdependent environmental resources at appropriate levels.



ROI One consists of areas within NAFR that are subject to physical disturbance. This includes roads, targets, airfields, threat emitters, tracking and scoring devices, and any other facilities.



ROI Two includes the entire exclusive use area. The majority of this area is undisturbed and constitutes a protected habitat for all resources, including biological and cultural resources.



ROI Three encompasses the area under the Nellis airspace used by aircraft training on NAFR. This ROI extends outside the physical boundaries of NAFR. The area defined as ROI Three is revised or extended for specific resources to capture the potential for impact to those resources.

3.0 AFFECTED ENVIRONMENT

Under the National Environmental Policy Act (NEPA), the analysis of environmental conditions is directly related to the expected environmental consequences of the proposed alternatives. NEPA requires that the analysis address those areas and the components of the environment with the potential to be affected by the proposed action; locations and resources with no potential to be affected need not be analyzed. The environment includes all areas and lands that might be affected, as well as the natural, cultural, and socioeconomic resources they contain or support.

In the environmental analysis process, analysts first identify the resources to be analyzed and then select the level of analysis, both in spatial extent and in intensity that the resources will be examined. For this proposal, the Air Force has examined 14 environmental resources at three different levels. These levels have been identified as Regions of Influence (ROIs), each with a different spatial extent, ranging from (1) disturbed areas within Nellis Air Force Range (NAFR) to (2) the approximately 3 million-acre withdrawal area, to (3) the approximately 7.5 million acres underlying the airspace area currently employed by the Air Force. Whether an ROI was examined for a resource, and the extent of the data gathering necessary, depended upon the type of resource and how it could be affected by the action.

REGION OF INFLUENCE ONE (ROI ONE)

ROI One comprises the areas potentially affected by ground disturbance. This includes all targets, threat, tracking and communication sites, all other facilities (including those at the Tonopah Test Range [TTR], Indian Springs Air Force Auxiliary Field [ISAFAF], and Tolicha Peak Site), all roads, and all other areas of direct disturbance (Figures 1-2, 1-3, 1-4, 1-6, and 1-7).

REGION OF INFLUENCE TWO (ROI TWO)

ROI Two comprises the current and projected withdrawal areas. This includes all areas described in Public Law (PL) 99-606 as amended, and those areas withdrawn from or returned to the Department of Interior (DOI) by the Air Force since November 6, 1986. This ROI, comprising the north and south ranges, is designed to support analyses of impacts resulting from exclusive military use (Figure 1-1).

REGION OF INFLUENCE THREE (ROI THREE)

ROI Three includes lands under the affected airspace. This includes lands under restricted areas (R-4806, R-4807, and R-4809), the Desert and Reveille Military Operations Areas (MOAs), and other designated airspace directly connected to activities on the NAFR (see Figure 1-10). This ROI is designed to support analyses of impacts resulting from aircraft operations associated with NAFR. The spatial extent of ROI Three may vary somewhat from resource to resource to account for differences in data or resource attributes. This is further discussed within this chapter under the appropriate section.

In the following sections, the existing environmental conditions for each of the 14 resources (land use and transportation, and recreational and visual resources are combined) are presented. The specific extent of the ROIs is discussed within each resource section.

AIRSPACE

3.1

Special use airspace has been established and designated over NAFR withdrawn and adjacent lands to contain and protect the high-density training operations occurring regularly throughout this complex. Since its inception, this airspace complex has consistently been one of the most highly used military flight training areas in the world. NAFR provides a realistic testing and training environment where weapons delivery and air-to-air combat training are conducted within restricted access airspace. Aircraft and weapons systems can be tested in an area that preserves public safety and military security.

The military airspace that comprises the Nellis Range Complex (NRC) is not part of the land withdrawal renewal under the Federal Land Policy and Management Act (FLPMA).





Airspace is used by a wide variety of aircraft, such as the A-10, shown here.

Airspace use is managed by rules and regulations that govern how and where aircraft may fly, much like the highway system and traffic laws regulate vehicle travel. The Federal Aviation Administration (FAA) has the overall responsibility for managing airspace and works closely with airport planners, military airspace managers, and other interests to determine how airspace can best be utilized to serve both civil and military aviation needs.

Different types of airspace included in this analysis are as follows:

- Military Operations Areas (MOAs) are established to separate nonhazardous military flight training from other Instrument Flight Rules (IFR) traffic and to identify for Visual Flight Rules (VFR) pilots where these operations are being conducted.
- Restricted Areas are established over NAFR and adjacent lands where classified and/or hazardous activities such as bombing, gunnery, and artillery operations are conducted.
- Military Training Routes (MTRs) are essentially aerial "highways" of varying lengths, widths, and altitudes that are used for low-altitude flight tactics and navigation.
- Aerial Refueling Routes (ARs) are used to refuel military aircraft, thus extending the length of an aircraft sortie.
- Low Altitude Tactical Navigation (LATN) areas are large geographic areas where random low-altitude operations are conducted at airspeeds below 250 knots.



Airspace rules administered by FAA help identify and protect areas where military flight activities occur.

3.1 AIRSPACE

The primary objectives of airspace management are to ensure the best possible use of available airspace to meet user needs and to segregate any user needs that are incompatible with other airspace or land uses. The Federal Aviation Administration (FAA), which has the overall responsibility for managing the nation's airspace, constantly reviews civil and military airspace needs to ensure that all interests are compatibly served to the greatest extent possible.

The safe, orderly, and compatible use of the nation's airspace is made possible through a system of flight rules and regulations, airspace designations, and air traffic control (ATC) procedures, just as traffic laws and vehicle operating rules govern use of the nation's highways. This system is designed to accommodate the individual and common needs of general, commercial, and military aviation without imposing unreasonable restrictions on any one group. The national airspace system has helped achieve a level of air safety that is widely considered safer than driving a car. One of the primary reasons for this level of air safety is the manner in which airspace is structured across the country and managed to protect aircraft operations around busy airports, along a complex network of airways and jet routes, and within areas where special activities, such as military flight operations, are conducted.

The FAA manages airspace use by (1) establishing rules that specify how aircraft must be operated, (2) depicting routes and other areas on maps that identify where aircraft may or may not fly, and (3) providing ATC services that help aircraft operate in a safe and orderly manner. Collectively, these means are intended to make airspace use as effective and compatible as possible for all types of aircraft, from private propeller-driven aircraft to large high-speed commercial and military jet aircraft.

To better understand how airspace is managed relative to the rules by which pilots operate, a brief explanation of these rules (visual and instrument) is needed. General aviation pilots flying between local airports and airfields within a familiar geographical area operate under Visual Flight Rules (VFR). VFR generally allows these pilots to fly off published routes (weather conditions permitting) using visual references such as highways, powerlines, railroads, or other such cues. Federal Airways may also be followed at altitudes not used for instrument flight. VFR flight is restricted to altitudes below 18,000 feet above mean sea level (AMSL) and does not require flight clearances from ATC, although traffic advisories may be requested. VFR pilots exercise "see-and-avoid" clearance precautions, which means they must be vigilant of their surroundings and alter their course or altitude, as necessary, to remain clear of other traffic, terrain, populated areas, clouds, etc. Other air traffic, including appropriately certified general aviation pilots, commercial air carriers, corporate jets, and military aircraft, operate under Instrument Flight Rules (IFR). IFR requires pilots to be trained and certified in navigational methodologies and adhere to ATC clearances containing specific flight route and altitude directions. ATC clearances and use of elaborate radar and navigational aid systems keep IFR aircraft separated from each other from takeoff to landing. The safe and compatible use of all airspace by both VFR and IFR aircraft depends heavily on pilot adherence to the rules that apply to their type of operations.

3.1.1 NAFR Airspace Use and Management

The airspace region of influence is ROI Three. ROI Three includes those local airspace areas currently delegated by the FAA or designated by the Air Force that have been traditionally used in conjunction with NAFR. ROI Three for airspace in this land withdrawal renewal Legislative Environmental Impact Statement (LEIS) includes restricted airspace and MOAs.

Restricted airspace has been established and designated over NAFR withdrawn and adjacent lands to contain and protect the high density training operations occurring regularly throughout this complex. A 1944 sectional aeronautical map indicates that a "danger area" was established over this area before the national airspace system (as it is known today), came into existence. The outer boundary of this "danger area" nearly coincides with Nellis range restricted airspace as it now exists. Since its early inception, this airspace complex has consistently been one of the most highly used military flight training areas in the world. It provides a realistic training environment where weapons delivery and air-to-air training can be conducted with relatively little impact on other aviation, as discussed later in this section.

MOAs are used to separate military flight activities from IFR traffic and to identify for VFR traffic those areas where nonhazardous military operations are being conducted. Military flight training has occurred in the airspace encompassed by the MOAs within ROI Three since World War II. The altitudes and flight tracks flown in the MOAs during the various types of NAFR test and training missions vary considerably.

The combination of restricted airspace overlying NAFR withdrawn lands and MOAs associated with NAFR use is referred to as the Nellis Range Complex (NRC). The airspace discussion describes how the NRC is structured, operated, and managed to support Department of Defense (DOD) flight training requirements.

The NRC consists of the Desert and Reveille MOAs and five restricted areas: R-4806E, R-4806W, R-4807A, R-4807B, and R-4809. Although the MOAs do not overlie the withdrawn lands, they are often used in conjunction with flight missions within the range restricted areas. Restricted Area R-4809 overlies NAFR lands operated by Sandia National Laboratories for the DOE and is scheduled and controlled by Nellis AFB. The Nevada Test Site (NTS), operated by the Department of Energy (DOE) and located southwest of and adjacent to NAFR, is protected by restricted areas R-4808N and R-4808S. NRC missions are scheduled and tracked by restricted area and MOA subdivisions that have been internally designated for mission planning purposes. NRC use, in terms of aircraft sorties, is generally expressed as the cumulative total of all sortie-operations conducted within each subdivision. A sortie-operation is the use of one airspace area or subdivision by one aircraft during the course of a sortie mission. On this basis, NRC use has historically ranged between 200,000 and 300,000 sortie-operations annually. Appendix A describes NRC sortie-operations in more detail. Regardless of the number of sortie-operations that use the NRC on a yearly basis, the NRC is used for air or ground-based activities nearly 100 percent of the time it is available.

There are several military training routes (MTRs) adjacent to or within portions of the NRC on which low-level training is conducted with or without use of NAFR. Other airspace includes the Low Altitude Tactical Navigation (LATN) areas, aerial refueling routes, an Alert Area, ATC-related airspace surrounding Nellis Air Force Base (AFB), Indian Springs Air Force Auxiliary Field (ISAFAF), and TTR Airfield, as well as range transition corridors. Each of these areas and their uses are described in more detail below.

RESTRICTED AREAS

A restricted area is airspace within which flight by non-participating aircraft, while not wholly prohibited, is subject to restriction during scheduled periods when hazardous activities are being performed (14 Code of Federal Regulations [CFR] Part 1.1). Restricted areas designated as "joint use" by the FAA permit ATC to route nonparticipating aircraft through this airspace when it is not in use or when appropriate separation can be provided. Those areas not designated as FAA joint use cannot be accessed by either non-participating civil or military aircraft at any time. Restricted Areas R-4806E/W and R-4807A/B, delegated by the FAA to Nellis AFB for control, are designated joint use. R-4808N and R-4809 are delegated to the DOE, and are not joint use due to the continuous nature of hazardous activities conducted in these areas. R-4808S is joint use and the FAA uses this area at or above Flight Level (FL)* 280 (represents a barometric altimeter indication of 28,000 feet). With the exception of R-4806E (which begins at 100 feet AGL), all of these restricted areas extend from the surface up for an unlimited distance into the atmosphere. A brief description of each restricted area follows.

R-4806 (R-4806W AND R-4806E)

R-4806W is subdivided and used for conventional bombing and gunnery testing and training. The lands under these subsections contain air-to-air gunnery capabilities, bomb circles, an airfield, supply area, convoys, anti-aircraft artillery/surface-to-air missile (anti-aircraft artillery [AAA]/surface-to-air missile [SAM]) sites, and a small arms live-fire training range. Lands under R-4806E do not contain any targets. Except for the extreme northern portion of these restricted areas, all of R-4806E/W are within the Desert National Wildlife Range (DNWR). For that reason, aircraft normally remain above 2,000 feet above ground level (AGL) unless a mission requires lower altitudes; air-to-air gunnery operations are conducted above 10,000 feet MSL. There is also an 8,000 feet AMSL restriction within 2 nautical miles (NM) of the U.S. Fish and Wildlife Service (USFWS) Corn Creek Station located in the southeast corner of R-4806W.

R-4807 (R-4807A AND R-4807B)

R-4807A is subdivided into several subsections. The range is comprised of an electronic battlefield with numerous tactical targets, including a simulated oil field, bomb circles, tank

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* Flight Level (FL) is a short-hand definition for indicating altitude. FL 280 is the shorthand for 28,000 altitude, mean sea level (MSL).

convoys, an airfield, industrial complex, munitions storage and sites, regimental/battery headquarters, signal platoons, air defense artillery units, infrared targets, and other target arrays. Manned electronic combat threat simulators are also located on lands beneath these restricted areas. R-4807B is used for overflights of a land area (Pahute Mesa) used by the DOE as an annex to the NTS.

R-4808 (R-4808N AND R-4808S)

R-4808N/S is controlled by the DOE for NTS activities (DOE 1996a). However, the southwestern and western portions of this restricted airspace are used for military aircraft transit to and from R-4807A/B through an agreement with the DOE. For this reason, Nellis AFB has internally subdivided R-4808N/S into R-4808 E / W for airspace scheduling purposes only. Further internal subdivision of this airspace is being coordinated with DOE to accommodate changes in the military use and scheduling of this restricted area. These changes do not affect the purpose and manner for which R-4808N/S was established nor does it affect surrounding airspace uses. R-4808S is also used by the FAA Los Angeles Air Route Traffic Control Center (ARTCC) for civil aircraft overflights.

R-4809

Portions of R-4809 are used jointly by the DOE and the Air Force. This airspace is normally used by aircraft in conjunction with other R-4807A&B subranges; however, the TTR Airfield, located beneath R-4809, can be used as a divert base for in-flight emergencies and other nonroutine operations. Other portions of R-4809 include Electronic Combat (EC) West, an electronic combat range.

MILITARY OPERATIONS AREAS

The Desert and Reveille MOAs are used for air-to-air intercept training, which consists of high speed operations, abrupt maneuvers, and supersonic flight at and above 5,000 feet AGL. The base of each MOA is 100 feet AGL. Since a MOA, by definition, only extends up to, but not including, 18,000 feet AMSL, Air Traffic Control Assigned Airspace (ATCAA) is provided by the FAA on an as-needed basis to extend training airspace to higher altitudes in accordance with a Letter of Agreement with Nellis AFB. ATCAAs are not designated airspace or charted on aeronautical maps and are only activated for military use when the higher altitudes are needed. The FAA may use that higher airspace for civil IFR overflights when it is not required for military missions. The type of flight maneuvers conducted in a MOA/ATCAA are considered non-hazardous and, therefore, compatible with other airspace uses. For that reason, VFR aircraft may fly through a MOA when it is in use, exercising see-and-avoid clearance precautions also performed by military pilots during their maneuvers. Military pilots are also vigilant of other aircraft during their maneuvers both visually and through use of cockpit radar displays to identify and remain well clear of nonparticipating air traffic that may be operating in the MOA. Depending upon terrain and an aircraft's position and use of transponder (electronic beacon) equipment, aircraft radar displays are capable of detecting aircraft within

100 miles, including smaller general aviation aircraft. Additionally, VFR pilots are always encouraged to contact Nellis ATC for the MOA status and traffic advisories when using this airspace. IFR aircraft normally fly routes that circumvent the NRC MOA / ATCAAs, but if transit through these areas is required for weather deviation or emergency, ATC maintains appropriate IFR separation between these aircraft and the military operations.

The Reveille MOA / ATCAA is located in the northern portion of the NRC. When not activated, the Reveille MOA / ATCAA is normally controlled by the FAA Salt Lake City ARTCC. Jet Routes (J58-80) are used for east-west transit of IFR traffic and are situated within this MOA / ATCAA, and therefore this airspace is not always readily available for NRC use. When needed for military use, the Reveille MOA / ATCAA is scheduled with the ARTCC in advance and IFR civil flights are provided the appropriate IFR separation from military operations.

The Desert MOA / ATCAA comprises the eastern half of NRC and is normally scheduled and used during daylight hours Monday through Saturday. Any changes to this normal schedule is disseminated by a Notice to Airmen (NOTAM) that advises all military and civil pilots of the use status. The Desert MOA / ATCAA is divided into subsections (Caliente, Elgin, and Coyote) (Figure 3.1-1), which are used individually or in combination for air-to-air training. Elgin is the primary air-to-air training area and contains the Air Combat Maneuvering Instrumentation (ACMI) range, which, through a system of aircraft transmitters and ground receivers, allows recording of all flight maneuvers for later replay and flight debriefings. Sally Corridor is the primary transition route between Nellis AFB and most portions of NRC.

AIRSPACE APPROVED FOR SUPERSONIC FLIGHT

Approximately 70 percent of ROI Three that includes the restricted areas and MOAs described above has been assessed and approved to perform tactical maneuvers at supersonic speeds. Of the total flight time flown by each sortie performing supersonic flight, between 3 and 10 percent (depending on aircraft type) is actually flown at supersonic speeds (cumulatively, 4 to 6 minutes). The areas shown in Figure 3.1-2, as authorized for supersonic flight, provide protection for noise-sensitive locations within ROI Three.

MILITARY TRAINING ROUTES

An MTR is a type of training airspace with established vertical and lateral dimensions used for the conduct of military flight training at airspeeds in excess of 250 knots below 10,000 feet AMSL. MTRs are designed to accomplish low-altitude training requirements while minimizing any disturbances to people and property. MTRs are established as instrument routes (IRs) or visual routes (VRs) on various aeronautical charts, with information on their normal scheduled use. Detailed route descriptions in DOD Flight Information Publications and pre-flight pilot

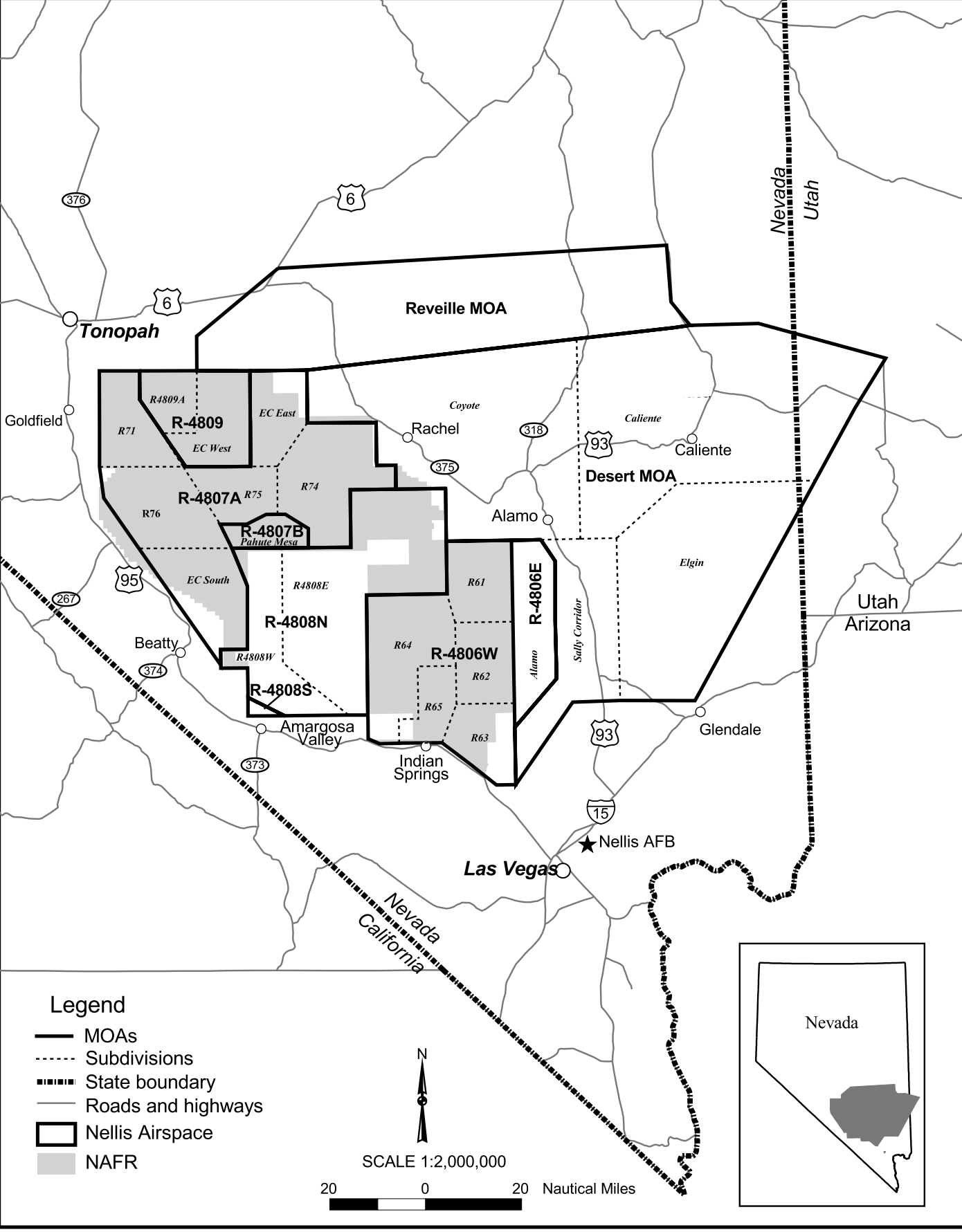


Figure 3.1-1. Nellis Air Force Range Airspace

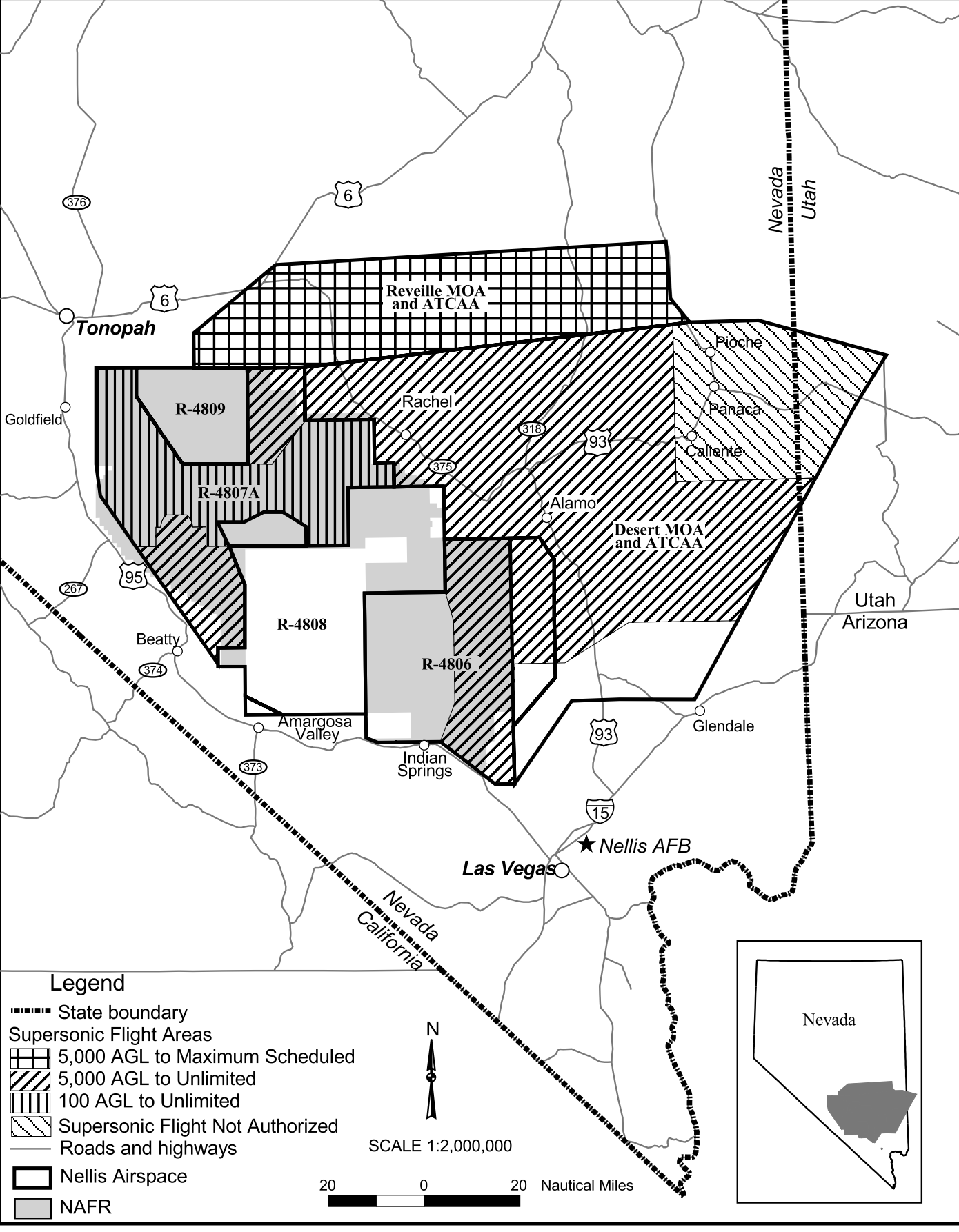


Figure 3.1-2. Airspace Authorized for Supersonic Flight within the Nellis Range Complex

briefings familiarize military pilots with specific locations to be avoided along the routes, such as airports, towns, wildlife habitat areas, and other noise-sensitive areas. MTRs in the region have floor segments as low as 100 feet AGL, but they are normally flown between 500 and 1,000 feet AGL. Both military and civil VFR pilots are responsible for exercising see-and-avoid clearance precautions while operating within MTR designated airspace.

Of the 21 different MTRs transiting within or immediately adjacent to the NRC, five have route segments that overlie NAFR withdrawn lands. These MTRs are controlled and scheduled by different Air Force units and are not always used in conjunction with NAFR activities (Appendix A). Table 3.1-1 identifies these five routes, home base of the scheduling unit, portion of the route within restricted airspace, and approximate annual number of sorties.

Table 3.1-1. MTRs that Access NAFR

MTR	*Scheduling Agency*	*NAFR Airspace Accessed*	*Estimated Annual Sorties*[1,2]
VR 222	Nellis AFB	Final segment in R-4807A	550
VR 1214	Edwards AFB	Last segment enters R-4807A	300
IR 279	Offutt AFB	Last segment enters R-4809	115
IR 282	Mountain Home AFB	Last segment enters R-4807A	12
IR 286	Nellis AFB	Final segment in R-4806W	21

Sources: 1. Flight Information Publication Area Planning AP/1B, Military Training Routes.
2. Nellis AFB Airspace Management records.

LOW ALTITUDE TACTICAL NAVIGATION AREAS

LATNs are large geographic areas where random low altitude operations are conducted at airspeeds below 250 knots. LATNs are established on the east and southwest sides of the NRC primarily for A-10s and helicopters to practice random selection of navigation points and low altitude tactical formations between 100 and 1,500 feet AGL when airspace may be unavailable within the NRC. About 40 to 50 sorties are conducted weekly in the LATNs by the Nellis AFB A-10 units, 75 percent in the southwest LATN.

The Air Warrior A-10s fly approximately two sorties per week in the southwest LATN only in conjunction with other training activities at Fort Irwin, California. Helicopters also conduct training operations within the LATN areas. While operating in these areas, aircraft must remain clear of residential, populated, and noise-sensitive areas. LATNs are not depicted on aeronautical charts, but local airports and aviation groups have been advised of the Nellis LATNs and their associated operations through civil pilot briefings and locally developed maps depicting their locations.

AERIAL REFUELING ROUTES

Aerial refueling (AR) routes consist of linear tracks or orbital anchors used by tanker aircraft to refuel mission aircraft. Those AR routes within or immediately adjacent to the NRC are used to sustain aircraft operations during training activities / exercises include the following:

- AR-625H / L, located adjacent to the northwest corner of the NRC, has low (FL180-210) and high (FL230-250) tracks that may be used simultaneously.

- AR-641A and B are located adjacent to and within the northeastern portion of the Desert and Reveille MOA / ATCAAs with published altitudes at 12,000 feet AMSL-FL230 (641A) and FL190-FL230 (641B). These AR routes cannot be used simultaneously.

3.1.2 Other Airspace

Nellis AFB and McCarran International Airport are surrounded by the Las Vegas Class B airspace. Class B-designated airspace requires continuous and positive control of all IFR and VFR aircraft operating within its boundaries. This class of airspace ensures flight safety in all airport environments having a very high volume of air traffic. The Las Vegas Class B airspace extends from 20 to 25 NM south and east of Las Vegas / Nellis AFB to the southern boundary of the Desert MOA (Sally Corridor). All aircraft entering or transiting through this charted Class B airspace must be in contact with, and under the positive control of, either the Nellis or McCarran radar approach control facilities, depending on their point of entry. The positive, protective nature of this airspace enhances flight safety for military aircraft operating between Nellis AFB and NAFR, as well as civil aviation transiting through this high air traffic density area.

ISAFAF, located on the southern boundary of R-4806W, provides aircraft staging support and emergency / divert recovery for NRC operations. The 11th and 15th Reconnaissance Squadrons use remotely operated aircraft out of ISAFAF. The airfield is also used as the primary training location for the Air Force's Thunderbirds Air Demonstration Squadron.

Class E airspace encompasses a 5-nautical-mile radius semicircle to the south of ISAFAF. The Indian Springs control tower provides ATC services within this area any time NAFR or ISAFAF has flying operations scheduled for the local area.

The TTR Airfield is located within restricted airspace and does not require a separate controlled airspace designation. It also provides emergency / divert recovery for NRC operations.

An Alert Area is, by definition, an area established and charted on aeronautical maps to inform pilots of a specific area wherein a high volume of pilot training or an unusual type of aeronautical activity is conducted. Alert Area A-481 west of Nellis AFB alerts civil aviation of high-density military aircraft operations transiting between the base and the western portion of NAFR. A-481 begins at 7,000 feet AMSL and extends to a ceiling of 17,000 feet AMSL.

RANGE TRANSITION CORRIDORS

Two flight corridors are used primarily to transition aircraft between Nellis AFB and NRC. As discussed previously in section 3.1.1, the Sally Corridor lies east of the NAFR in the Desert MOA (Figure 3.1-1) and provides the northern access to and from Nellis AFB for the NRC. Lee Corridor, an uncharted 10 NM wide ATC corridor area, lies south of the NRC between Nellis AFB and entry/exit points of R-4808S and R-4807A. It is used to control aircraft transition to and from the R-4806 and R-4807 ranges.

LOW-ALTITUDE AVOIDANCE AND NOISE-SENSITIVE AREAS

Over 40 sensitive and no-fly areas have been identified by Nellis AFB for avoidance of towns, settlements, airfields, wildlife areas, and other locations within and adjacent to NRC. These locations are avoided by established horizontal and vertical distances for flight safety, noise sensitivity, and environmental sensitivity. Avoidance restrictions are published locally in NRC procedures/maps and as special operating procedures for MTRs in DOD Flight Information Publication AP/1B. Temporary flight restrictions are also occasionally established within NRC for periods when the Bureau of Land Management (BLM) conducts fire-fighting activities.

Routine overflight of Goldfield and other towns within or adjacent to the NRC is not a part of the current or reasonably foreseeable future NRC mission. Overflights on some MTRs in ROI Three are controlled by the FAA and scheduled by other DOD installations and, therefore, not under Air Force control. Currently, both the Navy and the Air Force have established avoidance parameters for the town and airport of Goldfield through MTR route segment planning and/or published cautionary notices.

3.1.3 Civil Aviation Airspace Use

In general, airspace that has been designated by the FAA for military training in some areas of the country may cause some flight diversions and require increased awareness of other air traffic in shared airspace. FAA and military airspace management takes into account such concerns when planning and implementing airspace actions so that critical flight training requirements can be met in an effective and fuel efficient manner without imposing adverse effects on civil aviation. The long existence of NRC airspace and very few modifications that have been made to this airspace over the years have made it reasonably compatible with civil aviation needs in the region.

The NRC airspace is bordered by several Federal Airways (Victor Airways) and Jet Routes (Figure 3.1-3), which are part of a nationwide network of "highways" that interconnect the airport system. Federal airways are established below 18,000 feet AMSL and are normally used by unpressurized propeller aircraft or aircraft not equipped for longer distance, high altitude

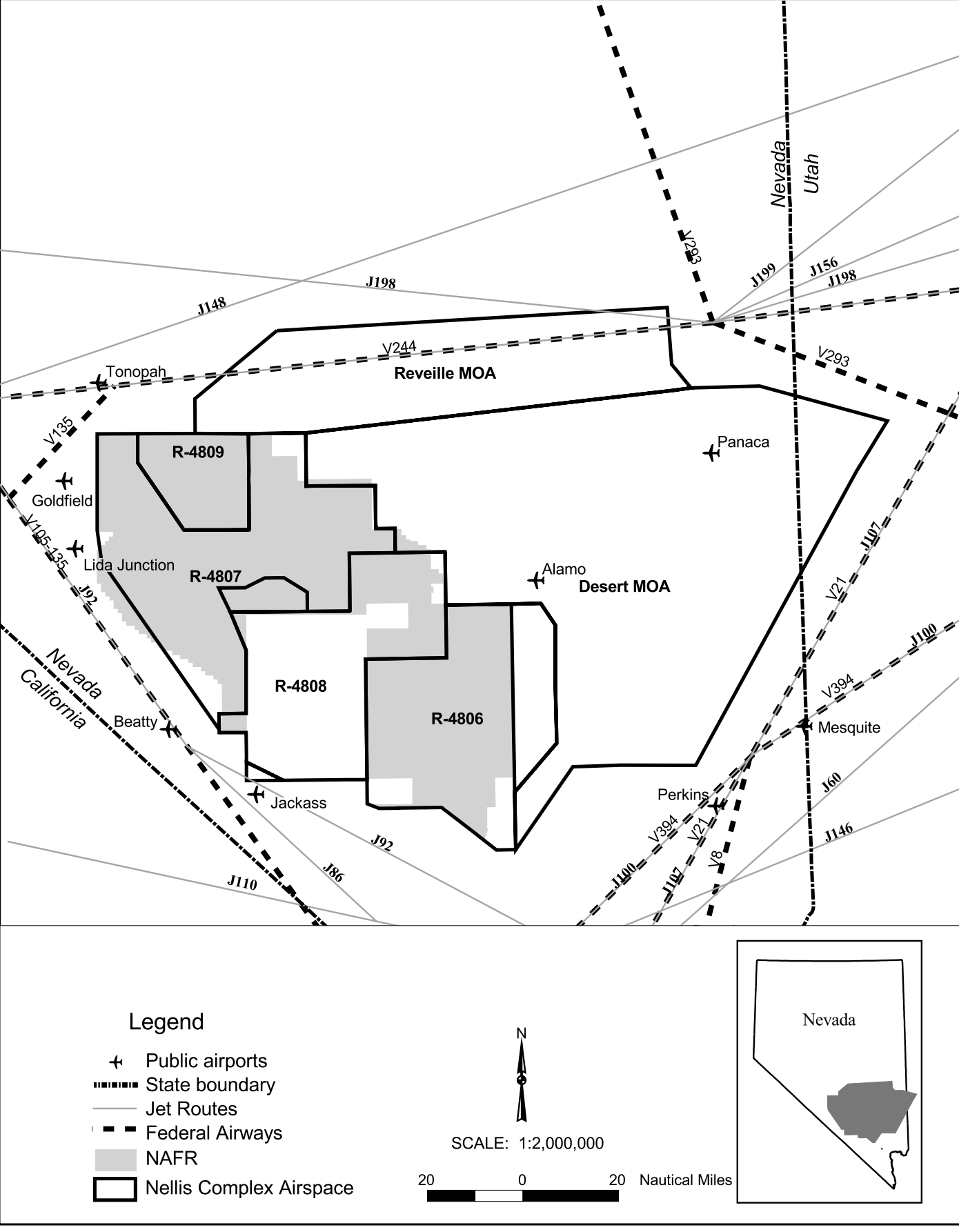


Figure 3.1-3. Federal Airways, Jet Routes, and Airports within the Nellis Range Complex Region of Influence

flight. Generally overlying those Federal Airways bordering the NRC are Jet Routes on which flight at and above 18,000 feet AMSL is conducted by the greatest majority of IFR air traffic (airliners, air cargo, corporate jets, and other high performance aircraft). These Airways and Jet Routes provide nearly direct IFR routing between key airports. NRC airspace does not pose a great inconvenience to scheduled airlines en route because of the routes and altitudes flown. However, if necessary to route IFR traffic through NRC airspace for a weather diversion or emergency situation, this traffic would be separated from military operations by Nellis ATC.

The few airports or airfields located adjacent to NRC airspace or beneath the Desert MOA include the Tonopah, Goldfield, Lida Junction, Alamo, Beatty, Panaca, and Jackass. The current and forecast annual operations for these airports and others in the region are shown in Table 3.1-2 to provide a general idea of their level of use.

Table 3.1-2 Current and Forecast General Aviation Operations Adjacent to the NRC

Airports/Airfields	*1995*	*2005*	*2015*
Alamo	50	50	50
Beatty	975	980	980
Boulder City	35,000	36,910	38,180
Coaldale	0	0	0
Echo Bay	750	750	750
Goldfield	300	300	300
Henderson Sky Harbor	60,000	63,830	65,360
Jackass	500	500	500
Lincoln County (Panaca)	2,400	2,400	2,400
Lida Junction	12	12	12
McCarran	494,006	550,626	613,636
Mesquite	15,000	16,880	16,880
North Las Vegas	161,130	191,400	219,340
Tonopah	12,507	13,130	13,760

Source: Nevada Department of Transportation (NDOT) 1995.

Air carrier activity in Nevada has increased considerably and is expected to continue to grow during the next 20 years. Most of this present and anticipated growth is at the Las Vegas and Reno airports. While passenger enplanements will grow nearly 98 percent above 1994 levels, air carrier operations are only expected to increase 54 percent from 427,000 total combined operations in 1994 to over 657,450 by 2015. General aviation activity is expected to grow at a much slower pace. Pleasure flying is declining while business or corporate activity is slowly

growing. General aviation operations are anticipated to grow by about 17 percent by 2015 (NDOT 1995).

Intrastate air transportation primarily uses general aviation aircraft since only four communities (Elko, Ely, Reno, and Las Vegas) have scheduled air service. General aviation airports within the state provide convenient air transportation access to many areas that depend heavily on this service, even though their based aircraft and operational activities are low in the rural airports (NDOT 1995).

VFR aircraft operating between any of the airports in the Las Vegas area and other airports or airfields west, north, or east of NRC must either remain west of the restricted airspace or may fly through the Desert and Reveille MOAs, using see-and-avoid precautions, as do the military pilots. Most VFR flights in this region can be conducted directly between these points without being impeded by NRC airspace or military aircraft operations. U.S. Highway 95 and Interstate 15 are commonly used by VFR pilots as visual references or "VFR flyways" when transiting the western or eastern areas of NRC. Normally of greater concern to these pilots are the numerous military flights transiting between Nellis AFB and NRC entry and exit points. In response to these concerns, Nellis AFB operations, airspace management, and ATC representatives provide periodic briefings on Nellis operations to civil general aviation pilots in St. George, Mesquite, North Las Vegas, Henderson Sky Harbor, Tonopah, and other locations as part of the ongoing Midair Collision Avoidance Program. Items discussed include the standard routes and altitudes normally flown by military aircraft in this area, the availability of radar traffic advisories from Nellis ATC, and the areas in which military aircraft operations are conducted.

One of the planning issues addressed in the Nevada State Airport System Plan is the impact of military airspace on the airport system, since nearly 40 percent of the airspace overlying the state is defined by FAA as special use airspace, which includes military airspace. The NDOT interacts with the FAA, regional transportation planning agencies, local governments, military authorities, the public, the air carrier and general aviation industries, and the private sector in fulfilling its airport planning and air transportation objectives. NDOT is a participating agency in meetings held with military agencies to foster better communications between DOD and state/federal agencies on airspace matters. Another forum, the Western Regional Airspace Council, is used by the FAA to discuss and coordinate DOD airspace matters.

The USFWS and Nevada Division of Wildlife (NDOW) conduct periodic flights for aerial census and tracking of bighorn sheep and maintenance of water facilities. These flights occur during the spring and fall, about three to five times a year, and are coordinated through the Nellis AFB range control and scheduling functions.

3.1.4 American Indian Issues Concerning Airspace

The Consolidated Group of Tribes and Organizations (CGTO) has not specifically identified issues concerning airspace.

NOISE

Noise is created by the engines, air frames, maneuvers, and weapons of military aircraft. Noise was identified as an issue during the scoping process. Specific concern was expressed regarding sonic booms.

An assessment of aircraft noise requires a general understanding of sound measurement and the noise effects on people and animals. The table on the back of this page shows typical maximum sound measurements in decibels (dB) and the relationship of those measurements to common sounds.

Noise levels throughout the Nellis Range Complex (NRC) are derived from actual measurements performed at NAFR. Computer-based simulation programs developed from these studies are used to determine noise impacts associated with high performance jet aircraft operations. The current or baseline noise environment is not expected to change with all action alternatives.

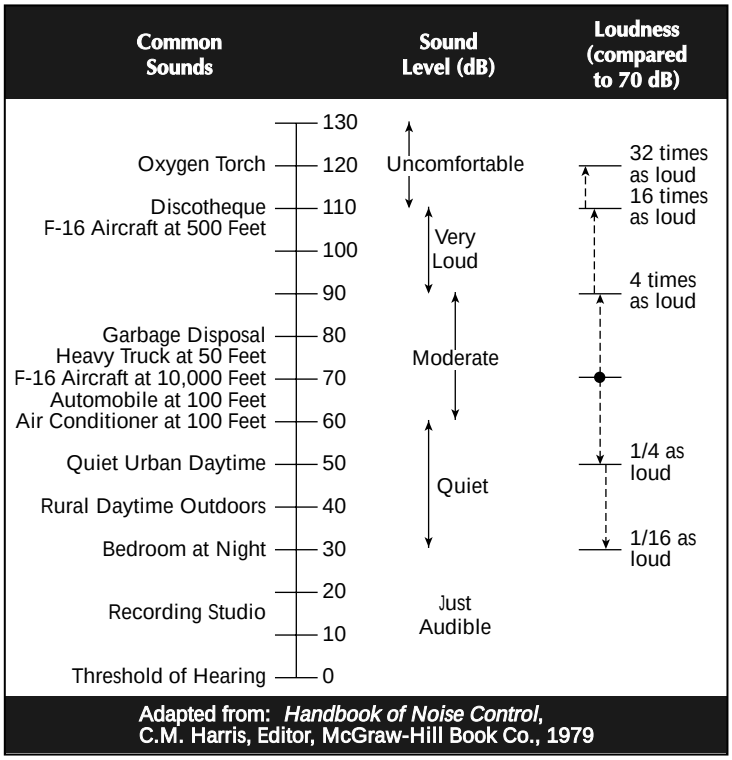


3.2



Noise levels from on-site measurements of aircraft operations at NAFR have been used to develop noise computer models used throughout the world.

TYPICAL MAXIMUM A-WEIGHTED COMMON SOUNDS



Adapted from: *Handbook of Noise Control*, C.M. Harris, Editor, McGraw-Hill Book Co., 1979

In the LEIS Noise section, the noise levels from subsonic aircraft operations are presented in terms of the Onset Rate-Adjusted Monthly Day-Night Average A-weighted Sound Level (L_{dnmr}). L_{dnmr} is not a description of a specific sound but rather is a measure of the total average sound level that can be used for comparison among alternatives. The typical maximum sound levels in the table above are part of the L_{dnmr} cumulative measure. The L_{dnmr} accounts for the cumulative sound energy over a 24-hour period. Although called an average, the L_{dnmr} is more accurately described as a cumulative measure because it accounts for the sound level of individual events, the duration of each event, and the number of events occurring each day. L_{dnmr} incorporates three considerations:

- Day/night operations are taken into consideration by adding 10 dB to the sound levels for aircraft operations between 10:00 P.M. and 7:00 A.M. This adjustment takes into consideration reduced typical night background noise levels and increased sensitivity.
- The surprise or startle effect from high-speed aircraft is taken into account by adding from 0 to 11 dB to the sound exposure level of the aircraft, depending on the rate of speed at which noise from approaching aircraft increases.
- The average operations during the busiest month of the year is the basis for L_{dnmr}. This is in contrast to annual averages used at civil airports. This busiest monthly average prevents predictions from being affected by seasonal periods of low military aircraft activity.

3.2 NOISE

Noise is perhaps the most identifiable concern associated with aircraft operations. Although many other sources of noise are present in today's communities, aircraft noise is often singled out for special attention and criticism. Existing noise from aircraft operations in MOAs associated with the NRC to the east of NAFR was a concern expressed at scoping meetings.

The ROI used for the noise analysis is ROI Three and consists of the NRC. The noise analysis considers all aircraft operations that occur in the NRC, which includes MOAs and Restricted Areas. For the most part, as described in section 3.1 (Airspace), regional MTRs exist outside of the NRC. The noise levels associated with these routes are not specifically considered, although the noise contribution of those segments of MTRs that underlie the NRC airspace will be assessed. Impulsive noise associated with the use of high explosives on NAFR will be assessed on a site-specific basis.

Two kinds of aircraft noise are of concern within ROI Three. The first is conventional subsonic noise, as generated by the aircraft's engines and airframe. This is the most familiar form of aircraft noise and is heard while an aircraft is within some distance of a receiver. The second type of noise is sonic booms, which are generated by aircraft when they fly faster than the speed of sound. Sonic booms are brief impulsive sounds. Assessment of aircraft noise for the proposed action and alternatives requires a general understanding of the measurement and effects of these two kinds of noise. Appendix E contains a detailed discussion of noise, the quantities used to describe it, and its effects. Appendix E may be referred to for explanations of concepts that are briefly defined in this section.

Baseline noise levels throughout ROI Three are calculated by computer-based simulation models. These models were developed from measurements conducted in a variety of military airspaces, including the NRC. Because utilization of the range complex varies from year to year, the baseline noise levels are presented for high and low typical use levels.

3.2.1 Representations of Noise

Noise is represented by a variety of quantities or "metrics." Each noise metric was developed to account for the type of noise and the nature of what may be exposed to the noise. Human hearing is more sensitive to medium and high frequencies than to low and very high frequencies, so it is common to use "A-weighted" metrics, which account for this sensitivity. Impact of impulsive noise depends on factors other than human hearing, so it is often quantified by "C-weighted" metrics, which are flat over a broad frequency range.

Different time periods also play a role. People hear the sound that occurs at a given time, so it is intuitive to think of the instantaneous noise level, or perhaps the maximum level that occurs during an aircraft flyover. However, impact over a period of time depends on the total noise exposure over extended periods, so "cumulative" noise metrics are used to assess the impact of on-going activities such as those that occur on the NRC. Within this LEIS, noise is described by

the sound level (L), the maximum sound level (L_{max}), the Sound Exposure Level (SEL), Day-Night Average Sound Level (L_{dn}) and Onset Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}). A-weighted levels are used for subsonic aircraft noise, and C-weighted levels are used for sonic booms and other impulsive noises. A "C" is included in the symbol to denote when C-weighting is used. The role of each of these metrics is outlined below. Further details are contained in Appendix E.

3.2.1.1 SOUND LEVEL

Sound level (L) is the amplitude of the sound that occurs at any given time. Some of the sounds are continuous or long term averages (e.g., garbage disposal; rural and urban ambient), and some are maximum levels (e.g., aircraft and truck passbys). Sound levels are measured in decibels, and are reflected on a logarithmic scale. A 3 dB increase reflects a doubling in sound level. However, due to the way the human ear responds to noise, it actually requires about a 10 dB increase to be perceived as a doubling in noise. It should also be noted that an "instantaneous" level as used in environmental analysis usually represents sound averaged over some short time period, typically one second for slowly changing sounds and 1/8 second for fast-changing sounds. When an aircraft flies by, the noise level changes continuously. It begins at the ambient (background) level, increases to a maximum as the aircraft passes closest to the receiver, then falls back to ambient as the aircraft recedes into the distance.

3.2.1.2 MAXIMUM SOUND LEVEL

Maximum sound level (L_{max}) is the highest instantaneous sound level measured during a single noise event, such as an aircraft overflight. The maximum sound level is important in judging whether a noise event will interfere with conversation, sleep, or other common activities.

3.2.1.3 SOUND EXPOSURE LEVEL

While L_{max} is commonly viewed as an indication of how intrusive a noise event is, impact also depends on how long a sound lasts. A sound that lasts a long time will be more intrusive than one that is over quickly. Sound Exposure Level (SEL) combines both of these characteristics (maximum sound and duration) into a single metric. SEL does not directly represent the sound level heard at any given time, but rather provides a measure of the total exposure of the entire event. For this reason, it is a better indicator of impact than just L_{max}. For sonic booms, which occur over a short time compared to typical sound level averaging times (1/8 second for fast sounds, as noted in the discussion of L), C-weighted SEL (CSEL) provides a meaningful measure of how a boom is perceived.

Sonic booms consist of a pair of shock waves, approximately equal to each other, separated by a fraction of a second. CSEL accurately describes the amplitude of the entire boom. It is, however, also common to report the amplitude of a sonic boom by the peak overpressure (in pounds per square foot [psf]) of its shock waves. CSEL and peak overpressure correlate well.

3.2.1.4 DAY-NIGHT SOUND AVERAGE LEVEL

Day-Night Sound Average Level (L_{dn}) is a composite metric combining the levels and duration of individual events, and the number of events that occur over an extended time period. Mathematically, it is a long-term average, but because it incorporates all noise events it is referred to as a *cumulative* metric. It is computed over a specific period of time, commonly a year, to represent the total noise exposure. Because noise is more intrusive at night than during the day, sounds that occur after 10 P.M. and before 7 A.M. are adjusted by a 10-dB penalty.

Studies have shown that L_{dn} represents adverse effects of noise much more reliably than individual noise levels alone. As noted above for SEL versus L_{max}, L_{dn} is not the sound level heard at any given time, but is the best measure of long-term cumulative impact.

For military airspaces, there are two important variations of L_{dn} that account for special characteristics of military aircraft noise, described below.

3.2.1.5 ONSET RATE ADJUSTED MONTHLY DAY-NIGHT SOUND AVERAGE LEVEL

When military aircraft fly low and fast, the sound can rise from ambient to its maximum very quickly. This rapid *onset rate* has the effect of the noise being perceived as louder than the measured level. Accordingly, an adjustment has been developed that adds a penalty of up to 11 dB for this kind of noise.

Military aircraft operations on ranges are often sporadic, with periods of high activity interspersed with periods of low activity. Computation of L_{dn} on an annual basis, as is common for civil airports, would tend to under-predict the impact that occurs during periods of high activity. Therefore, cumulative impact is computed for the busiest month of the year. This procedure is similar in concept to the use of *average busy day* for analysis of noise around airbases.

The primary metric for military airspaces is therefore Onset Rate Adjusted Monthly Day-Night Sound Average Level (L_{dnmr}), which is L_{dn} computed on a busy-month basis and with inclusion of the onset rate penalty of up to 11 dB.

3.2.1.6 C-WEIGHTED DAY-NIGHT SOUND AVERAGE LEVEL

In areas subject to sonic booms and other impulsive sounds, individual events are measured according to C-weighting. Therefore, the day-night sound level from these sounds is computed from C-weighted levels (L_{cdn}).

It is common for some areas to be exposed to both subsonic noise and impulsive noise. Because of the difference between A and C weighted noise, it is not appropriate to combine them into a single quantity. Instead, they are reported separately. The adverse impact of each is assessed via interpretive criteria, which are discussed in Appendix E.

3.2.2 Noise Modeling

Prediction of aircraft noise requires two elements. The first is a quantitative understanding of aircraft operations: numbers of aircraft, their speeds, altitudes and locations. The second element is physical modeling of the noise itself, which is then accumulated over all operations. Section 3.2.2.1 below describes operations on the range, from the perspective of noise analysis. Modeling of subsonic noise and sonic booms from supersonic flight is described in sections 3.2.2.2 and 3.2.2.3, respectively. Modeling of high explosive noise is discussed in section 3.2.2.4.

3.2.2.1 AIRCRAFT OPERATIONS

Aircraft operations in the NRC are described in Chapter 1.0. Activity varies from year to year. Historical data were therefore gathered from 1983 through 1997 and high and low baseline levels of activity were established. Data sources are described in section 3.1, and Tables 1.5-1 and 1.5-2 show the distributions of activity for the low (200,000 sortie-operation) and high (300,000 sortie-operation) baselines. The data shown in each table represents scheduled events of each type of aircraft in each airspace unit.

Noise analysis requires activity in terms of time on range, as well as speed, altitude, power setting, and position information. To develop these, a second data source was analyzed. Activity during Red Flag / Green Flag exercises is recorded for up to 36 aircraft at a time by the Red Flag Measurement and Debriefing System (RFMDS). RFMDS uses instrumentation pods mounted on the aircraft and ground tracking stations to record pertinent data. RFMDS data from 1991 and 1992 were used for prior noise analysis in the NRC (Frampton et al. 1993). In the 1993 study, 1991 RFMDS data and 1991 range schedule data were used to develop required inputs. For the current LEIS, 1997 RFMDS data have been processed and analyzed to update the earlier analysis. This updated RFMDS analysis has been combined with the low and high sortie-operations to provide the information required for input to the noise models.

In addition to RFMDS in the areas used extensively by Red Flag / Green Flag exercises, the Elgin MOA is equipped with an Air Combat Maneuvering Instrumentation (ACMI) system. This is similar to RFMDS, except that data are obtained for up to eight aircraft at a time and altitude coverage is above 5,000 feet AGL. This system records aircraft engaging in air combat maneuvers (ACM) training, which takes place at those higher altitudes. Six months of ACMI data were analyzed as part of a 6-month sonic boom monitoring study in the Elgin MOA in 1992 (Frampton et al. 1993). Those operations data were incorporated into the BOOMAP96 sonic boom model (Plotkin 1996), which can therefore work directly from schedule data such as in Tables 1.5-1 and 1.5-2.

3.2.2.2 SUBSONIC AIRCRAFT NOISE MODELING

Within MOAs and Restricted Areas, flight often occurs randomly, or, due to either airspace configuration or training scenarios, it may be spatially concentrated, or channeled, into specific areas or corridors. Concentrated areas can include MTRs. The Air Force has developed the MOA Range NoiseMAP (MR_NMAP) computer program (Lucas and Calamia 1996) to calculate

noise in these areas. The acoustic portion of the model is based on the Air Force's NoiseMAP technology, which is the standard method of analyzing military aircraft noise. MR_NMAP can calculate noise for both random operations and operations channeled into corridors. It is supported by measurements in several military airspaces (Lucas and Calamia 1996)

The NRC includes MOAs and Restricted Areas for which random operation is appropriate. There are also MTRs in the region. For the most part, these MTRs exist outside of the airspace overlying the NAFR. Therefore, the noise levels associated with these routes will not be specifically considered. However, operations within route segments that are within the NRC airspace are included in Tables 3.1-1 and 3.1-2, and are therefore included in the total noise analysis.

The primary noise metric calculated by MR_NMAP for this assessment is L_{dnmr}. This quantity has been computed for each of the 21 airspace units identified in section 3.1.1. As discussed in section 3.2.1 and Appendix E, this cumulative metric represents the most widely accepted method of quantifying noise impact. However, it does not provide an intuitive description of the noise environment. A common desire is to know how loud individual aircraft will be. MR_NMAP and its supporting programs can provide the maximum noise level and SEL for individual aircraft at arbitrary distance, altitude, and flight parameters. Tables in this section have been prepared showing the noise levels for various aircraft and distance.

Baseline noise levels are presented and discussed in section 3.2.3.

3.2.2.3 SONIC BOOM MODELING

Supersonic activity in the NRC is primarily associated with supersonic events during ACMs. This occurs in the Elgin subdivision of Desert MOA, which is an ACM training arena. It also occurs in various locations in the Desert MOA, primarily in Coyote and adjacent airspaces, as part of Red Flag / Green Flag exercises.

Sonic booms from ACM activity form an elliptical pattern. Aircraft will set up at positions 30 to 50 miles apart, then proceed toward each other for an engagement. The airspace used tends to be elliptical, aligned with a line connecting the setup points. Aircraft become supersonic at various times during these exercises. Supersonic events can occur as the aircraft accelerate toward each other, during dives in the engagement itself, and during disengagement. The long term average (L_{Cdn}) sonic boom patterns tend to be elliptical.

Long-term sonic boom measurement projects have been conducted in four airspaces: White Sands (Plotkin et al. 1989), the eastern portion of the Goldwater Range (Plotkin et al. 1992), the Elgin subdivision of Desert MOA at Nellis (Frampton et al. 1993) and the western portion of the Goldwater range (Page et al. 1994). These studies included analysis of schedule and ACMI data. They supported development of the BOOMAP model (Plotkin et al. 1991). The current version of BOOMAP (Plotkin 1996) incorporates results from all four studies.

A series of tests were conducted in and around the town of Caliente to provide additional data for the validations of the measurement techniques that simulate structural response to sonic boom and to demonstrate the process by which such measurements may be used to perform an environmental (structural) damage assessment. The results of this study found that prohibiting supersonic operations within five miles of Caliente is necessary and adequate for averting structural and window damage in the town. Without accounting for the current flight prohibition, some damage would be considerably more likely (Garrelick and Martini 1997).

3.2.2.4 HIGH EXPLOSIVE NOISE MODELING

The U.S. Army's Noise Assessment Prediction System (NAPS) model was used to assess conditions resulting from the use of high explosives on NAFR. NAPS is a single-event model that generates sound levels based on meteorological conditions. NAPS calculates sound pressure levels in dBP, unweighted maximum sound pressure level based on the TNT-equivalent weight of the explosive. The model uses a ray trace approach that takes into account spherical spreading, absorption and refraction. Appendix E presents a more detailed discussion of impulsive noise associated with the detonation of high explosives.

The dBP metric used by NAPS does not reflect the cumulative effects from multiple noise events over time. The preferred metric is L_{Cdn}. However, by considering the mathematical relationships between dBP, CSEL, L_{Cdn} and the number of events per day, L_{Cdn} values can be derived from the dBP values generated by NAPS.

3.2.3 Baseline Noise Levels

3.2.3.1 SUBSONIC NOISE

Table 3.2-1 shows the baseline noise levels for 21 of the airspace units described in section 3.1. Noise was not explicitly computed for the Sally Corridor or for Cedar. Sally Corridor is primarily a transit corridor for aircraft traversing between Nellis AFB and the north range. Sortie rates are comparable to the surrounding airspaces, while altitudes will tend to be higher. Noise levels in the Sally Corridor will therefore be comparable to or slightly less than those in the adjacent airspaces. Cedar is scheduled as part of Caliente's airspace in that its floor is 18,000 feet MSL. Because of this relatively high floor, noise in Cedar will be substantially below L_{dnmr} of 45 dB. Where noise levels are below 45 dB, explicit values are not shown. Levels that low represent areas where noise events are so infrequent that predictions are not statistically meaningful.

Table 3.2-1 has two columns: one for the low baseline of 200,000 sortie-operations and a second for the high baseline of 300,000 sortie-operations. Tables 3.2-2 and 3.2-3 show L_{max} and SEL for several representative aircraft at altitudes of 500, 1,000, 2,000, 5,000, 10,000, and 20,000 feet

Table 3.2-1. Baseline Noise Levels		
	200,000 SORTIE-OPERATIONS	300,000 SORTIE-OPERATIONS
Airspace	*Ldnmr*	*Ldnmr*
Caliente	54	56
Coyote	57	59
Elgin	46	47
Reveille	54	56
R-61	53	55
R-62	53	55
R-63	53	55
R-64	53	55
R-65	53	55
Alamo	53	55
EC South	52	54
Pahute Mesa	53	54
R-71	53	55
R-74	60	62
R-75	61	63
R-76	58	60
R-4808W[1]	46	47
R-4808E[1]	<45	<45
R-4809A	49	51
EC East	55	57
EC West	56	57
1. DOE airspace over NRC		

Table 3.2-2. Aircraft Maximum A-weighted Sound Levels (dB) at Various Altitudes Above Ground Level*

	ALTITUDE IN FEET					
Aircraft Type	*500*	*1,000*	*2,000*	*5,000*	*10,000*	*20,000*
B-1B	113	106	98	86	75	61
F-15	114	107	98	86	73	57
F-16	104	97	89	76	64	48
A-10	94	87	78	65	54	43
C-130	91	84	76	66	56	46

*Level flight, steady high-speed conditions.

Table 3.2-3. Sound Exposure Levels (dB) at Various Altitudes Above Ground Level*

	ALTITUDE IN FEET					
Aircraft Type	*500*	*1,000*	*2,000*	*5,000*	*10,000*	*20,000*
B-1B	112	107	101	92	82	69
F-15	112	107	101	90	80	65
F-16	103	98	91	81	70	56
A-10	95	89	82	72	63	53
C-130	96	91	85	77	69	61

*Level flight, steady high-speed conditions.

AGL. These noise levels correspond to steady level flight at speeds and power settings typically used in high speed operations in MOAs and MTRs.

The SELs for five representative aircraft at a slant distance from the aircraft to an observer are presented on Figure 3.2-1. These aircraft are representative of the types of aircraft to be used on NAFR into the 21st century.

Cumulative noise levels are all below L_{dnmr} 65 dB. In the noisiest areas, an average of six aircraft per day would be loud enough to be intrusive.

3.2.3.2 SONIC BOOMS

Table 3.2-4 shows baseline sonic boom levels, L_{Cdn} in affected airspaces. The affected airspaces are Elgin (which is used for ACM training) and Coyote and surrounding airspace units (which are used for ACM training and also for air battles as part of flag exercises). As with subsonic

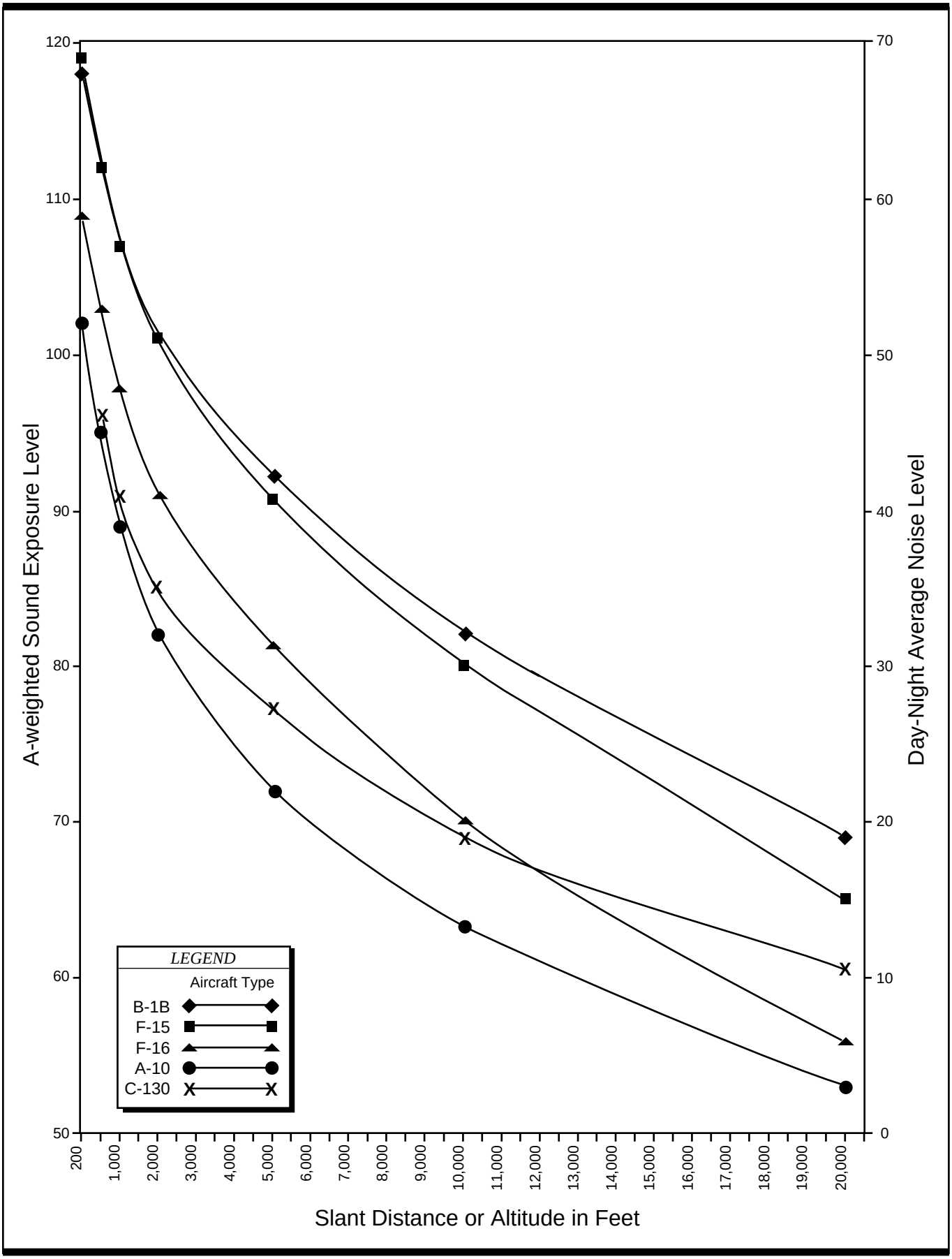


Figure 3.2-1. Aircraft A-Weighted Sound Exposure Level at Various Slant Distances or Altitudes (Right hand axis converts a single daytime set value into an L_{dn} value)

Table 3.2-4. Baseline Sonic Boom Levels and Numbers per Day				
	200,000 SORTIE OPERATIONS		300,000 SORTIE-OPERATIONS	
Airspace	*LCdn*	*Number/day*	*LCdn*	*Number/day*
Elgin	54	1.0	56	1.5
Coyote	48	0.2	50	0.3
All Others	<45	0.1	<45	<0.1

noise, airspaces with levels below 45 dB are not included in Table 3.2-4. Note that only portions of Caliente and Elgin are supersonic, and the values shown are for the supersonic areas.

Table 3.2-4 shows, in addition to L_{Cdn}, the number of booms per day which would be heard at an average location in each airspace. Individual sonic boom footprints will affect areas from about 10 square miles to 100 square miles, which is a small portion of the airspace. The booms / day values account for the total number of booms and the average area affected by each, and represent the number that would be heard, on average, by an individual on the ground under the airspace.

3.2.3.3 HIGH EXPLOSIVES

There are 73 target complexes on NAFR capable of supporting the delivery of live ordnance. To assess the most sensitive case, a representative target near a border of NAFR was selected for evaluation. Target 8 on Range 63, located approximately 6.3 miles from the range boundary, was used for this assessment. Considering all of the ordnance delivered on NAFR, the ordnance selected for evaluation purposes was a 2,000-pound general purpose bomb (which contains 1,162 pounds of TNT-equivalent high explosive). The scenario was modeled with NAPS, using a U.S. Standard Atmosphere with no winds.

For this evaluation, there are two levels of significance. Federal Occupational Safety and Health standards prescribe that an individual should never be exposed to impulsive sounds greater than 140 dBP without hearing protection (29 CFR Ch. XVII § 1926.52[e]). The second level is 136.4 dBP, which corresponds (at a rate of one explosion per day) to L_{Cdn} 62 dBC, a threshold for land use compatibility (refer to Appendix E for an explanation on the derivation of these values).

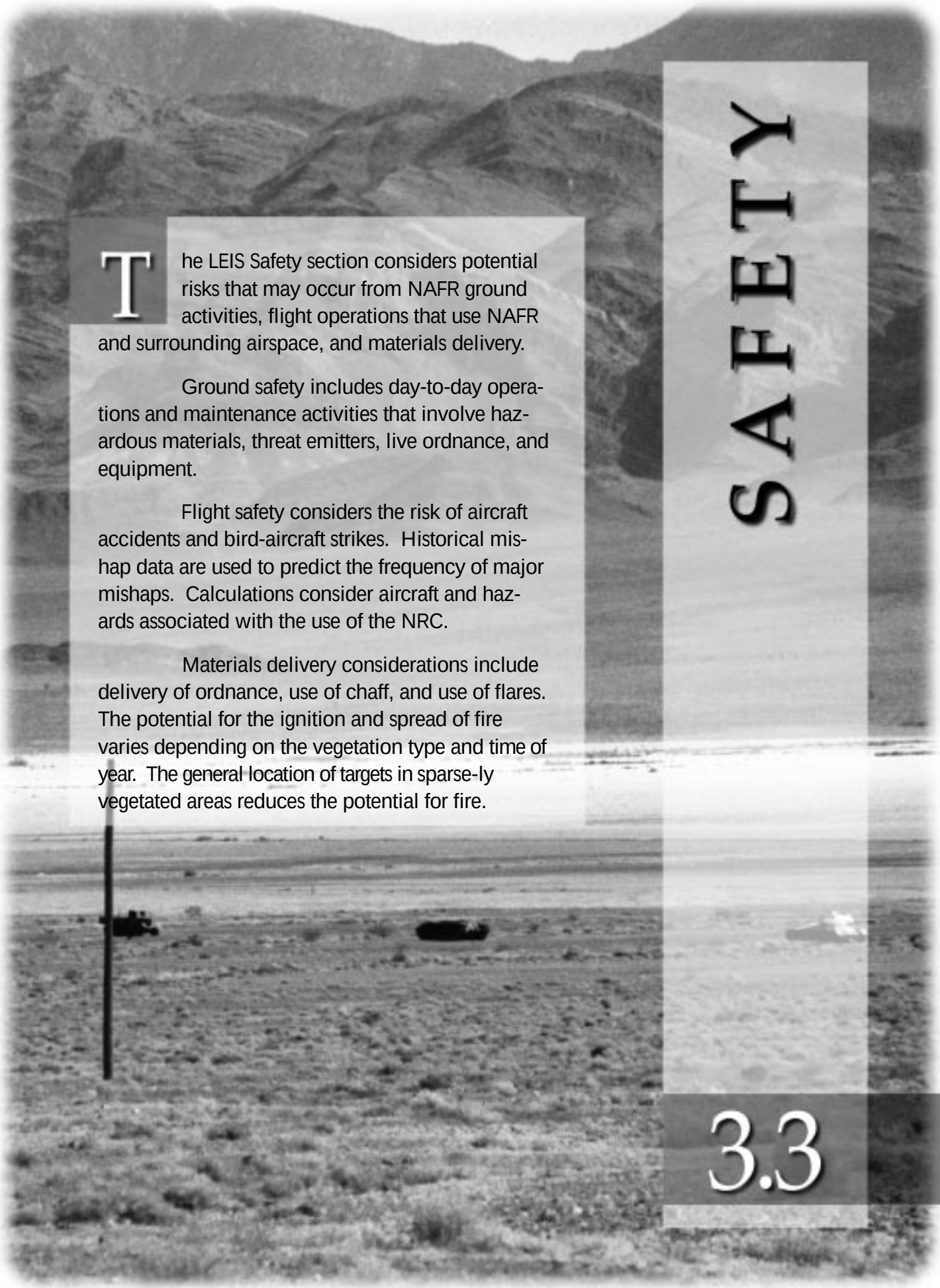
Modeling of this explosive weight indicates that 140 dBP or greater is present out to approximately 3,700 feet from the point of detonation. Safety requirements would preclude any human presence in this zone; therefore, there are no health or safety risks associated with this acoustic level.

Using output from the model, the sound pressure level (in dBP) at 6.3 miles was determined. After converting the sound pressure level into a C-weighted sound exposure level, the L_{Cdn} equation was solved for a single event, and the number of events required to equate that contour to L_{Cdn} 62. These calculations indicate that a single event results in L_{Cdn} 38.7 at the NAFR boundary, and that approximately 214 day-equivalent detonations could occur at that point per day, and the noise level of L_{Cdn} 62 would not extend past the range boundary. The capacity factor is considered in terms of day-equivalent events. Due to the penalty associated with noise events at night, this equates to about 21 night-equivalent events per day. However, these events can also be combined. For example, 114 day events and 10 night events per day equals 214 day-equivalent events.

In the capacity example developed above, a worst-case impact location was considered. Since all other impact locations are further removed from the range boundaries, their capacities would be proportionately greater. Based on the above, excessive impulsive noise levels associated with high explosives would not be expected to impact land areas off NAFR.

3.2.4 American Indian Issues Concerning Noise

The CGTO has not specifically identified issues concerning noise from military aircraft or from other sources. However, it is known from other areas that noise can be an issue for American Indians because it can intrude on ceremonies and other traditional activities.



SAFETY

The LEIS Safety section considers potential risks that may occur from NAFR ground activities, flight operations that use NAFR and surrounding airspace, and materials delivery.

Ground safety includes day-to-day operations and maintenance activities that involve hazardous materials, threat emitters, live ordnance, and equipment.

Flight safety considers the risk of aircraft accidents and bird-aircraft strikes. Historical mishap data are used to predict the frequency of major mishaps. Calculations consider aircraft and hazards associated with the use of the NRC.

Materials delivery considerations include delivery of ordnance, use of chaff, and use of flares. The potential for the ignition and spread of fire varies depending on the vegetation type and time of year. The general location of targets in sparse-ly vegetated areas reduces the potential for fire.

3.3

Ordnance delivery during training is limited to air-to-ground ranges within Restricted Airspace. Ranges in the NRC support delivery of a wide range of ordnance. Approximately 80 percent of the ranges accommodate inert bombs and rockets, approximately 64 percent accommodate live bombs, rockets, and missiles, and approximately 61 percent accommodate strafing.



When threatened by "enemy" radar, pilots must take evasive action, including the discharging of chaff to confuse the threat.

Day-to-day operations and maintenance activities on NAFR are performed in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements. The handling, processing, storage, and disposal of hazardous by-products of these activities are accomplished in accordance with all federal and state requirements applicable to the substance generated.



Ground safety includes radars to simulate "enemy" threats.

Emitters are operated under strict safety control measures to ensure that the radio frequency energy does not pose a health risk.

Specific ground safety items questioned during scoping include chaff and flare use, and unexploded ordnance:

- **Chaff** is used throughout NAFR. Chaff consists of very small strips of aluminum-coated mica designed to confuse a threatening radar system. The chaff is made to specifically counter a band of radio frequencies on which the radar is operating.
- **Flares** consist of highly flammable material that burns rapidly at extremely high temperatures. Their purpose is to provide a heat source other than the aircraft's engine exhaust as a target for a threatening heat-seeking missile.
- **Unexploded ordnance** may be encountered on various areas of the range. The treatment of this material is described in section 3.4, Hazardous Materials and Solid Waste.

3.3 SAFETY

This section addresses ground, flight, and range safety associated with activities conducted by units operating within ROI Three. Ground safety considers issues associated with NAFR operations and maintenance activities that support ROI Two, including fire and crash response that could occur in ROI Three. Flight safety considers aircraft flight risks such as aircraft accidents and bird-aircraft strikes in ROI Three. Range safety assesses the management and use of ordnance or munitions associated with operations and training activities primarily within ROI Two.

3.3.1 Fire Risk and Management/Ground Safety

The Nellis AFB military fire department provides crash response by convoy to those ranges that are close to Nellis AFB. The unit is fully equipped and staffed with qualified personnel. There are no identified equipment shortfalls or limiting factors (personal communication, Ploense 1998). Elements of the fire department are dispersed at locations throughout NAFR, and would respond to range fires on DOD withdrawn land. If required, additional response support could be provided by BLM in accordance with a memorandum of agreement. Fire and crash response on the south ranges is provided by the Air Force Fire Department at ISAFAF. Additional assistance could be provided under a mutual support agreement between the Air Force and the community fire department at Indian Springs. Fire suppression on the north range is the responsibility of the Air Force fire department at TTR, with additional assistance available under mutual support agreements and a memorandum of agreement with BLM (personal communication, Garner 1998). BLM has primary responsibility for suppression of wildland fires on NAFR.

Day-to-day NAFR operations and maintenance activities are performed by qualified personnel and are conducted in accordance with applicable Air Force safety regulations, published Air Force Technical Orders, and standards prescribed by Air Force Occupational Safety and Health (AFOSH) requirements. The handling, processing, storage, and disposal of hazardous by-products of these activities are accomplished in accordance with all federal and state requirements applicable to the substance generated. Additional specific data pertaining to hazardous material and solid waste management are contained in section 3.4 of this LEIS.

LASERS

Many aircraft operating at NAFR are equipped with laser targeting capability. Approximately 80 percent of the targets on the NAFR are approved for laser use. As part of this approval, each individual target and target complex is surveyed by a 99th Range Squadron quality assurance evaluator to ensure that no hazards, such as standing water or other reflective surfaces are present in the target area. Only those targets that pose no threat to human health or safety are approved for lasing. If necessary to ensure safety, detailed operational constraints applicable to specific targets (e.g., limitations on attack axes, dive angles, etc.) are documented (Air Force 1996d).

RADIO FREQUENCY EMISSIONS

To provide training realism, threat simulation electronic emitters (radars) are located throughout the NAFR. The frequencies at which radars operate are in the radio frequency (RF) band of the electromagnetic spectrum. Potential effects of RF energy on biological species are discussed below.

RF energy is absorbed macroscopically by an animal or human body in the form of heat and is defined as an increase in the mean kinetic energy of the molecules. The result is a temperature increase. At relatively low RF energy intensities, the heat induced can usually be accommodated by the thermoregulatory capabilities of the species exposed. Thus, any effects produced would generally be reversible. At high intensities, the thermoregulatory capabilities of any given species may be exceeded, which could lead to thermal distress or even irreversible thermal damage.

The effects of RF energy on people depend on the frequency and polarization of the energy field, the size and shape of the individual, and the individual's ability to dissipate the absorbed energy by a normal biological response. Department of Defense Instruction (DoDI) 6055.1 (1995) has set the permissible exposure limit (PEL) for personnel. These PELs represent conditions under which it is believed that humans may be repeatedly exposed without adverse effects, regardless of age, sex, or childbearing status. Depending on the RF frequency, the PEL for personnel working in a designated controlled environment where the emitter is operating is 10 milliwatts per square centimeter (10 mW/cm^2) over any continuous 6-minute period. For persons in an uncontrolled environment (i.e., the public), the PEL is 5 mW/cm^2 over any continuous 6-minute period. Repetitive exposures to these levels (that are less than 6 minutes each) are not be expected to be harmful. Most studies have shown that, in general, people can actually be exposed to up to 10 times the above-stated PEL without any harmful health effects.

Acceptable energy levels and safe separation distances for persons vary depending on the frequency and transmitted power of the RF emitter. For the emitters used on the NAFR, calculations have been performed to determine the required separation distances for persons. These data are presented in Table 3.3-1. When a system operates across a band of frequencies, the range of separation distances is shown.

The majority of this equipment is aircraft threat simulation radar. Frequency management ensures that these transmitters do not create interference with other federal or civil transmitters or receivers. The unit is normally placed on elevated ground, and then emits skyward. It is not pointed at the ground, or along roadways. This equipment is operated under strict safety control measures that are determined for each system. These measures include installing warning signs, erecting rope or chain barriers, and having the equipment and the surrounding area under constant observation while it is operating. Adherence to these established safety standards ensures that no health or safety impacts will occur.

Table 3.3-1. Emitter Safe-Separation Distances			
Equipment	*Distance (in Feet)*	*Equipment*	*Distance (in Feet)*
AN / MPQ-T3	62 - 78	AN / TPT-4	53 - 58
AN / MPS-14	783	AN / TPT-T1V,1A	118
AN / MPS-T9	432	AN / TPT-T1V,1B	131
AN / MSQ-T13	127 - 239	AN / TPT-T1V,2A	146
AN / MSQ-T43	176 - 194	AN / TPT-T1V,2B	57
AN / MPS-T1	2 - 252	AN / MSQ-77	93
AN / VPQ-1	21		
Source: Air Force 1997g.			

RF emitters used on aircraft pose no hazard to the public due to the aircraft's altitude, the energy levels used by the equipment, and the speed of the aircraft. Given these factors, the duration of any possible RF energy exposure is very small if such exposure were even to occur. However, RF emissions near the NTS need to be coordinated with the DOE, because there is communication and other electronic equipment at the NTS that is sensitive to RF emissions.

SUPERSONIC FLIGHT

Some high performance aircraft using NAFR may go supersonic while training for air combat maneuvering. When an aircraft flies faster than the speed of sound, it creates a shock wave that is projected along its flight path. When this shock wave reaches the ground, it is manifested as an overpressure and is sensed as a sonic boom. A sonic boom is characterized as a rapid rise in pressure, followed by a rapid drop-off before the pressure returns to normal atmospheric levels. This change occurs rapidly (i.e., in significantly less than one second). In the vast majority of cases, all overpressures created are relatively low, and are well below levels that would even begin to cause physical injury or damage to structures.

In rare cases, a sonic boom may cause physical damage, as to a window, if the overpressure is of sufficient magnitude. Sonic booms are alleged to cause startle effects in humans and animals, resulting in safety issues. The Air Force has established procedures for documenting any such cases, and for working with affected parties.

ACCIDENT RESPONSE

The 57th Wing maintains detailed mishap response procedures to respond to a wide range of potential incidents. These plans assign agency responsibilities and prescribe functional activities necessary to react to major mishaps, whether on or off base. Response would normally occur in two phases. The initial response considers such factors as rescue, evacuation, fire suppression, safety, and elimination of explosive devices, ensuring security of the area, and

other actions immediately necessary to prevent loss of life or further property damage. Subsequently, the investigation phase is accomplished.

The initial response element consists of those personnel and agencies primarily responsible for beginning the initial phase. This element includes the Fire Chief, who normally is the first on-scene commander, fire fighting and crash rescue personnel, medical personnel, security police, and crash recovery personnel. A subsequent response team is comprised of an array of organizations, whose participation is governed by the circumstances associated with the mishap, and actions required to be performed.

If an aircraft accident occurs on non-federal property, regardless of the agency initially responding to the situation, as soon as the situation is stabilized, a National Defense Area would normally be established around the accident scene. The site would be secured for the investigation phase.

After all required investigations and related actions on the site are complete, the aircraft would be removed. The base civil engineer accomplishes cleanup of the site or contracts to an outside agency to accomplish the cleanup.

Overall, the purpose of response planning is to:

- save lives, property, and material by timely and correct response to mishaps;
- quickly and accurately report mishaps to higher headquarters; and
- investigate the mishap to preclude the reoccurrence of the same or a similar mishap.

3.3.2 Flight Risks

Aircraft flight operations on the NRC are governed by standard rules of flight. Additionally, specific procedures applicable to local operations are contained in detailed standard operating procedures that must be followed by all aircrews operating from the installation (Nellis AFB Instruction 11-250).

The primary public concern with regard to flight safety is the potential for aircraft accidents. Such mishaps may occur as a result of mid-air collisions, collisions with manmade structures or terrain, weather-related accidents, mechanical failure, pilot error, or bird-aircraft collisions. Flight risks apply to all aircraft; they are not limited to the military. Flight safety considerations addressed include aircraft mishaps and bird-aircraft strikes.

AIRCRAFT MISHAPS

The Air Force defines four categories of aircraft mishaps: Classes A, B, C, and High Accident Potential (HAP). Class A mishaps result in a loss of life, permanent total disability, a total cost in excess of $1 million, destruction of an aircraft, or damage to an aircraft beyond economical repair. Class B mishaps result in total costs of more than $200,000, but less than $1 million, or

result in permanent partial disability, but do not result in fatalities. Class C mishaps involve costs of more than $10,000, but less than $200,000, or a loss of worker productivity of more than eight hours. HAP represents minor incidents not meeting any of the criteria for Class A, B, or C. Class C mishaps and HAP, the most common types of occurrences, represent relatively unimportant incidents because they generally involve minor damage and injuries, and rarely affect property or the public. This LEIS will focus on Class A mishaps because of their potentially catastrophic results.

It is impossible to predict the precise location of an aircraft accident. Major considerations in any accident are loss of life and damage to property. The aircrew's ability to exit from a malfunctioning aircraft is dependent on the type of malfunction encountered. The probability of an aircraft crashing into a populated area is extremely low, but it cannot be totally discounted. Several factors are relevant: the ROI and immediate surrounding areas have relatively low population densities; pilots of aircraft are instructed to avoid direct overflight of population centers at very low altitudes; and, finally, the limited amount of time the aircraft is over any specific geographic area limits the probability that impact of a disabled aircraft in a populated area would occur.

Secondary effects of an aircraft crash include the potential for fire and environmental contamination. The extent of these secondary effects is situationally dependent, and is therefore difficult to quantify. The terrain overflown in the ROI is diverse. For example, should a mishap occur, highly vegetated areas during a hot, dry summer would have a higher risk of experiencing extensive fires than would more barren and rocky areas during winter. When an aircraft crashes, it may release hydrocarbons. Those petroleums, oils, and lubricants not consumed in a fire could contaminate soil and water. The potential for contamination is dependent on several factors. The porosity of the surface soils will determine how rapidly contaminants are absorbed. The specific geologic structure in the region will determine the extent and direction of the contamination plume. The locations and characteristics of surface and groundwater in the area will also affect the extent of contamination to those resources.

Since the NAFR includes portions of the DNWR, additional effects could result from an aircraft mishap in these areas. The lands comprising the DNWR are managed by the DOI as wilderness, with special steps taken to preserve wilderness values. To support these management objectives, the Air Force is party to agreements with DOI that place some restrictions on military operations conducted over some of these lands. These restrictions include such steps as establishing minimum flight altitudes. Steps such as this not only minimize intrusiveness on wilderness values, but also enhance safety by limiting the risks associated with low altitude flight.

Should a mishap occur in these areas, response and recovery operations could necessitate such activities as the use of motorized vehicles and excavation to contain contamination. This type of activity is normally prohibited in wilderness areas. While these actions could result in damage to the wilderness characteristics of the area, the Air Force would attempt to minimize direct damage and the resultant evidence of intrusiveness to the maximum extent practicable,

consistent with national security considerations and the need to protect life and property from further risk.

F-16 aircraft carry a small quantity of hydrazine in a sealed canister that is designed to withstand crash impact damage. Hydrazine is a highly volatile propellant that contains toxic elements. It is carried on the F-16 as part of the emergency power unit (EPU) system. When used for this purpose, hydrazine is completely consumed, and poses no safety hazard. In any crash that is severe enough to rupture the canister, it is most likely that fire will also be involved. In this case, the hydrazine will also burn and be completely decomposed. In the unlikely event that the hydrazine should be released, but not consumed by fire, impacts on soils and groundwater are likely to be of minor consequence. Hydrazine absorbs water at room temperature. It is incombustible in solution with water at concentrations of 40 percent or less, and it evaporates at any given temperature at a rate slightly slower than water evaporation. Movement of hydrazine through natural soils has been shown to be slow and limited. Due to its absorption and natural decomposition processes, the probability of released hydrazine significantly contaminating groundwater is considered extremely low. However, if quantities of hydrazine were to reach a surface water body, aquatic life in those areas experiencing high concentrations could be significantly impacted.

Based on historical data on mishaps at all installations, and under all conditions of flight, the military services calculate Class A mishap rates per 100,000 flying hours for each type of aircraft in the inventory. Combat losses are excluded from these mishap statistics. In the case of MOAs and restricted areas, an estimated average sortie duration may be used to estimate annual flight hours in the airspace. Then, the Class A mishap rate per 100,000 flying hours can be used to compute a statistical projection of anticipated time between Class A mishaps in each applicable element of airspace. In evaluating this information, it should be emphasized that those data considered are only statistically predictive. The actual causes of mishaps are due to many factors, not simply the amount of flying time of the aircraft.

To assess existing conditions, elements of the NRC have been grouped into major categories, comprised of MOA-type airspace and restricted airspace. MOAs include the Desert MOA, with its sub-areas, and the Reveille MOA. Sub-sets of the Desert MOA include the Caliente, the Coyote, and the Elgin. Restricted areas, with their indicated specific elements, include the following:

- R-4806. This includes the 60-series ranges.
- R-4807. This includes the 70-series ranges, the south electronic combat (EC) range, and Pahute Mesa.
- R-4808. This is used for transit along the western border to and from the northern range.
- R-4809. This includes the east and west EC ranges.

There are also several MTRs that afford access to the NAFR. Use of these routes can be generally characterized as low. The vast majority of these routes terminate at the point-of-entry to the NAFR airspace. While a few transverse some small portion of the NAFR for short distances, the small number of aircraft involved and the extremely brief periods of time they are on the routes within the boundaries of the NAFR reduce the risk of a Class A mishap to insignificant levels.

Table 3.3-2 summarizes the statistically predicted minimum time between Class A mishaps for each of the airspace categories identified above. These data reflect the highest risk associated with potential aircraft mishaps in each airspace element under a maximum and minimum scenario. The maximum scenario considers a total of 300,000 annual sortie-operations flown in the airspace, while the minimum scenario considers 200,000 annual sortie-operations.

Table 3.3-2. Class A Mishaps under Current Operations

	200,000 ANNUAL SORTIE-OPERATIONS		300,000 ANNUAL SORTIE-OPERATIONS	
Airspace	*Minimum Time Between Class A Mishaps (in Years)*	*Probability of Class A Mishap*	*Minimum Time Between Class A Mishaps (in Years)*	*Probability of Class A Mishap*
Desert MOA	3.0	0.000030	2.0	0.000030
Reveille MOA	12.7	0.000012	8.5	0.000012
R-4806	36.5	0.000010	24.3	0.000010
R-4807	7.7	0.000013	5.2	0.000013
R-4808	67.5	0.000003	45.0	0.000003
R-4809	26.9	0.000009	17.9	0.000009

Sources: Mishap Rates – personal communications, Air Force, Navy Flying Safety Centers; Aircraft Sortie-Operations — personal communication, Air Combat Command (ACC), 1997

However, several factors can influence the calculation of this projected time interval. Since the calculation is based on hours of flight time per year, an indication of increased risk can result from a large number of aircraft flying in the airspace, or a smaller number flying for extended periods. To place these values into context, it is also appropriate to consider the probability of a mishap, which accounts for each aircraft's exposure. As illustrated in Table 3.3-2, although the greatest indicated risk is associated with MOA airspace under the maximum-use scenario (2.0 years in the Desert MOA), the probability of a mishap remains very low. The aircraft involved is the single-engine F-16, which will fly an estimated 16,837 annual sortie-operations in the Caliente MOA. All other aircraft in that MOA, as well as all other aircraft in every airspace element indicate significantly less risk. Overall, there is low risk associated with flight operations on NAFR. Over the last 5 years, there have been eight Class A mishaps on NAFR (personal communication, AWFC/SE 1998).

BIRD-AIRCRAFT STRIKE HAZARDS

Bird-aircraft strikes constitute a safety concern because of the potential for damage to aircraft or injury to aircrews or local populations if an aircraft crash should occur in a populated area. Aircraft may encounter birds at altitudes of 30,000 feet above MSL or higher. Over 95 percent of reported bird strikes occur below 3,000 feet AGL. Approximately 50 percent of bird strikes happen in the airport environment, and 25 percent occur during low-altitude flight training (Worldwide Bird-Aircraft Strike Hazard [BASH] Conference 1990).

Migratory waterfowl (e.g., ducks, geese, and swans) are hazardous to low-flying aircraft because of their size and their propensity for migrating in large flocks at a variety of elevations and times of day. Waterfowl vary considerably in size, from 1 to 2 pounds for ducks, 5 to 8 pounds for geese, and up to 20 pounds for most swans. There are two normal migratory seasons, fall and spring. Waterfowl are usually only a hazard during migratory seasons. These birds typically migrate at night and generally fly between 1,500 to 3,000 feet AGL during the fall migration and from 1,000 to 3,000 feet AGL during the spring migration.

The potential for bird-aircraft strikes is greatest in areas used as migration corridors (flyways) or where birds congregate for foraging or resting (e.g., open water bodies, rivers, and wetlands).

Along with waterfowl, raptors, shorebirds, gulls, herons, and songbirds also pose a hazard. In considering severity, the results of bird-aircraft strikes on MTRs and in restricted areas show that strikes involving raptors result in the majority of Class A and B mishaps, which are few in number. Raptors of greatest concern are vultures and red-tailed hawks. Peak migration periods for raptors, especially eagles, are from October to mid-December and from mid-January to the beginning of March. In general, flights above 1,500 feet AGL would be above most migrating and wintering raptors.

Songbirds are small birds, usually less than one pound. During nocturnal migration periods, they navigate along major rivers, typically between 500 to 3,000 feet AGL.

While any bird-aircraft strike has the potential to be serious, many result in little or no damage to the aircraft, and only a minute portion result in a Class A mishap. During the years 1985 to 1996, the Air Force BASH Team documented 31,522 bird strikes. Of these, 23 resulted in Class A mishaps. These occurrences constituted approximately 0.07 percent of all reported bird-aircraft strikes (personal communication, BASH Team 1997).

For aircraft operating in the immediate vicinity of Nellis AFB, the bird-aircraft strike data maintained by the 57th Wing indicate that from 1985 through 1995, aircraft have experienced 135 bird strikes. The majority (56.3 percent) occurred at altitudes of 1,000 feet AGL or less. Of this total, 10 percent were classified as Class C mishaps; there were no Class A or Class B mishaps (personal communication, HQ AFSC/SEFW 1997).

The Air Force BASH Team maintains a database that documents all reported bird-aircraft strikes. Historic information for the last 10 years for the NAFR airspace indicate that 10 bird-aircraft strikes have occurred. Of these, one was a Class B mishap and three were Class C mishaps. These data reflect total strikes experienced by all users of the airspace, not just aircraft from Nellis AFB.

3.3.3 Munitions Use and Handling

Personnel at Nellis AFB control, maintain, and store all ordnance and munitions required for mission performance. This includes training and inert bombs and rockets, live bombs and rockets, chaff, flares, gun ammunition, small arms ammunition, and other explosive and pyrotechnic devices. Ordnance is handled and stored in accordance with Air Force explosive safety directives (Air Force Manual [AFM] 91-201), and all munitions maintenance is carried out by trained, qualified personnel using Air Force-approved technical data. All munitions storage facilities are sited for the ordnance they store. One storage facility exemption is currently in effect. The quantity-distance safety zone associated with the Live Ordnance Loading Area exceeds the installation boundary (personal communication, Nellis AFB Safety Office 1997). The Air Force is working with BLM, local communities, and owners of the land to resolve this issue.

Use of ordnance during training is limited to ranges within Restricted Airspace. Air Force safety standards require safeguards on weapons systems and ordnance to ensure against inadvertent releases. All munitions mounted on an aircraft, as well as the guns carried in the aircraft, are equipped with mechanisms that preclude release or firing without activation of an electronic arming circuit.

System malfunctions or material failures that could result in either an accidental release of ordnance or the release of a dud component that fails to operate properly cannot be totally discounted. However, studies have shown that the probability of such an accidental release occurring, followed by injury to a person or damage to property on the ground, is infinitesimal (Air Force 1997d). In the last five years, no inadvertent releases have occurred on NAFR.

Air-to-ground ranges in the Nellis Range Complex support delivery of a wide range of ordnance. Approximately 80 percent of the ranges accommodate training or inert bombs and rockets, approximately 64 percent accommodate live bombs, rockets, and missiles, and approximately 61 percent accommodate strafing.

Chaff and flares are also used throughout the NAFR. Their use is controlled in accordance with standard operating procedures (SOPs) detailed in Air Force Instruction (AFI) 13-212, Volume 2, NAFB Supplement 1. Depending on the type of chaff and flares used, types of use, locations, and altitudes authorized for release vary. When fire danger is extreme, all flare use is curtailed.

Chaff is small fibers of aluminum-coated mica packed into approximately 4 ounce bundles and ejected by aircraft to reflect radar signals. When dispensed from an aircraft, chaff forms a brief "cloud" that temporarily hides the aircraft from radar detection. Although the chaff may be ejected from an aircraft using a small pyrotechnic charge, the chaff itself is not explosive. Chaff

is composed of silicon dioxide fibers ranging in diameter from 0.7 to 1 mil (thousandth of an inch), coated by an aluminum alloy and a slip coating of stearic acid (fat). Analyses of the materials comprising chaff indicate that they are generally non-toxic in the quantities used (Air Force 1997d). Silicon dioxide is an abundant compound in nature that is prevalent in soils, rocks, and sands. The trace quantities of metals included in the mica fibers are not present in sufficient quantities to pose a health risk. Aluminum is one of the most abundant metals in the earth's crust and water. In general, aluminum is regarded as non-toxic. Trace quantities of silicon, iron, copper, manganese, magnesium, zinc, vanadium, or titanium may be found in the alloy. The quantities involved are a minuscule percentage of levels that might cause concern. Stearic acid is found naturally as a glyceride in animal fat and some vegetable oils. Chaff has also been test-fired in a controlled environment to determine its potential to break down into respirable particulates (PM_{10}). The findings of the test detected no PM_{10} (Air Force 1997d).

Flares consist of small pellets of highly flammable material that burn rapidly at extremely high temperatures. The purpose of defensive flares is to provide a heat source other than the aircraft's engine exhaust to mislead heat-sensitive or heat-seeking targeting systems and decoy them away from the aircraft.

The quantity of ordnance expended in 1995 is presented in Table 3.3-3. All ordnance other than self protection flares and chaff are expended on NAFR. Of this, nearly one-half of the ordnance by weight is live, high explosive ordnance.

Table 3.3-3. Ordnance Expenditures 1995

Ordnance Type	*Quantity*	*Ordnance Type*	*Quantity*
Training Bombs	17,928	Training Ammunition [2]	266,700
Inert Bombs	1,944	HEI Ammunition [2,3]	15,267
Live Bombs [1]	4,867	Self-Protection Flares	90,089
2.75-Inch Rockets	4,228	Illuminating Flares	1,349
Missiles	102	Chaff (Bundles)	394,744

Notes: 1 Live Bombs include both gravity and glide bomb units (GBU)
2 Gun ammunition includes 20mm and 30mm
3 HEI = High Explosive / Incendiary
Source: AFI 13-212, Volume 1, Nellis AFB Supplement.

To ensure safe ordnance delivery, safety footprints based on specific aircraft and type of ordnance delivered have been developed for each target on NAFR. These footprints describe geographic areas around the targets where inert or training ordnance itself, or the effects of high explosive ordnance could cause injury or damage property. Therefore, these areas must remain clear when the target / range is being used. These footprints are unique for specific aircraft, specific delivery or attack profiles, and ordnance type. Application of these footprints is a prime safety concern, and is one of the elements contributing to the target / ordnance compatibility documentation contained in Nellis AFB Supplement 1 to AFI 13-212, Volume 2.

The South Range also supports ground training for military, federal, state, and local law enforcement personnel. This training, Silver Flag Alpha, is the ACC's air base defense school and is part of Nellis' Desert Warfare Training Center. In 1995, 5,595 people were trained on this range. Training is provided in desert combat tactics and procedures to provide security for air bases. Weapons used in this training reflect a wide range of small arms, shoulder fired weapons, and various incendiary and explosive devices. Training is conducted on Range 63A. Additional details regarding Silver Flag Alpha are contained in Appendix A.

After use, ordnance is removed from target areas under a program called "Coronet Clean." Initiated in 1975, this process clears unexploded ordnance (UXO), refurbishes targets, and removes debris. Conventional and test ranges are cleared to a distance of 500 feet every 2 months, and to 2,000 feet annually. Tactical ranges are cleared to 1,000 feet from the center of the target.

3.3.4 American Indian Issues Concerning Safety

American Indians have general concerns about the safety of transporting hazardous materials. However, they acknowledge that the Air Force follows Occupational Safety & Health Administration (OSHA) regulations, and have not specified any particular concerns about safety with respect to NAFR.

HAZARDOUS MATERIALS AND SOLID WASTE

3.4

Hazardous materials are defined as any substance that, due to quantity, concentration, physical, or chemical characteristic, may present substantial danger to public health, welfare, or the environment when released. Examples of hazardous materials include petroleum, natural gas, synthetic gas, and toxic chemicals. Hazardous wastes include any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that pose a substantive present or potential hazard to human health or the environment.

Daily operations and maintainance at NAFR require the use of hazardous materials. Hazardous materials have been used and solid wastes have been generated at all disturbed areas on NAFR. Solid and hazardous wastes are generated on the North and South ranges at both manned and unmanned sites. Trash disposal areas, exploded ordnance disposal sites, practice and live ordnance ranges, and electronic countermeasures sites are typical examples.



The great majority of non-weapon wastes generated at NAFR are controlled through an Air Force solid waste management process. Concrete and metal target waste materials are collected and reused as part of the waste management program.

The Nellis AFB environmental stewardship program is a priority mission objective in all operations. The Environmental Management Directorate at Nellis AFB conducts an extensive environmental education and protection program on NAFR that includes environmental compliance (permitting, hazardous material and hazardous waste management, underground storage tank and aboveground storage tank management, air and wastewater protection, spill prevention, incident reporting), pollution prevention, the base focal point for hazardous materials (HAZMART), recycling, product substitution, waste minimization), natural and cultural resources management, and restoration/remediation. The environmental protection program has looked at past activities on the range and has identified and evaluated areas where environmental issues occurred associated with these activities. The proactive program includes education and actions in support of current operations, and precludes, to the greatest degree possible, future environmental issues. Planned future activities are evaluated for environmental impacts, and mitigation measures are included to minimize the environmental impacts of the activities.

The Department of Energy (DOE) Environmental Restoration Division is responsible for directing and managing environmental restoration activities at sites previously used by the DOE in the State of Nevada. Past atmospheric testing and underground testing of nuclear weapons on parts of NAFR introduced quantities of radioactive and chemical contaminants into the soil and groundwater flow systems. The DOE and the Department of Defense (DOD) have entered into a Federal Facility Agreement and Consent Order (FFACO) with the State of Nevada that provides guidance and direction for the evaluation and cleanup of these contaminated test sites.



Installation Restoration Program (IRP) sites on NAFR are marked by large concrete blocks.

3.4 HAZARDOUS MATERIALS AND SOLID WASTE

Hazardous materials are identified and regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), the Solid Waste Disposal Act (SWDA), and the Emergency Planning and Community Right-to-Know Act (EPCRA). They are defined as any substance that, due to quantity, concentration, physical, chemical, or infectious characteristic, may present substantial danger to public health, welfare, or the environment when released. Examples of hazardous materials include petroleum, natural gas, synthetic gas, toxic chemicals, and low-level radioactive sources, such as compasses and gauges. Hazardous wastes that are regulated under the Resource Conservation and Recovery Act (RCRA), are defined as any solid, liquid, contained gaseous or semisolid waste, or any combination of wastes that either exhibit one or more hazardous characteristic of ignitability, corrosivity, toxicity or reactivity, or are listed as a hazardous waste under 40 CFR Part 261 (RCRA, Determining Solid and Hazardous Wastes).

The ROI for potential contamination associated with the use of hazardous materials and solid waste is ROI One, which includes all disturbed areas on NAFR. These areas include six Air Force major operations areas and portions of other areas on NAFR where hazardous materials are being used, or have been used in the past, and where hazardous wastes have been generated. Other areas include targets, roads, and monitoring, tracking, and communications sites.

The operations areas are ISAFAF, Point Bravo Facility, and Silver Flag Alpha on the South Range. TTR, Tonopah Operations and Management (O&M) Compound, and Tolicha Peak Electronic Combat Range (TPECR) are on the North Range. Activities that generate wastes at some or all of NAFR operations areas include fuel handling and storage, vehicle maintenance and cleaning, aircraft maintenance and cleaning, fire training, landing operations, Civil Engineering infrastructure maintenance, and construction. Wastes commonly produced may include used fuel and oil, greases and lubricants, solvents, paint waste, used batteries, oil filters, and contaminated anti-freeze.

Solid and hazardous wastes are also generated at both manned and unmanned sites on the North and South ranges. Waste sites include target debris, exploded ordnance disposal sites, practice and live ordnance ranges, and electronic countermeasures (ECM) sites.

Fuel and oil spills in the major operations areas and at some of the ECM sites have resulted in small areas of soils contamination in the immediate area of the spill. Petroleum contamination has also been noted at some of the target debris sites.

Department of Transportation regulations as specified in 49 CFR are followed for the transportation of hazardous material on and off NAFR. Drivers of vehicles transporting hazardous or nonhazardous materials are required to have Nevada commercial vehicle operator licenses. Drivers transporting hazardous materials are trained in how to respond to incidents involving hazardous materials.

DOE has used hazardous materials, including radioactive materials, and generated radioactive and hazardous wastes at the Nevada Test Site (NTS) and on a portion of TTR. DOE testing of nuclear devices has caused contamination of NAFR land adjacent to the DOE test sites. The State of Nevada, the DOE, and the DOD have entered into a Federal Facility Agreement and Consent Order (FFACO) for DOE environmental restoration activities in Nevada.

3.4.1 Hazardous Materials

The great majority of the non-weapon hazardous materials used by Air Force and contractor personnel on the range are controlled through an Air Force pollution prevention process called HAZMART. This process provides management for the procurement, handling, storage, and issuing of hazardous materials and the turn-in, recovery, reuse, recycling, or disposal of hazardous wastes. The HAZMART process includes review and approval by Air Force personnel to ensure users are aware of exposure and safety risks. After the request for the issue of hazardous material is approved, the user picks up the material from the hazardous material storage area. The user then transports the hazardous material directly to the work site or to a hazardous material storage site at one of the main operating areas. Range personnel may also obtain hazardous materials through other on-base government supply outlets such as the Contractor Operated Parts Store or the Contractor Operated Civil Engineering Supply Store. Requests for hazardous materials that are processed through one of these alternate supply outlets are reviewed for environmental, health, and safety risks.

NAFR flight and aircraft maintenance operations and installation maintenance processes such as vehicle maintenance, target refurbishment, and electronic countermeasures emitter repair require the use of hazardous and toxic materials. The Air Force and its range contractors store and use moderate amounts of paints, solvents, thinners, adhesives, aircraft fuel, diesel, gasoline, lubrication oils, brake and hydraulic fluids, cleaners, batteries, acids, chlorofluorocarbon refrigerants, herbicides, insecticides, rodenticides, and compressed gases in compliance with applicable regulations and Air Force instructions. The Air Force maintains data within the supply system that can be used to generate listings of the hazardous materials that are used for various purposes/processes at the ranges and operations areas.

3.4.2 Hazardous Waste Management

Hazardous materials and wastes are federally regulated by the U.S. Environmental Protection Agency (USEPA), in accordance with the Federal Water Pollution Control Act, the Clean Water Act (CWA), the Toxic Substance Control Act (TSCA), SWDA, RCRA, CERCLA, and the Clean Air Act (CAA). Pesticide application, storage, and use are regulated by the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA). The federal government also complies with applicable state laws and regulations. State and Air Force directives applicable to the management of hazardous material and hazardous waste are referenced in Appendix C.

In February 1997 the USEPA finalized the Military Munitions Rule, 40 CFR 260, and it became effective 12 August 1997. This rule identifies when conventional and chemical military

munitions become a hazardous waste under RCRA and provides for the safe storage and transport of such wastes. The rule applies generally to unused munitions but does clarify that on-range disposal (e.g. the recovery, collection, and subsequent burial or placement in a landfill) of UXO is a RCRA-regulated activity. USEPA postponed applying the munitions rule to closed and transferred ranges pending evaluation of the proposed DOD Range Rule. It does not apply to NAFR at this time.

The proposed DOD Range Rule (32 CFR 178) was published in the *Federal Register*, 26 September 1997. The rule identifies a process for evaluating appropriate response actions on closed, transferred, and transferring military ranges. Response actions will address safety, human health, and the environment. This rule contains a five-part process that is consistent with CERCLA and is tailored to the special risks posed by military munitions and military ranges. The parts consist of identification of applicable ranges, range assessment and accelerated response to risks posed by munitions or other materials on military ranges, range evaluation / site- specific response evaluation, recurring reviews, and close-out. The rulemaking includes extensive public and government agency involvement to ensure this regulation responds to public needs. Once the rule is final, numerous government agencies and the public will continue their involvement to ensure the safety and environmental protection of the range response actions.

NAFR generates, stores, and transports hazardous waste as defined under RCRA, as amended, and TSCA. The hazardous wastes generated by range operations include waste paint that does not meet Defense Reutilization and Marketing Office (DRMO) and HAZMART labeling and condition standards for resale or reuse, used paint filters, used solvents, contaminated anti-freeze, fuel soaked pads and fuel filters. Nonhazardous wastes include recyclable used petroleum products, reclaimable JP-8 (jet fuel), and diesel fuel.

The Air Force manages four 90-Day Accumulation Points, referred to as sites on NAFR, for hazardous wastes generated on the ranges. These accumulation sites are located at Point Bravo, ISAFAF, TPECR, and TTR Area 10. Each site accepts all types of hazardous wastes from all range users (associate contractors, subcontractors, temporary duty military units, Air Force personnel, and tenant organizations). Once at the accumulation sites, the contractor personnel manifests and transports the waste to the DRMO RCRA-permitted storage facility on Nellis AFB. This facility is the only RCRA-permitted storage facility on Nellis AFB and NAFR. DRMO is responsible for the disposal of excess property and waste generated on NAFR, and accomplishes this mission through reuse, transfer, sale, donation, or ultimate disposal. Approximately 38,000 pounds of hazardous wastes from NAFR were manifested for disposal in 1995 (personal communication, Cardenas 1997).

The Range O&M Contractor removes hazardous materials, including dials and gauges, that contain low-level radioactive sources from older vehicles that are to be used as targets. These items are placed in 55-gallon drums and stored in designated areas pending disposal. Storage areas are surveyed periodically by the Range Radiation Protection Officer. The contractor sends requests for disposal to the Nellis AFB Bioenvironmental Engineer, who forwards the request to

the Air Force Low-Level Radiation Waste office at Brooks AFB, Texas. This office provides the instructions on where the waste is to be shipped for disposal. Approximately 4 to 5 drums are disposed of every 2 years.

The Air Force and their subcontractors have policies and procedures in place to prevent spills from occurring at the major work areas on the range. Emergency Response / Contingency Plans (ER / CP) and an associated Spill Prevention, Control, and Countermeasures (SPCC) Plan has been prepared and implemented for these areas. For future releases of CERCLA hazardous substances, the National Contingency Plan will be followed (40 CFR 300). Pre-positioned absorbent materials, cleanup material, and personal protective equipment are stored at various areas in the major operating areas. When spills do occur, they are cleaned up following the procedures described in the above plans and reported to the Nevada Division of Emergency Management (NDEM). Reporting criteria are in section 3.4.3.5.

3.4.3 Department of Defense Environmental Monitoring Program

Major DOD environmental investigations and restoration programs on NAFR have included the DOD Installation Restoration Program (IRP), RCRA Facility Assessments, and the Surface Soil Sampling Investigation of Bombing Targets. In addition, small spill sites and aircraft crash sites have been evaluated for environmental impacts.

3.4.3.1 INSTALLATION RESTORATION PROGRAM

The DOD developed IRP to identify and investigate potentially hazardous material disposal sites on DOD property. The IRP process begins with a Preliminary Assessment (PA) designed to identify and evaluate past disposal and / or spill sites that might pose a potential or actual hazard to public health, welfare, or the environment. Tasks are accomplished through document review, records searches, and personnel interviews. None of these sites are subject to RCRA corrective action.

If the PA suggests that a particular site may be contaminated, a Site Investigation (SI) is conducted. The investigation consists of field activities designed to confirm the presence or absence of contamination. A Remedial Investigation may then be performed if it is necessary to quantify and identify the site contaminants, the extent of the contaminant plume, and pathways of contaminant migration. The findings from these activities result in the selection of one or more of the following options: no further action; long-term monitoring; and / or a feasibility study designed and developed to identify and select the most appropriate remedial action.

Ninety-eight IRP sites have been identified on NAFR since the IRP began at the range in 1982. Seventy-four of these sites were recommended for no further action based upon the initial PA. SIs were done for the remaining 24 sites including four sites on the DNWR. Two sites, a fire training area at ISAFAF and a septic tank at Range 65N, required remedial action under CERCLA (limited hydrocarbon-contaminated soil removal at the fire training area and the removal of two underground storage tanks [USTs] and a septic tank at the Range 65N site). These actions were completed in 1993. The field observations, immunoassay, and laboratory

test results revealed no evidence of soil contamination at most of the locations sampled on NAFR. Metal concentrations were generally low and not a source of concern. The results of the SIs indicated that these IRP sites were not causing adverse environmental impacts. Twenty-two of the remaining 24 sites, including the two sites where remedial actions were done, were recommended for No Further Action. Two landfill sites at ISAFAF were recommended for long-term monitoring. Decision Documents (DD) for no further action at 96 of the 98 sites have been accepted and signed by the Nevada Division of Environmental Protection (NDEP).

Two permitted landfills are located on NAFR, one Class II (nonhazardous solid waste) and one Class III (solid construction debris). These landfills are operated in compliance with the Nevada Administrative Code (NAC 444.570 to NAC 444.748); the Code of Federal Regulations (40 CFR parts 240, 241, 243); and the Air Force Instruction (AFI 32-7042, Solid and Hazardous Waste Compliance, and Air Combat Command Solid Waste Program Management Guidance, dated October 5, 1994). All IRP sites on NAFR were addressed in a manner consistent with CERCLA NCP. Decision documents for no further action have been accepted and signed by the Nevada Division of Environmental Protection for 96 of the 98 sites. Long-term monitoring is being conducted at two landfills at ISAFAF.

3.4.3.2 RESOURCE CONSERVATION AND RECOVERY ACT FACILITY ASSESSMENT

A RCRA Facility Assessment (RFA) of NAFR was conducted in August, September, and November 1995. This proactive initiative was done voluntarily and was not required by law since there is no Part B Permit to operate a hazardous waste treatment, storage, and disposal facility on the range. None of the surveyed sites are subject to RCRA corrective action. RFAs are conducted in three phases: the preliminary review, the visual site inspection, and the sampling visit. The following summarizes the findings of the RFA and the actions that followed.

Preliminary reviews are conducted to identify locations of potential environmental contamination. Locations identified for further site inspection are classified as either Solid Waste Management Units (SWMUs) or Areas of Concern (AOC). A SWMU is defined by the USEPA as any discernible waste management unit at a RCRA-permitted facility from which hazardous constituents might migrate, regardless of whether the unit was intended for the management of solid and/or hazardous wastes. This definition includes landfills, container storage facilities, USTs, above-ground storage tanks (ASTs), wastewater treatment units, and areas contaminated by routine, systematic, and deliberate discharge from process areas. It does not include product storage areas and accidental spills from production areas. An AOC is defined as a discernible unit or area in which the management of hazardous waste was not intended, however, the release of potential hazardous waste may have occurred through accidental spill or leaks during normal day-to-day operation of the unit.

The information from the preliminary review came primarily from existing documents, including previous site investigations and preliminary assessments, maps, inspection reports, historical monitoring data, spill reports and interviews with personnel who were familiar with

the facility. The potential SWMUs and AOCs were visually inspected in September and November. No sampling visits were conducted during the RFA.

The SWMUs and AOCs found on NAFR include ECM sites, oil/water separators, acid neutralizing basins and oil interceptors, explosive ordnance disposal (EOD) and target debris disposal pits, initial and central hazardous waste accumulation points, and underground and above ground storage tanks.

A total of 272 SWMUs and AOCs were evaluated during the RFA. Further investigations were recommended if documented releases had occurred, if a risk was present to human health or the environment, or if a high potential for a significant release existed. All 68 of the sites have been reevaluated and sampled, as appropriate, in accordance with the recommendations (Table 3.4-1). An oil water separator was removed.

ELECTRONIC COUNTERMEASURES SITES

A typical ECM site consists of a small, graded area that is currently or has in the past been the location of manned and unmanned mobile radar stations and related support equipment. The sites vary in size from 20 feet to 250 feet in diameter. The equipment that is, or has historically been used, at the ECM sites included 250 to 600-gallon capacity, portable diesel and/or high octane aviation gasoline fuel tanks and their associated generator(s). The active sites generally have 2 to 6-inch thick layers of well-sorted, fine-to medium-grained gravel evenly spread around the one to two generators. At inactive sites, the past generator locations are identified by patches of gravel or electrical ground rods.

A total of 83 ECM sites were visually inspected on the North Range: 60 sites on the EC West and EC East ranges and 23 sites on the TPECR. Signs of possible fuel releases associated with generators were found at 30 of the EC West and East sites and 11 of the TPECR sites as evidence by stained soil/gravel. Stained areas were generally found to be covered with gravel and to be from less than a foot in diameter to as much as several feet in diameter.

In 1993, a new SOP was instituted for releases at Air Force-managed ECM sites that included notification to the State of Nevada (for releases greater than 5 gallons), followed by remediation of the impacted soil. Notification in this case is done by Nellis AFB environmental management personnel. Spills at non-Air Force-managed sites are typically done by the contractor operating the site (personal communication, Haarklau 1997).

WASTEWATER TREATMENT UNITS

The wastewater treatment units inspection process includes oil/water separators, oil interceptors, grease traps, and closed-loop recycle systems. In addition, four acid neutralizing basins were identified in documents for TTR.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1] (page 1 of 10)			
Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
TTR O&M Compound			
Nonhazardous waste accumulation point (NHWAP)	NHWAP in use for more than 10 years	Metals, crushed oil filters, used oil. Visible soil staining and petroleum odor.	Based on the long history and the lack of knowledge related to past hazardous waste storage practices, it should be examined further by soil sampling for volatile organic compounds (VOC) and total recoverable petroleum hydrocarbons (TRPH).
Former Oil/Water Separator	The oil/water separator was taken out of service and building floor drains blocked in approximately 1991.	Minor amounts of POLs, cleaning compounds from vehicle, generator, and equipment maintenance. No evidence of release	The integrity of the unit at the time of removal and the methodology used to determine closure are not known. Should further investigation uncover evidence that possible releases may have occurred, soil sampling for VOCs and TRPH should be conducted.
Civil Engineering Yard	Storage of equipment and some hazardous materials required for ongoing O&M. Two potential SWMUs were identified and have been tentatively identified as sumps. PCB-containing transformers also were formerly stored.	Three 55-gallon drums of ethylene glycol and possibly PCB. Some dark brown staining relative to the background soil.	Soil sampling should include VOCs, TRPH, and PCBs.
TPECR Main Compound			
Hazardous Waste Accumulation Point (HWAP)	HWAP in operation for approximately 2 years. A former waste accumulation site was also identified. The length of operation is not known.	Paint, oily rags, antifreeze, fuel fibers, fluorescent bulbs, battery rinsate.	In addition to ongoing, regular compliance inspection of the HWAP. It is recommended that a non-hazardous waste storage area be established. If further investigation uncovers evidence of possible releases, soil sampling for VOCs and TRPH should be conducted.
Grease and Oil/Sand Interceptors	Two grease and oil/sand interceptors, connected in series, accepting influent from three floor drains of a vehicle maintenance building	Wastewater with minor amounts of lube oil grease, motor oil, hydraulic fluid, auto and diesel fuel, antifreeze. No evidence of a release.	If inspection uncovers that possible releases may have occurred, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH. To characterize the presence and extent of the possible release to the leach field, it is recommended that soil samples from the leach field be analyzed for VOCs and TRPH.
Septic Tank/Leach Field System	System has been in place since 1979. It was designed to serve 90 to 110 persons with a maximum discharge rate of 5,500 gallons per day to the 0.25-acre leach field.	Domestic wastewater including toilets, urinals, sinks, showers. No evidence of release.	Since the leach field has received waste from the vehicle maintenance building for an unknown length of time and the past practices regarding spill cleanup are not well known, it is recommended that soil samples be collected from the leach field and analyzed for VOCs and TRPH.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1]
(page 2 of 10)

Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
		Indian Springs AFAF	
Oil/Water Separators (Bldgs 115, 225, and 227)	Five oil/water separators are located on ISAFAF. Two receive wastewater from the floor drains beneath the main parking bay. One is connected to a trench drain inside the truck maintenance building. One is used to treat wastewater from the trench drain in the vehicle maintenance area. The final one is used for heavy vehicle maintenance.	Wastewater with minor amounts of lube oil grease, motor oil, hydraulic fluid, auto and diesel fuel, antifreeze. No evidence of a release.	It is possible that the separators may have released materials to migration pathways via leaks or overflows. If further investigations uncover evidence that possible releases may have occurred, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Underground Storage Tanks (USTs)	There are three underground storage tanks located on ISAFAF.	POL, diesel fuel No. 2, unleaded gasoline. There are documented historic UST spills and overfills.	It is recommended that all USTs be considered suspect until an inspection and/or monitoring indicate no release has occurred. Alternatively, they can be removed and the site closed in order to prevent future releases.
Former Drum Storage Rank	A drum rack used for storage and dispensing virgin hydraulic oil previously located outside. All materials used in maintenance operations are now stored inside.	Hydraulic oil and possibly other POLs. There is no visual evidence of a release.	It is recommended that surface soil samples be collected and analyzed for TRPH to assess the presence or absence of soil contamination due to potential releases.
Suspected Asbestos Containing Tiles	Scattered pile of suspected asbestos containing floor tiles located just west of the western end of the taxiway. Tile appear to have been blown to this location by wind.	Possible asbestos containing tiles. The site was not visually inspected.	The debris should be removed by a qualified contractor. The site is considered a low risk due to the low potential for contact.
		Point Bravo	
Above ground Storage Tank (AST) Farm	Three ASTs are located within a tank farm.	Unleaded gasoline, diesel fuel. Documented contaminated soils.	Recommended that a concrete foundation and berms be installed to provide a more effective containment system around the tank farm. The presence and extent of any possible releases should be further investigated by soil sampling for VOCs, TRPH, and RCRA metals.
Possible Former Drum Storage Locations	Three former drum storage locations.	Reportedly paint solvents, motor oil, hydraulic oil, diesel fuel, antifreeze.	It is recommended that more information be gathered about the past practices at this site before other action is taken. If the investigation uncovers evidence that possible releases may have occurred, the presence and extent of the release should be further investigated by soil sampling for VOCs, TRPH, and RCRA metals.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1]
(page 3 of 10)

Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
		Point Bravo	
Historic Spill Locations	Three former spill locations.	Approximately 6 gallons of unleaded gasoline and small quantity of PCB-contaminated oil. No visual evidence, although documented evidence indicated that soil contamination has occurred over the long period of site operation.	It is recommended that more extensive soil sample for VOCs, TRPH, and PCBs be conducted to identify other areas of potential soil contamination.
		Ranges 61, 62, and 64	
Scattered Target Debris Area	Scattered wood target debris.	Unknown, site not visually inspected.	No specific recommendations.
		Silver Flag Alpha — Range 63A	
Fuel Storage Building	Storage location for flammable liquids	Approximately 30 5-gallon cans containing unleaded gasoline and diesel fuel, and some smaller cans of hydraulic fluid. Brown staining of the soil outside the entry doors.	It is recommended that the contaminated soil be removed and an area adjacent to the building entrance be paved and bermed to capture the incidental spills. Limited soil samples for TRPH is also recommended.
Septic Tank / Leach Field Systems	One abandoned system and one existing system.	Domestic wastewaters and potentially unknown fluids from a floor drain. No evidence of a release.	Further investigation of the abandoned leach field is recommended on the basis that past practices concerning the exposed drain are not known.
Range Storage Yard	A flammable storage building and former HWAP.	Approximately 14 5-gallon cans containing unleaded gasoline and diesel fuels, cans of paint, motor oil, acetone, epoxy. No visual or documented evidence of a release.	Further investigation is recommended to determine the details regarding use as a HWAP.
Rifle Bore Cleaner Storage Shed	Small shed reportedly served as a storage shed for rifle bore cleaning fluid and fuel.	Rifle bore cleaning fluid, unleaded gasoline and / or diesel fuel. No evidence of a release.	Further investigation to determine what types and quantity of fluids were stored at the site.
		Range 63	
Site X-63-211	Surface debris pile	Diesel fuel, hydraulic fluids, engine fluids. One stained area.	Identify wastes through soil sampling and verify that the military tanks have been properly defluidized.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1] (page 4 of 10)

Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
Range 63			
Borrow pit	Borrow pit	Oil, tar, asphalt. No indication of release, however, the potential exists for precipitation to leach potential waste constituents from the pile.	Collect soil samples for TRPH analysis.
Range 65			
Mile Range Staging Area	Target preparation, defluidization, and staging area.	Lube oil grease, motor oil, hydraulic fluid, transmission fluid, unleaded/leaded gasoline, diesel fuel, antifreeze. Releases have been documented.	Soil sampling and analysis for VOCs and TRPH.
Asbestos-Containing Material (ACM) Debris Pile	Debris pile	Non-friable ACM. No evidence of release but may still release a very small number of fibers if disturbed.	Remove debris.
Checkerboard Building	Two buildings (inactive since approximately 1975) used for target scoring evaluation of nearby strafe pits.	Diesel fuel, ACM, trace amounts of mercury, metals. No evidence of release.	Remove inert materials from the location and separate according to material type for eventual recycling. Collect samples and analyze for the asbestos fiber content.
1940s Target Vehicle Debris Area	Storage of target and practice ordnance debris	Lube oil grease, motor oil, hydraulic fluid, leaded gasoline, diesel fuel, antifreeze, vehicle batteries, trace amounts of munition debris. No visible evidence of release.	A thorough search for UXO should be conducted prior to any action. Soil samples should be collected at engine-containing vehicle locations and analyzed for VOCs, TRPH, and metals.
M-Series Target Debris Area	Storage of debris and target vehicles	Lube oil grease, motor oil, hydraulic fluid, leaded gasoline, diesel fuel, antifreeze, vehicle batteries, trace amounts of munition debris. No visible evidence of release.	A thorough search for UXO should be conducted prior to any action. Soil samples should be collected at engine-containing vehicle locations and analyzed for VOCs, TRPH, and metals.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1]
(page 5 of 10)

Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
		Range 65	
Old Tank Table Target Debris Area	Former target area which contains an estimated 50 to 75 target vehicles	Lube oil grease, motor oil, hydraulic fluid, leaded gasoline, diesel fuel, antifreeze, vehicle batteries, trace amounts of munition debris. No visible evidence of release, however, assumed that residual amounts of fluid have leaked from the target vehicles..	A thorough search for UXO should be conducted prior to any action. Soil samples should be collected at engine-containing vehicle locations and analyzed for VOCs, TRPH, and metals.
Abandoned Strafe Pits	Surface debris	Unknown / not documented. Not visually inspected.	No specific recommendations provided.
Beacon Hill Debris Pile	Abandoned wood / barrels, debris piles (possible ACM)	Unknown / not documented. Not visually inspected.	No specific recommendations provided.
FAC Hill	Surface garbage, debris, and abandoned military equipment	Unknown / not documented. Not visually inspected.	No specific recommendations provided.
Gravel Pit	Abandoned shed, surface debris, abandoned military equipment (M-60 tank)	Unknown / not documented. Not visually inspected.	No specific recommendations provided.
		Area 10	
Oil / Water Separator Bldg 145	Oil / water separator handles influent from wash and rinse basins in Bldg 145	Possible POL and sludge of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil / Water Separator Bldg 184	Separator handles influent from floor drains in Bldg 184	Possible POL, fire foam, a 2-inch layer of gravel, saw cutting mud, aluminum cans, bricks, and wood. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil / Water Separator Bldg 186	Separator handles influent from floor drains in Bldg 186	Possible POL, antifreeze, and sludge of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil / Water Separator Bldg 188	Separator handles influent from floor drains in Bldg 188	Possible POL, antifreeze, and sludge of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1]
(page 6 of 10)

Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
Area 10			
Oil/Water Separator Bldg 266 (original)	Separator handles influent from floor drains in Bldg 266	Possible POL and grease containing sludges/sediments of an unknown composition. Not visually inspected.	If further inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 257 (East)	Separator handles influent from a washrack in Bldg 257	Possible POL, hydraulic fluids, and sludges/sediments of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 257 (West)	Separator handles influent from floor drains in Bldg 257	Possible POL, hydraulic fluids, and sludges/sediments of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 257 (South)	Separator handles influent from floor drains in Bldg 257	Possible POL, hydraulic fluids, degreasing agents and sludges/sediments of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 257 (Southwest)	Separator handles influent from floor drains in Bldg 257	Possible POL, hydraulic fluids, degreasing agents and sludges/sediments of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 227	Separator handles influent from floor drains in Bldg 257 and an exterior washrack	Possible POL and sludges/sediments of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 218	Separator handles influent from floor drains in Bldg 218	Water and sludge/sediment of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 228	Separator handles influent from floor drains in Bldg 228	Possible POL and sludges/sediments of an unknown composition. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 505	Separator handles influent from paint booth scrubbers in Bldg 505	Water with possible paint thinners, solvents, and paints. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1]
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Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
		Area 10	
Oil/Water Separator Bldg 229	Separator handles influent from floor drains from an oil dispensing area in Bldg 229	Observed to be dry in 1988 during inspection. Effluent present in the overflow/storage tank was reported to be predominantly water with a thin film of "unknown" oil. Not visually inspected.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 259	Two separators handle influent from floor drains and a paint booth	Effluent present in the south separator in 1988 included liquid (brown/green/yellow) with a strong solvent odor and possibly POL containing sludges/sediments of an unknown composition. No effluent was present in 1995. Some minor deterioration of concrete was observed in both separators.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 249	Handles influent from floor drains from Bldgs 351 and 269, and catchbasins on the west apron pad.	Water with possible POL and solvents present. No evidence of possible release.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 536	Handles effluent from five poly drains, 22 floor drains, one acid neutralizing basin, and two service sinks from Bldg 536	Water with possible POL and solvents present. No evidence of possible release.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 524	Influent from three catchbasins/floor drains flow to a settling basin, the settling basin and water tank drains flow to recycling basin which drains into the separator.	The settling basin contained dirty water with no indication of any oil. No evidence of possible release.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 535	Handles influent from body shop, paint booth, and paint booth scrubber floor drains in Bldg 535	Effluent observed in 1988 consisted of blue-colored water containing paint chips. No evidence of possible release.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1]
(page 8 of 10)

Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
		Area 10	
Oil/Water Separator Bldg 373, 374, 383, and 384	Handles effluent from floor drains in Bldgs 373, 374, 383, and 384	Effluent observed in 1988 consisted of black/brown/red colored water, possible POL, and sediment/sludges of unknown composition. No evidence of possible release.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 376, 377, 286, and 387	Handles effluent from floor drains in Bldgs 376, 377, 386, and 387	Effluent observed in 1988 consisted of black/brown/red colored water, possible POL, and sediment/sludges of grease, sand, and sweeping compound. No evidence of possible release.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 401 and 411	Separator handles effluent from floor drains in these buildings	Effluent observed in 1988 consisted of black/brown/red colored water, possible POL, and sediment/sludges of grease and concrete-saw cutting mud. During the 1988 survey, evidence of possible releases were observed from the transfer tube from the separator to the outer chamber.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 405, 409, 415, and 419	Separator handles effluent from floor drains in these buildings	Effluent observed in 1988 consisted of brown colored water, possible POL, and sediment/sludges of grease of unknown composition. No evidence of possible release.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Oil/Water Separator Bldg 431, 435, 441, and 445	Separator handles effluent from floor drains in these buildings	The separator was not functioning during the 1988 survey because it was fouled with miscellaneous construction debris. No evidence of possible release.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1]
(page 9 of 10)

Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
Area 10			
Oil/Water Separator Facility 493 (Fire Training Pit)	Handles influent from the facility burn rings	Effluent observed in 1988 consisted of water mixed with possible POL, and sediment/sludge of unknown composition. During the 1988 survey, evidence of possible releases related to overloading of the separator with fuels were observed.	The separator should be emptied, cleaned, and inspected for cracks or other structural failures. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Waste Storage Tank Bldg 142 (Waste Trichloroethane Tank)	Tank handles effluent from a drain in Bldg 142	Effluent observed in 1988 consisted of a brown fluid containing paint particles and POL. No evidence of possible release.	The tank should be emptied and removed. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Waste Oil Storage Tank, Bldg 536	Tank handles effluent from waste oil drains in Bldg 142	No effluent was observed. No evidence of possible release.	The tank should be emptied. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Waste Fuel Storage Tank, Facility 493	Tank handles overfill from the fill pad located over the tank.	Effluent observed in 1988 was contaminated fuels to be used in burn exercises. No evidence of possible releases.	The tank should be emptied. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Acid Neutralizing Basin, Bldg 143	Handles influent from floor drains and wash basin in Bldg 143	No effluent was observed in 1988. The basin was not in use. No evidence of possible releases.	The basin should be emptied. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Acid Neutralizing Basin, Bldg 536	Handles influence from floor drains and wash basin in Bldg 536	No effluent was observed in 1988. The basin was not in use. The basin was inaccessible and could not be inspected.	The basin should be emptied. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Acid Neutralizing Basin, Bldg 249 (Wheel and Tire Shop)	Handles influent from the Wheel and Tire Shop in Bldg 249	Unknown. The basin was inaccessible and could not be inspected.	The basin should be emptied. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.
Acid Neutralizing Basin, Bldg 249 (Battery Shop)	Handles influent from the Battery Shop in Bldg 249	Unknown. The basin was inaccessible and could not be inspected.	The basin should be emptied. If the inspection uncovers possible releases, the presence and extent of the release should be further investigated by soil sampling for VOCs and TRPH.

Table 3.4-1. Summary of Release Assessment Sites Recommended for Further Action [1]
(page 10 of 10)

Site Name	*Description*	*Materials/Contaminants*	*Evaluation/Recommendations*
Area 10			
Pesticide and Herbicide Storage Bldg 543 and 546	Buildings are used for storage and mixing of pesticides and herbicides for building and ground maintenance	Materials that are mixed include a variety of herbicides, fungicides, and insecticides. No evidence of releases. The buildings are inactive.	The sump should be emptied. The floor drain should be closed to prevent possible future releases at the mixing area.
Underground Storage Tanks (USTs)	Underground storage tanks	The majority of the USTs contain POLs. Oil/water separator tanks may contain other typical separator materials. The USTs were not visually inspected.	All USTs should be considered as potential release sites until inspection or monitoring indicate that no release has occurred. If further investigation uncovers evidence of possible releases, soil sampling for VOCs, TRPH and RCRA metals should be considered.
Steam-Cleaning Pad (north of Bldg 543)	Building is used for general steam cleaning	Materials include a variety of herbicides, fungicides, insecticides, and possible POL. No evidence of a possible release. However, it has been reported that some of the surrounding soil at the site was removed due to oil contamination.	The presence and extent of the release should be further investigated by soil sampling for VOCs, TRPH, herbicides, and pesticides.
Former Drum Storage Reynolds Electric Company Open Storage Yard	Possible former drum storage area	It is unknown what type of drummed material may have been stored and dispensed at this site. No evidence of a release was observed.	The presence and extent of a possible release should be further investigated by soil sampling for VOCs and TRPH.
Concrete Batch Plant	The plant was constructed in early 1980 or 1981 to supply concrete for the Area 10A runway and other construction projects. The plant is currently inactive.	Various drummed wastes. No evidence of possible release.	The presence and extent of the release in the drum storage area should be further investigated by soil sampling for VOCs, TRPH, and RCRA metals.
SUMMARY OF INSTALLATION RESTORATION PROGRAM SITES RECOMMENDED FOR LONG-TERM MONITORING			
ISAFAF			
LF-01	Landfill that received all types of waste generated at ISAFAF prior to 1975	Monitoring wells were installed and sampled in 1989. With the exception of benzene at a concentration of 0.1 µg/L of water, VOCs and semivolatiles were not detected in the groundwater. TRPHs were at or below 1.3 µg/L water and metals were generally below laboratory detection levels.	Long-term monitoring is currently being performed.
LF-02	Landfill	Reported disposal debris includes vehicle parts and target debris; however, chemical disposal was not reported.	Long-term monitoring is currently being performed.

Fifty-three systems were identified at the various manned compounds. Two sets of two oil interceptors in series were identified at the TPECR main compound. Seven oil/water interceptors, two grease traps, and three grease oil/sand interceptors were identified at the ISAFAF main compound. Two oil interceptors were identified during the visual sight inspection of Point Bravo. At the O&M compound in the North Range, a removed oil/water separator was noted. Four acid neutralization basins were identified at TTR.

EOD AND TARGET DEBRIS DISPOSAL PITS AND SURFACE PILES

The use of live and practice ordnance on portions of NAFR generates large volumes of target debris, smaller quantities of exploded ordnance debris, ordnance casings, concrete, live ordnance, and trace amounts of explosive residue.

From 1958 to 1975, the standard practice for disposal of target debris was to bury it in pits on the range. Depending on the frequency of use and the volume of debris generated, as many as four to five pits may have been located on a 1-acre parcel of land adjacent to the target site. These unlined pits were approximately 10 to 16 feet wide, 100 feet in length, and 8 to 12 feet deep. Once filled to approximately 2 feet below the surface, a 2-foot layer of native soil was used as covering. There is a possibility that live ordnance may be present in pits constructed during this period. The NDEP has signed Decision Documents (DD) agreeing to no further action (NFA) for the burial sites. The NFA decisions were based on results of an August 1995 Site Inspection report that indicated that the IRP burial sites on NAFR were not causing adverse environmental impacts.

Training on the Nellis Range includes bombing targets that are generally constructed of wood, concrete blocks, and salvaged military vehicles. When new, the concrete blocks measure 2 x 2 x 8 feet. The blocks are generally destroyed by the bombing. The larger pieces that remain are reused for targets. Currently, smaller pieces of concrete rubble that cannot be reused are scattered around the target sites. Nellis AFB has received approval from NDEP to use the concrete rubble to fill the bomb craters at the target sites (personal communication, Gravenstein 1997).

HAZARDOUS WASTE ACCUMULATION SITES

Hazardous waste accumulation sites and hazardous waste initial accumulation points are facility locations designated for the temporary storage and segregation of RCRA and regulated hazardous wastes. The waste materials are stored in drums or other containers that are sealed, labeled, and placed on spill containment pallets or wooden pallets and covered with a tarp or hard "poly" shell.

At the central hazardous waste accumulation points, containers are housed within locked and ventilated hazardous waste containment buildings or within other appropriate facilities. The wastes are isolated from the ground with asphalt, concrete, or bermed concrete surfaces. The accumulation site locations are fenced. Prior to expiration of the 90-day storage limit, the

wastes are transported to the RCRA-permitted storage facility on Nellis AFB for disposal. The accumulation sites are well maintained and comply with applicable RCRA regulations.

UNDERGROUND STORAGE TANKS

Underground storage tanks (USTs) on NAFR are constructed of several different materials including fiberglass-reinforced plastic, coated steel, and or steel with cathodic protection. All regulated USTs at TTR, Tonopah EC Range (TECR), and TPECR, with the exception of one UST at the TTR fire department, meet the upgrade and leak detection requirements found in 40 CFR Part 280.

The number of USTs currently in use on NAFR are provided in Table 3.4-2:

Table 3.4-2 Number of USTs Currently in Use on NAFR

Location	*Regulated Tanks*	*Non-Regulated Tanks*
ISAFAF	0	3
TTR	16	70
TECR	3	1
TPECR	4	0

The majority of the regulated tanks contain unleaded gasoline, diesel, JP-8 jet fuel, or other petroleum products. Most of the non-regulated tanks contain heating fuel. Tanks are removed and/or replaced when they are found to be leaking (personal communication, Haarklau 1997).

ABOVE-GROUND STORAGE TANKS

During the RFA a total of 21 and 4 ASTs were visually inspected at ISAFAF and the TPECR main compound, respectively. The majority of these ASTs contained diesel fuel. The AST fuel farm at ISAFAF contained materials such as diesel fuel, unleaded gasoline, and JP-8. Secondary containment is provided for the ASTs at ISAFAF and six major bulk fuel storage tanks at TTR.

The ASTs at ISAFAF were cathodically protected and placed on concrete drip pads with fuel lines set in concrete channels. Those tanks of older design have diesel fuel filters situated over the surrounding gravel bed. These are locations where minor leaking occurs. The operations areas' Emergency Response/Contingency Plans identify the location(s) of spill cleanup materials and disposal instructions for hazardous wastes.

OTHER SWMUS AND AOCS

Other potential SWMUs and AOCs include a concrete batch plant on TTR, and an asphalt debris pile at ISAFAF.

3.4.3.3 DEPLETED URANIUM TARGET ASSESSMENT

Research, tests, and evaluations were conducted during the 1970s to develop an improved armor-penetrating munition capable of defeating a heavily armored target, such as main battle tanks. The development of the 30 millimeter (mm) depleted uranium (DU) round in the early 1980s created the need for a range to support its development, testing, and operational testing. The present Range 63 DU was created for this purpose. With establishment of the Nuclear Regulatory Commission in 1982, the Range 63 target areas were licensed for firing 30 mm DU rounds at tank, aircraft, and vehicle targets.

The possession and use of DU munitions by Nellis AFB is currently authorized by Air Force radioactive materials permit No. 27-30048-1AFP, issued by the Air Force Radioisotope Committee on April 23, 1996. The permit was issued under the Master Materials License issued to the Air Force by the Commission in 1986. This license is administered by the Commission's Region IV and is managed by the Region's Division of Radiation Safety and Safeguards. The permit authorizes a maximum quantity of 35,000 kilograms (77,000 pounds; 116,178 rounds) of DU munitions to be stored at Nellis AFB. The permit also authorizes the expenditure of 30 mm AN/GAU-8 API armor-piercing incendiary (API) and API Tracer (APIT) rounds on the Range 63 target area in quantities "as needed" for pilot training and tactical employment evaluation (Air Force 1996b). The storage locations are radiologically surveyed at least annually and the results are documented in a report to the Radioisotope Committee.

The Range 63 licensed area encompasses Target 63-10 and a holding area for used and new targets. The target area consists of four tanks in two groups spaced 300 feet apart and located within two 100-meter bladed circles. This area is approximately 2,000 feet east of the holding area that contains nearly 200 tanks and vehicles that have been fired upon with DU munitions in the past. Depleted uranium target refurbishment must be accomplished in accordance with the DU Management Plan and under the direct supervision of a qualified health physicist, as specified in the Nellis AFB permit. A variety of live and inert ordnance is authorized on the target area and the associate strafing fans encompassing the target. Conventional munitions consisting of 20 and 30 mm training projectiles and high explosive incendiary (HEI) are used on the target area.

Conventional and DU rounds are fired by a AN/GAU-8 30 mm seven-barrel gatling gun mounted in the nose of the A/OA-10 Thunderbolt aircraft, the only USAF aircraft that employs DU rounds. This aircraft is used for close-air support in attacking ground threats such as tanks and armored vehicles, and also serves as a forward air control observer for sighting ground threats and directing air strikes against enemy targets. DU is the primary munition of the A/OA-10 in a combat environment.

In 1992, NAFR maintenance personnel attempted to refurbish two DU tank targets within Target 63-10 under the oversight of the Air Force Armstrong Laboratory Health Physics Function. Background air samples were taken and personnel participating in this activity were fitted with air samplers to determine the extent of any respirable hazard. Readings from the

background samplers around the targets showed DU contamination was relatively localized to the immediate target area (within 300 feet). The personnel air sampler results ranged from 6.5 attoCuries (10^{-18}) per liter to 0.58 picoCuries (10^{-12}) per liter. The higher value, 0.58 picoCuries per liter, is about 0.64 percent of the allowed Derived Air Concentrations (DAC) as listed in International Commission on Radiation Protection Publication 30, of 0.9 picoCuries per liter. Use of DAC is a method of determining the hazard associated with air concentrations of radionuclides in the workplace, based on a 2,000-hour work year exposure to the hazard. Since there has been very little range maintenance activity in Target 63-10 over time, personnel exposure to the DU contamination has been negligible. None of the individuals monitored during refurbishment had any measurable contamination on their respirators and little, if any, contamination on their protective clothing or equipment. It was concluded that no significant airborne DU contamination hazard existed, but adequate health physics controls were necessary to ensure DU contamination was not inadvertently removed from the site via boots, gloves, and equipment.

In 1993, Nellis AFB suspended the use of DU rounds at the request of the USFWS, who expressed concerns about the environmental impacts of DU to the flora and fauna in the DNWR. Up to that time, the quantity of DU material expended on Nellis Range 63 for all activities is estimated to be 27,805 kilograms (Lockheed Martin 1995).

Nellis AFB conducted a limited site assessment of Range 63 from March through November of 1994. The objectives of the assessment were to determine the scope of the suspected contamination, identify the uranium concentrations and distribution in the vicinity of the target area soils, and investigate the possible pathway transmission of the DU and its oxides. The assessment was not intended to locate all the DU on the range, nor to provide a blueprint for cleanup. The area that was studied included the specific target areas, areas around the aircraft run-in line, strafe fans from projectile hits and over shot, and other areas that potentially might be impacted from stray rounds. This included a large area on Range 63 starting from the dry lake bed in the southwest quadrant to the northeast area, nine miles beyond the target area. The limited site assessment determined the general locations and probable state of the DU bullets or penetrators, so that an approach for management of the DU could be developed. A sampling approach was taken to determine the extent of both affected and unaffected areas and transmission pathways, with the understanding that this initial sampling would provide the basis for other studies if deemed necessary.

Soil samples were taken at the Range 63 control center to determine background levels of naturally occurring uranium (U^{238}). The control center is 10 miles from Target 63-10. Background levels ranged from 0.14 pCi/g to 1.0 pCi/g. Samples taken from or immediately adjacent (up to 300 feet) of the DU targets gave results ranging from 54.8 pCi/g to 1.6 nanoCuries per gram (nCi/g) of U^{238} (Lockheed Martin 1995).

The sampling results indicate that current contamination levels at Target 63-10 are approximately 1.5 orders of magnitude greater than background levels, and that the activity of surface soils decreases quickly beyond the immediate target area (up to 300 feet).

In addition to soil sampling and analysis, gamma scans were performed on the areas around sampling trenches and on the trench bottoms and sidewalls. The results of the gamma scans indicate that the maximum concentrations of DU persist on and in the surface soil, and that DU rounds do not penetrate one foot below the surface.

Results of the limited site assessment indicate that, at present, the DU on Range 63 does not appear to pose a hazard to public health, and it is not an environmental hazard. This was concluded from the active air sampling studies conducted during target refurbishment in the DU area, and from the results of soil sampling for both DU and from an infiltration chloride analysis as an indicator of water migration both laterally (surface water transport) and vertically (transport from surface to ground water). Due to the very limited occurrence of plant and animal species in and around the DU impact area, conclusions could not be drawn regarding the risks and biological effects associated with DU exposure to the small mammals. With continued restricted land use, there appears to be no pathway for exposure potential.

Nellis AFB provided information to the USFWS regarding the site assessment and other efforts taken for management of the Range 63 target area. In response, the USFWS authorized temporary resumption of DU use on Range 63 (within the DNWR) in October 1996. It should be noted that, although the USFWS gave this authorization following extensive site assessment and environmental analysis, the use of hazardous materials on a unit of the National Wildlife Refuge System is not allowed. An exception was made in this case to accommodate the mission of the Air Force.

An environmental assessment for the resumption of use of DU on Target 63-10 was completed in June 1998. The Air Force will not resume the use of DU until the DU Management Plan and Air Force Policy are finalized.

3.4.3.4 SURFACE SOIL SAMPLING AT NAFR BOMBING TARGETS

The Air Force has gathered environmental information about NAFR in an effort to comply with the Military Lands Withdrawal Act (MLWA). One area of environmental information was to determine whether explosives, metals, and other organic residues are present in surface soils as a result of historical bombing activities at NAFR. A surface soil sampling program was conducted to gather this information. The following text summarizes information contained in Air Force 1996b and 1997.

Surface soil sampling was conducted at ten representative bombing targets, six on the North Range and four on the South Range. The sampling confirmed that the bombing targets on NAFR contain concentrations of inorganic and explosive constituents in excess of background concentrations. Semi-volatile organic compounds (SVOCs) and polynuclear aromatic hydrocarbons (PAHs), which are potential thermal degradation products of explosives, were generally absent from the target areas. The inorganic concentrations were generally less than the USEPA Preliminary Remediation Goals (PRGs). However, certain explosives frequently exceeded the risk-based PRGs (Air Force 1996b).

The primary inorganic constituents detected on the range included cadmium, chromium, copper, nickel, zinc, cyanide, and to a lesser degree lead and suppressed pH (pH values less than the background range of pH values of 8.2 to 8.9 on the South Range and 8.0 to 9.6 on the North Range). The constituents are likely a result of expended ordnance. Antimony and mercury might also be attributable to expended ordnance, although the detectable concentrations were generally very low. The inorganic PRGs for the above listed inorganic parameters were only exceeded once for chromium (370,000 milligram [mg] / kilogram [kg] compared to the PRG of 100,000 mg / kg) and once for zinc (550 mg / kg compared to the PRG of 450 mg / kg).

The data indicate that use of cluster bomb units (CBUs) resulted in the highest and most widespread distribution of both inorganic and explosive contamination among the target sites samples. The use of HEI ammunition also appears to cause relatively high and widespread contamination, particularly with respect to explosives contamination. The soil contamination concentrations relative to the USEPA Preliminary Remedial Goals, for both the CBU and HEI sites, is usually contained within approximately 600 feet of the immediate target area. There are currently three targets where live CBUs are authorized (Targets 62-7 and 63-4 on the South Range, and 75-46 on the North Range) and four targets where HEI is authorized (Targets 63-10 and 64-1 on the South Range, and 71-12, and 74-4 on the North Range) (personal communication, Starrett 1997).

Ecological risks are considered insignificant at targets located on playas, since playas are naturally free of vegetation. Ecological risks related to bombing residues may exist in target areas outside of playas. However, bombs / strafe tend to destroy vegetation in target areas. Therefore, plant uptake and associated exposure of foraging wildlife would not likely occur within active target areas.

The remaining live ordnance types, such as air-to-ground missiles, rockets, general purpose bombs and guided bomb units, resulted in some localized areas of metals and explosives concentrations above background levels but these target areas seldom exceeded the risk-based PRGs. The types of contaminants were similar to those previously discussed. These general ordnance types account for the majority (about two-thirds) of the target areas.

3.4.3.5 SPILLS AND AIRCRAFT CRASHES

Spills are reported to the National Response Center and the NDEM when the following occurs:

- a substance is released in a quantity equal to or greater than that reportable to the National Response Center under 40 CFR 302.6(a).

- any quantity of pollutant, hazardous waste, or contaminant is released into water.

Spills are reported to the NDEM when the following occurs:

- A quantity of a petroleum is released that is either a volume greater than 25 gallons or affects a soil volume greater than 3 cubic yards.

- Any quantity of sewage release from waste treatment systems on the range.

Historically, an average of nine spills have been reported each year. Guidance in the Nellis AFB Contingency Plan will be used in the event of a release of a hazardous substance.

3.4.4 Department of Energy Environmental Restoration Program

As a signatory to the FFACO with the DOD and the State of Nevada, DOE remediates contaminated sites on the NTS, parts of the TTR, and parts of the NAFR through its Environmental Restoration Program (FFACO 1996). The Agreement clearly shows that the DOE, in cooperation with the DOD, is responsible for remediating areas it and its predecessor agencies have used on the NTS, the NAFR, and the TTR. For purposes of the FFACO, the approximately 106,000 acres of Air Force land withdrawn in the Pahute Mesa area, transferred by MOU to the Atomic Energy Commission in 1963, is considered to be part of the Nevada Test Site. The TTR is treated as a DOE-managed area separate from the NAFR. Both the FFACO and the Pahute Mesa MOU state that DOE is responsible for remediating the test areas on Pahute Mesa. The DOE also has responsibility for remediation efforts on the TTR for those sites resulting from past DOE activities. In addition to those sites on the TTR (Clean Slate 1, 2, and 3) and Pahute Mesa (Cabriolet and Palanquin), four contaminated areas of the NAFR are also subject to the terms of the FFACO: Project 57, Small Boy, Schooner, and Double Tracks (Figure 3.4-1). The Air Force and DOE have signed an MOU delineating environmental restoration responsibilities on NAFR (effective July, 1998).

The strategy for implementation of the FFACO organizes corrective action sites into management groups called corrective action units. The units are further categorized into four projects: Industrial Sites, Underground Test Area Sites, Soil Sites, and Offsites. *Industrial Sites* include sites on Pahute Mesa and TTR used to support nuclear testing activities. Units where underground testing occurred that might have impacted groundwater are grouped as the *Underground Test Areas.* Units where tests have resulted in surface and/or shallow subsurface contamination are grouped as the *Soil Sites.* Units that are not on NAFR or on the NTS are designated as *Offsites* and are not discussed in this LEIS. Corrective action would proceed in four steps: (1) identifying the sites, (2) grouping the sites into the corrective action units, (3) prioritizing the work schedule for funding, and (4) implementing the corrective investigations and/or actions as applicable. After a corrective action is completed, DOE will provide a closure report to the state of Nevada and the Air Force. Corrective actions depend on the nature of the unit, anticipated future land use, and the assessment of risk. DOE will prepare planning documents according to the complexity of the needed action for each unit investigation and corrective action.

DOE's Environmental Restoration Program (ERP) has identified and categorized all known sites. Some sites are under investigation and a some sites have been remediated and closed.

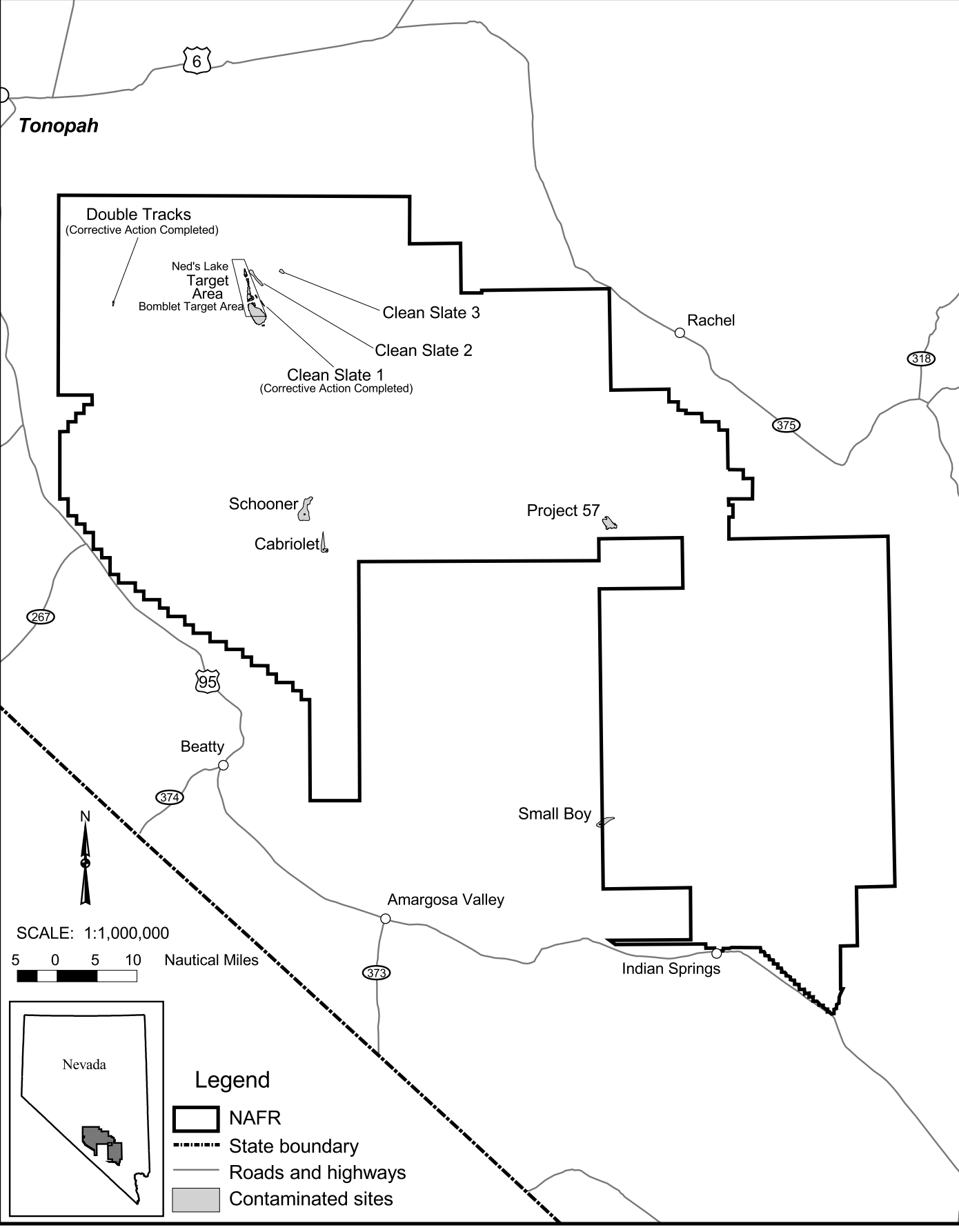


Figure 3.4-1. Locations of Potential Contamination from Prior DOE Actions

Appendix II of the FFACO lists those sites where investigation has not begun or corrective action has not been completed, Appendix III lists those sites in investigation, and Appendix IV lists those sites that have been closed. These Appendices are updated on a semi-annual basis.

Tests of nuclear devices conducted in Nevada by the U.S. have caused radioactive contamination of the land surface and groundwater. Although most of the tests were conducted on the NTS, some caused contamination of the surface and/or groundwater on the NAFR. A few tests were conducted on the NAFR, and these have left areas of surface contamination. Nuclear weapons exploded on or above the surface left downwind fallout contamination of the surface. Some nuclear weapons exploded underground contaminated groundwater that may have moved beyond the boundaries of the test site. Supporting activities that employed such facilities as landfills and drains caused other types of contamination, both chemical and radiological.

Two industrial sites of significant area on the TTR are the Bomblet Target Area and NEDS Lake (Figure 3.4-1). NEDS Lake is located within the Bomblet Target Area. The NEDS lake area is contaminated with depleted uranium and the Bomblet Target Area is contaminated with conventional ordnance. Site investigations have been initiated because the areas are active weapons test areas and may contain live ordnance. The NEDS Lake and Bomblet Target Area are listed in the FFACO as inactive sites, pending characterization and corrective actions.

INDUSTRIAL SITES

For the purposes of the FFACO, the industrial sites category includes facilities contaminated with chemical hazardous materials as well as with radioactive materials. The FFACO Appendices II, III, and IV (as revised January 1998), list the corrective action sites and progress toward closure. The nature of these sites range from abandoned septic systems and drains to buried ordnance and underground storage tanks. Remedial actions that lead to closure will be conducted in accordance with applicable laws and regulations.

STATUS OF THE REMEDIATION OF INDUSTRIAL SITES

Industrial sites on the TTR are in various stages of remediation. Remediation has completed for many industrial sites on the TTR. The FFACO Appendices II, III, and IV (as revised January 1998), list the corrective action sites and progress toward closure.

SOIL SITES

The U.S. Government conducted *safety tests* of nuclear weapons where small quantities of plutonium or entire weapons were subjected to conventional high explosives (HE) to determine whether a nuclear chain reaction could occur following an accidental triggering of the HE materials in an assembled weapon. These experiments resulted in the dispersal of plutonium into the air and onto the ground (DOE 1996b).

Although most of the nuclear testing occurred on the NTS, one atmospheric nuclear test (Small Boy in 1962) and five safety experiments were conducted within the NAFR complex. Small Boy was exploded just east of the NTS / NAFR border on Frenchman Flat and left a downwind fallout pattern of fission products and plutonium on NAFR land which was still detectable in an 1994 aerial survey (DOE 1996a). Safety experiments on the NAFR included Project 57 (April 1957), Double Tracks under NAFR Range R-71 (May 1963), and Clean Slate I, II, and III (May and June of 1963) on the TTR. These safety shots did not produce fission products but dispersed plutonium onto the land surface.

Under a 1963 MOU, the Air Force delegated the portion of the NAFR known as Pahute Mesa to the Atomic Energy Commission for high-yield nuclear testing. The delegated area is delineated by R-4807B or equivalently by Areas 19 and 20 of the NTS. Surface contamination from the cratering tests, Palanquin (April 1965), Cabriolet (January 1968), and Schooner (December 1968) were detected in the RIDP ground survey (DOE 1995) and in the 1994 aerial survey (EG&G 1994). The aerial survey data confirm that surface contamination from the Schooner test extends into the NAFR beyond the NTS boundary of the delegated Pahute Mesa area.

STATUS OF THE REMEDIATION OF SOIL SITES

Interim clean-up actions were completed at the Double Tracks site in 1996. Clean Slate I sites were completed in accordance with the FFACO in 1997. The FFACO Appendices II, III, and IV (as revised January 1998), list the corrective action sites and progress toward closure.

The Air Force, DOE, and NDEP have formed a technical working group with other identified decisionmakers to reach concurrence on a corrective action level for radionuclide contamination in soil. It has been agreed upon through the technical working group that military future land-use scenarios will be used for the soil sites on the TTR and NAFR, and that a dose criteria of 25 milliroentgen equivalent man / yr and the RESRAD computer program will be used to calculate a corrective action level, where appropriate. Some of the military future land-use scenarios are relatively simple, so the corrective action levels can be calculated using simple spread sheet-type calculations. The corrective action level calculations are being independently peer-reviewed by the Nevada Risk Assessment Management Program. After the Nevada Risk Assessment Management Program's review and concurrence, and the as low as reasonably achievable analysis is complete, a corrective action level will be established.

UNDERGROUND TEST AREAS

The underground nuclear weapons tests conducted on Pahute Mesa have contaminated the groundwater. Of the underground test areas on the NTS, Pahute Mesa is in closest proximity to existing groundwater wells off site in the Oasis Valley (Daniels et al. 1993). The sites on Pahute Mesa are divided into two corrective action units (CAU): The Western Pahute Mesa CAU and the Central Pahute Mesa CAU. Eighty-one underground nuclear weapons development tests, one DOD nuclear test detection experiment, and three nuclear cratering experiments were conducted in the Pahute Mesa area (DOE / NV 1994).

The Western Pahute Mesa CAU consists of 18 sites in Area 20. These tests were all conducted in vertical emplacement holes. This CAU is separated from the Central Pahute Mesa CAU by the Boxcar Fault and is distinguished by the relative abundance of tritium. Transport of contaminants on and from Western Pahute Mesa involves groundwater flow in both welded and vitric tuffs, both in the rock matrix and in the fracture system (FFACO 1996).

The Central Pahute Mesa CAU consists of 64 sites in Areas 19 and 20 on Pahute Mesa. These tests were all conducted in vertical emplacement holes. Transport of contaminants on and from Central Pahute Mesa involves groundwater flow in fractures and the rock matrix in welded and vitric tuffs and lava flow aquifers. The influence of the large-scale block faulting is not well known (FFACO 1996).

STATUS OF THE REMEDIATION OF UNDERGROUND TEST AREAS SITES

The DOE ERP is utilizing new and existing wells to characterize radionuclide transport via groundwater flow. Because of the contamination resulting from underground nuclear tests, portions of Pahute Mesa may require restrictions to additional groundwater development (DOE 1996a).

3.4.5 Solid Waste Management

On the North Range, nonhazardous refuse, office wastes, dining hall wastes, and garbage that are generated in the major operating areas are collected in dumpsters and transported to a Class 2 landfill on TTR for disposal. A permit application for this landfill has been submitted to the State of Nevada. The landfill is currently operated under interim approval NAC 444.6405, paragraph 5. Hazardous wastes, asbestos wastes, construction debris and other special wastes are not permitted in this landfill. On the South Range, nonhazardous refuse and garbage generated in the major operating areas is picked up by a commercial disposal company and transported off-range to the Apex disposal site north of Las Vegas for disposal. Materials containing asbestos are removed from the ranges by licensed contractors and transported to commercially licensed permitted disposal facilities off-range. Polychlorinated biphenyl (PCB) contaminated equipment and wastes are disposed of through the DRMO. They are transported off base and disposed of at licensed permitted facilities. Hazardous wastes are removed from the range by licensed contractors and transported to commercially licensed and permitted disposal facilities off-range (personal communications, Vanderveen 1997 and Feldt 1997).

3.4.6 American Indian Issues Concerning Hazardous Materials and Solid Waste

Although American Indian languages in the NAFR region have no words equivalent to the concepts of radiation and radioactive materials, the term “angry rocks” expresses the cultural perception. American Indians near NAFR believe that breaking or disturbing a rock, without accompanying the action with a full explanation, may release the rock’s power and upset its natural balance. This action will “anger” the rock and result in “the creation of a source for cultural anomalies, which upsets the balance of the cultural ecosystem and affects Indian

people" (AIWS 1997). They believe that radiation, or the power released by the "angry rock," can hurt, damage or kill plants, animals, people, water or the air.

Indian people believe that past releases of radiation have already contaminated plants and animals used in traditional cultural practices. Some Indians feel they can detect radiation; if an area is determined by whatever means to be contaminated, then Indian people can no longer use its resources.

With regard to transporting hazardous materials, the *Native American Resource Document* (NARD) states:

> Portions of the current road system within the western U.S. is based on ancient pathways and trails of Indian people. The Southwestern Desert Trail System was not used for trivial activities, but for trade, commerce, pilgrimage, and often for a hasty retreat or to pursue an enemy in the act of warfare. Trails were used to relay important messages to distant tribal groups.

Tribal governments would like to cooperate with Nellis AFB in the development and implementation of safe transportation policies. However, no systematic consultation with tribal governments has been conducted to date. [AIWS 1997]

3.5 EARTH RESOURCES

NAFR is located within the southern part of the Great Basin and includes geographic portions of the Mojave Desert. NAFR is generally characterized by regularly-spaced, north-south trending mountain ranges that are separated by internally-draining alluvial basins or playas.

The elevations of mountains and intervening valleys increase from south to north. The valley bottoms of the South Range vary in elevation from approximately 3,000 to 3,600 feet, whereas the valley bottoms of the North Range are approximately 4,500 to 5,500 feet. Mountain range elevations are in excess of 6,000 feet on the South Range and over 8,600 feet on the North Range.



The basin and range structure of this region is most prominent in the southern and eastern portions of NAFR, as compared to the northern and western portions where volcanic activity buried the prominent mountain ranges. Pahute Mesa is a volcanic plateau within NAFR.

NAFR is in the basin and range province, which is characterized by steep north-south trending mountains that drain to usually dry lake beds called playas.



The primary earth resource currently used on NAFR is aggregate spread on roads used to access target areas and other NAFR facilities.

3.5 EARTH RESOURCES

Earth resources include geologic, soil, and paleontological resources located within ROI Two. For this assessment, the term "soil" refers to unconsolidated material and "rock" refers to consolidated material. Earth resources include mineral deposits, soils, significant landforms, tectonic features, and paleontologic (fossil) remains, any of which can have scientific, economic, and recreational value. This assessment analyzed data on the area's geologic setting, as well as the metallic, industrial, and energy resources of NAFR.

3.5.1 Geology

PHYSIOGRAPHY AND TOPOGRAPHY

NAFR is located within the southern part of the Great Basin, the northernmost subprovince of the Basin and Range Physiographic Province (Figure 3.5-1). This province is characterized by north-trending mountain ranges that are separated by alluvial basins (Figure 3.5-2). The Great Basin subprovince drains internally; precipitation has no surface water outlet to the Pacific Ocean.

Elevations vary substantially across NAFR. The valley bottoms of the South Range vary in elevation from approximately 3,000 to 3,600 feet, whereas those of the North Range are approximately 2,000 feet higher. Similarly, mountain ranges on the South Range exceed 6,000 feet and are more than 8,600 feet on the North Range (Air Force 1997g).

The topography over most of NAFR is undisturbed; however, the topography has been locally modified by man-made features, including roads, sand and gravel pits, underground mining, flood-control structures, drainage improvements, airstrips, landfills, fuel staging and storage areas, bombing targets, and by cratering from aerial bombing and nuclear detonations. Air Force tactical target complexes and associated infrastructure have disturbed approximately 90,000 acres. Aerial bombing craters are often present in the vicinity of the numerous bombing targets located throughout the North and South Ranges. However, the Coronet Clean program annually reconditions the target area by clearing unexploded ordnance, refurbishing targets, and removing bombing craters. Underground nuclear detonation tests, which result in the shattering of overlying rock layers and subsequent collapse of the near-surface soils, have created surface craters in the vicinity of Pahute Mesa.

The basin and range structure of this region is most prominent in the southern and eastern portions of NAFR. In this area, block-faulted mountains composed of massive Paleozoic carbonate rocks rise abruptly from flanking bajadas (coalescing alluvial fans). These bajadas are prominent physiographic features, attaining slopes up to 6 degrees. Because the prevailing wind direction in this area is from the west, sand ramps, created by blowing sediments from upwind playas (dry lakes), mantle the bajadas on the west side of the Desert and Pintwater ranges as they extend into the Three Lakes and Indian Springs valleys, respectively (Figure 3.5-2). The lower portions of the alluvial fans commonly attain slopes of 2 degrees or less, and

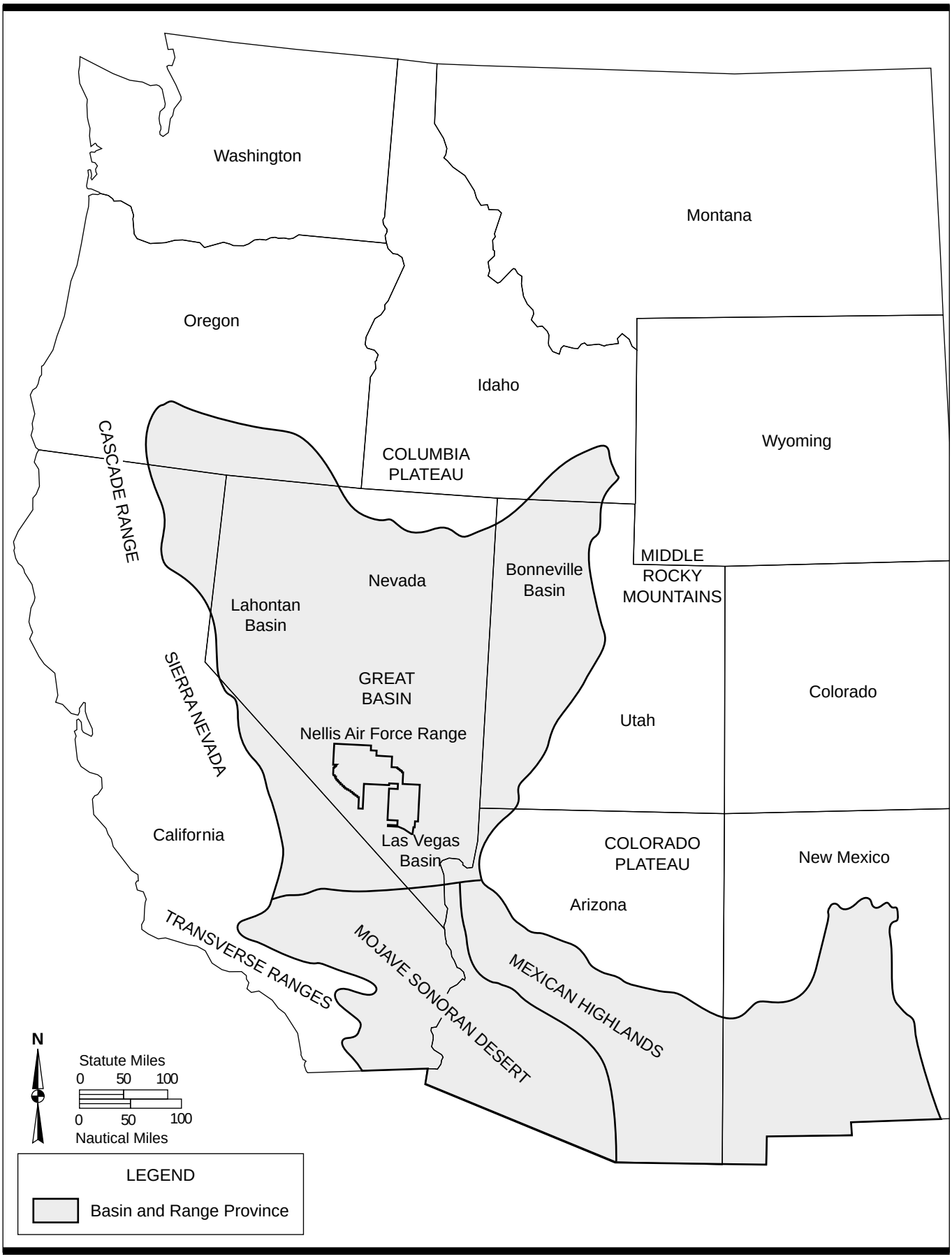


Figure 3.5-1. Basin and Range Physiographic Province

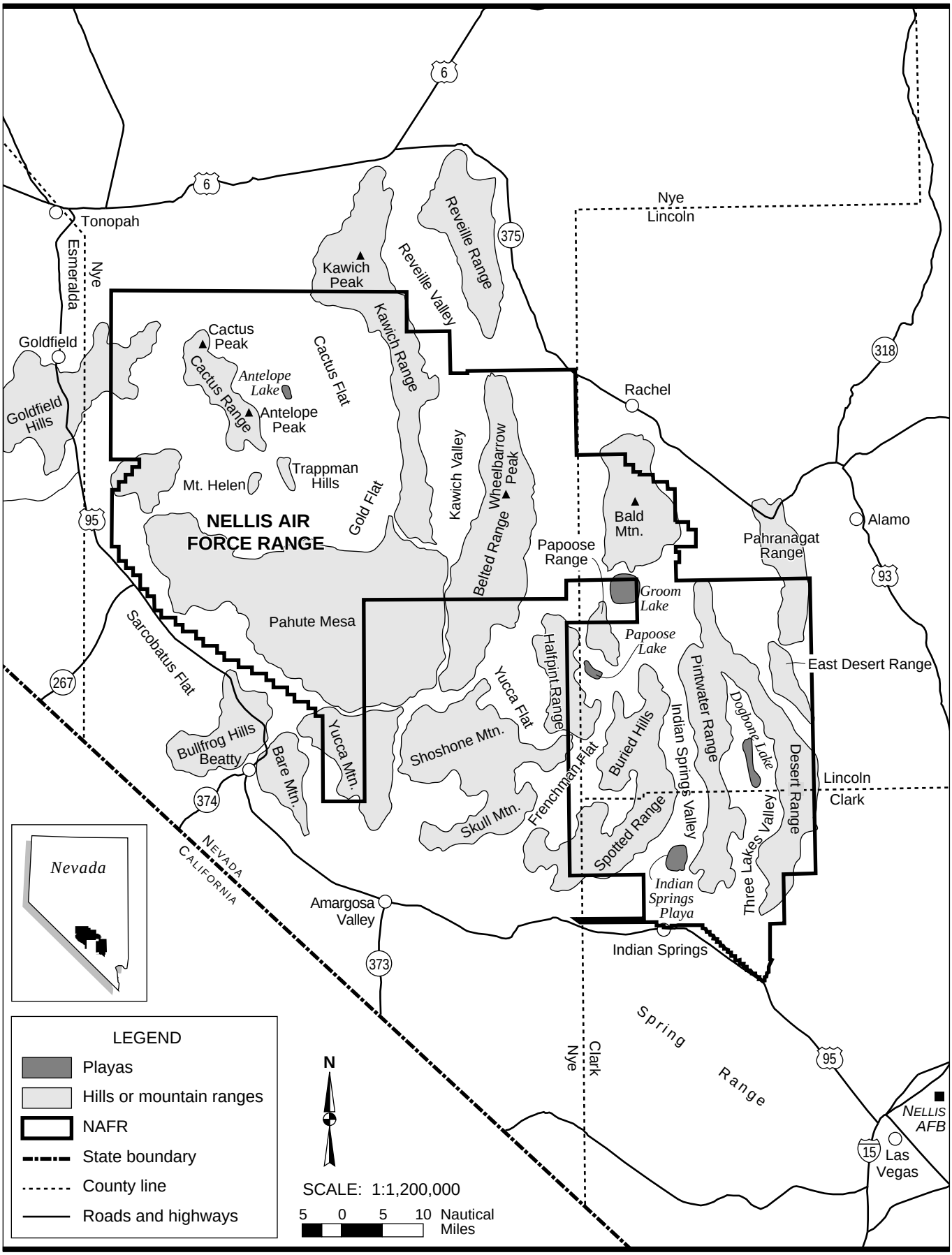


Figure 3.5-2. Physiographic Map of the Nellis Air Force Range and Surrounding Portions of Southern Nevada

terminate at playas that occupy the floors of many valleys in the NAFR. Other mountain ranges in this area include the Spotted, Pahranagat, Groom, and Belted Ranges (Air Force 1997g; NBMG 1997). The basin and range topography is not as pronounced in the northern and western portions of NAFR, as compared to the southern and eastern portions, due primarily to enormous accumulations of Tertiary volcanic rocks that have buried landscape. Pahute Mesa, a volcanic plateau in the southwestern part of NAFR (Figure 3.5-2), separates the two physiographic areas. Vast expanses of volcanic ash and rock, derived from the vicinity of the western Pahute Mesa, form Timber Mountain, Stonewall Mountain, the Black Mountains, and the Cactus and Kawich Ranges (Figure 3.5-2) (Cornwall 1972). The valleys are broader in this area than in the southern portions of the NAFR. In addition, playas have developed in many of these valleys (e.g., Mud Lake, Stonewall Flat, Cactus Flat). Drainages from Stonewall Mountain and Pahute Mesa flow west and southwest into Sarcobatus Flat and the Amargosa Desert (Air Force 1997g; NBMG 1997).

GEOLOGIC SETTING

The geologic terrain of NAFR can be divided into a southeastern area of largely Paleozoic sedimentary rocks and a northwestern area of mainly volcanic rocks of late Cenozoic age (Figure 3.5-3) (NBMG 1997).

STRATIGRAPHY

Rock formations (or units) exposed across NAFR vary in age from Precambrian (older than 570 million years before present [B.P.]) to Quaternary (less than 1.6 million years B.P.). Quaternary alluvium and lower Tertiary volcanic rocks occur in and near valleys as relatively large, irregular-shaped outcrop patterns, whereas the older strata, primarily mixed clastic and carbonate rocks, occur in the mountains as smaller, scattered, isolated outcrops. This distribution of rocks at the surface is a function of both the covering affect of volcanics and alluvium and the extensive fragmentation of the older rocks from multiple mountain-building events in the region (Air Force 1994a).

The strata in NAFR represent many depositional environments and time periods. Upper Precambrian and Lower Cambrian strata, which range in age from 550 to 650 million years B.P., are predominantly mixed clastic sediments (sandstone and shale) and carbonates (limestone), with some metasedimentary rocks (quartzite and chert). The remainder of the Paleozoic section, which ranges in age from 245 to 550 million years B.P., includes a similar mix of rock types, with scattered volcanics occurring in the lower portion. Mesozoic rocks (66 to 245 million years B.P.) are sparse. Lower Tertiary strata (Eocene, Oligocene, and Miocene), which range in age from 5 to 58 million years B.P., are dominated by volcanics, whereas mixed sediments are generally present in the upper Tertiary sequence (Pliocene — 1.6 to 5.3 million years B.P.). Quaternary sediments are generally unconsolidated debris shed from the erosion of neighboring mountains (Air Force 1994a).

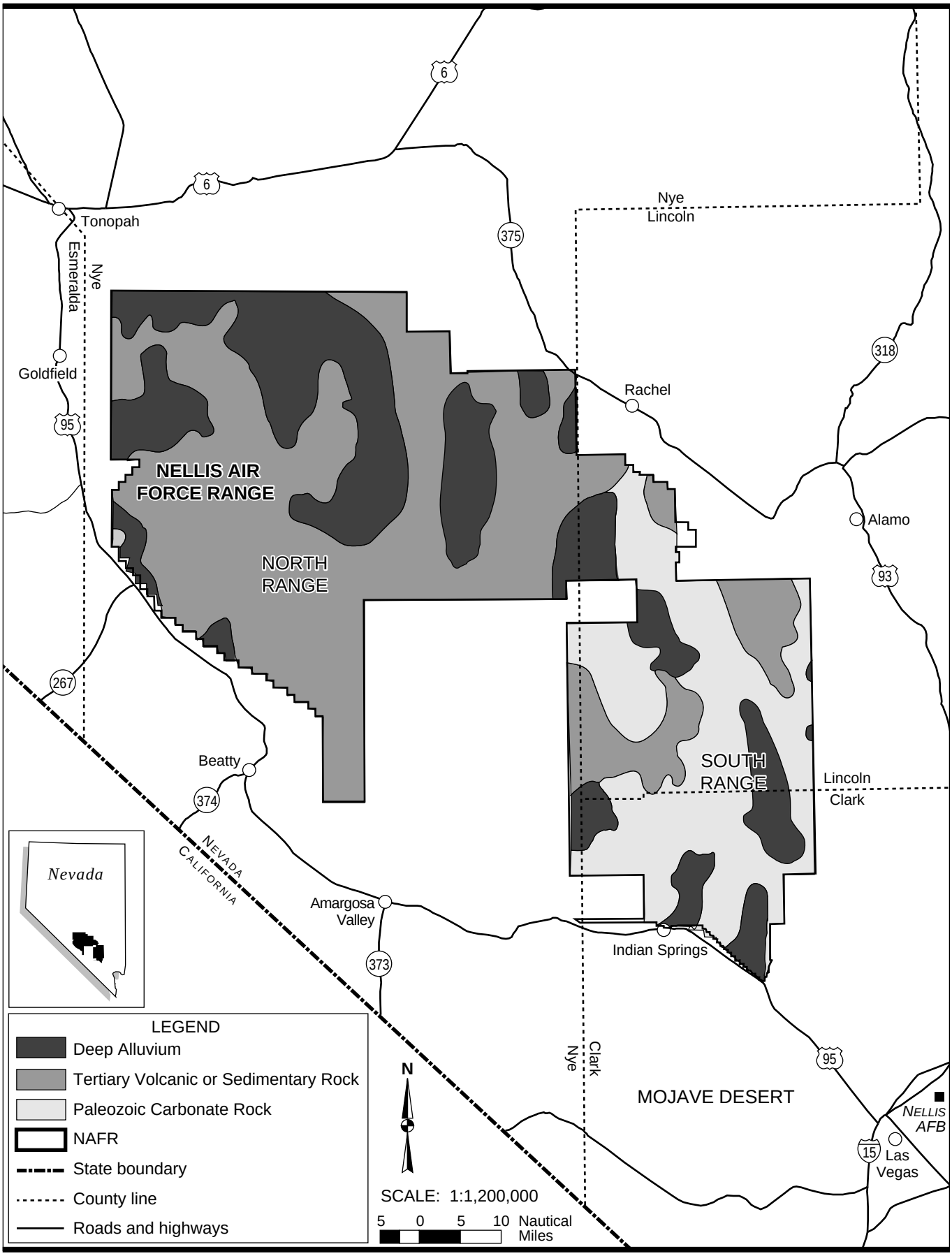


Figure 3.5-3. General Geology within the Nellis Air Force Range

The mountain ranges in the South Range are dominated by Paleozoic carbonate rocks, with lesser amounts of quartzite, sandstone, and shale (Figure 3.5-3). Valleys contain thick deposits of late Tertiary and Quaternary alluvium from erosion of adjacent mountain ranges. Lacustrine and fluvial sedimentary rocks, deposited in shallow basins from middle to late Tertiary, crop out in several areas within NAFR, particularly in the southern Spotted Range, the Pintwater Range, and the Desert Range (Figure 3.5-2). Locally, older Tertiary valley-fill sediments, which were uplifted with the underlying Paleozoic bedrock, are exposed on the flanks of some mountains (Longwell et al. 1965; NBMG 1997).

Tertiary volcanic rocks dominate the geology of the North Ranges. The Timber Mountain caldera was one of several large centers of volcanic activity in this area (Figure 3.5-4) (Byers et al. 1976, Huber 1988). Other volcanic centers include the Black Mountain, Cactus Range, and Silent Canyon calderas, and the Mount Helen dome. Welded and air-fall tuff, derived from these volcanic centers, extend throughout the North Ranges, including the extensive tableland of western Pahute Mesa, the southern Cactus and Kawich ranges, and Stonewall Mountain (Cornwall 1972; NBMG 1997) (Figure 3.5-2).

Two general groups of volcanic rocks are recognized: (1) an older, late Oligocene-early Miocene sequence of ash-flow tuffs and related lavas erupted from volcanic centers within and to the north of NAFR (Ekren et al. 1971; Best et al. 1989); and (2) middle- and late-Miocene ash-flow tuffs and lavas erupted from volcanic centers of the southwestern Nevada volcanic field (Byers et al. 1976; 1989; Noble et al. 1991; Sawyer et al. 1994).

Hydrothermal alteration and associated mineralization have affected rocks in many parts of NAFR. Many areas of alteration appear to be related to magmatism (mainly middle to late Tertiary) associated with caldera margins or centers of silicic to intermediate volcanic and shallow subvolcanic rocks (NBMG 1997).

TECTONIC HISTORY

The tectonic history of the region is very complex. The Basin and Range was a stable continental margin until late Devonian time, when uplift and erosion resulted in the deposition of thick Mississippian sandstones in a foreland basin. Regional thrusts, folds, and wrench faults developed during compressional deformation associated with the Sevier orogeny during late Cretaceous and early Tertiary time; that mountain-building episode rearranged the position of Paleozoic and older sedimentary rocks in southern Nevada (Armstrong 1968; Caskey and Schweickert 1992). The Spotted Range thrust fault, located in the South Range (Figure 3.5-5), is believed to be a result of this compressional deformation (NBMG 1997).

Following erosion throughout early Tertiary time, the initial stages of the modern basin and range structural province began to develop from extension along low-angle normal faults, high-angle normal faults, and strike-slip faults (Guth 1981; Hamilton 1988; Wernicke et al. 1988; NBMG 1997). The initiation of extensional faulting at NAFR is poorly documented; however, early phases appear to be episodic, beginning in Eocene or Oligocene time (Best and

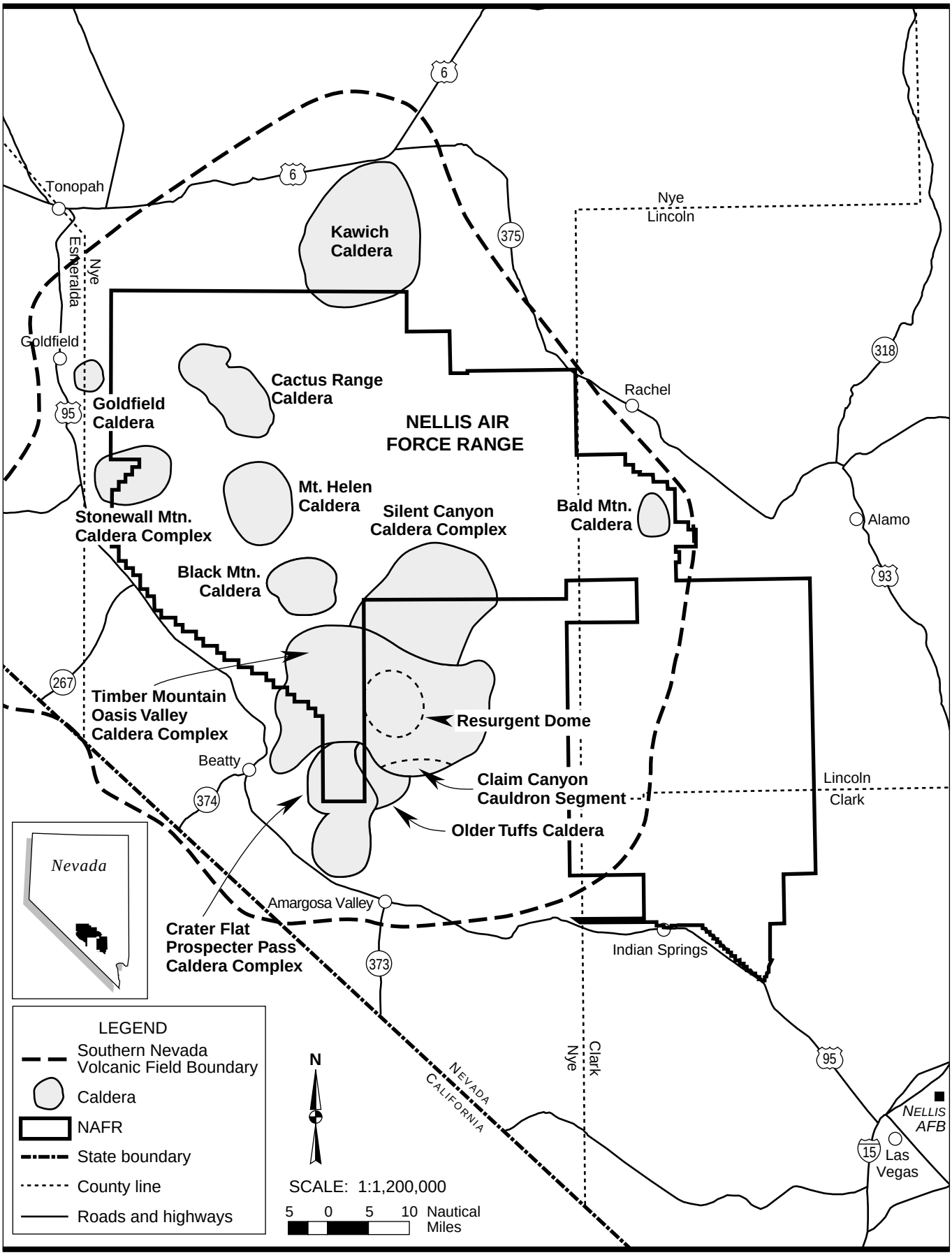


Figure 3.5-4. Southwestern Nevada Volcanic Field

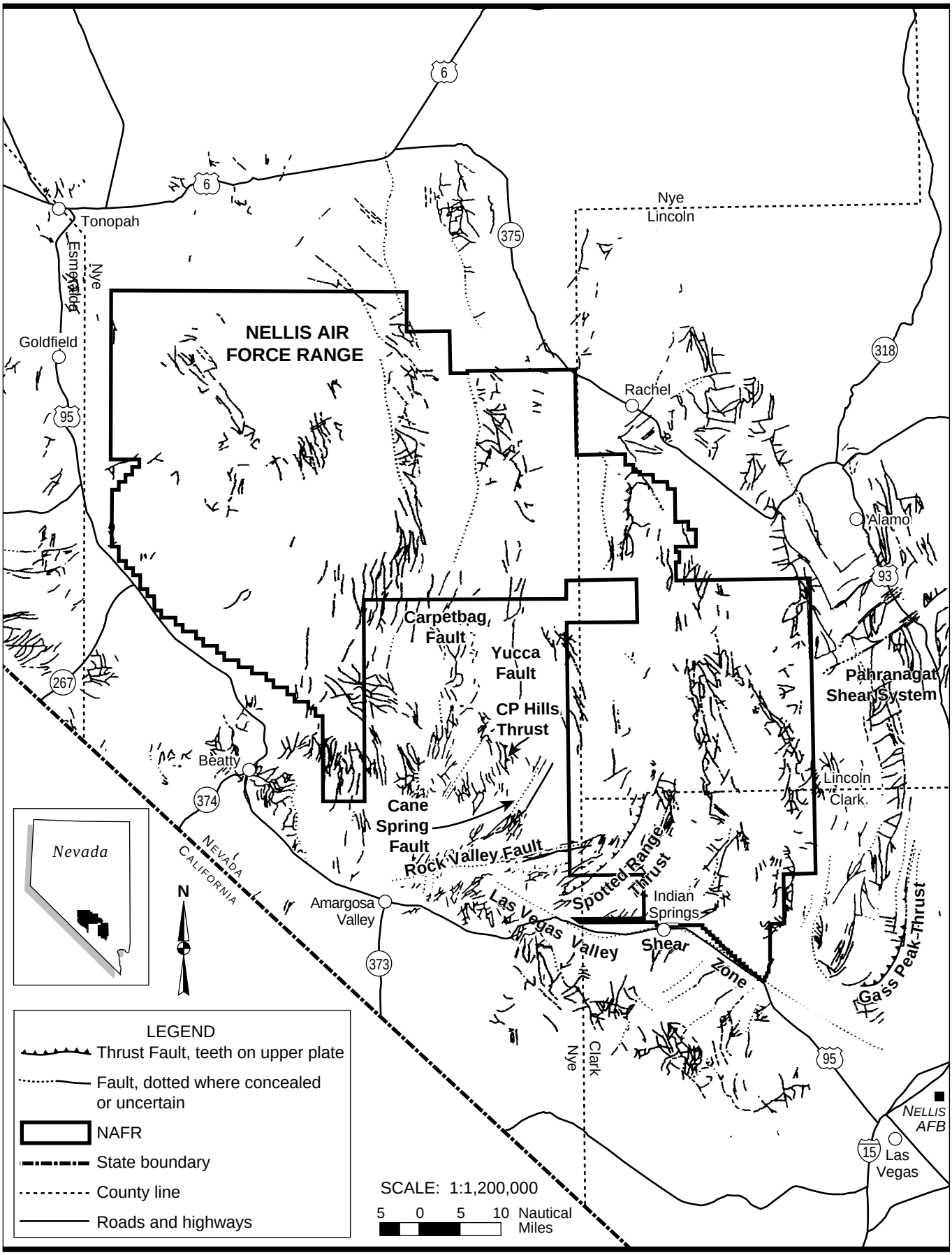


Figure 3.5-5. Tectonic Map of NAFR and Vicinity

Christiansen 1991). Low-angle normal faulting and associated tilting began in the early Miocene. High-angle, basin-and-range normal faulting at NAFR began in the middle Miocene (14 to 17 million years B.P.) (Ekren 1968).

Eruptions of the southwest Nevada volcanic field occurred in middle Tertiary time (Sawyer et al. 1990). Successive eruptions produced at least seven large and partially overlapping calderas on NAFR (Figure 3.5-4), which were filled with lava flows and covered by vast deposits of tuff. This volcanic field is located along the margin of the Walker Lane Belt, a zone of diverse topography between the Sierra Nevada and the north-striking ranges of the basin and range. In the western NAFR, this section of the Walker Lane Belt does not include significant right-lateral strike-slip faults, in contrast to other sections such as the Las Vegas Valley shear zone and areas in west-central and northwest Nevada (NBMG 1997).

Although extensional faulting has occurred in the area for the past 17 million years, this faulting has been episodic and has changed in location through time. The existing mountains have generally been present in the current configurations for 5 to 7 million years. Resultant intervening alluvial basins have progressively filled with coarse gravels, sands, and playa deposits. Specific faulting mechanisms (e.g., normal faults overlying detachment faults versus simple normal faulting) often determine resulting sedimentation and erosion patterns.

SEISMICITY AND FAULTING

NAFR is located within Seismic Zones 2B and 3, as defined in the Uniform Building Code (ICBO 1991) (Figure 3.5-6). The eastern two-thirds of NAFR is located within Zone 2B, defined as an area of moderate damage potential. The western one-third of NAFR is located within Zone 3, defined as an area with major damage potential. Current design standards require facilities to be built to seismic Zone 4 standards (DOE 1996a).

At least one active fault is located at NAFR. The Yucca fault, located in the south-central portion of the site (Figure 3.5-5), is considered active based on displacement of surface alluvium by as much as 60 feet. Offset of such young deposits is indicative of fault movement within the last few thousand to tens of thousands of years. Subsurface displacement along this fault has been determined to be approximately 700 feet (Sinnock 1982). Other active faults may also occur on the range.

Inactive or potentially active faults are also present at NAFR. The Carpetbag fault, located west of the Yucca fault, demonstrates approximately 2,000 feet of displacement in the past 7.5 million years (Sinnock 1982). In addition, the Pahranagat fault system, located in the South Range, displays Quaternary (past 2 million years) fault movement. The majority of the faults on NAFR are considered inactive.

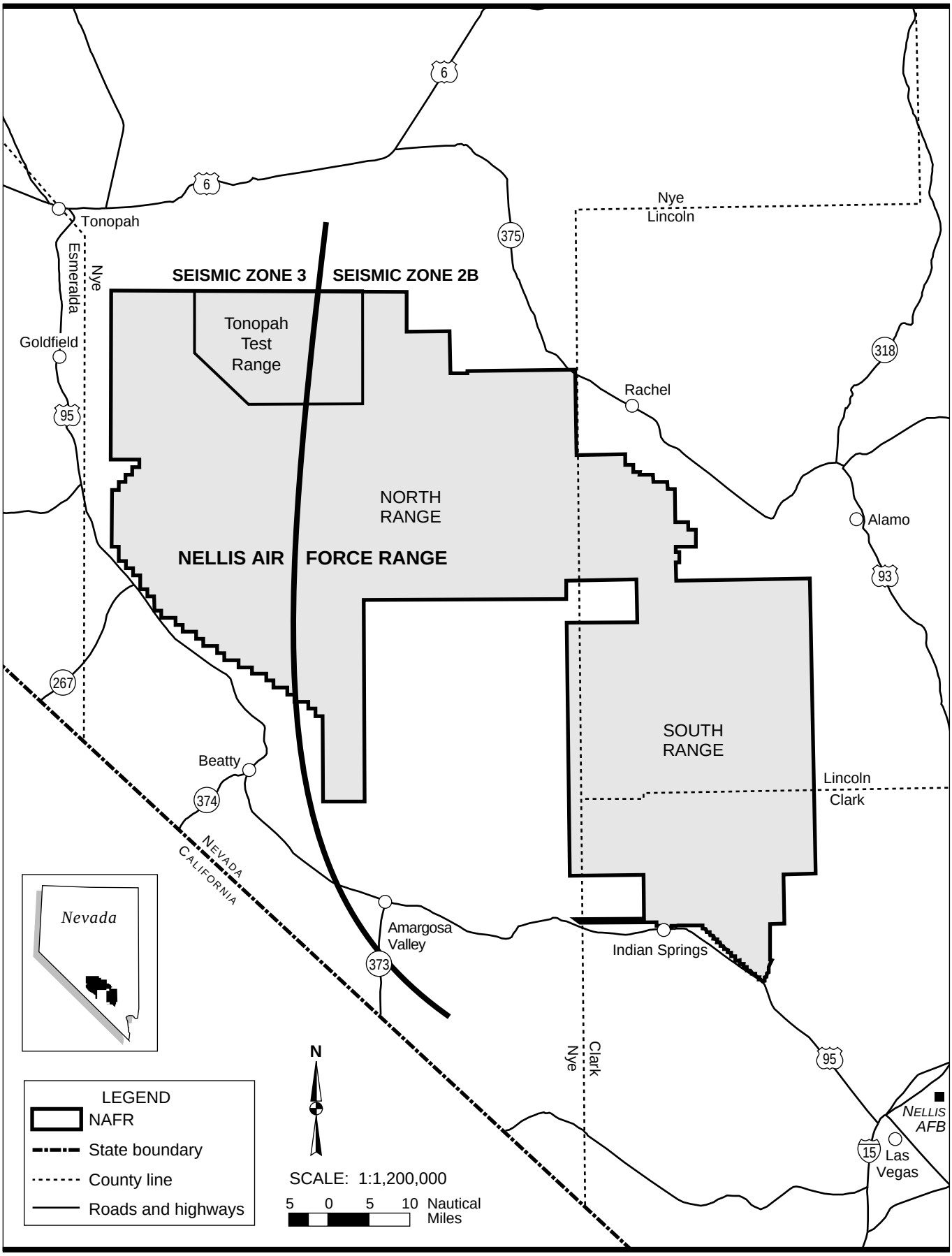


Figure 3.5-6. Seismic Zones in the NAFR Area

VOLCANISM

Several late Cenozoic silicic calderas occur on NAFR. The area containing these calderas is referred to as the southwestern Nevada volcanic field (Byers et al. 1989) (Figure 3.5-4). The Stonewall caldera, located in northwestern NAFR, is the youngest major silicic center in the area (7.5 million years). Silicic volcanism is characterized by large-volume explosive eruptions (DOE 1996a).

During the past 10 million years, low-volume, mild eruptions of basalt occurred in the region (Christiansen and Lipman 1972). These eruptions resulted in basaltic cinder cones and lava flows (Sawyer et al. 1990; Stewart 1980). The nearest examples of Quaternary (past 1.6 million years) volcanic cones and lava flows are at Crater Flat, located in southwestern NAFR (Crowe et al. 1986).

Based on an analysis of previous basaltic volcanism in the NAFR region, no evidence exists of either an increase in the rate of volcanic activity or that large-volume volcanic activity would resume (Crowe et al. 1986).

3.5.2 Soils

The soils on NAFR have not been mapped in detail; however, general descriptions of soil series are available from the U.S. Department of Agriculture (USDA). NAFR consists of several general soil associations. The St. Thomas series, consisting primarily of shallow, well-drained soils that formed in colluvium and residuum from limestone and dolomite, are the primary soil types found in the mountains. These soils generally occur on hills and mountains with 8 to 75 percent slopes. The Crosgrain and Arizo soil series are the primary soil types on the fan piedmonts. The Crosgrain series are shallow, well-drained soils that formed in mixed alluvium on ballenas (older fan piedmonts), with slopes of 4 to 30 percent. The Arizo series are very deep, excessively drained soils that formed in mixed alluvium on recent alluvial fans, with slopes of 0 to 15 percent (USDA 1993).

The basin floors generally consist of the Mazuma and Ragtown soil series. The Mazuma series are very deep, well-drained soils that formed in alluvium and lacustrine materials from mixed rock sources. Mazuma soils occur on fan skirts and alluvial flats, with slopes of 0 to 15 percent. The Ragtown series are very deep, moderately well-drained soils that formed in moderately fine and fine-textured lacustrine materials from mixed rock sources. This series occurs on lake plain terraces with slopes of 0 to 4 percent (USDA 1993).

The alluvial soils that dominate the fans and basins, in conjunction with the fine soil particles from lacustrine sources are subject to excessive wind erosion. These fine-grained materials are often thrust into the airstream, resulting in fugitive dust problems. This problem is made worse by vehicle-induced soil disturbance or loss of topsoil due to wildfires or concentrated grazing activities.

Soil data are also available from cultural resource surveys (e.g., Dames & Moore 1995) and geologic studies in adjacent areas (Quade et al. 1995). Based on these studies, the soils of the South Range are aridisols developed in carbonate parent material, usually with weak, vesicular A horizons, strong cumulic B horizons, and moderate to well developed C horizons (depending on the age of the parent sediment). Strongly developed carbonate soil morphologies occur where major washes are entrenched into alluvial fans (Air Force 1997g).

In the North Ranges, A horizons are typically better developed due to more moisture compared to the South Range, and because the soils have developed on predominantly volcanic parent material. These soils typically consist of a noticeable organic component in relatively dense scrub and woodland habitats. Similar to the South Range, B horizons in the North Range have a cumulic character due to the influx of eolian silt and clay-sized particles that occurred during Quaternary time. Carbonate horizons are commonly developed in older parent material with most carbonate material originating from eolian dust (Air Force 1997g).

The creation of subsidence craters at each of the target areas at NAFR, as described in section 3.5.1, may have resulted in increased erosion due to the removal of natural topsoil in these areas. The permeability of the soils and strata underlying subsidence craters (induced by underground nuclear testing) on Pahute Mesa may have increased from natural conditions due to the shattering and fracturing of rock associated with the detonation (DOE 1996a).

Another consequence of former underground testing and aerial bombing has been contamination of soils. Pockets of radioactive contamination surround each expended underground test (DOE 1996a). Ordnance residues (e.g. napalm, fuel-air explosives, white phosphorus) have contaminated soils in the vicinity of bombing targets (Air Force 1996c). In addition, soil contamination has been identified on the NAFR from operations and maintenance spills (primarily fuels, oils, etc.). See section 3.4, Hazardous Materials and Solid Waste Management, for additional information on soil contamination.

3.5.3 Mineral Resources

REGULATORY COMPLIANCE

The creation of NAFR in the 1940s withdrew large amounts of public land from mining. In accordance with the Engle Act of 1958 (43 CFR, USC 155 et seq.), all mineral exploration within land withdrawal areas must be compatible with military uses and completed under the jurisdiction of the Secretary of the Interior. In 1986, Air Force requirements to test advanced weapons and tactics eventually necessitated increased security for NAFR. Therefore, the Secretary of the Air Force was given authority for exclusive military use by enactment of PL 99-606 and the MLWA of 1986. In accordance with PL 99-606 as amended, the Secretary of the Interior must determine, at least every five years, whether it is suitable to open any of the withdrawn lands for mineral resource entry. As part of the renewal process, an environmental impact statement (EIS) must be completed, which includes a mineral resource analysis prepared by a qualified geologist.

REGIONAL MINERAL RESOURCES

Mining has occurred on NAFR since the 1860s. Most of the known gold and silver deposits were discovered in the early 1900s. Although mining decreased substantially after these initial discoveries, it continued sporadically until 1942 when NAFR was closed to mining. Most mining occurred in the northern part of NAFR, with most production in the Groom district (Air Force 1996b). Production from mining districts at NAFR is summarized in Table 3.5-1 and districts are outlined in Figure 3.5-7. Because more ore was almost certainly produced in some districts than was recorded, the numbers in Table 3.5-1 represent minimum production estimates (NBMG 1997).

With the exception of the Groom Mountain Range, little or no mineral exploration or related activity has been allowed in the last 50 years. The Groom Mountain area contains 1 unpatented mining claim, 16 patented mining claims, and all or portions of two oil and gas leases. Each of these claims and leases will continue to be recognized by the DOI until relinquishment, expiration, or purchase by the Air Force (Air Force 1996b; DOI 1989). Minerals discovered at NAFR include gold, silver, copper, lead, zinc, mercury, tungsten, and turquoise. In addition, commercial-grade sand, gravel, and limestone occur at NAFR. Potentially valuable deposits of sodium, potassium, alunite, and potash also occur in this area. Significant quantities of gypsum and limestone are produced from areas adjacent to NAFR (Air Force 1996b; DOI 1989).

SITE-SPECIFIC MINERAL RESOURCES

All or part of 25 mining districts and areas are located within NAFR. In addition, 13 smaller areas of prospecting activity have been identified. Mineral production has occurred in most of the larger areas. The smaller areas may consist of only a few concentrated prospects (NBMG 1997). A mineral inventory (NBMG 1997) summarizes the geology and mineralization at each of the primary mining districts and areas at NAFR. Locations of these districts and areas are shown on Figure 3.5-7.

ASSESSMENT OF MINERAL AND ENERGY RESOURCE POTENTIAL

The following assessment of mineral and energy resource potential on NAFR is based on the NBMG (1997).

METALLIC MINERALS

Regional geochemical data were used to define areas of mineral resource potential for precious and base metals (Figures 3.5-8 through 3.5-11). On a district level, rock sampling and field examination data were used to define specific areas of metallic resource potential (Figures 3.5-12 and 3.5-13, Tables 3.5-2 and 3.5-3).

Gold and Silver. Areas of gold and silver potential (Figure 3.5-8) are generally concentrated in the northern part of NAFR. Large areas of high resource potential were defined in the

Table 3.5-1. Total Production by District, NAFR

District	*Ore (tons)*	*Gold (oz.)*	*Silver (oz.)*	*Copper (lbs.)*	*Lead (lbs.)*	*Zinc (lbs.)*	*Years Produced*
Antelope Spring	328	157	54,024	275	454		1912-1917, 1926, 1939
Cactus Springs	200	15	3,147				1909-1910, 1915-1916, 1920, 1927, 1940-1941
Clarkdale	316	160	398				1932-1933, 1936-1938, 1940
Gold Crater	188	82	2,722		4,500		1913, 1916, 1939, 1949, 1953
Gold Reed	335	217	475				1910-1912, 1921, 1927, 1941
Groom	34,484	45	145,279	72,421	10,425,430	39,100	1915-1918, 1922-1931, 1933-1938, 1942-1956
Jamestown	1	4					1908
Mellan	20	3	2				1936
Oak Springs	26	10	667	3,832			1917, 1951
Papoose	458	1	3,029	400	301,673		
Rainstorm	39	5	918	128	42,741		1933, 1951
Silverbow*	3,524	1,346	95,976				1906-1914, 1920-1923, 1929-1936, 1940-1947, 1955
Southeastern	31		352	1,400	2,700		1940, 1947
Stonewall*	38	16	1,165				1910, 1915-1916
Tolicha	991	1,345	2,409				1923, 1929-1936, 1940
Trappmans	1	1	130				1908
Wilsons	15		527	105	993		1933
TOTAL	40,995	3,407	311,220	78,561	10,778,491	39,100	

Notes: * Some production for Silverbow and Stonewall districts may have come from mines outside NAFR. Production for all other districts came entirely from mines within NAFR.

Source: NBMG 1997.

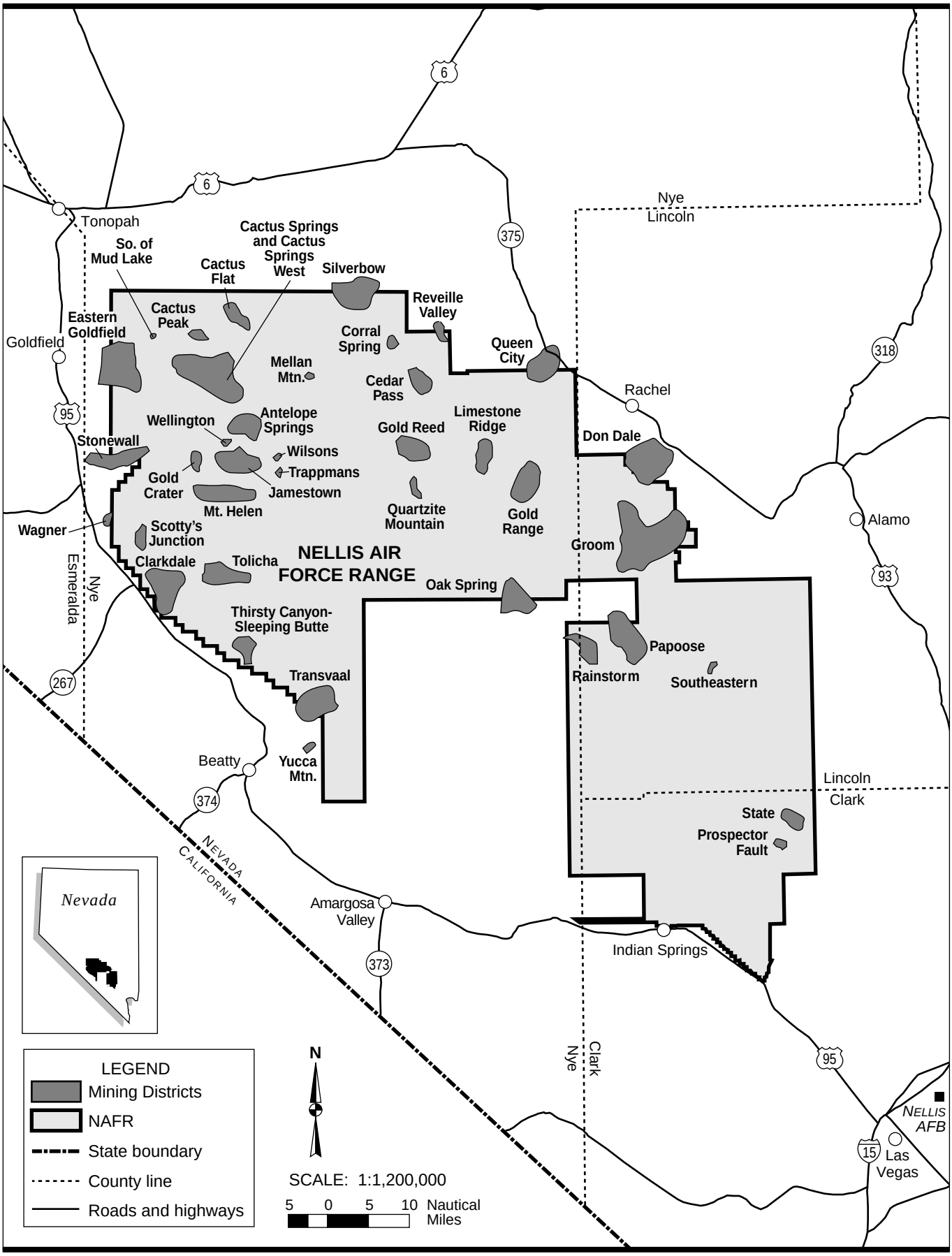


Figure 3.5-7. Mining Districts and Areas within the Nellis Air Force Range

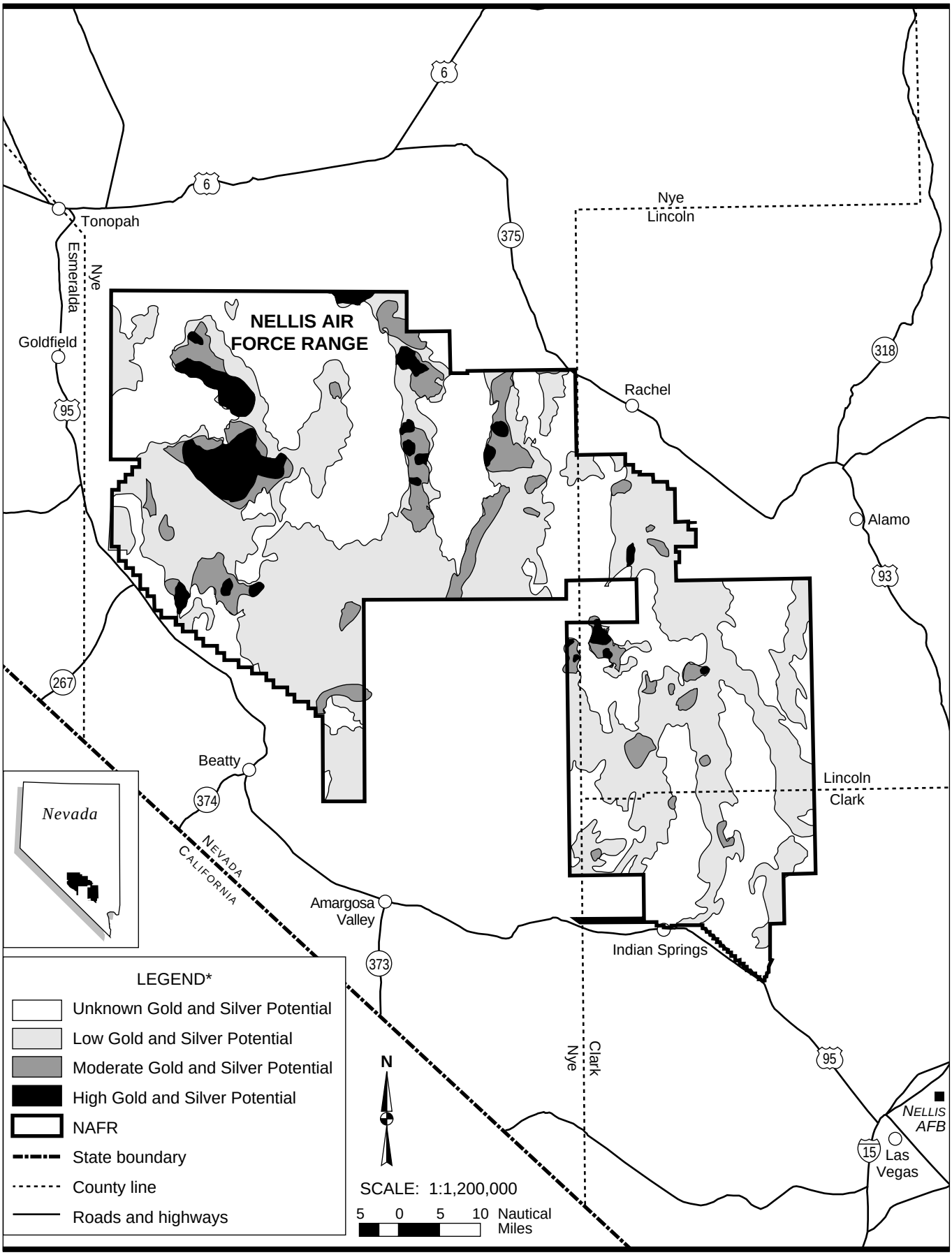


Figure 3.5-8. Areas of Gold and Silver Potential (*as defined by stream sediment samples)

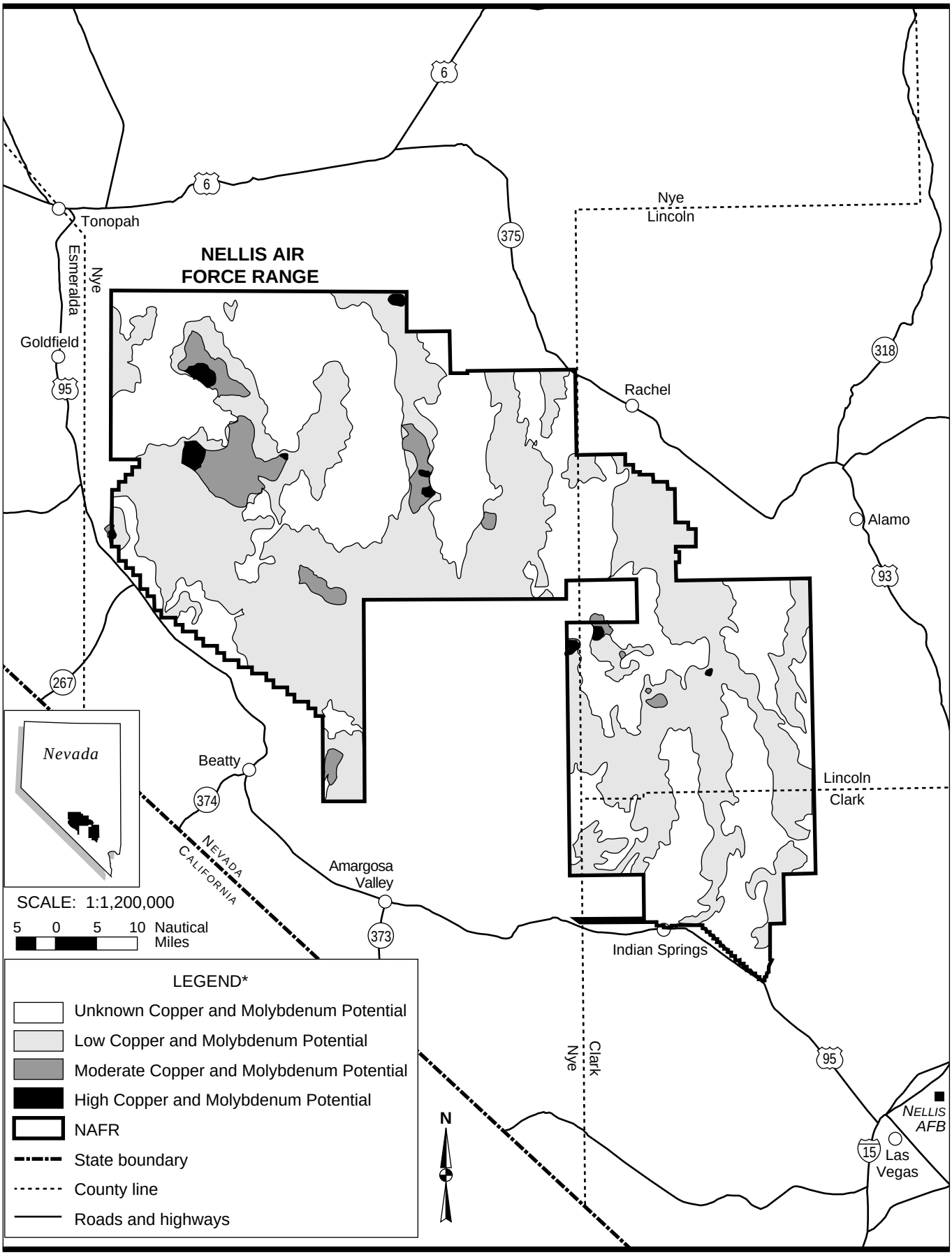


Figure 3.5-9. Areas of Copper and Molybdenum Potential (*as defined by stream sediment samples)

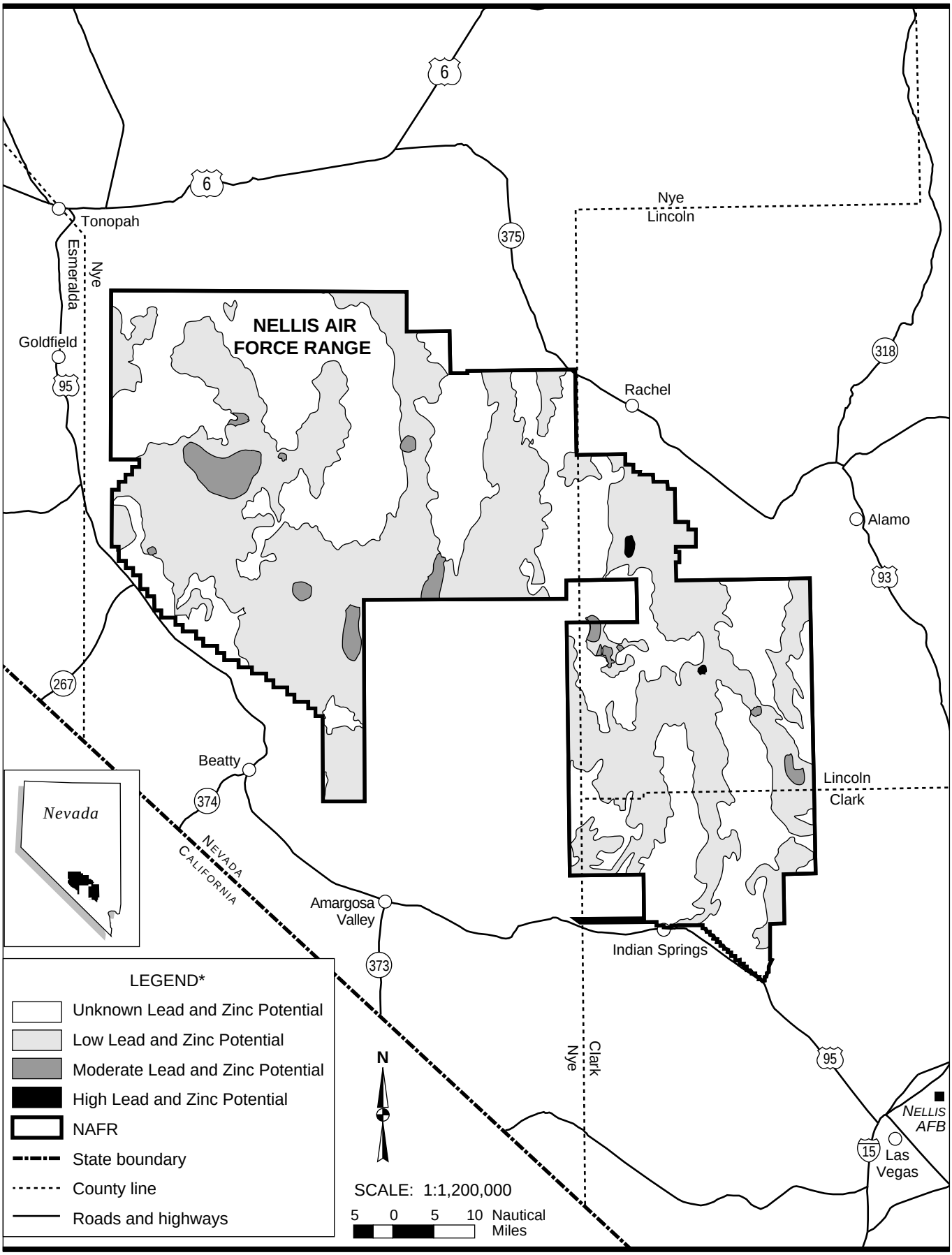


Figure 3.5-10. Areas of Lead and Zinc Potential (*as defined by stream sediment samples)

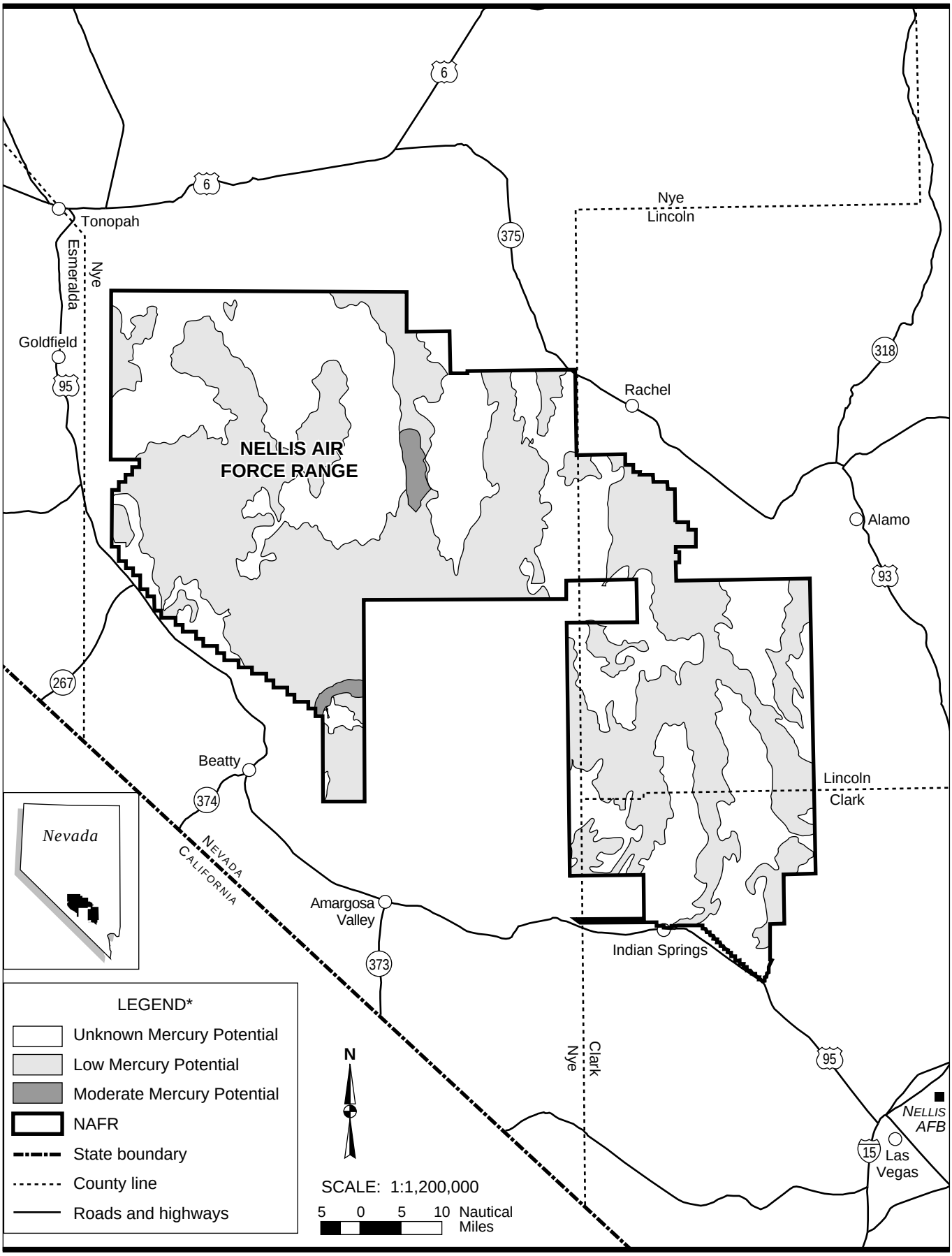


Figure 3.5-11. Areas of Mercury Potential (*as defined by stream sediment samples)

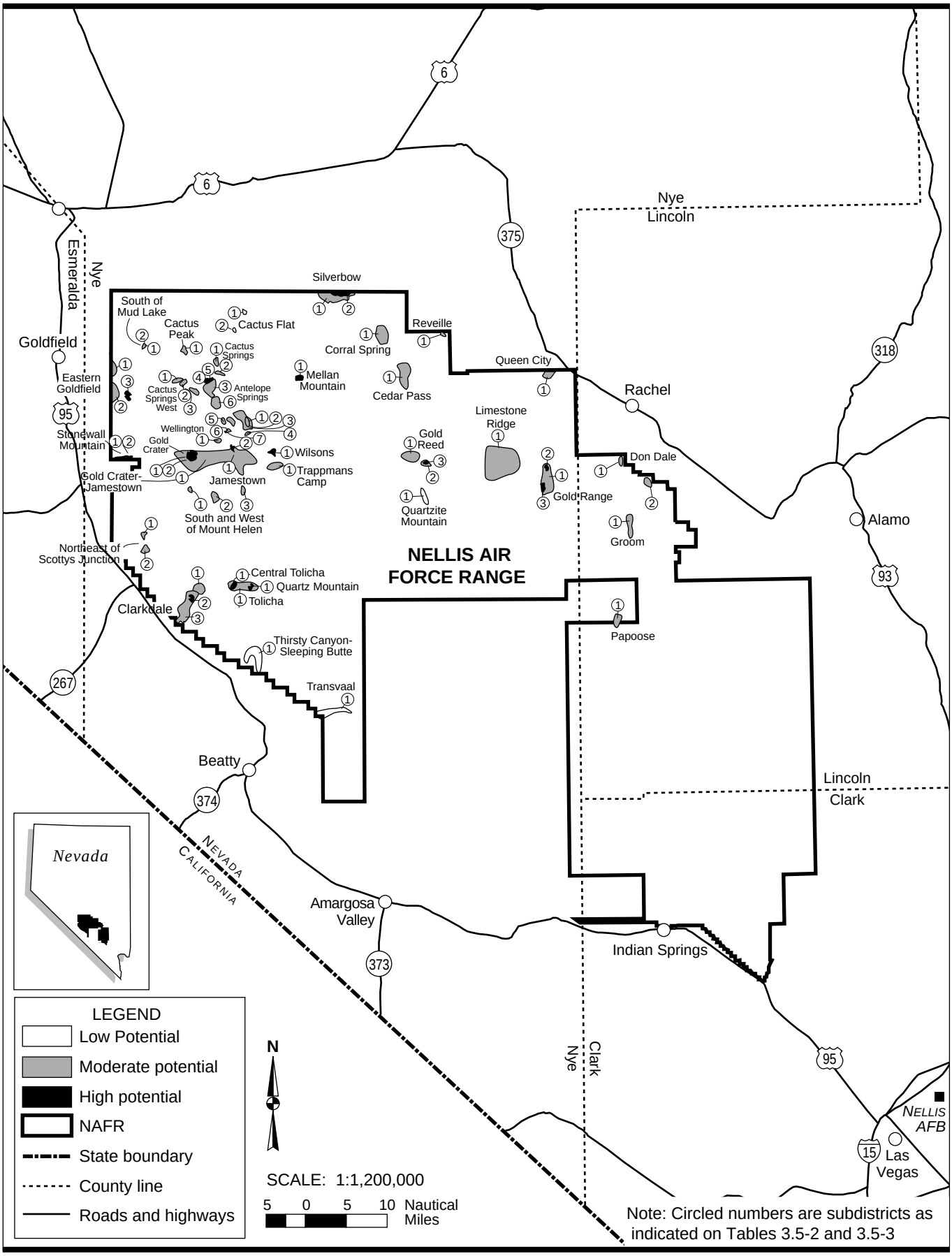


Figure 3.5-12. Precious Metals Potential, Nellis Air Force Range

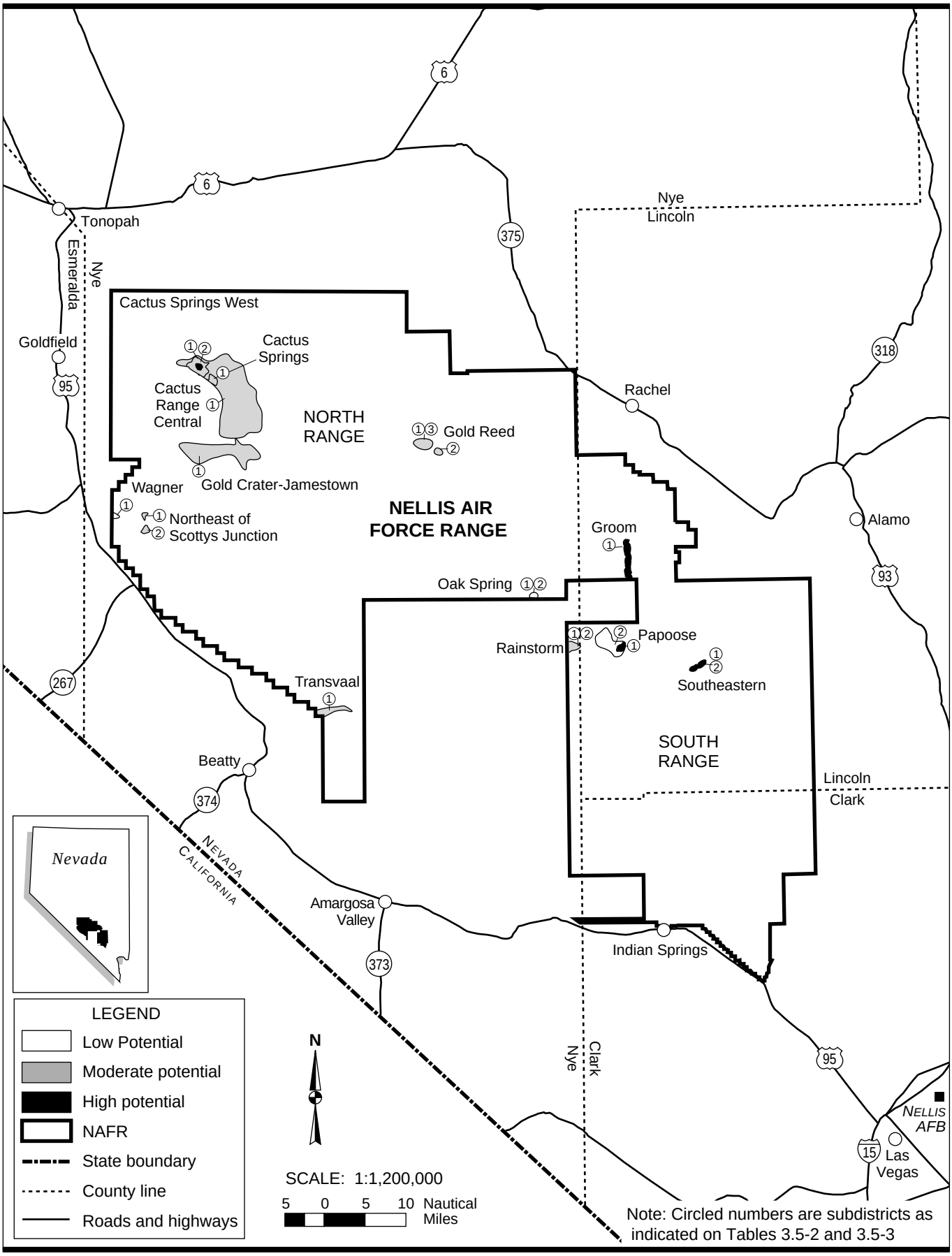


Figure 3.5-13. Base Metals Potential, Nellis Air Force Range

Table 3.5-2. Areas of Resource Potential, Precious Metals (page 1 of 3)

District	*District/ Area**	*Mineral Resource*	*Resource Potential*	*Comments*
Antelope Springs	1	Silver, Gold dissem	Low	Defined by alteration, rock chemistry
	2	Silver, Gold vein	Moderate	Defined by mine and surface sampling
	3	Silver, Gold	Moderate	Defined by mines, prospects, alteration
	4	Silver, Gold	Moderate	Defined by mines, prospects, alteration
	5	Silver, Gold	Moderate	Defined by mines, prospects, alteration
	6	Silver, Gold	Moderate	Defined by mines, prospects, alteration
	7	Silver, Gold	Moderate	Defined by mines, prospects, alteration
Cactus Flat	1	Silver, Gold	Low	Defined by prospects, alteration, rock chemistry
	2	Silver, Gold	Low	Defined by prospects, alteration, rock chemistry
Cactus Peak	1	Gold, Silver	Moderate	Defined by color anomaly, rock alteration
Cactus Springs	1	Gold, Silver	Moderate	Defined by color anomaly, rock alteration
	2	Gold, Silver	Moderate	Defined by color anomaly, rock alteration
	3	Silver, Gold	Moderate	Defined by mines, prospects, alteration, rock chemistry
	4	Silver, Gold veins	High	Defined by mines, prospects, alteration, rock chemistry
	5	Silver, Gold	Moderate	Defined by mines, prospects, alteration, rock chemistry
	6	Silver, Gold	Moderate	Defined by prospects, alteration, rock chemistry
Cactus Springs West	1	Gold, Silver	Moderate	Defined by rock alteration, rock chemistry
	2	Gold, Silver	Moderate	Defined by mines, prospects, alteration, rock chemistry
	3	Gold, Silver	Moderate	Defined by mines, prospects, alteration, rock chemistry
Cedar Pass	1	Silver, Gold	Moderate	Defined by prospects, color anomaly, alteration, rock chemistry
Central Tolicha	1	Gold, Silver	High	Defined by mines, prospects, alteration, rock chemistry
Clarkdale	1	Gold, Silver	Moderate	Defined by alteration, rock chemistry
	2	Gold, Silver	High	Defined by mines, prospects, alteration, rock chemistry

Table 3.5-2. Areas of Resource Potential, Precious Metals (page 2 of 3)

District	*District/ Area**	*Mineral Resource*	*Resource Potential*	*Comments*
Clarkdale (cont)	3	Gold, Silver	Moderate	Defined by mines, prospects, alteration, rock chemistry
Corral Spring	1	Gold, Silver	Moderate	Defined by prospects, alteration, rock chemistry
Don Dale	1	Silver, Gold	Moderate	Defined by prospects, rock chemistry
	2	Gold	Moderate	Defined by stratigraphy, rock chemistry
Eastern Goldfield	1	Gold, Silver	Moderate	Defined by mines, prospects, alteration, rock chemistry
	2	Gold, Silver	Moderate	Defined by mines, prospects, alteration, rock chemistry
	3	Gold, Silver	High	Defined by mines, prospects, alteration, rock chemistry
Gold Crater	1	Gold, Silver	High	Defined by alteration, rock alteration
	2	Gold, Silver	High	Defined by mines, prospects, alteration, rock chemistry
Gold Crater-Jamestown	1	Gold, Silver	Moderate	Defined by color anomaly, alteration
Gold Reed	1	Gold, Silver	Moderate	Defined by prospects, color anomaly, alteration, rock chemistry
	2	Gold, Silver	Moderate	Defined by prospects, color anomaly, alteration, rock chemistry
	3	Gold, Silver	High	Defined by prospects, color anomaly, alteration, rock chemistry
Gold Range	1	Gold, Silver	Moderate	Defined by prospects, alteration, rock chemistry
	2	Gold, Silver	Moderate	Defined by prospects, alteration, rock chemistry
	3	Gold, Silver	Moderate	Defined by prospects, alteration, rock chemistry
Groom	1	Silver, Gold	Moderate	Defined by mines, prospects, structure, rock chemistry
Jamestown	1	Gold, Silver	High	Defined by mines, prospects, alteration, rock chemistry
	2	Gold, Silver	High	Defined by mines, prospects, alteration, rock chemistry
Limestone Ridge	1	Gold	Moderate	Defined by stratigraphy, alteration, rock chemistry
Mellan Mountain	1	Gold, Silver	High	Defined by mines, prospects, rock alteration, rock chemistry
Northeast of Scotty's Junction	1	Gold, Silver	Moderate	Defined by prospects, color anomaly, rock chemistry

Table 3.5-2. Areas of Resource Potential, Precious Metals (page 3 of 3)

District	*District/ Area**	*Mineral Resource*	*Resource Potential*	*Comments*
Northeast of Scotty's Junction (cont.)	2	Gold, Silver	Moderate	Defined by prospects, color anomaly, rock chemistry
Papoose	1	Gold	Moderate	Defined by prospects, stratigraphy, alteration, rock chemistry
Quartz Mountain	1	Gold, Silver	High	Defined by mines, prospects, alteration, rock chemistry
Quartzite Mountain	1	Silver, Gold	Low	Defined by prospects, alteration, rock chemistry
Queen City	1	Silver, Gold	Low	Defined by color anomaly, alteration, rock chemistry
Reveille Valley	1	Gold, Silver	Moderate	Defined by color anomaly, alteration
South and West of Mount Helen	1	Gold, Silver	Moderate	Defined by color anomaly, alteration, rock chemistry
	2	Gold, Silver	Moderate	Defined by color anomaly, alteration, rock chemistry
	3	Gold, Silver	Moderate	Defined by color anomaly, alteration, rock chemistry
Silverbow	1	Silver, Gold	Moderate	Defined by mines, prospects, alteration, rock chemistry
	2	Silver, Gold	High	Defined by structure, alteration, rock chemistry
South of Mud Lake	1	Silver	Low	Defined by mines, prospects, alteration, rock chemistry
	2	Silver	Moderate	Defined by mines, prospects, alteration, rock chemistry
Stonewall Mountain	1	Silver, Gold	High	Defined by prospects, alteration, rock chemistry
	2	Silver, Gold	Moderate	Defined by geology, mines, prospects
Thirsty Canyon	1	Gold, Silver	Low	Defined by alteration, rock chemistry
Tolicha	1	Gold, Silver	Moderate	Defined by color anomaly, alteration, rock chemistry
Transvaal	1	Gold, Silver	Low	Defined by alteration, rock chemistry
Trappman's Camp	1	Silver, Gold	Moderate	Defined by mines, prospects, alteration
Wellington	1	Gold, Silver	Moderate	Defined by prospects, alteration, rock chemistry
Wilsons	1	Gold, Silver	High	Defined by rock structure, color anomaly, alteration, rock chemistry

Note: * Refer to Figures 3.5-12 and 3.5-13 for district and area locations.
Source: NBMG 1997.

Table 3.5-3. Areas of Resource Potential, Base Metals

District	*District/ Area**	*Mineral Resource*	*Resource Potential*	*Comments*
Cactus Range, Central	1	Cu, Mo, Au	Moderate	Multiple porphyritic intrusions; propylitic, argillic, acid-sulfate alteration
Cactus Springs	1	Zn, Pb, Ag	Moderate	Defined by stratigraphy, alteration, rock chemistry
Cactus Springs West	1	Cu, Mo	Moderate	Defined by mines, prospects, rock chemistry
	2	turquoise	High	Defined by mines, prospects, rock chemistry
Cedar Pass	1	Mo	Moderate	Defined by prospects, color anomaly, alteration, rock chemistry
Gold Crater-Jamestown	1	Cu, Mo	Moderate	Defined by alteration, mineral zoning
Gold Reed	1	Cu	Moderate	Defined by prospects, color anomaly, alteration, rock chemistry
	2	Cu	Moderate	Defined by prospects, color anomaly, alteration, rock chemistry
	3	Hg	Low	Defined by prospects, color anomaly, alteration, rock chemistry
Groom	1	Pb, Ag, Zn	High	Defined by mines, prospects, structure, rock chemistry
Northeast of Scotty's Junction	1	Cu, Mo	Moderate	Defined by alteration, rock chemistry
	2	Cu, Mo	Moderate	Defined by alteration, rock chemistry
Oak Spring	1	W	Moderate	Defined by stratigraphy, rock chemistry
	2	Pb, Ag	Moderate	Defined by prospects, rock chemistry
Papoose	1	Pb, Ag	High	Defined by mines, prospects, rock chemistry
	2	Pb, Ag	Low	Defined by mines, prospects, rock chemistry
Prospector Fault	1	Cu, Pb, Ag, Zn	Moderate	Defined by prospects, rock structure, rock chemistry
Rainstorm	1	Pb, Ag (replacement)	Moderate	Defined by mines, prospects, stratigraphy, rock chemistry
	2	Pb, Ag (vein)	Moderate	Defined by mines, prospects, stratigraphy, rock chemistry
Southeastern	1	Pb, Cu, Ag (replacement)	High	Defined by mines, prospects, stratigraphy, rock chemistry
	2	Pb, Cu, Ag (vein)	High	Defined by mines, prospects, stratigraphy, rock chemistry
Transvaal	1	Hg	Moderate	Defined by prospects, alteration, rock chemistry
Wagner	1	Cu	Low	Defined by geologic relationships.

Note: *Refer to Figures 3.5-12 and 3.5-13 for district and area locations.

Source: NBMG 1997.

following areas: (1) Cactus Range, southeast of the Cactus Springs district, (2) in the Mount Helen area, (3) near Cedar Pass and north and south of the Gold Reed district in the Kawich Range, and (4) north of Limestone Ridge in the Belted Range (Figure 3.5-2). With the exception of the Slate district, and possibly the Prospector Fault area in the southern part of NAFR, gold and silver have been sought in every mining district within NAFR.

Copper and Molybdenum. The three largest areas of potential copper and molybdenum deposits include (1) the west slope of the northern Cactus Range, (2) the area extending from Gold Crater through Mount Helen to the Trappman Hills, and (3) the area surrounding Gold Reed in the southern Kawich Range (Figures 3.5-2 and 3.5-9). Mineral resource potential exists for three types of copper deposits within NAFR. In the Cactus Springs West district, rock alteration and surface trace element associations indicate potential porphyry-type copper-molybdenum mineralization. Disseminated copper mineralization could be present in high-sulfidation epithermal systems such as those present at the Jamestown and Gold Crater districts and portions of the Cactus Springs West district. In addition, polymetallic replacement deposits of copper may be present in the Wagner, Southeastern, Groom, Papoose, and Rainstorm districts.

Lead and Zinc. Only two areas of high potential for lead and zinc are present at NAFR: (1) the central portion of the Groom district, which is the largest known lead-producing district within NAFR, and (2) the Southeastern Mine in the northern Pintwater Range (Figures 3.5-2 and 3.5-10). The potential for lead and zinc production in the Gold Crater-Jamestown-Mount Helen area is moderate. Seven districts within NAFR produced lead; however, only one district produced zinc. The Groom district has produced both lead and zinc. The Papoose district, the second largest district on NAFR, has produced only lead. The potential exists for development of polymetallic vein or polymetallic replacement deposits of lead and/or zinc in the Groom, Papoose, Rainstorm, and Southeastern districts.

Mercury. The Gold Reed district in the southern Kawich Range and the Transvaal Hills south of Pahute Mesa (Figure 3.5-2) are the only known areas with mercury potential in the NAFR (Figure 3.5-11). Both of these areas coincide with areas of known mercury prospects. No large mercury-producing districts are present in the vicinity of the NAFR. The Bristol group of claims in the Gold Reed district were evaluated for mercury in the early 1930s, and a small area of shallow hot-spring alteration and possible mercury mineralization is present in the eastern part of the Transvaal district.

NONMETALLIC (INDUSTRIAL) MINERALS

Assessments of nonmetallic minerals at NAFR are based on limited information from the few nonmetallic mineral occurrences, illustrated on Figure 3.5-14, combined with regional knowledge of favorable geologic settings. Areas of nonmetallic mineral resource potential are listed in Table 3.5-4 and shown on Figures 3.5-15 through 3.5-21. Following are descriptions of specific nonmetallic minerals in the vicinity of NAFR.

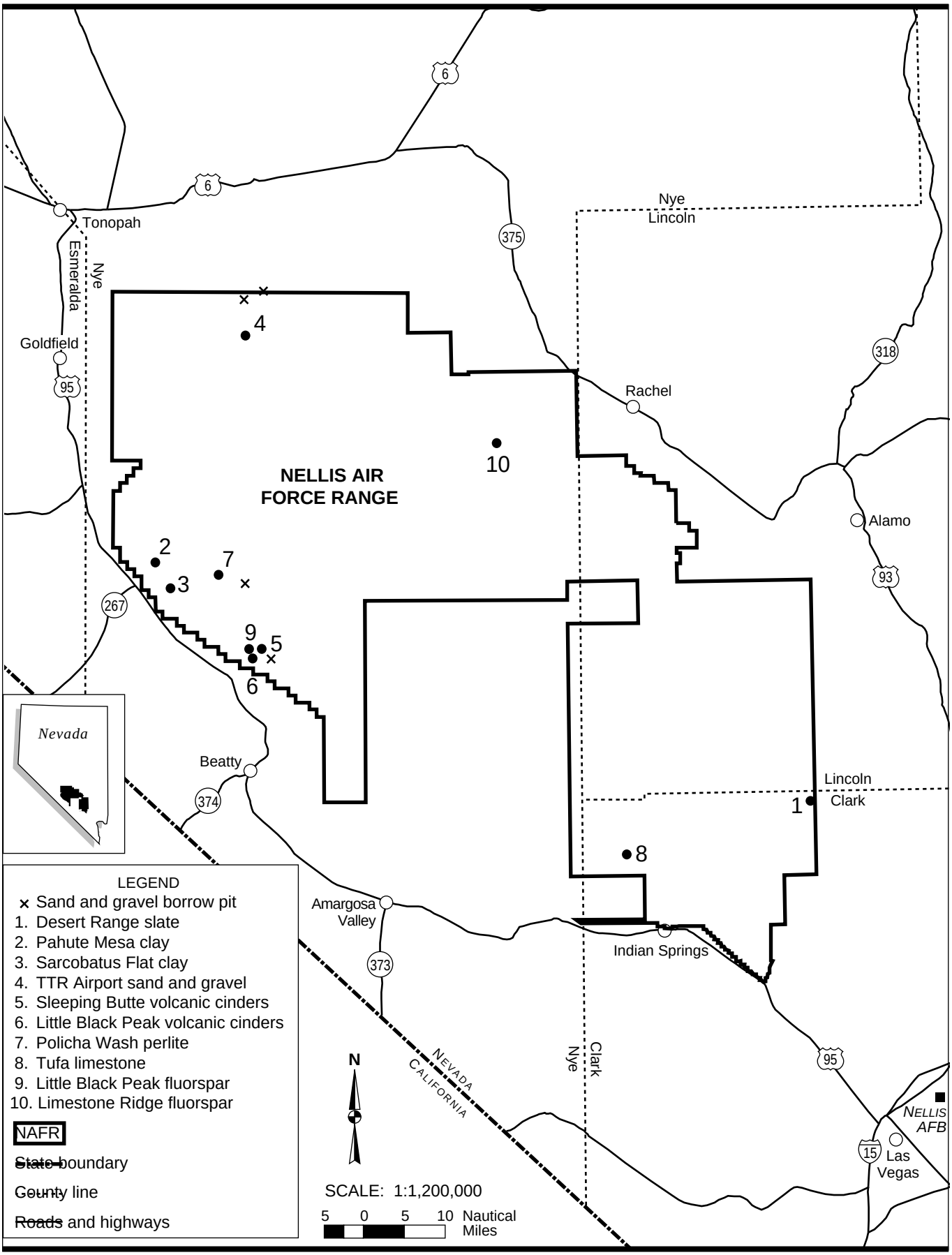


Figure 3.5-14. Industrial Mineral Deposits on the Nellis Air Force Range; Nye, Lincoln, and Clark Counties, Nevada

Table 3.5-4. Areas of Resource Potential, Industrial (Nonmetallic) Minerals

Mineral Resources	*Area*	*Resource Potential*	*Comments*
Barite	NAFR	Low	None
Borate minerals	NAFR	Low	None
Building stone	NAFR	Moderate	Includes slate
Clay	NAFR	Moderate	Tertiary rocks
Clay	Southern NAFR	Low	Pre-Tertiary rocks
Construction aggregate	NAFR	Low	None
Dolomite	NAFR	Low	None
Fluorspar	NAFR	Low	None
Gypsum	NAFR	Low	None
Limestone, high calcium	NAFR	Low	None
Limestone, cement	Southern NAFR	Moderate	Paleozoic exposures
Limestone, cement	Area of tufa limestone	High	None
Lithium	NAFR	Low	None
Perlite	NAFR	Low	None
Pumice / pumicite	NAFR	Low	None
Saline minerals, leasable	NAFR	Low	None
Volcanic cinders	NAFR	Moderate	Two cinder cones
Zeolites	Northern NAFR	High	None
Zeolites	Southern NAFR	Low	None

Source: NBMG 1997.

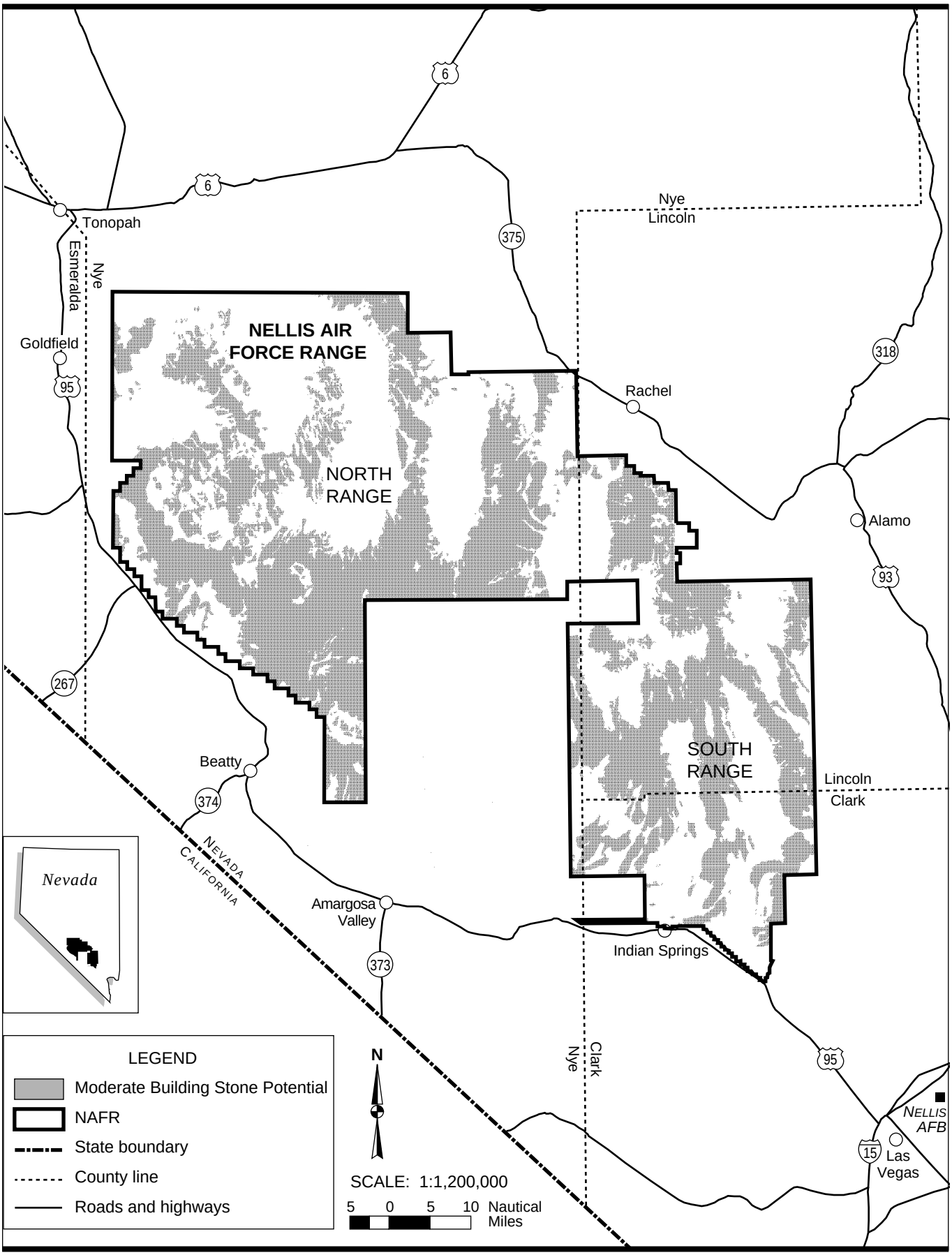


Figure 3.5-15. Areas of Building Stone Potential

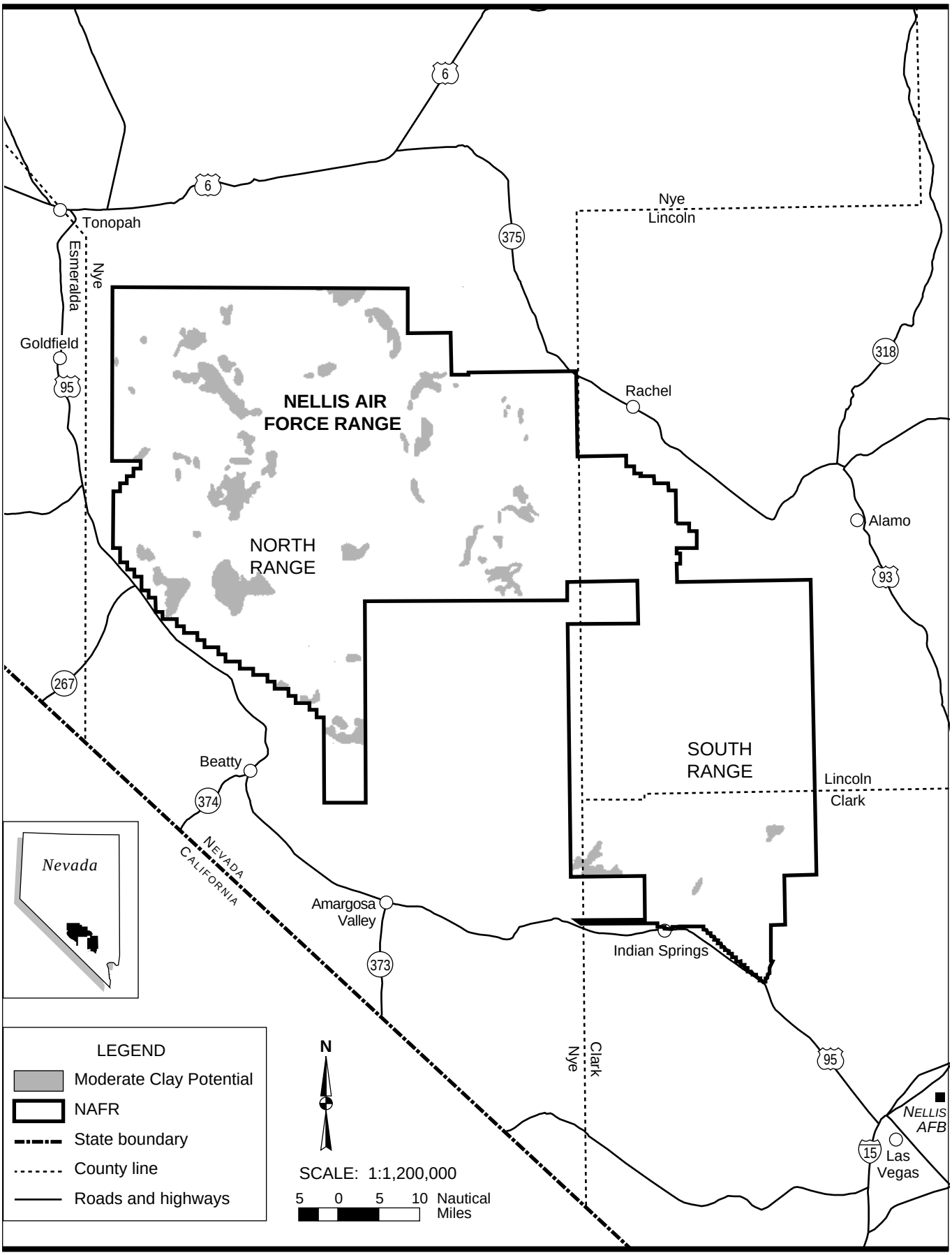


Figure 3.5-16. Areas of Clay Potential

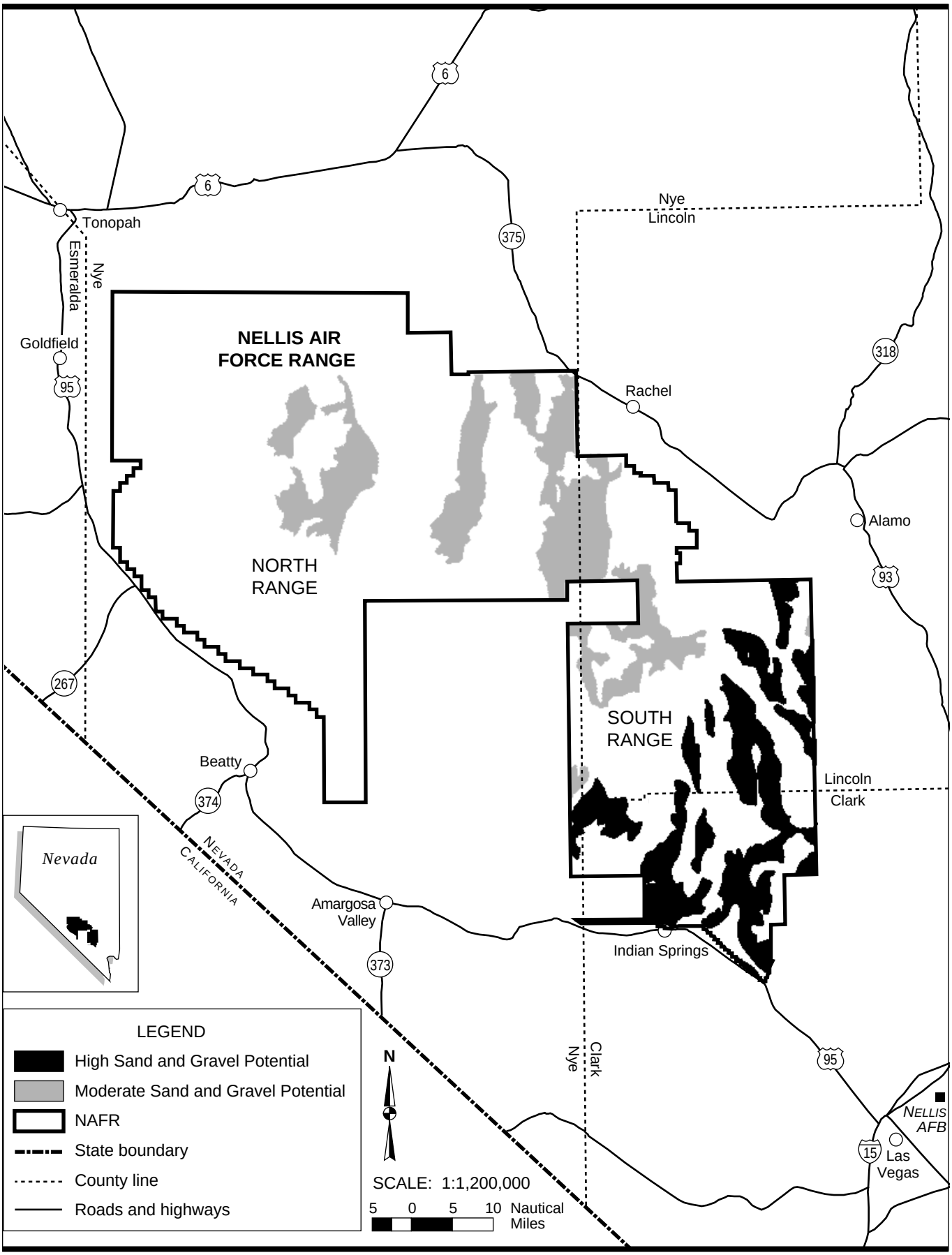


Figure 3.5-17. Areas of Sand and Gravel Potential

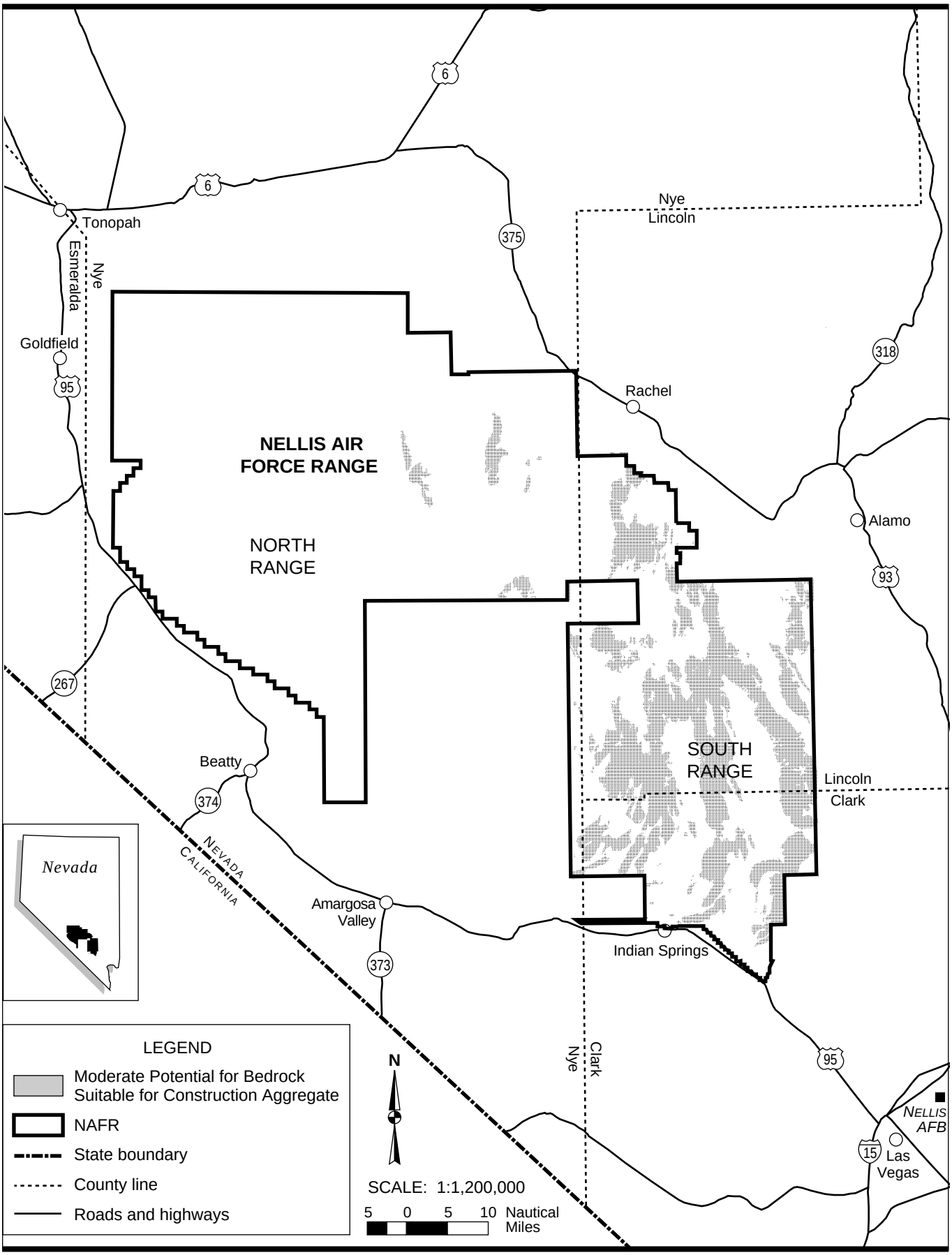


Figure 3.5-18. Potential Areas of Bedrock Suitable for Construction Aggregate

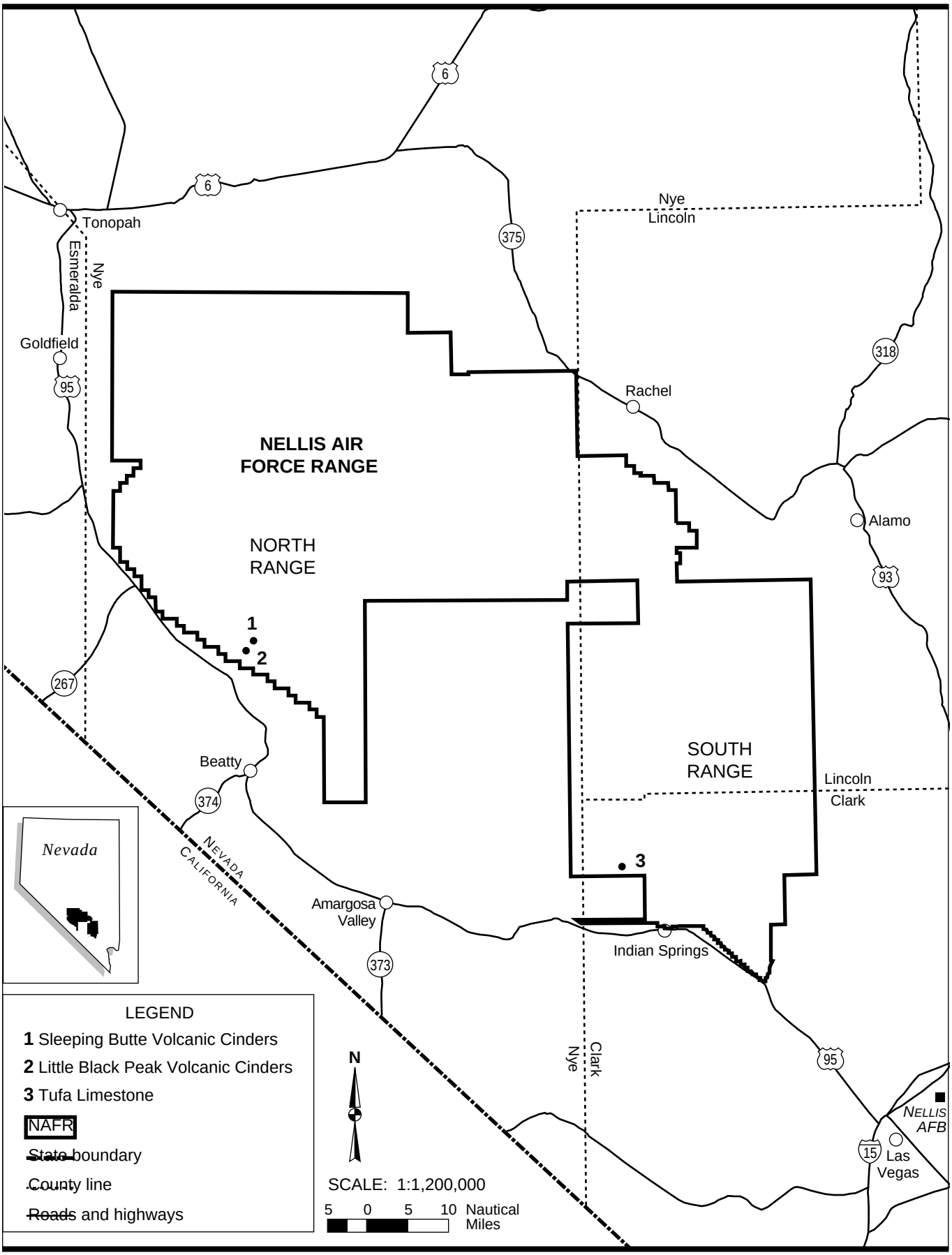


Figure 3.5-19. Areas with Moderate Potential for Volcanic Cinder and High Potential for Tufa Limestone

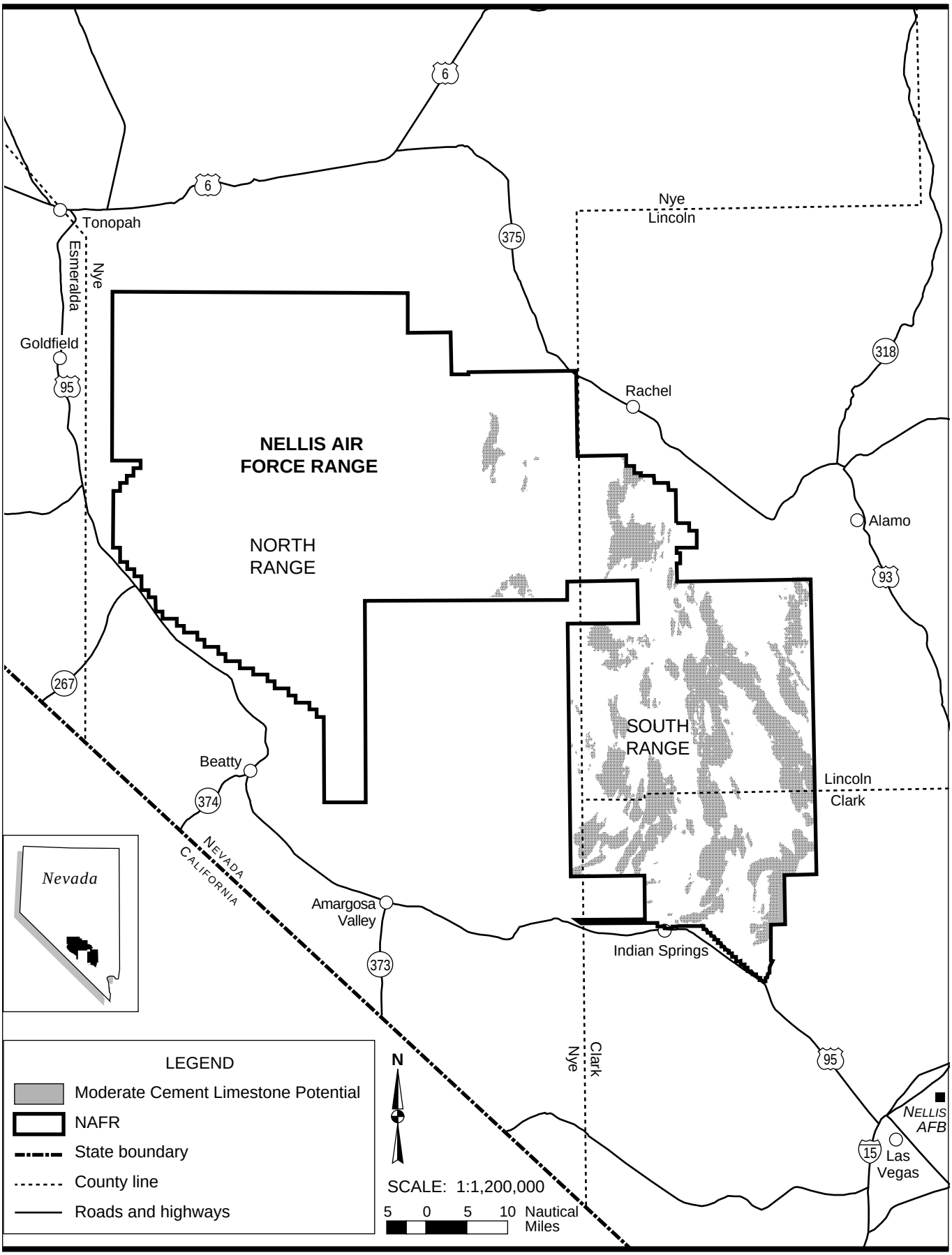


Figure 3.5-20. Areas of Cement Limestone Potential

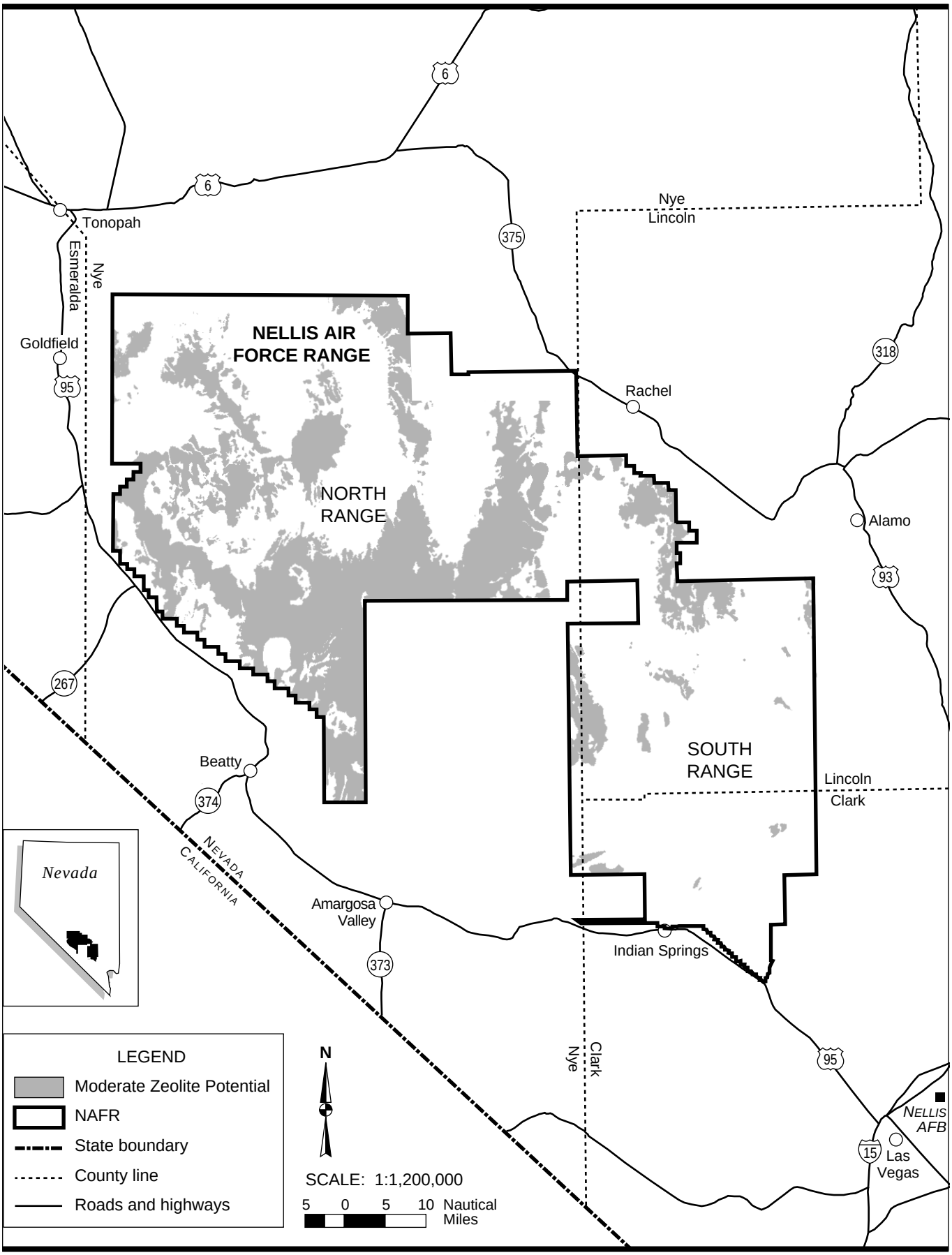


Figure 3.5-21. Areas of Zeolite Potential

Barite. Five deposits in the vicinity of NAFR have produced barite, including three deposits of bedded barite in Paleozoic rocks north of NAFR, and two veins of barite west of NAFR. No barite deposits are known within the boundaries of NAFR.

Borate Minerals. Bedded borate deposits occur in the Tertiary Horse Spring Formation in the Muddy Mountains, located approximately 43 miles southeast of NAFR. No borate deposits are known within the boundaries of NAFR.

Building Stone. Nevada Neanderthal Stone, a company located northeast of Beatty (Figure 3.5-2), is the only active building stone producer in the NAFR region. This company quarries and cuts 12 varieties of Miocene-age ash-flow tuff deposits from localities adjacent to NAFR to produce floor tiles, wall panels, and other stone products. These ash-flow tuffs are widespread within the southwestern part of NAFR and the potential for production exists in this area.

Slate quarries in the Desert Range (Figure 3.5-14) are the only known mining sites for building stone in the southern NAFR. Limited information is available regarding the mining history of these quarries, but "greenstone-flagstone" was reportedly produced from the Hancock Stone Quarry in this area in the 1920s. These deposits may have potential for use as structural slate in such products as floor tile or steps, or for use as decorative paving stone or flagstone. Other areas of building stone potential on NAFR are shown on Figure 3.5-15.

Clay. Two sites near NAFR currently mine clay. The IMV Division of Floridin Company, the largest producer of clay in Nevada, mines sepiolite, montmorillonite, saponite, and hectorite from deposits in the Ash Meadow area approximately 30 miles south of NAFR, and at the New Discovery Mine approximately 20 kilometers west of NAFR. Within NAFR, two areas of clay deposits occur along the west side of Pahute Mesa (Figure 3.5-14). Other deposits of clay minerals are probably present in northern NAFR because hydrothermally-altered volcanic rocks are common (Figure 3.5-16). However, no major sources of high-grade clay have been identified.

Construction Aggregate. Paleozoic rocks in southeastern NAFR contain high-quality sand and gravel and crushed stone (Figures 3.5-17 and 3.5-18). Areas of alluvium in southeastern NAFR, which include Cenozoic sedimentary detritus, have considerably lower potential because of deleterious amounts of gypsum. Large amounts of sand and gravel are also present in the valleys and alluvial fans in northern NAFR. This material consists of sound, durable welded and bedded tuff fragments; however, some inferior non-welded and bedded tuff fragments are probably also present in many areas. In addition, large areas of altered volcanic rock that contain deleterious materials such as clay minerals and reactive silica are known to be present in northern NAFR. Alluvium that contains such materials has low potential for construction aggregate.

Volcanic cinder, a relatively valuable type of construction aggregate that can be shipped long distances, occurs near the southwestern boundary of NAFR (Figure 3.5-19). The largest of these deposits forms an asymmetrical cinder cone on the north side of Sleeping Butte. Another deposit, Little Black Peak, is approximately one mile southwest of Sleeping Butte.

Fluorspar. Three prospects at NAFR contain fluorspar (fluorite). Purple to white fluorite occurs in veinlets in pieces of silicified welded ash-flow tuff from the dump next to a small prospect pit 1 kilometer north of Little Black Peak in southern NAFR (Figure 3.5-14). Clear to pale green fluorite cubes, up to 2 mm in diameter, form the matrix of breccia collected from the dump of the Zabriskie shaft in the Limestone Ridge area of northern NAFR (Figure 3.5-7). In addition, minor amounts of fluorite occur in a small prospect in the eastern Goldfield mining district of northern NAFR (Figure 3.5-7).

Gypsum. No rock with more than a few percent of gypsum has been discovered at NAFR.

Halite and Other Saline Minerals. No substantial deposits of evaporite minerals have been found in playas or in Tertiary sedimentary rocks at NAFR.

Limestone and Dolomite. Extensive exposures of Paleozoic limestone and dolomite, which are used as raw materials for lime and cement, are present at southern NAFR (Figure 3.5-20). In addition, Tertiary tufa in the Spotted Range (Figure 3.5-14) could meet specifications for cement limestone. Southern NAFR probably contains significant amounts of carbonate rock suitable for lime or cement production. These deposits are remote and their potential for economic development is low.

Lithium. No substantial concentrations of lithium were discovered in playas examined at NAFR. It is unlikely that a lithium-bearing brine meeting today's criteria for economic recovery is present at NAFR.

Perlite. A single occurrence of potentially economic perlite was found at NAFR 1 mile east of Obsidian Butte in Tolicha Wash (Figure 3.5-14). Perlite was found at several locations in an area 1 kilometer in diameter, but at each location the perlite was exposed in steep walls, rendering surface mining uneconomical because large amounts of overburden must first be removed.

Pumice and Pumicite. Pumice deposits have not been reported at NAFR; however, pumicite has been produced 4 miles northeast of Beatty (Figure 3.5-2). This deposit was mined at irregular intervals during the 1940s for aggregate in the manufacture of concrete blocks. No data are available on the size and reserves of the deposit. Large reserves of domestic pumice and pumicite are available for sale into a relatively stable, long-term market. Therefore, it is unlikely that new pumice or pumicite mines will be opened in the near future in the vicinity of NAFR.

Silica. Although the Eureka Quartzite is exposed in many areas of southern NAFR, samples indicate that the rock is generally unsuitable as a source of silica because of impurities in the rock. Quartzite samples from other units at NAFR generally have higher amounts of impurities than the Eureka Quartzite. Large amounts of silica-rich rock, which formed by nearly complete replacement of rhyolite by hydrothermal quartz, occur in the Cactus Springs West mining district (Figure 3.5-7). However, this rock carries too much alumina, probably as kaolinite and / or alunite, for commercial silica.

Zeolites. An active zeolite mine and other known zeolite resources are present in the region around NAFR, and similar deposits may be present at NAFR. Unmined zeolite resources in the region around NAFR include 200-foot-thick zeolitized ash-flow tuff in Beatty Wash that typically contains 75 percent clinoptilolite, and Tertiary ash-flow tuffs on Beatty Mountain that contain as much as 70 to 85 percent clinoptilolite and mordenite. These deposits are 6 miles west of NAFR.

Northern NAFR has a high potential for high-grade zeolite deposits of considerable size (Figure 3.5-21). Zeolite deposits of the type that may be present at NAFR have economic potential for uses that require only impure materials of relatively low unit value. Therefore, it is not likely that these deposits would be commercially attractive.

ENERGY RESOURCES

Uranium. No known uranium prospects are located at NAFR. However, most of the northern part of NAFR is covered by silicic volcanic rocks, predominantly ash-flow tuffs, which contain moderate to high amounts of uranium. Uranium released from these silicic volcanic rocks during erosion may be concentrated at some sites in the same volcanic sequences or in adjacent sedimentary basins. In addition, anomalous amounts of uranium have been detected in Tertiary playa-deposits, veins, and mineralized rock from many of the mining districts in NAFR. Nevertheless, the potential of uranium mineralization in economic concentrations is low at NAFR for both volcanic and nonvolcanic deposits (Table 3.5-5) (NBMG 1997).

Coal. There are no reports of coal at NAFR. The area closest to NAFR where coal has been reported is 21 kilometers north of the northeast corner of NAFR. The only unit that could possibly contain any coal material is the Chainman Shale, which is present on the eastern NAFR. However, the presence of coal in this shale or at any other locality at NAFR is unlikely (Table 3.5-5) (NBMG 1997).

Hydrocarbon Resources. Rock type and thermal maturity suggest that the northeastern part of NAFR has potential for oil and gas and the eastern and southeastern part of NAFR has the potential for gas (NBMG 1997) (Figure 3.5-22). However, thermal maturity levels are marginally acceptable, values for both total organic carbon and hydrogen index are generally continuous, and potential source rocks are scarce. In addition, previous exploration in Nevada indicates that adequate seals and traps for commercial oil/gas accumulations are rare or non-existent. Based on these findings, the potential for hydrocarbon resources in the region is considered to be low (Table 3.5-5) (DOE 1996a; NBMG 1997). Previous investigators have also concluded low potential for hydrocarbon resources in the region (Harris et al. 1980). No occurrences of oil and gas, coal, tar sand, or oil shale in the region have been reported.

3.5.4 Paleontological Resources

Fossils are present within many sedimentary rock formations at NAFR (Kleinhampl and Ziony 1985; Longwell et al. 1965; Tschanz and Pampeyan 1970; Cornwall 1972). These fossils are

Table 3.5-5. Areas of Resource Potential, Energy Minerals

Mineral Resource	*Area*	*Resource Potential*	*Comments*
Coal	NAFR	Low	No known occurrences; stratigraphy unfavorable
Geothermal, intermediate and high temperature	NAFR	Low	Resources possibly only at non-economic depths
Geothermal, low temperature	NAFR	Low	Shallow resources too low temperature and too remote
Oil and gas	NAFR	Low	Low source rock and preservation favorability
	NAFR	Low	Low preservation favorability, some source rock favorability
	NAFR	Moderate	Moderate source rock and preservation favorability
Uranium	Areas underlain by volcanic rocks and adjacent sedimentary basins	Low	Permissive environment, but economic concentrations unlikely
	Areas underlain by carbonate and clastic marine rocks and adjacent sedimentary basins	Low	No known occurrences; environment unfavorable

Source: NBMG 1997.

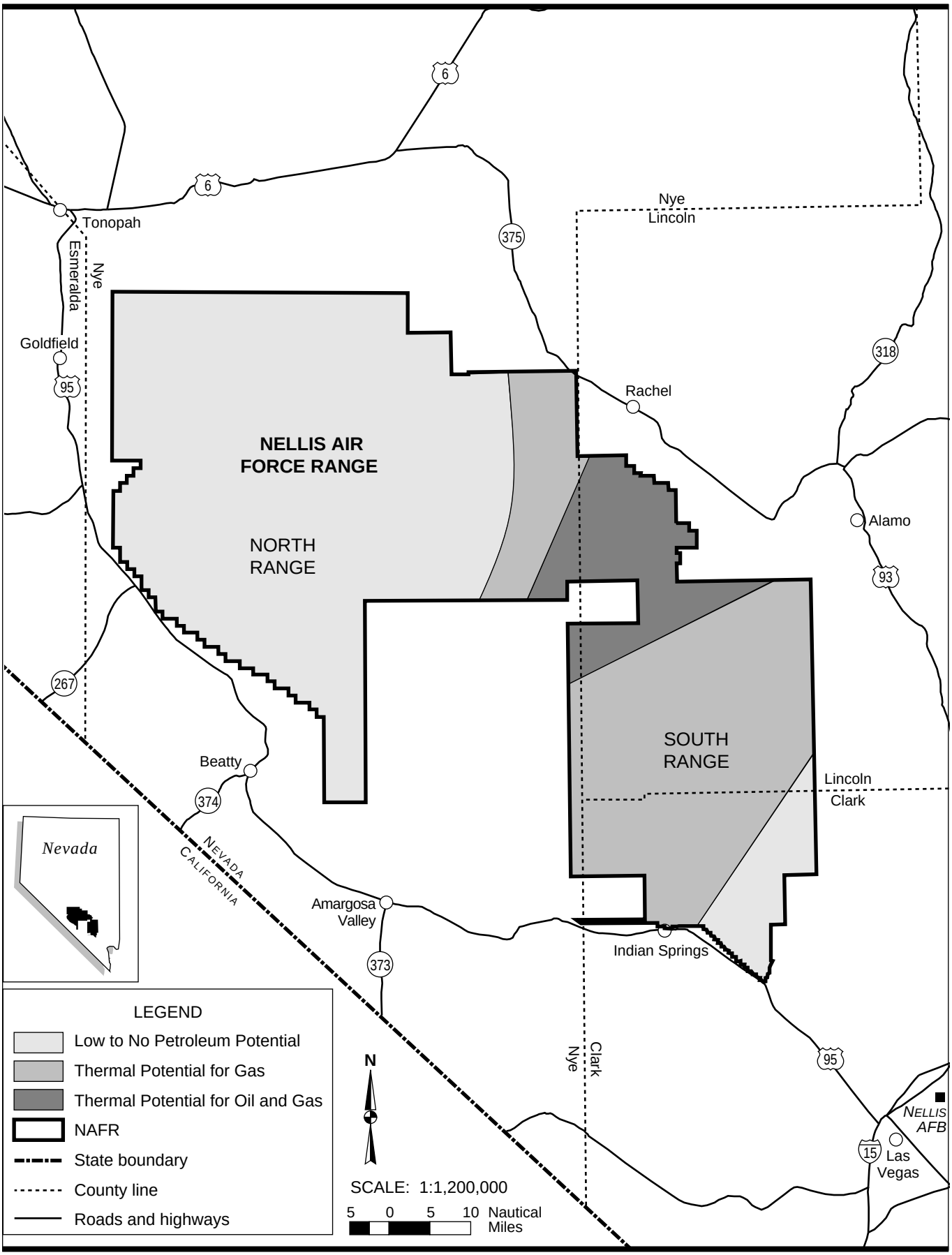


Figure 3.5-22. Petroleum Resource Potential for the Nellis Air Force Range

predominantly marine in origin; however, terrestrial plant and animal fossils also occur. Fossils are present in four general ages of sedimentary rocks, representing aquatic and terrestrial life from nearly 600 million years B.P. to the last 1.6 million years B.P. (BLM 1981).

Paleontological surveys have not been completed by the BLM at NAFR (personal communications, S. Rolf 1997; B. Reynolds 1997), but important fossil localities have been documented. Lower Paleozoic rocks (450 to 600 million years B.P.) are well exposed in the Belted Range in the northern part of NAFR (Figure 3.5-2) and contain fossils in a canyon west of Belted Peak. Other important fossils have been found in lower Paleozoic strata on the eastern side of the adjacent NTS. An important occurrence of fossils is also present in the hills northwest of the town of Mercury (BLM 1981).

Middle Paleozoic strata (300 to 440 million years B.P.) are not widely distributed in the area; however, fossil localities occur in the southern part of the adjacent NTS and in the hills between the NTS and Highway 95 (Figure 3.5-2). Upper Paleozoic (245 to 300 million years B.P.) rock outcrops are widespread at NAFR. These strata comprise the bulk of the Elena Range where fossils have been discovered (BLM 1981).

Pleistocene beds, representing the last 1 million years, outcrop along washes and alluvial fans. Although no fossils have been discovered in these materials, older gravels and sands offer possibilities of fossil occurrences because these sediments represent old terraces and stream channels where animals were probably common (BLM 1981).

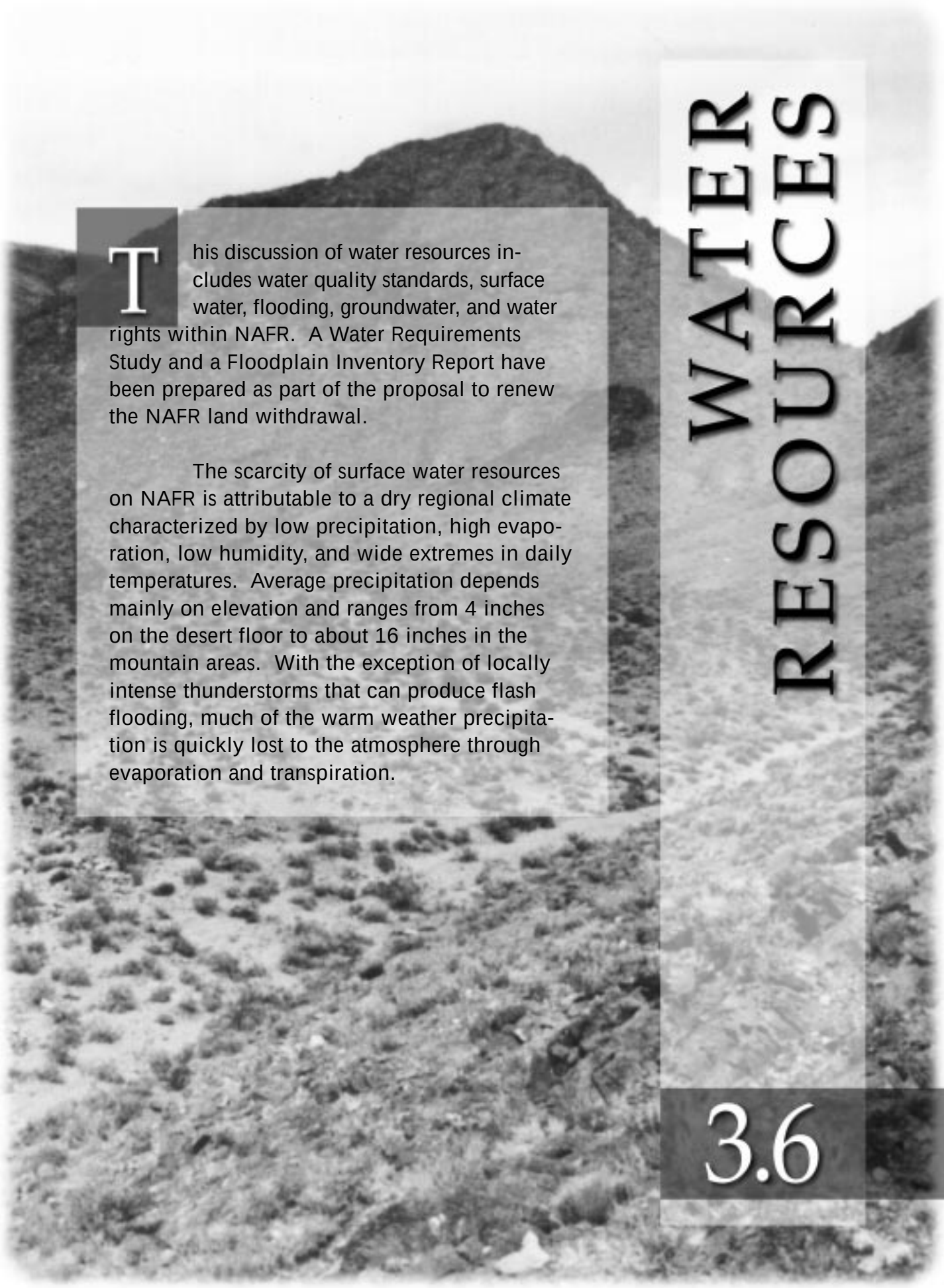
3.5.5 American Indian Issues Concerning Earth Resources

Earth resources, including the geology, soils and minerals of NAFR, are important to the tribal cultures represented in the CGTO. Areas of specific concern include:

- removal and exploitation of minerals that the CGTO perceives as theirs; and
- restricted access to traditional quarry sites and other mineral resources.

Geological formations are also part of American Indian cultural system, and are "significant for keeping the historic memory of American Indian people alive and for teaching children about their culture and history" (AIWS 1997). For this reason, the existing condition of earth resources on NAFR is of concern. The NARD states:

> Severe disturbance of the geology and soils on large portions of the NAFR has been caused by repeated military testing . . . . These impacts have made certain areas unfit for human use. These areas have become inaccessible to American Indians for religious purposes [AIWS 1997].



WATER RESOURCES

3.6

This discussion of water resources includes water quality standards, surface water, flooding, groundwater, and water rights within NAFR. A Water Requirements Study and a Floodplain Inventory Report have been prepared as part of the proposal to renew the NAFR land withdrawal.

The scarcity of surface water resources on NAFR is attributable to a dry regional climate characterized by low precipitation, high evaporation, low humidity, and wide extremes in daily temperatures. Average precipitation depends mainly on elevation and ranges from 4 inches on the desert floor to about 16 inches in the mountain areas. With the exception of locally intense thunderstorms that can produce flash flooding, much of the warm weather precipitation is quickly lost to the atmosphere through evaporation and transpiration.

Within the arid area of NAFR, the availability of moisture in excess of evaporation and transpiration is so limited that few perennial surface water features are present. With the exception of man-made ponds, the only perennial surface water comes from springs where the groundwater table intersects the surface. The springs flow for short stretches on the ground surface, which is underlain by bedrock. Pools at some large springs and poorly drained areas may exist around the edges of the valleys. Breen Creek is the only creek at NAFR considered to be perennial. Most surface water is only temporarily present as a result of ponding in low permeability playas and as ephemeral channel flow from infrequent precipitation and snow melt runoff. Playas are not major recharge zones due to low infiltration potential. Most surface water that reaches the playas is lost through evaporation.



NAFR incorporates all or portions of 21 different watershed areas. The watersheds flow to playas that are not major recharge zones due to the low infiltration potential. Most NAFR targets are located in or near playas.

3.6 WATER RESOURCES

This discussion for the water resources analysis includes water quality standards, surface water, flooding, groundwater, and water rights within NAFR, ROI Two. Water quality is also considered outside ROI Two wherever potential environmental consequences could occur. Special studies conducted in support of the proposed range withdrawal include a Water Requirements Study (Air Force 1998b), a Wetlands Survey Draft Report (Air Force 1996a), and a Floodplain Inventory Report (Air Force 1997a), from which much of the baseline information for this analysis has been derived.

3.6.1 Water Quality Standards

Criteria for water quality within the State of Nevada are contained in the Nevada Administrative Code (NAC), Chapter 445A.119, and apply to existing and designated beneficial uses of surface water bodies. Water quality standards are driven by the beneficial uses of specific water bodies. Beneficial uses include agriculture (irrigation and livestock watering), aquatic life, recreation (contact and non-contact), municipal or domestic supply, industrial supply, and wildlife propagation. There is a three tiered system of beneficial use designation of surface water resources within the NAC depending upon the size of the water body.

1. Major water bodies or rivers (including the Carson, Truckee, Walker, Colorado, and others) are specifically designated by name (in some cases by reach) and are assigned numeric standards (NAC Sections 445A.145 to 445A.225) or thresholds as well as anti-degradation criteria.

2. Smaller water bodies are classified (i.e., Class A, B, C, and D) as to the condition of the waters "as affected by discharges relating to the activities of man." Water quality standards are specified for each of the water classifications (NAC Sections 445A.124 to 445A.127).

3. Other surface waters are protected by generic standards that apply to all waters of the state (NAC Section 445A.121).

Due to the transient occurrence of surface water within the arid region of NAFR , there are no bodies of surface water present that are designated as to specific beneficial uses (i.e., categories 1 or 2 above). All surface water within the range are regulated and protected under the standards applicable to all waters of the state. However, the regulations allow for the classification of a body of public water not currently classified in the NAC if there is a permit request to discharge into that body of water. Additionally, beneficial uses of surface water on NAFR (e.g., livestock watering, domestic supply, etc.) would be subject to water quality criteria or standards specific to the use (e.g., drinking water standards for domestic supply). Sections of the NAC containing water quality standards and criteria that would apply to surface waters on NAFR are included in Appendix F.

Drinking water standards established by the USEPA under the Safe Drinking Water Act have been adopted by the State of Nevada. Drinking water quality for public supply systems is regulated by the Nevada Department of Health. Drinking water standards consist of maximum contaminant levels (MCLs) established for various water quality constituents. Primary MCLs are established to protect against adverse health effects and are enforceable on public drinking water supplies. Secondary MCLs are established for aesthetic reasons such as taste, color, or odor and are not enforceable on public drinking water supplies. Action levels are established for selected constituents that, if exceeded by a specified percentage of samples (based on the number of people served), require treatment of the water source prior to distribution to users of the supply system.

3.6.2 Surface Water

HYDROLOGY

The scarcity of surface water resources in ROI Two is attributable to a dry, regional climate that is characterized by low precipitation, high evaporation, low humidity, and wide extremes in daily temperatures. Average annual precipitation depends mainly on elevation and ranges from 4 inches on the desert floor to about 16 inches in the mountain areas. With the exception of locally intense thunderstorms that are intense enough at times to produce flash flooding, much of the warm weather precipitation is lost to the atmosphere through evaporation and transpiration within a very short period. The estimated average rate of potential evaporation within ROI Two ranges between 58 and 69 inches per year (Houghton et al. 1975).

Winter precipitation often falls as snow at higher elevations, which is more important with respect to runoff and groundwater recharge. Winter storms in the area are regional in nature. Snowpacks in the high mountains store enough moisture to permit runoff to overcome high evaporation and transpiration rates in the warmer summer months. Although days of measurable snowfall are very few in the lower elevations, snow may remain in the mountains during winter and early spring at elevations as low as 8,500 feet.

NAFR, and most of the State of Nevada, is located within the Great Basin region of the Basin and Range Physiographic Province of the U.S. This area is characterized by internally drained basins, with the exception of small parts that drain to the Colorado and Columbia Rivers. The Great Basin aquifer system extends into parts of six states. Surface water runoff in this region typically collects in the many playas found throughout the area. This is the case on NAFR where runoff collects in playas of the major valleys. Surface water runoff from the South Range predominantly collects into the Three Lake Valley, Tikaboo Valley, and Indian Springs Valley playas. Similar playas in the Kawich, Gold Flat, Cactus Flat, Groom Dry Lake, and Stonewall Flat collect and dissipate the runoff from the North Range (BLM, DOI, Air Force 1987).

Due to the arid conditions of the desert, the area is dry except during and shortly after a storm. The ephemeral waters exist in normally dry washes and playa surfaces for hours following summer storms and weeks following winter storms. Within the arid area of NAFR, the

availability of moisture in excess of evaporation and transpiration is so limited that few perennial surface water features are present. Typically, surface water is only temporarily present and is associated with ponding in the low permeability playas and channel flow from infrequent precipitation events and snow melt runoff. Playas are not major recharge zones due to low infiltration potential and most surface water that reaches the playas is lost through evaporation. With the exception of Breen Creek, NAFR has no permanent streams. Stream flow is ephemeral (short-lived) and occurs in response to precipitation events and snowmelt runoff. Streams in this area become losing streams in their lower reaches due to high rates of evaporation, transpiration, and infiltration. The area encompassed by NAFR incorporates all or portions of 21 different watershed areas (i.e., hydrographic basins), as illustrated in Figure 3.6-1a and b. The names of the basins, U.S. Geological Survey (USGS) basin numbers, watershed areas, and percentages of the total area within NAFR are listed in Table 3.6-1. The hydrographic boundaries depicted were delineated systematically by the USGS and Nevada Division of Water Resources in the late 1960s (Rush 1968; Cardinalli et al. 1968) for scientific and administrative purposes. The official hydrographic area names, numbers, and geographic boundaries continue to be used in scientific reports and Division of Water Resources administrative activities (USGS 1996).

With the exception of man-made ponds, the only perennial surface water comes from springs where the groundwater table intersects the surface and remains as (1) flows for short stretches of ground surface underlain by bedrock, (2) pools at some large springs, and (3) poorly drained areas around the edges of the valleys. Springs in the mountains discharge from perched water zones or emerge in areas where groundwater has migrated along fractures in the rocks and flows to the surface because of changes in geologic structure or material. Discharge from these springs flows along the surface for relatively short distances before infiltrating into the permeable materials. A wetlands survey (Air Force 1996a) conducted to support the range withdrawal renewal identified one stream on the entire range, Breen Creek, that could be referred to as perennial. See Figure 3.6-1a and b for surface water source locations on NAFR.

WATER QUALITY

The quality of surface water in southern Nevada varies greatly. Surface water quality, especially as it pertains to springs and seeps on NAFR, is primarily controlled by the physical and chemical characteristics of the rocks through which the groundwater flows prior to discharge to the surface. Once the water reaches the surface, its quality is affected by other environmental factors such as precipitation, evapotranspiration, erosion, and chemical characteristics of the rock or soil. Due to dilution by precipitation, concentrations of dissolved solids are usually greatest during periods of low surface flow and lowest during periods of high surface flow (Air Force 1998b). Investigations conducted in the Water Requirements Study for the proposed withdrawal, revealed limited regional and no site-specific water quality data available for surface waters on NAFR (Air Force 1998b).

No analytical data is currently available addressing surface water quality as it pertains to Air Force activities on NAFR. However, an investigation of surface soils was conducted at a

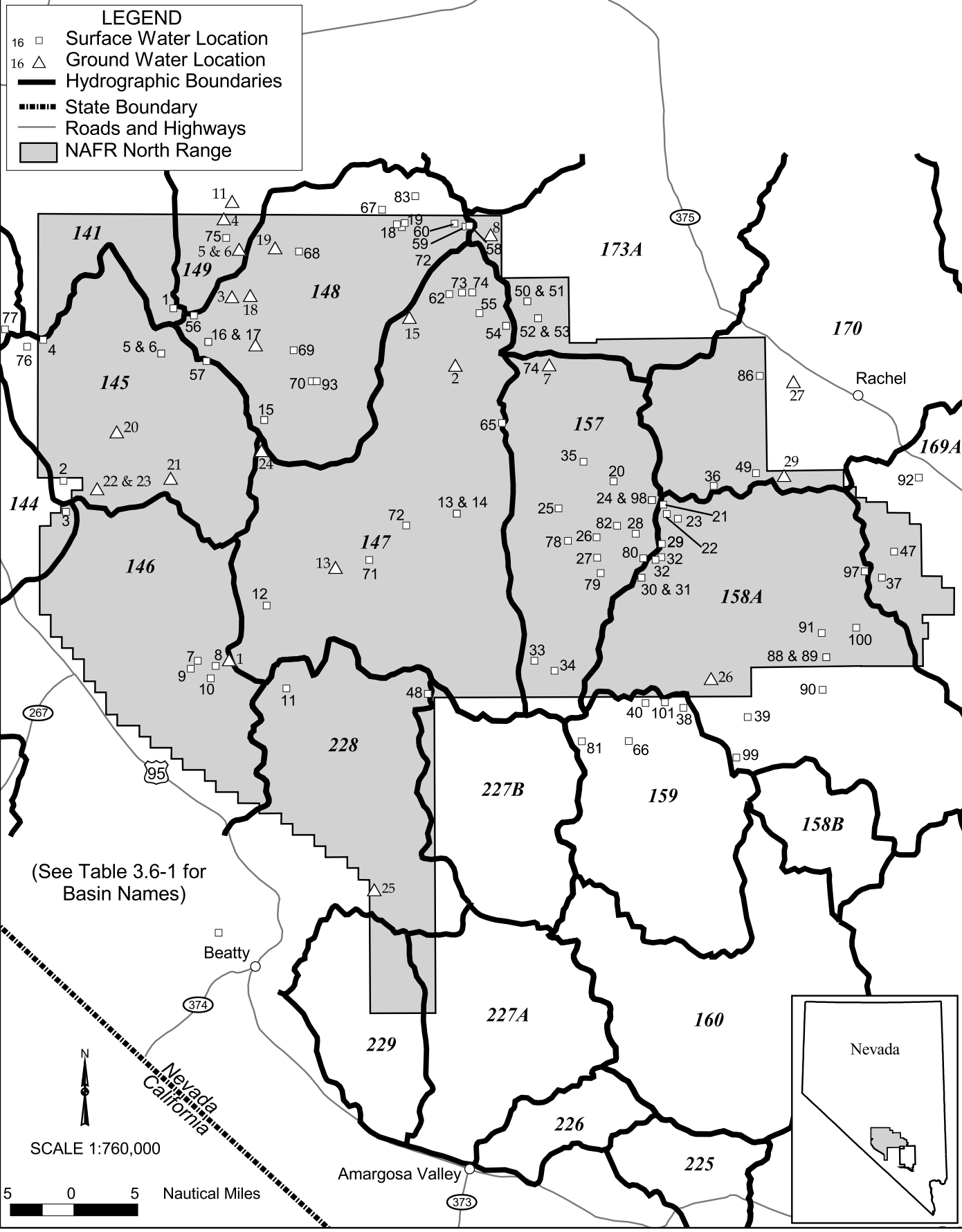


Figure 3.6-1a. Watershed Areas with Surface and Groundwater Locations for the North Range

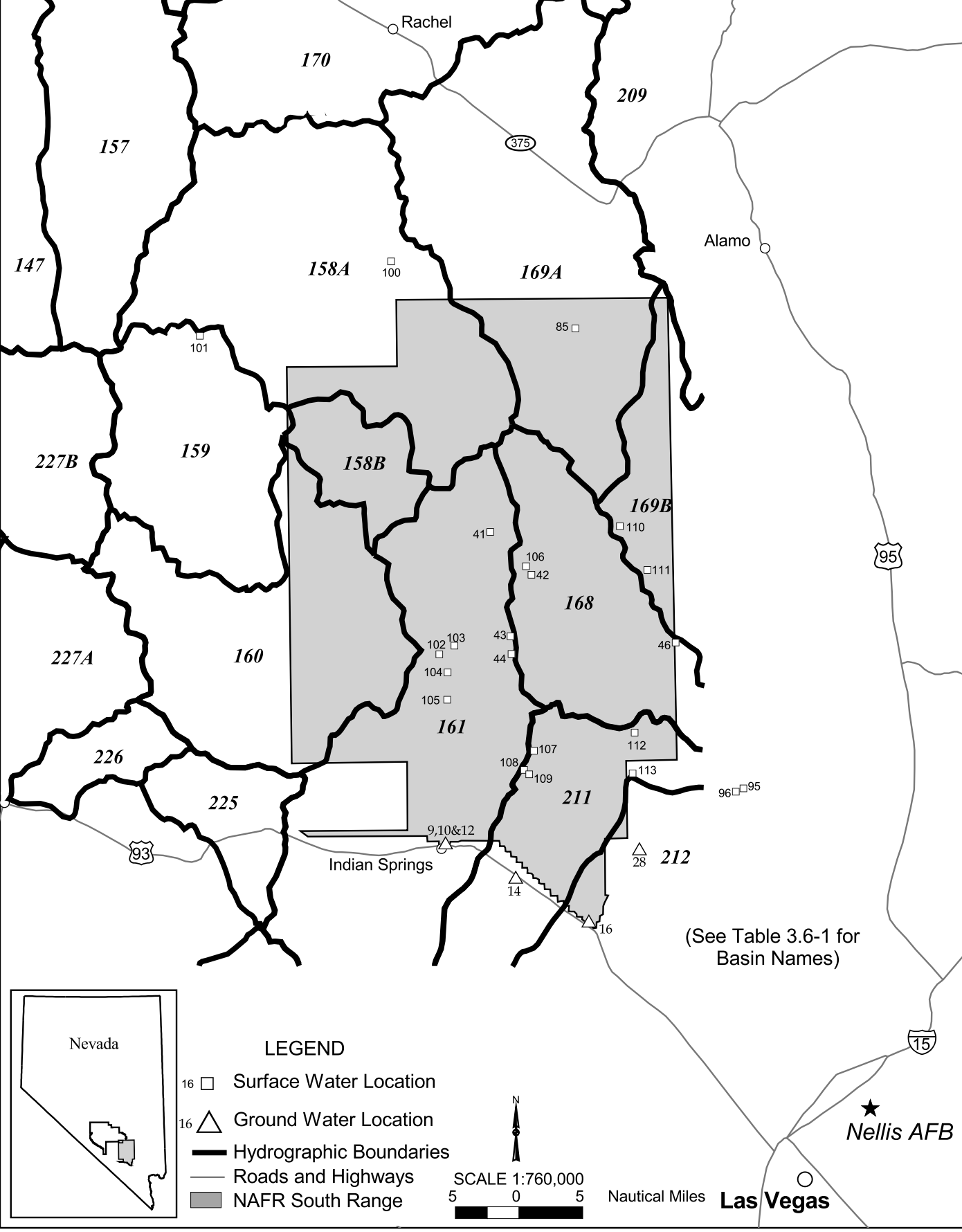


Figure 3.6-1b. Watershed Areas with Surface and Groundwater Locations for the South Range

Table 3.6-1. Hydrographic Basins within NAFR			
		WITHIN NAFR	
Basin	*Basin No.*	*Approx. Area (mi²)*	*Percent of NAFR*
Ralston Valley	141	90	1.89
Lida Valley	144	15	0.31
Stonewall Flat	145	328	6.88
Sarcobatus Flat	146	345	7.24
Gold Flat	147	673	14.13
Cactus Flat	148	344	7.22
Stone Cabin Valley	149	47	0.99
Kawich Valley	157	338	7.09
Emigrant Valley	158 (A, B)	564	11.84
Yucca Flat	159	5	0.10
Frenchman Flat	160	306	6.42
Indian Spring Valley	161	373	7.83
Three Lake Valley (Northern)	168	269	5.65
Tikapoo (Tikaboo) Valley	169 (A, B)	336	7.05
Penoyer (Sand Springs) Valley	170	142	2.98
Railroad Valley (Southern)	173A	76	1.59
Three Lake Valley (Southern)	211	156	3.27
Las Vegas Valley	212	16	0.34
Fortymile Canyon	227 (A, B)	27	0.57
Oasis Valley	228	282	5.92
Crater Flat	229	33	0.69
	Total:	**4,765**	**100**
Source: Air Force 1998b.			

representative sampling of bombing targets to determine if practice bombing activities have caused surficial soils contamination on NAFR (Air Force 1996b). The results of the study showed that while there was contamination at the target sites, the concentrations of contaminants (e.g., explosives and heavy metals) were relatively low and that there was little risk to people or the environment from residual contamination. Precipitation would tend to transport and disperse soil contaminants, reducing the contaminant concentrations. However, targets on NAFR are located in valley bottoms such that there is negligible surface water runoff (Air Force 1996b, 1997e). In addition, contaminants tend to be immobilized by the clayey, basic soils that are prevalent on valley bottoms.

Surface water quality would also likely be impaired in areas of accelerated erosion such as areas of fine-grained alluvial basin floor soil disturbed by vehicular traffic, foot traffic, wildfires, or concentrated grazing.

A 1998 GAO Report, Environmental Protection, DOD Management Issues Related to Chaff, identified and reviewed studies by DOD and others to evaluate the environmental effects of chaff. None of the studies were found to demonstrate significant environmental effects of chaff. Studies to establish the weathering rates and chemical fate of metal coating in soils and fresh water were prepared as part of the Air Force 1997 report entitled *Environmental Effects of Self Protection Chaff and Flares*. Based on this report, there were no significant environmental consequences of long-term chaff use. The Air Force has initiated action to insure removal from the inventory of all lead-based chaff, which was formerly used by the DOD. Chaff currently used is primarily composed of fiberglass and is non-toxic. However, the Air Force is continuing to address the question on environmental effects of chaff including the breakdown of chaff in the environment, the uptake path of any chemical constituents, and any potential long-term effects.

Water discharges on the range are regulated by the NDEP, Bureau of Water Permits and Compliance (BWPC). Surface water discharges fall under the requirements of the National Pollutant Discharge Elimination System (NPDES) of the Clean Water Act. There are currently two areas on NAFR that would be classified as “industrial” discharges, requiring a permit to discharge under the NPDES program. These would include the TTR and ISAFAF. NAFR has received authorization from the BWPC to discharge storm water from the TTR and ISAFAF, in accordance with general permit number GNV00022233.

3.6.3 Floodplains

As described above, much of the warm weather precipitation is lost to the atmosphere through evaporation and transpiration within a very short period. Regional storms, which generally occur in the winter months, are typically of low intensity, but can cause significant flooding on the playa lake beds. However, locally intense summer thunderstorms within the mountainous portions of NAFR can produce flooding in the low-lying valleys. Localized thunderstorms produce high-intensity, short-duration rainfall events that can result in flash flooding. When a

major storm moves into the area, water collects as surface runoff in a short period. Consequently, the resultant floods are flash floods, having sharp peaks and short durations.

A floodplain inventory study (Air Force 1997h) was conducted in support of the proposed land withdrawal to assess the suitability of present and potential future uses of NAFR with respect to flood hazards. Conventional methods of hydrologic analysis (such as those developed by the Army Corps of Engineers, Soil Conservation Service, etc.) were not used in analyzing the flooding potential for this study. The methods used in this study are unique to the site. The study identified floodplain boundary delineations for an approximate 100-year frequency storm event for each of the major categories of landforms that influence surface water hydrology and flooding on NAFR. These categories include major playas (dry lake beds), contributing drainage areas (valley collectors), and alluvial fans. Figure 3.6-2 depicts the flood zone boundary delineations for the three major categories of landforms that influence surface water hydrology and flooding in the study area. Flood zones corresponding to dry lake beds, valley collectors, and alluvial fans are mapped as Zone I, Zone II, and Zone III, respectively.

A total of 11 major dry lake beds were identified within the boundaries of NAFR based on natural topographic divides. Watershed areas for these major playas range in size from 99 to 971 square miles.

The anticipated runoff volumes for each of these major playas were determined by multiplying the watershed area of the playa by the estimated surface water runoff depth expected to result from the 100-year, 12-hour storm event. The rainfall estimate used produced an average runoff depth of 2.12 inches. A summary of the dry lake bed watershed areas and runoff volume estimates is provided in Appendix F.

Thirty-nine major valley collectors were identified that were defined as those valleys that have relatively large drainage areas or several smaller tributaries that discharge to the main collector from upstream contributory drainage areas. Drainage areas for the major valley collectors range in size from 6 to 347 square miles. Peak discharge flows for the valley collectors were estimated based on a description of the desert basins from the literature and observed soil conditions of the drainage areas, taking into account soil characteristics, rock types, and vegetative cover. The average rainfall estimate used, based on a 100-year, 24-hour storm event, was 2.8 inches. Due to the large number of valley collectors, each individual collector was not analyzed. A representative sampling of drainages was evaluated and used to develop general guidance in estimating peak discharges for the remaining collectors based on the size of the drainage areas. A summary of the collector drainage areas is provided in Appendix F. Drainage area boundaries are depicted on Figure 3.6-1a and b.

Major alluvial fans are defined as those fans having a drainage area greater than 0.5 square mile. Based on this definition, a total of 158 drainage areas containing major fans were identified on NAFR, ranging in size from 0.5 to 60 square miles. Similar to the valley collector analyses, peak discharge flows for the alluvial fans were estimated based on soil conditions described in existing literature and field observations. Peak discharge flows were estimated for

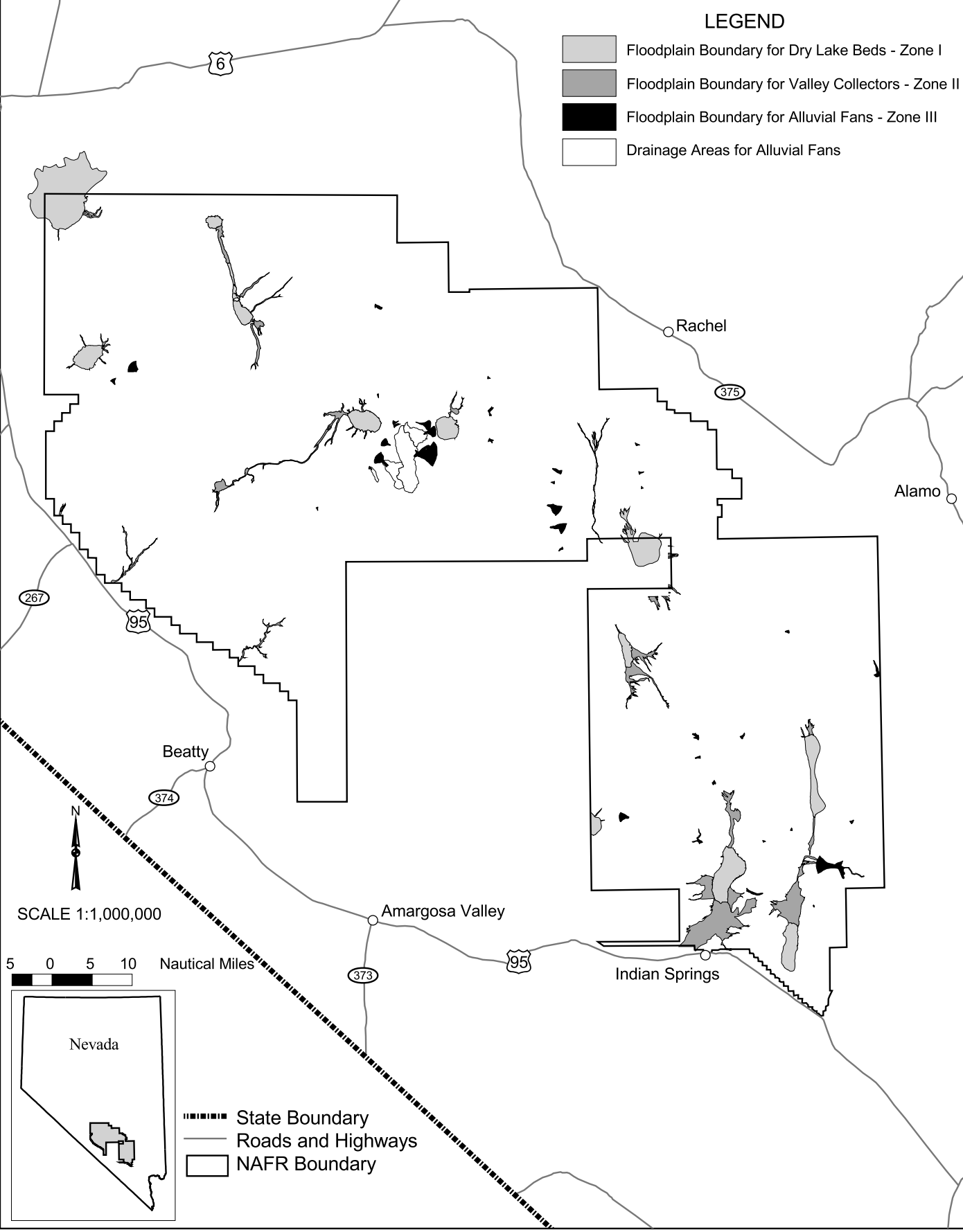


Figure 3.6-2. Floodplain Boundary Map

30 alluvial fans of varying drainage areas, which were then used to estimate peak discharges for the remaining fans based on the size of the drainage areas. The 100-year, 24-hour rainfall estimate representing the mountain areas surrounding NAFR that was used to calculate peak discharges was 3.0 inches. A summary of the alluvial fan drainage areas and peak discharge estimates for the 30 fans analyzed is presented in Appendix F.

3.6.4 Groundwater

HYDROGEOLOGY

Hydrogeologic systems can be defined as local, intermediate, or regional based on the distance between recharge and discharge points. The hydrogeologic systems that collect, store, and transmit groundwater within NAFR primarily comprise regional systems that have varying degrees of interconnection. Local and intermediate flow systems may exist on NAFR within individual basins and at the multiple basin level, although available information regarding these intermediate systems is not sufficient to definitively document their presence. In addition, the local and regional hydrogeologic systems in the vicinity of NAFR may be connected with adjacent regional groundwater systems (Air Force 1998b).

Three types of aquifers underlie portions of southern Nevada and the NAFR, including (1) valley fill or alluvial aquifers, (2) volcanic bedrock aquifers, and (3) carbonate bedrock aquifers. All three of these rock types make up the hydrogeologic systems that collect, store, and transmit groundwater within NAFR (Air Force 1998b). Many of the shallow, valley fill aquifers and volcanic aquifers are not continuous due to complex faulting in the region. However, certain regions of NAFR are underlain by regional carbonate rock aquifers that have varying degrees of interconnection. With the exception of the northern margin of the North Range, the NAFR is underlain by carbonate rock aquifers of the Death Valley and Colorado aquifer systems (USGS 1998), which may be hydrologically connected to the shallower alluvial and volcanic aquifer systems on NAFR. The Death Valley regional groundwater flow system encompasses approximately 94 percent of the deep groundwater flow beneath NAFR. The valley fill or alluvial aquifer is common to both the North and South Ranges. Depth to groundwater in these basins varies widely, from a few feet to over 1,000 feet below the surface, but on the average exceeds 200 feet (Air Force 1996b). The recent uplift of the mountains in the Basin and Range region (beginning about 17 million years ago to the present), led to increased erosion, transport, and deposition of sediments derived from the carbonate and volcanic rocks that make up the mountains on NAFR. These sediments are the principal materials that make up the alluvial aquifers. In general, the coarsest materials (gravel and boulders) were deposited near the mountains, and the finer materials (sand and clay) were deposited in the central parts of the basins or in the playas (lakes at the time of deposition). As a result, the central portion of the basins are commonly confined by layers of fine lacustrine clay that have low hydraulic conductivity. However, some interfingering of fine and coarse materials occurred during deposition due to occasional storms that would carry coarse materials further from the source (USGS 1998).

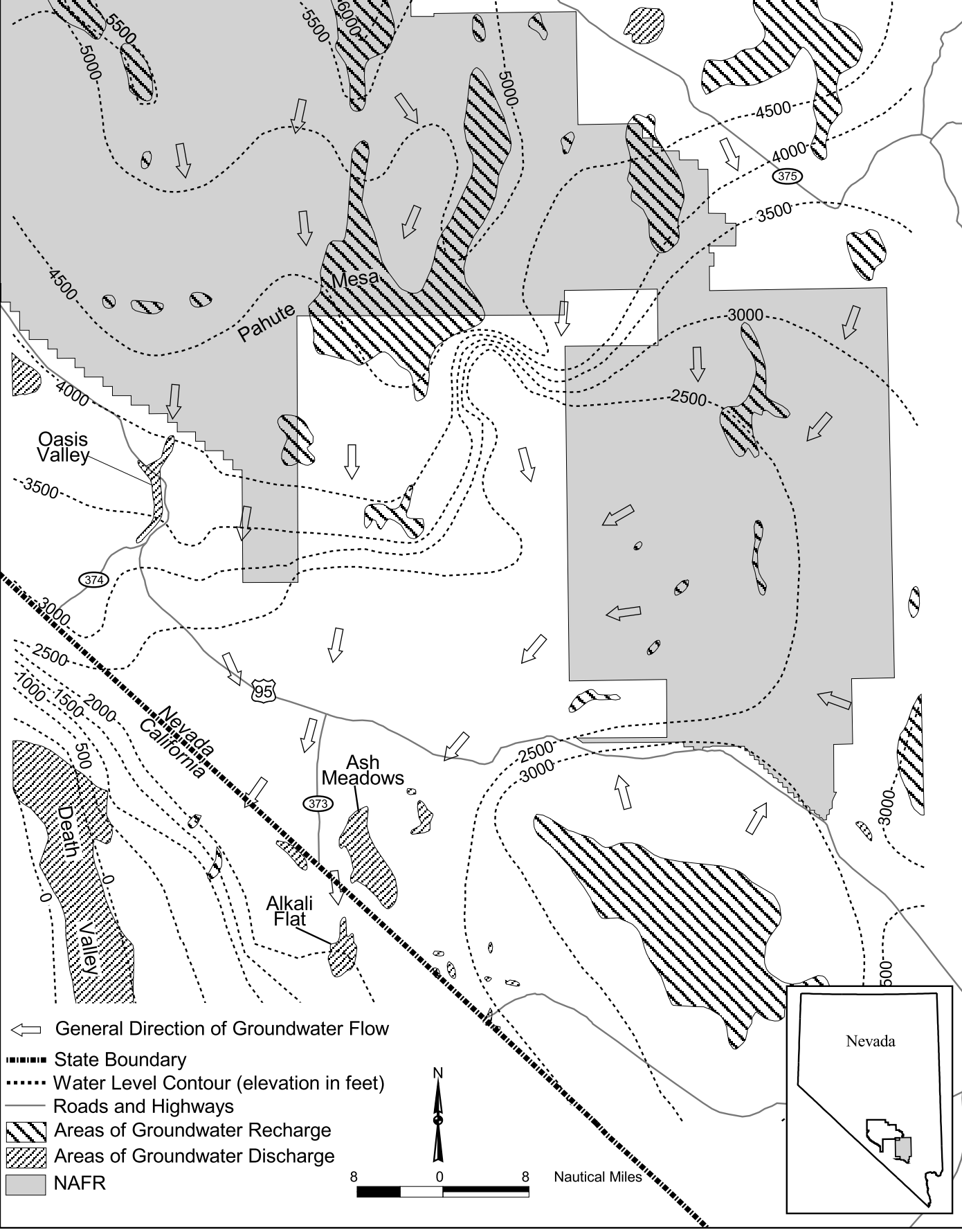
The second aquifer type present within NAFR, volcanic rock aquifers, are principally found on the North Range. The characteristics of various volcanic rock types that would allow for water storage and transmission are related to the amount of primary and secondary porosity within the rock. Primary porosity is defined as porosity that is present within the rock at the time of deposition (Bates and Jackson 1984). In volcanic rocks, this would include permeable zones of loosely consolidated cinders, created by textural differences in the rock due to gas present in the lava when the flow erupted. Secondary porosity is the porosity formed subsequent to emplacement or deposition of the rock. Secondary porosity in volcanic rocks is porosity developed after deposition such as fracturing. Where fracture systems interconnect with highly permeable rubble and cinder zones, the rock mass tends to be capable of transmitting relatively large quantities of groundwater (USGS 1997). Extensive fracturing and faulting in these rocks creates conduits for transmitting water, but these fractures are often re-cemented within the volcanic rocks on NAFR. The bedded nature of the volcanic rocks can also act as a barrier to water migration (Air Force, Navy, and DOI 1991). Other volcanic rock types that are present on the range and have water-bearing characteristics include ash-flow and ash-fall tuffs. These rocks occur in consolidated (welded) and semi-consolidated deposits and form from the flow or fall, respectively, of gas-charged ash during a volcanic eruption.

The third type of aquifer, located under most of NAFR, is the carbonate rock aquifer. The carbonate rock aquifers within the Basin and Range Province can be divided into two parts by age and composition: (1) an upper rock sequence of Late Triassic to Early Mississippian (395 million years before present [b.p.] to 190 million years b.p.) age that consists primarily of limestone with minor amounts of dolomite, interbedded with shale and sandstone; and (2) a lower sequence of limestone and dolomite of Middle Devonian to Middle Cambrian (535 million years b.p. to 420 million years b.p.) age that contains little clastic (e.g., shale, sandstone) material. Where the lower carbonate rocks are present, deep drilling data indicate that intervals of these rocks might locally extend as deep as 15,000 feet. However, this is rare at any given location due to a combination of deep erosion and structural deformation of the carbonate strata (USGS 1997). These rocks are extensively fractured and include solution openings that have resulted from dissolution of the rock by water moving through pre-existing interstices or fractures (Air Force 1998b), further enhancing their water transmitting capacity.

Groundwater flow beneath NAFR transcends individual mountain ranges in the deeper, carbonate aquifer system and is generally believed to flow to the south-southwest (Figure 3.6-3) (see Water Quality section below for more information). Flow in the local aquifer systems of individual basins mimics the surface drainage in most cases (Air Force 1996b). Therefore, groundwater flows from the surrounding highlands toward the topographic low point within the basins, similar to the flow of surface water after a storm event.

RECHARGE AND DISCHARGE

The 21 hydrographic basins wholly or partly included on NAFR represent an extensive water resource potential totaling over 49 million acre-feet of groundwater storage with a perennial yield of 93,000 acre-feet per year (AFY) (Air Force, Navy, and DOI 1991). The primary source of



3.6-3. Regional Groundwater Flow, Recharge Areas, and Discharge Areas

groundwater recharge on NAFR is precipitation in the form of snow or rain falling in the mountains and infiltrating into alluvial and bedrock aquifers. Mountain precipitation can infiltrate directly into aquifer outcroppings, thus providing recharge to the bedrock aquifers. The average 8 inches of precipitation annually results in a total of 2.1 million AFY of precipitation falling on the range. It has been estimated that between 3 and 7 percent of all precipitation reaches the water table through infiltration and percolation, with the remainder being lost to evaporation (Eakin et al. 1976). The Special Nevada Report (Air Force, Navy, and DOI 1991) indicates that less than 4 percent of all precipitation is estimated to reach the water table, with the remainder being lost to evaporation. This indicates that approximately 84,000 AFY of water actually reaches aquifers beneath NAFR (Air Force 1998b).

Direct evaporation of spring discharges to bare soils and subsurface outflow to adjacent aquifers are the primary types of groundwater discharge from NAFR. Discharge from springs occurs at numerous locations (Figure 3.6-1a and b), as discussed above, but does not account for a significant percentage of the total discharge from the range aquifers. Regional groundwater discharge occurs through surface springs to the south and southwest of NAFR and the NTS. See the Water Quality section below for additional information. Transpiration is limited due to the sparseness of vegetation on NAFR.

WATER QUALITY

Specific data regarding groundwater quality on NAFR is limited to analytical results from the monitoring of nine wells that are used for drinking water supply. These wells include two at ISAFAF (Wells 62-1 and 106-2), one at Point Bravo (Well 2278-1), one at Tolicha Peak Electronic Combat Range (TPECR) (Well TPECR #1), and five at TTR (Wells BLM, EH-7, EH-2, 3A, and 3B).

The MCLs for all regulated parameters have not been exceeded for any of the wells where data are available. Analytical data for these wells are included in the Water Requirements Study report (Air Force 1998b).

Extensive water quality testing has been done in the vicinity of NAFR at the NTS, including a study of water quality parameters prevalent in the three aquifer types discussed above. A summary of general water chemistry data for dissolved ions commonly found in well water samples for carbonate, volcanic, and alluvial aquifers found on the NTS is presented in Table 3.6-2.

Table 3.6-2. Range of Dissolved Ions Commonly Found in Three Aquifer Types on the NTS

	DOMINANT ROCK TYPE OF AQUIFER		
Ions	*Alluvium*	*Carbonate*	*Volcanic*
pH	7.6 – 9.0	6.6 – 8.7	7.3 – 9.1
Calcium (Ca) [1]	2.4 – 281	3.6 – 100	1.0 – 83.7
Magnesium (Mg) [1]	0.6 – 90	1.0 – 47	0.0 – 32.4
Sodium (Na) [1]	5.8 – 1,291	7.0 – 421	1.0 – 278
Potassium (K) [1]	0.0 – 12.0	1.4 – 15.5	1.1 – 21.5
Chlorine (Cl) [1]	3.3 – 56.2	5.0 – 33.9	3.2 – 113
Sulfate (SO_4) [1]	11.0 – 3,599	15.0 – 60	1.0 – 471
Bicarbonate (HCO_3) [1]	98 – 271	197 – 566	78 – 543
Silicon dioxide (SiO_2) [1]	5.1 – 74.3	5.1 – 98	0.0 – 85

Note: 1. Values are in mg/L
Source: Chapman and Lyles 1993.

In general, for alluvial aquifers, water quality varies between and within basins. Dissolved solids concentrations increase from the basin margins and on the slopes of alluvial fans, where the aquifers are recharged by the influx of water from the mountains, to the center of the basins (USGS 1997). In other words, the water quality is poorer at a greater distance from the recharge area (Dettinger 1992). Saline water can be found locally near thermal springs and in areas where the aquifer includes rocks containing large amounts of soluble salts, generally from evaporites. The groundwater beneath playas of smaller closed valleys may be brackish due to the high rate of direct evaporation in these basins (USGS 1997). A general characterization of the shallow aquifers on the North Range is that groundwater from these aquifers is a sodium bicarbonate type and usually has total dissolved solids (TDS) concentrations of less than 500 mg/l. Water quality within the South Range aquifers typically varies from 500 to 1,000 mg/l for TDS and is a calcium-magnesium-bicarbonate type of water (Air Force 1996b). The higher TDS range could be attributable to the presence of interbedded evaporite deposits within the carbonate aquifers, which are known to occur in certain areas of southern Nevada and cause saline contamination of otherwise fresh water. Another natural contaminant of concern is fluoride associated with volcanic tuff deposits that are prevalent throughout the region. In much of the area, fluoride concentrations in groundwater exceed the Nevada Public Health Service recommended standards for drinking water (Air Force 1998b).

Three categories of contaminants have been identified on NAFR, including (1) ordnance residues (i.e., primarily explosives), (2) operations and maintenance spills (primarily fuels, oils, etc.), and (3) radiological contamination related to the testing of nuclear devices (e.g., plutonium). In general, the contaminants exist in near-surface soils and are generally highly insoluble. The contaminants are generally not expected to migrate vertically downward to an

aquifer because the evaporation rate (58 to 69 inches / year) greatly exceeds the precipitation rate (4 inches / year in the valley floors to 16 inches / year in the highest mountains) and groundwater is generally very deep (i.e., generally in excess of 200 feet). Detection of significant groundwater contamination is limited to underground testing areas on Pahute Mesa. In these areas, contamination has been introduced over large areas and at variable depths above and below the water table. Specifically, the main test areas include Yucca Flat, Frenchman Flat, and Pahute Mesa (see Figure 3.5-2), part of which lies within NAFR. Of the 77 tests that were detonated below or near the water table on the Pahute Mesa, 24 occurred within NAFR boundaries. This portion of land, withdrawn as part of NAFR, is associated with the NTS and is under the administrative control of the DOE under a Memorandum of Understanding between DOE and the Air Force. The risks associated with groundwater contamination are being reevaluated on an on-going basis by DOE (Air Force 1997e).

Although there are few measurements or observations of contaminant occurrence, radioactive and other chemical contaminants are present near the test locations, based on the size and number of tests that have been conducted. Groundwater flow is the primary mechanism by which these contaminants can be transported significant distances away from the initial source to more accessible areas (e.g., spring discharge and groundwater withdrawal areas). Regional groundwater flow in this area is predominantly to the south, discharging south and southwest of the NTS. Analysis of water from supply wells on the NTS (one immediately adjacent to the NTS / NAFR boundary) has not detected any contaminants to date, but it is possible that in the future these or other wells withdrawing water from volcanic rocks beneath these mesas could intercept or induce movement of test-generated contaminants (USGS 1996).

The NTS and NAFR were initially chosen as locations for nuclear detonation testing due to the remoteness and interior drainage system (Great Basin). However, long-term studies of basin-and-range hydrology have identified regional aquifers that may allow radionuclides introduced into the subsurface environment to migrate beyond the NTS and NAFR boundary. Carbonate rock aquifers in this portion of Nevada form a north-south corridor, or "central corridor," that is generally laterally continuous for more than 250 miles. Groundwater generally discharges from this corridor to the south and southwest, ultimately reaching an intermediate discharge area, or Death Valley, where it is released as springflow or is evaporated or transpired. Intermediate discharge areas include Ash Meadows, Alkali Flat, and Oasis Valley (Figure 3.6-3). Radionuclides transported by regional groundwater aquifers to these discharge points may result in potential long-term impacts to surface water resources in these areas. Although the hydrology has been studied in some detail, much still remains uncertain about flow rates and directions through the fractured rock aquifers that transmit water great distances across this arid region. Estimated flow rates are highly variable and speculative. In the Pahute Mesa area, a major groundwater recharge area and the only portion of the NAFR where underground nuclear testing was completed, the definition of effective aquifers is poorly understood and the downgradient pathways are uncertain. Studies are continuing that will determine the potential for radionuclides to be transported within these aquifers and that will assist DOE in minimizing the effects of testing on the subsurface and surface hydrologic environments (USGS 1996, 1997, 1998).

Contamination from air-to-ground missions is another potential source for contamination on the range. Contamination of surface soils associated with practice bombing on NAFR was investigated at a representative sampling of bombing targets (Air Force 1996b). The study concluded that while there was contamination at the target sites, the concentrations of targeted compounds (e.g., explosives and heavy metals) were relatively low and that there was little risk to on-site workers or the public from residual contamination. It also concluded that there was little risk to groundwater quality due to the low precipitation, high evaporation, generally low solubility of the contaminants of concern, and the considerable depth to groundwater across most of the range.

Discharges of waste water or other waste streams to the ground also has the potential to affect groundwater quality. Under the authority of the Nevada Revised Statutes (NRS), Chapter 445, any discharge of water to groundwater requires a groundwater permit. In compliance with these discharge requirements, the Air Force currently holds three BWPC groundwater discharge permits: two at TTR and one at ISAFAF. All three permits are related to settling or aeration ponds associated with waste water treatment facilities. Permit requirements are imposed by the state in order to prevent degradation of groundwater quality and include the submittal of quarterly Discharge Monitoring Report Summaries.

3.6.5 Water Rights and Improvements

The NRS assigns the Nevada State Engineer's Office the jurisdiction over surface and groundwater rights and appropriations. Surface water appropriations are included in NRS 533 and are based on availability and seniority of appropriations. Groundwater appropriations are covered under NRS 534 and are based on perennial yield of each basin with special provisions for temporary appropriations and adjudication of overdrafted basins. Specific standards for well drilling are further detailed in NAC 534.

SURFACE WATER

Based on available data, a total of 946.37 AFY of surface water on NAFR is currently appropriated for stock, wildlife, domestic, and irrigation purposes. Agencies of the federal government hold approximately 796.97 AFY (84 percent) of these appropriations, while the remaining 149.14 AFY (16 percent) are privately held. A majority of the surface water rights owned by the federal government have been transferred from the original owners whose principal uses of water resources were probably in support of historical mining and ranching operations. Based on specific information regarding use of surface water on NAFR obtained from the Nevada State Water Engineer's Office (NVSWEO), surface water appropriations on the range are not currently used for direct mission-support activities by the Air Force. Some surface water appropriations on NAFR currently go unused for their intended or any other purpose, which makes them available to support wild horses and other wildlife (Air Force 1998b). Table 3.6-3 provides a listing of the surface water rights and appropriations on NAFR. The location of springs and seeps on the NAFR for which there are documented surface water appropriations are depicted in Figure 3.6-1a and 1b.

GROUNDWATER

Groundwater appropriations on the range are classified as either stock-watering, construction, or quasi-municipal. Records from the NVSWEO indicate that groundwater is appropriated from 25 wells located within the boundaries of NAFR, totaling 1,851.9 AFY of groundwater appropriations. Federal government agencies (e.g., Air Force, BLM, and DOE) currently hold appropriations for 22 of the 25 wells, which accounts for 98 percent (1,826.1 AFY) of these appropriations. The rights to the remaining 25.4 AFY (2 percent) are privately held for stock-watering and domestic purposes. Additional groundwater withdrawals related to direct mission support activities occur at Point Bravo (Well 2278-1) and Silver Flag Alpha (Well 2362-1). It is reported that appropriation requests for these wells have been recently submitted to the NVSWEO (Air Force 1998b). Available historical groundwater withdrawal data for use on or immediately adjacent to the range is presented in Table 3.6-4. The table represents metered groundwater withdrawal data from the three main groundwater use areas on the range. These data indicate the total average annual groundwater use in these areas is approximately 207 AFY. Only one private party holding water rights on NAFR is currently exercising these rights and appropriating water, as designated, for stock-watering purposes (Air Force 1998b). Table 3.6-5 provides a listing of the documented groundwater rights and appropriations on NAFR. The supply wells listed are depicted in Figure 3.6-1a and b.

3.6.6 American Indian Issues Concerning Water Resources

Indian people from the NAFR region would like future studies of surface water to include an American Indian perspective. The CGTO considers all water sources on NAFR to be culturally significant. For example, the CGTO believes that many of the surface water sources are part of the cultural landscape and may be associated with other features of cultural importance. Springs, including mineral hot springs, are of particular significance. Access restrictions have protected some of these water sources from modern disturbance, but these same restrictions have excluded Indian people from using these sources. Other water sources were still used after the formal land withdrawal, and are included in traditional stories and beliefs.

Table 3.6-3. Surface Water Sources on NAFR (page 1 of 4)										
						NVSWEO Appropriation Information				
Basin Name	*Basin No.*	*Common Water Source Name*	*Ref. No.*	*Owner*	*Location*	*Application No.*	*Certificate No.*	*Status*	*Beneficial Use* [2]	*Permit Amount (AFY)*
	161	Spotted #1	102	Unknown	R56E T13S S8 SW SE	Unknown	Unknown	Unknown	Wildlife	Unknown
	161	Spotted #2	103	Unknown	R56E T13S S9 NE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	161	Foggy Guzzler	104	Unknown	R56E T13S S20 SE NE	Unknown	Unknown	Unknown	Wildlife	Unknown
	161	Patches Guzzler	105	Unknown	R56E T14S S5 NE NE	Unknown	Unknown	Unknown	Wildlife	Unknown
	168	Indian Canyon Guzzler	106	Unknown	R57E T11S S35 SE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	168	Dain Peak Guzzler	107	Unknown	R57E T14S S27 SE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	211	Heaven's Well Guzzler	108	Unknown	R57E T15S S4 SE NW	Unknown	Unknown	Unknown	Wildlife	Unknown
	211	Heaven's Well Tinaja	109	Unknown	R57E T15S S3 SW SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	169	Tommy Guzzler	110	Unknown	R59E T11S S17 NW SE	Unknown	Unknown	Unknown	Wildlife	Unknown
	169	Chuckwalla Guzzler	111	Unknown	R59E T12S S3 NE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	211	White Sage Guzzler	112	Unknown	R59E T14S S19 NE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	211	Blacktop Guzzler	113	Unknown	R59E T15S S7 NE NW	Unknown	Unknown	Unknown	Wildlife	Unknown
Ralston Valley	141	Unnamed Seep	1	USA / USAF	NW SE S13 T2S R45E	7357	2253	Assigned	Stock	0.9
Lida Valley	144	Stonewall Spring	2	USA / USAF	SE SE S32 T4S R44E	12362	3772	Assigned	Stock	7.2
	144	Jerome Spring	3	USA / USAF	SW SE S16 T5S R44E	5931	850	Assigned	Stock	18.1
Stonewall Flat	145	Wildhorse Spring	4	USA / USAF	SE NW S31 T2S R443	3908	1581	Assigned	Stock	2.5
	145	Alkali Spring	5	USA / USAF	SW NW S5 T3S R46E	5929	848	Assigned	Stock	18.1
	145	Alkali Spring	6	USA / USAF	SW NW S5 T3S R46E	12784	4167	Assigned	Stock	7
	145	Urania Mine Seep	57	Not filed	S10 T3S R46E	N / A	N / A	N / A	N / A	0
Stonewall Flat	145	Cane Spring	76	USA / USAF	SW SW S36 T2S R43E	3909	1582	Assigned	Stock	2.53
	145	Tognoni Spring	77	USA / USAF	SW NE S28 T2S R43E	7730	1542	Assigned	Stock	3.64
Sarcobatus Flat	146	Monte Cristo Spring	7	Lamb	SW SW S28 T7S R46E	3942	2378	Assigned	Stock	2
	146	Rock Spring	8	Cook	SE SW S26 T7S R46E	6022	851	Assigned	Stock	4.3
	146	Trappman Spring	9	Cook	NW SE S32 T7S R46E	5173	856	Assigned	Stock	10.9
	146	Tule George Spring	10	Cook	NW SE S3 T8S R46E	5540	853	Assigned	Stock	1.4
Gold Flat	147	Pillar Spring	11	Calvin	NE NE S10 T8S R46E	13283	4664	Assigned	Stock	8
	147	Larry's Seep	12	Siedentopf	NW NE S8 T7S R47E	10863	3141	Assigned	Stock	3.6
	147	Jackpot Reservoir	13	USA / USAF	SE SE S9 T5S R50E	11609	4343	Assigned	Stock	7
	147	Unknown	14	Not filed	SE SE S9 T5S R50E	N / A	N / A	N / A	N / A	0
	147	Rose Spring	54	USA / USAF	SE SE S24 T2S R50E	V02374	N / A	Vested	Stock	21.7
	147	Rose Spring	54	N / A	SE SE S24 T2S R50E	13317	N / A	Denied	Stock	0
	147	Log Spring	55	Not filed	S23 T2S R50E	N / A	N / A	N / A	N / A	0

Table 3.6-3. Surface Water Sources on NAFR (page 2 of 4)

Basin Name	*Basin No.*	*Common Water Source Name*	*Ref. No.*	*Owner*	*Location*	NVSWEO Appropriation Information				
						Application No.	*Certificate No.*	*Status*	*Beneficial Use* [2]	*Permit Amount (AFY)*
	147	Nixon #1	71	USA / USAF	SW NW S7 T6S R49E	V02371	N / A	Vested	Stock	18.1
	147	Nixon #2	72	USA / USAF	NE NW S27 T5S R49E	V02372	N / A	Vested	Stock	18.1
	147	Tunnel Spring	73	USA / BLM	SE SE S4 T2S R50E	V02373	N / A	Vested	Stock	7.2
Cactus Flat	148	Antelope Spring	15	USA / USAF	SW NW S4 T4S R47E	13288	4170	Assigned	Stock	4.8
	148	Antelope Spring	15	N / A	NW SW S4 T4S R47E	13467	N / A	Denied	Stock	0
Cactus Flat	148	Cactus Spring	16	USA / USAF	SE NW S34 T2S R46E	1580	377	Assigned	Stock	7.2
	148	Cactus Spring	17	USA / USAF	SE NW S34 T2S R46E	12785	4168	Assigned	Stock	7.1
	148	Silverbow Spring	18	USA / USAF	NW NE S9 T1S R49E	2376	N / A	Assigned	Stock	18.1
	148	Silverbow Spring	18	USA / USAF	NW NE S9 T1S R49E	13625	3956	Assigned	Stock	21.7
	148	Silverbow Spring	18	N / A	SW SE S4 T1S R49E	13315	N / A	Denied	Stock	0
	148	Silverbow Creek	19	USA / USAF	NW SE S4 T1S R49E	4943	1111	Assigned	Irrigation & Domestic	108.3
	148	Stealth Seep	56	Not filed	S22 T2S R46E	N / A	N / A	N / A	N / A	0
	148	Sandeen Spring	59	Not filed	S9 T1S R50E	N / A	N / A	N / A	N / A	0
	148	Thunderbird Spring	60	Not filed	S8 T1S R50E	N / A	N / A	N / A	N / A	0
	148	Stinking Springs	67	USA / USAF	SW NW S6 T1N R49E	V02367	N / A	Vested	Stock	7.2
	148	Fork Spring	68	USA / USAF	NW NW S22 T1S R47E	V02368	N / A	Vested	Stock	14.5
	148	N. Antelope Reservoir	69	USA / USAF	SE NE S2 T3S R48E	V02369	N / A	Vested	Stock	14.5
	148	Antelope Reservoir	70	USA / USAF	NW NE S19 T3S R48E	V02370	N / A	Vested	Stock	18.1
	148	Corral Spring	74	USA / BLM	NW NE S8 T1S R50E	V02375	N / A	Vested	Stock	14.5
	148	Silverbow Canyon	83	USA / USAF	NW SW S23 T1N R49E	4910	1066	Assigned	Irrigation & Domestic	144
	148	Unnamed	93	N / A	NW E S19 T3S R48E	14754	N / A	Denied	Stock	N / A
Stone Cabin Valley	149	Reservoir #2	75	USA / BLM	NE NE S14 T1S R46E	12692	3521	Assigned	Stock	13.2
Kawich Valley	157	Coyote Pond	20	USA / Fallini	SE NE S5 T4S R51.5E	12692	3521	Assigned	Stock	22.4
	157	Horse Spring	21	USA / BLM	NE NE S1 T5S R52E	12044	3454	Assigned	Stock	5.3
	157	Unnamed Spring	22	USA / USAF	NW NE S7 T4S R53E	55322	14606	Assigned	Wildlife	4.6
Kawich Valley	157	Unnamed Spring	23	USA / USAF	SE SE S8 T5S R53E	55321	14605	Assigned	Wildlife	9
	157	Kawich Tank	25	USA / Fallini	NW SW S13 T5S R51E	11865	3297	Assigned	Stock	21.7
	157	Lamb's Pond	26	USA / USAF	NE NE S24 T5S R51E	11669	3266	Assigned	Stock	4.6
	157	Sundown Reservoir	27	USA / USAF	NE SE S36 T5S R51E	11606	3259	Assigned	Stock	4.6
	157	Wildcat Spring	28	USA / USAF	SE SW S31 T5S R53E	3887	690	Assigned	Stock	2.2

Table 3.6-3. Surface Water Sources on NAFR (page 3 of 4)

Basin Name	*Basin No.*	*Common Water Source Name*	*Ref. No.*	*Owner*	*Location*	NVSWEO APPROPRIATION INFORMATION				
						Application No.	*Certificate No.*	*Status*	*Beneficial Use* [2]	*Permit Amount (AFY)*
	157	Gold Spring	29	USA / USAF	SW SW S1 T6S R52E	12043	3453	Assigned	Stock	4.7
	157	Indian Spring	39	Lamb	NW NW S11 T6S R52E	2359	208	Assigned	Stock & Domestic	2.8
	157	Indian Spring	31	USA / USAF	SW NW S11 T6S R52E	11608	3261	Assigned	Stock	4.6
	157	Johnnie's Water	32	Watkins	SE SE S12 T6S R52E	3746	334	Assigned	Stock	18.1
	157	Johnnie's Spring	33	N / A	SE SE S12 T6S R52E	3894	N / A	Denied	Stock & Domestic	0
	157	Black Rock Spring	33`	USA / USAF	NW SE S22 T7S R51E	11625	3263	Assigned	Stock	4.6
	157	Kihibab Spring	34	USA / USAF	NE NE S35 T7S R51E	11660	3284	Assigned	Stock	4.6
	157	Antelope Reservoir	35	USA / Fallini	SW SW S29 T4S R51E	11626	3536	Assigned	Stock	4.3
	157	Granite Spring	65	N / A	NE NE S12 T4S R50E	13318	N / A	Denied	Stock	0
	157	Live Oak Spring	81	USA / USAF	SE SE S7 T8S R51 1 / 2E	11610	3262	Assigned	Stock	4.56
	157	Pony Spring	82	USA / USAF	SW NW S26 T5S R52E	11668	3265	Assigned	Stock	4.56
Emigrant Valley (A&B)	158	Chalk Spring	36	USA / USAF	SW SE S5 T5S R54E	3889	688	Assigned	Stock	0.2
	158	Tub Spring	38	USA / Army	SW NE S20 T8S R53E	3744	332	Assigned	Stock	18.1
	158	Cane Spring	39	Lincoln Land	SW NW S17 T9S R56E	6842	779	Assigned	Stock	22.4
Emigrant Valley (A&B)	158	Miners Spring	88	USA / USAF	S25 T7S R55E	V01379	N / A	Vested	Stock	36.24
	158	Disappointment Spring	89	USA / USAF	S25 T7S R55E	V01370	N / A	Vested	Stock	36.24
	158	Belted Reservoir #2	90	USA / USAF	SE NE S11 T8S R55E	10595	3130	Assigned	Stock & Domestic	5
	158	Nanquinta Reservoir #1	91	USA / USAF	NE NE S14 T7S R55E	10594	3129	Assigned	Stock & Domestic	5
	158	Reservoir #4	99	USA / USAF	NW NW S10 T9S R54E	10597	2845	Assigned	Stock	5
	158	Cane Spring	100	USA / USAF	SE SW S25 T7S R55E	V01375	N / A	Vested	Stock	72.4
Yucca Flat	159	Wire Grass Spring	40	USA / BLM	NE NE S18 T8S R53E	3743	376	Assigned	Stock & Domestic	18.1
	159	White Rock Spring	66	USA / ARMY	NE NE S4 T9S R52E	3896	692	Assigned	Stock	4.3
	159	Oak Springs	101	USA / ARMY	SW SW S13 T8S R52E	3745	333	Assigned	Stock	18.1
Indian Springs Valley	161	Quartz Spring	41	USA / USAF	SE NW S20 T11S R57E	11642	3371	Assigned	Stock	0.7
	161	Tim Spring	43	USA / USFWS	NE SW S4 T13S R57E	13521	3787	Assigned	Stock	0.7
	161	Sand Spring	44	USA / USFWS	NE NW S15 T13S R57E	13520	3786	Assigned	Stock	

Table 3.6-3. Surface Water Sources on NAFR (page 4 of 4)

						NVSWEO APPROPRIATION INFORMATION				
Basin Name	*Basin No.*	*Common Water Source Name*	*Ref. No.*	*Owner*	*Location*	*Application No.*	*Certificate No.*	*Status*	*Beneficial Use* [2]	*Permit Amount (AFY)*
Three Lake Valley (Northern)	168	Indian Spring Canyon	42	USA / USFWS	NE NW S2 T12S R57E	12631	3535	Assigned	Stock	7.2
	168	Shale Cut Spring	45	USA / BLM	NE SW S1 T13S R59E	3253	2620	Assigned	Stock & Domestic	2.2
	168	White Rock Spring	46	USA / USAF	NW SE S12 T13S R59E	3254	2621	Assigned	Stock	2.2
Tikapoo Valley (A&B)	169	Rock Spring	37	D4 ENTPR	NE NW S29 T6S R56E	57083	14625	Assigned	Stock	1.7
	169	Quail Spring	47	D4 ENTPR	SE SW S9 T6S R56E	57083	14608	Assigned	Stock	1.8
	169	Summit Spring Drainage	48	USA / BLM	NE SW S15 T8S R58E	4730	897	Assigned	Stock	18.1
	169	Cresent Valley Wash	84	USA / USAF	S T9S R59E	4333	N / A	Withdrawn	Stock	0
Tikapoo Valley (A&B)	169	Tule Spring	87	N / A	SE NW S27 T4S R58E	4746	1983	Assigned	Stock	
	169	Indian Spring	92	N / A	SE SE S2 T5S R56E	V01372	N / A	Vested	Stock	72.3
	169	Cattle Spring	97	USA / USAF	SW NE S21 T5S R56E	V01367	N / A	Vested	Stock	72.4
	169	Cliff Spring	98	USA / USAF	NW SW S29 T5S R56E	V01369	N / A	Vested	Stock	18.1
Penoyer (Sand Springs Valley)	170	Cliff Spring	24	USA / USAF	NW NE S14 T5S R52E	11605	3258	Assigned	Stock	4.56
	170	Cliff Spring	24	LAMB	NW NE S14 T5S R52E	2357	350	Assigned	Stock & Domestic	7.2
	170	Beck Spring	49	USA / BLM	NE NE S2 T5S R54E	3888	689	Assigned	Stock	1.1
	170	Pink Hills Reservoir	86	USA / BLM	NE SW S21 T3S R54E	11693	N / A	Withdrawn	Stock & Domestic	N / A
Railroad Valley (A)	173	Summer Spring	50	FALLINI	NW NW S16 T2S R51E	5662	949	Assigned	Stock	14.5
	173	Summer Spring	51	FALLINI	NW NW S16 T2S R51E	13541	3659	Assigned	Stock	14.5
	173	Cedar Spring	52	FALLINI	NW NW S22 T2S R51E	13542	3660	Assigned	Stock	18.1
	173	Cedar Spring	53	FALLINI	NW SW S22 T2S R51E	23501	8133	Assigned	Stock	18.1
	173	Phantom Spring	58	Not Filed	S14 T1S R50E	N / A	N / A	N / A	N / A	0
	173	Shirley Spring	79	USA / USAF	NE SE S16 T6S R52E	11607	3260	N / A	Stock	4.56
Three Lake Valley (Southern)	211	Unnamed	95	USA / USFWS	NE SE S12 T15S R60E	12630	3530	Assigned	Wildlife	0.72
	211	Unnamed	96	USA / USFWS	SW NE S11 T15S R60E	12633	3531	Assigned	Wildlife	0.72
Oasis Valley	228	Unnamed	94	USA / BLM	SW SE S26 T11S R46E	25628	8454	Assigned	Municipal	3.61

Notes: 1. See Figure 3.6-1a and 1b.
2. Nonspecific term used to describe beneficial use of the water.

Source: Mariah 1996 (Map #s 1-62), Air Force 1997g (Map #63-79), personal communication, Major Jeff Shea 1998 (Map #100-115).

Table 3.6-4. Annual Metered Historic Groundwater Use

Location	*Well Name*	ACRE-FEET PER YEAR		
		1995 Water Use	*1996 Water Use*	*1997 Water Use*
TTR — Man Camp	BLM, EH-7	33.6	37.5	70.8
TTR — Industrial Area	3A, 3B, EH-2	69.2	47.5	35.7
TECR — O&M Compound	TECR #1	24.5	27.3	43.6
TPECR	TPECR #1	8.94	16.9	9.41
Indian Springs - AFAF	62-1, 106-2	87.3	91.1	97.4
Point Bravo	2278-1	6.67	7.5	7.4
Silver Flag Alpha	2362-1	0.6	1.24	1.01
Total		**230.81**	**229.04**	**265.32**

Source: Air Force 1998b.

Table 3.6-5. Groundwater Sources on NAFR (page 1 of 3)

				NVSWEO Appropriation Information						
Common Water Source/Name	*Ref No.*	*Location*	*Owner*	*County*	*Basin*	*Application Number*	*Certificate No.*	*Status*[4]	*Beneficial Use*	*Permit Amount (AFY)*
Active Production Wells[1]										
Tolicha Peak	1	NW NW S25 T7 R46E	USA / USAF	Nye	146	48429	13619	Assigned	Municipal	14
Site 4	2	SW NW S5 T3S R50E	USA / USAF	Nye	148	54178	Pending	Assigned	Municipal	61.4
EH #2	3	NE NW S12 T2S R46E	USA / USAF	Nye	148	50169	14160	Assigned	Municipal	24.3
EH #7	4	NW NE S2 T1S R46E	USA / USAF	Nye	149	53885	14093	Assigned	Municipal	147
3A	5	SE SE S13 T1S R46E	USA / USAF	Nye	149	58150	14286	Assigned	Municipal	460
3B	6	NE SE S13 T1S R46E	USA / USAF	Nye	149	58149	14285	Assigned	Municipal	320
Camp's Well	7	SE SW S11 T1S R51E	USA / FALLINI	Nye	157	12143	3253	Assigned	Stock	23.9
Georges Water	8	SE SW S11 T1S R50E	FALLINI	Nye	173A	11862	3132	Assigned	Stock	23.2
62-1	9	S5 T16S R56E	USA / USAF	Clark	161	51573	13637	Assigned	Municipal	68
62-1 Additional	9	S5T16S R56E	USA / USAF	Clark	161	64234	Pending	Appl. Filed	Industrial	18.32
106-2	10	S8 T16S R56E	USA / USAF	Clark	161	51572	13636	Assigned	Municipal	35.5
106-2 Additional	10	S8 T16S R56E	USA / USAF	Clark	161	64236	Pending	Appl. Filed	Industrial	50.75
BLM	11	NE SW S25 T1N R46E	USA / USAF	Nye	149	56916	14097	Assigned	Municipal	23
ISAFAF Well 3	12	S8 T16S R56E	USA / USAF	Clark	161	64235	Pending	Appl. Filed	Industrial	20
Gold Flats #2	13	SW SE S9 T6S R48E	USA / USAF	Nye	147	64237	Pending	Appl. Filed	Industrial	11
Point Bravo	14	NE NE S29 R16S R57E	USA / USAF	Clark	211	62502	Pending	Appl. Filed	Municipal	10
O & M	15	NW SE S22 T2S R49E	USA / USAF	Nye	147	62503	Pending	Appl. Filed	Municipal	350
Silver Flag Alpha	16	NE SW S14 T17S R58E	USA / USAF	Clark	212	63001	Pending	Appl. Filed	Municipal	4.5
Rollercoaster	17	SW NE S32 T2S R47E	N / A	Nye	148	62682	N / A	Withdrawn	Municipal	N / A
Sandia Well 6	18	NE NE S & T2S R47E	N / A	Nye	148	62684	N / A	Withdrawn	Municipal	N / A
Sandia Area 9	19	NE SW S-15 T1S R47E	N / A	Nye	148	62683	N / A	Withdrawn	Municipal	N / A
Inactive Production Wells[2]										
Desert Well	20	NE SE S15 T4S R45E	USA / USAF	NYE	145	13284	4169	Assigned	Stock	7.02
Gold Crater	21	SE SW S36 T4S R45E	USA / USAF	NYE	145	13289	4171	Assigned	Stock	5
Yellow Tiger	22	SW SW S1 T5S R44E	USA / USAF	Nye	145	8977	2201	Assigned	Stock	2.2

Table 3.6-5. Groundwater Sources on NAFR (page 2 of 3)

				NVSWEO Appropriation Information						
Common Water Source/Name	*Ref No.*	*Location*	*Owner*	*County*	*Basin*	*Application Number*	*Certificate No.*	*Status*[4]	*Beneficial Use*	*Permit Amount (AFY)*
Inactive Production Wells[2]										
Yellow Tiger	22	NW SW S1 T5S R44E	COLVIN	Nye	145	12707	7726	Assigned	Stock	2.2
Sulphide	24	SW NW S21 T4S R47E	USA / USAF	Nye	147	13365	4172	Assigned	Stock	12
Stager's	25	SE SE S17 T10S R49E	USA / USAF	Nye	228	9606	2295	Assigned	Stock	1.5
Naquinta Valley	26	NE NE S6 T8S R54E	USA / USAF	Nye	158A	10590	3192	Assigned	Stock	12.32
South Western	27	NE NW S25 T3S R54E	USA / BLM	Lincoln	170	12541	3216	Assigned	Stock	5.8
Cow Camp	28	N / A	N / A	N / A	212	N / A	N / A	N / A	N / A	N / A
Other/Unused Potential Groundwater Sources[3]										
Sulphide	29	SW NW S21 T4S R47E	USA / USAF	Nye	147	13468	N / A	Denied	Stock	0
ISAFAF / Well 3	30	SW NW S2 T6S R49E	USA / USAF	Clark	161	51574	N / A	Canceled	Municipal	0
Gold Flats #1	31	SW NW S2 T6S R49E	USA / USAF	Nye	147	13216	N / A	Denied	Stock	0
EH #1	32	NW NW S7T2S R47E	USA / USAF	Nye	148	50166	N / A	Canceled	Municipal	0
1A	33	NE NW S1 T1S R46E	USA / USAF	Nye	149	50168	N / A	Canceled	Municipal	0
Sandia 1	34	N / A	N / A	Nye	148	Not Filed	N / A	N / A	Monitoring	0
Oak Spring Butte	35	SE NW S6 T8S R54E	N / A	Nye	158A	10644	N / A	Canceled	Municipal	0
Cactus Flats #2	36	SE SE S31 R1N R46E	USA / USAF	Nye	149	2364	N / A	N / A	Construction	0
Gold Flats #2	37	SE SE S9 T6S R48E	USA / USAF	Nye	147	13215	N / A	Denied	Stock	0
Gold Flats #2A	37	SE SE S9 T6S R48E	USA / USAF	Nye	147	11873	N / A	Denied	Stock	0
Salsbury Well	38	SW NW S18 T6S R48E	USA / USAF	Nye	147	13287	N / A	Denied	Stock	0
Kawich	39	SE NW S25 T2S R51E	USA / USAF	Nye	173A	45467	N / A	Denied	Commercial	0
Lambs Well	40	N / A	USA / USAF	Nye	157	N / A	N / A	N / A	Stock	0
Dead Horse	41	N / A	USA / USAF	Nye	148	Not Filed	N / A	N / A	Stock	0
Mine Well	42	N / A	USA / USAF	Nye	226	Not Filed	N / A	N / A	Mining	0
Hammel Mine	43	N / A	N / A	Nye	226	Not Filed	N / A	N / A	Mining	0
Mellan	44	N / A	N / A	Nye	145	Not Filed	N / A	N / A	Stock	0
Civet Cat Mine	45	N / A	N / A	Nye	146	Not Filed	N / A	N / A	Monitoring	0

Table 3.6-5. Groundwater Sources on NAFR (page 3 of 3)

				NVSWEO Appropriation Information						
Common Water Source/Name	*Ref No.*	*Location*	*Owner*	*County*	*Basin*	*Application Number*	*Certificate No.*	*Status*[4]	*Beneficial Use*	*Permit Amount (AFY)*
Other/Unused Potential Groundwater Sources[3]										
Civet Cat Cave	46	N / A	N / A	Nye	146	Not Filed	N / A	N / A	Monitoring	0
Sandia 5	47	N / A	N / A	Nye	148	Not Filed	N / A	N / A	Monitoring	0
TTR 3BB	48	NE SE S13 T1S R46E	N / A	Nye	149	Not Filed	N / A	N / A	Monitoring	0
EH-4	49	N / A	N / A	Nye	148	Not Filed	N / A	N / A	Monitoring	0
EH-6	50	N / A	N / A	Nye	149	Not Filed	N / A	N / A	Monitoring	0
MW-20	51	N / A	N / A	Clark	161	Not Filed	N / A	N / A	Monitoring	0
MW-21	52	N / A	N / A	Clark	161	Not Filed	N / A	N / A	Monitoring	0
MW-22	53	N / A	N / A	Clark	161	Not Filed	N / A	N / A	Monitoring	0
Sandia 2	54	N / A	N / A	Nye	148	Not Filed	N / A	N / A	Monitoring	0
Sandia 4	55	N / A	N / A	Nye	148	Not Filed	N / A	N / A	Monitoring	0
Alpha #2	56	N / A	N / A	Clark	211	Not Filed	N / A	N / A	Monitoring	0
Alpha #3	57	N / A	N / A	Clark	211	Not Filed	N / A	N / A	Monitoring	0
TTR Fire Pit #1	58	N / A	N / A	Nye	149	Not Filed	N / A	N / A	Monitoring	0
TTR Fire Pit #2	59	N / A	N / A	Nye	149	Not Filed	N / A	N / A	Monitoring	0
TTR Fire Pit #3	60	N / A	N / A	Nye	149	Not Filed	N / A	N / A	Monitoring	0
TTR Landfill	61	N / A	N / A	Nye	148	Not Filed	N / A	N / A	Monitoring	0
TTR Landfill	62	N / A	N / A	Nye	148	Not Filed	N / A	N / A	Monitoring	0

Notes:
1. Active wells currently being used for stock, quasi-municipal, or industrial purposes.
2. These wells are on NAFR and have Appropriated water rights but are currently inactive.
3. These water sources are not used but are potential sources of water.
4. Assigned = Permitted with a Certificate of Beneficial Use Wells.
   Appl. Filed = Permitted wells with Certificate of Beneficial Use not yet filed.
   Withdrawn = Applicaton withdrawn by applicant from NVSWEO.
   Denied = Well in which application has been denied by NVSWEO.
   N / A = Not applicable and / or information not available.

Source: Air Force 1998b.

AIR QUALITY

Air quality is determined by the concentration of various pollutants in the atmosphere. The lower the concentration of pollutants, the better the overall air quality. Air pollutants are either solid, liquid, or gaseous and come from many different sources. For example:

- Stationary or point sources are primarily commercial or industrial sources such as power generators. NAFR has sources scattered throughout the range.
- Mobile sources include cars, planes, trucks, and other vehicles. There is little ground vehicle activity on NAFR.
- Natural sources are wildfires, wind-blown dust, and pollens. Exposed surface areas in ROI One contribute to these pollutants.

Existing air quality at NAFR and in the supporting MOAs is generally considered very good due to NAFR being a remote, unpopulated location with limited pollutant sources.



3.7



Fugitive dust is created by vehicles traveling on unpaved roads within NAFR or by wind effects on exposed soil.



Ordnance delivery is another source of fugitive dust at target areas within NAFR.

The EPA designates attainment areas as having air quality better than the National Ambient Air Quality Standards (NAAQS), and nonattainment areas as having air quality worse than the NAAQS. The criteria for nonattainment designation varies by pollutant: (1) an area is in nonattainment for O_3 if its NAAQS has been exceeded more than three discontinuous times in 3 years, and (2) an area is in nonattainment for any other pollutant, such as CO or PM_{10}, 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 EPA to form a basis for attainment status.

The majority of NAFR is located in portions of Nye, Lincoln, and Clark counties. The entire NAFR area is unclassified for the state and national standards. A small portion of the SE corner of NAFR is in "serious" non-attainment for CO and PM_{10}. However, portions of Clark County are designated as a "serious" CO nonattainment area and a "serious" PM_{10} nonattainment area. The CO nonattainment problem occurs within the Las Vegas Metropolitan area and is due to vehicular emissions. Elevated levels of PM_{10} mainly occur from fugitive dust within the metropolitan Las Vegas area.

3.7 AIR QUALITY

Air quality in the project area and surrounding region would be affected by emissions from the proposed action and alternatives. The following sections describe the existing conditions related to air quality, including (1) description of resource, (2) region of influence, (3) regional climate, (4) baseline air quality and emissions, and (5) applicable air quality rules and regulations.

3.7.1 Description of Resource

Air quality in a given location is defined by the concentration of various pollutants in the atmosphere, generally expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g / m^3$). The significance of a pollutant concentration is determined by comparing it to federal and/or state ambient air quality standards. These standards represent the maximum allowable atmospheric concentrations that may occur and still protect public health and welfare with a reasonable margin of safety. The federal standards are established by the USEPA and termed the National Ambient Air Quality Standards (NAAQS). The NAAQS are defined as the maximum acceptable concentrations that, depending on the pollutant, may not be equaled or exceeded more than once per year, except for annual standards, which may never be exceeded. These standards include concentrations for ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter less than 10 microns in diameter (PM_{10}), particulate matter less than 2.5 microns in diameter ($PM_{2.5}$), and lead (Pb). Within the Nevada project region, the NDEP, Bureau of Air Quality, has adopted the NAAQS to regulate air pollutant levels within the state, with the following exceptions and additions: (1) the state annual SO_2 standard is more stringent than the national standard; (2) Nevada has added an 8-hour CO standard specific to elevations greater than 5,000 feet above mean sea level; and (3) Nevada has added standards for visibility impairment and 1-hour hydrogen sulfide (H_2S) concentrations. The national and state ambient air quality standards are shown in Table 3.7-1.

The pollutants considered in the impact analysis of this LEIS include volatile organic compounds (VOC), O_3, CO, nitrogen oxides (NO_x), NO_2, SO_2, PM_{10}, and $PM_{2.5}$. Nitrogen oxides and VOC are considered as precursor emissions that form O_3. Airborne emissions of lead and H_2S are not addressed in this LEIS because there are no known significant lead or H_2S emission sources in the region or associated with the project and its alternatives.

3.7.2 Region of Influence

Identifying the ROI for air quality requires knowledge of (1) the types of pollutants being emitted, (2) location(s) of the emissions source(s) (for stationary sources) or areal extent of emissions (for mobile sources), (3) emission rates of the pollutant sources, (4) the proximity of project emission sources to other emission sources, and (5) local and regional meteorological conditions. The ROI for emissions of inert pollutants (pollutants other than O_3, its precursors, and NO_2) is generally limited to a few miles downwind from the source. The ROIs for O_3 and

Table 3.7-1. National and Nevada Ambient Air Quality Standards

			NATIONAL STANDARDS [a]	
Pollutant	***Averaging Time***	***Nevada Standards*** [a]	***Primary*** [b,c]	***Secondary*** [b,d]
Ozone (O_3)	1-hour	0.12 ppm (235 µg/m^3)	0.12 ppm (235 µg/m^3	Same as primary
	8-hour	0.08 ppm (160 µg/m^3	0.08 ppm (160 µg/m^3	Same as primary
Carbon monoxide (CO)	8-hour	9 ppm [e] (10 mg/m^3) 6 ppm [f] (6.67 mg/m$^{3)}$	9 ppm (10 mg/m^3)	—
	1-hour	35 ppm (40 mg/m^3)	35 ppm (40 mg/m^3)	—
Nitrogen dioxide (NO_2)	Annual	0.053 ppm (100 µg/m^3)	0.053 ppm (100 µg/m^3)	Same as primary
Sulfur dioxide (SO_2)	Annual	0.02 ppm (60 µg/m^3)	0.03 ppm (80 µg/m^3)	—
	24-hour	0.14 ppm (365 µg/m^3)	0.14 ppm (365 µg/m^3)	—
	3-hour	—	—	0.5 ppm (1,300 µg/m^3)
Suspended Particulate Matter (PM_{10})	Annual	50 µg/m^3	50 µg/m^3	Same as primary
	24-hour	150 µg/m^3	150 µg/m^3	Same as primary
Suspended Particulate Matter ($PM_{2.5}$)	Annual	15 µg/m^3	15 µg/m^3	Same as primary
	24-hour	65 µg/m^3	65 µg/m^3	Same as primary
Lead (Pb)	Calendar quarter	1.5 µg/m^3	1.5 µg/m^3	Same as primary
Visibility	Observation	In sufficient amount to reduce the prevailing visibility to less than 30 miles when humidity is less than 70%	—	—
Hydrogen sulfide (H_2S)	1-hour	112 µg/m^3	—	—

Notes:
(a) Standards, other than 1-hour O_3, 8-hour O_3, 24-hour PM_{10}, 24-hour $PM_{2.5}$, and those based on annual averages, are not to be exceeded more than once a year. The 1-hour O_3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standard is equal to or less than one. The 8-hour O_3 standard is attained when the 3-year average of the annual 4th-highest daily maximum 8-hour concentrations is below 0.08 ppm. The 24-hour PM_{10} standard is attained when the 3-year average of the 99th percentile 24-hour concentrations is below 150 µg/m^3. The 24-hour $PM_{2.5}$ standard is attained when the 3-year average of the 98th percentile 24-hour concentrations is below 65 µg/m^3.
(b) Concentrations are expressed first in units in which they were promulgated. Equivalent units are given in parenthesis.
(c) Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
(d) Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
(e) Applies at elevations less than 5,000 feet above mean sea level.
(f) Applies at elevations equal to or greater than 5,000 feet above mean sea level.

NO_2 generally extend much farther downwind than the ROI for inert pollutants: in the presence of solar radiation, the maximum effect of precursor emissions on O_3 formation levels, and the transformation of NO_x emissions to NO_2, usually occur several hours after their emission and, therefore, many miles from the source.

The air quality analyses will consider impacts in each of the three ROIs, but the primary area of focus will be ROI Three, since this region encompasses the other two ROIs and contains or affects non-military receptors. The ROI Three boundary is defined by the boundary of the NAFR complex airspace. Potential receptors (such as non-military population, non-military facilities, and Class I natural areas) are located within ROI Two, ROI Three, and outside of ROI Three within approximately 50 miles. ROI Two is closed to public access.

3.7.3 Climate

The climate in the area of the NRC is affected by two main sources of air movement. From fall through spring the area is influenced by Pacific air movements that come across the Sierra Nevada mountains. In summer to early fall winds from Mexico predominate in the area.

Annual precipitation depends mainly on elevation and varies on the average from 4 inches on the desert floor to about 12 inches in the higher mesa areas. Winter precipitation often falls as snow (at higher elevations), whereas summer rains are often associated with thunderstorms, which are intense enough at times to produce local flash flooding. Approximately 15 to 30 thunderstorms occur at a given location in the NRC during the course of a year (NOAA 1980).

The hottest months of the year are July and August. Daily temperatures rise into the 90s and drop to the 50s at night , with average monthly temperatures of about 76°F. The average monthly winter temperature is between 31 and 41°F. The relative humidity averages 58 percent in the early morning, and dips to an average daily low of 25 percent by late afternoon (BLM 1981).

An assessment of the meteorological potential for pollution can be made quantitatively using the results of Holzworth's studies (1972). However, because of the variable terrain over the range complex, significant deviations from average values can occur. Mixing heights average about 1,100 feet in the morning and 8,000 feet in the afternoon. Wind speeds range from 9 to 11 miles per hour (mph) in the morning to 11 to 13 mph in the afternoon. With moderate to strong insolation throughout the year, stability ranges from slightly unstable to moderately unstable from midmorning to late afternoon and becomes neutral in the early evening hours. Overall, dispersion characteristics are good to fair. The highest potential for poor dispersion will exist in valleys; however, even here, wind direction must be considered in individual cases to correctly characterize the situation. The highest potential for poor dispersion exists during the winter months from December through February, due to the persistence of strong surface-based temperature inversions (BLM 1981).

3.7.4 Regulatory Setting

The federal Clean Air Act of 1970 (CAA) initiated the first air quality regulations. This act established the NAAQS and delegated the enforcement of air pollution regulations to the states. Within the NRC, the NDEP Bureau of Air Quality regulates sources of air pollution. However, mobile sources of emissions, such as inflight aircraft, are not subject to regulation. The following is a summary of the air pollution rules and regulations that apply to the project and its related activities.

FEDERAL REGULATIONS

STATE IMPLEMENTATION PLAN

The CAA requires each state to prepare and maintain a State Implementation Plan (SIP), detailing how the state will maintain air quality within attainment areas (as discussed below) and how it will bring nonattainment areas into compliance with the NAAQS within mandated time frames. The requirements and compliance dates for reaching attainment are based on the severity of the standard violation.

PREVENTION OF SIGNIFICANT DETERIORATION

The CAA established Prevention of Significant Deterioration (PSD) regulations to protect the air quality in regions that already meet the NAAQS. The major requirement of the PSD regulations is that the air quality impacts from new or modified PSD sources in combination with impacts from other PSD sources must not exceed the maximum allowable incremental increases for NO_2, PM_{10}, or SO_2, as identified in Table 3.7-2.

Table 3.7-2. Maximum Allowable Pollutant Concentration Increases under PSD Regulations

Pollutant	*Averaging Time*	PSD INCREMENTS ($\mu G / M^3$)	
		Class I	*Class II*
Nitrogen Dioxide	Annual	2.5	25
PM_{10}	Annual 24-Hour	4 8	17 30
Sulfur Dioxide	Annual 24-Hour 3-Hour	2 5 25	20 91 512

Certain national parks, monuments, and wilderness areas have been identified as Class I areas, where any appreciable deterioration in air quality is considered significant. Class II areas are those where moderate, well-controlled growth could be permitted. There are three PSD Class I areas within 50 miles of the NAFR and/or NRC airspace. The Great Basin National Park on the eastern border of Nevada is approximately 45 miles northeast of the eastern corner of the NRC

airspace. The closest Class I area in Utah, Zion National Park, is approximately 37 miles east of the NRC. The northeast corner of Death Valley National Park, which overlaps the California / Nevada border within 50 miles is located approximately 10 miles from the southwestern portion of the NAFR. In addition, the Grand Canyon National Park Class I area is located approximately 55 miles east of the southeastern portion of the NRC and 75 miles from the NAFR. The Lake Mead National Recreation Area, which is not a Class I area, is located approximately 23 miles from the nearest portion of the NRC and 28 miles from the southeastern corner of the NAFR South Range.

VISIBILITY IMPAIRMENT

The impact of project aircraft emissions on visibility is also an issue with regard to federal Class I areas. Section 169A of the CAA, as amended in 1977, states that it is a national goal to prevent any further impairment of visibility within Class I areas from manmade sources of air pollution. Visibility impairment is defined as (1) a reduction in regional visual range and (2) temporary atmospheric discoloration or plume blight. Therefore, the potential for visibility impacts to occur from inflight project aircraft will be addressed in section 4.7 of this LEIS.

CONFORMITY DETERMINATION

The 1990 Clean Air Act Amendments (CAAA) state that a federal agency cannot support an activity unless the agency determines that the activity will conform to the most recent USEPA-approved SIP within the region of the proposed action. This means that federally supported or funded activities will not (1) cause or contribute to any new air quality standard violation; (2) increase the frequency or severity of any existing standard violation; or (3) delay the timely attainment of any standard or any required interim emission reductions or other milestones in any area. In accordance with Section 176(c) of the 1990 CAA, the USEPA promulgated the final conformity rule for general rule federal actions in the November 30, 1993 *Federal Register*. Under the rule, certain actions are explicitly given exemptions from preparing conformity determinations while others are assumed to be in conformity if total project emissions are below *de minimis* levels. The renewal of the NAFR withdrawal falls within the exemption provisions of these regulations regarding legislative actions and continuing operations.

FEDERAL OPERATING PERMIT (TITLE V)

Title V of the 1990 CAAA required the USEPA to develop a federal operating permit program for "major" stationary sources of air pollutants (i.e., any source with emissions above certain regulatory thresholds, plus those falling under certain source-specific regulations). The draft USEPA Title V permit rule (also known as the Part 70 regulation) was promulgated in June 1992. Each state was required to develop its own Title V permit regulations that follow the federal rule. The Title V permit program defines what qualifies as a major source facility and the conditions under which the facility must prepare annual emission reports and / or monitor criteria pollutants and hazardous air pollutant emissions. NAFR has applied for Title V permits

for ground-based operations at the TPECR and at Area 10 and the Operating & Maintenance (O&M) Compound located at TTR.

LOCAL REGULATIONS

Air Quality Attainment Plans. The Clark County Air Pollution Control District (CCAPCD) has prepared two planning documents to demonstrate attainment of the NAAQS for CO and PM_{10} in Clark County: (1) *CO Air Quality Implementation Plan for the Las Vegas Valley Nonattainment Area, Clark County, Nevada* (Clark County Board of Commissioners 1995) and (2) *Draft PM (PM_{10}) Air Quality Implementation Plan for the Las Vegas Valley Nonattainment Area, Clark County, Nevada* (Clark County Board of Commissioners 1997). In addition, the CCAPCD is in the process of performing a Title V update to reflect changes in air quality attainment requirements. Measures to control aircraft emissions have not been required in the attainment planning process.

CCAPCD Rules and Regulation. The CCAPCD has developed rules and regulations to regulate stationary sources of air pollution.

3.7.5 Baseline Air Quality and Emissions

The USEPA designates all areas of the U.S. as having air quality better than (attainment) or worse than (nonattainment) the NAAQS. The criteria for nonattainment designation varies by pollutant: (1) an area is in nonattainment for O_3 if its NAAQS has been exceeded more than three discontinuous times in a 3-year period; (2) an area is in nonattainment for any other pollutant if its NAAQS has been exceeded more than once in a year. Pollutants in an area are often designated as unclassified when there are insufficient ambient air quality data for the USEPA to form a basis for attainment status.

The majority of the NAFR is on lands that have been designated as "unclassified" with reference to state and federal standards for criteria pollutants. However, a small portion of the southeast corner of NAFR is in "serious" nonattainment for CO and PM_{10}. In addition, nearby portions of Clark County are also designated as "serious" CO and PM_{10} nonattainment areas (40 CFR Part 81.329). The CO nonattainment problem occurs within the Las Vegas Metropolitan area and is due to vehicular emissions within congested roadways. Elevated levels of PM_{10} mainly occur from fugitive dust within the metropolitan Las Vegas area. The boundaries of the CO and PM_{10} nonattainment area, as shown in Figure 3.7-1, correspond with the boundaries of Hydrographic Basin 212.

Table 3.7-3 provides a summary of baseline emissions associated with this action. The table includes emissions from ground-based sources operating at Nellis AFB and within NAFR, emissions from aircraft operations at Nellis AFB (below 3,000 feet AGL), and emissions from aircraft operating in the NRC airspace (LEIS ROI Three). The data for ground-based sources at Nellis AFB were obtained from an inventory report prepared for the base (Radian 1996). Emissions from ground-based sources for NAFR were obtained from both an inventory report for the TTR (Radian 1997), and from calculations of NAFR generator emissions, vehicle fuel

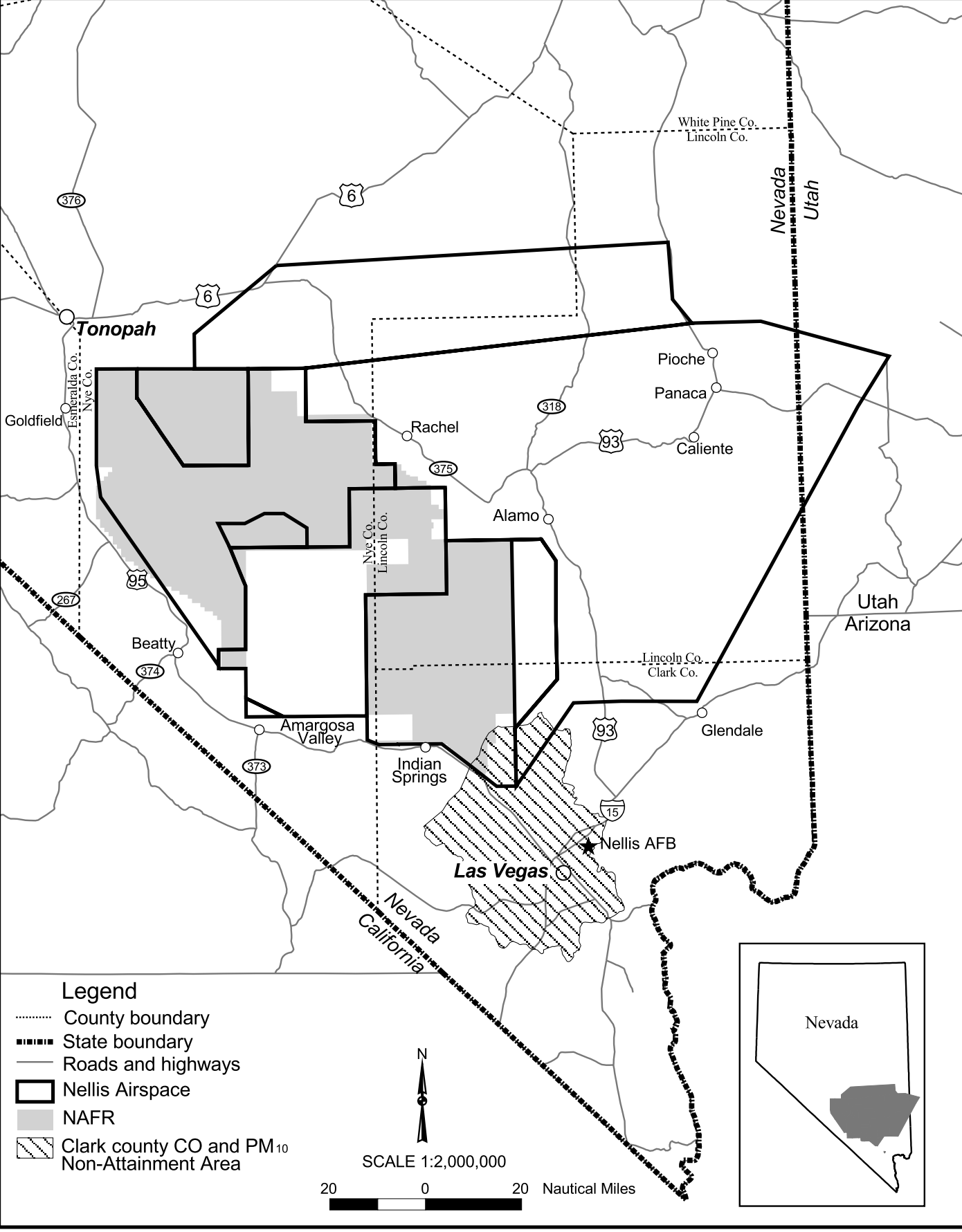


Figure 3.7-1. Relationship of Clark County CO and PM Non-Attainment Area to NAFR and NRC Complex Airspace

combustion emissions, and vehicle road dust (as shown in Appendix I using source data from Appendix A). The Nellis AFB aircraft emissions were obtained from an inventory report prepared by Radian (1995), while the aircraft emissions for the NRC were obtained from the document, *Environmental Assessment for Supersonic Flight over the Nellis Range Complex* (Air Force 1994b). These data presented in Table 3.7-3 will be used for comparative purposes to evaluate the potential magnitude of impact resulting from changes in level of activity that would occur from the proposed action and alternatives.

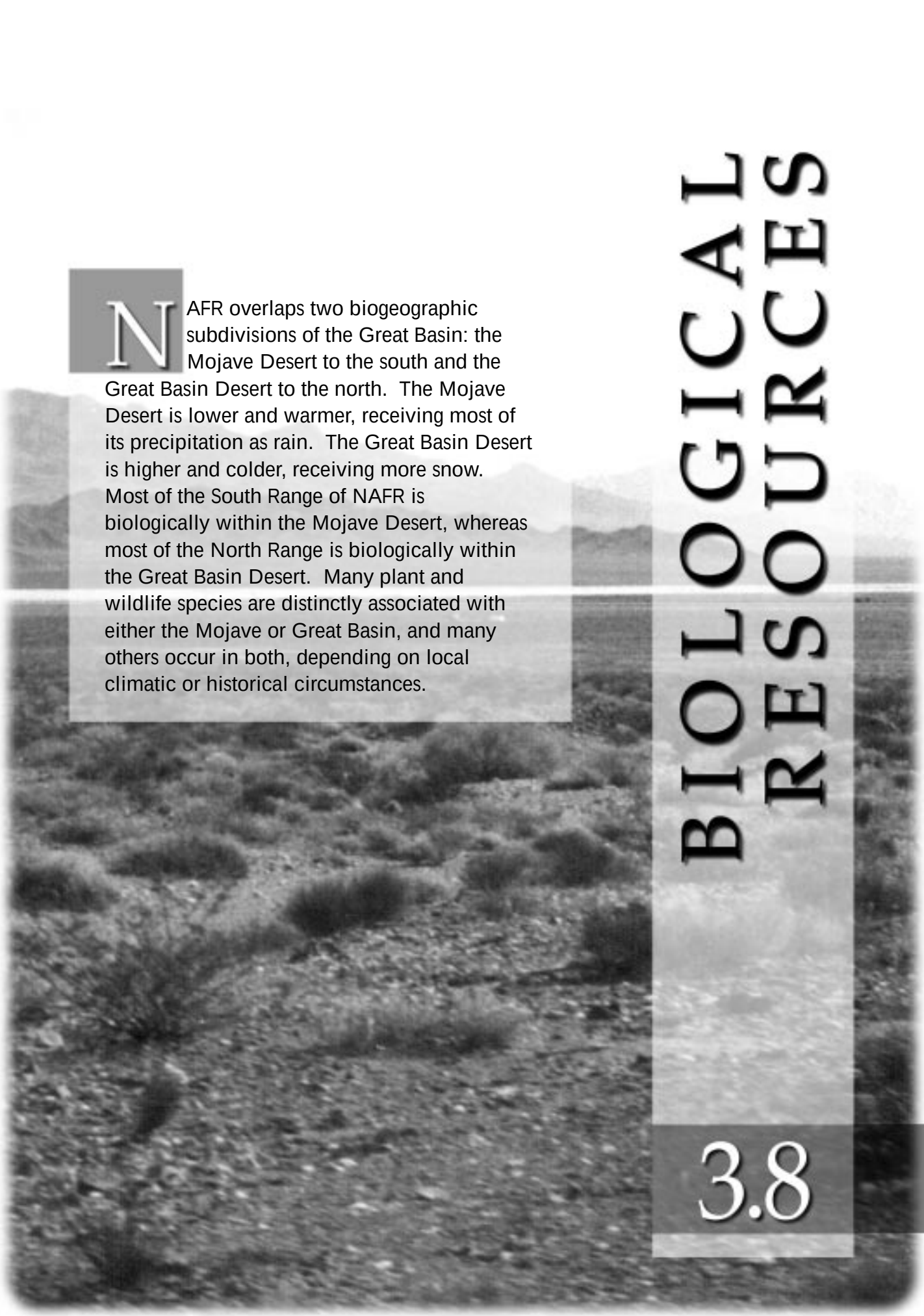
Table 3.7-3. Summary of Baseline Ground-based and Airspace Emissions (tons/year)

Location	*CO*	*NO_x*	*PM_{10}*	*SO_2*	*VOC*
Nellis AFB (ground based)(1)	1,805	339	34	34	228
Nellis AFB (aircraft only)(2)	839	320	30	338	305
TTR (ground based)(3)	875	1,587	108	105	206
NAFR (ground-based)(4)	554	245	6,084	13	78
Nellis Range Complex (aircraft only)(5)	695	8,983	230	214	52

Notes:
1. Includes stationary source, AGE, and portable I.C. engine emissions from Nellis AFB, Main Base Areas I, II, and III, as reported in the *Nellis AFB 1995 Air Emissions Inventory Report* (Radian 1996). Also includes motor vehicle emissions from the Nellis AFB 1994 *Air Emissions Inventory Report* (Radian 1995).
2. Includes landing and takeoff (LTO) and touch-and-go (TGO) emissions from all phases of aircraft operations at Nellis AFB (Radian 1995).
3. Includes ground-based emissions from all non-exempt sources associated with the three operating facilities at the TTR (within the NAFR), i.e., Area 10, the O&M Compound, and the TPECR, as reported in the *1995 Air Emissions Inventory for Tonopah Test Range,* (Radian 1997).
4. Includes fuel combustion emissions from generators and vehicles operating in the NAFR, as well as road dust emissions from vehicle miles traveled over paved and unpaved roads in the NAFR (see Appendix I).
5. Represents aircraft emissions that occur in airspace over the NRC. Data obtained from the *Environmental Assessment for Supersonic Flight over the Nellis Range Complex* (Air Force 1994a).

3.7.6 American Indian Issues Concerning Air Quality

In the view of American Indians from the NAFR region, radiation and other actions can cause the living air to die by consuming the oxygen and disturbing the spirituality necessary for life (AIWS 1997). They believe that dead air will not support life and can cause airplanes to crash. Also, the damage that can result from exposure to radiation goes beyond the physical effects of the radiation itself, and is traced by Indian people to the air's loss of its spiritual power.



BIOLOGICAL RESOURCES

3.8

NAFR overlaps two biogeographic subdivisions of the Great Basin: the Mojave Desert to the south and the Great Basin Desert to the north. The Mojave Desert is lower and warmer, receiving most of its precipitation as rain. The Great Basin Desert is higher and colder, receiving more snow. Most of the South Range of NAFR is biologically within the Mojave Desert, whereas most of the North Range is biologically within the Great Basin Desert. Many plant and wildlife species are distinctly associated with either the Mojave or Great Basin, and many others occur in both, depending on local climatic or historical circumstances.



The desert tortoise is a special status species that inhabits lower elevations of the South Range.

In this LEIS, existing biological resources on NAFR are grouped into the following categories:

- **Vegetation.** The native vegetation of NAFR consists primarily of desert scrub communities at low to mid-elevations, mixed shrub and woodland communities at mid- to upper elevations, and small patches of forest vegetation on the highest peaks and ridgelines.
- **Wildlife.** Wildlife on NAFR includes species that are primarily associated with Mojave Desert and Great Basin scrub and woodland habitats. A variety of migratory and widely distributed species are also associated with the limited water resources such as desert springs, wildlife "guzzlers," seasonally flooded playas, and artificial ponds that exist on the range. Resident and migratory wildlife include several species having special status or otherwise considered sensitive by state and federal governments.
- **Aquatic and Wetland Habitats.** Aquatic and wetland habitats are extremely limited on NAFR. The surface water resources consist of known seeps, springs, ponds, and one creek. Waterfowl in small numbers may use playas at Mud Lake, Cactus Flat, Gold Flat, Indian Springs Valley and Three Lakes Valley during years when these areas are sufficiently flooded.
- **Special Status Species.** Special Status Species include federally listed, proposed, and candidate threatened and endangered plant and wildlife species. Other special status species include federal and state species identified by virtue of rarity or recreational importance.



Wild horses are a non-native species that inhabit large areas of the North Range and compete with native species for water and vegetation.

3.8 BIOLOGICAL RESOURCES

3.8.1 Overview

NAFR is part of a regional landscape that encompasses surrounding public lands, the DNWR, and the NTS as well as NAFR. This larger landscape has similar physiographic, topographic, hydrographic, and geologic features that result in similar flora and fauna.

In many respects NAFR constitutes an ecological island that provides protected, relatively undisturbed areas for animals, plants, and natural communities indigenous to the Mojave and Great Basin ecoregions. Biological data available on NAFR suggest that biological resources on NAFR are in good ecological condition. Although some areas have been substantially disturbed by military operations, DOE tests, and the presence of wild horses, the vast majority of NAFR represents an ecological island that sustains viable populations of plants and animals that are directly or indirectly affected by population, commercial, and recreational growth in areas outside NAFR.

This Biological Resources section includes both native and naturalized plants and animals and the habitats in which they occur. For purposes of this LEIS, Biological Resources are subdivided into Vegetation, Wildlife, Aquatic and Wetland Habitats, and Special Status Species; each is addressed in a separate subsection below. The geographical scope of this analysis is confined to NAFR and directly associated airspace, corresponding to areas wherein impacts associated with the proposed action or alternatives are reasonably likely to occur (refer to Chapter 2.0 for maps of NAFR and descriptions of existing and proposed actions).

Parts of NAFR overlap the zone of transition between the Mojave and Great Basin deserts. The Basin-and-Range topography of NAFR (see below) includes low- to mid-elevation mountain ranges and valleys that are oriented north-south across the transition, allowing plant and animal dispersal between the two deserts. The scarcity of roads across NAFR contributes to a high degree of continuity between habitats, with minimal disruption of plant dispersal and animal migration. Combining as it does the plants and animals of the two deserts, NAFR supports a high diversity of species, although species diversity within communities at any one location is generally low. NAFR is isolated from livestock grazing (although wild horses have severely impacted parts of the North Range) and land development, and has experienced a limited extent of land disturbance from military activities (only about 3 percent of the land is subject to ground disturbance by military training).

NAFR is generally within the Great Basin, a physiographic region with no external drainage characterized by “basin and range” topography, in which hydrographically isolated basins or valleys are separated by north-south trending mountain ranges. NAFR overlaps two biogeographic subdivisions of the Great Basin: the Mojave Desert to the south and the Great Basin Desert to the north. The Mojave Desert is lower and warmer, receiving most of its precipitation as rain, whereas the Great Basin Desert is higher and colder, receiving more snow. The transition between the two deserts occurs very broadly along the 37th parallel (Beatley 1976; The Nature

Conservancy [TNC] 1995). As a result, most of the South Range of NAFR is within the Mojave Desert, whereas most of the North Range is within the Great Basin Desert. However, although many plant and wildlife species are distinctly associated with either the Mojave or Great Basin Desert, many others occur in both deserts, depending on local climate, soils, or historical circumstances. The resulting biotic communities encountered on NAFR consist of some typical Mojave or Great Basin Desert associations, but others that are mixed, transitional, or widely distributed, and best described simply in terms of their constituent species.

Facilities and airspace associated with the use of NAFR include the ISAFAF, which is included as part of South Range, the TTR in the North Range, the MOA (Desert and Reveille), and the MTRs that provide aircraft entry and exit to and from different parts of the range. The MOA airspace comprises a number of subunits where different types of training occur. The areas that are outside of NAFR but subject to overflight extend around the northern to eastern boundaries of the range (refer to Chapter 2.0 for descriptions). The MOA airspace spans Great Basin Desert habitats in the north, and extends over the Great Basin Desert-Mojave Desert transition in the east. The eastern part of this area is hydrographically outside of the Great Basin, with drainage to the Colorado River via the Virgin River, Meadow Valley Wash, and the Muddy River (into which flows the White River through Pahranagat Valley). Vegetation and wildlife habitats are essentially similar to those occurring westward within the Great Basin, except for the inclusion of more extensive wetland and riparian habitats.

3.8.2 Vegetation

The vegetation of NAFR is described in the Integrated Natural Resources Management Plan (INRMP) Air Force 1997g), which is a primary source of information for this section. Additional sources include the Intermountain Flora (Cronquist et al. 1972), unpublished studies conducted for the Air Force as part of the MX missile program in the late 1970s-early 1980s (Air Force 1981), and recent surveys by TNC (1994, 1995, 1996). Unpublished studies by USFWS (Ackerman 1981) provided the basis for much of TNC's recent work. A comprehensive vegetation map has yet to be prepared for NAFR, although work on an updated classification of the vegetation has been initiated by TNC (1994, 1995, 1997). Appendix G provides a generalized map of potential vegetation (i.e., under undisturbed conditions) that is indicative of the major vegetation types on undisturbed lands on NAFR and in the region. The description of vegetation types and communities that follows is based in part on Beatley's (1976) studies of the NTS and adjacent areas. Reference has also been made to Brown's (1982) vegetation-based classification of biotic communities and to recent environmental documents covering NAFR (BLM 1992a; Dames & Moore 1996; TNC 1994, 1995, 1997) to avoid potential confusion regarding the definition of vegetation and habitat types. The convention followed throughout this document is to refer to vegetation or plant community types by dominant species (e.g., black sagebrush or creosote-bur sage) and physiognomy (i.e., scrub [shrub-dominated] or woodland [tree-dominated]).

The native vegetation of NAFR consists primarily of desert scrub communities at low to mid elevations and mixed shrub and woodland communities at mid- to upper elevations. Montane shrub communities dominate the highest elevations except for small patches of forest vegetation,

which are limited to the highest mountain peaks and ridgelines. Some vegetation communities are strongly limited to, and may even be considered indicators of, either the Mojave or Great Basin Desert, whereas others are transitional or occur in both deserts where conditions are suitable (Turner 1982). Native herbaceous species are prevalent as winter annuals in the Mojave Desert, whereas native perennial grasses also occur as an understory element of mid- to upper elevation scrub and woodland communities in the Great Basin Desert (Turner 1982). Non-woody range weeds like halogeton (*Halogeton glomeratus*), tumbleweed (*Salsola tragus*), and non-native grasses, including cheatgrass (*Bromus tectorum*) in the Great Basin and red brome (*Bromus madritensis* ssp. *rubens*) in the Mojave Desert, are locally abundant on disturbed sites and commonly occur in desert scrub (Air Force 1997g). Wetland vegetation is extremely localized around water sources, as discussed in section 3.8. 4.

The South and North Ranges, and MOA airspace, are discussed separately in the following subsections.

3.8.2.1 SOUTH RANGE

The South Range lies in the northeastern portion of the Mojave Desert. Vast areas of the basins and bajadas (composed of coalescing alluvial fans) in the Mojave Desert, below an elevation of approximately 4,000 feet, often support a scrub community dominated by creosote bush (*Larrea tridentata*), with which white bur-sage (*Ambrosia dumosa*) is commonly co-dominant. Additional associates include saltbushes (*Atriplex* spp.), ephedras (*Ephedra* spp.), brittlebush (*Encelia virginensis*), desert mallow (*Sphaeralcea ambigua*), cacti (*Opuntia* spp.), and Mojave yucca (*Yucca schidigera*). This community typifies Mojave Desert scrub vegetation.

At upper elevations within this range, Joshua tree (*Yucca brevifolia*) occurs and often forms a distinctive Mojave Desert woodland community. While it is rarely the dominant species in terms of numbers or cover in these communities, the Joshua tree's proportionate biomass in the local area may be appreciable, and its mature height of up to 20 feet contributes to its visual domination over the surrounding low shrubs.

Where soils are especially alkaline and clayey, as on valley bottoms and dry lake beds (playas) at the lowest elevations, saltbush, especially four-wing saltbush (*Atriplex canescens*) and shadscale (*A. confertifolia*), dominate the vegetation, making them the characteristic species in the saltbush community, which is also commonly referred to as salt desert or shadscale scrub. The saltbush community is especially prevalent in a broad transition zone between the Mojave Desert and Great Basin. The introduced salt cedar (*Tamarix ramosissima*) occasionally occurs on playa margins and in desert washes on the South Range.

Mixed scrub vegetation typical of the Mojave Desert occurs on ISAFAF, where several associations including creosote bush, bur-sage, saltbush, and Joshua tree can be distinguished (Dames & Moore 1996).

At higher elevations in the Mojave Desert, approximately 4,000 to 6,000 feet, the blackbrush community may predominate. This community includes blackbrush (*Coleogyne ramosissima*),

ephedras, turpentine-broom (*Thamnosma montana*), and range ratany (*Krameria parvifolia*). Current research suggests that the blackbrush community was more widespread in previous centuries and is currently experiencing widespread range reduction (Lei, in press).

Above 5,000-6,000 feet, pinyon-juniper or Great Basin conifer woodland is typical of the higher elevations throughout the Great Basin Desert and occurs more locally in parts of the Mojave Desert regions. At these higher elevations, increased precipitation and lowered temperatures permit the development of this woodland type, consisting of trees or large shrubs less than 45 feet in height. Single leaf pinyon (*Pinus monophylla*) and Utah juniper (*Juniperus osteosperma*) are the dominant woody species. On the South Range, blackbrush is a frequent understory dominant. Other shrub associates include joint fir (*Ephedra viridis*), rabbitbrush (*Chrysothamnus* spp.), and (primarily on the North Range) sagebrush (*Artemisia* spp.). Mixed sagebrush-pinyon-juniper communities are more typical of the mountains of the North Range and elsewhere in the Great Basin desert. Although much more widespread in the lowlands during the last glacial age, post-glacial warming and drying trends have led to the restriction of pinyon-juniper woodland to the highest mountains of the South Range (Spaulding 1985, 1990).

3.8.2.2 NORTH RANGE

The southwestern part of the North Range is transitional between the Mojave Desert and Great Basin and supports a mixture of community types, including creosote bush scrub, Joshua tree woodland, pinyon-juniper woodland, a transitional mixed desert scrub community, Great Basin sagebrush (*Artemisia tridentata*) scrub, black sagebrush (*Artemisia nova*) scrub, and a sparsely vegetated rock outcrop community (TNC 1995). Northward, the North Range is within the Great Basin Desert, a floristic region defined by Shreve (1942) as being typified by sagebrush and saltbush vegetation north of about the latitude of Beatty, Nevada. In this region winter temperatures are too low to support plants such as creosote bush that are typical of the warmer deserts of the southwest.

The hydrographic Great Basin was described and named by J.C. Fremont in 1844. Fremont recognized that the valley floors he encountered while crossing over multiple mountain ranges on his east-west travels did not have hydrologic outlets, a condition called endorheic (Hubbs et al. 1974). The Great Basin is a collection of endorheic basins that lie between the north-south trending mountain ranges. Most of the precipitation that falls, the bulk of it as snow, remains in the region until it is absorbed into the ground or evaporated, but is not transported out of the region by surface flow. Though warm in the summer and possessing low relative humidity throughout the year, low temperatures and typically strong winds during the winter make this one of the coldest desert regions in the United States.

The vegetation of the basin floors of the North Range is typified by shadscale and greasewood (*Sarcobatus vermiculatus*). Either of these halophytic (salt-tolerant) shrubs may occur in relatively monotypic stands, or may include winter fat (*Krasheninnikovia [=Ceratoides, Eurotia] lanata*) and green molly (*Kochia americana*) as co-dominants. Most of the middle and upper elevation bajadas are dominated by the sagebrush-pinyon-juniper community. Additional species that occur in this

community include: rabbitbrush species, joint fir, and occasional Joshua trees. Scattered Utah juniper can occur on the flanks of hills near the upper limit of sagebrush vegetation. The blackbrush community reaches its northernmost limit on upper bajadas below the west face of the central Groom Range mountains (Beatley 1976). Elsewhere, blackbrush vegetation occurs in the southerly portions of the North Range as a transitional community between the shadscale community and sagebrush-pinyon-juniper community.

The dominant vegetation type in the North Range mountains above approximately 5,000 feet elevation is pinyon-juniper woodland, with big sagebrush dominating the shrub layer. White fir (*Abies concolor*) occurs at elevations above approximately 8,000 feet on Bald Mountain in the Groom Range (Beatley 1976) and elsewhere on North Range, with single-leaf pinyon and limber pine (*Pinus flexilis*).

Historically, wild horses have concentrated around water sources and have severely impacted the vegetation for many miles around areas that provide accessible water (Air Force 1997g). The effects of horse grazing are strongest where the vegetation provides palatable forage species, e.g., in salt desert scrub vegetation of the Kawich Valley (Air Force 1997g). Current utilization levels are projected to be light to moderate (35 to 45 percent [USFWS 1998]). On the TTR, DOE has fenced areas known as "Clean Slate Sites" that restrict people and animals from contaminated areas. The Clean Slate exclosures have taller shrubs and grasses than adjacent grazed sites, and species abundance between the grazed and ungrazed sites appears quite different. Plants outside the exclosures are smaller, which is an indicator of reduced vigor resulting from heavy use, versus no use inside the exclosure. However, with the utilization being reduced to a light to moderate rate, full recovery of plant vigor and production is expected. A joint Air Force-BLM program to construct horse exclosures around seeps and springs that are outside the Wild Horse Management Area is in progress and should allow surrounding vegetation to recover and improve the quality of surface water for other types of wildlife.

3.8.2.3 LANDS BENEATH MOA AIRSPACE

The northern to northeastern parts of the MOA airspace overly Great Basin Desert vegetation characterized by shadscale and sagebrush scrub in the valleys and pinyon-juniper woodland (often with sagebrush as a dominant understory) on the mountains, between elevations of 6,000 and 8,000 feet. The southern parts of the MOA airspace overlie creosote bush and shadscale scrub in the valleys and on lower mountain slopes, with pinyon-juniper woodland on the mountains. The higher mountain ranges (e.g., the Kawich, Quinn, Bristol, and Sheep ranges) provide extensive areas above 8,000 feet in elevation and support montane coniferous forests of white fir (*Abies concolor*) and limber pine (*Pinus flexilis*), with lesser amounts of ponderosa pine (*Pinus ponderosa*) (Cronquist et al. 1972). Other noteworthy vegetation includes an unusually extensive ponderosa pine forest on the Highland Range, and bristlecone pines in the Sheep Range, Quinn Canyon Range, and on Irish Mountain (Charlet 1996).

Desert spring and marsh habitats are relatively abundant along the White River and Pahranagat Valley (into which the river flows). Riparian (streambank) scrub and woodland vegetation,

including willows (*Salix* spp.) and cottonwoods (*Populus fremontii*), occurs along the White River-Pahranagat Valley, Meadow Valley Wash, and sporadically along mountain streams. As on the South Range, low-elevation desert springs and washes often support a riparian desert scrub association.

3.8.3 Wildlife

Information regarding wildlife species' presence in different habitats or specific regions of NAFR is principally based on data provided in the draft INRMP (Air Force 1997g), reports on specific resources produced for the Nellis Environmental Management Directorate (Air Force 1997g, 1997b), and NAFR Resource Plan and Environmental Impact Statement (BLM 1989). Information on the MOA airspace areas comes from unpublished reports prepared as part of the NEPA evaluation of the MX Missile program (Air Force 1981).

3.8.3.1 SOUTH RANGE

Wildlife in the vicinity of the South Range includes species that are primarily associated with Mojave Desert scrub and woodland habitats (see section 3.8.2). A variety of migratory and widely distributed species also occur in limited numbers where surface water is available (see section 3.8.4). Resident and migratory wildlife include several species having special status or otherwise considered sensitive by state and federal governments (section 3.8.5, Special Status).

Common mammals of the South Range include coyote (*Canis latrans*), badger (*Taxidea taxus*), black-tailed jackrabbit (*Lepus californicus*), and desert kit fox (*Vulpes macrotis*). These species can be found in all habitat types in low numbers, predominately in areas without heavy human disturbance. Desert bighorn sheep (*Ovis canadensis nelsoni*) prefer the roughest and remotest habitat on or near the mountain tops, although this species will move farther down the slopes during the winter. Wild burros (*Equus asinus*), which escaped or were released periodically over the last 200 years, are found in low numbers within the creosote bush scrub habitat. Mule deer *(Odocoileus hemionus*), mountain lion (*Felis concolor*), and bobcat (*Lynx rufus)* occur in the mountains of the South Range, although these large mammals are more numerous on the North Range.

Common small mammals include whitetailed antelope squirrel (*Ammospermophilus leucurus*), Merriam's kangaroo rat (*Dipodomys merriami*), longtailed pocket mouse *(Perognathus formosus*), cactus mouse (*Peromyscus eremicus*) and southern grasshopper mouse (*Onychomys torridus*). These rodent species are normally found in loose sandy soils in areas with creosote bushes whereas the canyon mouse (*Peromyscus crinitus*) and desert woodrat (*Neotoma lepida*) are associated with rocky soils, canyons, and Joshua trees.

There are up to 20 species of bats occurring on NAFR. Initial survey results are discussed under section 3.8.3.2, North Range, where most of the survey work was done.

An Air Force-commissioned bird survey in 1996 (Air Force 1997b) documented the presence of 114 avian species on NAFR. The report summarized avian use of the desert scrub and higher elevation woodland communities as relatively low through much of the year, particularly for wintering and

breeding. Springs and ponds supported the greatest number of birds although the wetland habitat makes up only a small proportion of NAFR.

Birds present throughout the South Range include the common raven (*Corvus corax*), which is found throughout all habitat types, horned lark (*Eremophila alpestris*), loggerhead shrike (*Lanius ludovicianus*), mourning dove (*Zenaida macroura*), sage sparrow (*Amphispiza belli*), black-throated sparrow (*Amphispiza bilineata*), burrowing owl (*Athene (=Speotyto) cunicularia*), greater roadrunner (*Geococcyx californianus*), lesser nighthawk (*Chordeiles acutipennis*), and, depending on water sources, Gambel's quail (*Callipepla gambelii*). All of the foregoing are regularly present in creosote scrub. The variety of bird species normally increases where Joshua trees, riparian vegetation, or large cacti are present. The cactus wren (*Campylorhyncus brunneicapillus*) is associated with stands of cholla cactus. Scott's oriole (*Icterus spurius*) are occasionally observed nesting in Joshua trees, and phainopepla (*Phainopepla nitens*), ash-throated flycatcher (*Myiarchus cinerascens*) and black-tailed gnatcatchers *(Polioptila melanura*) are associated with riparian scrub habitat that may occur around springs.

Raptors are found in a variety of habitats and include red-tailed hawk (*Buteo jamaicensis*), American kestrel (*Falco sparverius*), golden eagle (*Aquila chrysaetos*), prairie falcon (*Falco mexicanus*) and, on rare occasions, the peregrine falcon (*Falco peregrinus).* Up to 18 species of raptors are expected to use NAFR during the winter. Raptors that are expected to breed on NAFR include ferruginous hawk, red-tailed hawk, sharp-shinned hawk, Cooper's hawk, golden eagle, and six species of owls (Air Force 1997b).

Bird species that are associated with urbanized areas include house finch (*Carpodacus neomexicanus*), house sparrow (*Passer domesticus*), European starling *(Sturnus vulgaris*), and white-crowned sparrow (*Zonotrichia leucophrys*). Several migratory songbirds such as yellow-rumped warbler (*Dendroica coronata*), Townsend's warbler (*Dendroica townsendi*), and orange-crowned warbler (*Vermivora celata*) will use the habitat surrounding the desert springs and open water habitats during migration and occasionally for nesting, making this habitat a valuable resource in an otherwise dry and sparsely vegetated area. Gambel's quail (*Callipepla gambelii*) is also commonly associated with water sources in desert scrub habitats.

Reptiles are especially adapted to drought conditions and extreme temperatures and are therefore well represented in this area. The most notable reptile species found in the Mojave creosote scrub habitat is the desert tortoise (*Gopherus (=Xerobates) agassizii*). Lizard species include side-blotched lizard (*Uta stansburiana*), California whiptail, (*Cnemidophorus tigris*), zebra-tailed lizard (*Callisaurus draconoides*), desert spiny lizard (*Sceloporus magister*), desert night lizard (*Xantusia vigilis*), chuckwalla lizard (*Sauromalus obesus*), and desert horned lizard (*Phrynosoma platyrhinos*). Snakes include the coachwhip (*Masticophis flagellum*), western patch-nosed snake (*Salvadora hexalepis*), gopher snake (*Pituophis melanoleucus*), western shovel-nosed snake (*Chionactis occipitalis*), and the Mojave rattlesnake (*Crotalus scutulatus*).

The limited surface water habitat and desert springs habitat within the South Range provide extremely valuable resources for wildlife species. The diversity of plants and insects found in

these normally well-vegetated areas provide an important food base to a variety of wildlife species. This habitat is especially important for migrating birds. More common bird species nest and forage in the vegetation year-round while mammals and reptiles forage and make their homes within the understory. Two species of amphibians, the western spadefoot toad (*Scaphiopus hammondi*) and the western toad (*Bufo boreas*) may occur near natural or man-made bodies of water. There are no native fish populations on NAFR.

The dry lakes or playas located on the South Range are dry most of the time and provide little resources for most wildlife species. In some years, however, during the rainy season these areas contain water and may support limited food resources for small numbers of migratory waterfowl and shorebirds.

3.8.3.2 NORTH RANGE

Wildlife in the vicinity of the North Range includes species that are primarily associated with Great Basin montane scrub, pinyon-juniper woodland, Great Basin desert scrub, desert springs and open water habitats. These habitats support numerous wildlife species including several species considered sensitive by state and federal governments (section 3.8.5, Sensitive Species).

Most of the North Range comprises Great Basin habitats, the exceptions being in the southwestern corner, which is part of the transition between Mojave and Great Basin deserts (section 3.8.2). As a result, some habitats described in the South Range section (Mojave Desert scrub and playas) are also present on the North Range, and conversely, some of the habitats described as being Great Basin habitats (Great Basin conifer woodland and Great Basin montane scrub) are present on the South Range at higher elevations. Many (but not all) wildlife species associated with these habitats will occur regardless of North or South Range distinctions. As a result, wildlife species associated with Mojave Desert habitats found in the North Range are similar to those described above in the South Range section.

Most of the common larger mammal species such as coyote, skunk, badger, and black-tailed jackrabbit that occur in the South Range habitats are similarly found in the North Range Great Basin habitats. A population of bighorn sheep occurs on Stonewall Mountain. In addition, the rougher, more densely vegetated regions in the higher elevations of the North Range also support mountain lion, bobcat, and mule deer. Pronghorn antelope (*Antilocapra americana*) and wild horses (*Equus caballus*), however, occur predominantly in desert scrub communities found in the North Range, particularly in Cactus Flat, on alluvial fans bordering Breen Creek, and in the Kawich Valley. The rodents of the Great Basin desert scrub habitat differ from those of the southern desert and include the pallid kangaroo mouse (*Microdipodops pallidus*), dark kangaroo mouse (*M. megacephalus*), sagebrush vole (*Lagurus curtatus*) and chisel-toothed kangaroo rat (*Dipodomys microps*).

Several bat species are documented on the range in a NAFR-commissioned bat survey report (Air Force 1997c). Six species of bats, of the 20 species potentially occurring in the area, were documented on NAFR including long-legged myotis (*M. volans*), fringe-tailed myotis (*M.*

thysanodes), California myotis (*Myotis californicus*), pipistrelle (*Pipistrellus hesperus*), Townsend's big-eared bat (*Plecotus townsendii*), and pallid bat (*Antrozous pallidus*). The California myotis was the most widespread and commonly observed species in the report and was found in all habitats that were sampled, including desert scrub, grassland, and woodland. Pallid bats were observed in only desert scrub communities and fringe-tailed and Townsend's big-eared bats were described as occupying a range of habitats from desert scrub to pinyon-juniper woodland. All of the bat species on NAFR primarily use caves, abandoned mines, trees, and abandoned buildings for roosts. Several abandoned mine shafts were documented as having bats presently roosting in them. Although these species may be present throughout the NRC, their preferred foraging and roost habitat is usually near open water or desert springs habitat.

Bird species typical of the sagebrush community include the sage thrasher *(Oreoscoptes montanus*), sage sparrow, and horned lark. Other species observed less frequently include the green-tailed towhee (*Pipilo chlorurus*), mourning dove, greater roadrunner, common nighthawk, western meadowlark (*Sturnella neglecta*), and common raven. Chukars (*Alectoris chukar*) have been introduced into the area and survive in rocky habitat and desert scrub near freshwater habitat. Raptors regularly observed in the area are similar to those found in the Mojave desert scrub habitat with Swainson's (*Buteo swainsoni*) and ferruginous (*B. regalis*) hawks slightly more common in the north.

The pinyon-juniper woodland supports the greatest bird diversities in the region. During spring, species such as the blue-gray gnatcatcher (*Polioptila caerulea*), gray vireo (*Vireo vicinior*), and black-throated gray warbler (*Dendroica nigrescens*) forage on insects in the dense vegetation. Plain titmouse (*Parus inornatus*), gray flycatchers (*Empidonax wrightii*), pinyon jays (*Gymnorhinus cyanocephalus*), Townsend's solitaire (*Myadestes townsendi*), and house finch are year-round residents of this habitat.

Reptiles are less abundant in the North Range, which is colder than the Mojave Desert Scrub habitat. Some reptile species found in the North Range are also observed in the South Range (side-blotched and whiptail lizards). Additional reptile species or subspecies common to the Great Basin habitats include sagebrush lizard (*Sceloporus graciosus*), leopard lizard *(Gambelia wisilenii*), and Great Basin (*Crotalus viridis luteosus*) and Hopi (*C. v. nuntius*) rattlesnakes. Amphibians on the North Range are restricted to areas in the vicinity of water and include the Great Basin spadefoot toad (*Scaphiopus intermontanus*).

3.8.3.3 LANDS BENEATH MOA AIRSPACE

The foregoing discussion of wildlife on the North Range is generally applicable to the MOA airspace, which overlies similar habitats, with qualifiers as noted below.

- Mule deer use of mountain ranges under the MOA airspace appears to be somewhat greater than on the North Range, with important winter range habitat in the Coal Valley and at lower elevations on the Kawich Range (Air Force 1981).

- Bighorn sheep occur on most of the mountain ranges that are overlapped by the MOA airspace east of the land withdrawal area, including on the Sheep and East Desert ranges that are part of the DNWR (Air Force 1981; USFWS 1998).

- Pronghorn antelope occur primarily under the northwestern part of the MOA airspace, with key habitat areas, including winter range and/or breeding grounds, along the foothills and adjacent valleys of the Kawich, Reveille, and Quinn ranges (Air Force 1981).

- Important waterfowl habitats under the MOA airspace include Bear Paw Lake in the north; and along the White River-Pahranagat Valley-Muddy River drainages (including the Key-Pittman Wildlife Management Area and Pahranagat National Wildlife Refuge) and Meadow Valley Wash in the southeastern part (Air Force 1981).

3.8.4 Aquatic and Wetland Habitats

3.8.4.1 NORTH AND SOUTH RANGE

Aquatic and wetland habitats are extremely limited on NAFR. The major surface water resources, consisting of known seeps, springs, ponds (both natural and artificial), and one intermittent stream (Breen Creek) on the range were evaluated in 1996 (Air Force 1996c; 1997g). These water resources are shown in Figures 3.8-1a and 1b and on Table 3.8-1. Additional information on the surface waters of NAFR was compiled in the Water Requirements Study for NAFR (Air Force 1998b), as discussed in section 3.6 (Figure 3.6-1, Table 3.6-3). Additional data on water resources in and around Emigrant Valley were obtained from BLM (1995). Appendix G provides additional information, including plant and wildlife species, current conditions, and potential jurisdictional status under Section 404 of the CWA. Playas and other seasonally or ephemerally wet areas have not been systematically investigated, but some playas may be used in the spring by migratory birds (Air Force 1981; Dames & Moore 1996). During some years, migratory waterfowl may use areas at Mud Lake, Cactus Flat, and Gold Flat on the North Range; and Indian Springs Valley and Three Lakes Valley on the South Range (Air Force 1981).

The wetland inventory conducted on NAFR focused primarily on the current and potential value of existing surface water resources to wildlife. Most of NAFR's surface waters are heavily impacted by wild horses or human alteration. This limits their value to wildlife, and it makes an assessment of their jurisdictional status problematic (Air Force 1996c). A joint Air Force-BLM program to create horse exclosures around water sources while maintaining access for other types of wildlife should improve the quality of water resources for wildlife on NAFR.

The primary functions of these surface waters on NAFR are as wildlife habitat, providing a critical resource that is limiting to many wildlife species living in or migrating through this arid environment. Groundwater recharge is another important function provided by Breen Creek. Aquatic biota associated with NAFR's surface waters have not been sampled. Native fishes are not known or expected to occur because of the lack of perennial pools of water of sufficient extent to sustain populations during drought. Native amphibian or invertebrate taxa could be present but

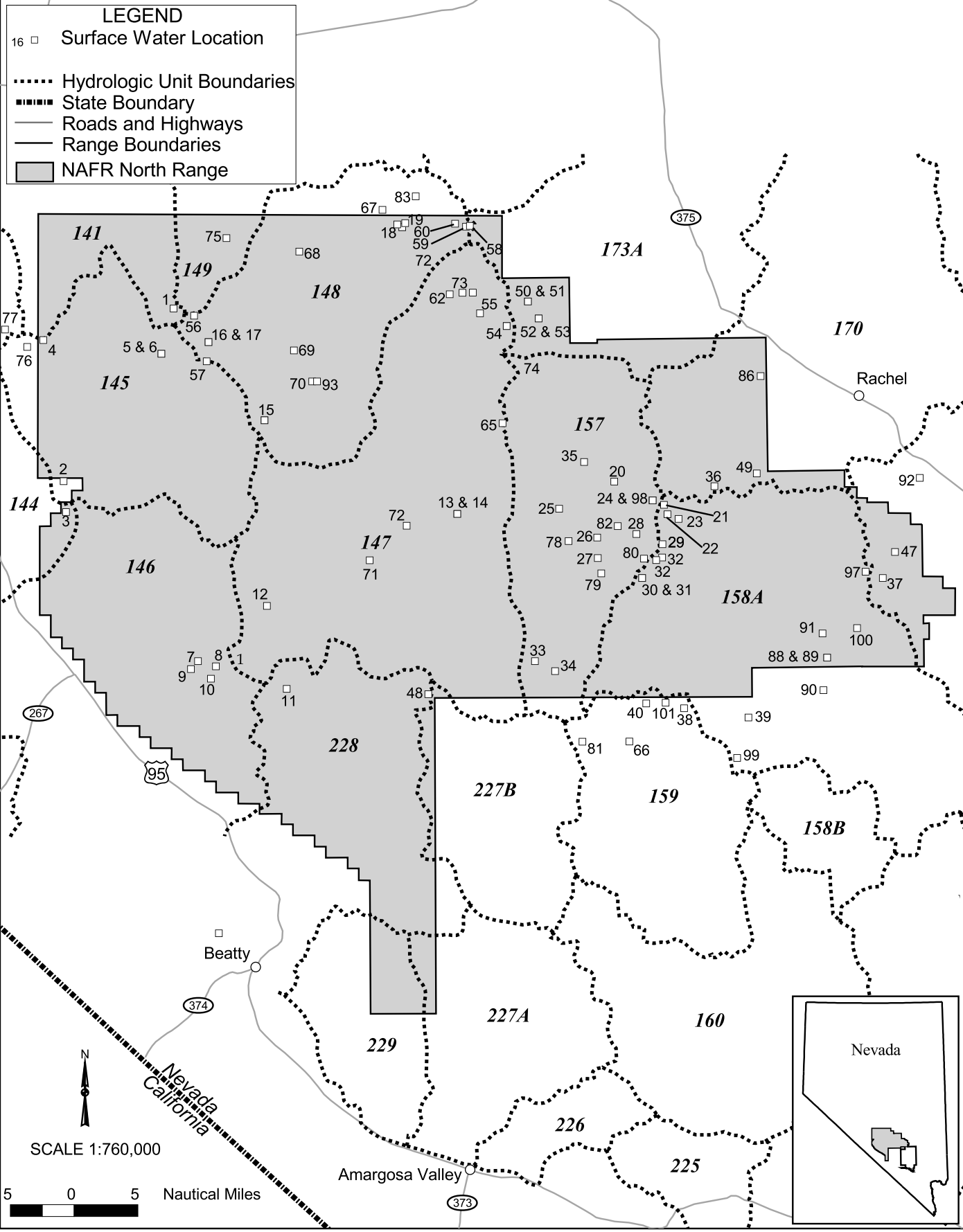


Figure 3.8-1a. Surface Water Resources on the North Range

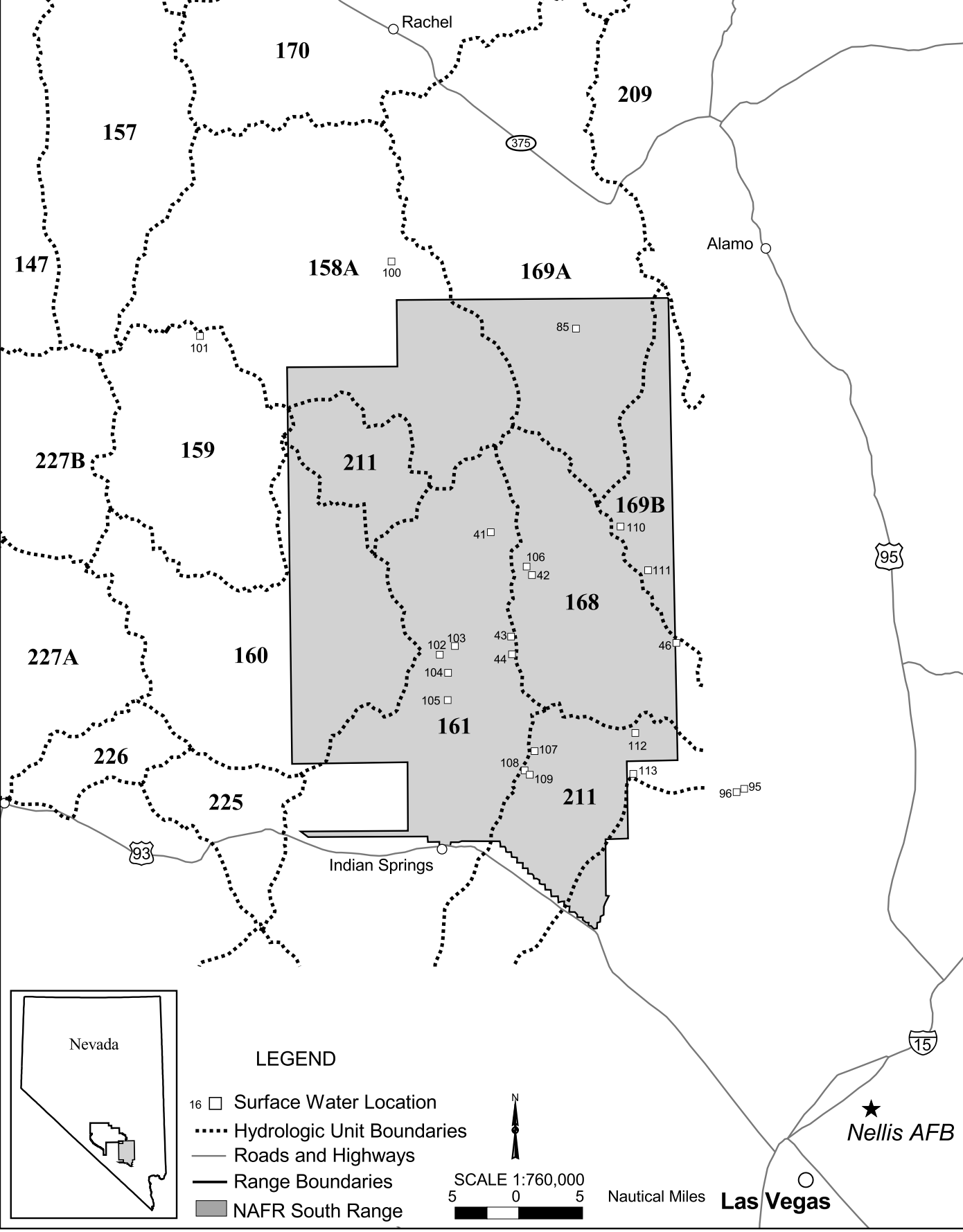


Figure 3.8-1b. Surface Water Resources on the South Range

Table 3.8-1. Surface Water Resources on NAFR

Basin Name	*Basin No.*	*Common Water Source Name*	*Ref. No.*	*Owner*	*Location*	NVSWEO Appropriation Information				
						Application No.	*Certificate No.*	*Status*	*Beneficial Use*[2]	*Permit Amount (AFY)*
	161	Spotted #1	102	Unknown	R56E T13S S8 SW SE	Unknown	Unknown	Unknown	Wildlife	Unknown
	161	Spotted #2	103	Unknown	R56E T13S S9 NE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	161	Foggy Guzzler	104	Unknown	R56E T13S S20 SE NE	Unknown	Unknown	Unknown	Wildlife	Unknown
	161	Patches Guzzler	105	Unknown	R56E T14S S5 NE NE	Unknown	Unknown	Unknown	Wildlife	Unknown
	168	Indian Canyon Guzzler	106	Unknown	R57E T11S S35 SE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	168	Dain Peak Guzzler	107	Unknown	R57E T14S S27 SE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	211	Heaven's Well Guzzler	108	Unknown	R57E T15S S4 SE NW	Unknown	Unknown	Unknown	Wildlife	Unknown
	211	Heaven's Well Tinaja	109	Unknown	R57E T15S S3 SW SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	169	Tommy Guzzler	110	Unknown	R59E T11S S17 NW SE	Unknown	Unknown	Unknown	Wildlife	Unknown
	169	Chuckwalla Guzzler	111	Unknown	R59E T12S S3 NE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	211	White Sage Guzzler	112	Unknown	R59E T14S S19 NE SW	Unknown	Unknown	Unknown	Wildlife	Unknown
	211	Blacktop Guzzler	113	Unknown	R59E T15S S7 NE NW	Unknown	Unknown	Unknown	Wildlife	Unknown
Ralston Valley	141	Unnamed Seep	1	USA / USAF	NW SE S13 T2S R45E	7357	2253	Assigned	Stock	0.9
Lida Valley	144	Stonewall Spring	2	USA / USAF	SE SE S32 T4S R44E	12362	3772	Assigned	Stock	7.2
	144	Jerome Spring	3	USA / USAF	SW SE S16 T5S R44E	5931	850	Assigned	Stock	18.1
Stonewall Flat	145	Wildhorse Spring	4	USA / USAF	SE NW S31 T2S R443	3908	1581	Assigned	Stock	2.5
	145	Alkali Spring	5	USA / USAF	SW NW S5 T3S R46E	5929	848	Assigned	Stock	18.1
	145	Alkali Spring	6	USA / USAF	SW NW S5 T3S R46E	12784	4167	Assigned	Stock	7
	145	Urania Mine Seep	57	Not filed	S10 T3S R46E	N / A	N / A	N / A	N / A	0
Stonewall Flat	145	Cane Spring	76	USA / USAF	SW SW S36 T2S R43E	3909	1582	Assigned	Stock	2.53
	145	Tognoni Spring	77	USA / USAF	SW NE S28 T2S R43E	7730	1542	Assigned	Stock	3.64
Sarcobatus Flat	146	Monte Cristo Spring	7	Lamb	SW SW S28 T7S R46E	3942	2378	Assigned	Stock	2
	146	Rock Spring	8	Cook	SE SW S26 T7S R46E	6022	851	Assigned	Stock	4.3
	146	Trappman Spring	9	Cook	NW SE S32 T7S R46E	5173	856	Assigned	Stock	10.9
	146	Tule George Spring	10	Cook	NW SE S3 T8S R46E	5540	853	Assigned	Stock	1.4
Gold Flat	147	Pillar Spring	11	Calvin	NE NE S10 T8S R46E	13283	4664	Assigned	Stock	8
	147	Larry's Seep	12	Siedentopf	NW NE S8 T7S R47E	10863	3141	Assigned	Stock	3.6
	147	Jackpot Reservoir	13	USA / USAF	SE SE S9 T5S R50E	11609	4343	Assigned	Stock	7
	147	Unknown	14	Not filed	SE SE S9 T5S R50E	N / A	N / A	N / A	N / A	0
	147	Rose Spring	54	USA / USAF	SE SE S24 T2S R50E	V02374	N / A	Vested	Stock	21.7
	147	Rose Spring	54	N / A	SE SE S24 T2S R50E	13317	N / A	Denied	Stock	0
	147	Log Spring	55	Not filed	S23 T2S R50E	N / A	N / A	N / A	N / A	0
	147	Coral Spring	62	N / A	NE NE S9 T2S R50E	13316	N / A	Denied	Stock	0
	147	Nixon #1	71	USA / USAF	SW NW S7 T6S R49E	V02371	N / A	Vested	Stock	18.1
	147	Nixon #2	72	USA / USAF	NE NW S27 T5S R49E	V02372	N / A	Vested	Stock	18.1
	147	Tunnel Spring	73	USA / BLM	SE SE S4 T2S R50E	V02373	N / A	Vested	Stock	7.2
Cactus Flat	148	Antelope Spring	15	USA / USAF	SW NW S4 T4S R47E	13288	4170	Assigned	Stock	4.8
	148	Antelope Spring	15	N / A	NW SW S4 T4S R47E	13467	N / A	Denied	Stock	0
Cactus Flat	148	Cactus Spring	16	USA / USAF	SE NW S34 T2S R46E	1580	377	Assigned	Stock	7.2
	148	Cactus Spring	17	USA / USAF	SE NW S34 T2S R46E	12785	4168	Assigned	Stock	7.1

Table 3.8-1. Surface Water Resources on NAFR

Basin Name	*Basin No.*	*Common Water Source Name*	*Ref. No.*	*Owner*	*Location*	NVSWEO Appropriation Information				
						Application No.	*Certificate No.*	*Status*	*Beneficial Use*[2]	*Permit Amount (AFY)*
	148	Silverbow Spring	18	USA / USAF	NW NE S9 T1S R49E	2376	N / A	Assigned	Stock	18.1
	148	Silverbow Spring	18	USA / USAF	NW NE S9 T1S R49E	13625	3956	Assigned	Stock	21.7
	148	Silverbow Spring	18	N / A	SW SE S4 T1S R49E	13315	N / A	Denied	Stock	0
	148	Silverbow Creek	19	USA / USAF	NW SE S4 T1S R49E	4943	1111	Assigned	Irrigation & Domestic	108.3
	148	Stealth Seep	56	Not filed	S22 T2S R46E	N / A	N / A	N / A	N / A	0
	148	Sandeen Spring	59	Not filed	S9 T1S R50E	N / A	N / A	N / A	N / A	0
	148	Thunderbird Spring	60	Not filed	S8 T1S R50E	N / A	N / A	N / A	N / A	0
	148	Stinking Springs	67	USA / USAF	SW NW S6 T1N R49E	V02367	N / A	Vested	Stock	7.2
	148	Fork Spring	68	USA / USAF	NW NW S22 T1S R47E	V02368	N / A	Vested	Stock	14.5
	148	N. Antelope Reservoir	69	USA / USAF	SE NE S2 T3S R48E	V02369	N / A	Vested	Stock	14.5
	148	Antelope Reservoir	70	USA / USAF	NW NE S19 T3S R48E	V02370	N / A	Vested	Stock	18.1
	148	Corral Spring	74	USA / BLM	NW NE S8 T1S R50E	V02375	N / A	Vested	Stock	14.5
	148	Silverbow Canyon	83	USA / USAF	NW SW S23 T1N R49E	4910	1066	Assigned	Irrigation & Domestic	144
	148	Unnamed	93	N / A	NW E S19 T3S R48E	14754	N / A	Denied	Stock	N / A
Stone Cabin Valley	149	Reservoir #2	75	USA / BLM	NE NE S14 T1S R46E	12692	3521	Assigned	Stock	13.2
Kawich Valley	157	Coyote Pond	20	USA / Fallini	SE NE S5 T4S R51.5E	12692	3521	Assigned	Stock	22.4
	157	Horse Spring	21	USA / BLM	NE NE S1 T5S R52E	12044	3454	Assigned	Stock	5.3
	157	Unnamed Spring	22	USA / USAF	NW NE S7 T4S R53E	55322	14606	Assigned	Wildlife	4.6
Kawich Valley	157	Unnamed Spring	23	USA / USAF	SE SE S8 T5S R53E	55321	14605	Assigned	Wildlife	9
	157	Kawich Tank	25	USA / Fallini	NW SW S13 T5S R51E	11865	3297	Assigned	Stock	21.7
	157	Lamb's Pond	26	USA / USAF	NE NE S24 T5S R51E	11669	3266	Assigned	Stock	4.6
	157	Sundown Reservoir	27	USA / USAF	NE SE S36 T5S R51E	11606	3259	Assigned	Stock	4.6
	157	Wildcat Spring	28	USA / USAF	SE SW S31 T5S R53E	3887	690	Assigned	Stock	2.2
	157	Gold Spring	29	USA / USAF	SW SW S1 T6S R52E	12043	3453	Assigned	Stock	4.7
	157	Indian Spring	39	Lamb	NW NW S11 T6S R52E	2359	208	Assigned	Stock & Domestic	2.8
	157	Indian Spring	31	USA / USAF	SW NW S11 T6S R52E	11608	3261	Assigned	Stock	4.6
	157	Johnnie's Water	32	Watkins	SE SE S12 T6S R52E	3746	334	Assigned	Stock	18.1
	157	Johnnie's Spring	33	N / A	SE SE S12 T6S R52E	3894	N / A	Denied	Stock & Domestic	0
	157	Black Rock Spring	33`	USA / USAF	NW SE S22 T7S R51E	11625	3263	Assigned	Stock	4.6
	157	Kihibab Spring	34	USA / USAF	NE NE S35 T7S R51E	11660	3284	Assigned	Stock	4.6
	157	Antelope Reservoir	35	USA / Fallini	SW SW S29 T4S R51E	11626	3536	Assigned	Stock	4.3
	157	Granite Spring	65	N / A	NE NE S12 T4S R50E	13318	N / A	Denied	Stock	0
	157	Live Oak Spring	81	USA / USAF	SE SE S7 T8S R51 1 / 2E	11610	3262	Assigned	Stock	4.56
	157	Pony Spring	82	USA / USAF	SW NW S26 T5S R52E	11668	3265	Assigned	Stock	4.56
Emigrant Valley (A&B)	158	Chalk Spring	36	USA / USAF	SW SE S5 T5S R54E	3889	688	Assigned	Stock	0.2

Table 3.8-1. Surface Water Resources on NAFR

Basin Name	*Basin No.*	*Common Water Source Name*	*Ref. No.*	*Owner*	*Location*	NVSWEO Appropriation Information				
						Application No.	*Certificate No.*	*Status*	*Beneficial Use*[2]	*Permit Amount (AFY)*
	158	Tub Spring	38	USA / Army	SW NE S20 T8S R53E	3744	332	Assigned	Stock	18.1
	158	Cane Spring	39	Lincoln Land	SW NW S17 T9S R56E	6842	779	Assigned	Stock	22.4
	158	Miners Spring	88	USA / USAF	S25 T7S R55E	V01379	N / A	Vested	Stock	36.24
	158	Disappointment Spring	89	USA / USAF	S25 T7S R55E	V01370	N / A	Vested	Stock	36.24
	158	Belted Reservoir #2	90	USA / USAF	SE NE S11 T8S R55E	10595	3130	Assigned	Stock & Domestic	5
Emigrant Valley (A&B)	158	Nanquinta Reservoir #1	91	USA / USAF	NE NE S14 T7S R55E	10594	3129	Assigned	Stock & Domestic	5
	158	Reservoir #4	99	USA / USAF	NW NW S10 T9S R54E	10597	2845	Assigned	Stock	5
	158	Cane Spring	100	USA / USAF	SE SW S25 T7S R55E	V01375	N / A	Vested	Stock	72.4
Yucca Flat	159	Wire Grass Spring	40	USA / BLM	NE NE S18 T8S R53E	3743	376	Assigned	Stock & Domestic	18.1
	159	White Rock Spring	66	USA / ARMY	NE NE S4 T9S R52E	3896	692	Assigned	Stock	4.3
	159	Oak Springs	101	USA / ARMY	SW SW S13 T8S R52E	3745	333	Assigned	Stock	18.1
Indian Springs Valley	161	Quartz Spring	41	USA / USAF	SE NW S20 T11S R57E	11642	3371	Assigned	Stock	0.7
	161	Tim Spring	43	USA / USFWS	NE SW S4 T13S R57E	13521	3787	Assigned	Stock	0.7
	161	Sand Spring	44	USA / USFWS	NE NW S15 T13S R57E	13520	3786	Assigned	Stock	
Three Lake Valley (Northern)	168	Indian Spring Canyon	42	USA / USFWS	NE NW S2 T12S R57E	12631	3535	Assigned	Stock	7.2
	168	Shale Cut Spring	45	USA / BLM	NE SW S1 T13S R59E	3253	2620	Assigned	Stock & Domestic	2.2
	168	White Rock Spring	46	USA / USAF	NW SE S12 T13S R59E	3254	2621	Assigned	Stock	2.2
Tikapoo Valley (A&B)	169	Rock Spring	37	D4 ENTPR	NE NW S29 T6S R56E	57083	14625	Assigned	Stock	1.7
	169	Quail Spring	47	D4 ENTPR	SE SW S9 T6S R56E	57083	14608	Assigned	Stock	1.8
	169	Summit Spring Drainage	48	USA / BLM	NE SW S15 T8S R58E	4730	897	Assigned	Stock	18.1
	169	Cresent Valley Wash	84	USA / USAF	S T9S R59E	4333	N / A	Withdrawn	Stock	0
Tikapoo Valley (A&B)	169	Tule Spring	87	N / A	SE NW S27 T4S R58E	4746	1983	Assigned	Stock	
	169	Indian Spring	92	N / A	SE SE S2 T5S R56E	V01372	N / A	Vested	Stock	72.3
	169	Cattle Spring	97	USA / USAF	SW NE S21 T5S R56E	V01367	N / A	Vested	Stock	72.4
	169	Cliff Spring	98	USA / USAF	NW SW S29 T5S R56E	V01369	N / A	Vested	Stock	18.1
Penoyer (Sand Springs Valley)	170	Cliff Spring	24	USA / USAF	NW NE S14 T5S R52E	11605	3258	Assigned	Stock	4.56
	170	Cliff Spring	24	LAMB	NW NE S14 T5S R52E	2357	350	Assigned	Stock & Domestic	7.2
	170	Beck Spring	49	USA / BLM	NE NE S2 T5S R54E	3888	689	Assigned	Stock	1.1
	170	Pink Hills Reservoir	86	USA / BLM	NE SW S21 T3S R54E	11693	N / A	Withdrawn	Stock & Domestic	N / A
Railroad Valley (A)	173	Summer Spring	50	FALLINI	NW NW S16 T2S R51E	5662	949	Assigned	Stock	14.5
	173	Summer Spring	51	FALLINI	NW NW S16 T2S R51E	13541	3659	Assigned	Stock	14.5
	173	Cedar Spring	52	FALLINI	NW NW S22 T2S R51E	13542	3660	Assigned	Stock	18.1

Table 3.8-1. Surface Water Resources on NAFR

Basin Name	*Basin No.*	*Common Water Source Name*	*Ref. No.*	*Owner*	*Location*	NVSWEO APPROPRIATION INFORMATION				
						Application No.	*Certificate No.*	*Status*	*Beneficial Use*[2]	*Permit Amount (AFY)*
	173	Cedar Spring	53	FALLINI	NW SW S22 T2S R51E	23501	8133	Assigned	Stock	18.1
	173	Phantom Spring	58	Not Filed	S14 T1S R50E	N / A	N / A	N / A	N / A	0
	173	Shirley Spring	79	USA / USAF	NE SE S16 T6S R52E	11607	3260	N / A	Stock	4.56
Three Lake Valley (S.)	211	Unnamed	95	USA / USFWS	NE SE S12 T15S R60E	12630	3530	Assigned	Wildlife	0.72
	211	Unnamed	96	USA / USFWS	SW NE S11 T15S R60E	12633	3531	Assigned	Wildlife	0.72
Oasis Valley	228	Unnamed	94	USA / BLM	SW SE S26 T11S R46E	25628	8454	Assigned	Municipal	3.61

Notes: 1. See Figure 3.6-1a and 1b.
2. Nonspecific term used to describe beneficial use of the water.

Source: Mariah 1996 (Map #s 1-62), Air Force 1997g (Map #63-79), personal communication, Major Jeff Shea 1998 (Map #100-115).

are largely unknown. As discussed previously in section 3.8.3, migratory and resident birds and resident large mammals rely heavily on surface water.

3.8.4.2 LANDS BENEATH MOA AIRSPACE

The MOA airspace overlies important aquatic and wetland habitats associated with the White River and, downstream, the Pahranagat Valley and Muddy River (Air Force 1981). Several unique and federally protected species of fishes, as well as a number of endemic aquatic insects, occur in the large, thermal springs of Pahranagat Valley (Air Force 1981). The Meadow Valley Wash contains a narrow perennial stream that flows south into the Muddy River at Moapa. There is well-developed riparian vegetation along the banks in several areas and the stream supports beaver and native fishes (Air Force 1981). Elsewhere, habitat for fishes is limited to sections of Cherry Creek and Cottonwood Creek of the Quinn Range that support brook and/or rainbow trout (Air Force 1981). Bear Paw Lake, a seasonally flooded playa, is a major waterfowl use area (Air Force 1981).

3.8.5 Special Status Species

This section addresses special status species that are known or likely to occur on NAFR. Included are state and/or federally listed, proposed, and candidate threatened and endangered species, federal species of concern (former candidates), and other species that are of concern by virtue of rarity or socioeconomic importance (e.g., game animals).

3.8.5.1 PLANTS

Table 3.8-2 summarizes existing data on the occurrence of special status plant species on NAFR. The list includes federally listed, proposed, candidate, and federal concern species, including former USFWS category 2 candidate plants and plants included on the Nevada BLM Sensitive Species List (Appendix G); as well as plants identified by TNC (1997) as "imperiled" in Nevada or throughout their range. Appendix G provides mapped locations of species confirmed on NAFR. There are no federally listed threatened or endangered plants known or likely to occur on NAFR. A USFWS species of concern, Clokey eggvetch (*Astragalus oophorus* var. *clokeyanus*), that was previously known only from the Spring Mountains, was discovered on NAFR on the Belted Range and could occur elsewhere on NAFR. One species listed by the Nevada Department of Forestry as critically endangered, Beatley's milkvetch (*Astragalus beatleyae*), occurs on NAFR on Pahute Mesa.

Other special status plants whose occurrence on NAFR has been recently confirmed by TNC (1997) and DOE (1996a) include the following, all of which are federal species of concern:

- Eastwood's milkvetch *(Asclepias eastwoodiana)*
- Merriam bearpoppy (also known as bear poppy, bearpaw poppy) (*Arctomecon merriami*)
- Ackerman milkvetch (*Astragalus ackermanii*

Table 3.8-2. Special Status Plant Species Known or Likely to Occur on NAFR and Under Associated Airspace[1]

Scientific Name *Common Name*	*Regulatory Status[2]*	*Heritage Rank[3]*	*Description, Flowering Period*	*Distribution and Habitat (reference)*
Arctomecon californica Las Vegas bearpoppy	SOC, CE		Cespitose perennial herb, with 6-20 yellow flowers on each stalk; flowers April-May	Clark County; reported on NAFR. On barren slopes, flats, and hummocks, often on gypsum soils, in creosote bush scrub, 1,310-2,760 feet (Mozingo and Williams 1980).
Arctomecon merriami Merriam's bearpoppy	SOC, BLM	G3S2	Clumped perennial herb, with white flowers borne singly on stalks; flowers April-June	Clark, Lincoln, and Nye counties, on NAFR (40 populations on South Range, incl. ISAFAF), MOA airspace (Kane Springs Wash). Shallow gravelly soils, limestone outcrops, flats and dry lake beds, in various Mojave Desert scrub communities, 2,000-6,300 feet (Mozingo and Williams 1980; Air Force 1981; Dames & Moore 1996; TNC 1997).
Arenaria stenomeres Meadow Valley sandwort		G1S1	Clumped perennial herb; flowers in May	Clark and Lincoln counties, under MOA airspace (Las Vegas Range, S. Meadow Valley Mts.). On barren limestone cliffs and steep, rocky slopes, 3,300-3,600 feet (Mozingo and Williams 1980; Air Force 1981).
Asclepias eastwoodiana Eastwood milkweed	SOC, BLM	G2S2	Low, few-stemmed perennial herb from woody caudex; flowers May-June	Esmeralda, Lander, Nye Counties; reported on NAFR (Tonopah Test Range [DOE 1996]). Occurs in low alkaline clay hills or shallow, gravelly drainages, in shadscale scrub, 5,300-6,900 feet (Mozingo and Williams 1980).
Astragalus ackermanii Ackerman milkvetch	SOC	G2S2	Tufted perennial from woody taproot; flowers April-June	Clark and Lincoln counties, on NAFR (Sheep and Pintwater ranges). Ledges and crevices of limestone cliffs, 4,000-6,200 feet (Air Force 1981; TNC 1997).
Astragalus aequalis Clokey milkvetch	SOC, BLM	G2S2	Erect perennial herb; flowers May-June	Clark County, in Spring Mts but unconfirmed on NAFR. On dry gravelly hillsides and open ridges, limestone, in pinyon-juniper woodland, yellow pine forest, 5,905-8,400 feet (Mozingo and Williams 1980; Air Force 1981).
Astragalus amphioxus var. *musimonum* Sheep Range milkvetch	SOC, BLM	G5T2S2	Low tufted perennial herb; flowers April-June	Clark County, on NAFR (Desert Range), under MOA airspace (Las Vegas, Sheep, and East Desert ranges). On dry limestone bajadas, gentle slopes, disturbed areas, in mixed Mojave Desert scrub and pinyon-juniper woodland, 4,400-6,400 feet (Mozingo and Williams 1980; Air Force 1981; TNC 1997).
Astragalus beatleyae Beatley milkvetch	SOC / CE	G2S2	Dwarf, cespitose perennial herb; flowers in May	Nye County, on NAFR (N and E Pahute Mesa). On shallow, gravelly rhyolitic tuff soils, in barren areas, mixed scrub, and pinyon-juniper woodland, 5,600-6,800 feet (Mozingo and Williams 1980; TNC 1997).
Astragalus eurylobus Peck Station milkvetch	SOC, BLM	G2S2	Description unavailable; flowers April-June	Lincoln County, under MOA airspace (vicinity of Peck Station). On alkali clay hills at 4,650-4,950 feet (TNC 1995).

Table 3.8-2. Special Status Plant Species Known or Likely to Occur on NAFR and Under Associated Airspace[1]

Scientific Name Common Name	*Regulatory Status[2]*	*Heritage Rank[3]*	*Description, Flowering Period*	*Distribution and Habitat (reference)*
Astragalus funereus Black woolypod	SOC, BLM	G2S2	Mat-forming perennial herb; flowers March-May	Nye County; reported on NAFR and NTS below Yucca Mountain in Beatty Wash. On steep, gravelly slopes of volcanic tuff, occasionally on limestone screes, in barren areas and shadscale scrub, 3,200-7,680 feet (Beatley 1976; Mozingo and Williams 1980; TNC 1997).
Astragalus gilmanii Gilman milkvetch	SOC, BLM	G3S1	Winter annual; flowers in May	Nye County, on NAFR (N Emigrant Valley, Groom Range). On volcanic tuff, in blackbrush scrub, pinyon-juniper woodland, 5,300-6,200 feet (Air Force 1985; BLM 1992; TNC 1997).
Astragalus mohavensis var. *hemigyrus* Half-ring pod milkvetch	SOC, CE	G3T2S2	Bushy perennial herb; flowers April-June	Clark County, in Spring Mountains; Lincoln County, on NAFR (Desert Range). On limestone ledges and gravelly hillsides, with creosote, juniper, 3,400-6,070 feet (Mozingo and Williams 1980; Air Force 1981; TNC 1997).
Astragalus oophorus var. *clokeyanus* Clokey eggvetch	SOC		Low, slender perennial herb; flowers June-July	Clark County, in NW Spring Mountains (S slope below Wheeler Pass); Nye County, on NAFR (Belted Range). On NAFR in washes bordering pinyon-juniper; elsewhere on ridges and slopes in gravelly limestone soil, in sagebrush scrub, pinyon-juniper woodland, and montane forest; 6,800-9,100 feet (Mozingo and Williams 1980; TNC 1997).
Astragalus oophorus var. *lonchocalyx* Long-calyx milkvetch	SOC, BLM	G4T1S1	Low, slender perennial herb; flowers May-July	Lincoln County, N Wilson Creek Range but unconfirmed on NAFR or MOA airspace. On dry gravelly hillsides and stony flats, limestone, in pinyon-juniper woodland, associated with sagebrush, 6,000-8,500 feet (Mozingo and Williams 1980; Air Force 1981).
Astragalus remotus Remote milkvetch	SOC, BLM	G1S1	Perennial herb to subshrub; flowers April-June	Clark County, Spring Mountains and Bird Spring Range, unconfirmed on NAFR. In washes, in blackbrush scrub, 4,000-6,000 feet (TNC 1995; BRRC 1998).
Astragalus uncialis Currant milkvetch	SOC, BLM	G2S1	Small, tufted perennial; flowers in May	Northeastern Nye County, unconfirmed on NAFR or MOA airspace. On dry knolls and slopes, saline sand or limestone gravel, in shadscale scrub, 5,300-6,050 feet (Mozingo and Williams 1980).
Camissonia megalantha Cane Spring evening primrose	SOC	G2S2	Annual herb; flowers in May or June-Oct	Nye County; on NTS at Cane Spring, reported on NAFR (Tonopah Test Range [DOE 1996]). In washes on volcanic soils and on a talus seepage slope at Cane Spring, in shadscale scrub (Beatley 1976; TNC 1995).
Castilleja martinii var. *clokeyi* Clokey paintbrush	SOC	G3T2S2	Perennial herb; flowers June-July	Nye County, presumed to occur elsewhere, on NAFR (TNC 1995). On mountains in sagebrush scrub, pinyon-juniper woodland, ponderosa pine-white fir forest, 6,200-9,000 feet (Beatley 1976, TNC 1995).

Table 3.8-2. Special Status Plant Species Known or Likely to Occur on NAFR and Under Associated Airspace[1]

Scientific Name Common Name	*Regulatory Status[2]*	*Heritage Rank[3]*	*Description, Flowering Period*	*Distribution and Habitat (reference)*
Chrysothamnus eremobius Remote rabbitbrush	SOC, BLM	G1S1	Low shrub; flowers Sept-Oct	Clark County, on NAFR (Sheep and Pintwater ranges). On limestone cliffs, in sagebrush and blackbrush scrub, 4,600-7,000 feet (TNC 1997).
Cryptantha welshii Welsh's cat's-eye	SOC, BLM	G1S1	Description unavailable; flowers in May	Distribution unavailable; unconfirmed on NAFR; reported as occurring on alluvial fans, in sagebrush-blackbrush scrub, above 5,000 feet (TNC 1995).
Cymopterus ripleyi var. *saniculoides* Sanicle biscuitroot	SOC, BLM	G1S1	Perennial herb; flowers April-June	Lincoln and Nye counties, on NAFR (Tonopah Test Range, Groom Range, Kawich Valley), under MOA airspace (Pahranagat Valley). On sand dunes, sandy soil, volcanic tuff, in shadscale scrub, 3,900-6,800 feet (Air Force 1981; DOE 1996; TNC 1997).
Epilobium nevadense Nevada willowherb	SOC, BLM	G2S2	Low, shrubby perennial, with erect stems arising from prostrate branches; flowers July-Sept.	Clark County, Spring Mountains., unconfirmed on NAFR. On limestone talus slopes, in coniferous forest, 7,450-9,200 feet (Mozingo and Williams 1980).
Erigeron ovinus *Sheep fleabane*	SOC, BLM	G1S1	Perennial herb from taproot; flowers in June	Clark and Lincoln counties, on NAFR and under MOA airspace (Sheep and Desert ranges, N Pahranagat Range, Groom Range, Mt. Irish. On limestone outcrops in pinyon-juniper woodland, 6,200-8,400 feet (Air Force 1981, 1985; TNC 1997).
Frasera gypsicola Sunnyside green gentian	SOC, CE	G2S2	Perennial herb arising from short, wide root crown; flowers June-July	Northeastern Nye County, unconfirmed on NAFR or MOA airspace. On mineralized clay (fine, self-rising soil encrusted with mineral salts), in sagebrush scrub, 4,950-5,190 feet (Mozingo and Williams 1980).
Frasera pahutensis Pahute green gentian	SOC, BLM	G2S2	Low, spreading perennial herb arising from woody rootstocks; flowers May-July	Nye County, SE rim of Pahute Mesa on NTS, reportedly occurs on NAFR (Tonopah Test Range [DOE 1996]). On gravelly slopes and valley bottoms, in pinyon-juniper woodland, 7,200-7,900 feet (Beatley 1976; Mozingo and Williams 1980).
Galium hilendiae ssp. kingstonense Kingston bedstraw	SOC, BLM	G4T2S2	Dioecious, mat-forming, weak-stemmed perennial subshrub; flowers in June	Nye County, S Belted Range below Oak Spring Butte on NTS, unconfirmed on NAFR. On loose, rocky soil in ravines and gullies, in sagebrush scrub, pinyon-juniper woodland, 5,500-6,500 feet (Beatley 1976; Mozingo and Williams 1980).
Gilia heterostylus (no common name)			Annual herb; flowers April-June	Newly discovered species, on NAFR in loose sands, creosote bush scrub, 5,000 feet (TNC 1995).
Glossopetalon clokeyi Clokey greasewood	SOC	G1S1	Small shrub; flowers May-June	Clark County, unconfirmed on NAFR. On limestone cliffs in sagebrush scrub, pinyon-juniper woodland, 4,000-6,500 feet (Mozingo and Williams 1980; TNC 1995).

Table 3.8-2. Special Status Plant Species Known or Likely to Occur on NAFR and Under Associated Airspace[1]

Scientific Name Common Name	*Regulatory Status[2]*	*Heritage Rank[3]*	*Description, Flowering Period*	*Distribution and Habitat (reference)*
Jamesia tetrapetala Waxflower	SOC, BLM	G2S2	Shrub; flowers May-June	Distribution unavailable; unconfirmed on NAFR. In pinyon-juniper woodland above 5,000 feet (TNC 1995).
Lathyrus hitchcockianus Mojave sweetpea		G2S2	Diffuse perennial herb; flowers April-May.	Nye County, on NTS but not known from NAFR or related overflight areas. In washes, canyon bottoms, in sagebrush, pinyon-juniper woodland, 4,500-5,200 feet (TNC 1995).
Lewisia maguirei Maguire biscuitroot	SOC	G1S1	Fleshy perennial with succulent taproot; flowers in June	Northeastern Nye County, MOA airspace (Cherry Creek Summit in Quinn Canyon Range). On limestone scree slopes, loose soil, in pinyon-juniper woodland, 7,500-7,800 feet (Mozingo and Williams 1980; Air Force 1981).
Penstemon arenarius Nevada dune penstemon	SOC, BLM	G2S2	Shrubby perennial; flowers May-June	Nye, Mineral, and Churchill Counties, occurs south of Tolicha Peak near NAFR boundary. In sandy areas, sometimes with dark gravel pavement, in shadscale scrub, 3,990-4,400 feet (Beatley 1976; Mozingo and Williams 1980; Air Force 1981).
Penstemon bicolor ssp. *roseus* Rosy bicolored penstemon	SOC	G2T2 S2	Tall perennial herb; flowers May-June	Clark County, Dry Lake Valley but unconfirmed on NAFR or Desert MOA. On gravelly washes, roadsides, in Mojave Desert scrub associations, 1,970-5,480 feet (Mozingo and Williams 1980; Air Force 1981).
Penstemon fruticiformis ssp. *amargosae* Amargosa penstemon	SOC, BLM	G3T2S2	Many-branched perennial from woody base; flowers April-June	Western Clark and southern Nye counties, unconfirmed on NAFR. In sandy or gravelly washes, in Mojave Desert scrub associations, 3,300-5,200 feet (Mozingo and Williams 1980).
Penstemon pahutensis Pahute Mesa beardtongue	SOC, BLM	G2S2	Perennial herb arising from root crown; flowers June-July	Clark, Lincoln and Nye counties, on NAFR(Pahute Mesa), Stonewall Mountain. On loose soil, rocky areas; in barren areas and pinyon-juniper woodland, 5,800-7,500 feet (Mozingo and Williams 1980; Air Force 1981; BLM and Air Force 1987; TNC 1997).
Penstemon pudicus Bashful beardtongue	SOC, BLM	G1S1	Perennial arising from woody base; flowers June-July	Nye County, on Kawich Peak under MOA airspace. On steep mountain slopes and ridges, in pinyon-juniper woodland and montane scrub, 7,600-9,200 feet (Beatley 1976; Mozingo and Williams 1980).
Phacelia beatleyae Beatley's phacelia	SOC, BLM	G2S2	Diminutive annual herb; flowers April-May	Lincoln and Nye Counties, on NAFR (Halfpint Range, W Emigrant Valley), NTS. On gravel or volcanic tuff, along washes and in canyons, also on slopes. In barren areas, creosote bush scrub, shadscale scrub, 2,500-5,800 feet (Beatley 1976; Mozingo and Williams 1980; TNC 1997).

Table 3.8-2. Special Status Plant Species Known or Likely to Occur on NAFR and Under Associated Airspace[1]

Scientific Name Common Name	*Regulatory Status[2]*	*Heritage Rank[3]*	*Description, Flowering Period*	*Distribution and Habitat (reference)*
Phacelia parishii Parish's phacelia	SOC, BLM		Low-spreading annual herb; flowers in May	Clark, Lincoln, and Nye counties, on NAFR (Indian Springs Valley, Three Lakes Valley); also on NTS (below Mercury Ridge, S Frenchman Flat. Playas, shadscale scrub, 3,000-3,200 feet (Beatley 1976; TNC 1997).
Porophyllum pygmaeum Pygmy pore leaf	SOC, BLM	G1S1	Perennial herb; flowers April-May	Clark, Lincoln, and Nye counties, on NAFR(Desert and Sheep ranges). In limestone washes, in blackbrush scrub / Joshua tree woodland, 3,000-4,000 feet (TNC 1997).
Salvia dorrii var. *clokeyi* Clokey mountain sage	SOC, BLM	G5T2S2	Shrub; flowers May-July	Distribution unavailable; unconfirmed on NAFR. On limestone in alpine meadows above 9,000 feet (TNC 1997).
Sclerocactus blainei Blaine pincushion	SOC, BLM	G1S1	Pincushion cactus; flowers May-June	On NAFR. On alluvial fans, in sagebrush, >3,500 feet (TNC 1997).
Sclerocactus schlesseri Schlesser pincushion	SOC, BLM, CE	G1S1	Pincushion cactus; flowers May-June	Distribution unavailable, unconfirmed on NAFR. On sand with cryptogamic crust, in sagebrush scrub, 3,000 feet (TNC 1997).
Selaginella utahensis Utah spikeweed	SOC	G2S2	Nuch branched, loosely clumped perennial (non-flowering)	Clark County, unconfirmed on NAFR or in MOA airspace. Known only from steep sandstone cliffs in desert chaparral vegetation, 4,000-6,500 feet (Mozingo and Williams 1980).
Silene nachlingerae Nachlinger catchfly	SOC, BLM	G2S2	Herb, flowers in June.	Reported as occurring on NAFR, on limestone peaks in pinyon-juniper woodland, above 6,000 feet (TNC 1997).
Smelowskia holmgrenii Holmgren smelowskia	SOC		Tufted perennial with branching crown; flowers June-August	Northern Nye, southern Lander counties, unconfirmed on NAFR or MOA airspace. On cliffs, talus of schist, crevices in calcareous rocks, in montane herb associations, 6,500-11,000 feet (Mozingo and Williams 1980).
Sphaeralcea caespitosa Tufted globe mallow	SOC, BLM	G3S2	Perennial herb from thick, woody crown; flowers May-June	Northeastern Nye County, unconfirmed on NAFR or MOA airspace. On gravelly or sandy limestone soil, in shadscale scrub, 5,000-6,500 feet (Mozingo and Williams 1980).
Townsendia jonesii var. *tumulosa* Charleston ground-daisy	SOC, BLM	G2T2S2	Rosette-forming perennial; flowers March-June	Clark County, Spring and Sheep ranges; under MOA airspace but unconfirmed on NAFR. On ridges, slopes, saddles, washes and open sites, in montane coniferous forest, 6,500-10,000 feet (Mozingo and Williams 1980; Air Force 1981).
Trifolium andinum var. *podocephalum* Currant Summit clover	SOC, BLM	G3T1S1	Perennial herb	Unconfirmed on NAFR (other data unavailable) (TNC 1995)

Table 3.8-2. Special Status Plant Species Known or Likely to Occur on NAFR and Under Associated Airspace[1]

Scientific Name Common Name	*Regulatory Status[2]*	*Heritage Rank[3]*	*Description, Flowering Period*	*Distribution and Habitat (reference)*
Trifolium rollinsii Rollins clover	SOC	G4T2S2	Perennial herb	Nye County, Toiyabe Range, unconfirmed on NAFR (TNC 1995; BRRC 1997).

1. Based on correspondence from U.S. Fish and Widlife Service, December 2, 1996, supplemented with additional information compiled by The Nature Conservancy (TNC 1997). Includes species that are known or likely to occur on NAFR and adjacent traning areas and which are federally listed, proposed, or candidate threatened or endangered species; federal species of concern; are ranked by The Nature Conservancy (TNC 1997) as critically imperiled; or have been recently discovered on NAFR and are not known to occur elsewhere. See TNC (1995), BLM and Air Force (1987) for additional endemic plant taxa.

2. Status abbreviated as follows:

Federal Status

FC = Candidate for federal listing as threatened or endangered

SOC = Federal Species of Concern, indicating former candidate status and potential for reconsideration in the future.

BLM = listed on Nevada BLM Sensitive Species List (4/97).

State Status

CE = Listed as Critically Endangered by the Nevada Division of Forestry

3. TNC Rankings (TNC 1997) abbreviated as follows:

G = Global rank indicator, based on worldwide distribution at the species level

T = Trinomial rank indicator, based on worldwide distribution at the infraspecific level

S = State rank indicator, based on distribution within Nevada at the lowest taxonomic level

1 = Critically imperiled due to extreme rarity, imminent threats, or biological factors

2 = Imperiled due to rarity or other demonstrable factors

3 = Rare and local throughout its range, or with very restricted range, or otherwise vulnerable to extinction

4 = Apparently secure, though frequently quite rare in parts of its range, especially at the periphery

5 = Demonstrably secure, though frequently quite rare in parts of its range, especially at the periphery

- Sheep Range milkvetch (*Astragalus amphioxus* var. *musimonum*)
- Funeral Mountain milkvetch (*Astragalus funereus*)
- Gilman milkvetch (*Astragalus gilmanii*)
- Half-ring pod milkvetch (*Astragalus mohavensis* var. *hemigyrus*)
- Remote rabbitbrush (*Chrysothamnus eremobius*)
- Sanicle biscuitroot (*Cymopterus ripleyi* var. *saniculoides*)
- Sheep fleabane (*Erigeron ovinus*)
- Pahute Mesa beardtongue (*Penstemon pahutensis*)
- Beatley's phacelia (*Phacelia beatleyae*)
- Parish's phacelia (*Phacelia parishii*)
- Pygmy pore leaf (*Porophyllum pygmaeum*)

Occurrences of these species on NAFR are shown in Figure 3.8-2.

3.8.5.2 FISH AND WILDLIFE

LISTED, PROPOSED, AND CANDIDATE SPECIES

Wildlife species discussed in this section are state and federally listed or proposed for listing as threatened or endangered, or are candidates for listing, and are known or expected to occur on NAFR (Table 3.8-3).

Desert Tortoise

The Mojave Desert population of the desert tortoise was listed as threatened by the USFWS on April 2, 1990. The decline of this species has been attributed to disease, predation from increased raven populations, collecting, vehicle mortalities, and habitat degradation,

destruction, and fragmentation. The desert tortoise is the only federally listed wildlife species that is resident year-round on NAFR.

The species' range in Clark County is located primarily within the Mojave desert scrub habitat at elevations generally below 4,000 feet. Desert tortoises are expected to occur primarily in the Mojave desert scrub habitat on the South Range. Desert tortoises occur in flat areas, washes, bajadas and valleys and are found in a variety of plant communities including Joshua tree, Mojave yucca, creosote bush, and salt bush scrub, on a variety of soil types.

This species is active primarily in spring (early March through May) and in fall and remains underground in burrows during extremely hot (June through early September) or cold temperatures (October through late February). Tortoises may emerge from their burrows on warm winter days or during the cooler parts of the day during the summer. Tortoise diet

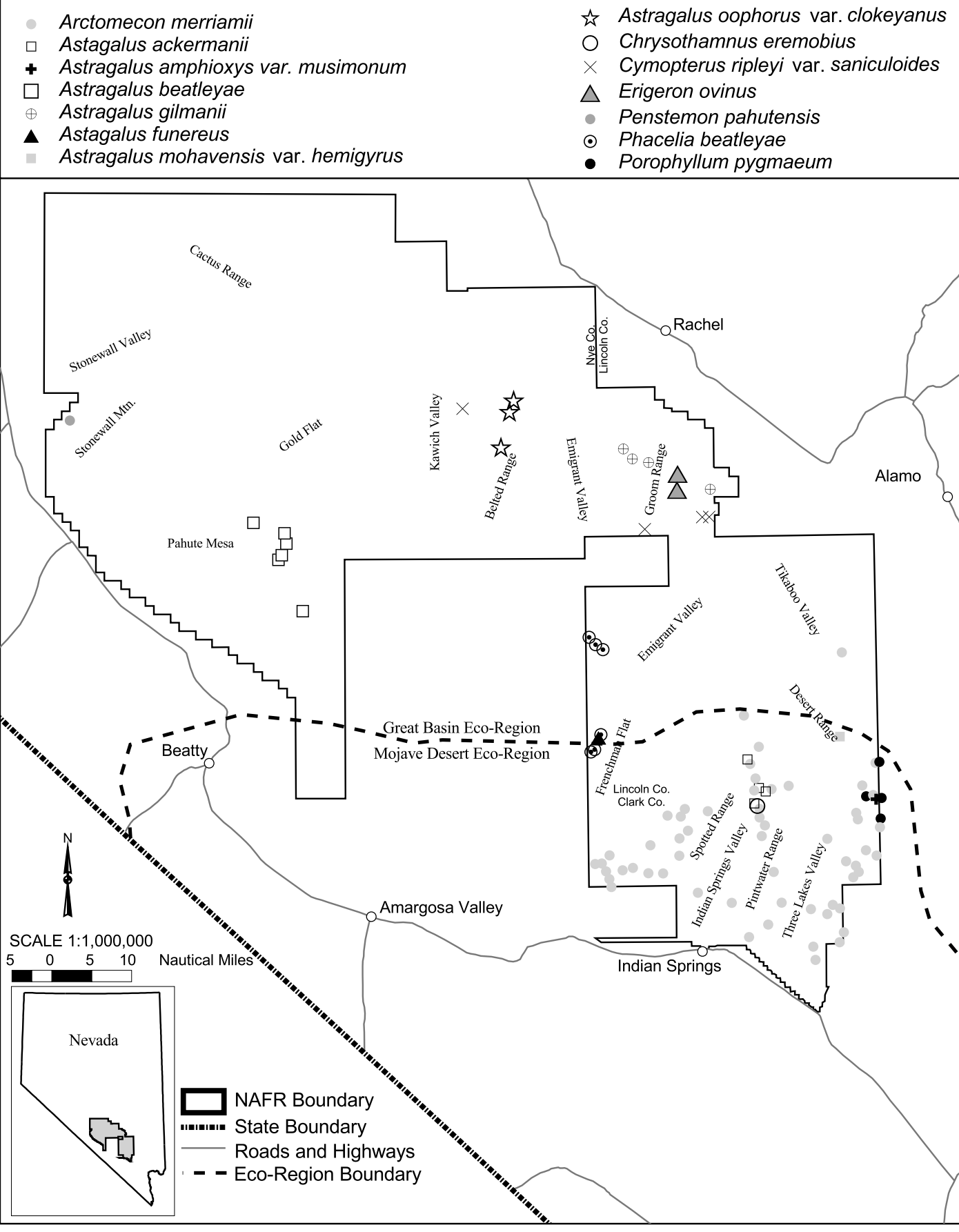


Figure 3.8-2. Occurrence of Special Status Plants on NAFR

Table 3.8-3. Special Status Wildlife Species Known or Likely to Occur on NAFR and Under Associated Airspace (page 1 of 3)

	STATUS		
Species	***Federal***	***State***	***Occurrence on Range, Overflight Areas***
Threatened or Endangered Species			
Peregrine falcon (*Falco peregrinus*)	E	E	Expected as a rare transient. No records of breeding on NAFR.
Bald eagle (*Haliaeetus leucocephalus*)	T	E	Occasional migrant and winter visitor, expected only in low numbers on NAFR; Pahranagat Valley is a wintering area.
Desert tortoise (*Gopherus agassizii*)	T	T	Present in low densities throughout Mojave Desert scrub habitat.
White River Springfish (*Crenichthys baileyi baileyi*)	E	-	Under MOA airspace, in Pahranagat Valley (Lincoln Co.) springs, Muddy River near Moapa, Clark Co.
Hiko White River Springfish (*Crenichthys baileyi grandis*)	E	-	Under MOA airspace, in Pahranagat Valley springs, Lincoln Co.
Pahrump poolfish (*Empetrichthys latos latos*)	E	CE	Under MOA airspace at Corn Creek Springs, Clark Co.
Pahranagat Roundtail Chub (*Gila robusta jordani*)	E	CE	Under MOA airspace, in Ash Spring outflow in Pahranagat Valley, Lincoln Co.
Big Spring Spinedace (*Lepidoma mollispinis pratensis)*	T	P	Under MOA airspace, near Panaca in Coyote Canyon, Meadow Valley Wash drainage, Lincoln Co.
Moapa Dace (*Moapa coriacea*)	E	CE	Under MOA airspace in Muddy River N of Moapa, Clark Co.
Special Status Species			
Pygmy rabbit (*Brachylagus idahoensis*)	SOC		Found in sagebrush communities where stands are dense, alluvial habitat is preferred. Potentially occurs on NAFR.
Hidden Forest Uinta chipmunk (*Eutamias umbrinus nevadensis*)	SOC		Sheep Mountains - Hidden Forest at 7,700-8,500 feet, overflown by MOA airspace.
Pahranagat Valley montane vole (*Microtus montanus fucosus*)	BLM		Found in grassy areas near springs, restricted to Pahranagat Valley.
Spotted bat (*Euderma maculatum*)	SOC	T	Found in various habitats from desert to mountain coniferous forest but always in association with nearby high cliff faces. Observed on the NTS and potentially occurs on NAFR.
Greater western mastiff bat (*Eumops perotis californicus*)	SOC		Inhabits rugged canyons with caves, rock crevices, also in buildings. In Nevada, not known to occur north of Las Vegas and therefore unlikely on NAFR.
Allen's big-eared bat (*Idionycteris phyllotis*)	SOC, BLM		Typically associated with pine and oak forests. Roosts in caves. Potentially occurs on NAFR.

Table 3.8-3 Special Status Wildlife Species Known or Likely to Occur on NAFR and Under Associated Airspace (page 2 of 3)

	STATUS		
Species	***Federal***	***State***	***Occurrence on Range, Overflight Areas***
California leaf-nosed bat (*Macrotus californicus*)	SOC, BLM		Colonial, roosts in caves and abandoned buildings. Southern boundary of NAFR is the northernmost boundary of this species' range making occurrence on NAFR unlikely.
Western small-footed myotis (*Myotis ciliolabrum*)	SOC, BLM		Occurs in a variety of habitats but most common in arid environments. Roosts primarily in caves, buildings, mines or crevices. Observed on the NTS and potentially occurs on NAFR.
Long-eared myotis (*Myotis evotis*)	SOC, BLM		Occurs primarily in forests but also less frequently in sage and chaparral habitats. Roosts in cracks in cliffs, hollow trees, caves, mines and buildings. Observed on the NTS and potentially occurs on NAFR.
Fringed myotis (*Myotis thysanodes*)	SOC, BLM		Found in desert scrub, shrub-steppe, oak- pinyon and coniferous forest habitats. Roosts in caves, rock crevices and buildings. Observed on NAFR.
Cave myotis (*Myotis velifer brevis*)	SOC, BLM		Reaches northern limit in southern Clark County; not known or expected on NAFR. Maternity and nursery colonies in mines, caves, under bridges, migrates south during winter.
Long-legged myotis (*Myotis volans*)	SOC, BLM		Typically associated with montane forests but also found in riparian and desert habitats. Roosts in rock crevices in cliffs, cracks in ground, behind loose bark on trees and in buildings. Observed on NAFR.
Yuma myotis (*Myotis yumanensis*)	SOC, BLM		Found in areas with trees adjacent to open water. Roosts in caves, tunnels and buildings. Potentially occurs infrequently on NAFR due to little overlap of this species' range and NAFR.
Big free-tailed bat (*Nyctinomops macrotis*)	SOC		Occurs in rugged mountainous country; may roost in buildings. Possible on NAFR.
Townsend's big-eared bat (*Plecotus townsendii*)	SOC, BLM		Roosts in caves, mines and buildings. Observed on NAFR.
Least bittern (*Ixobrychus exilis hesperis*)	SOC		Observed in wetlands of Pahranagat Valley. Expected in small ponds on NAFR infrequently in small numbers
White-faced ibis (*Plegadis chihi*)	SOC		Observed in wetlands of Pahranagat Valley. Expected in small ponds on NAFR infrequently in small numbers.
Northern goshawk (*Accipiter gentilis*)	SOC		Spring and fall migrant in low numbers. No records of breeding on NAFR.
Ferruginous hawk (*Buteo regalis*)	SOC		Spring and fall migrant and winter visitor in low numbers. No records of breeding on NAFR.

Table 3.8-3 Special Status Wildlife Species Known or Likely to Occur on NAFR and Under Associated Airspace (page 3 of 3)

	STATUS		
Species	***Federal***	***State***	***Occurrence on Range, Overflight Areas***
Black tern (*Chlidonias niger*)	SOC BLM		Observed at wetlands in Pahranagat Valley. Spring and fall migrant and summer visitor to the region and possibly the NAFR.
Burrowing owl (*Athene cunicularia*)	SOC	P	A spring and fall migrant and breeder on the NAFR. Recorded on NAFR in Great Basin desert scrub and expected in slightly disturbed areas.
Phainopepla (*Phainopepla nitens*)	BLM	P	A permanent resident of Mojave Desert scrub and desert spring habitats. Observed on NAFR.
Banded Gila monster (*Heloderma suspectum cinctum*)		T	Mojave desert scrub habitats in southernmost Nevada.
Chuckwalla (*Sauromalus obesus*)	SOC, BLM		Expected in rocky hillsides and rock outcrops within the Mojave Desert scrub community.
Mormon White River Springfish (*Crenichthys baileyi thermophilus*)	SOC, BLM	-	Under MOA airspace, in White River-Pahranagat Valley, Lincoln Co.
Pahranagat pebblesnail (*Fluminicola merriami*)	SOC, BLM		Under MOA airspace in Pahranagat Valley
Desert monkey grasshopper (*Psychomastix deserticola*)	SOC		Listed by USFWS as potentially occurring on NAFR
Pahranagat naucorid bug (*Pelocoris shoshone shoshone*)	SOC, BLM		Under MOA airspace in Pahranagat Valley
White River wood nymph (*Cercyonis pegala* ssp.)	BLM		Under MOA airspace in White River Valley

Notes: E Endangered
T Threatened
SOC Federal Species of Concern
BLM Nevada BLM Sensitive Species List
CE Listed as Critically Endangered by Nevada Department of Wildlife
P Protected by the Nevada Division of Wildlife

Sources: Air Force 1981, 1994a, 1997g, 1997, 1997e; Burt and Grossenheider 1980; Hall 1946, 1981.

includes herbaceous perennial and annual forbs, grasses, and fresh pads and buds of some species of cacti.

Females lay one clutch of eggs between April and July and most young hatch in fall, although some clutches may overwinter and hatch in the spring.

Predators on adult desert tortoises include kit fox, badger, coyote, bobcat, mountain lion, and golden eagle. Juvenile tortoises are more likely than adults to be preyed upon by these same predators and also by ravens, skunks, and some species of snakes. Tortoises are preyed upon primarily during times when other food items are scarce. Because of their low density, tortoises are not a primary food source for these predators, but are taken opportunistically.

Based on standardized sign-census techniques, tortoise population densities at the target sites on the South Range are very low to low, relative to other parts of the tortoise's range (USFWS 1997). The USFWS Biological Opinion, issued on February 5, 1997 (amending the earlier Biological Opinion issued on July 19, 1994), estimated that the continuation of current weapons testing and training would degrade a total of approximately 971 acres of disturbed desert tortoise habitat associated with target impact zones, and that this would affect 12 desert tortoises annually (2 killed or injured and 10 captured and removed or displaced). However, the USFWS determined that the continued activities on NAFR would not jeopardize the continued existence of the Mojave population of desert tortoise.

Terms and conditions are included in the Biological Opinion, and are required in order to minimize the take of desert tortoises due to training activities. These include (but are not limited to): a maximum speed limit of 25 mph during the tortoise's active season (March 1 through October 31); the use of a qualified desert tortoise biologist, or, where it is unsafe for the biologist, properly trained explosive ordnance disposal (EOD) personnel, to relocate tortoises away from hazards associated with EOD activities, according to the approved protocol; monitoring and maintaining a tortoise-proof fence at Target 62-6; the prohibition of off-highway vehicle use except for ordnance disposal and removal; implementing a vegetation rehabilitation plan for about 140 acres of degraded tortoise habitat; the transferral of $50,000 to the Desert Tortoise Habitat Conservation Fund administered by Clark County; and a training program for all contractors and employees to inform them of desert tortoises and the measures required to protect the species.

Peregrine Falcon

The peregrine falcon is a medium-sized, extremely fast-flying bird of prey that is state and federally listed as endangered. This species eats small to medium-sized birds that it catches in flight. Nests are normally located on ledges or "potholes" in cliffs, usually near large bodies of water. This species forages in open country on smaller birds, especially waterfowl and shorebirds. Its nationwide decline in numbers is attributed largely to pesticide contamination of the food chain, illegal capture by falconers, and general human disturbances. Recent

reintroduction efforts in many parts of the United States have been relatively successful and numbers are increasing slowly.

The peregrine falcon is an uncommon spring and fall migrant and winter visitor throughout the NRC region and is expected to occur sporadically in low numbers (Air Force 1997b). Peregrine falcons could be attracted to playas during some years when concentrations of waterfowl or shorebirds are present due to heavy rains or runoff from rapid snow melts.

Bald Eagle

The bald eagle (*Haliaeetus leucocephalus*) winters in desert valleys in eastern Nevada and along major waterways throughout the state and is federally listed as threatened. The bald eagle typically feeds on fish, but also feeds on black-tailed jackrabbits and carrion in desert habitats. Eagles roost, frequently in groups, in tall trees located in canyons and occasionally in planted groves. The species decline is attributed to habitat loss, human disturbance, pesticide poisoning through the food chain, and shooting. Legislative protection and the curtailment of DDT use have resulted in a significant recovery of bald eagles.

This species is expected to occur on NAFR only sporadically and in small numbers (Air Force 1997d), most likely as a migrant or winter visitor.

OTHER LISTED SPECIES THAT OCCUR UNDER THE MOA AIRSPACE

Several listed fish species occur under the MOA airspace outside of NAFR, specifically in the White River and Pahranagat Valley (see Table 3.8-3).

OTHER SPECIAL INTEREST SPECIES

Wildlife species discussed in this section are (1) USFWS species of concern (generally former Category 2 candidates for listing) and Nevada BLM Sensitive Species; (2) species with special interest due to their being large game animals; or (3) wild horses and burros (protected by the Wild Free-Roaming Horse and Burro Protection Act of 1971).

USFWS Species of Concern and Nevada BLM Sensitive Species

On February 28, 1996, the USFWS revised their list of candidate species under the Endangered Species Act to include only those species for which there is enough information to support a listing proposal. Species that were previously designated as C1 became ”candidate” species, and many former C2 species were removed from candidacy and are now referred to as “species of concern.” The Nevada State Office of the USFWS has provided a list of species of concern that may occur on NAFR; these species are included in Table 3.8-3. It should be noted that this category does not confer any specific legal protection. However, the Nellis Environmental Management Directorate gives consideration to species of concern in ongoing management of the range and as part of NEPA compliance.

Nevada BLM Sensitive Species are species designated by the State Director, in cooperation with the Nevada Department of Conservation and Natural Resources, that are not already Federally listed, proposed, or candidate species, or State-listed because of potential endangerment. BLM's policy is to "ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered." Appendix G.3 includes the complete Nevada BLM Sensitive Species List as of April 1997, plus a list of proposed additions. All of the vertebrate taxa on the BLM Sensitive Species List that are likely to occur on NAFR or under associated airspace are included in Table 3.8-3; most of these are also USFWS species of concern.

Species of concern and BLM sensitive species that are known or likely to occur on NAFR include 15 species of mammals (12 of which are bats), 7 species of birds, and 2 species of reptiles (Table 3.8-3). According to the bird survey report (Air Force 1997b), a majority of these avian species are expected to occur on NAFR only seasonally in small numbers. The phainopepla is the only common year-round resident, and burrowing owl and ferruginous hawk may breed on NAFR in small numbers. Due to the lack of small mammal surveys there is no evidence concerning the presence of the pygmy rabbit on NAFR. The Hidden Forest Uinta chipmunk is reported in the INRMP (Air Force 1997g) as being present only in elevations above 7,700 feet in the Sheep Mountains. The bat survey report (Air Force 1997a) documents the presence of three sensitive species of bats on NAFR, Townsend's big-eared bat, fringed myotis, and long-legged myotis. Other bat species such as the western small-footed myotis, spotted bat, and the long-eared myotis have been observed on the NTS and are likely to occur on NAFR.

Game Animals

Figure 3.8-3 summarizes big game areas within the NAFR.

Within the Great Basin communities on NAFR, pronghorn antelope inhabit valleys and higher elevation plateaus but can also be found in areas of open pinyon-juniper woodland. They are not generally considered migratory but do move seasonally to locate adequate forage and water. This species requires open expanses with unobstructed views and is primarily found in elevation ranging from 4,000 to 6,000 feet. Available water must be within approximately 1 to 5 miles. Breeding occurs between late July and early October and young are born in the spring. The distribution of pronghorn antelope and other big game is shown in Figure 3.8-3.

Pronghorn antelope are regularly observed east of Cactus Flat on the North Range (Air Force 1997a) and main concentrations are found in the northern portion of Cactus Flat and all of Kawich Valley, with occasional sightings near Stonewall Mountain (BLM 1989). The pronghorn antelope population, estimated as less than 100 animals in 1977 (BLM, DOI, and Air Force 1987), and as 200 animals in the mid-1980s (DOI 1989), is currently on the rise due to the reduction of the wild horse population (Air Force 1997g).

Bighorn sheep were historically found in most of the mountain ranges in Nevada. Hunting, predation by mountain lions, competition with livestock grazing, and diseases spread by domestic sheep have been factors in the decline of this species within its range. In the arid

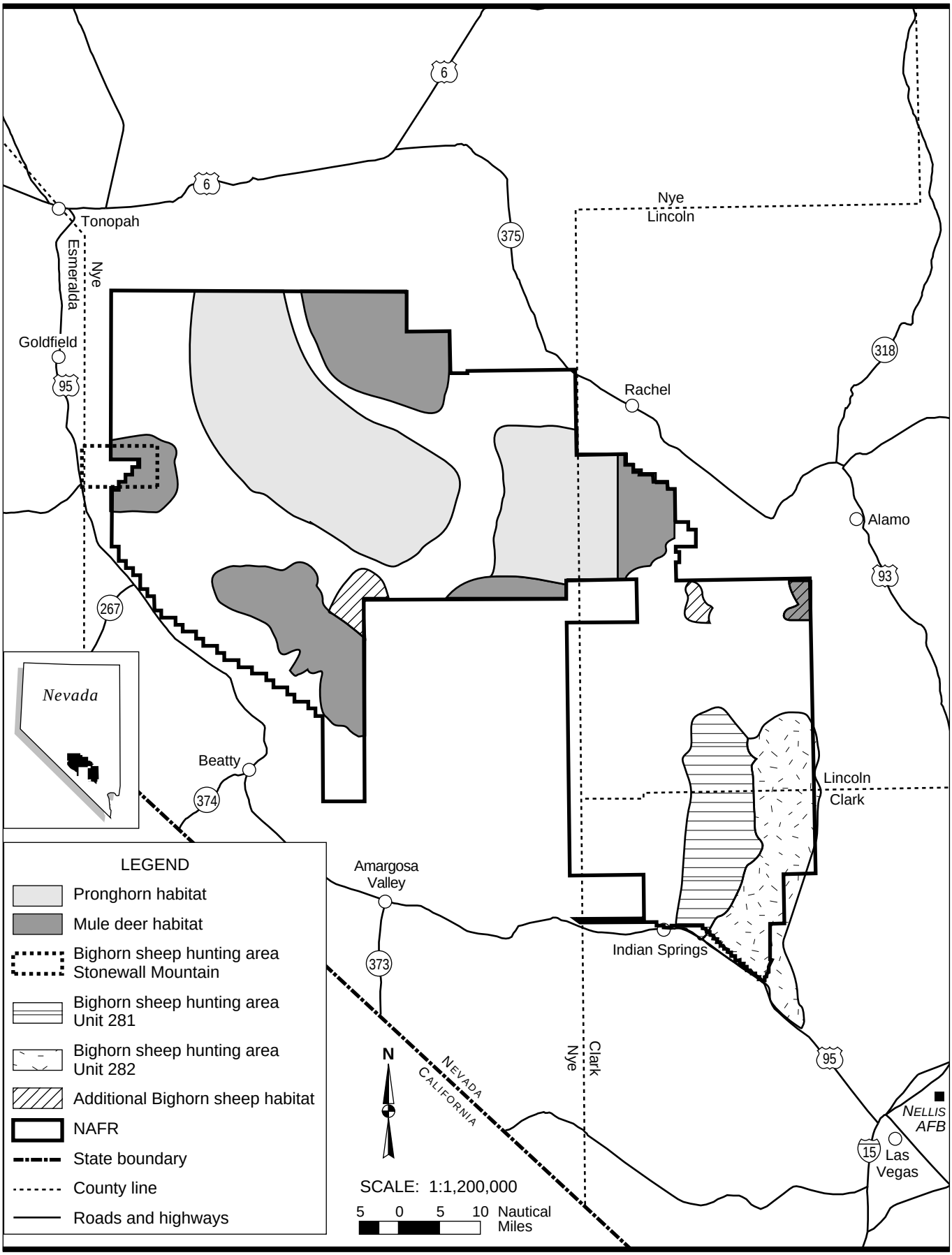


Figure 3.8-3. Big Game Areas within the Nellis Air Force Range

Great Basin and Mojave communities, bighorn sheep are restricted to areas within 2 miles of water during the summer. The need to remain close to water decreases during the remainder of the year, and, as a result, bighorns are found in higher elevations in summer and often select lower elevations in late winter. Regardless of temperatures and water availability, however, bighorn sheep use areas that provide adequate escape cover. The sheep probably select lower elevations for a variety of reasons. First, cooler temperatures and increased humidity reduce water requirements, thus the sheep can move farther from permanent water supplies. Second, the water they require can probably be obtained from a larger number of sources, including rain and snow melt, during winter. Also, green herbaceous growth contains a large amount of water that can be used in metabolic processes. Finally, green forage at lower elevations has a higher nutrient content than dormant forage plants at higher elevation. The intake of high-quality forage by pregnant ewes during the late winter and/or early spring months should benefit reproductive success. Bighorn sheep breed in July and August and most young are born in February and March.

This species exhibits a high fidelity to traditional ranges. Current populations of desert bighorn sheep on NAFR are located around the higher elevations on the South Range that overlap portions of the DNWR, including the Spotted, Pintwater, and Desert ranges (USFWS 1998). Desert bighorn sheep also occur near Stonewall Mountain and on the east side of Pahute Mesa on the North Range. Other areas on NAFR that could be expected to support this species include Tolicha Peak, Quartz Mountain, Thirsty Canyon, and the Cactus Range (Air Force 1997a). Desert mountain ranges east of NAFR but under MOA airspace also support desert bighorn sheep, including relatively large numbers in the Sheep and East Desert ranges that are part of the DNWR.

USFWS (1998) survey data indicate that populations of desert bighorn sheep have declined on the DNWR since the 1980s. Based on 1997 data, USFWS estimates a population of 143 sheep in the Pintwater Range, with an adult sex ratio of 0.85 ram per ewe, and production of 0.35 lamb per ewe. The corresponding estimates for the Desert Range are 65 sheep, 0.31 ram per ewe, and 0.31 lamb per ewe. A population of 50 to 60 sheep has been reestablished in the Spotted Range (USFWS 1998). Elsewhere on NAFR, 83 desert bighorn sheep were observed on a one-day survey conducted on January 27, 1995. Most of the sheep were recorded along the western part of the Pahute Mesa in the vicinity of Stonewall Mountain (NDOW 1995). Forty-eight desert bighorn sheep were observed in a similar survey conducted in 1997 (NDOW 1997a).

Mule deer are widely distributed in North America. In the Great Basin area, deer were historically sparse, and grazing by livestock may have resulted in a lower seral stage, increasing the abundance of browse species and allowing mule deer populations to expand. The present distribution of mule deer throughout NAFR is primarily in regions of higher elevations. Mule deer are found in the area surrounding Tolicha Peak; on the Kawich, Groom, and Belted ranges; on Pahute Mesa and Stonewall Mountain; and in the Fallout Hills (DOI 1989; Air Force 1997g).

The mule deer range is divided into seasonal use areas. Summer range includes the higher elevation where water and forage is more available during dry, hot months. During the winter,

cold temperatures and snow force deer to lower elevations where they often concentrate in areas with sufficient food and cover. Deer migrate between these seasonal use areas along well established routes. Breeding occurs in fall and early winter.

Wild Horses and Burros

Horses were native to this continent but became extinct approximately 15,000 years ago. Those present today in the western United States are the result of introductions by Europeans as early as the 1500s. Burros were never native to North America. Their current presence in the western United States is the result of mining activities in the 1800s. As mining began to decline in the late 19th century, many of these animals were abandoned. Both horses and burros are extremely adaptive and compete with native species such as mule deer, pronghorn , and bighorn sheep. The impacts to water resources and forage on NAFR has been severe in accessible areas at lower elevations. The NAFR Wetlands Survey Report (Air Force 1996c) describes wild horses as the most likely source of impact to NAFR spring resources. The Nevada Wild Horse Range (NWHR) Herd Management Area Plan proposes measures to protect NAFR water resources that include exclusion, restoration, monitoring, and artificial water delivery systems.

Figure 3.8-4 presents the extent of distribution of wild horses during different seasons and the livestock grazing allotments within NAFR.

Wild horses and burros are protected under Public Law 92-195, the Wild Free-Roaming Horse and Burro Act of 1971. Under this act, the BLM and USFS are charged with managing and protecting these animals. With protection, wild horses and burro populations began increasing at a rapid rate. BLM estimated 17,000 horses and burros were present on public lands in 1971 when the Act was passed and by 1976 there were roughly 50,000 animals. The NWHR (Figure 3.10-2) was established in 1962 and is managed by the BLM. The population of wild horses on the NWHR in 1963 was estimated at 200 horses. Their population size was estimated throughout NAFR at close to 5,000 individuals in 1987 (Air Force 1997g) and 8,000-10,000 head in the early 1990s (personal communication, McFadden 1998). The wild horse gather of July 1997 left a total of 526 horses, with a sex ratio of 1 stallion to 3 mares (personal communication, McFadden 1998). Horses are still able to move long distances from the defined NWHR. Future plans include repeated “gatherings” every 3 to 4 years to remove horses from the range and maintain a population size between 600 to 1,000 head, which is the current Appropriate Management Level (AML) for the entire North Range.

The burro population was estimated at 69 individuals in 1980 and increased to a maximum of 195 individuals in 1982. Removals resulted in a decrease of the population so that by 1987 only four burros were recorded on NAFR (Air Force 1997g). Ten to 12 burros were observed on NAFR during the April 1997 aerial surveys (personal communication, McFadden 1997).

3.8.6 American Indian Issues Concerning Biological Resources

Traditional use of plants and animals is an important aspect of American Indian culture. The loss of important species dates to the time of Euroamerican contact with American Indians in

the area. At least 364 plants and at least 170 animals important to traditional cultural practices are present on or near NAFR.

The CGTO considers environmental restoration and management programs to be beneficial to traditional cultural resources, although, "specific actions will have direct local impacts" (AIWS 1997).

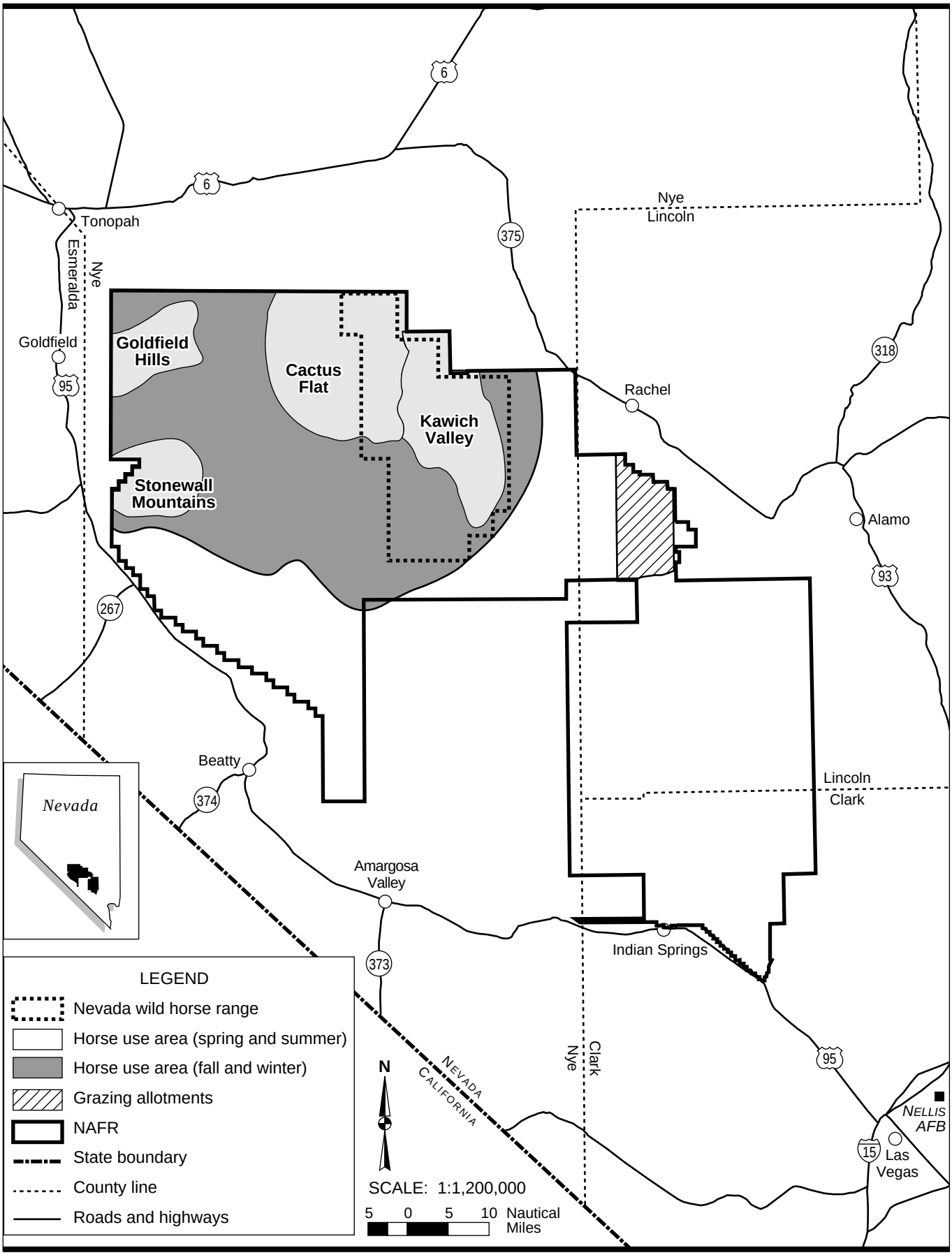


Figure 3.8-4. Wild Horse Range, Use Areas, and Livestock Grazing Allotments within the Nellis Air Force Range

CULTURAL RESOURCES

Cultural resources are sites, buildings, districts, or objects that are important to a culture or community. Cultural resources are divided into three groups:

- Archaeological resources
- Architectural resources
- Traditional cultural resources

Archaeological resources include sites that provide enhanced understanding of prehistoric and historic events. Original tent areas at Indian Springs are examples of historic archaeological resources.

Architectural resources are standing buildings, facilities and other structures. Cabins, outhouses, and other buildings in historic mining towns are examples of architectural resources.

American Indians value traditional cultural resources because of their importance to history, customs, and beliefs. These resources link the community to its past and help American Indians protect their cultural identity. Archaeological sites, rock art, and sacred sites can be of traditional cultural resources.

Federal law protects archaeological, architectural and traditional cultural resources if they meet the government's criteria for being listed on the National Register of Historic Places (NRHP) or if they are of special importance to American Indian groups. Federal Preservation Officers, archaeologists, American Indians, and historians work together to decide which resources are eligible for listing on the NRHP. To be listed, a cultural resource must meet at least one of the significance criteria listed below:

- association with events that have made a significant contribution to the broad patterns of our history
- association with the lives of persons significant in our past
- embodiment of the distinctive characteristics of a type, period, or method of construction, or representation of the work of a master, or possession of high artistic values, or representation of a significant and distinguishable entity whose components may lack individual distinction
- yield, or likelihood to yield, information important in history.

A significant cultural resource must also have integrity of location, design, setting, materials, workmanship, feeling, and association.

NAFR has restricted access for safety and security reasons. This has contributed to preservation of significant historic and early American Indian resources that qualify for the NRHP.



3.9 CULTURAL RESOURCES

3.9.1 Definition of Resource

Cultural resources are districts, sites, buildings, structures, or objects considered to be important to a culture, subculture, or community for scientific, traditional, religious or any other reason. For this LEIS, cultural resources are divided into three major categories: archaeological resources, architectural resources, and traditional cultural resources. Cultural resources for all three categories occur in ROI One where direct impacts could occur; in ROI Two where aircraft noise occurs but where access restrictions have contributed to resource protection; and in ROI Three where aircraft noise can occur.

Archaeological resources are locations where human activity has measurably altered the earth (e.g., hearths, rock alignments, foundations) or left deposits of physical remains (e.g., arrowheads, bottles). The term "prehistoric" is commonly understood to mean cultural resources that predate the beginning of written records. In southern Nevada, these resources are associated with American Indians before contact with Euroamericans, and range from isolated stone tools and rock alignments to complex habitation and rock art sites. The term "historic" is generally meant to include any cultural resource that postdates Euroamerican contact with American Indians. Historic archaeological resources in southern Nevada include campsites; the remains of roads, railroads, power lines, fences, and trails; collapsed buildings; dumps; and a variety of other features.

For the purposes of this LEIS, the terms "American Indian" and "early American Indian" are used rather than prehistoric, except where a law or regulation is quoted. "American Indian" is used in this document in preference to "Native American," following the example set by the AIWS (1997).

The distinction between early American Indian and historic time periods is now viewed as somewhat arbitrary since members of the American Indian population in southern Nevada, while performing some traditional activities, may still create artifacts and features that archaeologists might unintentionally label as "prehistoric." Furthermore, many American Indians do not distinguish "prehistoric" from "historic," but instead, based on their oral traditions, see one long continuous history.

The term "historic" will be retained in this LEIS for all archaeological sites that clearly post-date Euroamerican contact with American Indians. Most of these date to the 19th and 20th centuries and are of Euroamerican origin.

Archaeological resources are usually further classified as either sites or isolates on the basis of quantity, density, and type of cultural material. Over the years of recording cultural resources in southern Nevada and on NAFR, the distinction between sites and isolates has changed. Today on NAFR, archaeological sites are defined as having two or more artifacts or a feature, while isolates contain only one artifact and have no features. The purpose of such a distinction

is tied to management of cultural resources. Isolates contain relatively little scientific information. Many sites and isolates recorded on NAFR in the past do not fit these definitions.

For this LEIS, architectural resources are defined as standing buildings, facilities and other structures potentially having historical, aesthetic, or scientific significance. On NAFR, all known architectural resources are historic in age. Early American Indian rock alignments and similar features are considered archaeological resources.

Traditional cultural resources are resources associated with cultural practices and beliefs of a living community that are rooted in its history and are important in maintaining the continuing cultural identity of the community. In Nevada these are usually associated with modern American Indian groups. Traditional American Indian resources may include archaeological resources; locations of important historic events; sacred areas; sources of raw material used to produce tools and sacred objects; traditional hunting, gathering, or meeting areas; native plants or animals; prominent topographic features; and other elements of the natural environment. American Indians may consider these resources essential for the persistence of their traditional culture.

Under federal regulation (36 CFR 60.4), only significant cultural resources warrant consideration with regard to adverse impacts resulting from a federal undertaking. Significant archaeological, architectural, and traditional cultural resources include those that are listed in, or determined eligible for nomination to, the National Register of Historic Places (NRHP), which was created by the National Historic Preservation Act (NHPA). The significance of archaeological and architectural resources must be evaluated according to NRHP eligibility criteria (36 CFR 60.4). Determinations of eligibility are made by the lead federal agency (in the case of the Nellis LEIS, this would be the Air Force) in consultation with the State Historic Preservation Officer (SHPO). According to these criteria, "significance" is present in districts, sites, buildings, structures, and objects:

a) "that are associated with events that have made a significant contribution to the broad patterns of our history; or

b) that are associated with the lives of persons significant in our past; or

c) that embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

d) that have yielded, or may be likely to yield, information important in prehistory or history." (36 CFR 60.4)

An archaeological or architectural resource that is eligible to the NRHP is called a historic property. To be listed in or determined eligible for nomination to the NRHP, a cultural resource must meet at least one of the above criteria and must also possess integrity. Integrity

is defined as the authenticity of a resource's historic identity as evidenced by the survival of physical characteristics that existed during the resource's period of occupation or use. The NRHP recognizes seven aspects or qualities that, in various combinations, define integrity: location, design, setting, materials, workmanship, feeling, and association. Integrity of location means that the cultural resource has not been moved. Integrity of design, materials, and workmanship means that the resource's original building materials, plan, shape, and design elements remain intact. Integrity of setting means that the surrounding landscape remains largely as it was during the resource's period of significance. Integrity of feeling and association means that the resource retains a link to an earlier time and place and is able to evoke that era.

Significant archaeological or architectural resources usually must be at least 50 years old; however, certain structures associated with more recent, exceptionally important historic events (e.g., the Cold War or the development of nuclear energy) also may be considered eligible for nomination to the NRHP. Cultural resources are also usually considered eligible in the context of existing knowledge about the region, culture, property type or other set of characteristics represented by the resource. The existing knowledge is often summarized into historic contexts. Historic contexts organize information so that specific research questions can be pursued and the resulting information interpreted. Archaeological isolates, because of their small size and limited information potential, are not considered eligible for nomination to the NRHP by the Nevada SHPO.

Certain categories of traditional cultural resources, such as ancestral settlements or petroglyph and pictograph sites, may be protected through their eligibility to the NRHP. For this LEIS, if a traditional cultural resource has been determined to be eligible for nomination to the NRHP, it is called a traditional cultural property (TCP). On the other hand, natural features and spiritual locations may not be addressed in historic preservation legislation if their historic use cannot be documented; if the resource does not have an integral relationship to traditional cultural practices and beliefs; if the present condition is such that the relationships no longer survive; if the resource's boundaries cannot be delineated; or if the resource does not meet the NRHP significance and integrity criteria listed above.

However, even though a traditional cultural resource may not be considered significant according to NRHP criteria, it may still have importance to a particular group, such as an American Indian tribe or band. The management of some traditional cultural resources may also be affected by provisions of the Native American Graves Protection and Repatriation Act (NAGPRA), American Indian Religious Freedom Act (AIRFA) and EO 13007, Indian Sacred Sites.

Also, a single traditional cultural resource may be important for more than one reason. For example, one piñon camp on NAFR may be important to American Indians as (1) a spiritual location; (2) a link to the group's ethnic identity; (3) a location to teach children about traditional beliefs and practices; (4) a former living site; (5) a traditional use site; (6) a meeting place for subsistence, social or ceremonial purposes such as marriages or communal rabbit

hunts; and (7) a location traditionally considered the property of one group (personal communication, Myhrer 1997).

3.9.2 Jurisdictional Responsibilities

The Air Force is not the only federal agency responsible for cultural resource management on NAFR. The NHPA requires all federal agencies to weigh historic preservation and balance it with other public interests, including the agencies' missions. Two sections of the NHPA are especially pertinent to the proposed NAFR military land withdrawal renewal. Section 110 of the NHPA requires action on the part of an agency to preserve historic properties owned or controlled by the agency. This includes identification, evaluation, NRHP nomination and protection of historic properties. Section 106 of the NHPA requires that federal agencies take into account the effects of any undertaking on historic properties (ACHP and GSA 1994).

When a single federal agency has jurisdiction over land or an undertaking, then that agency is responsible for all aspects of the NHPA, including complying with Sections 106 and 110. However, when more than one federal agency is involved in land management or an undertaking, responsibility for complying with NHPA is usually resolved through an MOU. Some MOUs specify interagency cooperation (Air Force 1997i).

Although the BLM has overall management responsibility for the portions of NAFR not included in the DNWR (managed by USFWS), the land withdrawal gives the Air Force jurisdiction (Air Force 1997i). The Air Force has responsibility for Section 106 actions on NAFR. The Air Force also conducts all Section 110 activities and NAGPRA consultation on the North Range portion of the NAFR. On the South Range lands within the DNWR, the USFWS conducts Section 110 activities and NAGPRA consultation. Other agencies have responsibilities as outlined in Memoranda of Agreement or Understanding and Letters of Agreement (Air Force 1996a). For example, on the North and South Ranges, those areas not jointly used by the Air Force and another agency (e.g., DOE or USFWS) are the sole responsibility of the Air Force. These responsibilities include compliance with both Sections 106 and 110 of the NHPA.

On the North Range, DOE manages the TTR and Pahute Mesa. DOE is responsible for all aspects of cultural resource management within the lands under its jurisdiction. Also on the North Range, the NWHR is managed under an MOU between the Air Force and BLM.

3.9.3 Methods

At the inception of the environmental impact analysis process (EIAP) for the Air Force withdrawal renewal, the Air Force initiated consultation with the Nevada SHPO. The Air Force noted that one of its requirements, under *AFI 32-7065, Cultural Resources Management*, would be the development of a cultural resource management plan (CRMP) for NAFR. As part of the CRMP preparation, in 1995 and 1996 the Air Force completed a comprehensive literature review, examining records at the Southern Nevada Repository for Site Records, Museum of Natural History, University of Nevada at Las Vegas (UNLV); the Nellis AFB Environmental Management Directorate; and Federal Register volumes. Discussions were held with records

managers at the Las Vegas District BLM; Nevada State Museum and Historical Society Special Collections of the James R. Dickinson Library; Realty Records at the U.S. Army Corps of Engineers, Los Angeles District; and the office of the Nellis AFB historian. From these sources, the Air Force compiled a list of cultural resources recorded within Nellis AFB and NAFR (Air Force 1997c). Thus, it was not necessary to repeat the process for the LEIS. The CRMP (Air Force 1997c) provides most of the baseline information necessary for this LEIS. The CRMP discusses types of areas where cultural resources are expected and presents historic contexts for the NRHP eligibility evaluation of cultural resources.

The existing information about cultural resources on NAFR has several limitations. First, according to the CRMP (Air Force 1997c), several hundred cultural resources recorded in the past as archaeological sites would today be considered isolates by the Air Force and the Nevada SHPO. By definition, this automatically excludes them from NRHP eligibility. However, some of the isolates could potentially still be considered significant traditional cultural resources. Second, most records for cultural resources on NAFR do not include enough information to evaluate their NRHP eligibility. Finally, approximately half the site records do not meet modern site recording standards. Thus, although over 1,800 cultural resources are recorded on NAFR, perhaps fewer than 1,200 would be considered sites by today's standards, and of these, fewer than 600 have been adequately documented to evaluate NRHP eligibility (Air Force 1997c).

General information on the numbers of previously recorded cultural resources beneath the affected airspace outside of NAFR was obtained from the Southern Nevada Repository for Site Records, Museum of Natural History, UNLV.

Despite some deficiencies, enough data exist to characterize archaeological and architectural resources on NAFR and on the land under the MOA airspace. Although there are problems with consistency, the data show that there are numerous documented cultural resources, many of which are potentially eligible for nomination to the NRHP. Thousands of unrecorded sites also exist in the area.

In the NARD (AIWS 1997) created for use with the Nellis LEIS, representatives of American Indian groups have discussed traditional cultural resources. The NARD was prepared by representatives of the Southern Paiute, Western Shoshone, Owens Valley Paiute and Shoshone, and the Las Vegas Indian Center. They represent the CGTO, which is made up of the following tribes and official American Indian organizations (AIWS 1997):

- Southern Paiute
  - Kaibab Paiute Tribe, Arizona
  - Paiute Indian Tribes of Utah
  - Moapa Band of Paiutes, Nevada
  - Las Vegas Paiute Tribe, Nevada
  - Pahrump Paiute Tribe, Nevada

  - Chemehuevi Paiute Tribe, California
  - Colorado River Indian Tribes, Arizona

- Western Shoshone
  - Duckwater Shoshone Tribe, Nevada
  - Ely Shoshone Tribe, Nevada
  - Yomba Shoshone Tribe, Nevada
  - Timbisha Shoshone Tribe, California

- Owens Valley Paiute and Shoshone
  - Benton Paiute Tribe, California
  - Bishop Paiute Tribe, California
  - Big Pine Paiute Tribe, California
  - Lone Pine Paiute Tribe, California
  - Fort Independence Paiute Tribe, California

- Mojave
  - Fort Mojave Indian Tribe, Arizona

- Other Official Indian Organizations
  - Las Vegas Indian Center, Nevada

The Air Force is presently corresponding with American Indians on the location of specific traditional cultural resources on NAFR. American Indians have identified a number of sensitive areas throughout southern Nevada. "Cultural resources are not limited to archaeological or historical remains of native ancestors, but include all natural resources, as well as geological formations contained throughout the region … [including] plants and animals …[and] natural landforms [that] mark locations that are significant for keeping the historic memory of American Indian people alive and for teaching children about their culture" (AIWS 1997). Traditional cultural resources may include physical features of the environment, such as springs and caves, or biological features, such as nesting areas, that would typically not be recorded by archaeologists. The NARD (AIWS 1997) also points out that the significance of an archaeological resource, as measured by archaeologists using NRHP criteria, will not necessarily correspond to the resource's spiritual significance to an American Indian. Important plant and animal resources are listed and described in the NARD (AIWS 1997).

Consultation between the Air Force and the CGTO are part of the Native American Interaction Program (NAIP) initiated by the Air Force (Air Force 1997c). A primary purpose of the Native American Interaction Program is for the Air Force to establish working relationships with regional tribal members. This should facilitate the Air Force's compliance with laws pertaining to American Indian rights concerning traditional cultural resources and archaeological resources located on Nellis lands, including NAFR. Including American Indians in identifying

and evaluating resources, and in reviewing environmental documents is expected to create a stronger method of regular formal and informal consultation. It provides American Indians with a forum to request access to certain resources and still allows the Air Force to consider mission safety and security requirements.

Another purpose of the NAIP is to identify specific areas and locations to be designated for TCP protection. This would help the Air Force plan range management to consider the importance of the traditional cultural resources. The CGTO is concerned that sharing detailed traditional cultural resource information with non-Indians could expose the cultural resources to vandalism or other disturbances (AIWS 1997). The Air Force understands the importance of this information, and is committed to confidentiality.

3.9.4 Regional Overview

3.9.4.1 EARLY AMERICAN INDIAN HISTORY

Human inhabitants of the southern Great Basin 10,000 to 7,000 years ago lived in a wetter, more lush environment than exists there today, although as the period ended the Pleistocene lakes were drying and the climate was becoming more arid (Warren and Crabtree 1986; Air Force 1997c). Subsistence centered around hunting, especially big game species. This early period is characterized by stemmed, leaf-shaped, and lanceolate points. Sites from this period are scarce, and generally consist of low density scatters of stone flakes and tools. They are often located along rivers, streams and the margins of playas or lakes.

An extremely arid environment characterized the period from 7,000 to 4,000 years ago. Sites from this period are still located along stream channels, but now they also appear more commonly at springs, quarry areas, and rockshelters. Short-stemmed projectile points are typical of this period. The presence of grinding stones may indicate increased reliance on plant foods to supplement a diet that included deer, antelope, rabbit, tortoise, and chuckwalla (Warren and Crabtree 1986; Air Force 1997c).

From 4,000 to 1,500 years ago, a moister climate accompanied a change in settlement. Occupation sites are located in valley bottoms. Sites are also found in rockshelters. In some caves rock art depicts bighorn sheep pursued by hunters using spear throwers and darts. The artifact assemblage includes a variety of projectile points, mortars and pestles, and an increase in groundstone artifacts. Perishable artifacts found in dry caves include baskets, sandals, cordage, and figurines made from split twigs (Warren and Crabtree 1986; Air Force 1997c).

Sites from 1,500 to 800 years ago are found along rivers and along the lakes that formed as a result of the slightly moister climate of this period. People still practiced general seasonal movement through environments that would not support more permanent settlement. Artifacts include smaller projectile points, probably reflecting a change from spear thrower and dart to bow-and-arrow. During this period there was a strong influence from cultures located farther east, including the introduction of agriculture. This influence is reflected in artifacts and

features, such as slab-lined pits, pottery, and food-grinding implements. There is also evidence for wide-spread trade (Warren and Crabtree 1986; Air Force 1997c).

From 800 to 150 years ago, the Southwest influence waned. Small projectile points, twined and coiled basketry, and ceramics resemble those associated with the 19th century American Indians of the region. During this period, trade continued, although the focus shifted to the California coast. The period was characterized by hunting and collecting, and seasonal movement to different environmental zones. Cultivation was practiced in some areas. The end of this period was marked by Euroamerican settlement, and the removal of most American Indians to reservations (Warren and Crabtree 1986; Air Force 1997c).

3.9.4.2 RECENT AMERICAN INDIAN HISTORY AND EARLY EUROAMERICAN HISTORY

The recent American Indian history of southern Nevada is documented in the written records of Euroamerican explorers and in the reports of ethnographers who worked with the Mojave, the Chemehuevi, the Southern Paiute, and the Western Shoshone, and the Owens Valley Paiutes and Shoshones.

When Spanish missionaries entered southern Nevada in the 18th century, they were guided by the Mojave people who lived in villages along the lower Colorado River (Bancroft 1981). The Mojave people are known to have lived in the Mohave Valley since before contact with Euroamericans (Stewart 1983). They raised maize, beans, pumpkins and melons in the bottomlands of the river. Crops were supplemented by wild plants, fishing, and hunting. This way of life continued until the 1820s when Euroamerican fur traders, trappers, and explorers began traveling through the area. Tensions between the two cultures escalated until the late 1850s when a U.S. military outpost, Fort Mojave, was established and the native inhabitants were defeated (Stewart 1983). The Mojave people now live primarily in two areas along the Colorado River: The Mojave at Fort Mojave Reservation in the Mohave Valley, and the Mohave at the Colorado River Reservation farther south (Stewart 1983).

A Spanish mission route through southern Nevada, from Black Canyon to Goodsprings and Mesquite Valley, was established in 1829. This route, known as the Old Spanish Trail, passed through the Las Vegas Valley south of NAFR (Elliott 1987). It was used regularly by Mexican traders of livestock and other goods. Some traders captured native women and children, primarily Southern Paiutes, and sold them into slavery in New Mexico. Mormon settlement in southern Nevada ended the slave trade and Mormon missions were established among the Moapa and Las Vegas people (Kelly and Fowler 1986). Eventually Mormon settlements displaced Southern Paiutes from their favored lands for gathering and growing crops of maize, beans, pumpkins, and melons. Southern Paiutes retaliated with raids against settlements and travelers. In 1872, the Moapa Reservation, covering approximately 2,496,000 acres, was established north of the Old Spanish Trail. The reservation was expanded in 1874 and the Utah Southern Paiute agreed to move to the Moapa Reservation along with the Moapa people. The reservation was reduced to approximately 1,000 acres in 1875 (Kelly and Fowler 1986), and expanded to more than approximately 70,000 acres in 1980.

During the 19th century, the nomadic Chemehuevi people (Miller 1983) moved into Mojave lands along the river. They assumed lifeways similar to the Mojave people and farmed along the river in what became known as the Chemehuevi Valley. During the 1800s, the Chemehuevi came into conflict both with Euroamerican settlers and with Mojave people. The U.S. government attempted to move the Chemehuevi to the Colorado River Reservation, but residual conflicts with the Mojave people, also residing there, prevented this until the early 20th century. A separate Chemehuevi reservation was established in 1907 on the Colorado River north of Parker, Arizona (Kelly and Fowler 1986). A few families in the Chemehuevi Valley were successful cattle ranchers until 1939 when Parker Dam was built and most of their lands flooded (Kelly and Fowler 1986). The Chemehuevi now reside on the Colorado River Reservation near Parker, Arizona as members of one Colorado River Indian Tribe, and on the Chemehuevi Reservation at Lake Havasu.

The Southern Paiute and Western Shoshone people who lived in southern Nevada at the time of Euroamerican settlement spoke dialects of a common language. They led a nomadic life, traveling to collect seasonally available plants, animals, and water. In winter, family groups gathered at camps in sheltered locations where they stored winter food supplies like bulbs, seeds, agave root, mesquite pods, and piñon nuts. In spring, the camp dispersed in search of early greens and tubers. Animal resources included rabbit, tortoise, chuckwalla, a variety of small rodents, lizards and insects. Antelope, bighorn sheep, deer and elk were taken when available (Air Force 1997g).

Oral histories describe the locations of Western Shoshone winter villages and encampments, dating to the late 1800s, on or near what is now NAFR (Steward 1938). These included one and two family settlements, as well as several clusters of winter villages and encampments (Air Force 1997c). Western Shoshone reservations were established north of the Nellis area in Nye County at Duckwater and Yomba.

Steward (1938) recorded winter village and camp locations of some western Shoshone groups in southern Nevada. None were located in what is now the South Range. Four were on the North Range. Several others of these were outside the boundary of the North Range.

3.9.4.3 EUROAMERICAN HISTORY

Although the Spanish explored the area that was to become the southwestern United States beginning in the early 16th century, there were no known expeditions through southern Nevada until an attempt to establish a trade route between Yuma, Arizona, and the California coastal missions. This route saw limited use after the Quechan uprising of A.D. 1781. The Spanish did not reestablish a presence in southern Nevada until 1829, when the more successful Spanish Trail was established (Air Force 1997c). This trail ran south of NAFR.

The first Euroamericans to have crossed Nevada in pursuit of furs were in the party of Jedediah Strong Smith in 1826-1827. Although their exact route is uncertain, they probably passed north of NAFR. Smith returned in 1828 and crossed the region to the south, near the Colorado River. Other expeditions, including a Hudson's Bay Fur Company party led by Peter Skene Ogden

and the Walker-Bonneville expedition, entered the Great Basin from the northeast, and stayed well north of the NAFR region. The pace of exploration picked up in the 1840s and 1850s, as John C. Fremont and others traveled through the area (Air Force 1997c; Elliott 1987).

After the explorers came prospectors and settlers. Members of the loosely organized Death Valley, or Manley, group (Elliott 1987) traversed the NAFR in late 1849. Their path through the North Range area crossed between the Belted and Groom ranges to what is now called Emigrant Valley. A group led by Brier passed Tippipah Spring and through Fortymile Canyon. This trail, known later as the Emigrant Trail or Brier Route, became part of the route for mail service between Salt Lake City and Los Angeles, with relay stations at Whiterock Spring and Fortymile Canyon (Elliott 1987).

The Mormons traversed the NAFR region as part of their explorations for areas to settle, eventually establishing the Mormon Road between Salt Lake City and San Bernardino. They built the Mormon Fort in 1855 along the road at Las Vegas, with other settlements at Callville, Goodsprings, and Moapa (Air Force 1997c, Elliott 1987).

Among the Euroamerican settlers in the NAFR region were those who came in search of mineral resources. They were soon followed by traders and merchants with goods and services to support the miners. Other expeditions explored transportation routes between mining districts and supply centers. The Army also explored this portion of the West, and the General Land Office conducted cadastral surveys (Air Force 1997c, Elliott 1987).

The mining industry began a major expansion in the NAFR region in the early 1900s, when railroads, motor vehicles and roads improved access to processing locations and markets. Copper, gold, gypsum, lead, limestone, magnetite, manganese, mercury, sand, silver, tungsten, turquoise, and zinc have all been mined on or near NAFR (Air Force 1996g).

Las Vegas began in 1905 as a small town along the San Pedro, Los Angeles and Salt Lake (SPLA&SL) Railroad (Elliott 1987). It was linked to the Tonopah and Goldfield lines in 1906 and 1907. The Las Vegas and Tonopah (LV&T) Railroad crossed what would become the southern periphery of the South Range, east of Indian Springs. Other railroads in the region (that do not cross NAFR) were the Tonopah & Tidewater and the Bullfrog & Goldfield. In addition to Las Vegas, Indian Springs station provided supplies to the NAFR region. Large-scale ranching was practiced throughout much of NAFR. On the North Range, Gold Flat and the Pahute and Rainier mesa areas in particular were known as grazing locations (Elliott 1987). The South Range also supported ranching activities.

The mining boom in the region of Tonopah and points south went bust early in the 1910s, with the result that many towns and railroads suffered economic setbacks (Elliott 1987).

In Nevada, gambling was legalized in 1931. Jobs provided by the Works Projects Administration made significant contributions to the employment of workers, and in southern Nevada, construction of Hoover Dam had a major effect on the economy (Air Force 1997c, Elliott 1987). However, when the dam was finished in 1935, the result was massive

unemployment and a slumping economy. It would take World War II to bring the state back to economic health (Air Force 1997c). Supplying minerals and other earth resources for the war effort formed a significant portion of the resurgent economy.

Beginning in October 1940, the land that was to become NAFR was gradually accumulated through EOs, the first of which, E.O. 8578, was issued by President Franklin D. Roosevelt. The original range was augmented by additional public land transfers (Air Force 1997c). The central portion of the range was transferred over the period from 1952 to 1967 to the Atomic Energy Commission to form the NTS. This split NAFR into the North and South Ranges (Office of History 1994).

Grazing had been allowed to continue on the range from its inception in 1940, but between 1959 and 1965 the Air Force extinguished all remaining grazing privileges and mineral rights. Grazing on the land withdrawn in 1986 continued until those permits expired or were purchased by the Air Force. With the withdrawal of the Groom Range and Safety and Security Buffer grazing in these areas also ended (Air Force 1997i). Mining claims within the Groom Mountain Withdrawal (PLO-100-338) continue to be recognized (see section 3.10.1)

NRC and NAFR provided the airspace and ground targets to support air combat training provided by NAFB. The Air Force forged cooperative agreements with DOE, USFWS and BLM to make use of NAFR more efficient (Air Force 1994b).

3.9.5 Nellis Range Complex

3.9.5.1 ARCHAEOLOGICAL RESOURCES

Approximately 5,000 archaeological resources have been recorded under MOAs that define the limits of the airspace associated with NAFR. These consist of an estimated 600 within Clark County, 2,400 within Lincoln County, and about 2,000 within Nye County. Within Clark County, only one of these archaeological sites is listed on the NRHP. The site is located on NAFR as well as under the airspace. In Lincoln County, two archaeological districts are listed on the NRHP. In Nye County, one NRHP site is located under the airspace, within the boundaries of the NTS (NRHP 1996). Most of the recorded archaeological sites have not been evaluated for NRHP eligibility (personal communication, Myhrer 1997).

Because most of the land within the NRC has not been surveyed for cultural resources, it is likely that tens of thousands of archaeological sites remain to be discovered. A significant portion of these undiscovered sites are probably eligible for nomination to the NRHP.

3.9.5.2 ARCHITECTURAL RESOURCES

Mining settlements, supply depots, and early use of Nellis AFB all yielded structures that are architectural resources, some of which are potentially NRHP-eligible. The airspace of NRC (ROI Three) overlies more than 100 known historic ghost towns, with most containing architectural features. At least 15 mining districts are within NAFR itself and are considered

eligible for nomination to the NRHP (Air Force 1997c). Also within NAFR is a portion of the LV&T Railroad bed and at least three historic roads.

Thirteen Cold War cultural resources related to Weapons and Tactics Center operations and the Threat Facility training program have been documented on Nellis AFB (Lowe et al. 1994), under the MOA airspace, but outside NAFR. Two of these (a maintenance hangar and the weapons school) are NRHP-eligible (Air Force 1997c).

One NRHP-listed building in Clark County is located under the existing MOAs. Lincoln County has one historical district and three buildings under the airspace that are on the NRHP.

3.9.5.3 TRADITIONAL CULTURAL RESOURCES

From the perspective of Indian people, traditional cultural resources can be viewed as interdependent combinations of plants, animals, minerals, and the elements. These resources are bound together by function and proximity (Stoffle et al. 1996) and by their use and relationship to the people (AIWS 1997). Traditional cultural resources identified in the region around NAFR (AIWS 1997) include a range of environmental elements. These resources include places of power and ceremony such as the center of the Southern Paiute holy land, rock art locations, quarrying locations, mineral springs used for curing, locations of food and medicinal plants, and important crossroads of trails used by Indian people (AIWS 1997). The core area of a large Indian agricultural district is located just outside NAFR but partially under its associated airspace. In this district, lands next to springs and streams were farmed, while the nearby uplands were used for pine nut gathering and hunting. The area was a gathering place for trade and ceremonies, and local hot springs were used for curing (AIWS 1997).

The NARD (AIWS 1997) identifies 12 such general areas. The specific locations of these areas are not presented in this document in the interest of maintaining confidentiality. Those that occur within the NRC but at least partly outside NAFR include the following:

Area 10. This area is not on NAFR, but is under the associated airspace. It includes hot and cold springs, rock art, and over 100 sites (AIWS 1997).

Area 11. This area is located primarily outside both NAFR and NRC airspace, but NAFR may include portions of it. Within this area Indian people collected food, farmed, and conducted trade and ceremonies (AIWS 1997).

Area 12. Located far from NAFR, but still within the airspace boundaries, this area includes 10 plant species, animal species, and rock shelters identified by American Indians (AIWS 1997).

3.9.6 Nellis Air Force Range

3.9.6.1 ARCHAEOLOGICAL RESOURCES

Although there have been over 60 years of archaeological investigations on NAFR, most work has occurred in the past two decades. Approximately 2.3 percent of NAFR has been surveyed for the presence of cultural resources. Over 1800 cultural resources have been identified and recorded since the 1930s, including early American Indian village sites, historic mining towns and smaller sites and isolates. Table 3.9-1 summarizes the survey coverage by range. The number of acres surveyed is compared to the total number of acres in each area, percentage of area surveyed, and the number of cultural resources found.

The results of some previous surveys may not accurately represent the number, density or patterning of all cultural resources on NAFR. Many of the large-scale surveys conducted in the past used techniques that are no longer considered adequate by Nellis AFB staff. For example, cultural resource recording standards of the past did not specifically require collecting the variety of site and environmental data necessary today to evaluate the NRHP eligibility of a resource. These earlier techniques included surveying areas known or expected to contain significant cultural resources, with the result that many important resources were identified. Smaller sites or sites in areas of low site density were less likely to be documented. Nonetheless, the variable quality of the data, older survey records and reports still provide enough information about NAFR cultural resources to make general statements about resource densities, condition, and sensitivity for the presence of previously unrecorded cultural resources throughout the range. More recent surveys provide the data necessary to evaluate NRHP eligibility, and many have been conducted in areas used by the Air Force.

On the North Range, about 2.7 percent of its approximately 1.9 million acres have been examined for cultural resources. Over 1,300 cultural resources have been recorded, with densities of known cultural resources ranging from five cultural resources per 100 acres on TTR to one resource per 100 acres on Range 71. At this time, no data are available on the NRHP eligibility status of these cultural resources. Resources located away from direct impact areas (e.g., away from targets and roads) are relatively undisturbed by military or any other recent human activities.

The South Range has received less survey coverage. About 1.5 percent of the 1.2 million-acre area has been examined for cultural resources. Over 540 cultural resources have been located. Site densities vary more here than on the North Range, ranging from probably less than one per 100 acres on Range 61 where no cultural resources were found in a survey of 480 acres, to over five cultural resources per 100 acres on Range 63. No data are available on how many may be eligible for nomination to the NRHP. As on the North Range, cultural resources located away from direct impact areas are generally undisturbed.

Based on available cultural resource data collected over many years, the sensitivity of different areas on NAFR for the presence of significant cultural resources varies from high to low. For

Table 3.9-1. Percent Surveyed and Cultural Resources by Area

Area	Total Acres	Acres Surveyed	Percent Surveyed	Number of Resources	Estimated Resource Density per Acre
NAFR: North					
Range 71	196,920	4,364	2.2	47	0.011
Range 74	361,440	11,146	3.1	198	0.018
Range 75	149,240	12,443	8.3	307	0.025
Range 76	211,760	8,333	3.9	183	0.022
EC East	160,560	3,117	1.9	65	0.021
EC South (includes Yucca Mountain)	264,960	3,963	1.5	92	0.023
EC West	220,160	N/A	N/A	N/A	
Tolicha Peak ECR	25,600	N/A	N/A	N/A	
Tonopah Test Range (includes TECR)	335,000	7,973	2.4	406	0.051
Total NAFR North	**1,925,640**	**51,339**	**2.7**	**1,298**	
NAFR: South					
Indian Springs AFAF	1,600	1,600	100	5	0.003
Range 61	191,160	480	0.3	0	0.000
Range 62	188,960	3,321	1.8	55	0.017
Range 63	160,920	4,373	2.7	236	0.054
Range 64	353,500	1,983	0.6	71	0.036
Range 65	117,760	4,726	4.0	182	0.039
Total NAFR South	**1,013,900**	**16,483**	**1.6**	**549**	
Total NAFR	**2,939,540[1]**	**67,822**	**2.3**	**1,847**	

Notes: 1. Does not include FAC Alpha, FAC Bravo, Pahute Alpha and Pahute Bravo
Source: Air Force 1997c.

example, areas considered sensitive for early American Indian resources include mountain ranges and adjacent valleys, stream banks and floodplains, springs, piñon-juniper woodlands, mesquite groves, and playa margins. Areas with lower sensitivity for the presence of significant cultural resources may include dry lake beds.

NAFR is large enough to encompass a huge number of sites, many of them relatively undisturbed by recent human activity. Its boundaries include known archaeological resources from every phase of southern Nevada's history. Early American Indian archaeological site types on NAFR include the following:

- scatters of flakes from making stone tools (these vary widely in size, with little or no accumulation of cultural sediment);
- sites that indicate specialized activities such as food processing;
- housepits;
- rockshelters;
- stone quarries; and
- Numic winter villages.

Several of the Euroamerican settlements that emerged during southern Nevada's mining period lie within the existing NAFR. Most of the mines have not operated since the establishment of NAFR in the 1940s. In the North Range, as many as 50 mines were opened, many of them accompanied by towns. Many other mining-related sites, such as temporary camps, mine entrances (adits), prospects and other features, have been recorded throughout the area. There were fewer mines on the South Range. Many of the mines and associated facilities on NAFR may be both historic archaeological and architectural resources. In the South Range, three mining districts —Arrowhead, Papoose, and Slate — included a number of mines and settlements.

About 15 miles of the LV&T railroad bed crosses the South Range. Construction campsites are situated along the right-of-way. Of the 150-mile railroad bed, the 15 miles on the South Range have been considered the most intact by archaeologists. In places outside NAFR, the old railroad bed forms the subfoundation for U.S. Highway 95. Also, the only site on NAFR listed on the NRHP is Tim Springs in the South Range.

3.9.6.2 ARCHITECTURAL RESOURCES

Some mining settlements and supply depots possess structures that are architectural resources. Of over 50 sites in at least 15 districts on NAFR, at least several could have historic architectural resources that may be eligible for nomination to the NRHP (Air Force 1997c; 1997i).

3.9.6.3 TRADITIONAL CULTURAL RESOURCES

Traditional cultural resources identified on NAFR by the CGTO include a range of traditionally used plants and animals, trails and certain geographic areas (AIWS 1997). Areas specifically identified in the NARD as important on NAFR include (AIWS 1997):

- areas where trails converged;
- rock art sites;
- quarry locations;
- power rocks and locations;
- landscape features such as specific peaks or ranges, hot springs, meadows and valleys, and caves;
- land that supports specific species such as eagles, hawks, mountain lion, deer, lizards, snakes, and insects;
- agricultural areas;
- gathering places for trade, ceremonial, or resource collecting; and
- medicine areas.

The NARD (AIWS 1997) identifies 12 such general areas. The specific locations of these areas are not presented in this document in the interest of maintaining confidentiality. Those that occur completely or partially within NAFR include the following:

Area 1. The traditional resources in this area include 42 traditional-use plants, traditional-use animals such as hawks and eagles, power places, rock art, and burial sites.

Area 2. This area contains six identified plant locations with 42 traditional-use plants similar to those found in Area 1. Traditional-use animals such as eagles and hawks are present, as is a "unique species of ant valued for both food and medicine." An important trail, used in the recent memory of Indian people, passes through the area. Places of power and ceremony have also been identified within this group of resources.

Area 3. This area has been identified as containing such traditional-use animals as mountain lions, deer, and hawks, as well as 10 traditional-use plants. Major campsites served as gathering places for groups from distant communities. Intergroup activities included rabbit drives, dances, and ceremonies. A number of rockshelters considered significant by Indian people are also found in this area.

Area 4. Caves in this area are spiritually important to the Southern Paiute people. Area caves are included in traditional Indian songs and stories and are related to other significant traditional locations outside the range.

Area 5. This area includes landscapes and ecosystems described in traditional stories.

Area 6. This area includes a variety of resources, including a power rock, rock art panels, rock shelters and raw material used in production of stone tools.

Area 7. Within this area at least 15 camps were identified. It is also known for its abundance of resources. Ethnographic studies indicated that the people who lived here had close ties with those in the surrounding valleys and ranges (Steward 1938).

Area 8. Oral history indicates that this area contains a variety of resources, although there has been no formal study of the specific area.

Area 9. Ethnographic research from the 1930s (Steward 1938) indicates there may be important traditional cultural resources within this area, although there has been no formal study.

Area 11. This area is located primarily outside both NAFR and NRC airspace, but NAFR may include a portion of it. Within this area Indian people collected food, farmed, and conducted trade and ceremonies.

Areas 10 and 12. These areas are not on the range.

3.9.6.4 EXISTING DISTURBED AREAS

ARCHAEOLOGICAL RESOURCES

Archaeological resources are known to be located within the disturbed areas on NAFR, i.e., those areas that are specifically subject to activities such as target practice, use and maintenance of facilities, roads or utilities. Most targets areas have not been surveyed for cultural resources. While artifacts and features are rare on the playas, where vegetation is generally absent due to the saline nature of the soil, lithic scatters and temporary processing sites are found on the margins of the lake.

ARCHITECTURAL RESOURCES

Some historic architectural resources may be located within disturbed areas on NAFR. Again, it is likely that because target areas have been used for many years, architectural resources that may be located within these areas have been either destroyed, damaged, or covered with unexploded ordnance that makes the data inaccessible to researchers.

TRADITIONAL CULTURAL RESOURCES

TCPs have not been identified within the designated target areas on the clear, saline portions of the dry lake playa beds. Based on a lack of vegetation and the extremely flat topography in these playa areas, it is unlikely that significant traditional cultural resources would be identified.

3.10 LAND USE AND TRANSPORTATION

Existing lands on NAFR have primarily been used for military testing and training since the 1940s. Transportation routes on NAFR support military activities.

Prior to creation of NAFR, mining occurred within the range. Minerals found within NAFR included gold, silver, copper, lead, zinc, mercury, tungsten, turquoise, commercial-grade sand, gravel, and limestone. Adjacent to the range, significant quantities of gypsum and limestone are produced. Over half the mining districts located within NAFR have had some historic output. In 1997, BLM determined that no lands within NAFR were suitable for opening to mineral exploration and development.

Historical grazing use of NAFR was primarily in the North Range. The scarce supply of water resources and limited amounts of quality forage for livestock curtailed extensive use of the South Range for grazing. Between 1949 and 1965, all grazing and mineral rights within the range were extinguished. NAFR is closed to grazing except in those areas where it was authorized at the time of the 1986 withdrawal.



Most transportation routes on NAFR support access to targets and associated facilities. Gravel roads are typical and are infrequently traveled.

Overlapping management areas on NAFR include the following:

- **Tonopah Test Range (TTR).** TTR is managed by Sandia Corporation under contract to DOE. Facilities and roads on TTR are used by the Air Force as an integral part of the Air Test and Training Mission. The management and land use of TTR is compatible with overall activities on NAFR.
- **Pahute Mesa.** Located on the North Range adjacent to the NTS, Pahute Mesa is managed by the DOE. Pahute Mesa contains multiple nuclear weapons testing sites with associated contamination. The Air Force makes limited use of the mesa for threat emitter sites and also uses the airspace for tracking. DOE includes the management of Pahute Mesa within the NTS sphere of activity and essentially treats it as an extension of the NTS.

The NAFR-developed areas of TTR and Indian Springs, including the tower pictured here, are supported by operations and maintenance capabilities at Nellis AFB.





Use and public access to the joint-use area of the Desert National Wildlife Range (DNWR) and NAFR is restricted by an MOU between the Air Force and the Department of the Interior (DOI).

3.10 LAND USE AND TRANSPORTATION

Land use generally refers to human management of land, often for residential or economic purposes. It also refers to use of land for preservation or protection of natural resources such as wildlife habitat, vegetation, or unique features. Human land uses include residential, commercial, industrial, agricultural, or recreational uses, while some natural features are protected under designations such as national parks, national forests, wilderness areas, or other designated areas. Land use is considered within ROI Three outside NAFR, and within ROI Two where access is restricted. All land use in ROI One consists of military activity as described in Chapter 2.0. Wilderness areas are discussed in section 3.11 and recreation areas are discussed in section 3.12.

This section summarizes material presented in the *Land Use Study for Nellis Air Force Range* (Air Force 1997i). The attributes of land use described in this section include general land use and ownership, land management plans, special use areas, and transportation resources. Land ownership is a categorization of land according to type of owner. The major land ownership categories described in this section include federal, state, and private. Federal lands are further designated as BLM, USFS, USFWS, DOE, and DOD managed. Land use is generally regulated or influenced by management plans, policies, ordinances, and regulations that determine the types of uses allowed in particular areas and that protect specially designated areas and environmentally sensitive uses. Special use areas are identified by various agencies as requiring particular management attention. Transportation resources consist of the infrastructure and equipment used for the movement of people and materials. Particular emphasis for this analysis is given to the road and rail networks in the region. Airport facilities are discussed in section 3.1, Airspace.

3.10.1 General Land Use and Ownership

3.10.1.1 NAFR LANDS (ROI TWO)

Land encompassed by NAFR was once used primarily for mining and some grazing, until establishment of the range in the 1940s. Since then, the land has been used for military purposes, although some mining and controlled recreational activities are permitted and continue to occur within the confines of the range. The land also provides habitat for wild horses, bighorn sheep, desert tortoise, and other wildlife species. BLM, through Air Force concurrence, has granted limited rights-of-way in the range for specific purposes (Figure 3.10-1).

MINING

Prior to the 1940s during periods of active mineral exploration and extraction, minerals found within NAFR included gold, silver, copper, lead, zinc, mercury, tungsten, and turquoise (BLM 1989). Commercial-grade sand, gravel, and limestone have all also been found within the

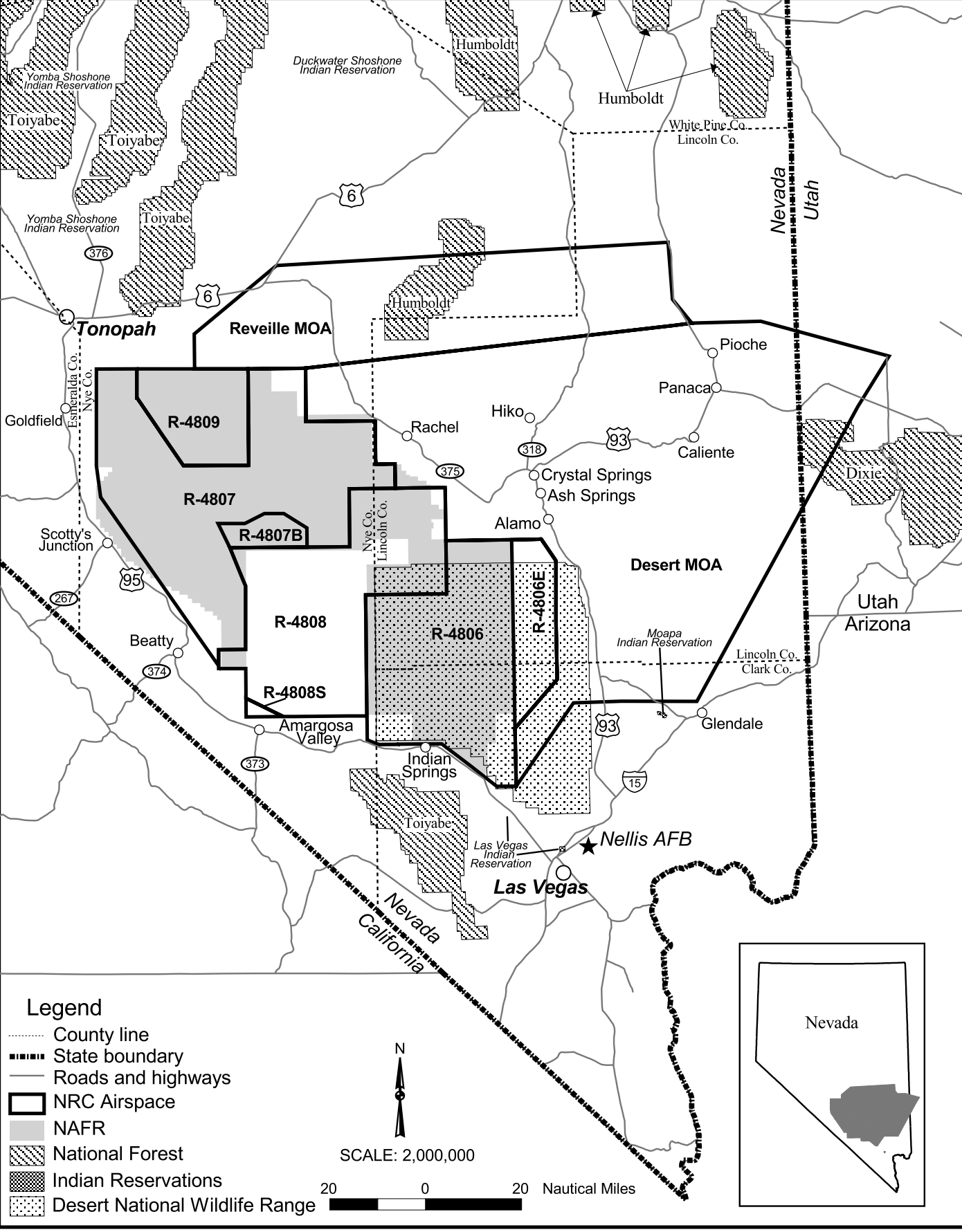


Figure 3.10-1. Land Ownership and Communities under Nellis Military Airspace

range. Adjacent to the range, significant quantities of gypsum and limestone are produced. Total mineral production in the area is not known; however, over half the mining districts located within NAFR have had some mining activity (BLM 1981).

Mining of the lands comprising NAFR and surrounding region began in the mid-1860s (USGS and U.S. Bureau of Mines 1978) and continued sporadically through the 1930s. Withdrawal of the lands for the range in 1940 suspended all mining activity. Between 1949 and 1965, under the authority of the Air Force Real Estate Directive 592.2, dated September 21, 1954, all mineral rights and grazing privileges within the range boundaries of that period were purchased and extinguished. Very little mining activity took place within the range until 1986, when the Groom Mountain Addition was withdrawn. This area included one unpatented mining claim, 16 patented mining claims, and all or portions of two oil and gas leases. The oil and gas leases have since expired, but the mining claims (listed in Table 3.10-1) continue to be recognized. Figure 3.5-7 shows the locations of mining districts within the NAFR area.

In 1997, BLM determined that, due to the continued safety and security concerns of the Air Force, no lands currently withdrawn could be opened to mineral exploration and development. In the future, if any existing mineral rights are eliminated by relinquishment, expiration, or purchase by the Air Force, they will revert to the U.S. As required by the MLWA of 1986, at 5-year intervals, the Secretary of the Interior will determine, with Air Force concurrence, which lands within NAFR are suitable to open for operation under the Mining Law of 1872; the Mineral Lands Leasing Act of 1920, as amended; the Mineral Leasing Act for Acquired Lands of 1947; the Geothermal Steam Act of 1970; or any one or more of such acts (BLM 1992a).

The Air Force has completed an assessment of the mineral and energy resources on NAFR as part of the land renewal process. This *Mineral and Energy Resources* Report (NBMG 1997) was conducted to provide an assessment of all extractable energy and mineral resources on property managed by the Air Force in southeastern Nevada that are subject to the provisions of the MLWA of 1986. The assessment conforms to mineral assessment guidelines and procedures required by the BLM.

GRAZING

Historical agricultural use of NAFR is associated with cattle ranching activities, primarily in the North Range area. The scarce supply of water resources and limited amounts of quality forage for livestock in the south historically has curtailed extensive use of the South Range area for grazing.

From the 1940s, cattlemen were allowed to use the lands comprising NAFR for grazing; but between 1949 and 1965, under the authority of the Air Force Real Estate Directive 592.2 (described above), grazing and mineral rights within the range were not renewed; however, trespass grazing continued through the 1970s. NAFR is still closed to grazing and ranching, except in those areas where it was authorized at the time of the Groom Mountain Range withdrawal.

Table 3.10-1. Mining Claims

District	*Claim Name*	Mineral Survey Number	Patent Number	PATENT DATE	Owner of Record	Comments
DON DALE	Cadwalader Millsite	41 B	3379	September 10, 1879	D/4 Enterprises, Inc., c/o Steve Medlin, Alamo, Nevada	The Cadwalader lode claim that was associated with this millsite is located in the Tem Piute district. BLM records show location to be in sec. 6, T5S, R55-1/2 E.
	Sterlling Millsite	57 B	9368	June 1884	Reland Johnson, Box 652, Farmington, Utah	The Sterlling lode claim that was associated with this millsite is located in the Tem Piute district.
Gold Crater	Black Eagle	2788	31381	November 27, 1908	United States of America, Commander, LA District Corps of Engineers, P.O. Box 2711, Los Angeles, California 90053	BLM survey plats locate M.S. 2788 high on the hill south of the Gold Crater mines. During field work, two patent corners were found in the central part of the district about 1.6 km to the north; M.S. is mislocated on the BLM plats.
	Manxman	2788	31381	November 27, 1908		
	Peacock	2788	31381	November 27, 1908		
Goldfield	Nancy Donaldson	3198	284077	July 15, 1912	William B. Golden, P.O. Box 2010, Sparks, Nevada 89432	According to the BLM mineral survey plats, this claim group lies across the NAFR boundary but was excluded from the NAFR; the NAFR fence swings east around the excluded ground.
	Nancy Donaldson No. 1	3198	284077	July 15, 1912		
	Nancy Donaldson No. 2	3198	284077	July 15, 1912		
	Eclipse	3217	83152	October 11, 1909	Pacific Gold Corp., 4518 Whitsett Avenue, Studio City, California 91604	BLM plats locate M.S. 3217 in sec. 12, T3S, R44E, east of the Goldfield Hills. It appears that the survey tie for the claim is linked to the wrong section corner, the claims, therefore, are actually located west of the NAFR boundary.
	Revenue	3217	83152	October 11, 1909		
Groom	Conception	37	1660	February 10, 1876	D.R. Sheahan, M.F. Sheahan, H. Patrick, A.B. Sheahan, J.F. Sears, T. Sears, B.V. Cline, W. Wheatley Estate, c/o Dan Sheahan, 2460 E. Flamingo Rd., Las Vegas, Nevada 89109	Patented claims at the Groom Mine have been held by the Sheahan family since 1885.
	White Lake	37	1660	February 10, 1876		
	Conception No. 2	38	1661	February 10, 1876		
	White Lake No. 2	38	1661	February 10, 1876		
	Bride	4658	1034979	February 20, 1930		
	South End	4658	1034979	February 20, 1930		
	South End Fraction	4658	1034979	February 20. 1930		
	Southern Groom	4659	1055957	July 6, 1932		
	Groom mine lode group	none	none	not patented		Assessment work was filed for 1995.
Jamestown	Daisy	3962	285880	July 23, 1912	Fuetsch Nuclear Mines Inc., c/o Carl F. Fuetsch, 860 Crocker Way, Reno, Nevada 89509	Claims of M.S. 3962 were acquired from Nye County in 1970 by the Fuetsch family. The claims are currently leased to the Air Force.

Table 3.10-1. Mining Claims

District	*Claim Name*	Mineral Survey Number	Patent Number	PATENT DATE	Owner of Record	Comments
	Last Chance	3962	285880	July 23, 1912		
	Mohawk	3962	285880	July 23, 1912		
	Golden Chariot No. 1	3971	296554	October 15, 1912		Claims of the M.S. 3971 have been owned by the Fuetsch family since 1908. The claims are currently leased to the Air Force.
	Golden Chariot No. 2	3971	296554	October 15, 1912		
	Golden Chariot No. 3	3971	296554	October 15, 1912		
Silverbow	Blue Horse	4457	1001726	May 15, 1927	Ruth and Randall Dugan, M. Kinneberg, and J.D. Kinneberg, 511 W. Flynn Lane, Phoenix, Arizona 85013	The Blue Horse claim overlaps the NAFR boundary, but the Range fence follows the claim outline and excludes it from inclusion in the NAFR.
Southeastern	South Eastern	2214A	43581	June 8, 1907	Last owner of record, Teledyne, Inc. (1977)	BLM plats show M.S. 4268 located in secs. 29, 30, 31, and 32, T9S, R58E instead of the actual location in secs. 33 and 34, T9S, R57E. Lincoln County records show no trace of these claims.
	South Eastern No. 1	2214 A	43581	June 8, 1907		
	South Eastern No. 2	2214 A	43581	June 8, 1907		
	South Eastern No. 3	2214 A	43581	June 8, 1907		
Wagner	Ish	3679	251234	March 12, 1912	Dulvick, J.W. and Eleanor, 1648 W. Tamarisk, Phoenix, Arizona 85041	There are 18 claims in M.S. 3679, only one, the Ish, extends into the NAFR. The overlap is a triangular sliver of land about 30 m wide at the south end.
Wellington	Hope Next	4268	572555	March 16, 1917	Last owner of record was Nye County (1986)	BLM patent plats show M.S. 4268 located at the mine workings at Wellington. No ownership is shown in the current Nye County assessors records although they were in County ownership between 1930 and 1986.
	Hope Now	4268	572555	March 16, 1917		

The Safety and Security Buffer area affected two grazing allotments: the entire Naquinta Springs allotment (approximately 52,425 acres) and a portion of the Bald Mountain allotment (approximately 37,175 acres of the total approximately 269,723 acres). At the time of the withdrawal, the Naquita Springs allotment was inactive and the Bald Mountain allotment was active. The status of these allotments has remained unchanged since the time of withdrawal. No additional grazing privileges have been awarded within NAFR since the 1986 withdrawal. To keep domestic livestock off the range, BLM, in cooperation with the Air Force, has installed fencing along much of the perimeter of the range boundaries.

RECREATION

Access restrictions on NAFR preclude all unrestricted recreational opportunities in the area. Controlled hunts are allowed to occur on the range each year for bighorn sheep. For further information on recreational uses of NAFR, refer to section 3.12, Recreation.

WILDLIFE WATERING

The range provides habitat to various forms of wildlife. Wildlife watering facilities and springs are maintained within the range to supplement natural water sources used by wildlife and wild horses. Seventeen of these watering facilities are located within the joint-use area of DNWR (depicted in Figure 3.10-1), and all are maintained by the USFWS for wildlife located on DNWR. For a full description of wildlife resources and their management, refer to section 3.8, Biological Resources.

RIGHTS-OF-WAY

BLM has granted rights-of-way to the owners of existing valid mining claims to provide access to their claims; access is restricted to pre-arranged and scheduled visits for working and maintaining of the mining claims. Rights-of-way have also been granted to utility companies for three electrical power transmission lines and a telephone line.

The DOE maintains a right-of-way over the portion of NAFR that includes Yucca Mountain for the purpose of site characterization.

MEMORANDA AND OTHER AGREEMENTS

The Air Force and the USFWS have formalized an agreement for the management and use of lands withdrawn for both the DNWR and NAFR. This overlapping withdrawal includes approximately 826,000 acres of land in the NAFR South Range. An MOU between the DOI (for USFWS) and Air Force delineates the rights and responsibilities of the two agencies with regard to the overlapping withdrawals. The restrictions on the Air Force include a minimum altitude for all activities except weapons delivery and landing or take offs. According to the MOU, delivery of air-to-ground ordnance is to be confined to approximately 100,000 acres. These are principally confined to lands below 3,600 feet altitude in the Indian Springs Valley and 4,000 feet in the Three Lakes Valley.

Two land-management overlays have been established to protect specific resources on or adjacent to the North Range. 1) Public Land Order (PLO) 6802 (published September 25, 1990) precludes mining and mineral leasing for a period of 12 years to maintain the physical integrity of the subsurface environment in support of site characterization at the DOE Yucca Mountain. 2) The BLM entered into a cooperative agreement in 1974 to maintain and manage the populations of wild horses within the NWHR on the NAFR. This area is shown in Figure 3.10-2.

An MOU between the Air Force and DOE outlines restrictions of overflight of restricted airspace in R-4808N and Pahute Mesa by military aircraft. A letter of agreement (LOA) between the Air Force and DOE defines functional areas of responsibility and cost sharing between the parties of the agreement. The LOA covers Area 10 in the TTR.

The Air Force and the DOE have several MOUs, other documents, and agreements that delineate the roles and responsibilities regarding lands within the NAFR. These include agreements regarding the use and restrictions to TTR, Pahute Mesa, and lands contaminated by nuclear device testing. Examples include:

- A letter of agreement serves as the basis for operations of all weapons testing at the TTR by Sandia National Laboratory for Albuquerque Operations of the DOE.
- The lands of Pahute Mesa were used for underground nuclear test events that resulted in surface and subsurface contamination. An MOU between the Air Force and DOE / Nevada Operations serves as the basis for current and future use of the lands and compliance with federal environmental regulations effective July 1998.
- Some of the lands in Stonewall Flats were contaminated by the Double Tracks experiment. An MOU between the Air Force and the DOE defines the authority and responsibility with respect to protection of and access to Stonewall Flats Area.

3.10.1.2 LANDS UNDER ASSOCIATED AIRSPACE (ROI THREE)

Outside of NAFR, land use consists primarily of federal land managed by BLM for multiple use. BLM authorizes livestock grazing within units delineated as grazing allotments on nearly all BLM land in the vicinity of NAFR. In addition to grazing, federal lands managed by BLM are used for mining and recreation. Various mining claims and prospects are located throughout the region. The area also offers recreational opportunities such as hunting, hiking, bird watching, and off-highway vehicle activities.

Other federal lands adjacent to NAFR-associated airspace include portions of Dixie National Forest and Humboldt National Forest, which are managed by the USFS. Land use in the national forests consists of grazing, recreation, wildlife and wildlife habitat preservation, timber

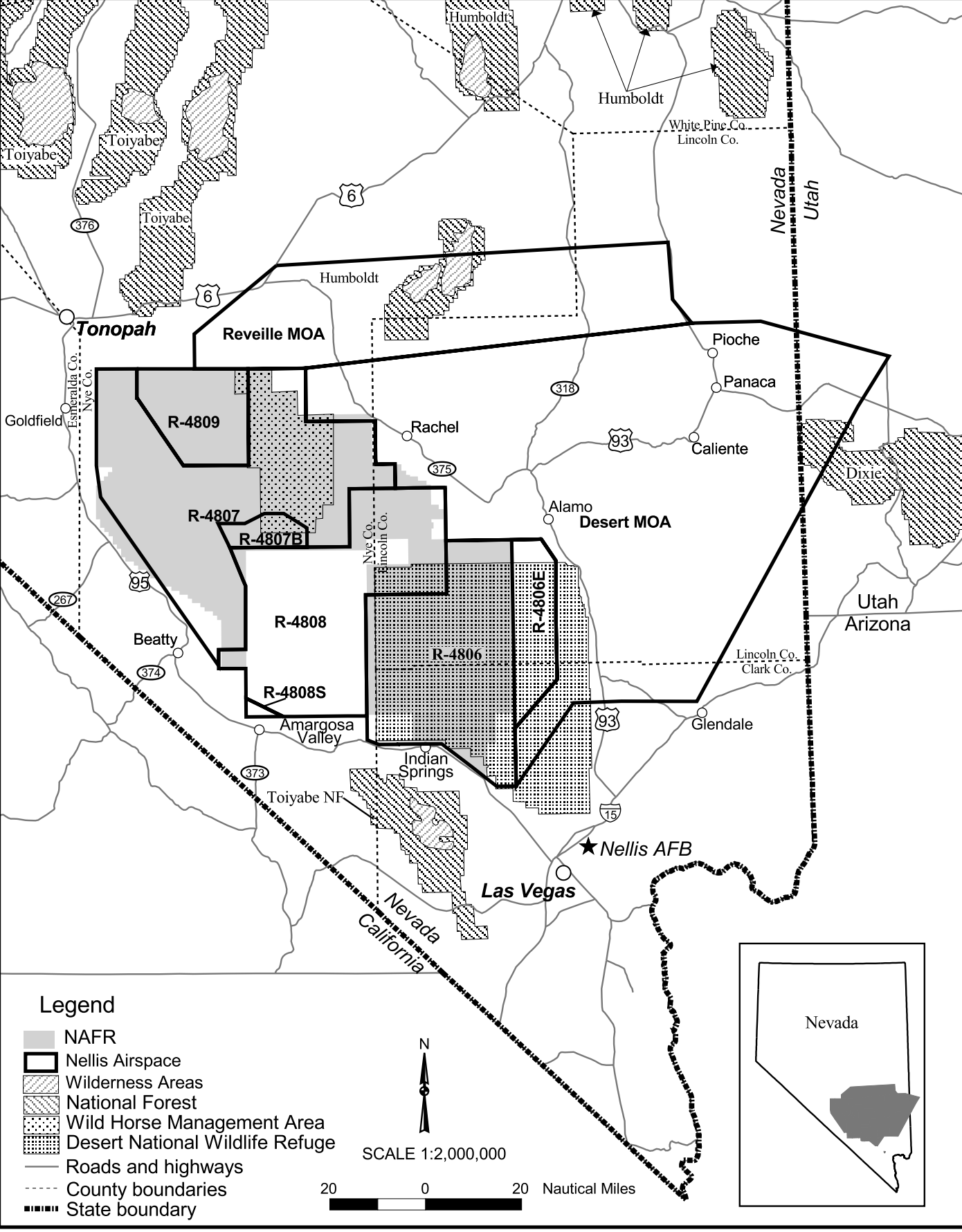


Figure 3.10-2. Special Use Areas under Nellis Military Airspace

production, and mining (USFS 1985). The State of Nevada maintains two state parks and one state recreation area adjacent to NAFR-associated airspace.

Sections of privately owned land occur outside NAFR boundaries, the largest of which is associated with the northern portions of the Las Vegas metropolitan area. Industrial land uses are located around the residential areas and along the Union Pacific Railroad (BLM 1990a). Other communities, including private land holdings, are located along the roadways surrounding NAFR (Figure 3.10-1).

3.10.2 Land Management Plans

3.10.2.1 NAFR LANDS (ROI 2)

BLM's guiding principle of multiple use extends to the use of federal lands withdrawn for national defense and security, which, although not available for public use, remain under BLM's jurisdiction and management with the exception of DNWR lands withdrawn to the USFWS. All uses, policies, and programs within the withdrawn lands must meet federal requirements mandated and administered through BLM. In accordance with the Federal Land Policy and Management Act (FLPMA), NEPA, and MLWA of 1986, BLM developed the *Nellis Air Force Range Resource Plan and Record of Decision* (BLM 1992c) to guide management of lands comprising NAFR. The plan was directed at "improving rangeland vegetative conditions and wildlife habitat by achieving and maintaining a thriving ecological balance for the wild horse population on the planning area" (BLM 1992c). Management objectives within the plan were derived for the following resources: vegetation, wildlife habitat, wild horses, visual resources, Area of Critical Environmental Concern (ACEC), access, minerals, soil, water, and air resources, forestry, livestock grazing, cultural and paleontological resources, recreation, wilderness and natural areas, and fire management.

As the federal agency responsible for protection, management, and control of wild horses and burros using federal lands, BLM, in cooperation with the Air Force, designated lands within NAFR as a wild horse management area (refer to Figure 3.10-2). A Cooperative Agreement between BLM and the Air Force, signed in 1974 and provided in Appendix C, provides direction and procedures for the care and management of the wild horse population that roams the area.

Grazing occurs on NAFR within the Bald Mountain Allotment in accordance with the *Caliente Management Framework Plan* (BLM 1980). The Domestic Livestock Grazing Management Program (BLM 1979) defines management guidelines derived for the following resources: visual, cultural, paleontological, recreational, agricultural, mineral, social, economics, forest, wildlife, land use controls and constraints, and livestock grazing. Grazing allotments are named according to the adjacent mountain range.

A Five-Party Cooperative Agreement (provided in Appendix C) between the Air Force, USFWS, BLM, Nevada State Clearinghouse, and the DOE was implemented with the goal of forming a working group to manage the natural resources within the Great Basin and Mojave Desert ecosystems using a biodiversity, conservation, and ecosystem-based approach.

An MOU between the DOD and the State of Nevada Clearinghouse defines the policies and relationship between state and local governments and the Air Force. It requires the Air Force to notify the state concerning any land and air use changes on NAFR and its adjacent lands.

3.10.2.2 LANDS UNDER THE ASSOCIATED AIRSPACE (ROI 3)

Most of the lands under the NAFR associated airspace consist of federal lands managed by BLM (Figure 3.10-1). BLM is guided by the principles of multiple use and sustained yield and a recognized need to protect and enhance the natural and human environment. Within each state, BLM manages lands in units referred to as districts or field offices. These associated airspace lands encompass lands within the Las Vegas Field Office, the Battle Mountain Field Office, and the Ely District in Nevada. Management of these lands is guided by the *Caliente Management Framework Plan* (BLM 1980). The BLM is amending the Caliente Management Framework Plan (MFP) specifically to address the management of threatened Desert Tortoise habitat (personal communication, McGinty 1998). The Caliente MFP is intended to guide resource management for 20 to 25 years, addressing all relevant activities and managing these activities by incorporating a balanced multiple use approach.

The Air Force has identified noise-sensitive areas under NRC airspace and surrounding NAFR. These sensitive areas are excluded from aircraft operations. These lands primarily include federal lands managed by the BLM. Municipalities and private lands are also included. These noise-sensitive areas are depicted on Figure 3.10-3.

3.10.3 Special Use Areas

3.10.3.1 NAFR LANDS

DESERT NATIONAL WILDLIFE RANGE

The DNWR was established by EO 7373 of President Franklin D. Roosevelt on May 20, 1936, primarily for the preservation of the desert bighorn sheep in its natural environment. Originally named the Desert Game Range under the joint jurisdiction of the Division of Biological Survey (later the Bureau of Sport Fisheries and Wildlife), and now the USFWS and the BLM, it contained a total of approximately 2,250,000 acres, including lands both north and south of U.S. Highway 95. PLO 4079, issued on August 26, 1966 and corrected on September 23, 1966, revoked EO 7373, changed the name to DNWR, reduced its size to the current approximately 1,588,000 acres, and transferred sole administration to the USFWS. Its southernmost boundary is about one half mile from the city limits of Las Vegas, as shown in Figure 3.10-2. The use of DNWR for military purposes began during World War II when portions of the area near Indian Springs were identified as suitable for military training, and a

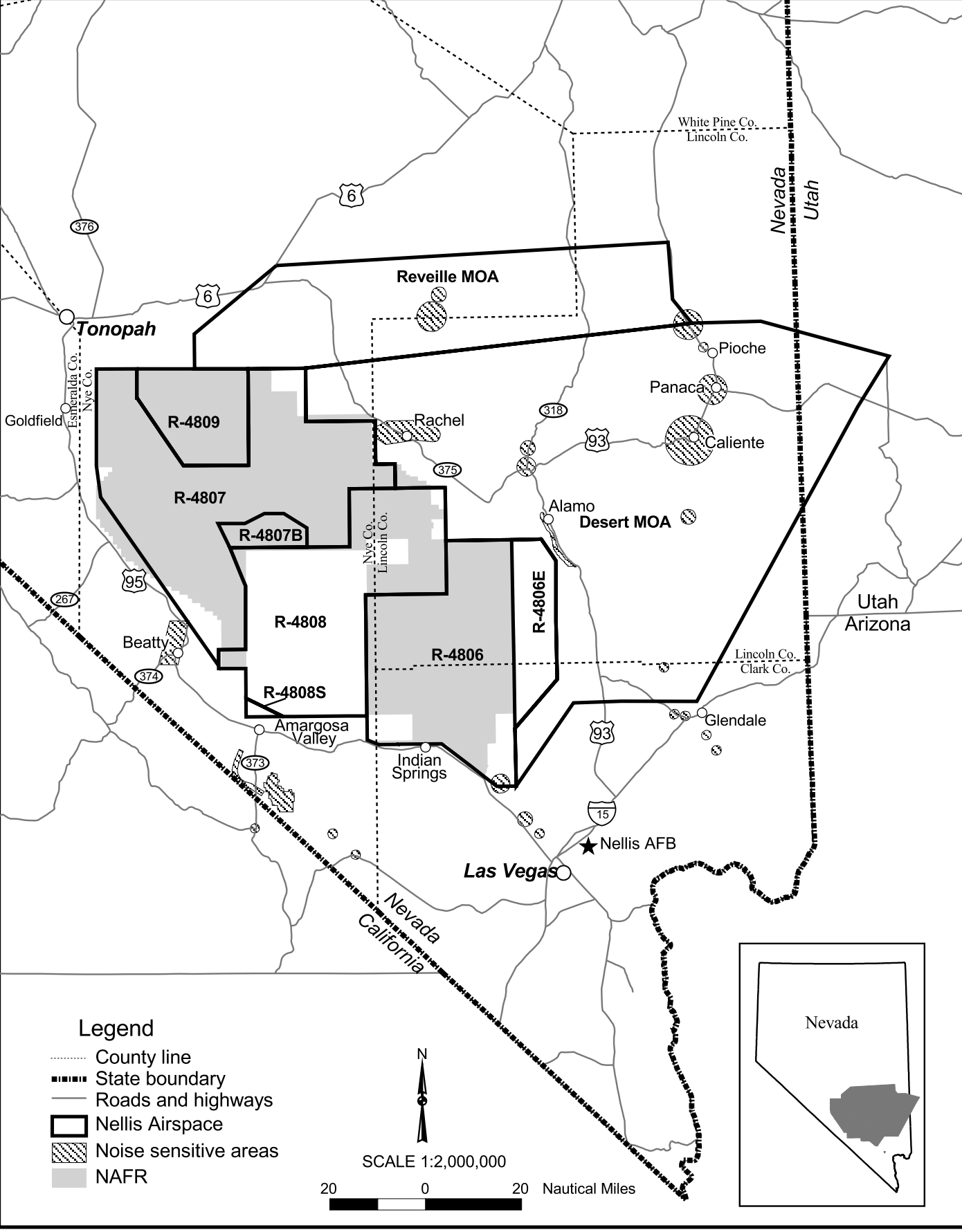


Figure 3.10-3. Noise Sensitive Areas

proclamation by President Roosevelt designated the area for such use. The Secretary of the Interior granted permission to DOD for military use of the area until the end of the Korean War. Use of the area for military training activities has continued to the present.

Use and public access to the joint-use area of DNWR and NAFR is restricted by an MOU between the Air Force and the DOI and further, by PL 99-606 as amended (Appendix C). All grazing rights or privileges within the joint-use area of DNWR have been eliminated through purchase or termination of permits. A description of recreational opportunities available in DNWR is provided in section 3.12, Recreation. A description of wildlife resources and their management within DNWR is provided in section 3.8, Biological Resources. A description of Wilderness Study Areas (WSAs) within DNWR is provided in section 3.11, Wilderness and Wilderness Study Areas.

TIMBER MOUNTAIN CALDERA NATIONAL NATURAL LANDMARK

The Timber Mountain Caldera, located adjacent to and overlapping the northwest portion of the Nevada Test Site, has been designated, by the Secretary of the Interior, as a National Natural Landmark. The area, with its associated volcanic features is one of the best examples of a caldera (Figure 3.10-4).

WILD HORSE MANAGEMENT AREA

The Wild Horse and Burro Act of 1971 (16 U.S.C. 1331-1340), and regulations of the Secretary of the Interior (43 CFR Part 4700) place the responsibility for protection, management, and control of wild free-roaming horses and burros with BLM when such animals use federal lands administered by BLM as all or part of their habitat. Wild Horse Management Areas (HMAs) are established to maintain populations of wild horses. HMAs delimit areas within which specified numbers of wild horses are protected from overpopulation and harassment. Management tools include periodic monitoring of population numbers, water sources, distribution patterns, and the condition of adults and foals. In accordance with these regulations, BLM, with Air Force concurrence (as outlined in a cooperative agreement provided in Appendix C), established a HMA within the confines of NAFR to facilitate management of the wild horses and burros that use land within the range (Figure 3.10-2).

DESERT TORTOISE MANAGEMENT AREA

An area within the range has been designated for special management of the desert tortoise in compliance with USFWS's Biological Opinion dated February 1997. A description of this area is provided in section 3.8, Biological Resources.

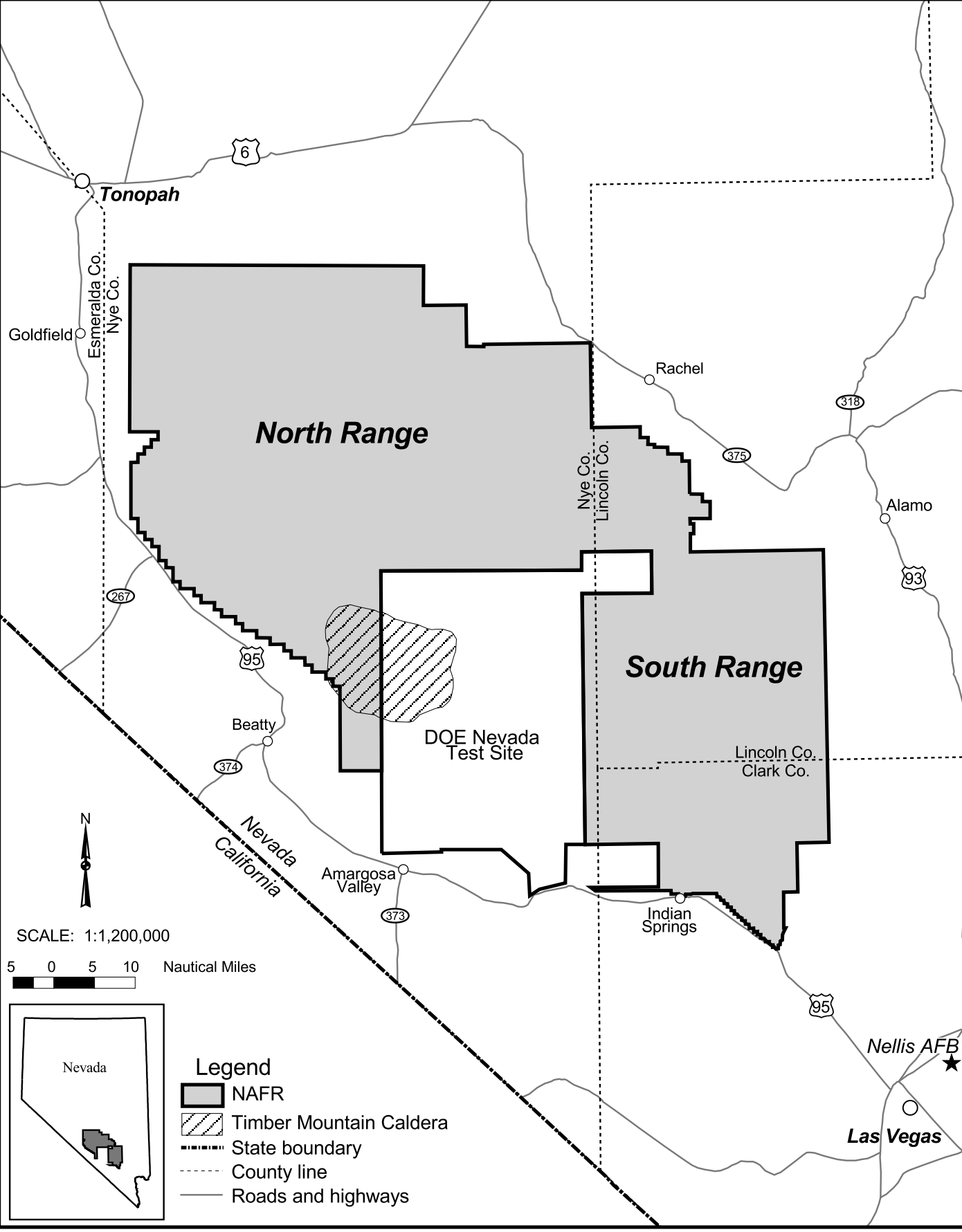


Figure 3.10-4. Timber Mountain Caldera

3.10.4 Transportation Resources

3.10.4.1 NAFR LANDS

Figure 1-3 depicts the major roads on NAFR, other roads and trails are too numerous to depict on this type of figure. With the exception of access to DOE administered sites by employees and contractors and rights-of-way provided to owners of mining claims and grazing permits within NAFR, public access onto the range is prohibited.

3.10.4.2 LANDS UNDER ASSOCIATED AIRSPACE

Interstate 15 (I-15), the largest highway in the area, is oriented in a northeast-southwest direction through Las Vegas. Three U.S. Highways and one state highway surround the NAFR. U.S. Highway 93, sharing a segment of road with I-15, is northeast of Las Vegas along the eastern boundary of the range and meets with Nevada State Highway 375 in Crystal Springs. Northwest out of Crystal Springs, State Highway 375 connects with U.S. Highway 6 at Warm Springs, which provides access to the City of Tonopah just north of the range. U.S. Highway 95 is south out of Tonopah along the western boundary of NAFR and completes the circle, intersecting with U.S. Highway 93 in Las Vegas.

Union Pacific Rail service runs east of the ROI through southeastern Nevada providing freight service to the City of Las Vegas.

Commercial air service is provided via the Las Vegas, McCarran Airport. No other airport in the region is serviced by scheduled airlines.

OTHER SPECIAL USE AREAS

Special use areas under the associated airspace include National Wildlife Refuges and Management Areas, and State Parks and Recreation Areas.

Units of the National Wildlife Refuge System are designated and managed by the USFWS "to administer a national network of lands and water for conservation, management, and where appropriate, restoration of fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations." The Pahranagat and Moapa Valley National Wildlife Refuges are located under the associated airspace. In addition, the Key Pittman Wildlife Management Area is also located within these lands. Section 3.8, Biological Resources, provides a full description of these areas.

Cathedral Gorge State Park, Beaver Dam State Park, and Echo Canyon State Recreation Areas are all located under the associated airspace. A discussion of these areas is provided in section 3.12.

3.10.5 American Indian Issues Concerning Land Use and Transportation

Members of the CGTO consider all aspects of the land to be interconnected. Some uses of the land by the military, other agencies, or the public may preclude certain American Indian practices. The CGTO considers the "natural condition" of the Nellis lands to be what existed before Euroamerican contact (AIWS 1997), or possibly before A.D. 1492. Specific issues include the following:

- Centrality. The lands are central to American Indian culture in the region.
- Land-disturbing activities stemming from Euroamerican use of the land, including military use, rendered it unusable for Indian people.
- Withdrawal of the NAFR offered protection for some traditional cultural resources, reducing vandalism, looting, grazing, and other types of disturbance.
- Dry lakes are part of culturally important hydrological areas. They are also commonly used for live ordnance target areas on NAFR.

The NARD states:

> American Indians believe a monetary value cannot be placed on lands. Indian people do not recognize boundaries other than their traditional territories. Land was traditionally respected for its ability to sustain the people economically, spiritually, and socially. American Indian perspectives on land use should be incorporated into all federal agency programs and activities that will potentially transform the natural landscape of traditional Indian land or impact its biological resources (AIWS 1997).

WILDERNESS AND WILDERNESS STUDY AREAS

3.11

Wilderness designation is intended to preserve areas in a primitive state that have little evidence of human activity. The Wilderness Act of 1964 identified criteria for evaluating those areas and gave direction on how a designated wilderness should be managed. In general, use of mechanized vehicles or other motorized equipment, landing of aircraft, and construction of structures and roads are prohibited in wilderness areas.

Section 603(c) of the FLPMA requires wilderness reviews on roadless public lands of 5,000 or more acres and roadless islands to determine which are suitable for wilderness designation. Under the NRC, two wilderness areas have been designated and a number of Wilderness Study Areas (WSAs) have been identified.



Each federal agency is responsible for evaluating, nominating, and protecting potential wilderness areas within the lands they manage. In 1975, the U.S. Fish and Wildlife Service (USFWS) proposed approximately 88 percent of the Desert National Wildlife Range (DNWR) for inclusion in the National Wilderness Preservation System. Areas excluded from the wilderness proposal included land on which NAFR target facilities are located. Aircraft operations over DNWR are generally 2,000 feet above ground level, except for special training missions. In 1979, DOI and BLM stated that the wilderness designation of the majority of the DNWR will not affect the Air Force's use of NAFR for bombing and gunnery practice and that continued military use, as described in the Memorandum of Understanding (MOU) between the USFWS and the Air Force, will not preclude the USFWS from managing the area to protect wilderness qualities.

BLM has inventoried federal lands under its jurisdiction and identified 20 WSAs under the NRC. Each WSA includes wilderness qualities such as naturalness, size, solitude, and special features. Additional wilderness quality factors evaluated by BLM include multiple resource benefits, balancing the geographic distribution of wilderness areas, diversity of natural systems, and manageability. Pending Congressional review of WSAs, BLM manages each WSA as *de facto* wilderness to not impair its suitability for wilderness designation.



Areas that contain permanent evidence of human activity, such as power lines or roads, do not meet wilderness quality factors.

3.11 WILDERNESS AND WILDERNESS STUDY AREAS

This section addresses wilderness and Wilderness Study Areas (WSAs) present within ROI Three, identifies their attributes, and discusses applicable management practices.

The objective of the Wilderness Act of 1964 (PL 88-57) is "to assure that an increasing population accompanied by expanding settlement and growing mechanization, does not occupy and modify all areas within the United States." The Act established a National Wilderness Preservation System to be "administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness . . . to provide for the protection of these areas and the preservation of their wilderness character." The Act mandated the USFS, the NPS, and the USFWS to review their lands for potential wilderness areas.

Wilderness designation is intended to preserve areas in a primitive state that have little evidence of human activity. The Wilderness Act of 1964 identified criteria for evaluating those areas and gave direction on how designated wilderness should be managed. Subject to certain exemptions, use of motor vehicles or other motorized equipment, landing of aircraft, and construction of structures and roads are prohibited in wilderness areas.

Management direction for wilderness in the National Wildlife Refuge System comes from the Wilderness Act, the National Wildlife Refuge System Administration Act of 1966 and supplemental amendments, the Alaskan National Interest Lands Conservation Act of 1980, and other legislation establishing individual units of the refuge system. These lands are implemented by published regulations for Wilderness Preservation and Management (50 CFR, part 35), DOI guides, and agency national policy for wilderness management (Hendee et al. 1990).

Congress passed the FLPMA in 1976, which mandated in Section 603(c) that the BLM also conduct a wilderness review. The BLM performed wilderness reviews on roadless public lands of approximately 5,000 or more acres and roadless islands to determine which were suitable for wilderness designation. The result of this review was the identification of WSAs. BLM submitted recommendations for designation of these lands to the Secretary of the Interior for eventual Congressional action. Because the Congressional review process is still underway, BLM manages WSAs as *de facto* wilderness so as not to impair their suitability for wilderness designation.

3.11.1 Wilderness and Wilderness Study Areas within ROI Three

This subsection identifies wilderness and WSAs and their attributes. Figure 3.11-1 depicts the location of these areas within the ROI.

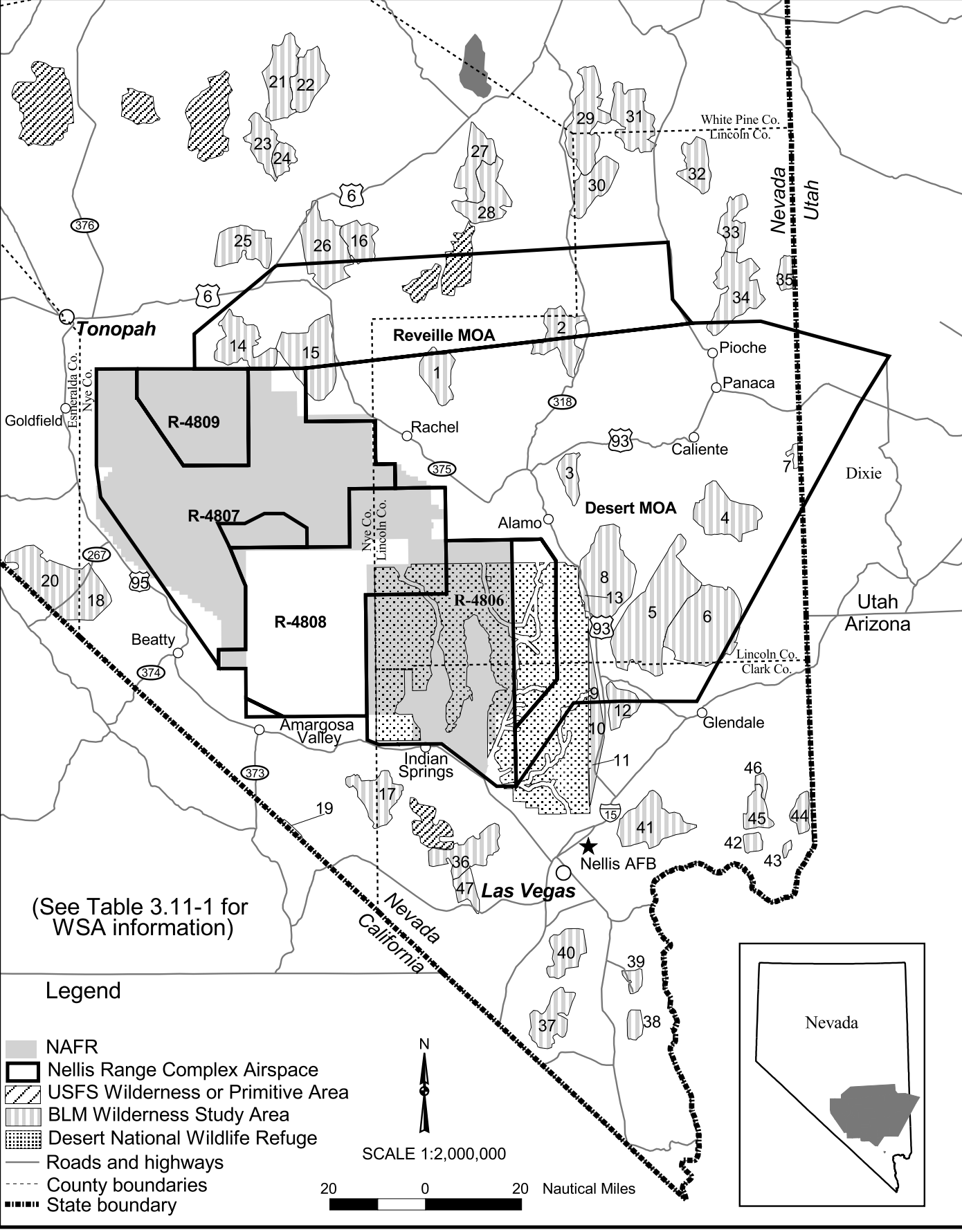


Figure 3.11-1. Wilderness and Wilderness Study Areas under Nellis Military Airspace

U.S. FISH AND WILDLIFE SERVICE

In 1975, the USFWS proposed approximately 88 percent of the DNWR (depicted in Figure 3.11-1) for inclusion in the National Wilderness Preservation System. Areas excluded from the wilderness proposal included lands on which NAFR target facilities are located. Target areas are generally located in valleys below 4,000 feet (below 3,600 feet in Three Lakes Valley). The proposed wilderness area within DNWR is currently managed as *de facto* wilderness so as not to impair its wilderness qualities. Aircraft operations, where practical, are generally restricted to a minimum of 2,000 feet above ground level, except for special training missions (BLM, DOI, and Air Force 1987). The *Public Land Withdrawal Environmental Impact Statement* (BLM, DOI, and Air Force 1987) states that the wilderness designation will not affect the Air Force's use of NAFR for bombing and gunnery practice and that continued military use, as described in the MOU between the USFWS and the Air Force will not preclude the USFWS from managing the area as *de facto* wilderness.

U.S. FOREST SERVICE

There are no designated wilderness areas on NAFR. One USFS Wilderness area is south of the NRC. The approximately 43,000-acre Mount Charleston Wilderness is located in the recently established Spring Mountain National Recreation Area in the Toiyabe National Forest. The two USFS wilderness areas under, or partially under, the NRC airspace are the Quinn Canyon and Grant Range Wilderness areas. These are located in the Humboldt National Forest and are approximately 27,000 acres and 50,000 acres, respectively.

BUREAU OF LAND MANAGEMENT

There are 20 WSAs managed by the BLM under or adjacent to the NAFR Complex. These are listed in Table 3.11-1. Additional WSAs in southern Nevada are listed in Table 3.11-2.

This subsection identifies attributes for each WSA within the ROI. Wilderness attributes include naturalness, opportunities for solitude, opportunities for primitive and unconfined recreation, special features, and size.

An area is considered natural if it appears to have been affected primarily by the forces of nature and human impact is substantially unnoticeable. Solitude refers to "the state of being alone or remote for habitation or a secluded place." Opportunities for primitive and unconfined recreation experience are defined as "activities that provide dispersed, undeveloped recreation which does not require facilities or motorized equipment" (BLM 1991a). Special features are not legally required as wilderness attributes; however geologic structures, important cultural or historic features, or unique wildlife habitat may enhance an area's overall wilderness quality. The area's overall size affects wilderness recommendation. Generally, larger areas have the capability to absorb the impacts of transitory sights and sounds; may have more natural and special features; and greater opportunities for solitude or primitive recreation.

Table 3.11-1. Wilderness Recommendations for Wilderness Study Areas in Close Proximity to NAFR (Page 1 of 2)

						Suitable for Wilderness	*Non-Suitable for Wilderness*	*Wilderness Attributes (Suitable for Wilderness)*			
Figure Number[1]	*District*	*State*	*WSA*	*EIS*	*Report Number*	*(Acres)*	*(Acres)*	*Nat*	*Sol*	*Rec*	*Spe*
1	Ely	NV	Worthington Mountains	Schell Resource Area Study FEIS 1987	NV-040-242	26,587	21,046	G	G	O	O
2	Ely	NV	Weepah Springs	Schell Resource Area Study FEIS 1987	NV-040-246	50,499	10,638	O	O	G	O
3	Ely	NV	South Pahroc Range	Caliente Wilderness Study FEIS 1989	NV-050-132	28,395	205	G-O	O	O	O
4	Ely	NV	Clover Mountains	Caliente Wilderness Study FEIS 1989	NV-050-139	84,875	60	O	O	O	O
5	Ely/Las Vegas	NV	Meadow Valley Range	Caliente Wilderness Study FEIS 1989	NV-050-156	97,180	88,564	G	O	O	O
6	Ely/Las Vegas	NV	Mormon Mountains	Caliente Wilderness Study FEIS 1989	NV-050-161	123,130	39,757	G	O	O	O
7	Ely / Cedar City	NV/ UT	Tunnel Spring (Cougar Canyon)	Utah Statewide Wilderness Study FEIS 1990	NV-050-166/ UT-040-123	6,408	9,560	G	O	G	G
8	Ely	NV	Delamar Mountains	Caliente Wilderness Study FEIS 1989	NV-050-177	0	126,257	G-L	G-L	G-L	G
9	Ely /Las Vegas	NV	Fish & Wildlife 1	Nevada Contiguous Lands Wilderness Study FEIS 1990	NV-050-201	0	11,090	G	L	L	G
10	Las Vegas	NV	Fish & Wildlife 2	Nevada Contiguous Lands Wilderness Study FEIS 1990	NV-050-216	0	17,242	G	L	L	G
11	Las Vegas	NV	Fish & Wildlife 3	Nevada Contiguous Lands Wilderness Study FEIS 1990	NV-050-217	0	22,002	G	L	L	G

Table 3.11-1. Wilderness Recommendations for Wilderness Study Areas in Close Proximity to NAFR (Page 2 of 2)

						Suitable for Wilderness	*Non-Suitable for Wilderness*	*Wilderness Attributes (Suitable for Wilderness)*			
Figure Number[1]	*District*	*State*	*WSA*	*EIS*	*Report Number*	*(Acres)*	*(Acres)*	*Nat*	*Sol*	*Rec*	*Spe*
12	Las Vegas	NV	Arrow Canyon Range	Clark County Study FEIS 1987	NV-050-215	0	32,853	G-L	O	G	G
13	Ely	NV	Evergreen ABC	Nevada Contiguous Lands Study FEIS 1990	NV-050-1R-16	0	2,694	G	L	L	L
14	Battle Mtn.	NV	Kawich	Tonopah Resource Area Study FEIS 1987	NV-060-019	0	54,320	G	O	G	G
15	Battle Mtn.	NV	South Reveille	Tonopah Resource Area Study FEIS 1987	NV-060-112	33,000	73,200	G	O	O	No
16	Battle Mtn.	NV	The Wall	Tonopah Resource Area Study FEIS 1987	NV-060-163	30,320	7,680	G	O	O	G
17	Las Vegas	NV	Mt. Stirling	Clark County Study FEIS 1987	NV-050-401	50,682	19,050	G	O	O	G
18	Battle Mtn.	NV	Grapevine Mountains	Esmeralda-Southern Nye Study FEIS 1987	NV-060-355	23,150	43,650	O	O	O	G
19	Las Vegas	NV	Resting Springs	Nye Study FEIS 1987	NV-050-460	0	3,850	G	O	L	None
20	Battle Mtn.	NV	Queer Mt.	Nye Study FEIS 1987	NV-060-354	46,650	38,900	O	O	O	G

Notes: O = Outstanding, G = Good, L = Low

1. Number corresponds to Figure 3.11-1, Wilderness and Wilderness Study Areas under Nellis Military Airspace.

Source: BLM 1991c

Table 3.11-2. Wilderness Recommendation for Wilderness Study Areas (Additional Wilderness Study Areas in Southern Nevada)

			Suitable for Wilderness	*Non-Suitable for Wilderness*
Figure Number[1]	*WSA*	*Report Number*	*(Acres)*	*(Acres)*
21	Antelope Range	NV-060-231/241	30,086	0
22	Park Range	NV-040-154	22,766	1,972
23	Fandango	NV-060-190	4,382	12,643
24	Morey Peak	NV-060-191	2,670	5,928
25	Rawhide Mountain	NV-060-059	25,800	0
26	Palisade Mesa	NV-060-142/162	23,233	16,716
27	Blue Eagle	NV-060-158/199	0	23,181
28	Riordian's Wall	NV-040-166	0	26,463
29	South Egan Range	NV-040-168	0	38,225
30	Far South Egans	NV-040-172	599	15,533
31	Mt. Grafton	NV-040-169	17,741	13,058
32	Fortification Range	NV-040-177	17,632	0
33	Table Mountain	NV-040-197	15,093	0
34	Parsnip Peak	NV-040-206	13,884	22,991
35	White Rock Range	NV-040-202	0	6,685
36	La Madre Mountains	NV-050-412	8,510	17,696
37	South McCullough Mountains	NV-050-435	14,680	8,226
38	Ireteba Peaks	NV-050-438	6,014	0
39	El Dorado	NV-050-423	4,826	0
40	North McCullough Mountains	NV-050-425	19,253	0
41	Muddy Mountains	NV-050-229	18,783	16,056
42	Garrett Buttes	NV-050-235	4,713	0
43	Jumbo Springs	NV-050-236	1,470	0
44	---	AZ-010-17	8,170	0
45	Million Hills	NV-050-233	5,729	5,984
46	Lime Canyon	NV-050-231	2,614	0
47	Pine Creek	NV-050-414	0	9,248

Note: Number corresponds to Figure 3.11-1. Wilderness and Wilderness Study Areas under Nellis Military Airspace.
Source: BLM 1991c

The Nevada Wilderness Study Report includes the recommendations and rationale for those WSAs in Nevada. The WSAs were identified through the wilderness inventory process and analyzed in separate EISs. The report focused on key study issues including impacts on wilderness values; impacts on the exploration for and development of mineral and energy resources; impacts on recreational off-highway vehicle use; impacts on grazing facility maintenance and construction; impacts on vegetation manipulation projects; and impacts on woodland product harvest.

The Nellis Air Force Range Resource Plan (BLM 1992) evaluated 2.2 million acres of NAFR withdrawn land, the lands that are not part of DNWR, for wilderness characteristics. As a part of that study, the BLM determined that none of the lands considered contained any land that meets the minimum criteria for WSA designation.

Table 3.11-1 lists the WSAs under or partially under the NRC. The table summarizes each WSA's attributes and identifies those WSAs that contain areas that BLM has recommended as suitable for wilderness designation. This table also shows acreages within the WSAs that BLM has recommended not suitable for wilderness designation.

The BLM recognized that solitude was potentially adversely affected in three WSAs by frequent military overflight. These WSAs are Worthington Mountains, Mormon Mountains, and Tunnel Spring (Cougar Canyon). The issue of existing military overflights over these WSAs was evaluated for each area and the effects of the overflights were determined to be not sufficient to warrant a nonsuitable recommendation for the WSAs.

3.11.2 Management Practices

Wilderness areas are managed to preserve and protect the area's resources and to prevent introduction of an activity that would degrade the quality of the environment or preclude Congress from designated the areas as wilderness. This management supports recreation and some rangeland uses, but precludes introduction of mechanized vehicles, except in emergencies. Nonimpairment criteria for WSAs require that motorized activities be temporary and reclaimable so as not to constrain Congress' decision on a wilderness designation. Overflights by general aviation and military aircraft fall within these nonimpairment criteria. The visual and audible intrusions of aircraft into the WSA or wilderness area are by nature temporary and reversible and leave no permanent evidence of human use.

This subsection identifies specific management practices for WSAs in the ROI.

U.S. FISH AND WILDLIFE SERVICE

Management of USFWS wilderness areas is implemented through two levels of planning including Refuge Management Plans and Individual Wilderness Management Plans. The lands located in DNWR are managed by the Refuge Management Plan as *de facto* wilderness by the USFWS. These lands are preserved through a "minimum tool" management approach which

requires refuge managers to use the least intrusive methods, equipment, and facilities necessary for administering the areas.

In the event of a disaster situation in DNWR, such as an aircraft crash, the wreckage removal and cleanup would involve the most non-intrusive methods possible and the DNWR's management objectives would be considered to the greatest extent practicable. Refer to section 3.3, Safety for a more detailed discussion of safety issues in and around NAFR.

BUREAU OF LAND MANAGEMENT

Between 1980 and 1991, the BLM conducted EISs on each WSA to assess the impacts of wilderness designation or allocation for other uses. The EISs evaluated wilderness values, recreation uses, mineral and energy resource potential, wildlife management, and other resources to determine the level of impact of designation as wilderness. During that time, USGS and the U.S. Bureau of Mines conducted a mineral study of each WSA. A Wilderness Study Report (1991) was completed and contained recommendations for wilderness and non-wilderness in each WSA (BLM 1991c).

BLM submitted recommendations for wilderness designation to the Secretary of the Interior for eventual congressional action. Until the Congressional review process is completed, WSAs are managed under BLM's Interim Management Policy (IMP) for lands under wilderness review (H-8550-1) so as to not impair their suitability for wilderness designation. A WSA possessing the greatest number of these attributes is more likely to be recommended suitable for wilderness designation.

The IMP outlines implementation procedures for the evaluation of proposed actions in a WSA. These procedures include:

1. Review the definition of wilderness
2. Consider exceptions and limitations to the nonimpairment standard
3. Notify interested parties of proposed action
4. Conclude whether the use or facility will meet the nonimpairment standard
5. Consult the guidelines for specific activities
6. Prepare an EA or EIS
7. Determination made

All WSAs are managed under the IMP until Congress acts. If Congress determines a WSA will not be designated as wilderness, that land will be managed under general BLM management policies and applicable land use plans. Areas designated as wilderness are managed under

BLM Manual 8560 — Management of Designated Wilderness Areas and under the regulations at 43 CFR 8560.

The BLM's management policy outlined in the IMP is "to continue resources uses on lands under wilderness review in a manner that maintains the area's suitability for preservation as wilderness. "The IMP contains guidelines for specific activities for interim management of lands under wilderness review. These include land actions (disposals, use authorizations, rights-of-way, access, and withdrawals), mineral uses, watershed rehabilitation and vegetation manipulation, rangeland management, wild horses and burro management, forestry, wildlife, recreation, cultural and paleontological resources, and fire management.

3.12 RECREATIONAL AND VISUAL RESOURCES

Recreational resources provide for outdoor recreational activities at natural or man-made locations. Due to public safety and national security requirements, NAFR access is restricted to the general public. Limited hunting is permitted on NAFR. Stonewall Mountain, located in the northwestern portion of NAFR, lies within Nevada's Hunting Group Unit 252. One four-week bighorn sheep hunt is permitted each year. Two other hunts are conducted within the DNWR each year. No other recreational activities are allowed within the boundaries of NAFR.



NAFR visual resources are dominated by arid playas and distant north-south trending mountain ridges.

Visual resources are the landforms, water bodies, vegetation, buildings, fences, and other features that give a particular environment its aesthetic qualities. The visual impression of an area is derived from the type, arrangement, and contrast between these features.

BLM uses the resource management classification (VRM) system to identify the existing visual character of the landscape and define the allowable extent and type of modification to the landscape. The VRM classification system rates visual character from the most sensitive (VRM Class I) to the least sensitive (VRM Class IV). Since visual classes are defined solely by the quality of visual resources of an area and not influenced by classifications of neighboring areas, the most sensitive class can be adjacent to the least sensitive class.



NAFR recreational resources include limited hunts for bighorn sheep, pictured here.

3.12 RECREATION AND VISUAL RESOURCES

For the purpose of this analysis, recreation resources include primarily outdoor recreational activities that occur away from a participant's residence. This section addresses natural resources and man-made facilities that are designated or available for public recreational use in remote areas. The setting, activity, and other resources that influence affected recreation resources enable assessment of potential impacts to this resource. ROI Three is considered as it relates to recreation potential outside NAFR. ROI Two is discussed in the context of existing recreational opportunities on NAFR.

Visual resources are the natural (landforms, water bodies, vegetation), and man-made (buildings, fences, signs) features that give a particular environment its aesthetic characteristics. A visual impression of an area is derived from the type, physical arrangement, and contrast between these features. Although each viewer's perception may be slightly different, an overall landscape character can be assigned to an area and impacts to that character can be assessed.

3.12.1 Recreational Opportunities

The NRC airspace overlays approximately 7 million acres of land. Due to public safety and security reasons, approximately 3 million acres of this land is closed to public access. Most of the remaining land beneath the associated airspace (ROI Three) that is open to public recreation is managed by the BLM for multiple use, which includes recreation.

Numerous broad valleys separate the north-south trending mountain ranges within and surrounding NAFR. The diverse landscape provides a variety of outdoor recreation opportunities ranging from hiking, camping, horseback riding, land sailing, rockhounding, and nature viewing to off-highway vehicle use, recreational mining, and hunting. State parks, recreation areas, national forests, and wildlife refuges also provide these types of activities as well as specific destinations for visitors. Public lands and special use areas where recreation occurs are shown on Figure 3.12-1.

The BLM Caliente Field office manages the majority of land under the associated airspace. The *Caliente Management Framework Plan* (BLM 1980) identified areas where recreation use is a concern due to delicate ecosystems. The recreation portion of the plan provides a wide variety of recreational opportunities in response to increasing public demand, while at the same time providing protection for locations with important botanical, zoological, geological, and paleontological values. These areas are Ash Springs, Clover Creek, Gleason Canyon, Ella Mountain Summit, Panaca Charcoal Kilns-Panaca Summit, Oak Springs Summit, and Hancock Summit (BLM 1980). Due to the dispersed nature of outdoor recreation, use figures are difficult to estimate. Many of the activities occurring, such as camping, hiking, nature viewing, etc., do not require special permits. Therefore, these visitors often are not accounted for by informal surveys. The Caliente Resource Area, located in the eastern portion of the NRC airspace, has approximately 50,427 visits in 1996 (personal communication, M. Bunker 1997). The Tonopah Resource Area, located under the northwest portion of the associated airspace, had

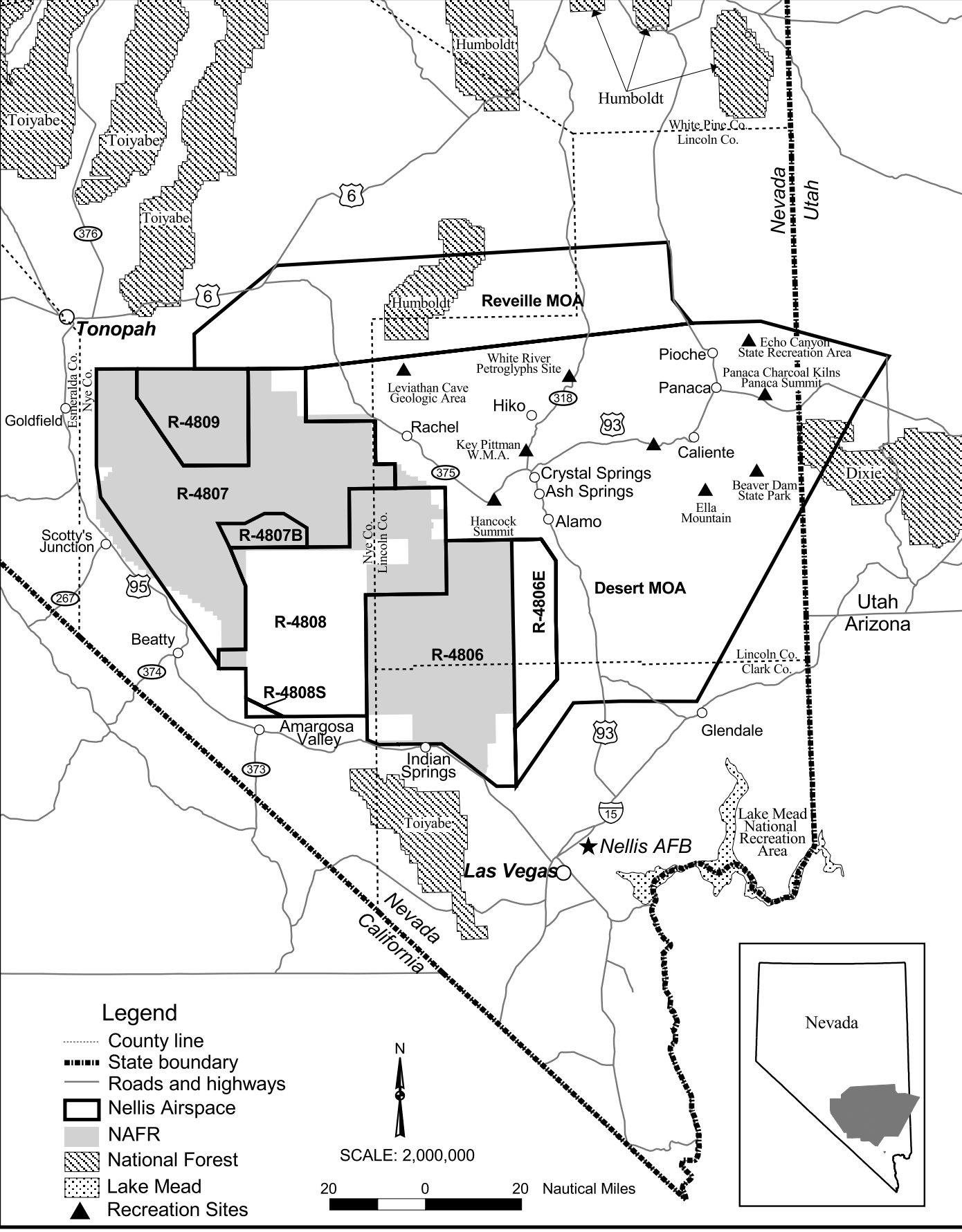


Figure 3.12-1. Recreation Sites and Areas under Nellis Military Airspace

761,588 visits in 1996 (BLM 1997) (a visit is defined as a visit to BLM administered land and/or waters by a person for the purpose of engaging in any recreational activity, except those which are part of or incidental to the pursuit of a gainful occupation, whether for a few minutes, full day, or more).

To account for the variety of recreation experiences and opportunity, the BLM uses the Recreation Opportunity Spectrum (ROS) as a management tool. The ROS provides a framework by which outdoor recreation environments, activities, and experience opportunities can be organized and defined. Underlying the ROS is the basic assumption that quality outdoor recreation is best satisfied through a diverse set of opportunities. Although the notion of quality is subjective, the concept depends on basic factors such as what kind of experience an individual may expect, how much of this expectation is realized, and to what degree the visitor is satisfied by the experience.

The ROS framework is arranged along a continuum and is divided into six general classes of recreational opportunities: Primitive, Semi-primitive Non-motorized, Semi-primitive motorized, Roaded Natural, Rural, and Urban. Opportunities for experiences along the continuum represent a range from a very high probability of solitude, self-reliance, and challenge to a very social experience with developed recreational amenities. The Caliente Resource area has no designated ROS. Both the Tonopah Resource area and Las Vegas Field office area are managed with ROS. In general, WSAs are managed as Primitive. Those land areas that are primitive in nature but are not in WSAs are managed as either Semi-Primitive Non-Motorized and Semi-Primitive Motorized depending on the amount of road access available. Roaded Natural areas, Rural, and Urban areas are all defined for the quality and amount of development occurring in the area with natural areas less developed than rural and urban areas.

The NDOW manages game units within the state. Big game management units in the ROI include 132, 133, 223, 231, 241, 242, 243, 244, 251, 252, 253, 271, 281, 282, 283, 284, 285, 286, and 287. Bighorn sheep, mule deer, antelope, and upland game (such as grouse, rabbit, and pheasants) are hunted throughout this region (Table 3.12-1). The hunting season varies by animal and equipment used. For general deer hunting, including archery and muzzleloaders, the season runs from August to December. For antelope, the season runs from August to September. The season for bighorn sheep, a premier trophy species, runs from about the first week in November to the first week in December (NDOW 1996).

Hunting also occurs in the southeastern corner of NAFR within portions of the DNWR (hunting units 281 and 282) (see Figure 3.12-2). An MOU between the Air Force and USFWS outlines the joint use and management of the portion of the NAFR that overlays DNWR. Hunting is permitted under this MOU for a period of not less than 14 consecutive days annually during the months of December and/or January to hunt bighorn sheep. Hunters must obtain a special range access permit prior to access to the area. The 1996 quota for bighorn sheep was five for hunting unit 281, which comprises the Pintwater Range, and two for unit 282, which comprises the area around Desert Range (see Table 3.12-1 for 1996 Nevada

Table 3.12-1. 1996 Nevada Hunting Statistics

Deer
(Hunt Numbers 1131, 1231, 1235, 1141, 1241, 1171, 1271)

Unit Group	*131-134*	*221-223*	*231*	*241-244*	*271, 272*
Deer kill	188	240	212	99	11
Tag sales	448	563	357	155	46
Total hunters	429	542	355	152	44
Percent hunter success	44	44	60	65	25

Pronghorn
(Hunt Numbers 2151, 2161, 2251, 2261)

Unit Group	*115, 222, 231*	*132, 133, 134, 245 (excluding hunt number 2261)*
Pronghorn kill	21	18
Tag sales	36	20
Total hunters	36	20
Percent hunter success	58	90

Bighorn Sheep
(Hunt Numbers 3000, 3151, 3251, and auction)

Unit Group	*132* [a]	*223, 241* [a]	*244* [a,b]	*252* [a,b]	*271* [a,b]	*281* [a]	*282* [a]	*283-285, 287* [a,b]	*286* [a,b]
Bighorn kills	0	1	3	4	6	3	1	1	1
Tag quotas	1	2	3	6	10	5	2	3	2
Total hunters	1	2	3	6	8	5	2	2	2
Percent hunter success	0	50	100	66	75	60	50	50	50

Notes: a. Resident
b. Non-Resident

Elk
(Hunt Numbers 4161, 4151, 4181)

Unit Group	*231*
Elk kills	24
Tag sales	37
Total hunters	35
Percent hunter success	69

Source: NDOW 1997b.

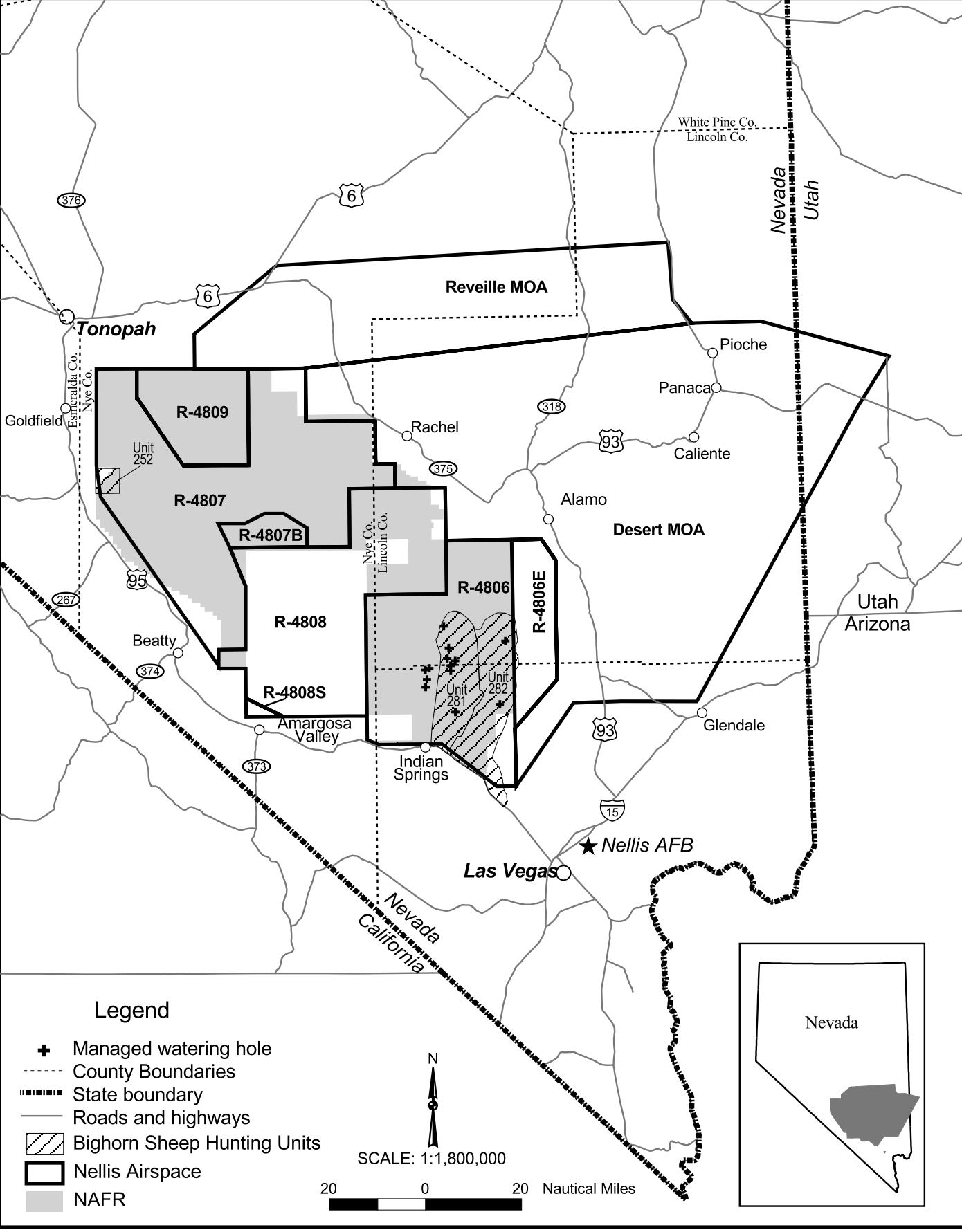


Figure 3.12-2. Bighorn Sheep Hunting Districts and Managed Watering Holes under Nellis Military Airspace

Hunting Statistics). Other recreational activities within the portions of DNWR outside of NAFR include hunting, hiking, and bird watching. Flight altitude restrictions over the DNWR are also described in this MOU.

Hunting on NAFR occurs on Stonewall Mountain, located on Nellis North Range (refer to Figure 3.12-2). An MOU also exists between Nellis AFB and the State of Nevada regarding Stonewall Mountain Bighorn Sheep management, including hunting activities. Hunting is permitted annually for a three-week period at the end of November / early December. Hunters must apply for the appropriate permits or tags through the NDOW prior to use of the area. Stonewall Mountain lies within hunting unit 252. The quota for bighorn sheep in 1996 for this unit was five. Small portions of two National Forests, Dixie and Humboldt, are located under the associated airspace ROI. Both of these National Forests offer picnicking, hunting, camping, and hiking in a rugged mountainous terrain. Special overflight restrictions have been placed on areas that include the Humboldt National Forest. These restrictions are over the Adven and Carter Ranches. Located under ROI Three are designated sites that can attract visitors. These include the DNWR, Humboldt National Forest, Cathedral Gorge State Park, Beaver Dam State Park, and Echo Canyon State Recreation Area. The location of these sites is depicted on Figure 3.12-1. These areas offer camping, picnicking, and hiking in a scenic location. Beaver Dam State Park and Echo Canyon State Recreation Area also offer fishing and water skiing. Table 3.12-2 provides visitor use information for these sites. The Timber Mountain Caldera Natural National Landmark is also located under ROI Three and attracts visitors interested in volcanic formations..

Table 3.12-2. Visitor Use Information

	Cathedral Gorge	*Echo Canyon*	*Beaver Dam*
Acreage	1,633	920	2,233
Peak Use Periods	April-Sept	April - Sept	May-Aug
Annual Visitors (1996)	42,617	53,447	6,926
Length of Stay	73% 1 day or less	75% 2 or more days	36% 1 day or less
Origin of visitors	46% in state	92% in state	95% in state
Most Popular Activities	1. Hiking 2. Relaxing 3. Driving 4. Photography 5. Camping	1. Relaxing 2. Lake Fishing 3. Hiking 4. Camping 5. Driving	1. Relaxing 2. Hiking 3. Lake fishing 4. Camping 5. Photography

Source: Personal communications, Weaver 1997

Areas not specifically designated for recreation can also attract visitors. The Key Pittman Wildlife Management Area, Pahranagat National Wildlife Refuge, White River Petroglyphs

Archaeological Site, and Leviathan Cave Geologic Area are designated areas that may draw visitors for their special or distinctive attributes.

Various ghost towns also attract visitors. The ghost towns located under ROI Three are in various states of disrepair. Usually these sites contain a few buildings or foundations of buildings. Some will also have cemeteries, mine tailings, and other evidence of historic mining. Historic ghost towns and mining camps are further discussed in section 3.9, Cultural Resources.

3.12.2 Visual Resources and Setting

When rating the visual character of an area, the shape, form, line, and color of the landscape all play an important role. As the stewards of the land in the ROI, the BLM uses the Visual Resource Management Classification (VRM) system to identify the existing visual character of the landscape and define the allowable extent and type of modification to the landscape. The VRM Classification system rates visual character from the most sensitive (VRM Class I) to the least sensitive (VRM Class IV). Since visual classes are defined solely by the quality of visual resources of an area and not influenced by classifications of neighboring areas, the most sensitive class (VRM I) can be adjacent to the least sensitive class (VRM IV). Areas identified to receive Class II management include areas surrounding or adjacent to the Pahranagat Valley Wildlife Refuge, Clover Creek, Beaver Dam State Park, the Big Hogback, Cathedral Gorge State Park, Highland Peak, Gleason Canyon, Echo Canyon State Park, Key Pittman Wildlife Management Area, and WSAs (BLM 1980).

As discussed previously in this document, ROI Three is located within the Basin and Range physiographic province characterized by flat valleys that provide broad views of distant mountain ranges. In the flat valley areas, local landforms consists of small hills, drainages, and volcanic rock formations. In the mountainous areas, land forms consist of large alluvial fans, barren rock, and vegetation covered mountainsides.

Within the broad valley areas, vegetation consists of a variety of communities: the southern portion of the ROI is dominated by communities typical of the eastern Mojave Desert (e.g., saltbrush, creosote bush scrub, and mixed Mojave communities); toward the northern portion of the ROI, transitioning to the Great Basin Desert, plant communities consist of saltbrush, pinyon juniper, and northern desert shrub. The mountain areas consist predominantly of coniferous forest. Plant associations vary geographically and with elevation (refer to section 3.8, Biological Resources, for a complete description of plant communities).

The Air Force has specific regulations that describe the requirements for cleanup of NAFR. In addition, the Air Force has an MOU with USFWS to clean up target debris, training ordnance, etc., from military training activities.

Very few urban areas exist within the ROI. These areas tend to be avoided by military aircraft for safety reasons. These towns and rural communities are typically associated with mining in the region.

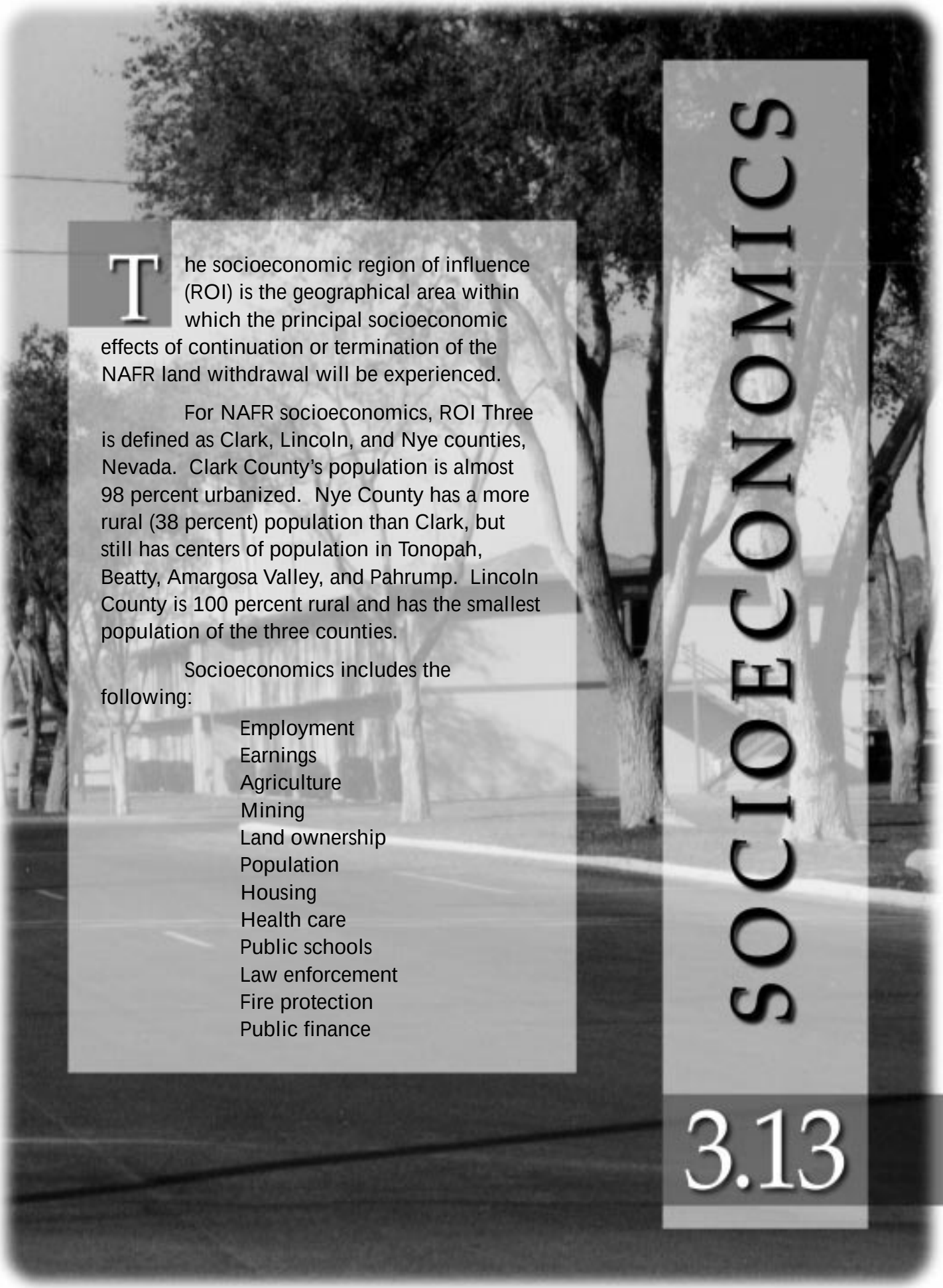
U.S. Highway 93 has been designated a scenic byway by the NDOT. This highway offers views of desert wildlife, eroded mountainous terrain, and ghost towns.

3.12.3 American Indian Issues Concerning Recreation and Visual Resources

The CGTO recognizes that, while the military land withdrawal limits their access to traditional resources, it also protects these resources from intrusions and disturbance by non-Indian recreationists.

Regarding visual resources, the NARD states:

> All land forms within the NAFR have high sensitivity levels for American Indians. The ability to see the land without the distraction of buildings, towers, cables, roads, and other objects is essential for the spiritual interaction between Indian people and their traditional lands (AIWS 1997).



SOCIOECONOMICS

3.13

The socioeconomic region of influence (ROI) is the geographical area within which the principal socioeconomic effects of continuation or termination of the NAFR land withdrawal will be experienced.

For NAFR socioeconomics, ROI Three is defined as Clark, Lincoln, and Nye counties, Nevada. Clark County's population is almost 98 percent urbanized. Nye County has a more rural (38 percent) population than Clark, but still has centers of population in Tonopah, Beatty, Amargosa Valley, and Pahrump. Lincoln County is 100 percent rural and has the smallest population of the three counties.

Socioeconomics includes the following:

- Employment
- Earnings
- Agriculture
- Mining
- Land ownership
- Population
- Housing
- Health care
- Public schools
- Law enforcement
- Fire protection
- Public finance

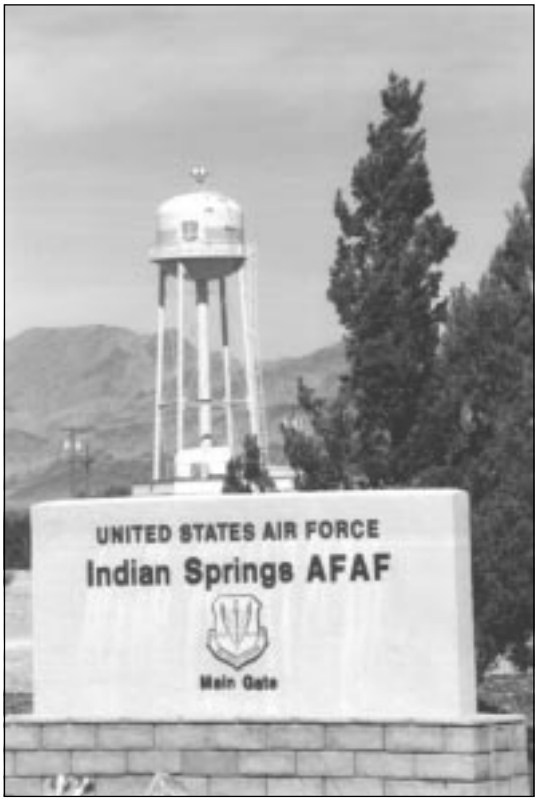


Socioeconomics addresses the social and economic effects of a federal action as it relates to environmental resources. Population growth increases pressure on other resources, including air quality, water availability, and biological species.

The NRC is primarily located in rural sections of Nye, Lincoln, and Clark counties. The economics of both Nye County (full- and part-time employment of 10,825 in 1995) and Lincoln County (full- and part-time employment of 2,038 in 1995) are small by comparison to that of Clark County (full- and part-time employment of 609,684 in 1995). Personnel associated with both NAFR and Nellis AFB numbered almost 10,000 in 1995, of whom over 70 percent were active duty personnel.

The mining industry plays an important role in the economy of rural Nevada. As a gold producer, the State of Nevada ranks third in the world after Russia and South Africa. Of the three counties in the ROI, Nye County has historically been the most prominent mining county. The Nye County share of the assessed valuation of mining properties in the state has fallen from 20 percent in 1987 to less than 10 percent in 1995.

Population growth between 1990 and 1995 within the ROI has primarily taken place within Clark County, which increased by 266,010 persons at an average annual rate of 6.1 percent. Nye County population increased by 4,860 persons over the same time period, at an average rate of 4.9 percent annually. Lincoln County's population has remained relatively stable and increased at an annual rate of 1.5 percent, from 3,810 persons to 4,110 persons.



Changes in governmental expenditures can affect growth or contraction of military facilities. Through the life of NAFR, Indian Springs has gone through several economic cycles.

3.13 SOCIOECONOMICS

3.13.1 Introduction

Socioeconomics addresses selected characteristics of the social and economic environment in the geographical area containing the NAFR. The socioeconomic environment in the Nellis AFB area is also presented due to the potential for environmental consequences associated with the No-Action Alternative. The characteristics addressed include the following: economic development (comprising employment and earning, with special attention to the agricultural and mining sectors of the economy), population, housing, public services and facilities (comprising health care, public schools, law enforcement, and fire protection), and public finance.

A substantial share of activity at Nellis AFB is directly and intimately tied to activities that take place at NAFR. Thus, background information is provided for both Nellis AFB and NAFR within their regional context.

3.13.2 Region of Influence

An analysis of the potential socioeconomic impacts of the renewal of withdrawal of NAFR requires establishment of an expanded ROI Three that encompasses three Nevada counties. This is the geographical area within which the potential direct and secondary socioeconomic effects of selection of an alternative would be experienced.

Clark, Lincoln, and Nye counties are the three southernmost counties of the State of Nevada. Clark County is the principal county of the Las Vegas Metropolitan Statistical Area (which also includes Nye County, Nevada and Mohave County, Arizona). Within Clark County are the incorporated communities of Las Vegas, Boulder City, Henderson, Mesquite, and North Las Vegas. The U.S. Bureau of the Census defines an urbanized place as one where there are 2,500 persons or more in an incorporated community or Census Designated Place (CDP). Thus defined, Clark County's population is almost 98 percent urbanized. Nye County has a more rural (38 percent) population than Clark, but still has centers of population in Tonopah, Beatty, Amargosa Valley, and Pahrump. Lincoln County is 100 percent rural and has the smallest population of the three counties.

Data used in this report comes from a wide variety of sources, including (but not limited to), the Nevada Statistical Abstract, the Regional Economic Information System (REIS) Database of the Bureau of Economic Analysis (BEA), the U.S. Department of Commerce, and U.S. Bureau of the Census.

3.13.3 Economics

3.13.3.1 EMPLOYMENT

NRC is located in rural areas of Nye, Lincoln, and Clark counties. The economies of both Nye and Lincoln counties are small in comparison to that of Clark County. The number of jobs in Nye County increased from 7,884 in 1980 to 13,351 in 1990 at an average annual rate of 5.4 percent. However, between 1990 and 1995 the number of jobs in the county declined by 2,526 to 10,825 at an average annual rate of 4.1 percent (see Table 3.13-1). This decrease in employment is attributable mainly to the hiring moratorium imposed on the NTS, the major employer in the county. In 1995, the most important sectors in terms of employment were services (47.1 percent of total employment), mining (12.7 percent), state and local government (11.1 percent), and retail trade (10.0 percent) as shown in Table 3.13-1.

Of the three counties making up the ROI, Lincoln County has the lowest level of employment. Employment in the county increased from 1,810 in 1980 to 2,403 in 1990, at an average annual rate of 2.9 percent. Between 1990 and 1995, employment fell by 365 jobs to 2,038 (see Table 3.13-2). In 1995, the most important sector in terms of employment was state and local government with 27.3 percent of total county employment (see Table 3.13-2).

Over the period 1980 to 1990 employment in Clark County increased from 266,339 to 459,873 at an average annual rate of 5.6 percent. By 1995, the number of jobs had increased to 609,684 at 5.8 percent annually. All sectors (with the exception of farm and military employment) grew substantially over the period 1990 to 1995 with the most rapid increase in the following major sectors: manufacturing (8.9 percent annually, on average); state and local government (6.5 percent); and services (6.2 percent). Of total employment in 1995, the largest share was contributed by the services sector (46.4 percent), followed by retail trade with 15.8 percent, construction with 8.6 percent, state and local government with 7.4 percent, and finance, insurance, and real estate with 7.1 percent (see Table 3.13-3). Most of the growth in the services sector is attributable to growth in the hotel, gaming, and recreation sub-sectors.

Based on information collected and tabulated by the BEA, the estimated number of full- and part-time jobs in the State of Nevada in 1990 stood at 767,748, having increased at an average annual rate of 4.6 percent since 1980 when there were 490,673 jobs. Between 1990 and 1995, the number of jobs increased by 186,753 to 954,501 at an average annual rate of 4.5 percent (see Table 3.13-4).

Total military and related personnel associated with Nellis AFB and NAFR numbered 10,110 in FY1994 and 9,996 in fiscal year (FY) 1995 (see Table 3.13-5). Of the FY1995 total, 7,205 were active duty military of whom approximately 170 (or 2.4 percent) worked on the NAFR. Between FY1994 and FY1995 there was a reduction of 2.8 percent (from 7,413 to 7,205) in active duty personnel assigned to Nellis AFB and NAFR. Civilian personnel at Nellis AFB totaled 1,890 in FY1994 and 1,852 in FY1995. Of these, the majority (55.6 percent in FY1994 and 53.8 percent in FY1995) were appropriated fund personnel. There were also contractor personnel

Table 3.13-1. Employment Characteristics for Nye County, Nevada, 1980 and 1990-1995

Nye County Employment	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Total Jobs	7,884	13,351	13,148	12,430	11,135	10,728	10,825
Farm	222	268	234	234	227	233	209
Nonfarm	7,662	13,083	12,914	12,196	10,908	10,495	10,616
Private	6,888	11,871	11,641	10,853	9,583	9,117	9,160
Ag. Services, Forestry, Fishing, Other	50	70	65	53	79	83	90
Mining	1,080	1,984	1,674	1,533	1,323	1,188	1,376
Construction	414	391	331	348	372	520	493
Manufacturing	88	162	162	166	180	172	218
Transportation & Public Utilities	(D)	(D)	(D)	(D)	234	243	269
Wholesale Trade	25	(D)	(D)	(D)	115	93	91
Retail Trade	525	964	933	965	1,031	1,040	1,086
Finance, Insurance, and Real Estate	(D)	(D)	(D)	406	408	417	435
Services	4,130	7,653	7,771	7,037	5,841	5,361	5,102
Govt. and Govt. Enterprises	774	1,212	1,273	1,343	1,325	1,378	1,456
Federal, Civilian	129	202	209	226	230	197	202
Military	101	77	72	78	69	62	52
State and Local	544	933	992	1,039	1,026	1,119	1,202
State	67	83	94	101	100	104	105
Local	477	850	898	938	926	1,015	1,097

Source: U.S. Department of Commerce 1997

	Average Annual % Rate of Change		*Absolute Change in Number of Jobs*		*Sector Employment as Percent of Total*	
Nye County Employment	*1980-1990*	*1990-1995*	*1980-1990*	*1990-1995*	*1990*	*1995*
Total Jobs	5.41%	-4.11%	5,467	-2,526	100.00%	100.00%
Farm	1.90%	-4.85%	46	-59	2.01%	1.93%
Nonfarm	5.50%	-4.09%	5,421	-2,467	97.99%	98.07%
Private	5.59%	-5.05%	4,983	-2,711	88.91%	84.62%
Ag. Services, Forestry, Fishing, Other	3.42%	5.15%	20	20	0.52%	0.83%
Mining	6.27%	-7.06%	904	-608	14.86%	12.71%
Construction	-0.57%	4.75%	-23	102	2.93%	4.55%
Manufacturing	6.29%	6.12%	74	56	1.21%	2.01%
Transportation & Public Utilities	NA	NA	NA	NA	NA	2.48%
Wholesale Trade	NA	NA	NA	NA	NA	0.84%
Retail Trade	6.27%	2.41%	439	122	7.22%	10.03%
Finance, Insurance, and Real Estate	NA	NA	NA	NA	NA	4.02%
Services	6.36%	-7.79%	3,523	-2,551	57.32%	47.13%
Govt. and Govt. Enterprises	4.59%	3.74%	438	244	9.08%	13.45%
Federal, Civilian	4.59%	0.00%	73	0	1.51%	1.87%
Military	-2.68%	-7.55%	-24	-25	0.58%	0.48%
State and Local	5.54%	5.20%	389	269	6.99%	11.10%
State	2.16%	4.81%	16	22	0.62%	0.97%
Local	5.95%	5.23%	373	247	6.37%	10.13%

(L) = Not shown to avoid disclosure of confidential information. Estimates are included in totals.
(D) = Less than 10 jobs. Estimates are included in totals.
Source: Bureau of Economic Analysis 1997

Table 3.13-2. Employment Characteristics for Lincoln County, Nevada, 1980 and 1990-1995

Lincoln County Employment	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Total Jobs	1,810	2,403	2,338	2,210	2,216	2,204	2,038
Farm	164	178	160	162	157	159	149
Nonfarm	1,646	2,225	2,178	2,048	2,059	2,045	1,889
Private	1,251	1,688	1,630	1,475	1,481	1,449	1,285
Ag. Services, Forestry, Fishing, Other	(L)	(D)	20	19	(L)	(L)	(L)
Mining	308	30	23	17	17	15	18
Construction	75	47	52	30	28	27	36
Manufacturing	12	10	(D)	(L)	(D)	(D)	(L)
Transportation & Public Utilities	96	88	88	69	62	70	59
Wholesale Trade	12	(L)	(D)	(D)	(D)	(D)	(D)
Retail Trade	310	250	228	248	247	253	(D)
Finance, Insurance, and Real Estate	52	50	60	61	50	53	59
Services	382	(D)	(D)	(D)	(D)	(D)	(D)
Govt. and Govt. Enterprises	395	537	548	573	578	596	604
Federal, Civilian	25	45	42	39	40	40	40
Military	12	12	11	11	10	(L)	(L)
State and Local	358	480	495	523	528	547	556
State	73	150	161	171	162	168	169
Local	285	330	334	352	360	379	387

Source: U.S. Department of Commerce 1997

	Average Annual % Rate of Change		*Absolute Change in Number of Jobs*		*Sector Employment as Percent of Total*	
Lincoln County Employment	*1980-1990*	*1990-1995*	*1980-1990*	*1990-1995*	*1990*	*1995*
Total Jobs	2.87%	-3.24%	593	-365	100.00%	100.00%
Farm	0.82%	-3.49%	14	-29	7.41%	7.31%
Nonfarm	3.06%	-3.22%	579	-336	92.59%	92.69%
Private	3.04%	-5.31%	437	-403	70.25%	63.05%
Ag. Services, Forestry, Fishing, Other	NA	NA	NA	NA	NA	NA
Mining	-20.78%	-9.71%	-278	-12	1.25%	0.88%
Construction	-4.57%	-5.19%	-28	-11	1.96%	1.77%
Manufacturing	-1.81%	NA	-2	NA	0.42%	NA
Transportation & Public Utilities	-0.87%	-7.68%	-8	-29	3.66%	2.89%
Wholesale Trade	NA	NA	NA	NA	NA	NA
Retail Trade	-2.13%	NA	-60	NA	10.40%	NA
Finance, Insurance, and Real Estate	-0.39%	3.37%	-2	9	2.08%	2.89%
Services	NA	NA	NA	NA	NA	NA
Govt. and Govt. Enterprises	3.12%	2.38%	142	67	22.35%	29.64%
Federal, Civilian	6.05%	-2.33%	20	-5	1.87%	1.96%
Military	0.00%	NA	0	NA	0.50%	NA
State and Local	2.98%	2.98%	122	76	19.98%	27.28%
State	7.47%	2.41%	77	19	6.24%	8.29%
Local	1.48%	3.24%	45	57	13.73%	18.99%

(L) = Not shown to avoid disclosure of confidential information. Estimates are included in totals.
(D) = Less than 10 jobs. Estimates are included in totals.
Source: U.S. Department of Commerce 1997

Table 3.13-3. Employment Characteristics for Clark County, Nevada, 1980 and 1990-1995

Clark County Employment	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Total Jobs	266,339	459,873	475,747	482,959	513,113	573,105	609,684
Farm	419	406	347	334	324	330	302
Nonfarm	265,920	459,467	475,400	482,625	512,789	572,775	609,382
Private	228,150	408,669	420,871	426,206	455,271	512,903	547,077
Ag. Services, Forestry, Fishing, Other	1,313	3,909	4,100	4,060	4,497	5,155	5,996
Mining	589	819	854	1,034	1,073	1,109	1,189
Construction	16,312	40,549	33,999	33,441	40,869	47,277	52,437
Manufacturing	7,271	11,671	11,483	11,976	13,915	15,947	17,832
Transportation & Public Utilities	13,758	21,081	22,119	22,026	23,614	26,417	28,614
Wholesale Trade	6,548	14,216	15,422	15,795	15,256	16,785	18,743
Retail Trade	44,266	72,356	75,786	77,952	80,309	88,927	96,320
Finance, Insurance, and Real Estate	20,410	35,154	35,729	35,010	38,270	42,098	43,200
Services	117,683	208,914	221,379	224,912	237,468	269,188	282,746
Govt. and Govt. Enterprises	37,770	50,798	54,529	56,419	57,518	59,872	62,305
Federal, Civilian	4,893	6,957	7,018	7,343	7,549	7,640	7,900
Military	10,515	10,913	11,108	10,097	9,292	9,902	9,300
State and Local	22,362	32,928	36,403	38,979	40,677	42,330	45,105
State	5,278	7,614	8,187	8,668	8,915	9,329	10,052
Local	17,084	25,314	28,216	30,311	31,762	33,001	35,053

Source: U.S. Department of Commerce 1997

	Average Annual % Rate of Change		*Absolute Change in Number of Jobs*		*Sector Employment as Percent of Total*	
Clark County Employment	*1980-1990*	*1990-1995*	*1980-1990*	*1990-1995*	*1990*	*1995*
Total Jobs	5.61%	5.80%	193,534	149,811	100.00%	100.00%
Farm	-0.31%	-5.75%	-13	-104	0.09%	0.05%
Nonfarm	5.62%	5.81%	193,547	149,915	99.91%	99.95%
Private	6.00%	6.01%	180,519	138,408	88.87%	89.73%
Ag. Services, Forestry, Fishing, Other	11.53%	8.93%	2,596	2,087	0.85%	0.98%
Mining	3.35%	7.74%	230	370	0.18%	0.20%
Construction	9.53%	5.28%	24,237	11,888	8.82%	8.60%
Manufacturing	4.85%	8.85%	4,400	6,161	2.54%	2.92%
Transportation & Public Utilities	4.36%	6.30%	7,323	7,533	4.58%	4.69%
Wholesale Trade	8.06%	5.68%	7,668	4,527	3.09%	3.07%
Retail Trade	5.04%	5.89%	28,090	23,964	15.73%	15.80%
Finance, Insurance, and Real Estate	5.59%	4.21%	14,744	8,046	7.64%	7.09%
Services	5.91%	6.24%	91,231	73,832	45.43%	46.38%
Govt. and Govt. Enterprises	3.01%	4.17%	13,028	11,507	11.05%	10.22%
Federal, Civilian	3.58%	2.57%	2,064	943	1.51%	1.30%
Military	0.37%	-3.15%	398	-1,613	2.37%	1.53%
State and Local	3.95%	6.50%	10,566	12,177	7.16%	7.40%
State	3.73%	5.71%	2,336	2,438	1.66%	1.65%
Local	4.01%	6.73%	8,230	9,739	5.50%	5.75%

Source: U.S. Department of Commerce 1997

Table 3.13-4. Employment Characteristics for the State of Nevada, 1980 and 1990-1995

Nevada Employment	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Total Jobs	490,673	767,748	784,481	792,119	830,951	904,855	954,501
Farm	5,448	5,260	4,494	4,409	4,285	4,367	3,962
Nonfarm	485,225	762,488	779,987	787,710	826,666	900,488	950,539
Private	413,849	672,192	684,460	688,726	725,894	795,706	842,270
Ag. Services, Forestry, Fishing, Other	2,625	6,227	6,651	6,409	7,164	8,061	9,180
Mining	6,627	15,588	14,730	14,670	14,085	13,923	14,971
Construction	30,857	57,997	50,517	49,981	58,196	67,919	74,657
Manufacturing	20,160	28,238	27,880	28,413	32,088	36,571	39,642
Transportation & Public Utilities	25,543	35,225	36,191	35,937	38,579	41,929	44,372
Wholesale Trade	13,973	25,746	27,071	27,932	27,836	30,086	32,957
Retail Trade	76,840	117,237	121,352	123,833	127,178	138,233	148,478
Finance, Insurance, and Real Estate	37,347	57,065	57,491	55,194	59,355	63,616	64,550
Services	199,877	328,869	342,577	346,357	361,413	395,368	413,463
Govt. and Govt. Enterprises	71,376	90,296	95,527	98,984	100,772	104,782	108,269
Federal, Civilian	10,476	12,356	12,404	13,003	13,219	13,369	13,618
Military	12,576	13,382	13,528	12,573	11,771	12,329	11,524
State and Local	48,324	64,558	69,595	73,408	75,782	79,084	83,127
State	14,918	19,706	21,048	21,873	22,360	23,062	24,041
Local	33,406	44,852	48,547	51,535	53,422	56,022	59,086

Source: U.S. Department of Commerce 1997

	Average Annual % Rate of Change		*Absolute Change in Number of Jobs*		*Sector Employment as Percent of Total*	
Nevada Employment	*1980-1990*	*1990-1995*	*1980-1990*	*1990-1995*	*1990*	*1995*
Total Jobs	4.58%	4.45%	277,075	186,753	100.00%	100.00%
Farm	-0.35%	-5.51%	-188	-1,298	0.69%	0.42%
Nonfarm	4.62%	4.51%	277,263	188,051	99.31%	99.58%
Private	4.97%	4.61%	258,343	170,078	87.55%	88.24%
Ag. Services, Forestry, Fishing, Other	9.02%	8.07%	3,602	2,953	0.81%	0.96%
Mining	8.93%	-0.80%	8,961	-617	2.03%	1.57%
Construction	6.51%	5.18%	27,140	16,660	7.55%	7.82%
Manufacturing	3.43%	7.02%	8,078	11,404	3.68%	4.15%
Transportation & Public Utilities	3.27%	4.73%	9,682	9,147	4.59%	4.65%
Wholesale Trade	6.30%	5.06%	11,773	7,211	3.35%	3.45%
Retail Trade	4.32%	4.84%	40,397	31,241	15.27%	15.56%
Finance, Insurance, and Real Estate	4.33%	2.50%	19,718	7,485	7.43%	6.76%
Services	5.11%	4.68%	128,992	84,594	42.84%	43.32%
Govt. and Govt. Enterprises	2.38%	3.70%	18,920	17,973	11.76%	11.34%
Federal, Civilian	1.66%	1.96%	1,880	1,262	1.61%	1.43%
Military	0.62%	-2.95%	806	-1,858	1.74%	1.21%
State and Local	2.94%	5.19%	16,234	18,569	8.41%	8.71%
State	2.82%	4.06%	4,788	4,335	2.57%	2.52%
Local	2.99%	5.67%	11,446	14,234	5.84%	6.19%

Source: U.S. Department of Commerce 1997

Table 3.13-5. Nellis AFB and NAFR Personnel, FY1994 and FY1995

Category	*FY 1994*	*FY 1995*
Active Duty Military	7,413	7,205
Nellis AFB	8,238	7,035
NAFR	175	170
Civilian	1,890	1,852
Appropriated Fund	1,051	997
Non-Appropriated Fund	810	828
Other	29	27
Contractor	807	939
Nellis AFB	121	139
NAFR	686	800
Total	10,110	9,996
As of FY98, there were 21 government employees and 77 contractor personnel at TTR		

associated with activities at the base and on NAFR. In FY1994 there were 121 contractor personnel on the base and 686 on the NAFR and these numbers increased by FY1995 to 139 on the base and 800 on NAFR.

3.13.3.2 EARNINGS

For Nye County, the greatest share of total earnings (which stood at $363.9 million in 1995) was contributed by the services sector with 54.3 percent of the total followed by mining with a share of 17.6 percent (see Table 3.13-6). The average value of earnings per job in 1995 was $33,619 with the highest represented by civilian employees of the federal government ($46,649) followed closely by workers in the mining sector ($46,538).

Earnings of workers in Lincoln County in 1995 totaled $54.4 million, a fraction of the level in Nye County. Of this total, 29.0 percent ($15.8 million) is contributed by the state and local government sector (see Table 3.13-7). Because of the small size of the county economy and relatively small number of enterprises, information is withheld from publication. Thus, it is difficult to identify the share that other sectors have of the total county earnings. However, 88.9 percent of the private, nonfarm earnings in the county is contributed by the following three sectors: wholesale trade, retail trade, and services. The average value of earnings per job at the county level was $26,671 in 1995. The highest reported value was for the transportation and

Table 3.13-6. Total Earnings and Average Earnings per job, Nye County, Nevada, 1980 and 1990-1995

Total Earnings ($000) *Nye County, Nevada*	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Earnings by Place of Work	$171,025	$412,568	$421,751	$426,663	$380,459	$365,128	$363,924
Farm	$2,216	$2,700	$2,828	$3,239	$2,817	$3,012	$3,350
Nonfarm	$168,809	$409,868	$418,923	$423,424	$377,642	$362,116	$360,574
Private	$158,371	$379,275	$384,327	$385,238	$336,645	$317,994	$314,071
Ag. Services, Forestry, Fishing, Other	$407	$225	$219	$297	$365	$408	$447
Mining	$26,023	$77,921	$70,148	$66,612	$59,428	$57,092	$64,036
Construction	$9,711	$10,475	$7,635	$7,270	$8,716	$14,586	$11,327
Manufacturing	$1,907	$2,103	$2,420	$2,392	$2,379	$2,522	$3,128
Transportation & Public Utilities	(D)	(D)	(D)	(D)	$8,469	$9,421	$10,463
Wholesale Trade	$389	(D)	(D)	(D)	$2,303	$2,231	$2,368
Retail Trade	$5,499	$10,761	$11,956	$12,794	$14,267	$15,779	$18,539
Finance, Insurance, and Real Estate	(D)	(D)	(D)	$5,529	$5,423	$5,416	$6,271
Services	$106,037	$265,763	$278,847	$279,596	$235,295	$210,539	$197,492
Govt. and Govt. Enterprises	$10,438	$30,593	$34,596	$38,186	$40,997	$44,122	$46,503
Federal, Civilian	$2,374	$7,079	$8,149	$9,257	$9,863	$9,196	$9,423
Military	$985	$909	$854	$1,053	$888	$695	$442
State and Local	$7,079	$22,605	$25,593	$27,876	$30,246	$34,231	$36,638
State	$1,224	$2,669	$2,982	$3,484	$3,498	$3,657	$3,821
Local	$5,855	$19,936	$22,611	$24,392	$26,748	$30,574	$32,817

Source: U.S. Department of Commerce 1997

Earnings per job, *Nye County, Nevada*	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Average Earnings per Job	$21,693	$30,902	$32,077	$34,325	$34,168	$34,035	$33,619
Farm	$9,982	$10,075	$12,085	$13,842	$12,410	$12,927	$16,029
Nonfarm	$22,032	$31,328	$32,439	$34,718	$34,621	$34,504	$33,965
Private	$22,992	$31,950	$33,015	$35,496	$35,129	$34,879	$34,287
Ag. Services, Forestry, Fishing, Other	$8,140	$3,214	$3,369	$5,604	$4,620	$4,916	$4,967
Mining	$24,095	$39,275	$41,904	$43,452	$44,919	$48,057	$46,538
Construction	$23,457	$26,790	$23,066	$20,891	$23,430	$28,050	$22,976
Manufacturing	$21,670	$12,981	$14,938	$14,410	$13,217	$14,663	$14,349
Transportation & Public Utilities	NA	NA	NA	NA	$36,192	$38,770	$38,896
Wholesale Trade	$15,560	NA	NA	NA	$20,026	$23,989	$26,022
Retail Trade	$10,474	$11,163	$12,815	$13,258	$13,838	$15,172	$17,071
Finance, Insurance, and Real Estate	NA	NA	NA	$13,618	$13,292	$12,988	$14,416
Services	$25,675	$34,727	$35,883	$39,732	$40,283	$39,272	$38,709
Govt. and Govt. Enterprises	$13,486	$25,242	$27,177	$28,433	$30,941	$32,019	$31,939
Federal, Civilian	$18,403	$35,045	$38,990	$40,960	$42,883	$46,680	$46,649
Military	$9,752	$11,805	$11,861	$13,500	$12,870	$11,210	$8,500
State and Local	$13,013	$24,228	$25,799	$26,830	$29,480	$30,591	$30,481
State	$18,269	$32,157	$31,723	$34,495	$34,980	$35,163	$36,390
Local	$12,275	$23,454	$25,179	$26,004	$28,886	$30,122	$29,915

(L) = Not shown to avoid disclosure of confidential information. Estimates are included in totals.
(D) = Less than 10 jobs. Estimates are included in totals.
Source: U.S. Department of Commerce 1997

Table 3.13-7. Total Earnings and Average Earnings per job, Lincoln County, Nevada, 1980 and 1990-1995

Total Earnings ($000) Lincoln County, Nevada	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Earnings by Place of Work	$27,221	$65,704	$64,808	$55,219	$56,508	$57,776	$54,356
Farm	$1,450	$1,916	$1,055	$424	$2,140	$1,849	$1,866
Nonfarm	$25,771	$63,788	$63,753	$54,795	$54,368	$55,927	$52,490
Private	$21,133	$50,656	$49,672	$39,338	$38,337	$39,213	$35,225
Ag. Services, Forestry, Fishing, Other	(L)	(D)	$116	$103	$68	$74	$78
Mining	$7,669	$519	$403	$304	$252	$257	$248
Construction	$2,194	$1,061	$703	$305	$329	$382	$556
Manufacturing	$108	$109	(D)	$118	(D)	(D)	$55
Transportation & Public Utilities	$1,796	$2,079	$2,489	$2,570	$2,533	$2,603	$2,324
Wholesale Trade	$101	(L)	(D)	(D)	(D)	(D)	(D)
Retail Trade	$2,218	$2,144	$2,321	$2,471	$2,489	$2,753	(D)
Finance, Insurance, and Real Estate	$325	$311	$475	$569	$502	$538	$650
Services	$6,685	(D)	(D)	(D)	(D)	(D)	(D)
Govt. and Govt. Enterprises	$4,638	$13,132	$14,081	$15,457	$16,031	$16,714	$17,265
Federal, Civilian	$390	$1,211	$1,184	$1,215	$1,374	$1,427	$1,429
Military	(L)	$73	$69	$76	$70	$72	$64
State and Local	$4,216	$11,848	$12,828	$14,166	$14,587	$15,215	$15,772
State	$1,204	$4,478	$4,980	$5,705	$5,523	$5,763	$6,003
Local	$3,012	$7,370	$7,848	$8,461	$9,064	$9,452	$9,769

Source: U.S. Department of Commerce 1997

Earnings per job, Lincoln County, Nevada	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Average Earnings per Job	$15,039	$27,342	$27,719	$24,986	$25,500	$26,214	$26,671
Farm	$8,841	$10,764	$6,594	$2,617	$13,631	$11,629	$12,523
Nonfarm	$15,657	$28,669	$29,271	$26,755	$26,405	$27,348	$27,787
Private	$16,893	$30,009	$30,474	$26,670	$25,886	$27,062	$27,412
Ag. Services, Forestry, Fishing, Other	NA	NA	$5,800	$5,421	NA	NA	NA
Mining	$24,899	$17,300	$17,522	$17,882	$14,824	$17,133	$13,778
Construction	$29,253	$22,574	$13,519	$10,167	$11,750	$14,148	$15,444
Manufacturing	$9,000	$10,900	NA	NA	NA	NA	NA
Transportation & Public Utilities	$18,708	$23,625	$28,284	$37,246	$40,855	$37,186	$39,390
Wholesale Trade	$8,417	NA	NA	NA	NA	NA	NA
Retail Trade	$7,155	$8,576	$10,180	$9,964	$10,077	$10,881	NA
Finance, Insurance, and Real Estate	$6,250	$6,220	$7,917	$9,328	$10,040	$10,151	$11,017
Services	$17,500	NA	NA	NA	NA	NA	NA
Govt. and Govt. Enterprises	$11,742	$24,454	$25,695	$26,976	$27,735	$28,044	$28,584
Federal, Civilian	$15,600	$26,911	$28,190	$31,154	$34,350	$35,675	$35,725
Military	NA	$6,083	$6,273	$6,909	$7,000	NA	NA
State and Local	$11,777	$24,683	$25,915	$27,086	$27,627	$27,815	$28,367
State	$16,493	$29,853	$30,932	$33,363	$34,093	$34,304	$35,521
Local	$10,568	$22,333	$23,497	$24,037	$24,765	$24,939	$25,243

(L) = Not shown to avoid disclosure of confidential information. Estimates are included in totals.
(D) = Less than 10 jobs. Estimates are included in totals.
Source: U.S. Department of Commerce 1997

public utilities sector ($39,390) followed by federal civilian employment ($35,725) and state government employment ($35,521).

Total earnings in Clark County totaled over $18,093 million in 1995 as shown in Table 3.13-8. The greatest share of this total is contributed by the services sector (48.0 percent), followed by construction (10.4 percent), retail trade (9.7 percent), and state and local government (8.8 percent). On average, in 1995, the annual earnings per job was $29,677, slightly above the state average. The average earnings per job varied from a high of $46,045 in civilian employment for the federal government, $36,683 for wholesale trade, $36,621 for transportation and public utilities, and $36,602 for local government to $18,252 in retail trade, $17,904 in agricultural services and forestry, and $10,775 in farming as shown in Table 3.13-8.

Total earnings derived from employment in the State of Nevada totaled over $27,971 million in 1995 as shown in Table 3.13-9. The greatest share of this total is contributed by the services sector (43.7 percent), followed by state and local government (10.1 percent), construction (9.7 percent), and retail trade (9.6 percent). On average, in 1995, the annual value of earnings per job was $29,305 statewide. The average earnings per job varied from a high of $49,031 in the mining sector and $45,330 in civilian employment for the federal government to $18,064 in retail trade, $16,572 in agricultural services and forestry, and $11,459 in farming as shown in Table 3.13-9.

3.13.3.3 AGRICULTURE

As of 1992, there were 2,890 farms statewide in Nevada, encompassing approximately 9.2 million acres. Of these farms, 122 were in Lincoln County (48,968 acres), 155 were in Nye County (140,380 acres), and 223 were in Clark County (82,100 acres), (see Table 3.13-10).

Agriculture in Nevada primarily consists of two commodities: crops and livestock. In Nevada between 1990 and 1994, cash receipts from the marketing of crops and livestock (gross receipts from commercial market sales as well as loans [net of redemption] made or guaranteed by the Community Credit Corporation and other purchases under price support payments) have remained flat. Receipts in Clark and Lincoln counties have risen slightly, while receipts in Nye County have fallen dramatically. State cash receipts, not adjusted for inflation, fell from $365,644,000 in 1990 to $364,013,000 in 1994, a loss of over $1.5 million in absolute terms. In dollar value adjusted for inflation, this represents nearly a 10 percent decline (see Table 3.13-11).

The declining performance of agriculture can be attributed to livestock commodities. Nevada supports cattle, sheep, and hogs. Cattle are the principal commodity in this group, comprising over 94 percent of the industry. While the production value of sheep and hogs has moved moderately between 1990 and 1995, the production value of cattle has dropped dramatically, from over $135 million to under $90 million (Nevada Statistical Abstract 1995). This has been reflected in the decline of cattle inventories statewide (see Table 3.13-12). By comparison, over the same period the production value of crops has risen from $178 million to almost $198 million, which is attributable to strong growth in the hay, potato, and onion markets (State of Nevada 1996).

Table 3.13-8. Total Earnings and Average Earnings per job, Clark County, Nevada, 1980 and 1990-1995

Total Earnings ($millions) Clark County, Nevada	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Earnings by Place of Work	$4,053.5	$10,948.4	$11,637.6	$12,907.0	$14,333.6	$16,168.7	$18,093.3
Farm	$3.2	$2.6	$2.7	$2.6	$3.6	$2.9	$3.3
Nonfarm	$4,050.3	$10,945.8	$11,634.9	$12,904.4	$14,330.0	$16,165.7	$18,090.1
Private	$3,474.1	$9,506.4	$10,008.2	$11,139.4	$12,451.1	$14,170.2	$15,913.6
Ag. Services, Forestry, Fishing, Other	$12.3	$57.7	$62.3	$66.7	$74.3	$87.5	$107.4
Mining	$20.2	$9.4	$10.3	$14.7	$20.6	$22.7	$25.2
Construction	$406.3	$1,271.0	$1,093.1	$1,141.4	$1,473.5	$1,682.4	$1,885.5
Manufacturing	$143.7	$328.6	$324.7	$363.4	$437.0	$512.9	$593.5
Transportation & Public Utilities	$304.6	$665.0	$722.2	$751.6	$833.2	$947.4	$1,047.9
Wholesale Trade	$127.6	$433.8	$495.4	$546.7	$538.2	$603.5	$687.5
Retail Trade	$478.7	$1,122.9	$1,196.0	$1,302.4	$1,379.4	$1,574.6	$1,758.1
Finance, Insurance, and Real Estate	$182.2	$487.7	$498.5	$668.8	$835.3	$950.3	$1,120.1
Services	$1,798.3	$5,130.1	$5,605.6	$6,283.7	$6,859.5	$7,788.8	$8,688.5
Govt. and Govt. Enterprises	$576.2	$1,439.4	$1,626.7	$1,765.0	$1,878.9	$1,995.5	$2,176.4
Federal, Civilian	$98.6	$239.0	$261.9	$298.7	$309.3	$334.4	$363.8
Military	$130.3	$227.6	$245.2	$223.7	$209.6	$210.5	$230.3
State and Local	$347.3	$972.9	$1,119.6	$1,242.6	$1,360.0	$1,450.6	$1,582.4
State	$73.5	$198.8	$226,255	$253.6	$263.3	$278.6	$299.4
Local	$273.8	$774.0	$893,389	$988.9	$1,096.7	$1,172,0	$1,283.0
Source: U.S. Department of Commerce 1997							

Earnings per job, Clark County, Nevada	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Average Earnings per Job	$15,219	$23,807	$24,462	$26,725	$27,935	$28,212	$29,677
Farm	$7,535	$6,443	$7,706	$7,871	$11,194	$8,948	$10,775
Nonfarm	$15,231	$23,823	$24,474	$26,738	$27,945	$28,223	$29,686
Private	$15,227	$23,262	$23,780	$26,136	$27,349	$27,627	$29,088
Ag. Services, Forestry, Fishing, Other	$9,394	$14,755	$15,202	$16,439	$16,531	$16,981	$17,904
Mining	$34,338	$11,518	$12,039	$14,244	$19,188	$20,509	$21,206
Construction	$24,911	$31,345	$32,152	$34,131	$36,055	$35,586	$35,958
Manufacturing	$19,768	$28,160	$28,277	$30,340	$31,406	$32,163	$33,283
Transportation & Public Utilities	$22,139	$31,548	$32,651	$34,125	$35,282	$35,865	$36,621
Wholesale Trade	$19,493	$30,513	$32,122	$34,610	$35,280	$35,956	$36,683
Retail Trade	$10,814	$15,520	$15,781	$16,707	$17,176	$17,706	$18,252
Finance, Insurance, and Real Estate	$8,929	$13,873	$13,954	$19,104	$21,827	$22,572	$25,929
Services	$15,281	$24,556	$25,321	$27,939	$28,886	$28,935	$30,729
Govt. and Govt. Enterprises	$15,255	$28,337	$29,832	$31,284	$32,666	$33,329	$34,932
Federal, Civilian	$20,155	$34,352	$37,320	$40,679	$40,979	$43,768	$46,045
Military	$12,390	$20,855	$22,071	$22,156	$22,556	$21,260	$24,761
State and Local	$15,530	$29,545	$30,757	$31,878	$33,433	$34,268	$35,083
State	$13,920	$26,112	$27,636	$29,262	$29,533	$29,865	$29,785
Local	$16,027	$30,578	$31,662	$32,626	$34,528	$35,513	$36,602
Source: U.S. Department of Commerc1997							

Table 3.13-9. Total Earnings and Average Earnings per job, State of Nevada, 1980 and 1990-1995

Total Earnings ($millions) *State of Nevada*	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Earnings by Place of Work	$7,373.0	$18,176.0	$19,130.6	$21,016.5	$22,854.4	$25,358.3	$27,971.7
Farm	$62.3	$73.3	$65.7	$50.7	$91.1	$59.0	$45.4
Nonfarm	$7,310.7	$18,102.7	$19,064.9	$20,965.7	$22,763.2	$25,299.3	$27,926.3
Private	$6,226.8	$15,596.0	$16,263.0	$17,908.5	$19,532.1	$21,866.0	$24,222.6
Ag. Services, Forestry, Fishing, Other	$27.9	$89.8	$95.6	$100.4	$110.5	$129.3	$152.1
Mining	$169.5	$593.4	$605.1	$633.0	$650.0	$667,5	$734.0
Construction	$749.9	$1,813.0	$1,622.2	$1,675.7	$2,080.1	$2,4482	$2,709.1
Manufacturing	$371.7	$789.8	$816.2	$956.4	$1,020.1	$1,188.4	$1,326,0
Transportation & Public Utilities	$559.3	$1,115.4	$1,195.9	$1,257.8	$1,386.1	$1,529.1	$1,664.5
Wholesale Trade	$261.5	$800.0	$843.9	$932.0	$953.5	$1,059.4	$1,191.2
Retail Trade	$829.1	$1,800.1	$1,908.1	$2,056.5	$2,177.9	$2,430.3	$2,682.1
Finance, Insurance, and Real Estate	$323.0	$740.6	$766.0	$994.1	$1,213.1	$1,350.5	$1,551.5
Services	$2,935.0	$7,853.9	$8,410.0	$9,302.6	$9,940.9	$11,063.3	$12,212.1
Govt. and Govt. Enterprises	$1,083.9	$2,506.6	$2,801.9	$3,057.2	$3,231.2	$3,433.3	$3,703.7
Federal, Civilian	$206.8	$421.0	$458.4	$517.4	$542.1	$585.2	$617.3
Military	$146.0	$260.6	$279.9	$261.8	$250.8	$253.4	$272.6
State and Local	$731.1	$1,825.0	$2,063.6	$2,277.9	$2,438.2	$2,594.8	$2,813.7
State	$227.6	$554.3	$621.4	$689.1	$712.3	$744.3	$798.4
Local	$503.5	$1,270.7	$1,442.3	$1,588.9	$1,726.0	$1,850.5	$2,015.3
Source: U.S. Department of Commerce 1997							
Earnings per job, State of Nevada	*1980*	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Average Earnings per Job	$15,026	$23,674	$24,386	$26,532	$27,504	$28,025	$29,305
Farm	$11,438	$13,928	$14,623	$11,504	$21,269	$13,501	$11,459
Nonfarm	$15,067	$23,742	$24,443	$26,616	$27,536	$28,095	$29,379
Private	$15,046	$23,202	$23,760	$26,002	$26,908	$27,480	$28,759
Ag. Services, Forestry, Fishing, Other	$10,634	$14,426	$14,375	$15,668	$15,420	$16,039	$16,572
Mining	$25,583	$38,066	$41,079	$43,150	$46,145	$47,942	$49,031
Construction	$24,301	$31,260	$32,112	$33,527	$35,743	$36,046	$36,287
Manufacturing	$18,436	$27,969	$29,275	$33,659	$31,790	$32,495	$33,449
Transportation & Public Utilities	$21,896	$31,666	$33,043	$35,000	$35,930	$36,470	$37,513
Wholesale Trade	$18,717	$31,075	$31,173	$33,368	$34,255	$35,212	$36,143
Retail Trade	$10,790	$15,354	$15,724	$16,607	$17,124	$17,581	$18,064
Finance, Insurance, and Real Estate	$8,648	$12,977	$13,324	$18,011	$20,438	$21,229	$24,035
Services	$14,684	$23,882	$24,549	$26,858	$27,506	$27,982	$29,536
Govt. and Govt. Enterprises	$15,186	$27,760	$29,331	$30,886	$32,064	$32,766	$34,208
Federal, Civilian	$19,741	$34,076	$36,958	$39,795	$41,010	$43,769	$45,330
Military	$11,605	$19,471	$20,689	$20,822	$21,309	$20,555	$23,659
State and Local	$15,130	$28,270	$29,652	$31,031	$32,174	$32,810	$33,848
State	$15,259	$28,131	$29,521	$31,504	$31,856	$32,273	$33,209
Local	$15,072	$28,331	$29,708	$30,831	$32,308	$33,031	$34,108
Source: U.S. Department of Commerce 1997							

Table 3.13-10. Farm and Ranch Acreage in Nevada by County, 1992				
	Clark County	*Lincoln County*	*Nye County*	*State of Nevada*
Number of Farms	223	122	155	2,890
Land in Farms (acres)	82,100	48,968	140,380	9,263,684
Ave. Size of Farms (acres)	368	401	906	3,205
Total Cropland (acres)	9,198	26,087	— [1]	840,364
Harvested Cropland (acres)	5,470	14,170	11,076	408,568
Irrigated Land (acres)	7,643	17,622	18,068	556,172
Ave. Value per Farm	$743,347	$361,190	$459,005	$811,941
Ave. Value per Acre	$2,196	$870	$496	$252
Note: 1. Information withheld to avoid disclosure of data for individual farms. *Source*: U.S. Department of Commerce 1992				

Table 3.13-11. Cash Receipts from Marketing of Crops and Livestock in Nevada by County (in thousands)					
County	*1990*	*1991*	*1992*	*1993*	*1994*
Clark	$21,020	$20,051	$21,376	$21,269	$24,302
Lincoln	$5,338	$5,045	$5,110	$6,269	$6,229
Nye	$9,097	$8,598	$7,914	$6,037	$6,841
Statewide	$365,644	$335,749	$330,456	$360,094	$364,013
Source: U.S. Department of Commerce 1997					

Table 3.13-12. Cattle Inventory in Nevada by County (as of January 1st)						
County	*1990*	*1991*	*1992*	*1993*	*1994*	*1995*
Clark	15,000	14,000	13,000	13,000	13,000	13,000
Lincoln	12,000	13,000	15,000	16,000	16,000	16,000
Nye	19,000	19,000	19,000	17,000	10,000	12,000
Statewide	530,000	520,000	520,000	500,000	490,000	500,000
Source: State of Nevada 1991						

3.13.3.4 MINING

The mining industry plays a critical role in the economy of rural Nevada. As a gold producer, Nevada ranks third in the world behind Russia and South Africa (Dobra 1997). Within the

three-county Southern Nevada ROI, Nye has historically been the most prominent mining county. In 1987, Nye accounted for nearly $55 million of the $264 million of assessed valuation of Nevada mining properties (see Table 3.13-13). For 1994, Nye County properties were valued at $97 million of the over $1 billion of assessed valuation of Nevada mining properties (see Table 3.13-13).

Table 3.13-13. Assessed Valuation of Nevada Mining Properties by County, 1987-1994 (in thousands)

	1987	*1988*	*1989*	*1990*	*1991*	*1992*	*1993*	*1994*
Eureka	$42,185	$56,574	$106,899	$184,335	$248,771	$271,433	$345,148	$422,880
Nye	$54,727	$56,160	$55,941	$108,827	$122,357	$115,165	$115,668	$97,430
Other Nevada Counties	$167,173	$211,471	$300,724	$427,208	$681,289	$516,214	$540,943	$532,107
Nevada	$264,085	$324,205	$463,564	$720,370	$1,052,417	$902,812	$1,001,759	$1,052,417
Percent of Total								
Eureka	15.97	17.45	23.06	25.59	23.64	30.07	34.45	40.18
Nye	20.72	17.32	12.07	15.11	11.63	12.76	11.55	9.26
Other Nevada Counties	63.30	65.23	64.87	59.30	64.74	57.18	54.00	50.56
Nevada	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: State of Nevada 1996.

3.13.4 Land Use and Ownership

A vast majority of the three-county Southern Nevada ROI, as well as the state as a whole, is federally owned or held in trust (see Table 3.13-14). Nevada contains approximately 70,745,600 acres, with nearly 57 million acres, or 80.4 percent held by the federal government. This ownership is dominated by the BLM, which owns nearly 48 million acres statewide. This is followed by the USFS, with approximately 5.8 million acres, and the USFWS, with approximately 2.2 million acres.

Nye County is more than twice the size of Clark County, with approximately 11.5 million acres. Federal ownership in the county is approximately 8.5 million acres, or 73.8 percent. This is primarily divided between the BLM, with approximately 6.5 million acres, and the USFS with approximately 1.9 million acres.

The remaining approximately 3.1 million acres is split between the NTS (106,971 acres), farms and ranches (approximately 140,380 acres), and other privately held lands (see Table 3.13-14).

Lincoln County contains approximately 6.8 million acres, with the federal government owning approximately 6.4 million acres, or 94.3 percent. Of this 6.4 million acres, over approximately

5.6 million is owned by the BLM. The USFWS owns a substantial portion of the remainder, with approximately 761,490 acres (see Table 3.13-14).

Table 3.13-14. Federally Owned Land in Nevada by Entitlement Acreage and County, FY1995 (in acres)

	Clark	*Lincoln*	*Nye*	*Statewide*
BLM	3,236,720	5,633,723	6,478,851	47,959,301
Forest Service	300,362	30,672	1,942,983	5,813,180
Bureau of Reclamation	0	0	0	88,075
National Park Service	587,321	0	106,971	774,669
Corps of Engineers	0	671	0	671
Fish & Wildlife	828,031	761,490	0	2,218,411
Total Federal Land	4,952,434	6,426,556	8,528,805	56,854,307
Total Land	5,173,760	6,816,000	11,560,960	66,905,600
% Federal Land / County	95.70%	94.30%	73.80%	80.40%

Note: This includes only land withdrawn pursuant to Public Law 94-565. It does not represent all federal lands. Acreage is used to compute tax payments.

Source: BLM 1991b, U.S. DOI, BLM; Department of Finance, Payments in Lieu of Taxes, FY1995.

While Clark County is relatively small (as compared with other counties in Nevada), with approximately 5.1 million acres and over 98 percent of its population in urbanized areas, approximately 4.9 million acres, or 95.7 percent, belongs to the federal government. This federal ownership is dominated by the BLM, with approximately 3.2 million acres in Clark County. This is followed by the USFWS, with approximately 828,031 acres, and the National Park Service, with approximately 587,321 acres (see Table 3.13-14).

3.13.5 Population

Between 1980 and 1990 Nevada was one of the fastest growing states in the nation, outpacing the national average of 0.97 percent growth per year with an annual growth rate of 5.0 percent (see Table 3.13-15). This growth has continued through 1995, as Nevada has grown from 1,236,130 persons in 1990 to 1,582,290 by 1995. This constitutes a net 5-year gain of 346,260 persons, or 30 percent (see Table 3.13-16).

Table 3.13-15. Population for the United States, the State of Nevada, and Clark, Lincoln and Nye Counties for 1970, 1980, 1990, and 1995

Area	*1970*	*1980*	*1990*	*1995*	AVERAGE ANNUAL RATE OF GROWTH		
					1970-1980	*1980-1990*	*1990-1995*
Unites States	205,052,000	227,726,000	249,913,000	263,034,000	1.05%	0.93%	1.03%
State of Nevada	488,738	800,493	1,236,130	1,582,390	5.06%	4.44%	5.06%
Clark County	273,288	463,087	770,280	1,036,290	5.42%	5.22%	6.11%
Lincoln County	2,557	3,732	3,775	4,110	3.85%	0.11%	1.71%
Nye County	5,599	9,048	17,781	23,050	4.92%	6.99%	5.33%

Source: U. S. Department of Commerce 1970,1980,1990a

Table 3.13-16. Population Estimates for the State of Nevada and Clark, Lincoln, and Nye Counties, 1990 through 1995

	1990	*1991*	*1992*	*1993*	*1994*	*1995*	*Average Annual Percent Change (1990-1995)*
State of Nevada	**1,236,130**	**1,297,910**	**1,343,940**	**1,398,760**	**1,494,230**	**1,582,390**	**5.06**
Clark County	770,280	820,840	856,350	898,020	971,680	1,036,290	6.11
Boulder City	12,760	12,960	13,000	13,350	13,640	14,090	2.00
Henderson	69,390	76,560	85,770	94,760	105,610	115,490	10.73
Las Vegas	268,330	289,690	303,140	323,300	346,350	368,360	6.54
Mesquite	1,960	2,070	2,370	3,270	3,850	5,120	21.17
North Las Vegas	50,030	51,060	55,400	60,880	69,700	77,820	9.24
Other Clark	402,470	432,340	459,680	495,560	539,150	580,880	7.61
Lincoln County	3,810	3,870	4,080	4,130	4,340	4,110	1.53
Caliente	1,120	1,140	1,140	1,160	1,160	1,160	0.70
Other Lincoln	2,690	2,730	2,940	2,970	3,180	2,950	1.86
Nye County	18,190	19,110	20,080	20,550	20,740	23,050	4.85
Gabbs	670	680	660	610	440	360	-11.68
Other Nye	17,520	18,430	19,420	19,940	20,300	22,690	5.31

This population growth has primarily taken place in Clark County, which increased by 266,010, from 770,280 persons in 1990 to 1,036,290 in 1995; a 6.1 average annual percent increase. Within Clark County, the City of Las Vegas had a total population of 268,330 in 1990, which increased at an annual rate of 6.54 percent to 368,360 by 1995 (see Table 3.13-16).

Henderson, which is the second largest incorporated city in Clark County, had a 1990 population of 69,390 and increased to 115,490 by 1995, at an annual average rate of 10.73 percent (see Table 3.13-16).

The population of Nye County grew from 18,190 persons in 1990 to 23,050 in 1995. This was a moderate gain of 4,860 persons, and rate of change (4.85 percent annually) below that of the state. Lincoln County's population has remained relatively stable, growing from 3,810 in 1990 to 4,110 in 1995, for an annual rate of growth of 1.53 percent (see Table 3.13-16).

The fact that the rates of growth correspond to the percent that the counties are urbanized is not surprising, because urbanized counties have substantially outpaced rural counties nationally in population growth since the 1980 Census. Between 1990 and 1995, there were 114,824 births in Nevada and 54,765 deaths, leaving net in-migration at 286,201 persons over this period. A large portion of these three components of population change were concentrated in Clark County, which had 76,166 births and 35,148 deaths, leaving net in-migration between 1990 and 1995 at 224,992 persons. This is substantial: a very large portion of the growth in Clark County is occurring because of in-migration, and not because of a natural growth rate (see Table 3.13-17).

The same can be said of Lincoln and Nye Counties, albeit on a smaller scale. Between 1990 and 1995, Nye County had 1,211 births, 949 deaths, and a net in-migration of 4,598 for a net gain of 4,860 persons by migration. Lincoln County's natural population change (births - deaths) actually declined by 29 persons between 1990 and 1995, with 194 births and 223 deaths. The population gain of 300 persons was attributable to 322 in-migrants (see Table 3.13-17).

The potentially affected population includes active duty military, Air Force civilian, and contractor personnel and each of their respective dependents. In FY1994 there were 7,413 active duty personnel assigned to Nellis AFB and the NAFR. Associated with these personnel were 17,612 dependents. There were an additional 2,697 civilian and contractor personnel. Assuming an average household size identical to that of Clark County (2.58 persons), these non-military personnel would be accompanied by 4,254 dependents giving a total population of 31,976 associated with activities at Nellis AFB and the NAFR. As of FY1995 this total population had declined to 29,292, attributable mostly to a reduction in the number of dependents of military personnel from 17,612 to 14,894.

The decline in military personnel and support personnel stands in contrast to the population trends of the State of Nevada.

Table 3.13-17. Births, Deaths, and Migration based on Nevada State Demographers Estimate of 1990-1995 Population

	1990	*1991*	*1992*	*1993*	*1994*	*1995*
State of Nevada Population	**1,236,130**	**1,297,910**	**1,343,940**	**1,398,760**	**1,494,230**	**1,582,390**
Nevada Births	NA	21,764	22,058	22,293	23,853	24,856
Nevada Deaths	NA	9,687	10,140	10,918	11,680	12,340
Net Migration	NA	49,703	34,112	43,445	83,297	75,644
Clark County Population	**770,280**	**820,840**	**856,350**	**898,020**	**971,680**	**1,036,290**
Clark County Births	NA	14,207	14,422	14,767	16,015	16,755
Clark County Deaths	NA	6,047	6,450	6,983	7,560	8,108
Net Migration	NA	42,400	27,538	33,886	65,205	55,963
Lincoln County Population	**3,810**	**3,870**	**4,080**	**4,130**	**4,340**	**4,110**
Lincoln County Births	NA	34	25	38	50	47
Lincoln County Deaths	NA	41	50	41	44	47
Net Migration	NA	67	235	53	204	(230)
Nye County Population	**18,190**	**19,110**	**20,080**	**20,550**	**20,740**	**23,050**
Nye County Births	NA	252	256	216	236	251
Nye County Deaths	NA	127	171	188	215	248
Net Migration	NA	795	885	442	169	2,307

Note: NA = not applicable.

3.13.6 Housing

The housing stock of Nevada, particularly Nye and Clark counties, has expanded to meet the demands of the constantly growing population. Between 1970 and 1990 the number of housing units in the state has more than tripled, growing from 172,558 units to 518,858 units (see Table 3.13-18). Much of this growth occurred in Clark County, which grew by nearly 225,000 units (from 93,047 units in 1970 to 317,188 units in 1990). Nye County's housing stock more than tripled, growing from 2,098 units in 1970 to 8,073 units in 1990. While Lincoln County's housing stock grew, it did so more conservatively (a reflection of the slower population growth), growing from 1,043 units in 1970 to 1,800 units in 1990. The distribution of population and housing units within each county is presented in Table 3.13-19.

Table 3.13-18. Household and Housing Unit Data			
	1970	*1980*	*1990*
Households			
State of Nevada	160,052	304,327	466,297
Clark County	87,728	173,891	287,025
Lincoln County	792	1,270	1,325
Nye County	1,813	3,434	6,664
Persons per Household			
State of Nevada	3.05	2.63	2.53
Clark County	3.12	2.66	2.54
Lincoln County	3.23	2.94	2.63
Nye County	3.09	2.63	2.50
Housing Units			
State of Nevada	172,558	339,949	518,858
Clark County	93,047	190,607	317,188
Lincoln County	1,043	1,685	1,800
Nye County	2,098	4,292	8,073
Persons per Housing Unit			
State of Nevada	2.83	2.35	2.27
Clark County	2.94	2.43	2.30
Lincoln County	2.45	2.21	1.94
Nye County	2.67	2.11	2.06
Source: U.S. Department of Commerce 1990a; 1980; 1970			

Table 3.13-19. Population and Housing Characteristics in the ROI, Counties, and State of Nevada, 1990

	Population	*Housing Units*	*Households*
State of Nevada	1,177,633	518,858	466,297
Clark County	729,567	317,188	287,025
Clark Division	23,248	10,960	8,511
Enterprise CDP*	827	334	310
Indian Springs CDP	1,131	510	417
Laughlin CDP	4,649	2,637	1,925
Mesquite	1,848	684	596
Moapa Valley CDP	3,444	1,415	1,127
Sunrise Manor CDP	4,451	1,599	1,523
Las Vegas Division	706,319	306,228	278,514
Boulder City	12,260	5,390	4,998
East Las Vegas City	11,066	4,846	4,367
Enterprise CDP	5,580	2,172	2,024
Henderson City	64,315	25,400	23,237
Las Vegas City	254,193	109,670	99,735
Nellis AFB CDP	7,064	2,065	1,905
North Las Vegas City	47,075	15,837	14,525
Paradise CDP	123,516	63,924	56,731
Spring Valley CDP	51,689	22,236	20,282
Sunrise Manor CDP	90,340	35,665	33,343
Winchester CDP	22,920	12,485	11,343
Lincoln County	3,488	1,800	1,325
Alamo Division	1,023	440	343
Caliente Division	1,006	490	412
Caliente	969	449	393
Pioche Division	1,459	870	570
Nye County	16,641	8,073	6.664
Amargosa Valley Division	761	334	279
Beatty Division	1,645	902	745
Beatty CDP	1,616	869	729
Crystal Division	92	49	46
Pahrump CDP	15	8	6
Duckwater Division	298	215	121
Gabbs Division	812	359	287
Gabbs	667	290	240
Pahrump Division	7,344	3,508	3,024
Pahrump CDP	7,328	3,501	3,018
Ralston Division	122	62	46
Round Mountain Division	1,923	891	679
Tonopah Division	3,644	1,753	1,437
Tonopah	3,580	1,713	1,406
Yucca Flat Division	1,016	all in group quarters	

Note: * CDP = Census Designated Place (i.e., non-incorporated community).
Source: U.S. Department of Commerce 1990

It is difficult to estimate or project the number of housing units that exist in the state and the ROI. Since most of the counties of Nevada are rural, they have no requirement for a building permit for new residential development, hence there is no post-censal estimation method with which to assess new housing development in the state. In urbanized Clark County, there is building permit information, but this can provide an inaccurate indication of the current housing stock. A building permit only indicates an intent to build, not the completion of a unit. Table 3.13-20 provides an annual breakdown of the permits issued and valuations for the incorporated places in Clark County from 1990 to 1994.

Nellis AFB, in 1990, had two on-base housing complexes containing a total of 1,476 units that accommodate military families. The first is Nellis Terrace, which contains 790 single family Wherry housing units. The second complex is referred to as Manch Manor. Manch Manor contains 202 Capehart housing units, 478 appropriated housing units, and 6 additional single-family homes (GRW 1990).

3.13.7 Public Services and Facilities

3.13.7.1 HEALTH CARE

As of 1995, the only comprehensive medical facility in Nye County was the Nye Regional Medical Center in Tonopah. In Lincoln County, the only comprehensive medical facility is the Grover C. Dils Medical Center, located in Caliente (see Table 3.13-21). These two facilities combined to provide Lincoln and Nye counties 25 licensed hospital beds. Combined, the counties of Nye and Lincoln contain 11 physicians, 56 registered nurses, and 30 LPNs (see Table 3.13-22).

Civilian hospital and medical facilities in the three-county Southern Nevada ROI are concentrated in Clark County. As of year end 1994, Boulder City, Desert Springs, Lake Mead, St. Rose Dominican, and Sunrise Hospitals, as well as the University Medical Center and Valley Hospital Medical Center, were located in Clark County. One other hospital, the Women's Hospital, had been in operation, but was closed at the end of 1994. The facilities afforded Clark County 2,092 licensed hospital beds (see Table 3.13-21). Clark County contains 1,418 physicians, 6,195 registered nurses, and 1,545 licensed practical nurses (LPNs) (see Table 3.13-22).

In addition to healthcare services that are available to the public at large, members of Indian tribes are afforded health care services through the Indian Health Service (IHS). The IHS is an agency of the U.S. Public Health Service within the Department of Health and Human Services. IHS provides health care services to American Indians who (a) are bona fide members of federally recognized tribes, bands, nations, villages, communities, and organized groups or (b) reside in a geographically designated Health Service Delivery Area.

Nellis AFB medical services are primarily supported by the Mike O'Callaghan Federal Hospital, which provides service to military veterans and military personnel and their

dependents. As of April 1, 1997, the hospital was authorized 78 medical staff with 70 personnel assigned. The facility currently has 114 beds and has approximately 17,813 outpatient visits per year.

Table 3.13-20. Building Permit Data 1990 - 1994

	SINGLE FAMILY		MULTI-FAMILY		
	Permits	*Valuation*	*Permits*	*Units*	*Valuation*
Unincorporated Clark County					
1990	3,116	$178,454,438	429	4,281	$141,869,365
1991	2,794	168,362,336	251	3,219	108,369,343
1992	2,188	130,438,636	146	1,326	51,423,894
1993	4,139	234,304,386	604	1,914	77,656,164
1994	4,139	277,628,110	945	3,860	143,407,457
Las Vegas					
1990	4,998	$274,034,657	493	4,451	$121,070,786
1991	5,296	280,877,948	178	1,145	33,184,056
1992	4,475	249,230,208	291	1,397	53,767,076
1993	6,029	335,389,321	144	995	29,697,034
1994	6,822	483,810,505	457	3,396	155,685,992
Henderson					
1990	2,207	$173,095,462	126	1,175	$37,727,008
1991	2,488	194,453,950	792	1,701	60,084,216
1992	1,736	140,322,956	315	484	18,934,124
1993	2,679	203,687,074	521	865	32,504,480
1994	3,217	275,432,698	636	651	28,993,202
Boulder City					
1990	69	$11,937,573	58	0	$6,221,485
1991	43	6,874,004	2	0	493,031
1992	91	14,801,582	37	0	3,021,558
1993	46	997,204	42	0	5,787,173
1994	40	7,728,706	25	25	2,198,056
North Las Vegas					
1990	787	$73,659,172	1	2	$90,826
1991	1,499	243,620,148	6	24	1,122,532
1992	1,496	114,167,723	1	248	8,058,659
1993	2,122	173,509,653	0	0	—
1994	2,539	218,799,439	0	0	—
Clark County Total					
1990	11,177	$711,181,302	1,108	9,909	$296,979,470
1991	12,120	783,188,386	1,229	6,089	203,253,178
1992	9,986	648,961,105	790	3,455	135,205,311
1993	15,015	947,887,638	1,311	3,774	145,644,851
1994	16,757	1,263,399,458	2,063	7,932	330,284,707

Source: Las Vegas Perspective 1995. *Las Vegas Review-Journal*, Nevada Development Authority, First Interstate Bank of Nevada, in cooperation with the University of Nevada, Las Vegas.

Table 3.13-21. Community Hospital Utilization in Nevada by Facility, 1995

Area/Hospital	*Ownership*	*Average Number of Beds*	*Average Daily Census*	*Number of Admissions*	*Patient Days*	*Average Length of Stay (Days)*	*Average Bill per Admission*	*Average Bill per Day*
Clark County								
Boulder City	Non-profit	23	10.6	995	3,887	3.9	$8,836	$2,262
Desert Springs	Profit	225	157.7	10,466	57,562	5.5	19,111	3,475
Lake Mead	Profit	170	103.4	7,632	37.752	4.9	13,967	2,864
St. Rose Dominican	Non-profit	136	62.6	5,623	22,857	4.1	14,131	3,476
Sunrise	Profit	681	491.7	33,806	179,474	5.3	19,086	3,595
University Medical	Public	519	351.0	19,822	128,106	6.5	18,066	2,795
Valley Hospital	Profit	338	273.0	19,141	99,637	5.2	18,055	3,469
Lincoln County								
Grover C. Dils	Public	4	1.0	93	356	3.8	5,198	1,358
Nye County								
Nye Regional	Public	21	5.2	544	1,901	3.5	7,573	2,164
Nevada		3,516	2,065.0	144,318	753,681	5.2	15,521	3,062

Source: State Department of Human Resources, Division of Health Resources and Cost Review 1995 Summary Financial Report.

Table 3.13-22. Practicing Physicians, Dentists, and Nurses in Nevada by County

County	*Physicians* [1]	*Dentists*	*Registered Nurses*	*LPNs*	*Advanced Practice of Nursing*
Clark	1,418	358	6,195	1,545	97
Lincoln	2	1	18	7	0
Nye	9	4	38	23	3
Nevada	2,322	618	9,851	2,297	185

Note: The information for Physicians and Dentists is for 1994, the information for Nurses is as of September 1995.

1. The above table only shows the licensed practicing physicians. This table does not represent those physicians who hold active licenses but do not reside in Nevada; those who are inactive; or those who are retired.

Source: Personnel communication, State Board of Medical Examiners, State Board of Dental Examiners, and State Board of Nursing.

3.13.7.2 PUBLIC SCHOOLS

The public schools system of southern Nevada is organized into school districts that correspond to County boundaries. Students in the three-county ROI are distributed across all class levels, with the heaviest concentration of students being in the elementary grades (see Table 3.13-23).

Table 3.13-23. Public School Enrollment in Nevada by Grade and School District End of First Month (School Year 1995-1996)

School District	*Pre-Kindergarten*	*Kindergarten*	*Elementary Grades 1-6*	*Secondary Grades 7-9*	*Secondary Grades 10-12*	*Ungraded*	*Total***	*Annual % Change*
Clark	1,011	14,236	82,937	37,310	30,305	489	166,788	6.7%
Lincoln	18	66	409	288	325	3	1,109	-1.7%
Nye	32	347	2,081	1,165	903	0	4,528	8.6%
Statewide	1,631	22,074	131,074	60,081	48,965	713	265,041	5.7%

Note: * Ungraded refers to a student who is enrolled in a nongraded class in a school for special education or a student who cannot be assigned to a particular grade because of the nature of his/her condition NAC 387.111.

** Totals include those students enrolled in special education programs per NRS 388.490.

Source: Nevada Department of Education, Research Bulletin, Student Enrollment and Licensed Personnel Information, Volume 35, February 1, 1996. (Provided by the Nevada Department of Education-Planning, Research and Evaluation Branch.

Nye County has 14 elementary schools and six junior/senior high schools that accommodated 4,528 students in the fall of 1995 (see Table 3.13-24).

Table 3.13-24. Public School Enrollment in Nevada by School District

School District [1]	*1990-91*	*1991-92*	*1992-93*	*1993-94*	*1994-95*	*1995-96*
Clark	121,984	129,233	136,188	145,327	156,348	166,788
Lincoln	1,055	1,090	1,097	1,091	1,128	1,109
Nye	3,441	3,519	3,663	3,918	4,170	4,528
Statewide	201,316	211,810	222,846	235,800	250,747	265,041

Note: 1. Totals include those students enrolled in special education programs per NRS 388.490.

Source: Nevada Department of Education, Research Bulletin, Student Enrollment and Licensed Personnel Information, various issues (provided by the Nevada Department of Education-Planning Research and Evaluation Branch).

Lincoln County has five elementary schools and three junior/senior high schools that contained 1,109 students in the fall of 1995 (see Table 3.13-24).

The Clark County School district was founded in 1956 through the merger of 14 separate school districts within the county. The Clark County School District (CCSD) provides public education in pre-kindergarten through the 12th grade for all residents of Clark County. It also provides specialized education for all grade levels and alternative education for secondary school students.

Nellis AFB has one on-base elementary school that is part of the CCSD. The school is referred to as the Lomie G. Heard Elementary School, and has 42 teaching stations with the capacity to

handle 900 students (CCSD 1994). In addition to the elementary school there is a child development center (two phases) that accommodates approximately 550 children per day.

The size of the school district has grown substantially since its origination in 1956, when there were 27 schools serving the entire county, to a district that currently has 184 separate schools throughout the county. The CCSD enrollment for fall of 1995 was 166,788 students (see Table 3.13-24). The percent change in school enrollment approximates the change in the total population, (see Table 3.13-25).

Under federal and tribal law, American Indian children can be educated in tribally controlled and federally certified schools located on Indian reservations. There is one tribally controlled elementary school in Nye County operated by the Duckwater Shoshone Tribe. In 1995 the school had 32 students enrolled from pre-school to 8th grade with three full-time certified teachers.

Table 3.13-25. Public School Enrollment in Nevada by School District (percentage)

School District	*1991-92*	*1992-93*	*1993-94*	*1994-95*	*1995-96*
Clark	5.94%	5.38%	6.71%	7.58%	6.36%
Lincoln	3.32%	0.64%	-0.55%	3.39%	-1.68%
Nye	2.27%	4.09%	6.96%	6.43%	8.59%
Statewide	5.21%	5.21%	5.81%	6.34%	5.70%

Note: Percentages are computed from the data in Table 3.13.7-4.

Source: Nevada Department of Education, Research Bulletin, Student Enrollment and Licensed Personnel Information, various issues. (Provided by the Nevada Department of Education-Planning, Research and Evaluation Branch.)

3.13.7.3 LAW ENFORCEMENT

Law enforcement for the southern Nevada ROI is accomplished by a wide range of officials and authorities. Since Lincoln and Nye counties are rural and sparsely populated, they rely solely on a county sheriff for law enforcement. As Nye County population has grown since 1990, law enforcement personnel have risen from 81 officers in the FY1989-1990 to 110 in the FY1995-1996. By contrast, the Lincoln County force has shrunk from 16 officers in the FY1989-1990 to 14 officers in FY1995-1996.

In Clark County, law enforcement is the responsibility of the Las Vegas Metropolitan Police Department, which merged with the Clark County Sheriff's Office in 1973. The Metropolitan Police Department is by far the largest in Southern Nevada, employing 2,190 in 1994. Within the county, the cities of North Las Vegas, Henderson, and Boulder City also have their own police forces, as does Nellis AFB / NAFR. The Metropolitan Police department was followed in

size by the Henderson Police Department, with 199 (as of 1994), North Las Vegas Police Department, with 180 employees, and Boulder City, with 121 (see Table 3.13-26).

In addition to the law enforcement service providers addressed above, there are tribal police departments and Bureau of Indian Affairs police that provide services to tribal communities within Clark and Nye counties.

Table 3.13-26. Emergency Services in Clark County, 1994

Police Protection

Department	*Officers*	*Other Personnel*	*Stations*	*Vehicles*
Boulder City	53	68	1	19
Henderson	127	72	3	81
Las Vegas	1,150	1,040	4	824
Nev. Hwy Patrol	145	36	6	156
North Las Vegas	129	51	1	38
Lake Mead	NA	215	10	15
Mt. Charleston	NA	5	1	4

Fire Protection

Department	*Personnel*	*Vehicles*	*Stations*	*1994 Responses*	*1994 Population*	*Responses per 1,000 Population*
Boulder City	34	9	1	1,407	13,640	103.15
Clark County	525	40	30	49,000	971,680	50.43
Henderson	127	30	3	7,376	105,610	69.84
Las Vegas	392	89	10	43,121	346,350	124.5
North Las Vegas	83	6	4	8,338	69,700	119.63

Note: NA = not available

Law enforcement on Nellis AFB is provided by the military and by civilian security. As of November 1, 1995, there were three civilian security personnel assigned. In 1995, there were 22 civilian security personnel assigned to NAFR at ISAFAF.

3.13.7.4 FIRE PROTECTION

The largest fire department in Southern Nevada is the Clark County Fire Department, with 525 firefighters in 1994. Contained within Clark County is the Las Vegas Fire District, with 392 firefighters in 1994. The combined total of paid, volunteer, Americans with Disabilities Act-appointed, seasonal, and inmate firefighters for the fire districts in 1992 numbered 1,982 firefighters (see Table 3.13-26). BLM also has wildland firefighting capability in the region.

The ISAFAF and Nellis AFB in Clark County, and Mercury Test Site in Nye County, have the next largest organized fire-fighting unit, with a combined 1992 staff of 160. Nellis AFB has 78 paid firefighters and ISAFAF has 33 paid firefighters.

3.13.8 Public Finance

Although the general fund may be categorized slightly differently in each county, it is still the most uniform administrative budgetary concept available to describe fiscal conditions and, hence, will be used as the basis for comparison between county budgets. In addition to the county general budgets, the impact of state and federal budget decisions on the counties will be considered.

The county budgets are balanced each year by taking the balance of the budget from the prior year, adding new revenues, and subtracting all expenditures. In reporting the budgetary information, any differences between ending balances and beginning balances between years are due to Audit Prior Period Adjustments and residual equity transfers between fund types. Definitions of government revenue and expenditure categories can be found in Table 3.13-27 and 3.13-28, respectively.

Allocational government policies in Nevada counties are funded through a variety of sources, primarily *ad valorem* revenue (property taxes) and Supplemental City-County Relief Taxes, or sales tax (SCCRT). There are no state or local income taxes. Other locally generated sources of revenue include fines, permits and fees, local gaming revenues, charges for county services, dedicated, and other revenues. These revenues are complemented by a number of state and federal redistributive policies.

The total impact of redistributed income to the counties is difficult to measure, because some parts are incorporated in places of the budget, which are primarily allocational, such as the SCCRT. Likewise, determining the amount of revenue generated wholly within a county is challenging as well. Therefore, the budgetary categories that are clearly defined as being "outside sources" (intergovernmental revenue, transfers in, grants, and federal payments in-lieu of taxes [PILT]) may be compared with the county budgets as a whole to provide an imperfect, but relative measure of each county's reliance on outside revenues.

The budgets of the Clark, Lincoln, and Nye counties vary dramatically. Clark County, being the most populous, has the largest budget. Including an opening fund balance of $64 million in 1997, the total budget for the county is over $550 million. Outside sources of revenue form a substantial portion of Clark County's budget, constituting $139 million, or 25 percent of revenues. The largest expenditure is transfers out of the county at $167 million, followed by public safety at $85 million, and general government obligations at $72 million (see Table 3.13-29).

The annual ending fund balance has remained relatively stable over the period FY1990-FY1997 between approximately $56.8 million and $89.6 million. *Ad valorem* tax revenues increased at

Table 3.13-27 Governmental Revenue Categories
Ad Valorem includes property taxes
Supplemental City-County Relief Taxes: includes sales taxes
Fines Permits and Fees include library fines, court fines, environmental fines, bail forfeits, business, liquor, county gaming, city gaming, marriage, animal, and bicycle licenses; building, sign, and mobile home permits; gas, electric, water, phone, and sanitation franchise fees; impact fees; and others. Most entities incorporate these into the general fund, unless they establish a specific special revenue fund.
Intergovernmental Revenue includes revenue sharing, grants, and payments-in-lieu-of-taxes (PILT) from the federal government; grants, fuel taxes, cigarette taxes, liquor taxes, basic and supplemental city/county relief (sales and use) taxes, motor vehicle privilege tax, state gaming licenses, court administrative assessments, and PILT from the state; and revenue shared with local governments from county gaming licenses, county road fund distributions, and real property transfer taxes.
Charges for Services are categorized according to the individual government function. Service charges primarily consist of fees and charges performed for a service rendered to the public. While the smaller entities maintain charges for service in the general fund, the larger entities create special revenue and/or proprietary funds.
Payment in Lieu of Taxes (PILT) involve annual payments distributed to eligible units of general local government by the BLM. The payments are intended to offset the loss of tax revenue to States and localities caused by the presence of tax-exempt federal land. Payments are made for tax-exempt federal lands administered by the BLM, USFS, National Park Service, USFWS and for federal water projects and some military installations. The payments are in addition to revenues from oil and gas leases, along with sales of minerals, timber and other materials and products derived from public lands.
Other Taxes may include park construction, room, county optional motor vehicle fuel, or the county optional 0.25 percent sales and use taxes. An entity may incorporate these into the general fund or a special revenue fund.
Miscellaneous receipts include interest earnings, rents, royalties, and contributions or donations from private sources. Interest earnings are usually included in the general and debt service funds. The others are commonly found in the general fund, but larger entities may include them in a special revenue or proprietary fund.

Table 3.13-28. Governmental Expenditure Categories

Counties, cities, and towns summarize their expenditures using the following functions and activities. An entity may supplement the following activities suggested by the Department of Taxation (State of Nevada 1995).

- General Government
  - Legislative
  - Executive
  - Elections
  - Finance and Other
- Judicial
- Public Safety
  - Police
  - Support Services
  - Corrections
  - Protective Services
- Public Works
  - Highway and Streets
  - Snow and Ice Removal
  - Street Lighting
  - Engineering
- Sanitation
  - Street Cleaning
  - Waste Cleaning & Disposal
  - Weed Control
- Debt Service
  - Principal
  - Interest
- Health
  - Vital Statistics
  - Public Health Administration
  - Communicable Disease Control
  - Maternal and Child Service
  - Cemetery
  - Animal Control
- Welfare
  - Institutional Care
  - Old Age Assistance
  - Direct Assistance
- Culture and Recreation
  - Participant Recreation
  - Spectator Recreation
  - Parks
  - Libraries
- Community Support
  - Housing Redevelopment
  - Economic Development
  - Economic Opportunity and Other

Intergovernmental Expenditures includes expenditures made by one level or unit of government to another government in support of governmental activities administered by the recipient unit. Excluded from this classification are matching employer contributions by a government to a pension or retirement system administered by another government.

Other Financial Sources and Uses are accounted for separately and are a major heading by themselves. They include proceeds of long- and short-term debt, operating transfers in and out, sale of fixed assets, and other miscellaneous items. Operating transfers represent transfers between funds. The in transfers are positive and the out are negative. Other miscellaneous items may be negative when they represent a fund reclassification.

Prior Period Adjustments are a method of accounting for changes in budget balances from the end of one year to the beginning of the next, and usually occur after the fact. These adjustments are commonly found when funds are created, discontinued, or reclassified in terms of type.

Residual Equity Transfers are non-routine transfers of equity between funds that occur during the course of a year. Examples include a contribution of enterprise fund capital by the general fund, then subsequent return of all or part of the contribution to the general fund; or the transfer of the residual balance from a discontinued fund to the general or debt service fund (State of Nevada 1995).

Fund Balance is “the excess of assets over liabilities and reserves in a governmental fund (NRS 354.533).” Beginning and ending balances now contain reserved and unreserved moneys. The reserve is "a portion of the fund balance which is not appropriable for expenditures or is segregated by law or contract for a specific future use (NRS 354.562)." Therefore, the reserved portions of a fund balance may only be available under certain previously defined circumstances (i.e., the outcome of litigation).

Table 3.13-29. Clark County Summary of Government Type Funds (in thousands)

Revenues/Expenditures	*Actual FY90*	*Actual FY91*	*Actual FY92*	*Actual FY93*	*Actual FY94*	*Actual FY95*	*Estimated FY96*	*Budgeted FY97*
Summary of All Revenues								
Opening Fund Balance	$44,585	$59,716	$64,486	$56,771	$68,743	$86,366	$89,633	$64,199
Ad Valorem	42,815	50,276	56,391	64,742	71,885	77,625	84,720	94,012
S.C.C.R.T.	69,375	66,652	69,188	79,024	92,290	104,034	113,298	120,653
Other								
Fines, Permits, and Fees	45,974	53,507	53,472	56,172	37,820	42,886	45,007	47,276
Local Gaming	0	0	0	0	25,966	27,966	29,464	31,420
Intergovernmental	16,314	15,717	17,025	20,942	14,646	16,457	18,321	19,784
Charges for Services	17,769	26,926	27,879	29,861	37,094	37,911	38,899	41,582
Interest charges	0	0	0	0	10,990	12,861	13,504	10,150
Transfer In	0	0	0	0	84,224	99,363	103,236	115,187
Grants	0	0	0	0	1,459	4,787	2,370	3,749
Federal In - Lieu	0	0	0	0	1,082	986	949	900
Dedicated	0	0	0	0	0	0	0	0
Other	82,332	95,551	94,497	108,100	2,451	4,804	2,134	1,431
Bond Proceeds / stf	0	0	0	0	0	0	0	0
Total Other Resources	162,389	191,701	192,873	215,075	215,732	248,021	253,884	271,479
Total All Resources	319,164	368,345	382,938	415,612	448,649	516,045	541,535	550,343
Summary of All Expenditures								
General Government	33,588	44,661	49,021	56,367	54,314	62,777	64,461	72,704
Judicial	45,808	52,981	60,512	69,436	65,551	72,888	49,930	54,284
Public Safety	28,847	32,843	38,602	40,436	42,408	44,032	79,259	85,364
Public Works	9,816	11,047	12,979	14,434	13,980	14,848	16,021	16,910
Culture & Recreation	6,692	7,784	8,948	10,653	10,897	11,712	12,791	14,123
Welfare	14,307	16,301	18,749	20,509	22,077	24,282	25,408	28,339
Health	8,830	8,990	4,234	4,381	4,516	4,554	12,259	12,393
Other	16,741	22,364	23,708	31,777	27,679	26,574	41,526	32,964
Transfers Out	94,820	106,886	109,414	98,877	129,400	164,947	175,681	167,428
Grand Total Expenditures	259,449	303,857	326,167	346,870	370,822	426,614	477,336	484,510
Ending Balance	59,716	64,486	56,771	68,743	77,827	89,633	64,199	65,833

an average annual rate of 11.9 percent over this period while SCCRT revenues increased by 8.2 percent annually. Expenditures grew most rapidly for public safety at 16.8 percent annually on average between FY1990 and FY1997. Growth in other areas included general government (11.7 percent annually), culture and recreation (11.3 percent annually), and welfare (10.3 percent annually).

The opening fund balance of Nye County is noticeable in that it has fallen from a high of $2.4 million in FY1993 to a forecast low of $0 in 1998. For FY1997, the opening balance of the budget was $441,000 and totaled $16 million.

Again, outside sources provided a substantial amount of this revenue, contributing $3.8 million, or 23 percent of the budget. In contrast with Clark County, the largest expenditure for Nye County in 1997 is public safety, with $6.6 million, followed by general government with $5.7 million and the judicial system with $2.3 million (see Table 3.13-30).

While *ad valorem* tax revenues have increased substantially (at an average annual rate of 27.2 percent between FY1990 and FY1997), SCCRT revenues have only increased by 1.2 percent. Major increases in expenditures have occurred for general government (10.8 percent annually), the judicial system (10.5 percent annually), and public safety (10.4 percent annually).

The budget of Lincoln County is comparatively small. The opening fund balance of Lincoln County is also noticeable, in that it has fallen from a high of $632,000 in FY1994 to a forecast low of $102,000 in 1998. With an opening fund balance of $213,000 in 1997, the total budget was $2.6 million. While outside sources contributed a relatively small amount of $563,000 to the budget, this still constituted 22 percent of the total revenues. Expenditures were concentrated on public safety, with $1.1 million, followed by general government with $856,000 and the judicial system with $473,000 (see Table 3.13-31).

Ad valorem tax revenues have increased at an average annual rate of 13.7 percent between FY1990 and FY1997 while SCCRT revenues have increased by only 1.0 percent annually. Increases in major expenditure categories have been as follows: 6.9 percent annually for general government; 8.0 percent annually for the judicial system; and 7.5 percent annually for public safety.

3.13.9 American Indian Issues Concerning Socioeconomics

American Indians living in the NAFR region of influence are tied to NAFR both spiritually and economically. Many work at jobs directly related to the Air Force or in support and service jobs. Because the Indian world view interrelates all aspects of the social, spiritual and economic spheres, the Indian people are concerned about all aspects of the Proposed Action and alternatives.

Table 3.13-30. Nye County Summary of Governmental Type Funds (in thousands)

Revenues/Expenditures	*Actual FY90*	*Actual FY91*	*Actual FY92*	*Actual FY93*	*Actual FY94*	*Actual FY95*	*Estimated FY96*	*Budgeted FY97*
Summary of All Revenues								
Opening Fund Balance	$1,815	$2,675	$1,385	$2,402	$803	$1,374	$1,106	$441
Ad Valorem	1,037	728	2,724	3,799	4,463	4,723	4,925	5,595
S.C.C.R.T.	3,162	2,794	2,859	2,852	2,899	3,291	3,065	3,441
Other								
Fines, Permits, and Fees	264	222	225	236	237	232	331	379
Local Gaming	0	0	0	0	58	52	60	70
Intergovernmental	2,369	2,358	2,875	2,575	2,190	2,174	2,395	2,436
Charges for Services	1,021	1,153	1,217	1,002	907	885	1,117	1,171
Interest charges	0	0	0	0	0	0	0	0
Transfer In	0	0	0	0	868	105	608	838
Grants	0	0	0	0	0	0	0	0
Federal In - Lieu	0	0	0	0	513	550	527	550
Dedicated	0	0	0	0	0	0	0	0
Other	878	285	1,802	666	1,081	1,737	1,945	1,543
Bond Proceeds / stf	0	0	0	0	0	0	0	0
Total Other Resources	4,532	4,018	6,119	4,479	5,855	5,734	6,982	6,987
Total All Resources	10,546	10,215	13,087	13,532	14,020	15,123	16,079	16,465
Summary of All Expenditures								
General Government	2,793	3,392	4,425	4,455	4,579	4,951	5,427	5,723
Judicial	1,166	1,175	1,392	1,636	1,764	1,884	2,107	2,352
Public Safety	3,304	3,856	4,430	4,973	5,443	6,008	6,711	6,582
Public Works	0	0	27	154	109	166	192	218
Culture & Recreation	0	0	148	0	0	0	0	0
Welfare	0	0	0	0	0	0	0	0
Health	104	109	190	226	406	582	709	789
Other	160	299	72	220	265	371	395	558
Transfers Out	344	0	0	1,065	78	54	98	243
Grand Total Expenditures	7,871	8,831	10,684	12,729	12,645	14,016	15,638	16,465
Ending Balance	2,675	1,385	2,402	803	1,374	1,106	441	0

Source: Nevada Legislative Counsel Bureau 1996

Table 3.13-31. Lincoln County Summary of Governmental Type Funds (in thousands)

Revenues/Expenditures	*Actual FY 90*	*Actual FY 91*	*Actual FY 92*	*Actual FY 93*	*Actual FY 94*	*Actual FY 95*	*Estimated FY 96*	*Budgeted FY 97*
Summary of All Revenues								
Opening Fund Balance	$326	$536	$522	$527	$632	$476	$519	$213
Ad Valorem Revenue	308	434	481	526	607	594	663	756
S.C.C.R.T.	679	623	640	640	665	727	714	711
Other								
Fines, Permits, and Fees	129	141	145	160	193	225	187	207
Local Gaming Revenues	0	0	0	0	5	3	6	6
Intergovernmental Revenue	428	441	409	549	528	575	550	378
Charges for Services	96	76	46	73	65	75	65	67
Interest charges	0	0	0	0	61	90	50	60
Transfer In	0	0	0	0	29	7	1	100
Grants	0	0	0	0	79	76	100	85
Federal In - Lieu	0	0	0	0	0	0	0	0
Dedicated Revenue	0	0	0	0	0	0	0	0
Other Revenues	118	120	168	157	49	47	51	33
Bond Proceeds / stf	0	0	0	0	0	0	0	0
Total Other Resources	771	778	768	939	1,008	1,098	1,009	935
Total All Resources	2,084	2,371	2,411	2,632	2,912	2,895	2,906	2,615
Summary of All Expenditures								
General Government	537	576	624	550	632	721	860	856
Judicial	276	288	330	420	434	470	513	473
Public Safety	698	837	899	1,025	975	1,107	1,252	1,154
Public Works	3	2	4	5	11	23	18	5
Culture & Recreation	0	0	0	0	0	0	0	0
Welfare	0	0	0	0	0	0	0	0
Health	17	16	17	0	21	55	50	25
Other	0	10	0	0	0	0	0	0
Transfers Out	18	119	10	0	363	0	0	0
Grand Total Expenditures	1,549	1,848	1,884	2,000	2,436	2,375	2,693	2,514
Ending Balance	536	522	527	632	476	519	213	102

Source: Nevada Legislative Counsel Bureau 1996

The NARD (AIWS 1997) identified the following socioeconomic issues relevant to the NAFR:

- **American Indian region of influence**: The following reservations are within the area the CGTO considers the Nellis AFB LEIS region of influence: Duckwater Shoshone Tribe, Las Vegas Paiute Tribe, Moapa Paiute Tribe, Yomba Shoshone Tribe. Other tribes that are outside the NAFR LEIS region of influence but that the CGTO consider as potentially impacted by the proposed action or alternatives are: Timbisha Shoshone Tribe, Death Valley, California; and the Pahrump Paiute Tribe.

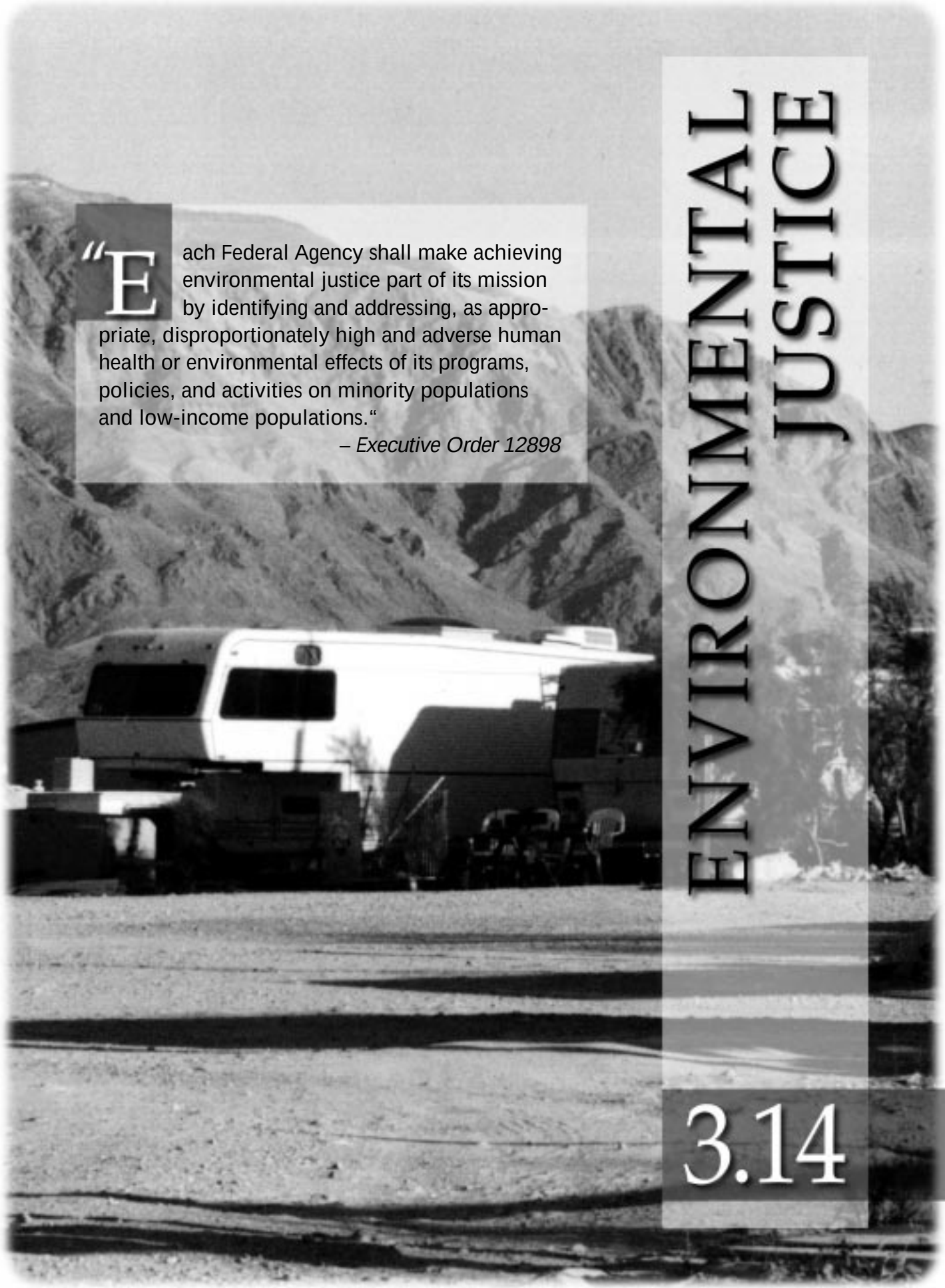
- **American Indian education**: Tribally operated schools in Nye County and Headstart programs on the Moapa Paiute Indian reservation.

- **Farming and ranching**: Prior to the military land withdrawal of NAFR, and in the NAFR region, Indian families owned or had access to springs and agricultural lands. Following the withdrawal, often there was no longer access to these resources.

- **Mining**: American Indians mined the NAFR region on their own behalf, with their own established mining claims. Some claims established by Euroamericans were first identified by Indian people who guided the Euroamerican prospectors to the ore deposits, but were usually excluded from partnerships and establishing their own mining claims.

- **Political integration and community cohesion**: Euroamerican settlement and the military land withdrawal fragmented the Indian cultures of the region, lowering the tribes' ability to negotiate, resolve conflicts, keep peace and share resources (AIWS 1997). Lack of access to traditional meeting places by the three ethnic groups represented in the CGTO, eroded their interethnic interaction skills and resulted in a loss of political power.

- **Transportation and tribal enterprises**: The CGTO is concerned about the issue of explosive materials being transported across reservations. AIWS has researched the effect of continued or increased transportation, and suggests that it is "detrimental to the economic success of tribal-owned business and may increase the cost of insurance policies" (AIWS 1997).



ENVIRONMENTAL JUSTICE

3.14

"Each Federal Agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations."

– Executive Order 12898



The NAFR/LEIS Outreach Program included scoping meetings in several locations throughout Clark, Lincoln, and Nye Counties that provided for public participation.

Environmental justice considers the potential for disproportionate environmental impacts incurred by minority or low-income populations as a result of a federal action subject to environmental review. Environmental justice applies to all environmental resources.

Environmental justice information about the region of influence focuses on the distribution of minority populations or low-income populations. For purposes of this analysis, minority populations and low-income populations are defined as follows:

- Minority populations: Persons of Hispanic heritage of any race; Blacks; American Indians, Eskimos and Aleuts; and Asian or Pacific Islanders. The census does not report the minority population of an area, but it does report population by race, and separately, by ethnic origin. These data were used to estimate the minority populations for this LEIS.
- Low-income population: Persons living below the poverty level, based on $12,674 for a family of four in 1989 as reported in the 1990 census. Estimates of these two population categories were developed using data from the 1990 Census of Population and Housing.



Low-income and minority populations within Nye, Lincoln, and Clark Counties were evaluated to define any environmental consequences associated with NAFR land withdrawal renewal.

3.14 ENVIRONMENTAL JUSTICE

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations provides that each federal agency make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low income populations. Air Force instructions and policy guidelines directed the methodology by which this environmental justice analysis was performed. To promote participation in the environmental impact analysis process by potentially affected populations, especially low-income and minority populations, the Air Force conducted scoping meetings in several locations throughout Clark, Lincoln and Nye counties, published a newsletter for the public about range operations and the LEIS process, operates a web site, and is conducting an extensive Native American interaction program.

The discussion that follows describes the number of persons in minority populations and low-income populations living in the project area.

3.14.1 Region of Comparison

The region of comparison (ROC) for environmental justice includes Clark, Lincoln, and Nye counties in Nevada. The portion of the Desert MOA that is located in Iron and Washington counties in western Utah is not expected to receive disproportionately higher effects than the general population affected by the project. The ROC comprises the smallest political jurisdictions (i.e., the counties) that encompass the land within NAFR and the lands underlying the related airspace.

3.14.2 Minority Populations and Low-Income Populations

For purposes of this analysis, minority populations and low-income populations are defined as follows:

- *Minority populations* — Persons of Hispanic origin of any race; Blacks; American Indians, Eskimos and Aleuts; and Asian or Pacific Islanders (without double-counting persons of Hispanic origin who are also contained in the latter groups)

- *Low-income populations*—Persons living below the poverty level, based on $12,674 for a family of four in 1989 as reported in the 1990 census

Estimates of these two population categories were developed using data from the 1990 Census of Population and Housing. The census does not report the minority population of an area, but it does report population by race, and separately, by ethnic origin, which were used to estimate the minority populations for this analysis.

In 1990, the three-county ROC contained 763,015 persons, of which 184,202 persons (24.1 percent) were minorities and 79,072 persons (10.4 percent) were living below the poverty level. Populations of the individual counties in the ROC are discussed below.

Lincoln County contained a population of 3,775 persons in 1990, of which 309 (8.2 percent) were minorities and 495 (13.1 percent) were living below the poverty level. A total of 156 persons (4.1 percent) were persons of Hispanic origin. In addition, 81 persons (2.1 percent) were Black; 58 persons (1.5 percent) of the population were American Indian, Eskimo, or Aleut, and 16 persons (0.4 percent) were Asian or Pacific Islander.

Nye County contained 17,781 persons in 1990, of which 2,134 persons (12.0 percent) were minorities and 1,840 persons (10.3 percent) were living below the poverty level. Persons of Hispanic origin comprised 1,237 persons (7.0 percent). In addition, American Indians, Eskimos, or Aleuts comprised 499 persons (2.8 percent) of the population. Blacks comprised 1.6 percent of the population or 291 persons, and Asians or Pacific Islanders comprised 155 persons (0.9 percent).

Clark County contained 741,459 persons in 1990, of which 181,759 persons (24.5 percent) were minorities and 76,737 (10.3 percent) were living below the poverty level. Persons of Hispanic origin comprised 82,904 persons (11.2 percent) of the total population. A total of 70,738 persons (9.5 percent) of the population were Black, 26,043 persons (3.5 percent) Asian or Pacific Islander, and 6,416 persons (0.9 percent) American Indian, Eskimo, or Aleut. Some persons in the latter categories are also included in the subtotal for persons of Hispanic origin. To avoid double-counting these persons, they are only counted once when calculating the minority population.

The Air Force is conducting an extensive Native American Interaction Program (NAIP) for NAFR and is working with 18 American Indian tribes and official American Indian organizations. Members of these tribes live within the local area either on reservation lands or off the reservation. Others live outside the local area while maintaining local ties as a result of ancestral and traditional connections to the area.

Indian reservations in the ROI include the Duckwater Reservation in northeastern Nye County, the Yomba Reservation in northwestern Nye County, the Moapa Reservation in northeastern Clark County, the Fort Mojave Reservation and Trust Lands in southern Clark County, and the Las Vegas Paiute Tribe in Clark County. The populations associated with these reservations are included in the county populations provided previously, and are reported separately below.

The Duckwater Reservation, which is approximately 50 miles north of the Desert MOA boundary, is approximately 6.2 square miles in size. In 1990, the population living on the reservation was 135 persons and there were 65 housing units; 24.5 percent of persons were living below the poverty level. The Yomba Reservation located approximately 60 miles north of Tonopah, is approximately 7.3 square miles in size and contained 95 persons and 36 housing units in 1990; 39.4 percent of persons were living below the poverty level. The Moapa Reservation located under the Sally Corridor subdivision of the Desert MOA at the NRC is

approximately 112 square miles in size. The population in 1990 was 375 persons and there were 112 housing units; 50.7 percent of persons were living below the poverty level. Portions of the Fort Mojave Reservation and Trust Lands are located on the southern tip of Clark County, approximately 80 miles from the NRC, and extend into Arizona and California. The Nevada portion of these lands is approximately 6.2 square miles in size, but it contains no population. The Las Vegas Colony contains approximately 6.2 square miles of land and in 1990 had a population of 80 persons and 26 housing units; 37.2 percent of persons were living below the poverty level.

For enumeration purposes, the Bureau of Census has defined small geographic units, for which data are aggregated, below the county level. Within metropolitan counties and urbanized areas, these units are called census tracts. In non-metropolitan counties such as Nye and Lincoln counties, where census tracts have not been established, block numbering areas (BNAs) are established. There are 129 census tracts/BNAs in the three-county ROI, including 120 in Clark County, four in Lincoln County, and five in Nye County. Figure 3.14-1 shows the counties and the census tracts/BNAs.

For the analysis of baseline conditions, individual census tracts/BNAs have been identified that contain higher percentages of minority populations and low-income populations, relative to the general population in the ROC. Three criteria were used to establish disproportion. For minority status, either the percentage of persons in minority populations in the census tract must exceed the average for the general population in the ROI (which is 24.1 percent) or the minority population must exceed 50.0 percent, indicating that in that census tract, minorities constitute a majority of the persons who could potentially be affected by the project. For low-income status, the percentage of persons living below the poverty level in the census tract must exceed the ROC average, which is 10.4 percent for the three counties.

Appendix H presents data on minority populations and low-income populations in the ROC for each of the 129 census tracts/BNAs. Census tracts/BNAs are marked "yes" in the center column if they have a higher percentage of minority persons than the ROC and "yes" in the final column if they have a higher percentage of minority persons than the ROC. The maps in Figures 3.14-1, 3.14-2, and Appendix H present the information in the table in a graphic form. Minorities comprise more than 50.0 percent of the total population in 14 census tracts in the ROC or 10.8 percent of all census tracts, all of which are in Clark County. The minority population percentage exceeds the ROC average of 24.1 percent in 43 of the 129 census tracts/BNAs or in 33.3 percent of the census tracts/BNAs. The percentage of the population living below the poverty level exceeds the ROC percentage of 10.4 percent in 52 of the census tracts or 40.3 percent of the total geographical units.

The Air Force conducted scoping meetings in several locations throughout Clark, Lincoln, and Nye counties. A newsletter was also published for the public about range operations and the LEIS process. An internet site (http:\\www.nellis.af.mil/range/renewal) is available for public use and an extensive NAIP is being conducted.

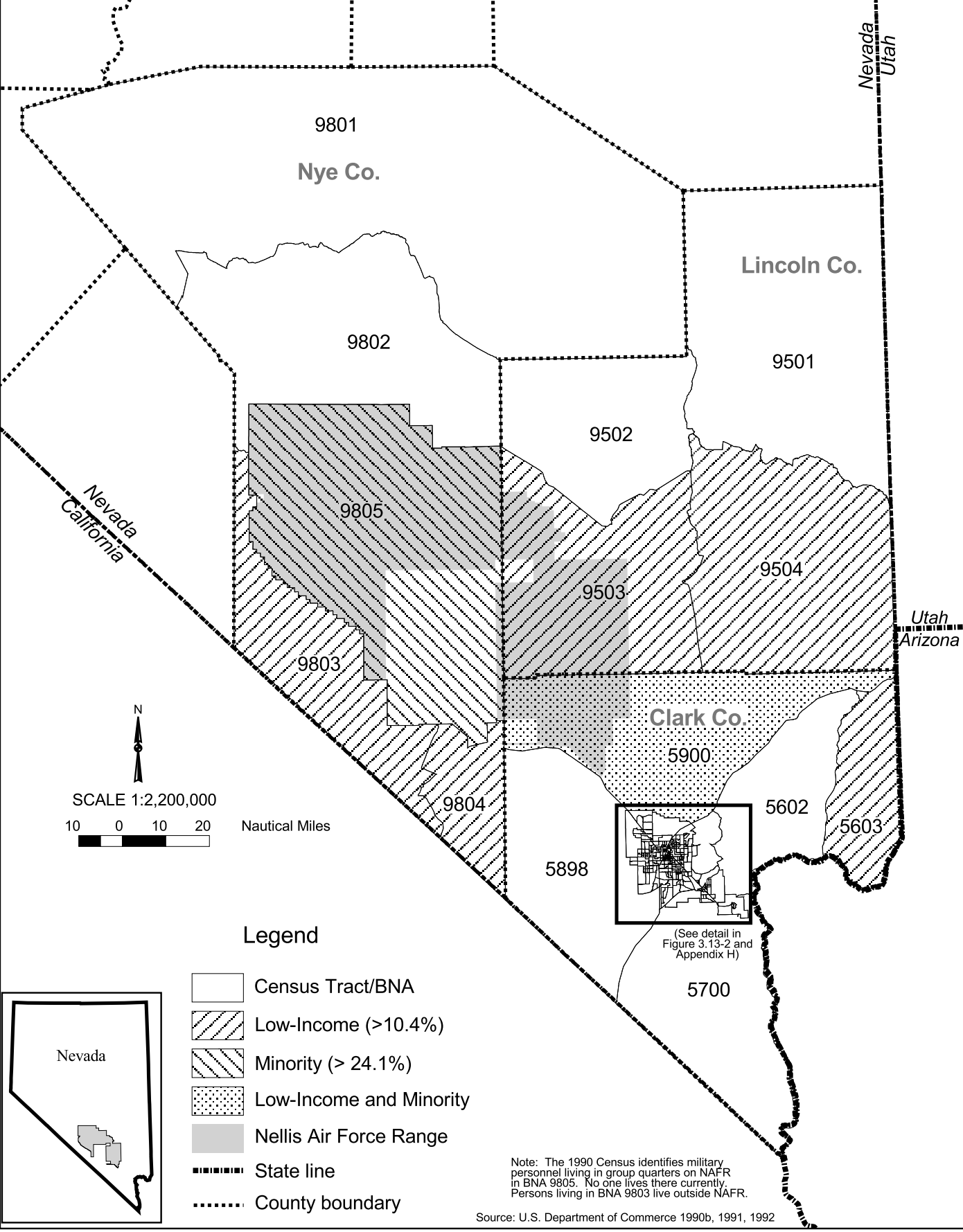


Figure 3.14-1. Census Tract/BNAs in Clark, Lincoln, and Nye Counties

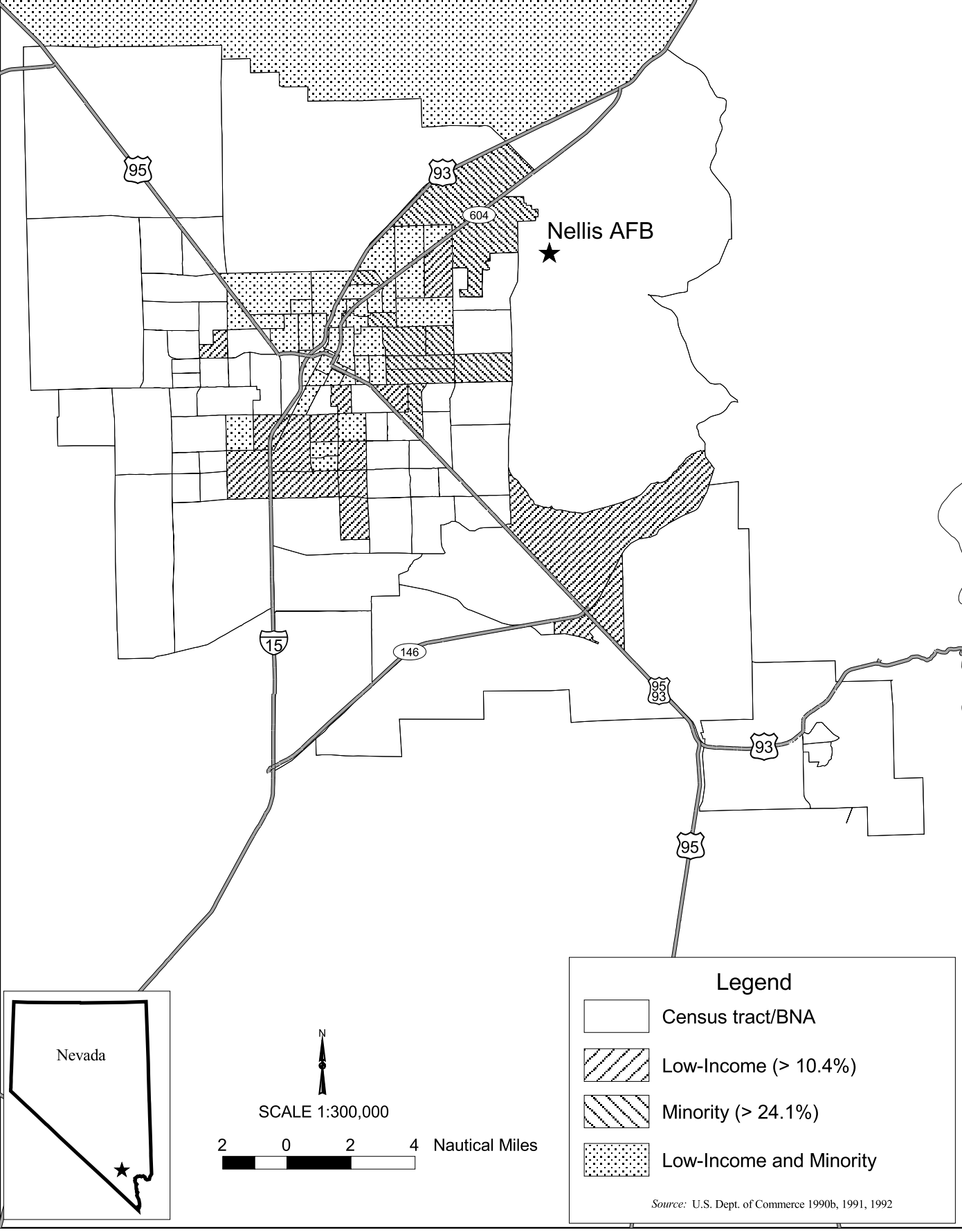


Figure 3.14-2. Census Tract/BNAs with High Percentage of Low-Income and Minority Populations

These efforts have provided for public participation by minority and low-income populations.

A list of environmental justice concerns identified through the scoping, public participation, and American Indian consultation process for this LEIS appears below:

- Nye County and Lincoln County indicated that they are rural, relatively lower per-capita income counties that may qualify for extra considerations, opportunities for participation, and mitigation measures, under EO 12898.

- American Indian tribes asked the Air Force to continue government-to-government negotiations.

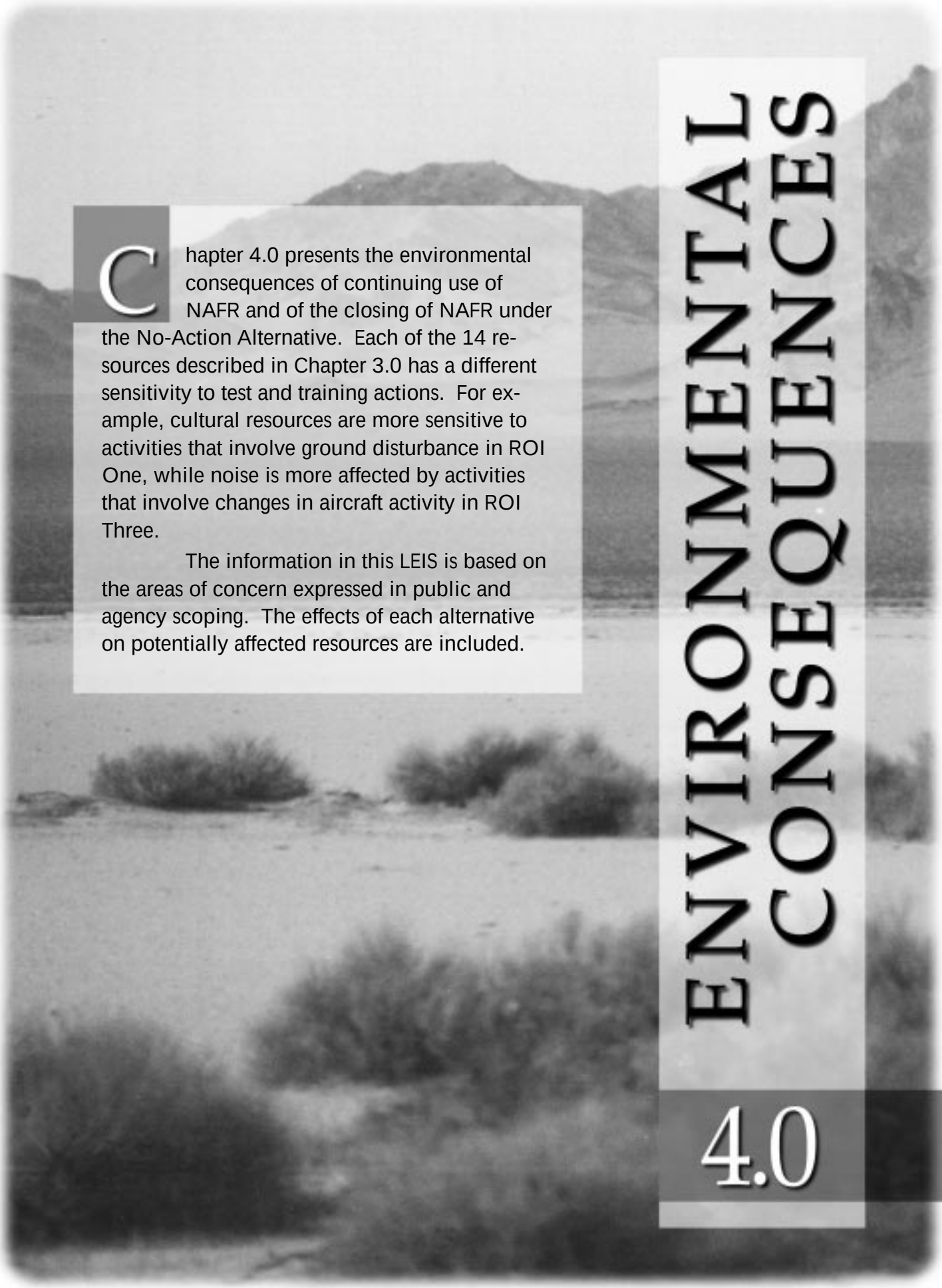
- American Indians have expressed concerns that past programs, policies, and activities on NAFR have resulted in disproportionate effects on Indian tribes resulting from sacred land violations, cultural resource protection, and access violations.

- American Indians believe that operation of the TTR has disproportionately impacted American Indians as a result of sacred land violations, perceived risks from radiation, failure to protect American Indian cultural resources, and restricted access.

3.14.2.1 AMERICAN INDIAN ISSUES CONCERNING ENVIRONMENTAL JUSTICE

The CGTO considers NAFR to be all American Indian traditional land. They consider existing Air Force activities to constitute violations of access to holy land and cultural survival. They believe that no group other than American Indians has been so specifically affected by the creation and operation of NAFR. For this reason, these points fall under the category of environmental justice. The Owens Valley Paiute, Western Shoshone and Southern Paiute peoples require access to the lands to conduct religious ceremonies and also to practice essential elements of their culture, including educating the younger generation.

The CGTO also feels that studies of cultural resources should not be initiated without their participation.



ENVIRONMENTAL CONSEQUENCES

4.0

Chapter 4.0 presents the environmental consequences of continuing use of NAFR and of the closing of NAFR under the No-Action Alternative. Each of the 14 resources described in Chapter 3.0 has a different sensitivity to test and training actions. For example, cultural resources are more sensitive to activities that involve ground disturbance in ROI One, while noise is more affected by activities that involve changes in aircraft activity in ROI Three.

The information in this LEIS is based on the areas of concern expressed in public and agency scoping. The effects of each alternative on potentially affected resources are included.

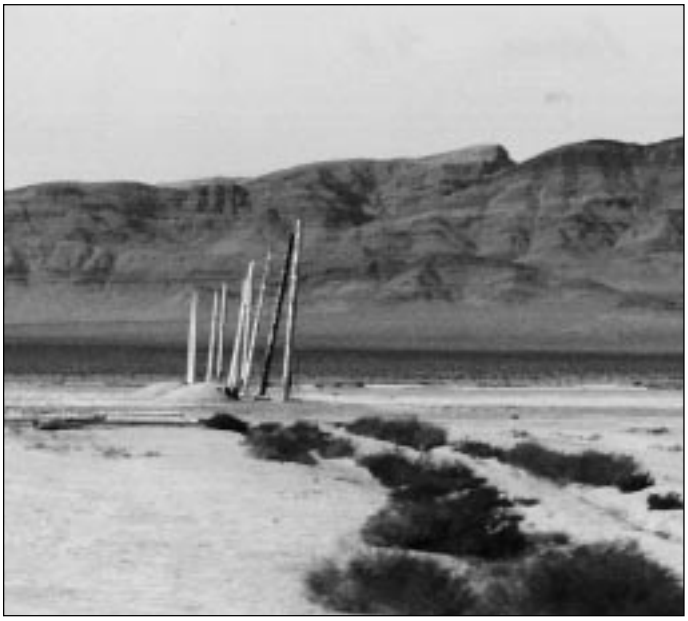


The consequences of continued Air Force exclusive use of NAFR will be continued air-to-ground and monitored air-to-air training, continued use of the range targets, and continued secure testing of complex weapons systems critical to U.S. interests into the 21st century.

The environmental consequences to renewal of NAFR and exclusive military use include the following:

- continued impacts to resources within the disturbed areas of ROI One.
- continued access exclusion and associated protection of resources within ROI Two. The extent of ROI Two and the area's exclusion would depend upon decisions made regarding land renewed and jurisdiction over that land.
- continued noise impacts and socioeconomic benefits associated with military training in ROI Three.

The No-Action Alternative has the potential for reduction of impacts to resources in ROI One, increased impacts to resources in ROI Two, and a combination of reduced impacts in some areas and increased impacts in other areas of ROI Three.



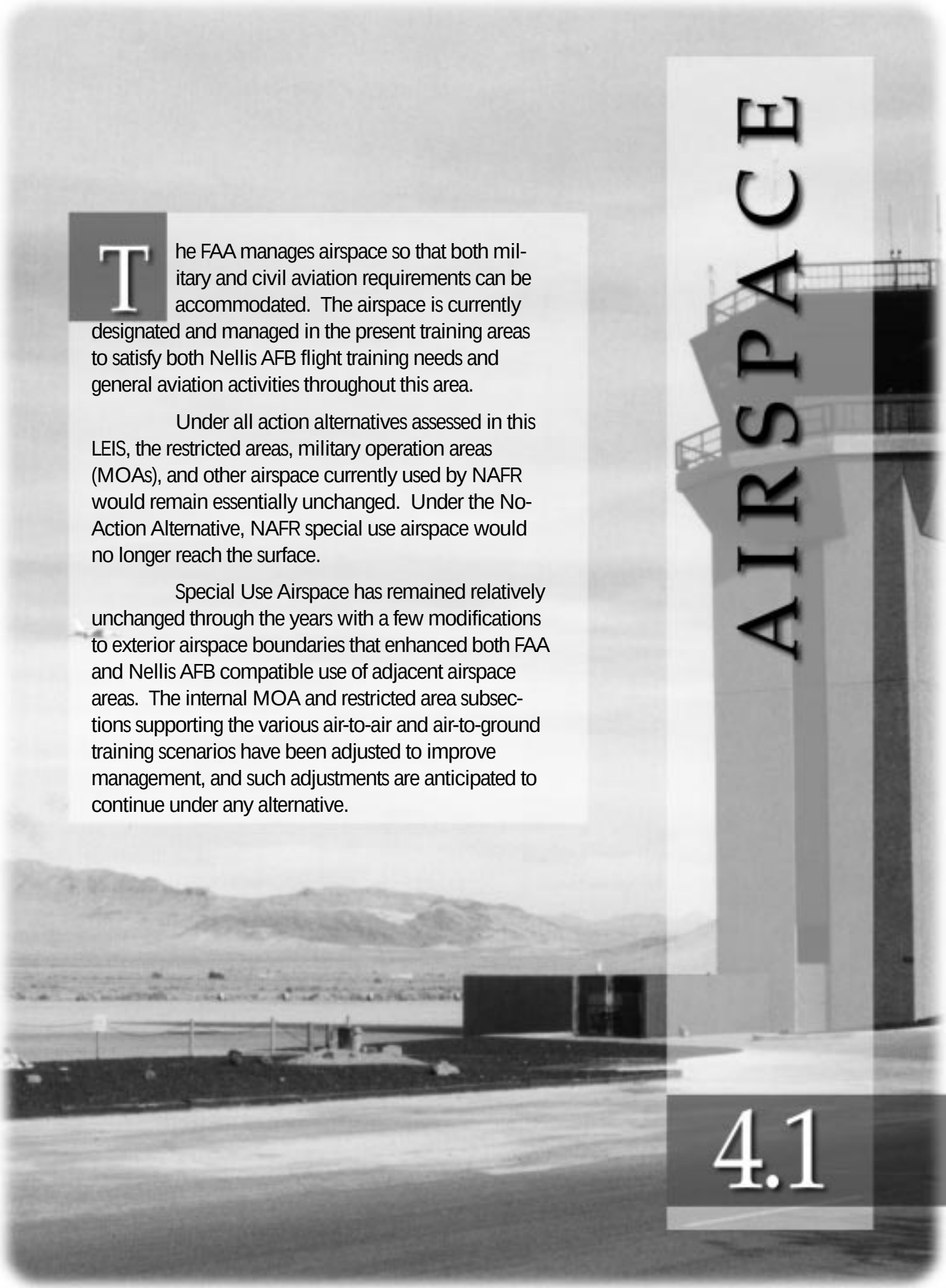
4.0 ENVIRONMENTAL CONSEQUENCES

This chapter overlays the project elements described in Chapter 2.0 onto the baseline or existing conditions of Chapter 3.0 to produce projected environmental consequences of the alternatives. For each resource area, Table 4.0-1 summarizes public or agency issues raised during scoping. Each of the 14 resource areas noted in the table is addressed in sections 4.1 through 4.14.

Table 4.0-1. Public or Agency Issues Raised during Scoping

Resource Area	*Public or Agency Issue*
1. Airspace	• Does the Air Force intend to take any more airspace? If so, how much? • Discuss the operations and effects of Nellis Air Force Base (AFB) on all special use airspace (Military Operations Areas [MOAs] and Restricted Areas).
2. Noise	• Sonic booms near rural communities (Caliente, Rachel, Alamo, Pioche). Identify locations of supersonic operations. • New aircraft noise emissions. • Identify changes in use of the range (e.g., increase in night operations). • How will these and Navy-proposed operations affect Nevada? • Assess impact of existing and potential MOA overflights.
3. Safety	• Reasons for and consequences of access restrictions to Nellis AFB. • Reasons for and consequences of access restrictions, specifically in regard to restriction of federal agencies charged with resource management activities (Bureau of Land Management [BLM], U.S. Fish and Wildlife Service [USFWS]). • Discuss opportunities and consequences of increased public access to the Nevada Wild Horse Range (NWHR), Timber Mountain National Monument, and the Desert National Wildlife Range (DNWR). • Analyze impacts of Nellis operations on off-site safety and identify safeguards / mitigation for public safety. • Discuss local responsibility for emergency response and management, mutual aid, and cleanup. • Provide a record of aircraft mishaps and crashes and their effects on the human and natural environment. • Analysis of objects and armaments released from aircraft.
4. Hazardous Materials and Solid Waste	• Toxic spills on Nellis Air Force Range (NAFR). • Describe surface disturbance and contaminant cleanup activities. • Describe pollution prevention and waste control activities, particularly from ordnance burial. • Describe soil surveys for environmental restoration. • Status of agreements for managing hazmat / waste and remediation activities (including plutonium contamination) on NAFR.
5. Earth Resources	• Return portions of the Clarkdale and Wagner Mining Districts to public domain status per Nevada Senate Joint Resolution (SJR) 25. • Provide a comprehensive mineral resources (rock and oil) inventory. • Identify potential mineral resources including precious metals, strategic and critical minerals and industrial minerals. • Identify definitive soil surveys conducted since the last LEIS.
6. Water Resources	• Provide a comprehensive water resources inventory. • Identify extent of contaminated groundwater.
7. Air Quality	• Studies should be conducted for potential impacts on air quality. • Evaluate the effects of gaseous emissions from aircraft operations.

Table 4.0-1. Public or Agency Issues Raised during Scoping	
Resource Area	*Public or Agency Issue*
8. Biological Resources	• Provide a comprehensive natural resources inventory. • Identify policies and activities supportive of ecosystem management. • Provide protection of riparian habitats. • Achieve and maintain a "thriving ecological balance" for the NWHR. • Extent of and management of wild horse, endangered species, and other game and non-game animals.
9.Cultural Resources	• Tribal Member involvement in data recovery. Loss of cultural heritage values. Warehouses of unanalyzed artifacts in storage. • Provide a comprehensive cultural resources inventory. • Open historic places for public access where it is permissible.
10. Land Use and Transportation	• Will the Air Force acquire any more land as it did with the White Sides withdrawal? • Identify all land areas not critical to the mission that could be returned to multiple use, to include mining, trapping, hunting, recreation, etc. • Extent of grazing on NAFR (Bald Mountain allotment and trespass grazing). • Extent of interaction with other land and resource management agencies with regard to the NWHR, Timber Mountain National Monument and DNWR. • Identify military impacts on the DNWR, how they are being handled, and what is proposed to avoid, reduce, or mitigate inherent conflicts and incompatibilities with refuge wildlife preservation. • Policies regarding environmental rehabilitation of surface-disturbed sites no longer in use. • LEIS should address why Air Force activities cannot be combined with Naval Air Station Fallon or other nearby bases to reduce amount of withdrawn lands in the western states. • Identify extent of roads constructed and abandoned since the last LEIS.
11. Wilderness and Wilderness Study Areas	• Define Wilderness Areas and Wilderness Study Areas (WSAs) under Nellis Range Complex (NRC). • Identify impacts to wilderness resources.
12. Recreation and Visual Resources	• Open access to portions of the range for recreation activities. • Allow access to Stonewall Mountain and other areas.
13. Socioeconomics	• Identify the negative economic impacts on airlines and civil aviation resulting from military restricted areas and other military operations. • Lincoln and Nye Counties are bearing risks of range activities but are not reaping economic benefits of withdrawals. Implement employment and procurement opportunities for rural area/communities surrounding the range. • Economic analysis in Special Nevada Report should be updated through the LEIS to show economic impacts. • Purchase electrical power from Lincoln County Power District to mitigate other economic losses. • Socioeconomic effects (both + and -) of Nellis AFB on southern Nevada.
14. Environmental Justice	• Environmental impacts of NAFR operations are disproportionately impacting low-income populations in Nye and Lincoln Counties. • Exclusive use disproportionately affects minority (American Indian populations who have historically used NAFR lands and resources.



AIRSPACE

4.1

The FAA manages airspace so that both military and civil aviation requirements can be accommodated. The airspace is currently designated and managed in the present training areas to satisfy both Nellis AFB flight training needs and general aviation activities throughout this area.

Under all action alternatives assessed in this LEIS, the restricted areas, military operation areas (MOAs), and other airspace currently used by NAFR would remain essentially unchanged. Under the No-Action Alternative, NAFR special use airspace would no longer reach the surface.

Special Use Airspace has remained relatively unchanged through the years with a few modifications to exterior airspace boundaries that enhanced both FAA and Nellis AFB compatible use of adjacent airspace areas. The internal MOA and restricted area subsections supporting the various air-to-air and air-to-ground training scenarios have been adjusted to improve management, and such adjustments are anticipated to continue under any alternative.



The No-Action Alternative would either affect or terminate all air-to-ground and security missions operating from Nellis AFB. The Thunderbirds Aerial Demonstration Team, shown here practicing over Indian Springs, would be one of the few operational squadrons that would still be able to train as it has in the past.

Under the No-Action Alternative, all ground activities associated with NAFR would terminate. Without Department of Defense (DOD) control over any land areas, the Air Force would work with the FAA to change restricted airspace to a minimum of 100 feet above ground level (AGL) or to convert to MOAs for remaining air-to-air training activities.



Under the No-Action Alternative, air-to-air training missions that do not require ground-based monitors, threats, or scoring could be conducted. There would be no large-scale Red Flag or similar training and no testing of new weapons systems requiring ground equipment.

4.1 AIRSPACE

The assessment of airspace use and management discusses how the action alternatives and No-Action Alternative would affect the current NRC airspace structure, its operational use, and its compatibility with civil aviation in the region. Renewal alternatives do not include any actions that would increase or expand the NRC airspace. Discussion of these alternatives focuses on anticipated future use of this airspace. Analysis of the No-Action Alternative considers potential effects on airspace use that could occur if the NAFR land withdrawal were not renewed.

4.1.1 Alternatives 1A and 1B – Indefinite Withdrawal and Withdrawal/Modification of Lands and/or Administration

4.1.1.1 NELLIS RANGE COMPLEX AIRSPACE USE AND MANAGEMENT

Under these alternatives, the restricted areas and military operations areas (MOAs) shown in Figure 3.1-1 would remain unchanged. As discussed in section 3.1, the NRC restricted airspace has remained relatively unchanged through the years with a few modifications made to the exterior airspace boundaries to enhance the compatible use of adjacent airspace areas by the Federal Aviation Administration (FAA) and Air Force. Any future need for additional modifications would continue to be a cooperative planning effort between the Air Force and FAA airspace managers and would be assessed, if necessary, through the National Environmental Policy Act (NEPA) process. The internal MOA and restricted area subsections would also be expected to remain unchanged although any boundary changes would not affect other adjacent airspace uses. In addition, no changes are anticipated for the northern and western ingress/egress transit routes currently used for the whole NRC.

Mission and operational changes have occurred from 1986 to the present and are expected to continue to occur. These changes are included in the historic level of between 200,000 and 300,000 annual sortie-operations used in this analysis. Although mission or operational changes, such as the introduction of the F-22, are expected in the foreseeable future, these changes are accounted for by the range of sortie-operations. The specific environmental consequences associated with such mission or operational changes would be assessed by specific NEPA documentation.

The five military training routes (MTRs) identified in Table 3.1-1 would continue to be used at current operational levels, whether they are flown in conjunction with or independent of NRC training missions. Department of Defense (DOD) periodically reviews MTR use and determines whether routes/route segments should be modified, combined, or eliminated, as necessary, to maximize overall MTR use by the different DOD service components or to respond to potential concerns with underlying land use conflicts. No significant changes are currently anticipated in the use or design of these five MTRs.

The Low Altitude Tactical Navigation (LATN) areas bordering the east and southwest boundaries of the NRC would continue to support low-speed, low-altitude training at their current use. There are no changes anticipated for the different refueling routes supporting Red / Green Flag exercises and other mission activities in the NRC.

Airspace that is designated around Nellis AFB (Las Vegas Class B) and Indian Springs Air Force Auxiliary Field (ISAFAF) (Class E) for air traffic control (ATC) purposes would change as operational requirements dictate. If any changes were necessary, they would be accomplished through FAA coordination and would not normally require NEPA assessment.

4.1.1.2 CIVIL AVIATION AIRSPACE USE

As discussed in section 3.1, the NRC is situated within an area that has had relatively little impact on either commercial or general aviation. This is due primarily to the near direct routing provided by Federal Airways and Jet Routes to accommodate instrument flight rules (IFR) traffic and the commonly flown routes for visual flight rules (VFR) traffic between most airports through this region. No changes are currently planned for the Airway / Jet Route structure surrounding NRC. Although commercial and general aviation is expected to increase 54 and 17 percent, respectively, by 2015 (Nevada Department of Transportation [NDOT]1995), such increases would not be affected by the continued existence and use of the NRC. Nellis AFB airspace and operations management would continue to interact with state and federal agencies at periodic forums, and with the FAA and other DOD agencies in the Western Regional Airspace Council to discuss any future airspace issues or modifications affecting the NRC.

Survey flights conducted by the Nevada Division of Wildlife (NDOW), BLM, and USFWS within portions of the NRC would be unaffected by continued use of this airspace. Nellis AFB range scheduling would continue cooperative efforts in coordinating and scheduling these flights when requested by the three agencies.

4.1.2 Alternatives 2A and 2B – 25-Year Withdrawal and 25-Year Withdrawal/Modification of Lands and/or Administration

The effects of these alternatives would be identical to those discussed for Alternatives 1A or 1B.

4.1.3 No-Action Alternative

4.1.3.1 NRC AIRSPACE USE AND MANAGEMENT

The discontinued withdrawal of NAFR lands and the associated termination of air-to-ground activities would require FAA reevaluation of the restricted airspace to determine whether remaining DOD mission requirements warranted the continued need for this restricted airspace. Without DOD control of the land, the Air Force would likely make application to FAA to redesignate the Restricted Airspace. Initially, air-to-air training would continue to

occur at current levels. Training would likely decrease at least 50 percent because training needing ground support would no longer be possible at NAFR.

Use of the five MTRs over the current withdrawn lands could be expected to decline since some low-level missions would no longer be able to be flown in conjunction with any weapons range use. Some training requirements could still be met on these routes, but such use may not warrant continued retention of all five MTRs. A determination would have to be made by the individual scheduling agencies on the further need for each route.

With elimination of the air-to-ground mission, the LATN areas could be eliminated because the low-speed, low-altitude aircraft would most likely be able to fulfill low-level navigation requirements within the NRC. There may be a continuing need to retain LATN southwest for Air Warrior A-10 training while these aircraft are in transit to the Fort Irwin range area.

Retention of the existing air refueling routes would need to be reevaluated, based not only on NRC operational requirements, but also other DOD refueling mission needs in either the Edwards Range or Utah Test and Training Range (UTTR). The Las Vegas Class B airspace and Indian Springs Class E airspace would remain unchanged because this airspace is established for ATC purposes, regardless of how the NRC is used.

4.1.3.2 CIVIL AVIATION AIRSPACE USE

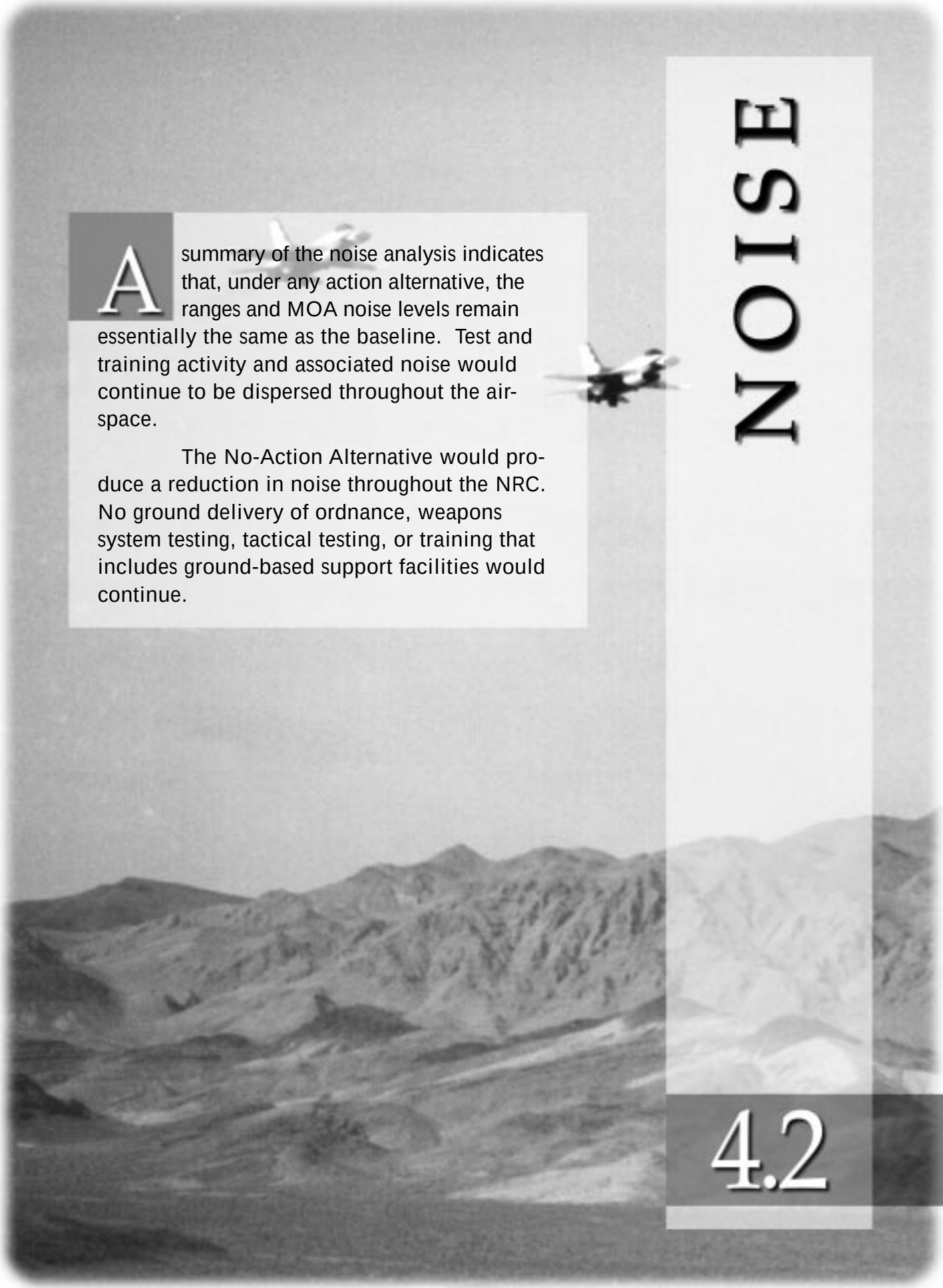
The No-Action Alternative would have little effect on transit IFR air traffic through this region. While this traffic would continue to operate principally on existing Federal Airways and Jet Routes already providing near direct routing between all key airports, the FAA would have more flexibility in routing these aircraft through portions of the NRC if hazardous air-to-ground operations did not exist. If any portions of the restricted airspace were to be redesignated as MOA airspace, VFR aircraft would no longer be restricted from using this airspace and could operate under see and avoid flight clearances within this airspace. Considering the current location and near direct alignment of general aviation airports outside of the existing restricted airspace, it is not likely that VFR aircraft would operate that extensively within this airspace if it were unrestricted.

Overall, airspace actions that could occur as a result of the No-Action Alternative would not be expected to have a significant effect on how airspace adjacent to the NRC has been used by the FAA and the DOD.

4.1.4 American Indian Issues Concerning Airspace

The Consolidated Group of Tribes and Organizations (CGTO) perceives any action associated with military training to have an adverse impact, but the CGTO has not specifically identified concerns regarding this resource. At a general level, they have stated that traditional cultural resources can potentially be affected by the actions around them, including actions that occur within military airspace. For example, Indian people feel that training exercises on NAFR, including the electronic combat (EC) program, have caused, “cultural resources, rock shelters,

and petroglyph panels . . . on the edge of rock outcrops to be destroyed and break off . . . " (AIWS 1997).



NOISE

A summary of the noise analysis indicates that, under any action alternative, the ranges and MOA noise levels remain essentially the same as the baseline. Test and training activity and associated noise would continue to be dispersed throughout the airspace.

The No-Action Alternative would produce a reduction in noise throughout the NRC. No ground delivery of ordnance, weapons system testing, tactical testing, or training that includes ground-based support facilities would continue.

4.2



During public scoping, some commentors expressed concern with existing overflight noise. Nellis AFB has an established procedure for dealing with noise complaints. However, under any alternative, overflights would likely continue to be a local issue.

Noise includes supersonic noise caused by military aircraft performing maneuvers over NAFR and in surrounding airspace. Noise levels were calculated using actual measurements of supersonic events in Nellis airspace. A computer model based on this extensive noise monitoring was used to predict noise events at NAFR and in MOAs where supersonic maneuvers take place. Each individual airspace was evaluated separately. Noise levels and the number of supersonic events for the baseline condition are the same as those for all action alternatives.

The No-Action Alternative would reduce supersonic noise because many missions for training and testing would not achieve performance goals without ground facilities.



The use of targets and threat emitters includes a limited number of military vehicles on the range roads. There is minimal noise from vehicles and sporadic noise from aircraft and ordnance delivery.

4.2 NOISE

4.2.1 Overview

Noise, often defined as unwanted sound, is one of the most common environmental issues associated with aircraft operations. Although aircraft are not the only sources of noise, they are readily identifiable to those affected by their noise emissions and are typically singled out for special attention and criticism. Consequently, aircraft noise is often noted as an environmental impact associated with military aircraft training flights in populated or recreation areas. Restricted access on NAFR precludes civilian and unauthorized military personnel on NAFR lands. The restrictions on land access reduce the potential for human exposure to noise from military activities. However, the NRC airspace overlies areas with civilian population and lands allowing public access.

The LEIS alternatives all involve aircraft operations of the types which currently occur over the NAFR, but with different levels of activity. Noise from these alternatives has therefore been analyzed by the methods described in section 3.2. The following subsections describe the noise consequences of each alternative.

4.2.2 Interpreting the Consequences of Noise

A general discussion of noise, the metrics for measuring noise, and noise effects is presented in Appendix E.

NOISE REGULATIONS AND POLICIES

Interpretation of Day-Night Average Sound Level (L_{dn}) or Onset Rate Adjusted Monthly Day-Night Average Sound Level (L_{dnmr}) can be based on an updated and validated "Schultz curve," (see Figure E-2 in Appendix E). This curve predicts the average response of individuals to various L_{dn} levels. The now-classical analysis of noise exposure-response relationships was first published in 1978 (Schultz 1978) and was based on data from 12 major social surveys addressing community annoyance due to transportation noise. Since then, it has been updated, refined, and validated several times (e.g., Fidell et al. 1991) and the described exposure-response relationships were adopted by the Federal Interagency Committee on Noise (FICON) (1992) for use by federal agencies in assessing aircraft noise-related impacts.

More recently, researchers began reevaluating the original Schultz curve data, and added a significant number of data points from new, technically improved community annoyance studies (Finegold et al. 1994). The current version of the curve used to predict community exposure-response relationships is shown in Figure E-3 of Appendix E, which compares the original Schultz curve with the most recently developed curve fit studies (Finegold et al. 1994). As shown, variances between results are slight. The equation fit by Finegold et al. represents a good fit to the data, and is also consistent with current theory of human annoyance reaction (Fidell et al. 1988). Features represented by this model include a single inflection point —

annoyance never going to zero as noise level decreases (some people are always annoyed), and annoyance never going to 100 percent as noise level increases (some people are never annoyed, or never complain). Response to L_{dnmr} is obtained by applying L_{dnmr} to the L_{dn} axis of the Schultz curve. Since L_{dnmr} is always equal to or greater than L_{dn}, this automatically yields the increased annoyance associated with the added penalties used with L_{dnmr}.

The most common point referred to on the Schultz curve is 65 decibels (dB). This is a benchmark often applied to determine residential land use compatibility around airports or highways. By extension, it is often used as a criterion in planning of airspace. For this LEIS, it is recognized that affected areas are diverse and it is not appropriate to use a single criterion.

The 65 dB L_{dn} value is useful to recognize as a level which, when exceeded, is normally not compatible with residential land use. The significance of other levels are as follows:

- An L_{dn} of 55 dB was identified by the U.S. Environmental Protection Agency (USEPA) as a level "… requisite to protect the public health and welfare with an adequate margin of safety" (USEPA 1972). Noise may be heard, but there is no risk to the public or its welfare.

- At L_{dn} values below 55 dB, the percentage of annoyance is correspondingly lower. Annoyance is never zero, but at an L_{dn} of 45 dB or less it is low enough to be negligible.

OTHER EFFECTS FROM NOISE

In addition to annoyance, other concerns about exposure to noise include the potential for hearing loss, other nonauditory health effects, the potential for speech and sleep interference, and possible effects on domestic animals and wildlife. These issues are addressed below and additional details are provided in Appendix E.

HEARING LOSS

Noise-induced hearing loss is probably the best defined of the potential effects of human exposure to excessive noise. Federal workplace standards for protection from hearing loss allow a time-average level of 90 dB over an 8-hour work period, or 85 dB averaged over a 16-hour period. Even the most protective criterion (no measurable hearing loss for the most sensitive portion of the population at the ear's most sensitive frequency, 4,000 hertz (Hz), after a 40-year exposure) suggests a time-average sound level of 70 dB over a 24-hour period (USEPA 1972). Since it is unlikely that persons will be exposed to elevated noise levels 24 hours per day for extended periods of time, there is little possibility of hearing loss below a L_{dn} of 75 dB, and this level is extremely conservative.

NONAUDITORY HEALTH EFFECTS

Nonauditory health effects of long-term noise exposure, where noise may act as a risk factor, have never been found to occur at levels below those protective against noise-induced hearing

loss, described above. Most studies attempting to clarify such health effects have found that noise exposure levels established for hearing protection will also protect against any potential nonauditory health effects, at least in workplace conditions. The best scientific summary of these findings is contained in the lead paper at the National Institutes of Health Conference on Noise and Hearing Loss, held on 22–24 January 1990 in Washington, D.C., which states the following:

> The nonauditory effects of chronic noise exposure, when noise is suspected to act as one of the risk factors in the development of hypertension, cardiovascular disease, and other nervous disorders, have never been proven to occur as chronic manifestations at levels below these criteria (an average of 75 dBA for complete protection against hearing loss for an eight-hour day). At the International Congress on Noise as a Public Health Problem (1988), most studies attempting to clarify such health effects did not find them at levels below the criteria protective of noise-induced hearing loss, and even above these criteria, results regarding such health effects were ambiguous. Consequently, one comes to the conclusion that establishing and enforcing exposure levels protecting against noise-induced hearing loss would not only solve the noise-induced hearing loss problem but also any potential nonauditory health effects in the work place. [von Gierke 1990; parenthetical wording added for clarification.]

SPEECH INTERFERENCE

Speech interference associated with noise is a primary cause of annoyance to individuals on the ground. The disruption of routine activities such as radio or television listening, telephone use, or family conversation gives rise to frustration and irritation. The quality of speech communication is also important in classrooms, offices, and industrial settings, and can cause fatigue and vocal strain in those who attempt to communicate over the noise. Research has shown that the use of the Sound Exposure Level (SEL) metric will measure speech interference successfully, and that an SEL exceeding 65 dB will begin to interfere with speech communication.

SLEEP INTERFERENCE

Sleep interference may be measured in either of two ways. "Arousal" represents actual awakening from sleep, while a change in "sleep stage" represents a shift from one of four sleep stages to another stage of lighter sleep without actual awakening. In general, arousal requires a somewhat higher noise level than does a change in sleep stage.

Some guidance is available in judging sleep interference. The USEPA identified an indoor L_{dn} of 45 dB as necessary to protect against sleep interference (USEPA 1972). Assuming a very conservative structural noise insulation of 20 dB for typical dwelling units, this corresponds to an outdoor L_{dn} of 65 dB as minimizing sleep interference.

NOISE EFFECTS ON DOMESTIC ANIMALS AND WILDLIFE

Animal species differ greatly in their responses to noise. Each species has adapted, physically and behaviorally, to fill its ecological role in nature, and its hearing ability usually reflects that role. Animals rely on their hearing to avoid predators, obtain food, and communicate with and attract other members of their species. Noise may mask or interfere with these functions. Secondary effects may include nonauditory effects similar to those exhibited by humans—stress, hypertension, and other nervous disorders. Tertiary effects may include interference with mating and resultant population declines.

There are available many scientific studies regarding the effects of noise on wildlife and some anecdotal reports of wildlife "flight" due to noise. Few of these studies or reports include any reliable measures of the actual noise levels involved. However, in the absence of definitive data on the effect of noise on animals, the Committee on Hearing, Bioacoustics, and Biomechanics of the National Research Council has proposed that protective noise criteria for animals be taken to be the same as for humans (National Research Council 1977).

QUANTIFYING NOISE FROM OUTDOOR RECREATIONISTS' PERSPECTIVE

Using L_{dnmr} does not necessarily help outdoor recreationists anticipate what sort of aircraft noise they may encounter on visits to overflown lands available for public access within ROI Three. When aircraft fly over outdoor public lands sporadically within the NRC airspace (hundreds of square miles), the experience of aircraft noise during a typical visit often takes the following form:

1. For much of any given visit, outdoor recreationists will unlikely notice any aircraft noise, because aircraft operations will be far enough away from them that the noise will be inaudible or only slightly audible, even in areas with low natural noise levels.

2. For a small part of a typical visit, noise from distant aircraft operations may intermittently come to the notice of outdoor recreationists when they are not hiking, talking, or making any other noises themselves.

3. For an even smaller part of a typical visit, noise from aircraft operating within a few miles of an outdoor recreationist, although not particularly loud, may intrude to some degree on enjoyment of natural quiet.

4. On rare occasions (once in many visits) and in certain locations, an aircraft may directly overfly a visitor at low altitude. On such occasions, a visitor will hear a very loud noise for a short period of time. This noise will probably be annoying and may be startling as well.

While these four conditions approximately describe expected aircraft noise exposure under most large areas of military training airspace, one or more condition may be influenced by the

specific use of the airspace. For example, if a person is situated in close proximity to an area where aircraft concentrate to enter the NAFR, conditions three and four (listed above) would be expected to occur with greater frequency. Such activity would likely occur in the Desert and Reveille MOA airspace (e.g., near "Student Gap," near Rachel, Nevada). Conversely, a person located under airspace where aircraft do not regularly concentrate would probably experience only conditions one and two.

There can be a wide range of experiences and perceptions of experiences. Reactions vary greatly from person to person, depending upon the individual's expectations and the context in which the event occurs.

4.2.3 Methodology for Noise Analysis

The NRC consists of 21 separate airspace units. Each unit was modeled to provide a basis for defining local noise consequences of aircraft overflights. The historic level and distribution of NAFR day / night operations is projected to continue into the foreseeable future.

4.2.3.1 DESCRIPTION OF THE NOISE MODEL

MOA RANGE NOISEMAP (MR_NMAP)

Noise levels for the alternatives addressed in this LEIS were computed using the Air Force's MR_NMAP computer program (Lucas and Calamia 1996). Within the Restricted Areas and MOAs with no preferred tracks, as is the case with the use of the NRC, it computes noise based on a uniform distribution of sortie-operations weighted by the percent of time the sortie-operations are within the airspace, and the range of varying altitudes flown by the aircraft.

ENTERING OPERATION DATA INTO MR_NMAP

MR_NMAP calculates the noise levels based on the operations data provided by the NRC airspace manager and the aircrews that currently use NRC airspace and train in ROI Three. The NRC airspace manager maintains records on the number of monthly operations flown, the airspace units used, and the amount of time each aircraft is scheduled to spend in a given airspace unit. This information is used to determine the amount of use each airspace unit experienced during a given year. While the amount of time each aircraft spends in one specific airspace unit is variable, because the purpose is to maximize training, the maximum time scheduled is an excellent average for the time used for modeling purposes.

Operational personnel provided input on the average time an aircraft spends at different altitudes, average airspeeds, and average power settings required for that airspeed. The altitude profile is an average of above-ground level readings experienced from the time the aircraft enters the airspace unit until the time it departs that unit and is dependent on the type of aircraft and its mission. Thousands of hours of radar data have also been collected and analyzed from the NRC to study the amount of time an aircraft spends at different altitudes. This information, combined with pilot interviews, was used in estimating the average altitude

profile. The average airspeeds and power settings to obtain that airspeed were based on what airspeeds were used during mission planning, which are also based on both fuel and time availability.

Averages are also used to determine the spatial distribution of aircraft within an airspace unit by separating the total number of operations flown into missions that can be individually modeled. All of the operations within the NRC assume the aircraft can literally fly anywhere in the airspace unit assigned for that particular mission.

RELIABILITY OF THE NOISE CALCULATIONS

The reliability of the noise modeling results is dependent on (1) the operations data entered into the model, (2) the measured aircraft noise data used in the calculations, and (3) the propagation algorithms contained in MR_NMAP. The operations data entered into the model are carefully reviewed by airspace personnel that are expert at the training conducted in the NAFR complex. These data represent the operations during the busiest time periods (month) of the year so that the noise predictions are not diluted by periods of low activity and if anything, they slightly overpredict the noise level. The power and speed settings, the altitude profile, and the spatial distribution are dependent on the training syllabus.

The measured aircraft noise data used in the calculations come from the Air Force Noise Effect Branch of Armstrong Laboratories, which collects and maintains aircraft noise data for the purpose of noise modeling. The acoustical data set used by the noise model is regularly updated with the latest noise measurements. Updated acoustic measurements were developed using actual dedicated overflights of F-15, F-16, and B-1 aircraft. Acoustical measurements were made using dedicated aircraft that flew under controlled conditions over a microphone array. The recordings were incorporated into a noise file data set (Omega 10) that is used by MR_NMAP.

The propagation algorithms used in the noise model account for spherical divergence (spherical spreading of noise energy), atmospheric absorption (reduction of noise as it interacts with air), and lateral attenuation (added reduction of noise as it interacts with the ground). Not included in the noise model are the effects due to wind, ground topography, and day-to-day variations in the meteorological conditions. For locations far from the aircraft, where propagation distance are greater than several thousand feet, atmospheric absorption and lateral attenuation can result in significant uncertainties in the noise levels calculated by MR_NMAP.

Because of the problems associated with the calculations of noise in mountainous areas (ROIs Two and Three include mountainous terrain) studies are being conducted on the effect of terrain (Plotkin et al. 1993; NATO 1994). These studies tentatively show that topographic features can sometimes cause momentary increases in noise levels ("reflections," potentially up to 3 dB for brief periods) and can sometimes decrease noise substantially ("shielding," often in excess of 20 dB). Low-altitude flight altitudes are expressed as feet above ground level (AGL). As such, in mountainous terrain, AGL is relative to the highest local ground elevation; altitudes above low areas are correspondingly higher. By using the specified altitude AGL in the

analysis, the calculations assume aircraft are at lower altitudes than they would actually fly. The net result is a conservative calculation, which tends to overpredict the cumulative noise levels.

ACCURACY OF THE NOISE CALCULATIONS

The limitation of all noise models is that the accuracy of the results varies depending on the noise levels calculated. The lower the noise level (below 55 dB), the greater the uncertainties. There are two reasons for these uncertainties. First, when there is a large number of aircraft operations, time-average sound levels below 55 dB will occur at relatively long distances from aircraft, thus giving atmospheric propagation effects greater opportunity to cause significant variability; all of which increase the uncertainty in the sound level of individual flights. Second, when there are a few number of operations, the time-average sound levels are generated by only a few individual aircraft noise events that may not be statistically representative of the given aircraft modeled. When the sound levels are greater than 55 dB, the noise predictions are accurate to within a few decibels.

4.2.3.2 NOISE MODELING APPROACH

For noise modeling purposes, the operation data of existing and potential restricted area and MOA overflights were entered into the model. These data consisted of two parts: (1) an air-to-air component, and (2) an air-to-ground component. Each of these parts were modeled separately using MR_NMAP and the results from the model predictions were summed using NMPLOT, a computer program that plots cumulative noise exposure. Aircraft noise is localized in each airspace. Activities in other airspace subdivisions or elsewhere in Nevada do not change the localized noise levels.

The air-to-air component assumed that the operations were uniformly distributed in each assigned airspace. A range of representative flight and altitude profiles, engine thrust settings, airspeeds, and the flight time in minutes in the airspace subdivision for each of the participating aircraft were entered into the model. Chapter 5.0 addresses cumulative effects of new aircraft, specifically the F-22, operating in the NRC.

The air-to-ground component of the noise model was used to represent the aircraft that perform air-to-ground training. The operations were modeled using a uniform horizontal distribution that is time-weighted according to the amount of time the aircraft spend in different regions of the airspace. Additional factors entered into the model included representative flight and altitude profiles, engine thrust settings, and airspeeds.

4.2.4 Noise Level Consequences Associated with Alternative 1A — Indefinite Withdrawal

This section assesses the environmental consequences of continuing land withdrawal and test and training activity at NAFR. Based on information from 1986 to the present, the number of sortie-operations is projected to be between 200,000 and 300,000 per year. A sortie-operation is

the use of one airspace subdivision by one aircraft. This annual level of sortie-operations is projected to continue. This range of sortie-operations incorporates current and projected day and night operations associated with NAFR.

4.2.4.1 SUBSONIC NOISE

Table 4.2-1 shows the projected L_{dnmr} for the 21 airspace subdivisions described in Chapter 1.0. Projected future levels are the same as the current condition. (For comparison to the baseline condition please see Table 3.2-1.) Projected future noise levels are within normally acceptable criteria. There is little, if any, change in noise consequences.

All noise levels associated with NAFR operations are well below those that would create any health or safety concerns. The highest L_{dnmr} calculated in this LEIS was 63 dB under one of the airspace subunits supporting NAFR targets.

4.2.4.2 SONIC BOOMS

Sonic booms, created by supersonic flights, were noted as a public concern in rural communities. Table 4.2-2 shows Day-Night Average C-weighted Sound Level (L_{Cdn}) and boom frequency for Alternative 1A. Airspaces not shown are subject to L_{Cdn} of less than 45 dB. Sonic boom levels and frequency of occurrence are projected to be the same as baseline. Alternative 1A is expected to result in no changes in impacts from supersonic noise.

4.2.4.3 NOISE FROM HIGH EXPLOSIVES AND GROUND ACTIVITY

Noise levels from the detonation of high explosives or other ground activity on NAFR are not expected to change from baseline conditions.

4.2.5 Noise Level Consequences Associated with Alternative 1B – Withdrawal/Modification of Lands and/or Administration

Noise from operations associated with this alternative would be expected to be the same as described under Alternative 1A.

Table 4.2-1. Noise Levels— Alternative 1A		
	200,000 SORTIE-OPERATIONS	300,000 SORTIE-OPERATIONS
Airspace	*Ldnmr*	*Ldnmr*
Caliente	54	56
Coyote	57	59
Elgin	46	47
Reveille	54	56
R-61	53	55
R-62	53	55
R-63	53	55
R-64	53	55
R-65	53	55
Alamo	53	55
EC South	52	54
Pahute Mesa	53	54
R-71	53	55
R-74	60	62
R-75	61	63
R-76	58	60
R-4808W[1]	46	47
R-4808E[1]	<45	<45
R-4809A	49	51
EC East	55	57
EC West	56	57
1. DOE airspace over NRC.		

Table 4.2-2. Baseline Sonic Boom Levels and Numbers per Day				
	200,000 SORTIE OPERATIONS		300,000 SORTIE-OPERATIONS	
Airspace	*LCdn*	*Number/day*	*LCdn*	*Number/day*
Elgin	54	1.0	56	1.5
Coyote	48	0.2	50	0.3
All Others	<45	0.1	<45	<0.1

4.2.6 Noise Level Consequences Associated with Alternative 2A – 25-Year Withdrawal

Noise from operations associated with this alternative would be expected to be the same as described under Alternative 1A.

4.2.7 Noise Level Consequences Associated with Alternative 2B – 25-Year Withdrawal/Modification of Lands and/or Administration

Noise from operations associated with this alternative would be expected to be the same as described under Alternative 1A.

4.2.8 Noise Level Consequences Associated with the No-Action Alternative

Aircraft overflight and sonic boom noise would continue. However, under this alternative, no land withdrawal renewal would occur. The NRC airspace horizontal boundaries will remain as currently defined by the FAA. The Air Force would likely make application to FAA to redesignate the Restricted Airspace. Aircraft operations that require ground facilities (targets, tracking sites, threat simulators or other test and training equipment) would no longer take place. The activities that would no longer occur include air-to-ground, weapons system testing, Red Flag/Green Flag large force exercises and all air-to-air activities that require ground-based tracking or related activities. Air Force operations would decrease by approximately 50 percent from the current use projections.

Noise associated with the no-action alternative has been computed for the 50 percent reduction case. Low (100,000 sortie-operations per year) and high (150,000 sortie-operations per year) ranges have been analyzed. Currently, 39 percent of sorties are associated with Red Flag/Green Flag. These have been eliminated from the sortie-operation distributions presented earlier. The remaining 11 percent reduction has been taken to be uniform across all other operations.

Table 4.2-3 shows L_{dnmr} for the 21 airspace units analyzed. Table 4.2-4 shows L_{CDn} and sonic booms heard per day for those airspaces that would be exposed to sonic booms. For analysis purposes, a 10 percent reduction in sorties would correspond to a 1 dB per year reduction in L_{dnmr} and L_{CDn} and a 10 percent per year reduction in frequency of noise and sonic boom events.

Noise levels in Tables 4.2-3 and 4.2-4 are from 1 to 5 dB lower than for baseline. There would be no adverse noise consequences from the No-Action Alternative.

4.2.9 American Indian Issues Concerning Noise

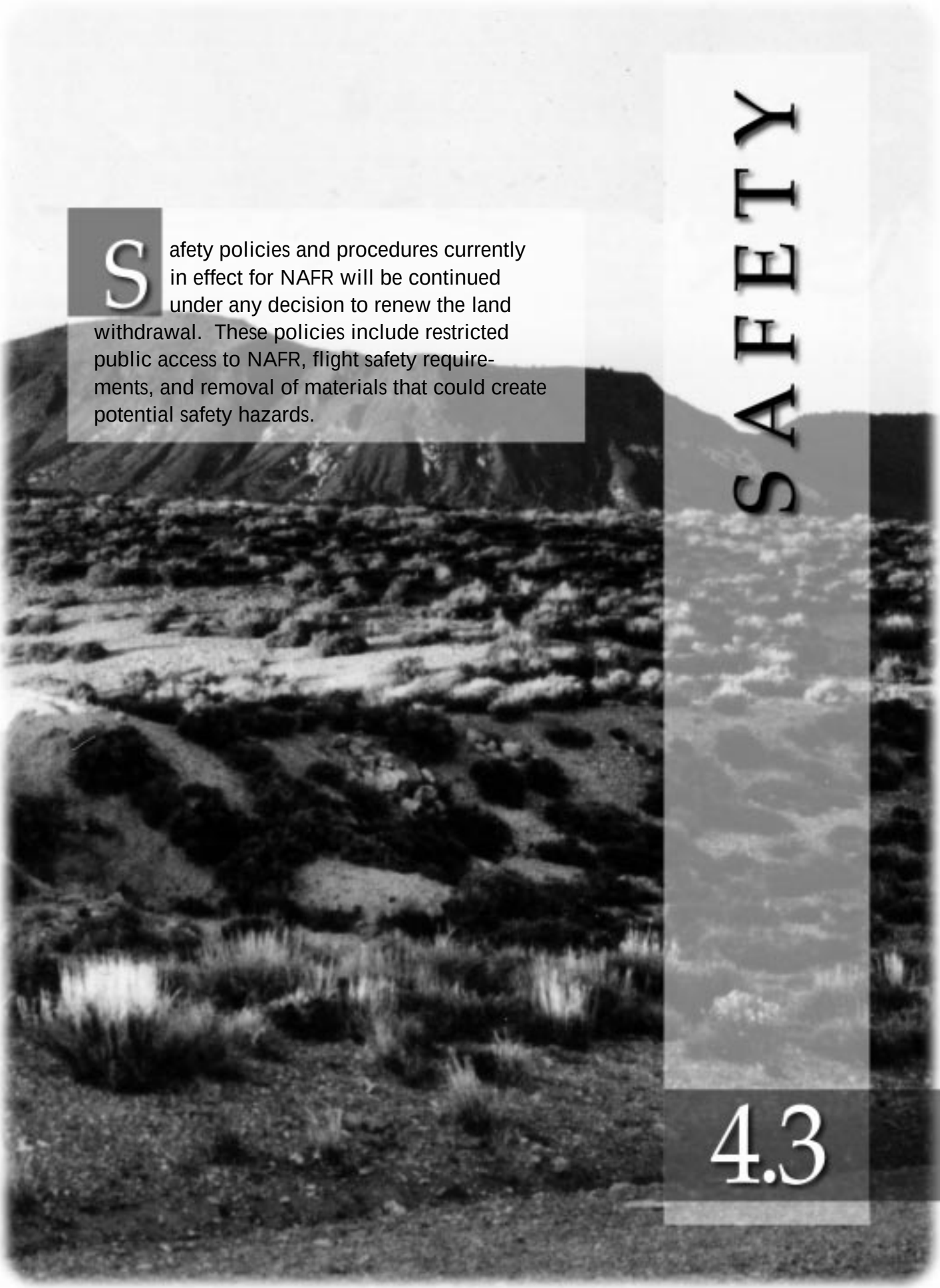
The CGTO perceives any action associated with military training to have an adverse impact, but the CGTO has not specifically expressed concerns about this resource. Noise can have a disruptive effect on traditional cultural activities, such as ceremonies, regardless of its external source. In other words, noise from military overflights, mining activities, or recreational vehicles can all potentially disturb traditional activities.

Table 4.2-3. Noise Levels for No-Action Alternative

	100,000 SORTIE-OPERATIONS	150,000 SORTIE-OPERATIONS
Airspace	*Ldnmr*	*Ldnmr*
Caliente	50	51
Coyote	52	54
Elgin	<45	<45
Reveille	49	51
R-61	52	54
R-62	52	54
R-63	52	54
R-64	52	54
R-65	52	54
Alamo	52	54
EC South	51	53
Pahute Mesa	51	53
R-71	50	52
R-74	55	57
R-75	57	59
R-76	54	56
R-4808W	<45	<45
R-4808E	<45	<45
R-4809A	48	50
EC East	53	55
EC West	53	55

Table 4.2-4. No-Action Sonic Boom Levels and Numbers per Day

	100,000 SORTIE-OPERATIONS		150,000 SORTIE-OPERATIONS	
Airspace	*LCdn*	*Number/day*	*LCdn*	*Number/day*
Elgin	53	0.6	54	1.0
Coyote	<45	<0.1	46	0.2
All Others	<45	<0.1	<45	<0.1



SAFETY

Safety policies and procedures currently in effect for NAFR will be continued under any decision to renew the land withdrawal. These policies include restricted public access to NAFR, flight safety requirements, and removal of materials that could create potential safety hazards.

4.3



Range safety protects persons and equipment from delivery of ordnance.

If the No-Action Alternative were selected, corporate mining and public access would depend upon DOI's determination. The No-Action Alternative could expose the public to safety risks in many areas of NAFR. Although target areas are regularly cleared of ordnance debris, over 50 years of NAFR use has resulted in dispersed shell casings, possible unexploded old ordnance, and metal fragments. These materials could be hazardous to the public if the No-Action Alternative were selected and public access were unrestricted.



Explosive safety zones are required to protect range personnel and the public. The missile fragment on the hillside was approximately 1.5 miles from the nearest target.



Restricted access reduces public exposure to unsafe conditions. Access to range target sections for even military personnel is closely monitored to ensure that no accidents occur.

4.3 SAFETY

Elements of the action alternatives or the No-Action Alternative that have the potential to affect safety are evaluated relative to the degree to which the alternative increases or decreases safety risks to military personnel, the public, and property. The need for a safe and secure test and training range is addressed in Chapter 1.0. Exclusive use of NAFR has protected public safety both on the range and in the NRC.

Safety includes fire and ground safety, including the potential for risk, as well as the Air Force's capability to manage that risk by limiting exposure, responding to emergencies, and suppressing fires. Aircraft flight risks both on NAFR and within the NRC address projected Class A mishaps and bird-aircraft strike hazards (BASH). Explosive safety addresses any changes in uses or handling from current uses and practices. If a unique situation is anticipated to develop as a result of continued withdrawal, the capability to manage that situation is assessed. Changes in risk arising from the alternatives are considered individually and collectively. Assessment is made about the adequacy of disaster response planning.

4.3.1 Alternative 1A — Indefinite Withdrawal

4.3.1.1 FIRE RISK AND MANAGEMENT/GROUND SAFETY

Operations and maintenance activities on NAFR would continue at the same level and continue to be conducted using the same processes and procedures as under current operations. All actions would be accomplished by technically qualified personnel, and would be conducted in accordance with applicable Air Force safety requirements, approved technical data, and Air Force Occupational Safety and Health (AFOSH) standards.

Since the type and level of use of NAFR is not expected to substantially change, there is no anticipated increase in fire risk. Planned disaster response actions and range fire suppression capabilities have proven adequate in the past; they would be expected to continue to be adequate in the future. Currently, approximately four to five fires a year occur on the range. There would be no change in applicable mutual aid agreements for fire risks.

The land areas surrounding training assets ensure public protection by restricting presence in the safety areas associated with laser use, emitters, and targets supporting air-to-ground ordnance delivery. Safety requirements associated with these activities were discussed in section 3.3.

LASERS

Laser targeting-equipped aircraft would continue to operate and train on NAFR. Laser use would be limited to those targets that have been surveyed and have been specifically approved for such use. If new or additional targets were recommended for laser use, the target and target area would be surveyed and assessed before approval to ensure that no potential hazards exist

that could create safety risks. If required, some operational constraints may be placed on the use of the target to mitigate any potentially hazardous condition.

ELECTRONIC EMITTERS

Use of electronic emitters to provide training in electronic warfare and add realism to other types of training activity would continue on NAFR. As previously discussed in section 3.3.1, safe separation distances from the specific emitter have been established. Operation of this equipment would continue with required safety zones established and maintained.

SUPERSONIC FLIGHT

Levels of supersonic flight activity would continue as described in section 3.3.1. Altitudes, speeds, and aircraft conducting supersonic activities would remain unchanged. Overpressures created by sonic booms would remain below levels that would create health risks to people, or any other safety risks to structures on the ground under the sonic boom footprint.

DROPPED OBJECTS

The exclusive use of NAFR protects the public from armament releases. Due to safeguards built into weapon systems guarding against the inadvertent arming, launching, or releasing of ordnance, the probabilities of such a release outside of designated target areas remains minuscule. While the possibilities of other objects separating from an aircraft in flight cannot be totally discounted, that risk, too, is extremely low. This analysis of existing and continuing potential safety risks within the NRC uses the representative scenario described in Appendix J. Under the conditions specified in this scenario, calculations indicate that the potential of such an event occurring and then injuring a person on the ground is approximately one chance in 370 million, and the potential of structure damage is about one chance in 465,000.

As further highlighted in Appendix J, these calculations do not even consider the probability of a person being present in the area. The NRC land areas are sparsely populated, further reducing public injury potential. For example, the population density of Lincoln County, Nevada, is 0.4 persons per square mile, and the population density of Nye County, Nevada, is 1.0 persons per square mile (U.S. Department of Commerce 1991). Based on the areas of these counties, this means that the probability of a person being present in any specified 1.5 square-foot area in Lincoln County is one chance in 52,600,000, and in Nye County it is one chance in 19 million. Overall, the risks associated with the potential for dropped objects on the NRC are so small that they can essentially be discounted.

4.3.1.2 FLIGHT RISKS

AIRCRAFT MISHAPS

Aircraft mishaps under current operations were assessed considering a range of maximum and minimum sortie-operations. It is expected that sortie-operations would continue within this

range. As previously shown in Table 3.3-2, the greatest indicated risk is associated with use of MOA airspace (Desert MOA). Throughout the MOA airspace, statistical projections indicate the probability of a Class A mishap once every 2.0 years. When the level of use is considered, this equates to a probability of a mishap of 0.00003 or one chance in more than 33,000. Risks associated with aircraft mishaps are anticipated to remain relatively unchanged. Should new aircraft enter the military's inventory, they would be assessed at that time.

Nearly 1.3 million acres of the refuge have been proposed for wilderness designation and must be managed as wilderness. Vast areas are roadless and almost inaccessible. If there is a mishap on or over refuge lands, the Air Force closely coordinates cleanup efforts with refuge personnel. This could require use of vehicles in remote areas, thus leaving tracks or other scars on the landscape.

BIRD-AIRCRAFT STRIKES

As previously indicated, there have been 10 documented bird strikes in the NRC since 1985. Of these, one was a Class B mishap and three were Class C mishaps. The other six strikes caused little or no damage. Risk associated with bird-aircraft strikes is expected to remain low.

Overall, flight risks do not indicate a significant safety issue.

4.3.1.3 MUNITIONS USE AND HANDLING

Use of live and training ordnance would continue on NAFR. Training on NAFR and over the NRC would continue to employ chaff and flares. All ordnance would be handled by trained and qualified personnel in accordance with all explosive safety standards and detailed published technical data. It is expected that the type and amount of ordnance expended would continue at current levels. If new targets were developed, or the use of existing ones changed, or if different ordnance were planned for use, prior to approval for use, a comprehensive safety footprint analysis would be accomplished around the target to ensure no safety risks arise. If necessary, operational constraints pertaining to use of specific delivery tactics, ordnance type, or aircraft headings would be developed to mitigate any potentially unsafe condition.

WEAPONS SAFETY FOOTPRINTS

Weapons safety footprints define land areas exposed to potential risk from ordnance delivery. When live ordnance detonates, risk is isolated to the immediate area exposed to explosive effects. However, in the case of training and inert ordnance, there is no detonation. The ordnance remains relatively intact, and can bounce, tumble, and skid along the ground, often for great distances. It is this phenomenon that creates the need for large land areas to accommodate some ordnance deliveries. The land area described by the safety footprint is that area wherein, at a 95 percent confidence level, it is calculated that 99.99 percent of the delivered ordnance would come to rest. These footprints are unique to the type of ordnance used, the aircraft delivering the ordnance, and the type of delivery accomplished. Some representative

safety footprints for varied ordnance are described in Table 4.3-1.

Table 4.3-1. Representative Weapon Safety Footprints

Ordnance Delivery	*Acres of Land Required*	*Square Miles of Land Required*
GBU 10/12 Medium Altitude	2,209	3.45
GBU 10/12 High Altitude	2,943	4.60
BDU-33 Low Angle	153	0.24
BDU-33 Dive Bomb	157	0.24
AGM 65 Low Altitude	28,850	45.08
AGM 65 High Altitude	38,691	60.45

Source: Air Force Instruction (AFI) 13-212.

CHAFF AND FLARE SAFETY

As previously discussed, the materials in chaff are generally nontoxic (except in quantities significantly larger than those any human or animal could reasonably be exposed to). Air quality concerns regarding chaff use addresses the potential for chaff to break down into respirable particles, and the possibility that hazardous air pollutants may be generated from the pyrotechnic impulse cartridges used with some chaff types. Chaff particulate tests and a screening health risk assessment concluded that these are not significant concerns.

The potential for chaff to affect soil and water is remote. Laboratory tests of chaff using a modified toxic characteristics leaching procedure, indicated little or no potential for adverse effects on soil. No adverse impacts from chaff on biological resources have been identified. Based on their digestive processes, few animals are expected to suffer physical effects from chaff ingestion. Effects from inhalation are not considered a significant issue, since chaff particles would represent a small percentage of the particulates regularly inhaled by animals.

Impacts on land use and visual resources are directly related to the visibility and accumulation of chaff debris. Field studies (one of which was conducted on NAFR) of the visibility of chaff and incidental debris in different environmental contexts concluded that significant aesthetic effects are unlikely (Air Force 1997d).

The primary potential impact associated with flare use is the possibility of burning material reaching the ground and igniting a fire, which could create significant secondary environmental impacts. Minimum release altitudes established for flare release, and the complete cessation of flare use during periods of extreme fire risk, minimize this risk (AFI 13-212, Volume 2, Nellis AFB Supplement 1).

Toxicity is not a concern since magnesium, the primary material found in flares, is not highly toxic, and it is extremely unlikely that humans or animals would ingest flare material. Impulse cartridges and initiators used with some flares contain chromium and, in some cases, lead, which are hazardous air pollutants under the Clean Air Act (CAA). A screening health risk assessment (Air Force 1997d) concluded that they do not present a significant health risk in the quantities involved. Laboratory analyses of flare pellets and flare ash indicate that these materials have little potential for affecting soil or water resources.

Field studies similar to those conducted for chaff indicate that flare debris does not accumulate in noticeable quantities; therefore, there is little potential for impact to aesthetic resources (Air Force 1997d).

Silver Flag Alpha training would continue under this alternative as under existing conditions.

In summary, all ordnance use is governed by detailed safety processes and procedures. These have proven effective in the past and are expected to continue to be effective in the future. Explosive safety does not involve any major safety issues.

4.3.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

Increased access associated with this alternative responds to public or agency access requests without increasing public risk. In general, no change in public access is anticipated for the NWHR, the Timber Mountain National Monument, or the DNWR.

4.3.2.1 Fire Risk and Management/Ground Safety

In general, fire risk and ground safety issues associated with this alternative remain as discussed above. Although some nonconsumptive co-use could occur in the areas of Mud Lake, the Kawich Range, and in the southern portion of the EC South Range, it would be on a non-interference basis with NAFR operations. Therefore, there should be no added safety concerns associated with the use of lasers and electronic emitters. Potential risks associated with dropped objects would also remain low. Procedures would be developed that would continue to ensure that national security and military operations would not be compromised, and that the public would continue to be protected with an adequate margin of safety to minimize risk.

Since the three areas considered for co-use are in areas of NAFR where no ordnance use is authorized, no unexploded ordnance (UXO) should be present. Flares are authorized for use in the airspace overlying these areas. Studies have shown that flare reliability is approximately 99 percent; although it is possible that a dud flare may come to rest on the ground, the probability of this occurring is very low (Air Force 1997d). Overall, planning and management actions should ensure that co-use creates no major safety issues. Nevertheless, this increased access resulting in increased human presence may have the potential to somewhat heighten fire risks.

4.3.2.2 FLIGHT RISKS

Aircraft operations would continue as under current use. Flight risks are unaffected by this alternative. Risks associated with aircraft mishaps and bird-aircraft strikes would remain low.

4.3.2.3 MUNITIONS USE AND HANDLING

Ordnance, chaff, and flare use would continue at current levels under this alternative. Since none of the lands considered for co-use currently have bombable targets, co-use would have no effect on ordnance use. Although the lands designated for co-use may be overflown, safeguards incorporated into weapon systems designed to prevent inadvertent arming, launching, or releasing ordnance would continue to be effective, reducing the risk to minimal levels. Also, as indicated above, no UXO would be present on the lands proposed for co-use. Explosive safety risks would remain as assessed for Alternative 1A.

Future unknown or undefined changes to Air Force mission, security, and/or safety requirements could negatively or positively affect the amount of land available for co-use. Should future Air Force requirements change, co-use of some or all of the three potential co-use areas may become inconsistent with Air Force mission, security, and/or safety requirements. Should that occur, co-use of that particular area could be further restricted or terminated. Changes to future Air Force requirements could also increase the size of the three potential co-use areas and/or make other locations of the range available for possible co-use.

4.3.3 Alternative 2A — 25-Year Withdrawal

This alternative is the same as Alternative 1A with the exception that lands would only be approved for continuation in withdrawn status for 25 years. Since the length of time associated with the withdrawal would have no interaction with safety concerns, Alternative 1A and Alternative 2A are assessed the same.

4.3.3.1 FIRE RISK AND MANAGEMENT/GROUND SAFETY

There is no significant fire risk and there are no significant ground safety concerns associated with this alternative action. Refer to section 4.3.1.1 for additional details.

4.3.3.2 FLIGHT RISKS

The risks associated with an aircraft mishap or bird-aircraft strike would remain low. Specific safety data are contained in section 4.3.1.2

4.3.3.3 MUNITIONS USE AND HANDLING

As previously discussed in section 4.3.1.3, risks associated with munitions use and handling are low.

4.3.4 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

With the exception of the time span associated with the withdrawal action, the actions that would occur under this alternative are the same as those under Alternative 1B. Since safety concerns are not affected by the length of time of the withdrawal, this alternative is assessed the same as Alternative 1B.

4.3.4.1 FIRE RISK AND MANAGEMENT/GROUND SAFETY

Although there are no major fire or ground safety concerns associated with this alternative, refer to section 4.3.2.1 for a discussion of the specific issues arising from co-use of some lands.

4.3.4.2 FLIGHT RISKS

Flight activity would remain unchanged from current operations. As previously discussed, risk from an aircraft mishap or bird-aircraft strike is low.

4.3.4.3 MUNITIONS USE AND HANDLING

As previously discussed in section 4.3.2.3, explosive safety risks are low.

4.3.5 No-Action Alternative

4.3.5.1 FIRE RISK AND MANAGEMENT/GROUND SAFETY

Before the lands currently comprising NAFR can be returned to DOI jurisdiction, the Air Force and (in some locations) the Department of Energy (DOE) are responsible for environmental cleanup of the non-renewed lands. Human presence and activity during collection, remediation, handling, storing, processing, transportation, and disposal of hazardous and solid waste in accordance with applicable federal and state laws and regulations could increase fire risk.

Since all military-related air-to-ground and ground-based activity would cease, the actions currently creating the greatest source of fire risk would no longer occur. Furthermore, since the Air Force would no longer operate or maintain anything on the lands currently comprising NAFR after the transfer, there would be no military-related ground safety concerns. After land transfer, BLM would have responsibility for fire response. Increased human presence may, in itself, be a source of increased fire risk.

Since the lands currently comprising NAFR would be administered and managed by the BLM, that agency would ultimately determine land uses. Environmental cleanup of some non-renewed lands may not be able to ensure ground safety. DOE, Air Force, and BLM review would be required to determine what areas would need to be fenced to ensure public safety. These areas are currently unknown and cannot be assessed for fire or ground safety risk.

4.3.5.2 FLIGHT RISKS

Military training in the airspace would continue. Although all air-to-ground training activity would cease, air-to-air training would still be possible. Flight activity in the regional military training airspace is projected to be reduced by 50 percent. Based on this assumption, it may be extrapolated that the minimum time between statistically predicted Class A mishaps would double (to an estimated 4.8 years), and the risk of bird-aircraft strikes would be halved. Overall, risks associated with aircraft flight training operations would be reduced.

4.3.5.3 MUNITIONS USE AND HANDLING

If the lands were no longer withdrawn, the use of ordnance for any air-to-ground training would cease. Routine cleaning of ordnance from ranges would no longer be required. While chaff and flares could still be used in the special-use airspace, the level of use would be reduced.

Before the non-renewed lands can revert to BLM control, the Air Force, DOE, and BLM would be required to assess the level of cleanup required. Target areas would be groomed of unexploded or malfunctioned ordnance by explosive ordinance disposal (EOD) personnel. Although some hazards are associated with these activities, the level of risk is normally considered manageable.

4.3.6 American Indian Issues Concerning Safety

The CGTO perceive any action associated with military training to have an adverse impact, but American Indians in the GGTO have not identified specific concerns about safety for either the Proposed Action or the No Action Alternative. Regarding occupational and public health and safety, the *Native American Resource Document* (NARD) states:

> The NAFR's programs and activities are performed in accordance with the regulations of the Occupational Safety and Health Administration. Tribes that live near the NAFR would like to be included in systematic research aimed at ensuring that public health and safety measures devised by Nellis AFB extend into tribal lands and communities [AIWS 1997].

4.4 HAZARDOUS MATERIALS AND SOLID WASTE

For any action alternative that continues the NAFR land withdrawal, hazardous materials would continue to be used in the disturbed areas of NAFR, including the six major operations areas and portions of the North and South ranges. Equipment maintenance and other installation maintenance such as vehicle maintenance, target refurbishment, and electronic countermeasures emitter maintenance would continue.

The types and amounts of waste generated would continue without significant change under any action alternative. The hazardous waste disposal procedures would be adequate for the amount of waste generated and would be retained and used. The clean-up and maintenance of target areas would continue using Coronet Clean procedures. The NAFR Spill Prevention and Response Plan would continue to be used and updated, as required.



All targets, such as these obsolete military vehicles, would continue to have hazardous materials removed prior to placement. Materials from used targets are recycled.

Installation Restoration Program (IRP) Decision Documents that have been accepted by the Nevada Division of Environmental Protection (NDEP) for hazardous waste sites would be implemented under the action alternatives. Long-term monitoring at two landfills on Indian Springs Air Force Auxiliary Field will be accomplished by sampling three monitoring wells at each site annually. The program of long-term investigation and remediation by the DOE under its Environmental Restoration Program would continue. Clean-up on TTR and Pahute Mesa would proceed and final closure of plutonium-contaminated sites would be done based on the results of negotiations between the DOE, DOD, and the NDEP. Proceedings for the management of the depleted uranium (DU) target area would be implemented as detailed in the DU Management Plan.

Existing nonhazardous solid waste collection and disposal procedures for the ranges would be adequate for the amount of wastes that is expected to be generated in the foreseeable future. Disposal of asbestos-containing materials would continue to be done by a licensed contractor at an off-range permitted disposal facility. PCB-contaminated equipment and wastes would be disposed of through the Defense Reutilization and Marketing Office (DRMO) at an off-base permitted disposal facility.



The cleanup and maintenance of target areas would continue using the Coronet Clean Procedures.

4.4 HAZARDOUS MATERIALS AND SOLID WASTE

4.4.1 Alternative 1A — Indefinite Withdrawal

4.4.1.1 HAZARDOUS AND TOXIC MATERIALS

Under this alternative, NAFR personnel would continue to use hazardous and toxic materials. Materials used include paints, solvents, thinners, adhesives, aircraft fuel, diesel, gasoline, lubrication oils, brake and hydraulic fluids, cleaners, batteries, acids, chlorofluorocarbon refrigerants, herbicides, insecticides, rodenticides, and compressed gases in compliance with applicable regulations and Air Force instructions.

The Air Force maintains data within the supply system that are used to generate listings of the hazardous materials that are used for various purposes/processes at the ranges and operations areas. Aircraft maintenance and other installation maintenance processes such as vehicle maintenance, target refurbishment, and electronic countermeasures emitter maintenance would continue. Existing Air Force pollution prevention processes, known as HAZMART for the management of procurement, handling, storage, and issuing of hazardous materials used on NAFR would be adequate for the foreseeable future and would be retained and used. Ordnance would continue to be expended on range targets. The Range Emergency Response/Contingency Plans and associated Spill Prevention, Control, and Countermeasures (SPCC) Plans would be updated as required to respond to new procedures, regulations, or any new waste systems. Transportation of hazardous material would continue to be done in accordance with the Department of Transportation requirements and regulations.

4.4.1.2 HAZARDOUS WASTE MANAGEMENT

The types and amounts of waste generated would continue under this alternative. The hazardous waste disposal procedures are adequate for the amount of waste generated and would be retained and used. If any new waste streams were identified as part of new weapons systems, the appropriate transportation and storage procedures would be developed and the Resource Conservation Recovery Act (RCRA) Part B permit would be modified to reflect the new waste streams. The Air Force would continue to manage the 90-Day Accumulation Sites for some hazardous waste generators on the ranges. Waste generation tracking procedures would remain in place. The Defense Reutilization and Marketing Office (DRMO) on Nellis AFB would continue to be responsible for the disposal of excess property and hazardous waste generated on NAFR. The cleanup and maintenance of target areas would continue using Coronet Clean procedures.

4.4.1.3 ENVIRONMENTAL RESTORATION AND MONITORING PROGRAMS

The Installation Restoration Program (IRP) Decision Documents, including soil surveys, that have been accepted by the Nevada Division of Environmental Protection (NDEP) would

continue. Long-term monitoring at two landfills on ISAFAF will be accomplished by sampling three monitoring wells at each site annually.

Several agreements exist for managing materials for which DOE is responsible. The program of long-term investigation and remediation by the Environmental Restoration Program (ERP) under DOE would continue in accordance with the Federal Facility Agreement and Consent Order (FFACO). Final closure of plutonium-contaminated sites would be accomplished based on agreements among the DOD, the DOE, and the NDEP. Procedures for the management of the depleted uranium (DU) target area, which will be detailed in the Final DU Management Plan, would be implemented. As noted above, the cleanup and maintenance of NAFR target areas would continue using the Coronet Clean Procedures.

4.4.1.4 SOLID WASTE

Existing nonhazardous solid waste collection and disposal procedures for the ranges would be adequate for the solid wastes expected to be generated in the foreseeable future.

4.4.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

4.4.2.1 HAZARDOUS AND TOXIC MATERIALS

The environmental impacts from the use of hazardous and toxic materials by the DOD under this alternative would be the same as the impacts from the use of hazardous and toxic materials under Alternative 1A. Co-use of NAFR lands or use of non-renewed lands, in concurrence with the BLM, could result in some use of hazardous and toxic materials by the public.

4.4.2.2 HAZARDOUS WASTE MANAGEMENT

The environmental impacts from the management of hazardous waste generated by DOD activities under this alternative would be the same as the impacts from the management of hazardous wastes under Alternative 1A. There could be some hazardous waste generated by the public in co-use or non-renewal locations. BLM would manage these wastes in non-renewed lands. Permitted recreation in co-use areas would be scheduled in concurrence with Air Force missions. Those activities that conflict with Air Force mission, security, and/or safety requirements would not be approved. This scheduling would need to include a notice prohibiting transportation of materials or production of hazardous waste.

4.4.2.3 ENVIRONMENTAL RESTORATION AND MONITORING PROGRAM

Those parts of the Clarkdale and Wagner Mining Districts and neighboring areas that are proposed for non-renewal would be the subject of surveys to identify any potential areas of contamination. The results of these surveys would be used to prepare the written determination. The extent of decontamination, if required, would be determined after consultation between the BLM and the Air Force in accordance with applicable legislation

(Public Law [PL] 99-606, as amended, Resource Conservation and Recovery Act (RCRA), Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), etc.).

The IRP program on the rest of NAFR under this alternative would be the same as under Alternative 1A.

4.4.2.4 SOLID WASTE

The environmental impacts from the generation, collection, and disposal of solid waste under this alternative would be the same as the impacts from solid waste under Alternative 1A. There could be an increase in solid waste generated during co-use under BLM permits. Management of these wastes would be in concurrence with the BLM and the Air Force.

Management of solid waste on any non-renewal areas would be performed by BLM in accordance with BLM procedures.

4.4.3 Alternative 2A— 25-Year Withdrawal

4.4.3.1 HAZARDOUS AND TOXIC MATERIALS

The environmental impacts from the use of hazardous and toxic materials under this alternative would be the same as the impacts from the use of hazardous and toxic materials under Alternative 1A.

4.4.3.2 HAZARDOUS WASTE MANAGEMENT

The environmental impacts from the management of hazardous waste under this alternative would be the same as the impacts from the management of hazardous wastes under Alternative 1A.

4.4.3.3 ENVIRONMENTAL RESTORATION AND MONITORING PROGRAMS

The environmental impacts from the hazardous waste sites under this alternative would be the same as the impacts from the hazardous waste sites under Alternative 1A.

4.4.3.4 SOLID WASTE

The environmental impacts from the generation, collection, and disposal of solid waste under this alternative would be the same as the impacts from solid waste under Alternative 1A.

4.4.4 Alternative 2B— 25-Year Withdrawal/Modification of Lands and/or Administration

4.4.4.1 HAZARDOUS AND TOXIC MATERIALS

The environmental impacts from the use of hazardous and toxic materials under this alternative would be the same as the impacts from the use of hazardous and toxic materials under Alternative 1B.

4.4.4.2 HAZARDOUS WASTE MANAGEMENT

The environmental impacts from the management of hazardous wastes under this alternative would be the same as the impacts from the management of hazardous wastes under Alternative 1B.

4.4.4.3 ENVIRONMENTAL RESTORATION AND MONITORING PROGRAMS

The environmental impacts from the management of hazardous waste sites under this alternative would be the same as the impacts from the hazardous waste sites under Alternative 1B.

4.4.4.4 SOLID WASTE

The environmental impacts from the generation, collection, and disposal of solid waste under this alternative would be the same as the impacts from solid waste under Alternative 1B.

4.4.5 No-Action Alternative

4.4.5.1 HAZARDOUS AND TOXIC MATERIALS

Under this alternative, hazardous and toxic materials would not be used by Air Force personnel, contractors, temporary duty military units, or tenant organizations on NAFR. Range maintenance processes such as vehicle maintenance, target refurbishment, and electronic countermeasures emitter maintenance would cease. Ordnance would not be expended on range targets. Hazardous materials would be removed from the range and taken to the HAZMART for reissue. Range Emergency Response / Contingency Plans and associated SPCC plans would remain in effect until range closure activities are completed.

Potential hazardous materials use in future public or commercial operations or any other land uses on what had been NAFR would receive separate environmental review and would be administered by Department of the Interior (DOI) and BLM.

4.4.5.2 HAZARDOUS WASTE MANAGEMENT

Under this alternative, hazardous waste would not be generated by routine NAFR maintenance activities because these activities would cease. Some hazardous waste could be expected from the decommissioning and shut-down of facilities in the major work areas on the range. Examples could include waste petroleum products from fuel storage tanks, building materials contaminated with lead-based paint and lead solder, and small quantities of various chemicals. During demolition activities associated with this alternative, the use of petroleum, oil, and lubricants for equipment would create the potential for minor spills and releases. Compliance with best construction practices would reduce this potential to insignificant levels. Existing hazardous waste disposal procedures would continue to be used until all facilities have been closed following applicable regulations. If large-scale demolition projects were initiated, the disposal of hazardous waste could be included in the demolition contract. Hazardous waste generated by future uses on NAFR would be administered in accordance with DOI agreements and permits, and applicable federal and state regulations.

4.4.5.3 ENVIRONMENTAL RESTORATION AND MONITORING PROGRAMS

No new DOD hazardous waste sites would be created under this alternative. The long-term monitoring at the two IRP landfill sites at ISAFAF would continue. Surveys of the RCRA Facility Assessment SWMUs and Areas of Concern that were recommended for further evaluation would be accomplished to determine whether and to what extent the lands that are proposed for recession are contaminated. Decisions regarding cleanup of contaminated solid waste management units (SWMUs), hazardous waste sites, and bombing targets would be made in consultations between the Air Force and the BLM in accordance with PL 99-606, as amended. Disposal of waste munitions would be done in accordance with the finalized DOD Range Rule. Interim institutional controls and physical barriers would be required to protect public health and safety until final closure is achieved at the sites. Lands that would not pose a risk to humans would be managed under the DOI multiple use of lands and resource policies.

Under this alternative, the DOE would accomplish their environmental restoration activities at the sites they are responsible for on NAFR in accordance with the FFACO.

4.4.5.4 SOLID WASTE

Solid waste from Air Force operations at the major work areas would not be generated, collected, or disposed of under this alternative. Small quantities of nonhazardous solid waste would be expected to be generated during range closure activities. The amount of waste would not be significant and would not present a potential health or environmental risk. The decision on disposal of these wastes would be made during development of closure plans.

Nonhazardous solid waste generated by future multiple use of NAFR land would be administered in accordance with DOI agreements and permits.

4.4.6 American Indian Issues Concerning Hazardous Materials and Solid Waste

The CGTO has stated that hazardous waste on Air Force withdrawn lands may have adversely affected traditional food and medicine sources on NAFR. Indian people would like to become involved in the siting of all new waste facilities, and the analysis of past contamination at existing facilities.

An accident with hazardous materials on roads crossing reservation lands could cause hardship for Indians for whom the road is their only connection to other highway systems. Regarding the transport of explosive and hazardous materials, the NARD states:

> Tribal governments would like to cooperate with Nellis AFB in the development and implementation of safe transportation policies. However, no systematic consultation with tribal governments has been conducted to date. Indian communities located along transportation routes are continuously exposed to risks of accidents, spills, and adverse impacts of transportation on tribal economies. The cumulative effects of long-term explosive and hazardous materials transportation through tribal lands would be traumatic and potentially life-threatening to the well-being of the Indian people. Many Indian people have expressed fear of such transportation practices through and near tribal lands in addition to potentially causing impacts to places of spiritual power.
>
> Tribal governments believe Nellis AFB has the responsibility to assist neighboring tribes in developing an emergency response management program in regard to transportation of explosive and hazardous materials as it passes through tribal lands.

EARTH RESOURCES

4.5

Earth resource specialists look at the following areas to determine if any impacts would occur as a result of continuation of NAFR as a test and training range:

- Physiography and Topography
- Stratigraphy
- Tectonic History
- Seismicity and Faulting
- Volcanism
- Paleontology
- Soils
- Mineral Resources
- Energy Resources



Continuation of the NAFR land withdrawal and use of the area as a test and training range is not projected to have any additional impacts upon earth resources. Non-renewal of specific land areas under Alternatives 1B or 2B or the No-Action Alternative has the potential to permit mineral exploitation and off-road recreational vehicle use that would impact the geology and soils.

Alternatives 1A and 2A would not increase use or cause any further modifications to withdrawn land. No direct additional impacts are anticipated to earth resources with these alternatives.

Under Alternatives 1B and 2B, potential mining in the non-renewed portion of the Clarkdale mining district could result in removal or significant alteration of geologic features. In addition, mining operations could strip existing topsoil, potentially resulting in increased soil erosion. Soil erosion could also occur as a result of off-road recreational vehicle use in the proposed 30,000 - 35,000 acres of land along the western border of the current NAFR.

Access to mineral resources under the No-Action Alternative could result in more adverse impacts to earth resources of the types described for Alternatives 1B or 2B, but could benefit local mining interests.

Mining access and mining decisions would be outside of Air Force control. Such decisions would be made by BLM with State of Nevada involvement. Appropriate environmental documentation and safeguards would be the responsibility of the permitting federal agency.

4.5 EARTH RESOURCES

4.5.1 Alternative 1A — Indefinite Withdrawal

4.5.1.1 UNIQUE GEOLOGIC/GEOMORPHIC FEATURES

This alternative would not increase the use of NAFR or cause any further modification to earth resources. No increase in impacts in mountainous areas would occur. Target areas are generally located on or near playas. No change in use or increase in impacts is projected to these geologic / geomorphic features.

4.5.1.2 GEOLOGIC HAZARDS

Because this alternative would not increase the use of NAFR or cause any further modifications, no impacts are anticipated with respect to geologic hazards (e.g., fault rupture, earthquake shaking, liquefaction, soil settlement, volcanic eruptions) at NAFR.

4.5.1.3 SOIL EROSION AND SOIL EXPANSION HAZARDS

Use of ordnance and vehicles on NAFR results in continuing ground disturbance and some soils are exposed to wind erosion. Because this alternative would not increase the use of NAFR or cause any further modifications, no change in impacts are anticipated with respect to soil erosion hazards or soil expansion hazards (i.e., damage to structure foundations due to expansion and shrinkage of clay-rich soils) at NAFR. Additional details of the effects of chaff on soils is presented in section 4.8.1.1.

4.5.1.4 MINERAL RESOURCES

Continued withdrawal of NAFR lands would delay economic opportunity associated with extraction of some mineral resources. Potentially valuable deposits of metallic and nonmetallic minerals are present throughout NAFR.

The success of mineral exploration often depends on the evaluation of large amounts of geologic data from a broad region. Synthesis of these data define smaller and smaller areas eventually leading to exploratory drilling. If economics permits, the end product of this process could be a mine, or several mines, contained within an original area that may have been 1,000 square miles or more. If geologic data are not available because exploratory access to the land is restricted, regional patterns, structures, and trends that could be critical to mineral discoveries may remain hidden. Restricted access means that, from a mineral-resource perspective, the geology is not accessible and therefore is not understood. From a mineral exploration or exploitation perspective, continued withdrawal of NAFR lands delays the acquisition of information. This is considered a potentially significant impact to mineral exploration or future mining developments.

Since most economically viable mineral deposits occur in mountainous areas of exposed bedrock and because target areas are located on bajada and playa sediments, potential mineral resources should be unaffected by current ordnance. However, the historic use of NAFR over the past 50 years may require site-specific economic analyses to determine whether costs of ordnance cleanup for safety are greater than the benefit of the mineral resources to be extracted.

4.5.1.5 PALEONTOLOGICAL RESOURCES

Because this alternative would not increase the use of NAFR or cause any further modification to paleontological resources, no impacts would occur.

4.5.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

4.5.2.1 UNIQUE GEOLOGIC/GEOMORPHIC FEATURES

This alternative would not increase the use of or cause any further modifications to NAFR. Unique geologic / geomorphic features could potentially be impacted by mining within the Clarkdale and Wagner Mining Districts, if permitted by BLM. Surface mining can significantly alter geologic / geomorphic features. Similarly, but to a lesser degree, subsurface mining can result in alteration of geologic / geomorphic features.

4.5.2.2 GEOLOGIC HAZARDS

This alternative would not increase the use of or cause any further modifications to NAFR. Geologic hazards could potentially impact mining operations within the Clarkdale and Wagner Mining Districts. No landslides or active faults have been mapped in this area, but this area is located within Seismic Zone 3, defined as an area of major damage potential.

4.5.2.3 SOIL EROSION/EXPANSION HAZARDS

This alternative would result in a small increase in use of NAFR lands. However, the proposed co-use of small areas would not cause any further modifications to NAFR. Therefore, minimal impacts are anticipated with respect to soil erosion hazards (e.g., creation of fugitive dust due to disturbance of fine-grained soils) or soil expansion hazards (i.e., damage to structure foundations due to expansion and shrinkage of clay-rich soils) within most of NAFR.

4.5.2.4 MINERAL RESOURCES

Potential activity at the Clarkdale and Wagner Mining Districts could increase local extraction of mineral resources. Such mining activity, were it to be proposed, would be subject to the DOI and the BLM NEPA review. Continued withdrawal of the remaining lands could result in the delay in obtaining geologic information and in economic opportunity associated with extraction of potentially viable mineral resources as described in Alternative 1A.

As with Alternative 1A, delivery of live ordnance could increase the cost of future minerals exploration and resource development, in select areas, due to the high cost of clearing ordnance to an acceptable level of safety. Areas that may pose significant safety hazards include the vicinity of long-term (20+ years) targets. Most of these sites are located in playas and other areas with a limited mineral potential.

4.5.2.5 PALEONTOLOGICAL RESOURCES

With the exception of the lands not included in the renewal application that are part of the Clarkdale and Wagner Mining Districts, this alternative would not increase the use of or cause any further modifications to NAFR. If this alternative were selected, potential impacts could occur to paleontological resources in the non-renewed area.

4.5.3 Alternative 2A — 25-Year Withdrawal

4.5.3.1 UNIQUE GEOLOGIC/GEOMORPHIC FEATURES

This alternative would not increase the use of NAFR or cause any further modification to earth resources. No increase in impacts in mountainous areas would occur. Target areas are generally located on or near playas. No change in use or increase in impacts is projected to these geologic / geomorphic features.

4.5.3.2 GEOLOGIC HAZARDS

Because this alternative would not increase the use of NAFR or cause any further modifications, no impacts are anticipated with respect to geologic hazards (e.g., fault rupture, earthquake shaking, liquefaction, soil settlement, volcanic eruptions) at NAFR.

4.5.3.3 SOIL EROSION AND SOIL EXPANSION HAZARDS

Use of ordnance and vehicles on NAFR results in continuing ground disturbance and some soils are exposed to wind erosion. Because this alternative would not increase the use of NAFR or cause any further modifications, no change in impacts are anticipated with respect to soil erosion hazards or soil expansion hazards (i.e., damage to structure foundations due to expansion and shrinkage of clay-rich soils) within most of NAFR.

4.5.3.4 MINERAL RESOURCES

Continued withdrawal of NAFR lands could delay economic opportunity associated with extraction of some mineral resources. Potentially valuable deposits of metallic and nonmetallic minerals are present within NAFR. Impacts would be as described in section 4.5.1.4.

4.5.3.5 PALEONTOLOGICAL RESOURCES

This alternative would not change the use of NAFR; therefore, no impacts would occur.

4.5.4 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

4.5.4.1 UNIQUE GEOLOGIC/GEOMORPHIC FEATURES

This alternative would not increase the use of or cause any further modifications to NAFR. Unique geologic/geomorphic features could potentially be impacted if BLM permitted mining within the non-renewal area. Surface mining can significantly alter geologic/geomorphic features. Similarly, but to a lesser degree, subsurface mining can result in alteration of geologic/ geomorphic features. Potential adverse impacts of possible mining in this area would be subject to DOI and BLM permits and NEPA review.

4.5.4.2 GEOLOGIC HAZARDS

With the exception of the lands not included in the renewal application that are part of the Clarkdale and Wagner Mining Districts, this alternative would not increase the use of or cause any further modifications to NAFR. Geologic hazards could potentially impact mining operations within the Clarkdale and Wagner Mining Districts. No landslides or active faults have been mapped in this area, but this area is located within Seismic Zone 3, defined as an area of major damage potential. Seismic impacts to potential mining in this area would be subject to additional NEPA review by BLM if this alternative were selected and mining became commercially feasible.

4.5.4.3 SOIL EROSION/EXPANSION HAZARDS

With the exception of the lands not included in the renewal application that are part of the Clarkdale and Wagner Mining Districts, this alternative would not increase the use of or cause any further modifications to NAFR. Therefore, no impacts are anticipated with respect to soil erosion/expansion hazards within most of the NAFR.

Soil erosion could occur in the non-renewal lands that are part of Clarkdale and Wagner Mining Districts. BLM permitted activity would be subject to separate NEPA review. Soil erosion such as creation of fugitive dust due to disturbance of fine-grained soils could potentially occur as a result of recreational use in the potential co-use lands, specifically in Mud Lake where co-use could include vehicle activity on the playa.

4.5.4.4 MINERAL RESOURCES

Access to part of the Clarkdale and Wagner Mining Districts by the mining industry could increase mineral exploration and knowledge of the area. If commercially viable deposits were located and DOI and BLM permits were acquired, including associated NEPA review, sand and gravel or other mineral resources within this area could be extracted. Mining operations in the non-renewed Clarkdale and Wagner Mining Districts could result in potential benefits to the mining industry associated with extraction of mineral resources.

Continued withdrawal of other NAFR lands could result in the delay of economic opportunity associated with extraction of some mineral resources. Continued restricted access to NAFR would preclude the exploration of NAFR lands for mineral deposits.

Delivery of live ordnance on NAFR targets could preclude future minerals exploration and resource development due to the high cost of clearing ordnance to an acceptable level of safety. Most of the target sites are located in areas of limited mineral potential.

4.5.4.5 PALEONTOLOGICAL RESOURCES

With the exception of the non-renewed part of the Clarkdale and Wagner Mining Districts, this alternative would not increase the use of or cause any further modifications to NAFR. Potential mining in the receded portion of the Clarkdale and Wagner Mining Districts or recreational use in the non-renewal lands or co-use lands could result in disruption of paleontological resources. A detailed paleontological survey has not been completed on NAFR. Potential impacts would be greater than under Alternative 1A or 2A.

4.5.5 No-Action Alternative

In the event that the land withdrawal for NAFR is not renewed, much of the approximately 3 million acres currently closed to the public would eventually be open to multiple use under BLM administration. The extent of the area opened would depend on an acceptable level of safety being achieved with respect to ordnance removal and soil remediation.

4.5.5.1 UNIQUE GEOLOGIC/GEOMORPHIC FEATURES

Depending on the location, type, and intensity of future BLM-permitted developments and uses, unique geologic / geomorphic features could be adversely impacted.

4.5.5.2 GEOLOGIC HAZARDS

Depending on the location, type, and intensity of future BLM-permitted development and uses, geologic hazards could adversely impact these public uses. Active faults have been mapped in the south-central portion of NAFR. Landslides have not been mapped but are most likely present throughout the mountainous regions of NAFR. In addition, this area is located within Seismic Zones 2B and 3, defined as areas of moderate damage potential and major damage potential, respectively.

4.5.5.3 SOIL EROSION AND SOIL EXPANSION HAZARDS

Depending on the location, type, and intensity of commercial and public uses permitted by BLM, soil erosion could increase. For example, mining operations and recreational use could strip existing topsoil, potentially resulting in increased soil erosion, surface water particulate loading, and exacerbated fugitive dust conditions due to wind erosion. Because detailed soil mapping has not been completed, the soil erosion and expansion potential in this area is not

fully defined. Soil erosion and expansion potential would be comparable to disturbed areas in other parts of the Great Basin.

4.5.5.4 MINERAL RESOURCES

The No-Action Alternative may result in extraction of mineral resources. Any new mining activities on what was NAFR would depend on the commercial viability of the mineral deposit. Potentially valuable deposits of metallic and nonmetallic minerals are present on NAFR.

4.5.5.5 PALEONTOLOGICAL RESOURCES

Depending on the location, type, and intensity of private uses, such as mining, or public uses, such as recreation, paleontological resources could be impacted. The degree of impact would be determined by access to any resource and the extent of protection provided to the resource by BLM. In all cases, the removal of Air Force restrictions to access would increase the potential for significant impacts to any previously undisturbed paleontological resources.

4.5.6 American Indian Issues Concerning Earth Resources

The CGTO has argued that certain activities on Air Force withdrawn lands may have adversely affected the rocks and soil. The NARD also states that because of past military activity, certain areas are unfit for human use and have become inaccessible to American Indians for religious purposes (AIWS 1997).

The CGTO wants to ensure access to quarry sites and other mineral resources important for making tools and other cultural activities. In addition, some locations on NAFR are considered by the CGTO to be power places, and are associated with traditional healing ceremonies. CGTO would like to see the Air Force consider the cultural importance of specific geological features when military actions are planned.

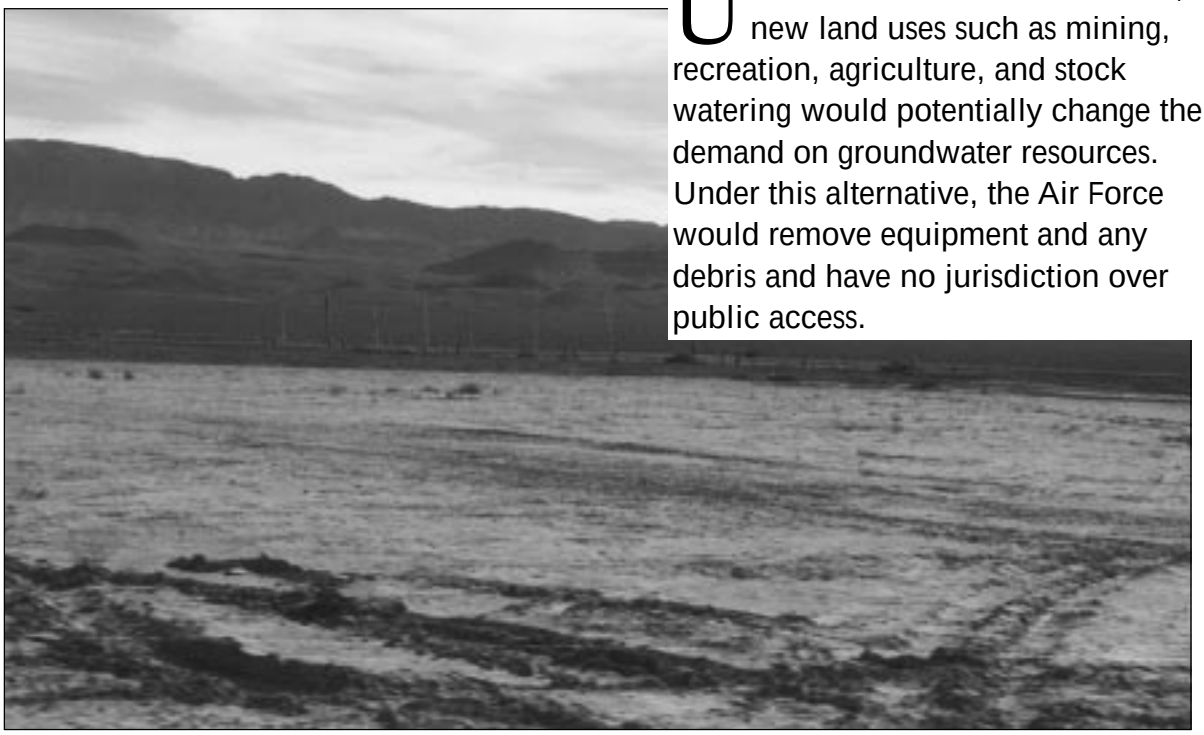
Under the No-Action Alternative, the CGTO feels that the BLM and USFWS will not be able to provide a level of protection to traditional cultural resources (which can include geological features and quarry sites) similar to that provided by restricted access on NAFR.

4.6 WATER RESOURCES

Water resources on NAFR would not change if Alternatives 1A or 2A were implemented. Range activities and the potential effect they would have on surface water occurrence, quality, and flow would be the same as currently exists for both ROI One and ROI Two.

Any change in water resources on NAFR would be limited to areas of non-renewed land or areas where co-use of the land would occur under Alternatives 1B or 2B. Changes in water use or water quality would be where land uses change from that which currently exists. Co-use activities would have limited potential to adversely affect surface water resources. Revitalizing or initiating new mining activities on non-renewed lands would have the potential to affect water quality due to runoff from mine tailings, process wastes, increased erosion, or other direct and indirect mining effects. The Air Force would have no decisionmaking authority on lands released to BLM under Alternatives 1B or 2B.

Under the No-Action Alternative, new land uses such as mining, recreation, agriculture, and stock watering would potentially change the demand on groundwater resources. Under this alternative, the Air Force would remove equipment and any debris and have no jurisdiction over public access.



Playa drainage areas are susceptible to damage and erosion if used by off-road vehicles. Restricted access minimizes this impact. The No-Action Alternative would increase the potential for off-road vehicle use.



Groundwater usage in developed areas of NAFR such as that pictured here at Indian Springs, and at TTR, includes domestic, landscaping, and industrial. These uses are not projected to change except under the No-Action Alternative.

4.6 WATER RESOURCES

The Air Force is committed under PL 99-606 to adhere to state water law. The Nevada State Engineer, therefore, permits water use on the NAFR.

This section addresses water resources within ROI One (range facilities) and ROI Two (NAFR land withdrawal area). Operation of the NAFR would not be expected to impact water resources in ROI Three.

4.6.1 Alternative 1A — Indefinite Withdrawal

4.6.1.1 SURFACE WATER

Surface water conditions on NAFR would be unchanged if this alternative were implemented. Range activities and the potential effect they would have on surface water occurrence, quality, and flow would be the same as currently exists for both ROI One and ROI Two.

4.6.1.2 FLOODPLAINS

The existing flooding conditions on the range would remain unchanged for both ROI One and ROI Two if this alternative were implemented. Many existing facilities (e.g., target areas, roads, etc.) are located on or near playas. These areas would be subject to the same hazards that currently exist on the range.

4.6.1.3 GROUNDWATER

Much of the groundwater available for use by the Air Force on the range is currently unused. The water demand on the range (ROI One and ROI Two) would be similar to that which currently exists if this alternative were implemented. Since this alternative does not include any significant increases in personnel, water demands of adjacent communities would not increase if this alternative were implemented. In addition, water quality impacts would be similar to those that currently exist. Current Air Force activities do not affect groundwater quality on NAFR. Underground storage of petroleum oil liquids (POL) would not be expected to change groundwater quality. Significant impacts to groundwater quality are limited to underground testing areas on the Nevada Test Site (NTS) and Pahute Mesa portion of NAFR. Risks associated with radioactive groundwater contamination are being evaluated on an on-going basis by the DOE, including assessment of potential off-site migration of contaminant plumes to the south-southwest by deep, regional aquifers.

4.6.1.4 WATER RIGHTS

Water rights on the range (ROI One and ROI Two) would remain unchanged if this alternative were implemented. Current water use is below appropriated amounts. However, as described above, the water demand on the range would be similar to the existing demand and, therefore, would not create a need for additional appropriations of surface or groundwater.

4.6.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

4.6.2.1 SURFACE WATER

Surface water on NAFR is very limited due to the low precipitation, high evaporation, low humidity, and wide extremes in daily temperature. Any change in these limited surface water conditions on NAFR (ROI Two) would be limited to areas not included in the renewal application or areas where co-use of the land would occur. In both cases, changes in surface water use or water quality would be where land uses change from that which currently exists. Co-use activities would have limited potential to adversely impact surface water resources. Future multiple use of lands not renewed would have the potential to change water quality due to the change in land uses. For example, should a full-scale mining operation be permitted by BLM, potential adverse impacts to water quality could occur due to runoff from mine tailings, process wastes, increased erosion, or other mining effects.

4.6.2.2 FLOODPLAINS

The existing flooding conditions on the range would remain unchanged for both ROI One and ROI Two if this alternative were implemented. Existing facilities (e.g., target areas, roads, etc.) would be subjected to the same hazards that currently exist on the range. Potential future development of lands not included in the renewal application would need to undergo further NEPA evaluation on a site-by-site basis to determine if new land uses would impact floodplains. Potential recreation, particularly vehicle use at Mud Lake, would have the potential to have short-term impacts to the playa.

4.6.2.3 GROUNDWATER

This alternative would not increase use or cause any further modifications to the majority of the range (ROI Two). Therefore, no impacts are anticipated for the majority of the range with respect to groundwater withdrawal or water quality. Similarly, no impacts are anticipated for the adjacent communities if this alternative were implemented since no significant increases in personnel is anticipated. Lands not included in the renewal application could allow BLM to evaluate for the revitalization of historic mining activities (or initiating new mining activities) such as those that have occurred at the Clarkdale Mining District. Surface and subsurface mining has the potential to require significant quantities of water that would likely be provided by groundwater extraction. Additionally, certain areas of the range would be available at times for co-use activities (i.e., recreation) that may involve minimal water use. However, the anticipated water demand of recreational activities (e.g., hiking, land sailing) would be negligible.

Adverse impacts to groundwater quality would be similar to those that currently exist on a portion of the range. Current Air Force activities do not change groundwater quality on NAFR. Significant impacts to NAFR groundwater quality is limited to underground testing areas Pahute Mesa. Risks associated with radioactive groundwater contamination are being

evaluated on an ongoing basis by the DOE, including assessment of potential off-site migration of contaminant plumes to the south-southwest by deep, regional aquifers.

4.6.2.4 WATER RIGHTS

Water rights on NAFR would remain unchanged if this alternative were implemented. The portions of NAFR that would be non-renewed or designated co-use areas would have the potential to be utilized for public or private activities. Future development on lands not included in the renewal application could likely increase the water demand. BLM would provide environmental review of future land use requests. Current water use is below appropriated amounts. In the event that additional water is needed, acquisition of existing appropriative water rights or the transfer of rights would be required.

4.6.3 Alternative 2A — 25-Year Withdrawal

4.6.3.1 SURFACE WATER

Similar to Alternative 1A, surface water conditions on NAFR would be unchanged if this alternative were implemented. Range activities and the potential effect they would have on surface water occurrence, quality, and flow would be the same as that which currently exists.

4.6.3.2 FLOODPLAINS

As with Alternative 1A, the existing flooding conditions on the range would remain unchanged if this alternative were implemented. Existing facilities (e.g., target areas, roads, etc.) would be subject to the same flooding hazards that currently exist on the range.

4.6.3.3 GROUNDWATER

Much of the groundwater appropriations on the range are currently unused. The water demand on the range would be similar to that which currently exists if this alternative were implemented. Similarly, if this alternative were implemented, the water demand on adjacent communities would be similar to that which currently exists since no significant increases in personnel is anticipated. Adverse water quality impacts would also be similar to those that currently exist on a portion of the range. Current Air Force activities do not change groundwater quality on NAFR. Significant impacts to groundwater quality are limited to underground testing areas on the Pahute Mesa portion of NAFR. Risks associated with radioactive groundwater contamination are being evaluated on an on-going basis by the DOE, including assessment of potential off-site migration of contaminant plumes to the south-southwest by deep, regional aquifers.

4.6.3.4 WATER RIGHTS

Water rights on the range would remain unchanged if this alternative were implemented. Current water use is below appropriated amounts. The water demand on the range would be

similar to the current demand and, therefore, would not create a need for additional appropriations of surface or groundwater.

4.6.4 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

4.6.4.1 SURFACE WATER

Any change in surface water conditions on NAFR would be limited to those areas not included in the renewal application. Future multiple use of the lands not renewed would have the potential to affect water quality due to changes in runoff, increased erosion, etc.

4.6.4.2 FLOODPLAINS

The existing flooding conditions on the range would remain unchanged for both ROI One and ROI Two if this alternative were implemented. Existing facilities (e.g., target areas, roads, etc.) would be subjected to the same hazards that currently exist on the range. Potential future development of lands not renewed would need to undergo further BLM NEPA evaluation on a site-by-site basis to assure that new land uses would not increase the flooding hazard. Potential co-use areas would be the same as discussed in Alternative 1A.

4.6.4.3 GROUNDWATER

No increase in water extraction, use, or water quality impacts would occur for the majority of the range if this alternative were implemented. Similarly, no increase in water extraction or use would occur on adjacent communities since no significant increases in personnel is anticipated. Lands not renewed on NAFR would likely be subject to multiple uses. If permitted by BLM, this could include the revitalization of historic mining activities such as those that have occurred at Clarkdale Mining District. Surface and subsurface mining has the potential to require significant quantities of water that would likely be provided by groundwater extraction. Potential future development of lands not renewed would need to undergo BLM NEPA evaluation on a site-by-site basis to identify impacts from any new land uses. Additionally, certain areas of the range would be available at times for co-use of recreational activities such as hiking and land sailing with negligible water demand.

Adverse groundwater quality impacts would also be similar to those that currently exist. Current Air Force activities do not change groundwater quality on the NAFR. Significant impacts to groundwater quality is limited to underground testing areas on the Pahute Mesa portion of the NAFR. Risks associated with radioactive groundwater contamination are being evaluated on an on-going basis by the DOE, including assessment of potential off-site migration of contaminant plumes to the south-southwest by deep, regional aquifers.

4.6.4.4 WATER RIGHTS

Water rights on the range would remain unchanged if this alternative were implemented. The portions of NAFR that would be non-renewed or designated co-use areas would have the

potential to be utilized for public or private activities. Future development on lands not included in the renewal application if permitted by BLM could likely increase the water demand. Current water use is below appropriated amounts.

4.6.5 No-Action Alternative

4.6.5.1 SURFACE WATER

If this alternative were implemented, there would be potential for BLM to permit multiple uses that could utilize or affect surface water resources such as mining or other public or private activities, livestock watering, and recreational activities. These land uses would be subject to separate BLM NEPA evaluation.

4.6.5.2 FLOODPLAINS

The existing flooding conditions on the range would remain unchanged if this alternative were implemented. BLM-permitted potential future land use would need to consider the areas of flood inundation and avoid potential hazards associated with development within flood prone areas.

4.6.5.3 GROUNDWATER

Under this alternative, new land uses permitted by BLM could change the demand on groundwater resources. Feasible land uses may require additional supply and therefore, additional groundwater withdrawal. Water uses would be subject to regulations of the Nevada Division of Water Resources and administered by the State Water Engineer.

The groundwater quality impacts that have occurred at the NTS and NAFR (associated with the underground testing of nuclear devices) would have a greater impact potential if the No-Action Alternative were implemented. This would be particularly true in those portions of the Pahute Mesa and west of the Pahute Mesa where underground testing has affected groundwater. The ongoing studies by the DOE will provide further insight as to the potential hazards that these contaminants currently pose to the public. These studies will also provide the baseline for evaluation of potential risks associated with future proposed activities in this area by BLM and the State of Nevada.

4.6.5.4 WATER RIGHTS

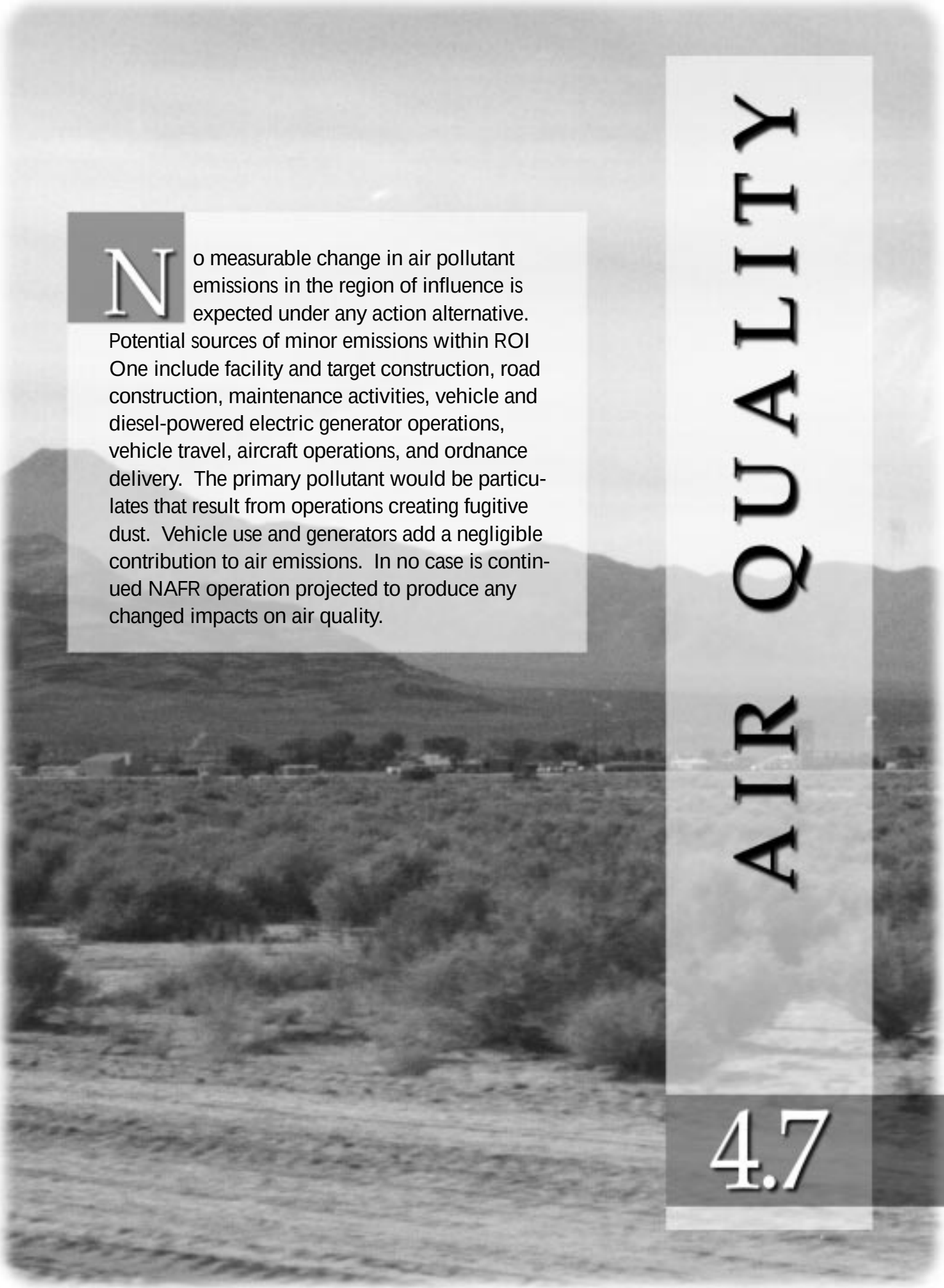
If this alternative were implemented, there would no longer be an Air Force need for existing surface water or groundwater appropriations on the range. These appropriations would be available for use by other public or private entities for uses permitted on the DOI or the BLM lands. Groundwater appropriations would be transferred from the Air Force and reassigned as appropriate by the State Water Engineers Office.

4.6.6 American Indian Issues Concerning Water Resources

The CGTO perceives any action associated with military training to have an adverse impact. With respect to surface hydrology and groundwater, the NARD states:

> Animals in these regions must drink this water; they do not have a choice. Water pollution also puts plant communities in jeopardy.
>
> Tribal governments are concerned that the migration of polluted water from contaminated areas into land outside the NAFR will have long-term adverse effects [AIWS 1997].

Access restrictions have protected some of these water sources from modern disturbance, but these same restrictions have excluded Indian people from using these sources. Under the No-Action Alternative, the CGTO feels that the BLM and USFWS will not be able to provide a level of protection to traditional cultural resources (which can include springs and other water sources) similar to that provided by restricted access on NAFR.



AIR QUALITY

4.7

No measurable change in air pollutant emissions in the region of influence is expected under any action alternative. Potential sources of minor emissions within ROI One include facility and target construction, road construction, maintenance activities, vehicle and diesel-powered electric generator operations, vehicle travel, aircraft operations, and ordnance delivery. The primary pollutant would be particulates that result from operations creating fugitive dust. Vehicle use and generators add a negligible contribution to air emissions. In no case is continued NAFR operation projected to produce any changed impacts on air quality.



Impacts due to combustive emissions from vehicles would be insignificant because most emission sources would be mobile and intermittent and pollutant impacts would not be large enough in a localized area to cause any exceedance of ambient air quality standards. Fugitive dust emissions from construction, maintenance, and operation activities on exposed soil would occur.

The level of activities proposed under Alternatives 1A or 2A would not differ substantially from activities that presently occur in this area.

The level of activities proposed under Alternatives 1B or 2B could differ from activities that presently occur. Increased recreation, particularly off-road vehicle use, could increase disturbed areas and generate additional fugitive dust. Construction and operation of any mining activity could result in a substantial new pollutant source. Any such development would be evaluated in separate environmental documentation.

Air quality impacts associated with Air Force activities under the No-Action Alternative would be associated only with surface and/or subsurface environmental cleanup.



Increased recreation and/or subsequent construction and maintenance activities by non-Air Force entities under the No-Action Alternative would be administered by the appropriate DOI agency. Any new projects would be regulated under the applicable local, state, or federal air pollution rules.

4.7 AIR QUALITY

Air quality in the project area and immediately surrounding region would be affected by emissions from sources associated with construction, maintenance, and operation of NAFR. The following sections provide a description of air quality impacts that would occur from each alternative. Emissions from any alternative that cause an exceedance of any state or national ambient air quality standard would result in environmental impacts.

4.7.1 Alternative 1A — Indefinite Withdrawal

4.7.1.1 CONSTRUCTION AND MAINTENANCE

Construction and maintenance activities are expected to occur under this alternative only at current levels. Air quality impacts associated with activities within ROI Two could occur from combustive emissions due to equipment and vehicle usage and fugitive dust emissions in the form of particulate matter less than 10 microns in diameter (PM_{10}) as a result of ground-disturbing activities and equipment / vehicle operations on dirt roads. Impacts due to combustive emissions from these sources would be insignificant, since most emission sources would be mobile and intermittent, and pollutant impacts would not be large enough in a localized area to cause any exceedance of an ambient air quality standard.

Air quality impacts during general maintenance activities would be short term and would cease at the end of the required maintenance. Additionally, the level of maintenance activity proposed under Alternative 1A would not differ substantially from activities that presently occur in this area. Therefore, air quality impacts from maintenance activities under this alternative would be insignificant.

4.7.1.2 OPERATIONS

Air quality impacts from the operation of Alternative 1A within NAFR would primarily be caused by generator emissions associated with operation of the numerous radar and communication sites in the NRC. Large amounts of particulate matter emissions could also occur from fugitive dust emitted during the delivery of ordnance from aircraft. Fugitive dust emissions associated with this activity would generally be small when non-explosive ordnance were used. However, use of live ordnance would have the potential to produce a substantial amount of fugitive dust, depending on the explosive potential of the ordnance and softness of the impacted soil. Fugitive dust emissions from ordnance deliveries would also be exacerbated during periods of high winds.

Some operational air quality impact would also occur from aircraft emissions. However, impacts due to aircraft emissions would be insignificant, since these emission sources would be mobile and intermittent and pollutant emissions would not be large enough in a localized area to cause any exceedance of an ambient air quality standard. Also, the ground-level impact of aircraft emissions released above the atmospheric mixing layer (which could range from a few

hundred feet to over 10,000 feet AGL, depending on the time of day and year) would be minimal due to the inability of the released pollutants to penetrate the mixing layer and mix downward to ground level.

Operational activities proposed under Alternative 1A would not quantitatively differ from activities that presently occur in this area. Therefore, operational air quality impacts associated with the alternative in this area would be insignificant.

The potential exists for project aircraft to impair visibility within a federal Class I area, defined as (1) a reduction in regional visual range and (2) temporary atmospheric discoloration or plume blight. Criteria to determine significant impacts on visibility within Class I areas usually pertain to stationary emission sources, because mobile sources are generally exempt from permit review by regulatory agencies. Since there are no readily available quantitative techniques to estimate visibility impacts from in-flight aircraft, the assessment is made in a qualitative manner. The nearest Class I area to NAFR is Death Valley National Park, approximately 10 miles from the western edge of NAFR. Emissions from aircraft would quickly disperse and would not be expected to affect visual range from a reference point 10 miles away. Additionally, plume blight would occur within an aircraft flight path, but only for a short duration immediately after passage of the aircraft. Therefore, impacts on visibility from the alternative within Class I areas in proximity to NAFR would be insignificant.

4.7.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

4.7.2.1 CONSTRUCTION AND MAINTENANCE

No different new construction is expected to occur under this alternative other than continuation of site-specific construction dictated by future mission changes. Air quality impacts associated with maintenance activities within ROI Three would be identical to those identified for Alternative 1A. Additionally, the overall level of activity proposed under Alternative 1B would not quantitatively differ from activities that presently occur. Therefore, air quality impacts from maintenance activities under the alternative would be insignificant.

Any construction on the non-renewed lands would be subject to BLM environmental review and permitting processes.

4.7.2.2 OPERATIONS

Air quality impacts from Air Force operations under Alternative 1B would be identical to those identified for Alternative 1A. The level of activities proposed under Alternative 1B would not differ substantially from activities that presently occur in this area. Therefore, air quality impacts from operational activities under the alternative in this area would be insignificant.

Operational activities that would occur on land not included in the renewal application by the Air Force would be administered by the DOI. Emissions from these activities would be regulated under the applicable local, state, or federal air pollution rules and regulations.

Potential PM_{10} emissions from recreation or co-use lands, particularly Mud Lake, would not be expected to contribute to non-attainment in the Las Vegas Valley due to the distances involved.

4.7.3 Alternative 2A — 25-Year Withdrawal

Air quality impacts associated with construction, maintenance, and operation of Alternative 2A would be identical to those identified for Alternative 1A. Proposed activities under this alternative would not differ substantially from activities that presently occur in this area. Therefore, air quality impacts would be insignificant.

4.7.4 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

Air quality impacts associated with construction, maintenance, and operation of Alternative 2B would be identical to those identified for Alternative 1B. Therefore, air quality impacts associated with this alternative would be insignificant.

4.7.5 No-Action Alternative

4.7.5.1 CONSTRUCTION AND MAINTENANCE

Air quality emissions associated with Air Force activities under the No-Action Alternative would be limited to clean up. Insignificant amounts of new combustion emissions due to equipment and vehicle usage and fugitive dust emissions in the form of PM_{10} may occur as a result of decommissioning activities.

4.7.5.2 OPERATIONS

Air quality emissions associated with the operation of the No-Action Alternative would decrease to 50 percent or less of present aircraft emissions due to decreased aircraft activities. Since the level of operations would decrease from the existing level of operations, and existing levels do not have significant impacts, impacts due to aircraft emissions under the alternative would remain insignificant.

4.7.6 American Indian Issues Concerning Air Quality

The CGTO perceives any action associated with military training on the part of the Air Force to have an adverse impact. In particular, the CGTO has argued that certain activities on Air Force withdrawn lands may have adversely affected the air, making food or other resources gathered from some parts of NAFR unusable.

The NARD states:

> Nellis AFB should make an effort to record systematically the adverse effects of military activities on the air quality of American Indian communities located near the NAFR. [AIWS 1997]

The CGTO wants to be included in future studies of air resources.

BIOLOGICAL RESOURCES

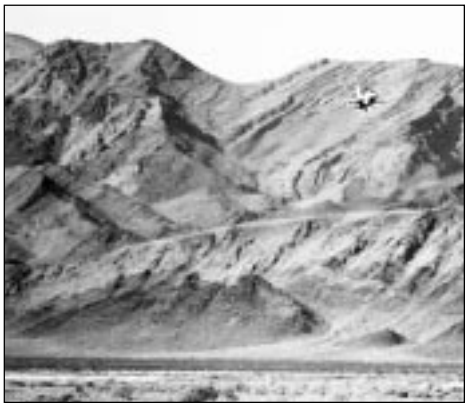
4.8

Native desert scrub and woodland vegetation remains predominant outside of training areas. The area directly impacted by training activities on NAFR represents a small fraction of the total land area. Training facilities and activities are concentrated in the valleys and bajadas, where they affect both local and regionally common vegetation types such as creosote bush scrub and saltbush scrub. Overall, the direct impacts of NAFR training on vegetation are considered less than significant.

Under Alternatives 1A and 2A, future impacts of NAFR activities on the biological resources within the NAFR withdrawn area would be expected to follow similar trends to the impacts resulting over the past 50 years of Air Force activities on this land. Native vegetation and associated species would be expected to dominate in ROI Two land not directly disturbed by Air Force activities and excluded from private and public access for safety and security issues

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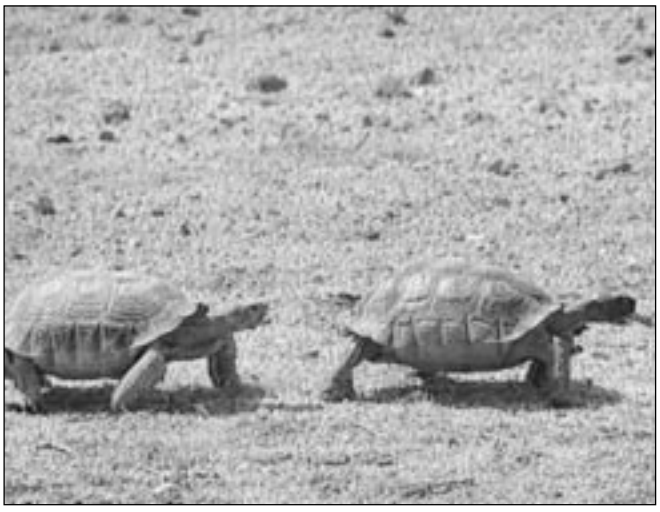
Indirect effects of the exclusive use of NAFR are the exclusion of mining, agricultural, and recreational use from the withdrawal area. This represents a beneficial impact for biological resources and results in general protection of these resources, especially in the large undisturbed areas of NAFR.



Under Alternatives 1B and 2B, local areas of soil and vegetation would likely be removed or otherwise disturbed in lands that become available for mining or public access. The resulting biological impacts would be localized, but collectively affect a sufficiently large area that the impacts could be significant if native desert scrub or woodland vegetation were eliminated or cover by native species substantially reduced due to disturbance.

The No-Action Alternative would have both positive and negative impacts on biological resources. The relinquishment of land to BLM would result in the cessation or reduction of military training activities that currently disturb vegetation and wildlife primarily in ROI One. These include disturbances caused by maintenance and use of test and training ranges, and the potential for wildfires, water and soil contamination, and erosion from Air Force activities. Aircraft overflights would continue at a reduced level.

Administration of the land under a multiple-use doctrine would allow public access and other uses such as mining, livestock grazing, or irrigated agriculture in ROI Two. Previously withdrawn lands would also become available for certain public uses, such as utility corridors needed to support expanding local populations. These land use changes are likely to have widespread negative impacts that would offset the short-term benefits of reduced military activity. Allowing private and public access into previously inaccessible areas would result in mortality of individual animals (including sensitive or special interest species) and the disturbance to wildlife habitat. Impacts resulting from public access and new land uses may have more of a detrimental effect on individual animals and populations of species than current activities on NAFR.



NAFR exclusive use areas remove two of the primary threats to desert tortoises, off-road vehicles and illegal collecting.



The exclusion of all human activities except those associated with DOD missions has effectively served to protect sensitive vegetation and species within NAFR.

4.8 BIOLOGICAL RESOURCES

4.8.1 Alternative 1A — Indefinite Withdrawal

Environmental impacts associated with this alternative are described below. The administrative change proposed under this alternative would not be expected to affect biological resources. Impacts associated with the re-allocation of funding would depend on which activities were eliminated, and which new activities could be funded as a result. For each sub-resource area, the discussion evaluates impacts at the three ROI levels.

The Integrated Natural Resource Management Plan (INRMP) for NAFR (Air Force 1997g) is a planning document that identifies the current and future management actions necessary to meet resource management goals. It is the document that guides the implementation of management resource actions. The INRMP for NAFR is a work-in-progress, which is evolving as inventory studies progress and input is generated through the Nellis Range Stewardship Dialogue. This process is part of the NAFR response to DOD Instruction 4715.3, which mandates a policy of ecosystem management on DOD installations (for background see Leslie et al. [1996]). These principles emphasize the management of installations such as NAFR to maintain biodiversity while ensuring the sustainability of military training activities. "Adaptive management," which allows the refinement of management strategies based on experimentation and monitoring results, is critical to successful ecosystem management. Any measures recommended in this LEIS for implementation through the INRMP must also be consistent with the principles of ecosystem management outlined in the DOD Instruction.

4.8.1.1 VEGETATION

Sources of potential impacts on vegetation on NAFR include air-to-ground gunnery and bombing practice at targets; maintenance and placement of targets and threat simulators; ground training, activities primarily in the vicinity of ISAFAF; and the use and maintenance of roads and utility lines.

These activities occur primarily in areas that have already been disturbed, with additional ground disturbance likely around the edges. The affected areas are concentrated on valley floors and adjacent bajadas. Much of the disturbance is concentrated on playas whose biological resource value is low because of the limited extent and duration of flooding and the general lack of wetland vegetation as compared, for example, with the extensive wetlands of Ash Meadows and the Pahranagat Valley. Localized erosion and soil contamination may occur, but is generally confined to the immediate areas of disturbance owing to the lack of flowing streams throughout the region and the concentration of ground-disturbing activities on level terrain.

Disturbances associated with roads that generally receive little use and are unfenced and with a variety of widely dispersed training facilities (see Chapter 1.0 for description), are not likely to hinder wildlife migration or influence the vegetation.

The direct impacts of continuing use are not significant, because of the disturbed nature of the affected areas, their wide dispersion, and the small fraction (approximately 3 percent) of the land area of NAFR that is affected. New land disturbing activities are subject to review and mitigation when warranted under NEPA.

Ground disturbance, including fires started by live ordnance or flares, may indirectly contribute to the spread of weeds, among which are foxtail or red brome (*Bromus madritensis* ssp. *rubens*) in the Mojave Desert and cheatgrass (*Bromus tectorum*) in the Great Basin Desert. The increase of these grasses and other weeds in desert scrub and woodland habitats can lead to increased fire frequency, causing "type conversion" from scrub and woodland to grassland vegetation. Such conversions, if they occurred over large areas, would be significant, threatening native plant and wildlife populations and degrading the ecological functions and human values associated with native desert habitats.

The use of chaff and flares on the NRC airspace is described in sections 1.5.4 and 3.3.3. The primary constituents of chaff fibers are silicon dioxide and alumina (aluminum oxide), with lesser amounts of oxides of calcium, magnesium, boron, sodium, potassium, and iron. The fibers have an aluminum alloy coating (99.45 percent aluminum) which includes trace amounts of copper, manganese, magnesium, zinc, vanadium, and titanium (Air Force 1997d). Chaff fibers are also coated with stearic or palmitic acid to aid their dispersion in the air. Chaff is deployed by aircraft using the NRC at a variety of altitudes and becomes widely dispersed by the wind, eventually settling to the ground. Soil sampling on the NAFR indicates that chaff fragments are frequently present in areas where training occurs (Air Force 1997d). Owing to the aridity of the NRC, decomposition of the chaff fragments occurs slowly through weathering (Air Force 1997d).

Increasing accumulations of metals deposited from chaff use can have adverse effects on plant growth (Bohn et al. 1979). However, the toxicity of aluminum and other metals to plants is normally associated with acidified soils from which cations, especially calcium, have been leached by rainfall. The likelihood of aluminum toxicity to plants on NAFR is minimal because the soils are neutral to basic, with soil pH averaging 8.2-8.9 on the South Range and 8.0-9.6 on the North Range (Air Force 1996d). The soils are buffered with calcium and other cations in salts retained near the surface because of evaporation. Other constituents of chaff--stearic and palmitic acid--are non-toxic vegetable oils that are degraded by weathering and microbial action, with no effect on soils or vegetation.

Given the nature of the soils and the wide dispersion of chaff over a land area of several million acres, it is not expected that chaff constituents, at the quantities deployed on the NRC, could accumulate in soil to the point of significantly affecting soil properties or plant growth (Air Force 1997d). During times when the range is heavily used, the total amount of chaff that is deployed amounts to about 400,000 bundles, each weighing about 0.1 kilograms, per year. Although this represents a large total mass, the quantities of aluminum and other metals being deposited on the land are probably several orders of magnitude less than the expected background concentrations in soils on the range. Aluminum deposition from ongoing chaff

use, assuming dispersion over roughly 1 million hectares (1 hectare = 2.47 acres), averages about 4 milligrams per square meter per year. In contrast, background amounts of aluminum in the upper 30 centimeters of the soil would be expected to be on the order of 5 to 10 kilograms per square meter, assuming that the soil consists of 5 to 10 percent aluminum as is typically the case (Bohn et al. 1979). As a result, annual deposition rates are probably less than one millionth of the existing background amounts, and average concentrations would not increase appreciably even after many decades of training, although there would be considerable variability depending on where chaff is most heavily deployed and how it is dispersed by wind. The potential impact on soils and vegetation is considered less than significant.

Flares are manufactured and used so as to minimize the possibility that burning material reaches the ground. Occasionally flares can continue burning and cause range fires (Air Force, Navy, and DOI 1991). This represents another type of disturbance that, in combination with the localized ground disturbances, could increase the abundance of undesirable weedy grasses in native scrub and woodland communities (Minnich 1995; Young 1995).

Future impacts of NAFR activities on the vegetation within the NAFR withdrawn area would be expected to follow similar trends to the impacts resulting over the past 50 years of Air Force activities on this land. Native vegetation would be expected to dominate in areas not directly disturbed by Air Force activities.

The available site descriptions (e.g., Air Force 1981, 1997g; The Nature Conservancy [TNC] 1995; Dames & Moore 1996) suggest that native desert scrub and woodland vegetation remains predominant outside of training areas, at least in non-wetland habitats. Accordingly, there is minimal risk of large-scale changes in desert vegetation beyond areas of immediate, ongoing impact.

The BLM requires the salvage of all valuable cacti and yuccas (e.g., Joshua trees) prior to land disturbing activities. The disposal of salvaged plants is coordinated by BLM and may include site restoration, landscaping public purpose facilities, or relocating material off-site for other projects. Efforts will be coordinated with the Forestry Program Lead for the Las Vegas Field Office.

Another indirect environmental consequence of the use of NAFR is the exclusion of mining, agricultural, and recreational use from the withdrawal area. Mining, agricultural, and recreational uses occur in the areas surrounding NAFR and DNWR. These uses are cited as threats to rare and endangered plants in Nevada. The continued withdrawal will exclude these activities and serve to protect the NAFR and DNWR from the adverse impacts of these activities. As noted in section 3.10, considerable areas of NAFR were subject to mining and agriculture (primarily livestock grazing) prior to the land withdrawal. These uses, along with increasing on- and off-highway traffic and recreational activity would have continued to result in the removal of native vegetation and the spread of weeds, if the withdrawal had not occurred. This exclusion represents a beneficial impact which cannot be quantified but which

may offset to a considerable degree the localized adverse effects that occur as a result of military training. This comparison is discussed in more detail under the No-Action Alternative.

Potential impacts on vegetation under the MOA airspace are negligible since Air Force activities in this region are confined to altitudes and locations where they are unlikely to cause disturbance of the vegetation.

4.8.1.2 WILDLIFE

Impacts to wildlife on NAFR result from on-the-ground activities including continuing use of range targets, ground facilities, training areas, and roads. The impacted areas tend to be in valleys and on bajadas and amount to only about 3 percent of the land area of NAFR. Disturbed sites generally provide only marginal habitat for most wildlife species found in the area. In these areas, wildlife populations are affected by the direct mortality of individual animals, habitat alteration, and the alteration of species' normal behavior. No data are available on wildlife use of range targets, but such use is expected to be minimal given the removal of vegetation, lack of water, and recurrent noise and hazards associated with live ordnance use.

A number of range targets are in the vicinity of playas that are temporarily flooded by heavy rainfall and/or runoff in some years. The extent of ponded habitat that may be available coincident with periods of bird migration is unpredictable, and these habitats are, therefore, considered to be of low value to birds and other wildlife, although during wettest years they may be visited by migratory shorebirds (Air Force 1997b). Springs and other surface water resources that are critical to desert wildlife are not directly impacted by training on NAFR. Because of the relatively small areas that are affected, and the lack of critical resources within these areas, the impacts on wildlife associated with local disturbance are considered less than significant.

Localized increases in contaminant concentrations in the soil, attributable to the use of explosive ordnance, have been detected at NAFR bombing targets (Air Force 1996b). This phenomenon is highly localized in the degraded areas where ordnance delivery occurs. These areas do not provide food or habitat resources likely to attract wildlife, nor are there obvious mechanisms that would transport contaminants into other areas where food chain effects might be more likely. Hence, potential toxicity to wildlife due to contamination is not considered a significant risk on NAFR at present.

The use of NAFR results in increased noise levels, episodic noise and visual disturbances, and chaff and flare releases on ranges in accordance with their approved uses. Although individual animals may be adversely affected in the immediate vicinity of these activities, there is no evidence to suggest that wildlife populations are reduced on the range relative to adjacent similar habitats (Air Force, Navy, DOI 1991). Much of the concern over noise impacts on wildlife comes from studies and anecdotal reports of the reactions of nesting raptors, colonial shore- and waterbirds, and migratory waterfowl (e.g., Gladwin et al. 1987; Lamp 1989), none of which occur in the areas most likely to be affected by overflight activity on NAFR.

Given that these activities occur in previously impacted areas constituting a small fraction of the land area of NAFR, and do not affect critical habitat resources, impacts on wildlife are generally not significant. Conversely, the exclusion of mining, agricultural, and recreational uses results in reduced habitat impacts and levels of disturbance to desert wildlife on NAFR. The withdrawal of NAFR results in the exclusion of mining, agriculture, and recreational use. These activities have been cited as threats to rare and endangered plants in Nevada.

Under Alternative 1A, special use airspace associated with NAFR would continue to be used in accordance with FAA / Air Force designations. It is assumed that current Memoranda of Understanding (MOUs) and standard operating procedures (SOPs) that lessen potential noise impacts on sensitive receptors, including the DNWR, Pahranagat National Wildlife Refuge (NWR), state wildlife management areas, and National Forest lands (Air Force, Navy, DOI 1991; Air Force 1994b), would remain in effect. These restrictions include the following:

- Avoidance of Pahranagat NWR by 1 nautical mile (NM) horizontally and 2,000 feet AGL, with supersonic overflight restricted to 5,000 feet AGL.
- With respect to the DNWR, avoidance by 2,000 feet AGL when using the Desert MOA, and restriction of supersonic flight to above 5,000 feet AGL within R-4806.
- Avoidance of Key-Pittman Wildlife Management Area by 2,000 feet AGL, with supersonic overflight restricted to 5,000 feet AGL.

Although the reactions of individual wildlife to aircraft noise are widely documented, the population and ecosystem effects of military flight training activities are uncertain. The most rigorous studies of wildlife responses to jet aircraft or simulated jet aircraft noise have shown little or no effect beyond temporary startle responses by individuals of most species (Ellis 1981; Black et al. 1984; Lamp 1989; Ellis et al. 1991), without the suggestion of effects at the population level (Air Force 1994a). Most importantly, there is no evidence that wildlife populations are diminished in areas subject to overflight by military aircraft. At NAFR, this may be partly due to the SOPs mentioned above as well as the exclusion of mining, agriculture, and recreation uses.

As described above in section 4.8.1.1, the continuing use of chaff on the NRC is not expected to affect soil and vegetation. A laboratory test indicated that chaff as normally deployed does not fragment into particles small enough (i.e. PM_{10}) to present a respiratory hazard, although the fibers may be partially inhaled and cause irritation to mucous membranes (Air Force 1997d). Local accumulations of windblown chaff may occur under rocks or plants, or along the margins of water bodies. In such cases, chaff could be ingested by wildlife, although there is no reason to expect deliberate consumption by animals. Investigators on the NRC found no evidence that chaff was being picked up and carried to nests or burrows by wildlife (Air Force 1997d). There is no evidence that chaff use has any long-term effects on wildlife populations on the NRC or other locations (Air Force 1997d). The continuing use of chaff is considered an insignificant impact on wildlife.

Range fires may occur as a result of Air Force activities as well as natural causes (lightning strikes) on NAFR. Fires can increase the spread of weeds, especially non-native grasses, which in turn contribute to increased fire susceptibility (Minnich 1995; Young 1995). The replacement of large areas of desert scrub and woodland habitats by non-native grassland could reduce the local diversity and abundance of native wildlife. This impact, if it occurred, would be significant.

Future impacts of NAFR activities on wildlife species inhabiting the NAFR would be similar to those impacts that have already occurred as a result of past Air Force activities. Future impacts could be assessed in a similar fashion to those discussed under the vegetation section (i.e., random sampling and periodic reassessments to detect large scale changes).

In conclusion, this alternative is not expected to significantly affect wildlife subject to overflight, given the continuation of existing MOUs and SOPs governing special use airspace associated with NAFR.

4.8.1.3 AQUATIC AND WETLAND HABITATS

Significant aquatic and wetland habitats on NAFR are limited to well-known springs, creeks, and impoundments and are not directly or indirectly affected by ongoing training activities (Figure 3.8-1; Appendix G). As discussed in section 3.8, surface water resources on the North Range have been severely impacted by wild horses due to trampling where the animals congregate. A joint Air Force-BLM program to construct horse exclosures at these sites is expected to have long-term beneficial impacts on the many types of native wildlife that depend on these resources.

Seasonally flooded playas have not been systematically studied, and the extent to which they are affected by current training activities is largely unknown. Localized disturbance has certainly occurred in many of the valleys on NAFR, where numerous targets are located. Being largely unvegetated, these areas would not qualify as wetlands, but they could be Waters of the United States under the CWA (33 CFR 328.3). As far as is known, these habitats do not provide significant resources for migratory birds or other biota (Air Force 1997b), suggesting that impacts on them are insignificant. It is possible, however, that for brief periods and/or in the wettest years, flooded playas are used by migratory birds, most likely during spring, and that training activities at those times and locations could cause birds to leave and/or avoid target areas in favor of less disturbed sites.

There are several important aquatic and wetland habitats overflown by aircraft training associated with NAFR. Effects on potentially sensitive wildlife were considered previously under section 4.8.12, Wildlife. No impacts on aquatic species are anticipated.

4.8.1.4 SPECIAL STATUS SPECIES

PLANTS

Most sensitive plant species known on NAFR (Table 3.8-2) occur in habitats that are not compatible with the siting of Air Force infrastructure that requires large, level areas. For this reason, there is very low potential for adverse effects on listed, proposed, or candidate threatened or endangered species. In general, land withdrawn for NAFR has long-term beneficial impacts on sensitive plants, by restricting livestock grazing, land development, and limiting ground-disturbance. It should be noted that these factors, which are frequently cited as threats to rare and endangered plants in Nevada (Mozingo and Williams 1980). The withdrawal of NAFR results in the exclusion of mining, agriculture, and recreational use. These activities have been cited as threats to rare and endangered plants in Nevada. None of the sensitive plant taxa identified as occurring on NAFR are threatened by training. Most do not occur in areas of potential direct impact (Table 3.8-2).

The only sensitive plants known to occur in the vicinity of targets or range-training activities are (1) Merriam's bearpaw poppy, which, because of its widespread occurrence (Figure 3.8-2), including many areas not impacted by training on NAFR, is not threatened by any localized impacts of training activities (TNC 1997); and (2) Parish's phacelia, which occurs in playas that are subject to training activities on South Range, but which has a population size of many millions of plants, spanning large areas in Indian Springs Valley and Three Lakes Valley during years of favorable rainfall (TNC 1997). Based on the abundance of Parish's phacelia in areas subject to ongoing military use, this species is not threatened by continuing activities associated with the land withdrawal. Not all of NAFR has been systematically searched. It is likely that sensitive plant taxa exist outside disturbed areas within NAFR. It is also possible that sensitive plant taxa exist in some areas not yet inventoried where training and ground disturbance occur. The continuation of existing land uses and Air Force activities within sites that are already established and recently used is not expected to significantly affect any special status plant populations because of the disturbed nature of these sites.

At least two sensitive plant taxa, Clokey eggvetch and Pahute Mesa beardtongue (Table 3.8-2), may be adversely impacted by wild horse grazing in drainages fed by springs on the North Range (TNC 1997). These plants may ultimately benefit from Air Force-BLM efforts to exclude wild horses from surface water sources.

At present, there is minimal overlap between training activities and the habitats known or likely to support special status plants. However, ground-disturbing activities in previously unused areas could impact special status plants. Existing distributional information on special status plants on NAFR is generally incomplete. Existing information would not rule out the occurrence of special status plants in most areas where future activities could be proposed unless recent botanical surveys at the appropriate time(s) of year had been done on the site (Table 3.8-2). The extirpation of a local population, if it occurred, could be a significant impact, depending on the rarity and endangerment of the affected species. In the past, TNC has

worked with Nellis to inventory and evaluate vegetation resources. Depending on funding, this work is expected to continue in the future. Such inventories reduce the likelihood that local populations of rare plants would be inadvertently threatened by military training activities.

WILDLIFE

Alternative 1A would not adversely affect any federally listed, proposed, or candidate threatened or endangered species, with the exception of the desert tortoise. Supporting information and analysis is provided below.

The only listed species that is known to occur in areas of direct impact is the desert tortoise (threatened). Protective measures (which include a training program, desert tortoise relocations, the restriction of off-highway use, and the presence of a qualified biologist) and compensatory measures (the transferal of $50,000 to the Desert Tortoise Habitat Conservation Fund, which will benefit tortoise populations in the entire northeastern Mojave Desert region) have been adopted by the Air Force and have resulted in the USFWS' issuance of a Biological Opinion stating that "current training … is not likely to jeopardize the continued existence of the desert tortoise and is not likely to destroy or adversely modify designated critical habitat" (USFWS 1997). Adverse impacts to the tortoise and its habitat would occur on a limited portion of the South Range that is used for air-to-ground weapons training. The impact amounts to the degradation of about 971 acres of habitat, and an annual take of up to 12 tortoises. When considered on a rangewide basis, impacts to desert tortoise would be an insignificant impact because the South Range is low to very low density habitat, and represents a very small percentage of the desert tortoise habitat available in the Northeastern Mojave Recovery Unit.

Other listed species that may occur on NAFR include the bald eagle and peregrine falcon, both of which may occur as occasional transients, but do not nest or overwinter anywhere on the range owing to the lack of appropriate habitat. Either species may occur frequently in winter or as a transient forager at other times in airspace associated with NAFR. Both are associated with wetlands and are most likely to occur in the Pahranagat Valley area of the Desert MOA. The SOPs explained in section 4.8.1 2 have horizontal and vertical "setbacks" from aerial combat training, and provide a reasonable assurance of insignificant impacts on these species and other birds occurring in these wetland habitats.

The impacts resulting from wild horses, especially to water resources on NAFR, are documented in the INRMP (Air Force 1997g). The BLM is responsible for managing the wild horse herd size. Management is ongoing, with round-ups occurring every 3 to 4 years. Other proposed control measures include maintaining free-roaming horses only on the NWHR, installing fences around important water resources, monitoring of the horse population and creating additional man-made water sources so horses will avoid natural springs.

Several listed fishes occur in waters under the MOA airspace (Table 3.8-2). Fishes and other aquatic organisms are unlikely to be affected by jet aircraft overflight and no impacts are anticipated. As explained in section 4.8.1.2, the continuing use of chaff is considered an insignificant impact to wildlife, including special status species.

Other special status species (federal species of concern, Table 3.8-2) and large mammals that are of special interest such as the desert bighorn, mule deer, and pronghorn antelope are unlikely to be significantly affected by ongoing use of the range and associated airspace, because (1) the affected areas have already been exposed to repeated activities of the type that would continue; (2) the affected areas represent a small fraction of the ranges inhabited by each species; and (3) despite observations of temporary disturbance to wildlife, there is no evidence that military aircraft training is adversely affecting wildlife populations.

Finally, there is a potential beneficial impact on special status and special interest wildlife associated with the exclusion from NAFR of non-military human uses including recreational, agricultural, and mining activities. This extent of restricted access and associated management is not possible on BLM lands. The withdrawal of NAFR results in the exclusion of mining, agriculture, and recreational use. These activities have been cited as threats to rare and endangered plants in Nevada. Public land uses would adversely affect wildlife habitat on the range, although effective management to balance the demand for public land uses with wildlife habitat protection would lessen the impact.

4.8.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

With respect to continuing operations in areas where land and airspace use would not change, this alternative has the same impacts as Alternative 1A. The land not included in the renewal application along the west boundary of NAFR and in a portion of the Clarkdale and Wagner Mining Districts would allow public access, mineral exploration, or agricultural uses in a number of areas that have been designated as exclusive military use. Public access for recreation and other activities would be available for co-use within Mud Lake, the Kawich Range, and EC South. Impacts foreseeable as a result of these land use changes are described below.

4.8.2.1 VEGETATION

If permitted by BLM, mining exploration, agriculture, or public access could disturb local areas of soil and vegetation. The resulting impacts would most likely occur in areas not previously affected by military use, and so would be new impacts, adding to the extent of disturbance on NAFR. The acreage that would be affected is uncertain. Impacts would be localized, but could collectively affect a sufficiently large area such that impacts could be significant if native desert scrub or woodland vegetation, or other native species were eliminated or substantially reduced due to disturbance.

Prior to opening non-renewed areas, BLM may need to systematically map and evaluate vegetation in terms of vulnerability to long-term elimination or replacement by undesirable weeds such as cheatgrass. Agricultural and mining leases, public access corridors, and other facilities or infrastructure should be sited on vegetation types that recover more quickly from disturbance and are more widely distributed, such as, for example, shadscale scrub as opposed

to Joshua tree woodland. Previously disturbed land should be utilized preferentially. Plans to control noxious weeds that have the potential to spread beyond the immediate area of disturbance would be needed in conjunction with public or commercial access.

4.8.2.2 WILDLIFE

Under this alternative, wildlife could be impacted by the loss or alteration of vegetation discussed above, and species that are more sensitive to human activity (e.g., pronghorn antelope, bobcat) would tend to be locally replaced by those that are more tolerant (e.g., jackrabbit, coyote). These impacts could be significant, analogous to those on vegetation, to the extent that impacts occur over a large area.

Steps to avoid impacts to wildlife are similar to, and typically done in conjunction with steps to reduce vegetation impacts. BLM areas subject to changing land uses would need to be evaluated in terms of wildlife habitat values, and former NAFR areas with the lowest values could be utilized for new activities such as grazing and mining leases or public access corridors.

4.8.2.3 AQUATIC AND WETLAND HABITATS

Under this alternative, several aquatic and wetland habitats may be affected by land use changes. Surface waters are not known to be present in the vicinity of the Clarkdale Mining District (Air Force 1997g; compare Figures 3.5-7 and 3.8-1). Because of the importance of springs or other surface water sources to desert wildlife, the absence of these resources should be confirmed in any areas subject to non-renewal to mitigate potential impacts. Other areas where co-use could occur should also be evaluated for potential surface waters, aquatic and wetland habitats that may be important to wildlife on a seasonal or permanent basis. These habitats need to be avoided spatially or temporally during seasons of use by wildlife. Water resources can be protected from wild horses by continued culling of herd size, maintaining free-roaming horses only in the NWHR, and if needed, fencing around springs and the installation of man-made water sources for horses to use.

4.8.2.4 SPECIAL STATUS SPECIES

No federally listed, proposed, or candidate threatened or endangered species are likely to be present or affected in the areas where land use changes could occur under this alternative. Other special status plants or animals could, however, be present. Losses of a small fraction of the individuals or habitat present in any particular location would not be significant, but the extirpation of a local population would have the potential to be a significant impact. If local populations of special status species had the potential to be adversely affected by changes in land use or administrative management, the agency responsible for the new land use would be expected to coordinate with the agencies responsible for the management of the particular species and to develop appropriate strategies to reduce the potential impacts to insignificance.

4.8.3 Alternative 2A — 25-Year Withdrawal

From the standpoint of biological resources, Alternative 2A is identical to Alternative 1A.

4.8.4 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

From the standpoint of biological resources, Alternative 2B is identical to Alternative 1B, except for the unknown, potentially beneficial inventory or management consequences associated with administrative or funding changes.

4.8.5 No-Action Alternative

The No-Action Alternative would have both positive and negative impacts on biological resources. The non-renewal of land would result in the cessation of military training activities that currently disturb vegetation and wildlife on the range. These include disturbances caused by maintenance and use of test and training ranges, impacts from noise due to aircraft overflights, and the increased potential for wildfires, water and soil contamination, and erosion. The cessation of practice bombing and strafing, with the cleanup of exploded and unexploded ordnance, would result in reduced hazards to wildlife.

There would be additional short-term disturbances associated with abandonment and cleanup activities, followed by a period of little or no disturbance by federal agencies during which vegetation and wildlife habitats may recover, depending on the extent of modification that has taken place.

Subsequently, however, DOI administration of the land under a multiple-use doctrine would be expected to allow public access and uses such as mining, livestock grazing, or dispersed recreation. Previously withdrawn lands would also become available for certain public uses, such as utility corridors needed to support expanding local populations. It is unlikely that lands would be needed for community expansion.

Although large areas of the Range, including areas that are part of the DNWR, would probably remain undisturbed, increased mining, agriculture, and recreational land use, along with increased vehicular traffic (on- and off-highway), are likely to have widespread negative impacts that would offset the short-term benefits of reduced military activity. Sections 3.10 and 4.10 identify areas where mining would be most likely to occur. Agricultural land uses such as grazing and alfalfa growing would likely expand near existing operations where water is accessible.

The factors whose influence would likely increase are among those most frequently cited as threats to rare and endangered plants in Nevada (Mozingo and Williams 1980). Allowing public access into previously inaccessible areas would result in mortality of individual animals (including sensitive or special interest species) and the disturbance to wildlife habitat, including NAFR protected habitat for many special interest plant and animal species. For

example, the Desert Tortoise (Mojave Population) Recovery Plan (USFWS 1994) includes urbanization, agricultural development, and mining operations as important causes of widespread desert tortoise habitat destruction. Impacts resulting from public access and new land uses may have more of a detrimental effect on individual animals and populations of species than current activities on NAFR.

Under new federal management, the impacts of new land uses would need to be assessed under NEPA. Effective management would be needed to balance public demands for access with habitat protection. This management could not approach the exclusive limited use NAFR now has. Casual dispersed recreation and increased access to previously closed areas would be difficult to regulate. Public access would probably be accompanied by an increase in wildlife and habitat management activity on NAFR lands, which could lessen impacts or provide benefits for some species.

Beneficial impacts would occur in areas of local disturbance and lands under MOA airspace, whereas NAFR could experience mostly adverse impacts. Resource management planning activities within the BLM would be expected to develop a plan that would balance the desires of the public for multiple use of the previously withdrawn lands while protecting its biological resources.

Due to the large area potentially affected by impacts under this alternative, wildlife species (including special status and special interest species) inhabiting areas affected by increased human presence and land use changes would need to be inventoried by BLM. Data gathered on wildlife species should include specific information including population size, breeding habitat, migration patterns, and seasonal use of different habitats to better understand and quantify level of disturbances to wildlife species on what was NAFR.

4.8.6 American Indian Issues Concerning Biological Resources

The CGTO perceive any action associated with military training on the part of the Air Force to have an adverse impact. Also, local Indian people believe that actions taken as part of an environmental restoration and management program will directly impact biological resources.

The NARD states:

> The NAFR's projects and activities have impacted the region's plant and animal species. A number of them are currently candidates for listing as either threatened or endangered. Indian people have deep knowledge of the biological resources of the area and should participate directly with scientists responsible for the protection of its biological resources. Although systematic traditional-use plant studies have not been conducted on the NAFR, American Indians would like to see Nellis AFB take a step further and invite them to assist the agency in the planning and implementing of ecosystem management programs at the NAFR. [AIWS 1997]

The CGTO also recognizes the protection offered to resources by the restricted status of lands on NAFR. The CGTO considers environmental restoration a worthy goal, but feels Indian people should be involved in designing such programs. They should also be allowed to assist in other ways on revegetation and reclamation projects. These recommendations would apply if an action alternative or the No-Action Alternative were implemented.

CULTURAL RESOURCES

4.9

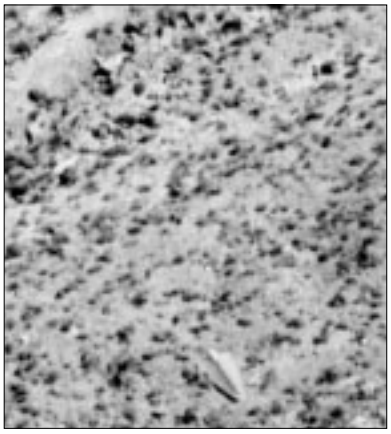
This impact assessment for cultural resources centers on the concept of cultural resource significance. Federal law can protect significant cultural resources. Impacts to cultural resources were assessed by:

- identifying the differences among NAFR alternatives and scenarios relevant to cultural resources;
- identifying existing impacts to NAFR cultural resources;
- understanding potential changes in NAFR associated with alternatives;
- understanding the potential for significant cultural resources to be affected; and
- determining the extent, intensity, and context of the effects of alternatives.



CULTURAL RESOURCES

The Air Force has initiated consultation with the Nevada State Historic Preservation Officer (SHPO) and with 18 American Indian groups cooperating under the aegis of the Consolidated Groups of Tribes and Organizations (CGTO). These groups are from the Western Shoshone, Owens Valley Paiute and Shoshone, Mojave, and Southern Paiute people. This consultation regarding the potential effects on cultural resources within ROIs One, Two, and Three included identification of known traditional cultural resources potentially affected by continuation of the range withdrawal or termination of land withdrawal. The importance of traditional cultural resources is discussed in the "Native American Resource Document" prepared by the CGTO.



To avoid potential vehicle impacts to environmental resources (such as cultural resources), many target darts and attached cables that have drifted down on hillsides are left in place on NAFR.

Under alternatives 1A and 2A, potential sources of impacts to archaeological and architectural resources would be a continuation of NAFR actions that potentially affect cultural resources, as follows:

- Access restrictions that both protect resources and make authorized access difficult.
- Ground disturbance in ROI One resulting from construction, operations, or maintenance of existing roads, utilities, facilities, and targets.
- Disturbance in ROI Two and ROI Three associated with noise, vibrations, and visual intrusions from overflights.

Under alternatives 1B and 2B, potential sources of impacts would include potential disturbance to archaeological, architectural, and traditional cultural resources from co-use or increased public access to selected areas.

No-Action Alternative potential sources of impacts include the following:

- Access-related impacts resulting from increased vandalism.
- Alterations in land status that result in changes in legal protection or enforcement of protection.
- Any modifications in land management policy that expose cultural resources to potential impacts from consumptive or non-consumptive uses.



The arid climate combined with exclusive use and restricted access has preserved significant historic and early American Indian resources within NAFR.

4.9 CULTURAL RESOURCES

This section begins with the general nature of potential impacts to cultural resources and a description of how to assess them. First, there is a description of the impact assessment process in relation to archaeological, architectural, and traditional cultural resources. Because the five alternatives proposing treatment of the military withdrawal process (Alternatives 1A, 1B 2A, 2B, and No Action) have common elements, potential impacts to cultural resources are addressed in general in section 4.9.1. Section 4.9.2 discusses compliance with Section 106 of the National Historic Preservation Act (NHPA). Sections 4.9.3 through 4.9.7 examine specific impacts under each alternative. Section 4.9.8 details American Indian concerns about cultural resources as they are summarized in *American Indian Perspectives to the Legislative Environmental Impact Statement for the Nellis Air Force Range Renewal, Nevada, Native American Resource Document* (AIWS 1997). Section 4.14.1 discusses environmental justice as it relates to American Indians.

4.9.1 Impact Assessment Process

Impacts to cultural resources were assessed by (1) identifying the differences among alternatives as they relate to cultural resources; (2) identifying the range of existing impacts to cultural resources on NAFR; (3) understanding the areas of NAFR and those under affected airspace that would be affected by the alternatives; (4) understanding the potential for significant cultural resources that could be affected; and (5) determining the extent, intensity, and context of the effects. The impact assessment process for cultural resources, as outlined in federal historic preservation laws and regulations, centers on the concept of cultural resource significance. Federal law requires consideration of cultural resources, including traditional cultural resources, under Archaeological Resource and Protection Act (ARPA), American Indian Religious Freedom Act (AIRFA), Native American Graves Protection and Repatriation Act (NAGPRA), Federal Land Policy and Management Act (FLPMA), and Executive Order (EO) 13007. However, the NHPA provides the greatest protection to significant cultural resources, that is, those that are eligible for nomination to the National Register of Historic Places (NRHP). (See discussion of NHPA in section 3.9.1.)

As part of the NRHP eligibility assessment process, the Air Force initiated consultation with the Nevada State Historic Preservation Officer (SHPO) and with 18 American Indian groups cooperating under the aegis of the CGTO (refer to section 3.9.5). The consultation regarding potential effects on cultural resources within ROIs One, Two, and Three included identification of known cultural resources potentially affected by the proposed action (AIWS 1997, Air Force 1997c). This analysis is based in part on the information provided in *Nellis Air Force Base Cultural Resource Management Plan* (CRMP) (Air Force 1997c). The importance of traditional cultural resources is discussed in the NARD prepared by the CGTO (AIWS 1997).

Impact analysis for archaeological and architectural resources employed guidelines and standards set forth in the Section 106 process defined under the NHPA (see section 4.9.2). This process requires identifying significant cultural resources potentially affected by an action,

determining the effect of that action, and implementing measures to avoid, reduce, or otherwise mitigate those effects.

An action results in adverse effects to a cultural resource eligible for nomination to the NRHP when it alters the resource's characteristics, including relevant features of its environment or use, that qualify it for inclusion in the NRHP (36 CFR 800.9[b]). Potential impacts could include the following:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property from, or alteration of the character of, the property's setting, when that character contributes to the property's qualification for the NRHP;
- Introduction of visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
- Neglect of a property resulting in its deterioration or destruction; and
- Transfer, lease, or sale of the property.

4.9.1.1 GENERAL SOURCES OF IMPACTS TO ARCHAEOLOGICAL AND ARCHITECTURAL RESOURCES

Impacts can be categorized according to their source. In this section, the sources of potential impacts to archaeological and architectural resources are summarized for each alternative, followed by a more detailed discussion of impact sources. Potential sources of impacts to NRHP-eligible archaeological and architectural resources considered for this LEIS include the following:

- Change in access rules;
- Alterations in land status;
- Transfer to a different governing land management policy;
- Ground disturbance from construction, air and ground operations, or maintenance (no specific undertakings are planned for any of the alternatives, but changes in land use could result in these activities); and
- Noise, vibrations, and visual impacts from construction, air and ground operations, or maintenance (no specific undertakings are planned for any of the alternatives, but changes in land use or airspace utilization could result in these activities).

ALTERNATIVES 1A AND 2A — INDEFINITE WITHDRAWAL AND 25-YEAR WITHDRAWAL

Under alternatives 1A and 2A, potential sources of impacts to archaeological and architectural resources within all ROIs would be the continuation of those actions that affect existing cultural resources at the time of the NAFR LEIS, including the following:

- Ground disturbance resulting from construction, air and ground operations or maintenance of existing roads, utilities, facilities, and targets;
- Noise, vibrations, and visual intrusions from construction, air and ground operations, or maintenance; and
- Access restrictions consistent with Air Force mission requirements.

Existing military targets, facilities, roads and utility lines would continue to be used. There would be no changes in military air traffic. Changes in the use of, or additions to, any of these range features would still require separate environmental analyses with associated impact assessments. Responsibility for such environmental analyses would remain with the overseeing agency (refer to Chapter 2.0).

ALTERNATIVES 1B AND 2B — INDEFINITE AND 25-YEAR WITHDRAWAL/MODIFICATION OF LANDS AND/OR ADMINISTRATION

For Alternatives 1B and 2B, potential sources of impacts to archaeological and architectural resources within all ROIs would be the continuation of those actions that have affected existing cultural resources since 1986. In addition, a portion of NAFR lands would be returned to BLM jurisdiction. Other portions of the withdrawn lands could be made available for recreation co-use. Potential sources of impacts include the following:

- Change in access rules;
- Alterations in land status;
- Transfer to a different governing land management policy;
- Ground disturbance resulting from military air and ground operations, military or civilian construction or maintenance activities, general civilian use (e.g., off-highway vehicles, grazing, mining), or maintenance of existing roads, utilities, facilities, and targets;
- Noise, vibrations, and visual intrusions from construction, air and ground operations, or maintenance.

NO-ACTION ALTERNATIVE

Under the No-Action Alternative, in ROI One and ROI Two all existing withdrawn lands would come under the jurisdiction of the BLM or DNWR (USFWS) and would be subject to those agencies' land use decisions. Potential sources of impacts to archaeological and architectural resources could include the following:

- Change in access rules, such as
  - possible increased access to some locations of sensitive cultural resources within ROI One and ROI Two; or a
  - change in traffic patterns.
- Alterations in land status as the result of a change in jurisdiction from Air Force to BLM and DNWR (USFWS).
- Transfer to a different land management policy that could allow
  - consumptive use (e.g., mining or grazing); or
  - non-consumptive use (e.g., hiking or off-highway vehicle use).
- Ground disturbance resulting from construction, air and ground operations, or maintenance.
- Noise, vibrations, and visual impacts resulting from construction, air and ground operations, or maintenance. These could include the following:
  - changes in the source of noise, vibration and visual intrusion;
  - continuation of military overflights; or
  - addition of effects from multiple use, such as mining machinery, recreational vehicles, or other civilian traffic.

Within ROI Three, potential sources of impacts for the No-Action Alternative could include reduction in noise, vibrations, and visual intrusions from overflights. Under No-Action military overflights would continue in the ROI Three airspace at a reduced level.

4.9.1.2 GENERAL EFFECTS OF IMPACTS

IMPACTS RELATED TO ACCESS

Access to most of the existing military land withdrawal at NAFR is presently restricted. Anyone desiring entry to NAFR must coordinate access with range personnel. As a consequence of these restrictions, the general public does not have access to cultural resources on the range. However, under EO 13007 and agreements between the Air Force and local

tribes, American Indians are currently able to gain access to certain cultural resources on NAFR provided access corresponds to Air Force mission safety and security requirements.

Access to cultural resources on NAFR could potentially change from existing conditions in two ways: it could be made easier or more difficult. Either of these changes could lead to adverse effects, depending on the specific resource. For example, under a multiple-use management plan such as that governing BLM lands, access to cultural resources would be easier than under Air Force public access restrictions. Road construction on public lands associated with future permitted activities could also lead to improved access, although gates and fences might inhibit access in some locations.

Improved access for American Indians to traditional cultural resources might simultaneously lead to improved access for other people wishing to vandalize cultural resources. Also, increased recreational use of some areas might interfere with American Indian ceremonies or other traditional uses of sacred sites or other cultural resources.

Improved access, through opening an area to multiple use, construction of new roads, or improvement of existing roads, has the potential to increase vandalism. In a study of vandalism on archaeological sites in Colorado (Nickens et al. 1981), proximity to unpaved access roads proved to be a predictor for rates of vandalism (the closer to the road, the more likely the site would suffer vandalism). Purposefully destructive actions, such as unauthorized excavation and artifact theft, defacement, and illegal off-highway vehicle use, are prime sources of adverse effects to cultural resources (cf. U.S. Army Corps of Engineers 1992). Cultural resources could also be disturbed through inadvertent actions, such as people driving over a site. Increased vandalism could affect the types of cultural resources most likely to be determined eligible for nomination to the NRHP (e.g., historic buildings, large sites, rock shelters, or rock art). These resources are typically more visible than small lithic scatters or isolated artifacts.

Professional archaeologists and avocational archaeologists in the southern Nevada region have noted that outside the Nellis withdrawal lands, archaeological sites are likely to experience impacts from uses such as recreation and casual mining. For example, many rock art panels outside NAFR in southern Nevada have suffered impacts from graffiti, spray paint, removal or other intentional defacement. In contrast, the rock art sites on NAFR show relatively little defacement and may remain in a condition similar to what those outside NAFR might have been 100 years ago (personal communication, Myhrer 1998).

IMPACTS RELATED TO ALTERATIONS IN LAND STATUS

According to the NHPA, changes in land status sometimes can adversely affect a significant cultural resource if, under the new owner or manager, the resource is protected by less stringent historic preservation laws or is not protected at all. Cultural resources protected under the NHPA and other federal laws and regulations (including AIRFA, NAGPRA, and EO 13007) would continue to have the same legal protection under any of the land withdrawal alternatives as well as the No-Action Alternative, despite any changes in jurisdiction. This is

because a federal agency would still manage the land and be obligated to comply with federal laws and regulations.

However, under the No-Action Alternative, the Las Vegas District BLM would receive an additional 2.2 million acres to manage, including protecting cultural resources. At the current funding level, the BLM would feel the impact on its budget. The majority of BLM funds targeted for cultural resources are used for compliance with Section 106 of NHPA (see section 4.9.2), with little or no funding available for Section 110 compliance. Although avocational archaeologists provide invaluable help to agency archaeologists monitoring the condition of cultural resources, they are too few to protect known cultural resources from deterioration and vandalism (personal communication, Myhrer 1997). The DNWR, managed by the USFWS, already is responsible for Section 110 compliance, so their acquisition of jurisdiction over approximately 846,000 acres would probably have little effect.

IMPACTS RELATED TO MODIFICATIONS IN LAND MANAGEMENT POLICY

Under the No-Action Alternative, the military land withdrawal would end, although some restrictions to public entry could remain in hazardous areas or until hazardous waste and materials could be removed or otherwise rendered safe for human contact. Jurisdiction over much of the land within what was NAFR would be the responsibility of the BLM and USFWS. The BLM is committed to a multiple-use philosophy and could allow consumptive (e.g., mining, grazing) or non-consumptive (e.g., hiking, off-highway vehicle) uses of an area. Lands that would come under the jurisdiction of DNWR would probably be managed the same way non-overlapping lands are managed under the land withdrawal, i.e., as a *de facto* wilderness (see Wilderness and Wilderness Study Areas, section 3.11). This management policy restricts motorized vehicle use and construction of structures, while allowing people to have recreational access. The loss of NAFR sensitivity restrictions would be expected to result in a greater number of recreationalists on the DNWR.

IMPACTS RELATED TO GROUND DISTURBANCE

Under the existing land status, ground disturbance could result from delivering explosive and non-explosive training ordnance, or dropping aircraft or missile parts from aircraft; transit of ground vehicles; use by military personnel of facilities for temporary or extended periods of time; target and earthworks use and maintenance; access road and utility line use and maintenance; or structure use and maintenance. These types of actions now occur on approximately 3 percent of the military land withdrawal. No actions not previously approved are included in the proposed action and alternatives. Any facilities not included in Air Force planning documents at the time of the NAFR LEIS would be subject to all applicable environmental regulations.

If the land is no longer part of the military land withdrawal, the land under BLM jurisdiction could be subject to ground disturbance from mining, grazing, off-highway vehicle use; construction; use and maintenance of new roads or trails; use and maintenance of other facilities; and other consumptive or non-consumptive uses the BLM could permit under its

multiple-use land management mandate. Ground disturbance could also result from cleanup activities associated with the removal of military facilities. This could include the removal of targets and other facilities, the cleanup of any hazardous waste sites dating to before modern disposal regulations, and removing unexploded ordnance from the live ranges. Any actions proposed by the BLM would be subject to all applicable environmental regulations. Because the DNWR is managed as a *de facto* wilderness area (refer to sections 3.11 and 4.11), ground disturbance on lands that would come under its jurisdiction would probably come from human foot traffic and camping.

IMPACTS RELATED TO NOISE, VIBRATION, AND VISUAL IMPACTS

Studies have established that subsonic noise-related vibration damage to structures, even historic buildings, requires high decibel levels generated at close proximity to the structure and in a low frequency range (USFS 1992; cf. Battis 1983, 1988). Aircraft must generate at least 120 dB at a distance of no more than 150 feet to potentially result in structural damage (Battis 1988). For this analysis, the assessment of the potential for adverse effects to structures employs these decibel and proximity criteria.

A large, high-speed aircraft flying directly over a building had less than a 0.3 percent chance of damaging fragile structures such as wooden buildings (Sutherland 1990). In other words, the probability of an aircraft, such as a B-1B bomber, operating at 200 feet AGL at 540 knots true airspeed directly over such a structure, is extremely unlikely to cause damage. Operations at higher elevations would have a lower potential for causing damage as on-the-ground noise levels decrease as the aircraft's elevation rises. Structures offset from the flight track have an even lower probability of being affected by low-flying aircraft.

In a report to Congress entitled *Potential Impacts of Aircraft Overflights of National Forest System Wildernesses*, the USFS (1992) examined the issue of noise effects on historic resources. The study observes that "concerns that aircraft noise causes damage are based on speculation" and that the "evidence of potential damage risk is more theoretical than empirical" (USFS 1992). It goes on to indicate that most damage could be expected in already fragile and susceptible structures, such as adobe buildings. In this type of building, cosmetic cracks that could be caused by a number of factors such as weathering, natural settling, or noise vibrations, could be worsened through repeated exposure to noise. However, to cause immediate damage, the noise would have to have extremely high pressure levels (such as a sonic boom) and to have originated close to the structure, or to have a frequency that coincides with one or more of the structure's natural frequencies (USFS 1992).

Noise effects on buildings have been difficult to test and document in the field. However, thresholds for noise effects to architectural resources are generally agreed to "be specifically oriented to the frequency range below 30 Hz" (USFS 1992). A vibration study on a historic building at White Sands National Monument, New Mexico, determined that "medium level vibrations (1-20 mm / sec at 1-30 Hz) were the most dangerous" (King et al. 1988).

It is possible for sonic booms to adversely affect some cultural resources. Individual sonic booms vary considerably. The average boom pressure on the ground is normally about 1 pound per square foot (psf). Window breakage for overpressures on the order of 2 psf would be approximately 75 broken panes per million. Maximum overpressures of even 6 psf have an extremely low potential to damage structures or displace rocks (Battis 1983). Therefore, while there is some potential for sonic booms to cause window breakage in historic buildings, there is very low potential for structural damage to architectural resources or for displacement and breakage of the components of most archaeological resources.

The effects of noise on cultural resources may also be related to setting. Noise that affects setting may be caused by construction and maintenance of facilities and by machinery or vehicles. Aircraft noise and overflights can also potentially affect setting. To be adversely affected, the setting of a resource must be an integral part of the characteristics that qualify the resource for listing on, or eligibility for, the NRHP. Because of modern development, this is often not the case for significant cultural resources, especially in urban or semi-urban environments. Even in rural areas, noise intrusions from vehicles, farm machinery, and off-highway machines may create a noise environment that is unlikely to be consistent with the original setting of the property.

If the audible and visible aspects of the setting are fundamental to the resource's significance, then the nature and magnitude of potential impact from audible or visual intrusions on that setting can be evaluated. Intrusions sufficient to alter the setting can adversely affect the resource. The nature and magnitude of the impacts depend upon the characteristics of the affected cultural resource, the amount by which the sound level exceeds baseline noise levels, the other types of noise sources in the vicinity of the cultural resource, and the frequency with which people visit the resource.

With the military land withdrawal, cultural resources in ROIs One, Two and Three are subject to effects from noise, vibration and visual impacts. These conditions would not change with Alternatives 1A, 1B, 2A, or 2B. Under the No-Action Alternative, there could be as much as a 50 percent reduction in military aerial activity, and all effects related to military ground activity would cease. There could also be noise, vibration, and visual impacts stemming from some activities allowed on land that would come under BLM jurisdiction, such as mining or off-highway vehicle use. Land that would be the sole responsibility of DNWR (USFWS) would probably experience approximately one-half the current noise, vibration, or visual impacts.

4.9.1.3 General Sources of Impacts and Their Effects on Traditional Cultural Resources

Most potential sources of impacts to traditional cultural resources, including those that are not NRHP-eligible, are essentially the same as those associated with archaeological and architectural resources: access-related impacts; changes in land status; change in land management policy; ground disturbance; and noise, vibrations, and visual intrusions. However, the significance or severity of the impact must be assessed in part through

consultation with representatives of the concerned American Indian groups. Certain areas could be frequently used for traditional purposes, while others could be used on a less frequent basis and may be of less immediate concern to American Indians.

As with archaeological and architectural resources, impact analysis for traditional cultural resources requires identifying significant traditional resources potentially affected by an action, determining the effects of that action, and implementing, if possible, measures to avoid or mitigate adverse effects. For this reason, the Air Force has implemented a Native American Interaction Program (NAIP). Under this program, the Air Force is conducting on-going discussions with members of the CGTO addressing the potential effects of the alternatives.

ACCESS

Two aspects of access are of concern to the CGTO (AIWS 1997). First, many American Indians do not want restrictions placed on their access to traditional cultural resources. Although the Air Force is committed to working with the CGTO, it must find a balance between the needs of the Air Force mission, safety, and the traditional concerns of the CGTO. Visiting traditional cultural resources is an important part of some American Indian religious activities. Second, the CGTO is concerned that improved roads or loss of restricted access in some locations could increase visitation to sensitive locations by non-Indians. This could lead to vandalism and to interference with American Indian ceremonies.

ALTERATIONS IN LAND STATUS AND MODIFICATIONS IN LAND MANAGEMENT POLICY

The CGTO recognizes the protection offered by the restricted status of lands on NAFR (AIWS 1997). Transference of jurisdiction to another federal agency, while offering the same protection under the law, could result in different effects on traditional cultural resources. The BLM's multiple-use mandate from the FLPMA could result in adverse effects to traditional cultural resources from intrusive activities such as mining, grazing, off-highway driving, hiking, and camping. The DNWR, while imposing few access restrictions on its lands, generally prohibits motorized vehicle traffic and development so that adverse effects would be limited to those that might stem from hiking and camping.

GROUND DISTURBANCE

Aspects of all five range development alternatives that could disturb the ground have the potential to disturb traditional cultural resources in the area. American Indian archaeological sites are often traditional cultural resources, but non-archaeological traditional cultural resources (e.g., natural features, native animal or plant species) may also be disturbed.

NOISE, VIBRATION, AND VISUAL IMPACTS

Noise could potentially affect traditional cultural resources in a variety of ways (AIWS 1997). For example, traditional ceremonies and rituals by members of tribes included in the CGTO often depend on isolation, solitude, and silence. An aircraft flying overhead, even at very high

altitudes, may be deemed an intrusion by members of the CGTO. Overflights and vehicle traffic can be very disruptive for American Indians engaged in ceremonial activities, sometimes preventing these activities from being conducted at certain locations.

4.9.2 Compliance with NHPA, Section 106

In preparing this LEIS, the Air Force is complying with NEPA, NHPA and associated regulations (36 Code of Federal Regulations [CFR] 60.4, 36 CFR 800) that require that effects to cultural resources from federal actions be taken into consideration as part of the decision-making process. NHPA requires that federal agencies considering undertakings go through consultations with the SHPO and the Advisory Council on Historic Preservation (ACHP). This process also requires that concerns of interested parties, such as the CGTO, be considered. The Air Force is conducting government-to-government consultation with each of the American Indian groups who comprise the CGTO.

During initial NEPA consultations with the Nevada SHPO regarding renewal of the military land withdrawal, the Air Force indicated they would prepare a comprehensive CRMP in compliance with AFI 32-7065 and NEPA (refer to section 3.9) (Air Force 1997c).

The NHPA's Section 106 review process consists of consultation with the SHPO, cultural resources inventory (site identification), evaluation of each cultural resource's eligibility for listing in the NRHP, determination of effect, and avoidance or mitigation of impacts. The Nellis AFB CRMP (Air Force 1997c) outlines procedures for complying with Section 106 in the context of the management of all cultural resources on Nellis AFB and NAFR. The CRMP presents these procedures under the following general categories:

- Determine eligibility and nominate appropriate cultural resources for NRHP listing.
  - identify cultural resources and determine whether they meet any NRHP criteria. The Nellis five-year plan addresses the identification process.
- Determine steps to reduce or mitigate adverse effects. Implementation of a mitigation plan might not prevent all cultural resources from being disturbed, but would recover scientific and historical data from affected sites, which would mitigate their loss. Data recovery might not mitigate the loss of a traditional cultural resource.
  - forward determination and mitigation proposals to the SHPO for review, and
  - in some instances, nominate resources for listing on the NRHP.
- Develop monitoring and mitigation objectives.
  - a mitigation plan would also address long-term management of cultural resources, ensure that cultural resources are not inadvertently damaged by other activities, and provide measures to prevent or reduce vandalism.

- Program survey efforts, including identifying areas with the potential for significant resources.
- Develop a five-year plan that prioritizes Section 106 and Section 110 compliance.
- Develop a Memorandum of Agreement or programmatic agreement with the SHPO for addressing cultural resource issues and areas of concern such as the following:
  - American Indian concerns;
  - ARPA compliance;
  - preservation and mitigation strategies;
  - identification of traditional cultural properties and resources;
  - survey of historic buildings and Cold War facilities;
  - potential cultural resource management impacts to the Air Force mission or Nellis programs;
  - unexpected discoveries of archaeological materials;
  - hazardous spill impacting cultural resources; and
  - consultation procedures.
- Continue coordinating efforts with the CGTO as part of the Nellis AFB NAIP.

4.9.3 Alternative 1A — Indefinite Withdrawal

Under this alternative, the Air Force would continue to operate the NAFR as it has since 1986. Existing MOUs between the Air Force and other agencies with whom the Air Force shares jurisdiction would remain in force. The Air Force would continue to fulfill its Section 110 obligation for existing lands, and would conduct Section 106 inventory as part of environmental documentation as the need arises. Compliance procedures would be guided by the Nellis AFB CRMP (Air Force 1997c). This configuration would continue indefinitely, although it would be subject to periodic review.

4.9.3.1 ARCHAEOLOGICAL RESOURCES

Prior to the military land withdrawal, the lack of roads, sparse regional population, and absence of vehicles capable of traveling the rough terrain contributed to the preservation of cultural resources through isolation.

Following the 1940 military land withdrawal, and for the ensuing years, archaeological resources were either directly affected by ground-disturbing military operations or were left in their undisturbed condition. Disturbances from military operations generally occurred within approximately 3 percent of the land withdrawal (section 4.9.1). Some of the archaeological resources within these limited areas may have been damaged to such an extent that, regardless

of their condition prior to the military land withdrawal in 1940, they no longer have any potential to be eligible for nomination to the NRHP. However, other archaeological resources located within ROI Two outside of the areas of ground disturbance, have been subject to noise vibration, visual intrusion, and dropping ordinance. Within ROI Three outside of NAFR boundaries, the effects to archaeological resources from military activities are limited to noise, vibration, and visual intrusion.

Under Alternative 1A, those archaeological resources in ROI One that have been previously affected by ground-disturbing actions on NAFR would continue to experience the same effects. Because no additional actions that would affect archaeological resources are included in Alternative 1A, cultural resources outside the areas of ground disturbance but within the withdrawal (ROI Two), would experience the same effects as today. Archaeological resources in ROI Two include one NRHP-listed site, one NRHP-eligible site, and up to 15 historic mining districts that may include archaeological remains and may also be NRHP-eligible. Their NRHP eligibility would remain unchanged. Cultural resources under the airspace outside of NAFR boundaries (ROI Three) would also experience no change in impacts or NRHP eligibility from NAFR activities. Archaeological resources listed on the NRHP include two archaeological districts and 106 historic ghost towns that could include archaeological deposits.

4.9.3.2 ARCHITECTURAL RESOURCES

There may be as many as 15 historic mining sites and complexes within ROI Two on NAFR that retain excellent integrity and meet eligibility requirements for the NRHP. A portion of the NRHP-eligible Las Vegas and Tonopah Railroad (LV&T) railbed also passes through ROI Two. Under Alternative 1A, potential effects to architectural resources would remain the same as today. Under the airspace beyond the NAFR boundaries, there are four buildings and one historical district listed on the NRHP, as well as three eligible historic architectural resources and 106 historic ghost towns that may be architectural resources. Because no changes are proposed for the use of airspace, there would be no change in impacts on historic architectural resources within ROI Three from NAFR activities.

4.9.3.3 TRADITIONAL CULTURAL RESOURCES

As part of the Native American Interaction Program the Air Force is working with members of the CGTO to collect information on traditional cultural resources throughout NAFR. This information is confidential and still being compiled. The results of studies so far are that there are numerous traditional cultural resources throughout the military land withdrawal that is NAFR. These include a wide variety of resources and site types, as described in section 3.9.5. Known traditional cultural resources include all aspects of the natural environment, such as naturally occurring rocks, plants, animals, water, and air. Properties also may be archaeological locations such as rock shelters, rock art, quarry locations, or campsites.

As with other cultural resources, the effects of this alternative would be mixed. Members of the CGTO (AIWS 1997) feel that present Air Force military actions adversely affect traditional cultural resources, that Alternative 1A would continue to adversely impact traditional cultural

resources, and that damage would increase and spread through continued ground disturbance, noise, vibrations, and visual intrusions. Also, because access would continue to be restricted, American Indians would still need to schedule planned or desired use of specific areas within the military withdrawal. This limitation on access is considered an adverse effect by the CGTO, because the lands are traditional territory. However, through the NAIP, the Air Force is committed to finding equitable solutions to the Indians' need to have access to NAFR. Members of the CGTO also recognize that a benefit of this access restriction is that traditional cultural resources are protected from vandalism and casual destruction.

Beneath the airspace beyond the NAFR boundaries, impacts to traditional cultural resources could continue to be caused by noise and visual intrusions from military overflights, but the impacts would be no greater than baseline conditions.

4.9.4 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

This alternative resembles Alternative 1A in that it proposes a land withdrawal for an indefinite period, and the Air Force would continue to operate the NAFR as it has since 1986. However, under this alternative there would be changes in the withdrawal. A portion of land, including part of the Clarkdale and Wagner Mining Districts, would return to BLM administration. MOUs between the Air Force and other agencies with whom the Air Force shares jurisdiction (i.e., DOE, USFWS) could be revised, and jurisdiction and land management issues would be resolved with those agencies that now share responsibility for environmental compliance within the range. The Air Force would continue to fulfill its Section 110 obligation for existing lands for which it is responsible, and would conduct Section 106 inventory as part of environmental documentation as the need arises (cf. Air Force 1997c). This configuration would continue indefinitely, although it would be subject to periodic review.

4.9.4.1 ARCHAEOLOGICAL RESOURCES

As was the case for Alternative 1A, archaeological resources that were undisturbed prior to the military land withdrawal in 1940 either continued in their undisturbed state or were directly affected by ground-disturbing military operations. These disturbances occurred in circumscribed areas (ROI One) constituting little of NAFR, and may have resulted from construction, use and maintenance of targets, associated facilities (e.g., emitters, scoring locations), access roads and utility lines, and personnel facilities.

Outside of ROI One but still within the military land withdrawal (ROI Two), archaeological resources have not experienced major ground disturbing effects but could have been affected by military activities. Within ROI Three, not including ROI One, effects on archaeological resources resulting from military activities are limited to noise, vibration, and visual intrusion.

Under Alternative 1B, as for Alternative 1A, those archaeological resources that have been previously adversely affected by ground disturbance on NAFR would continue to experience

the same effects. One NRHP archaeological site and 16 that are NRHP-eligible are within ROI Two.

Under Alternative 1B, anticipated effects could occur from increased co-use recreation access and from non-renewal. One important feature would be a change in jurisdictional obligations, particularly with regard to which agency would have responsibility for NHPA compliance. All federal agencies have similar legal responsibility toward cultural resources under the NHPA and other laws and regulations, but land use policies and law enforcement funding availability varies from agency to agency. A change in jurisdiction could also lead to changes in public access to the land. The majority of NAFR would remain under Air Force jurisdiction, and thus would not be affected under Alternative 1B. In cases where access rules would change, such as the Clarkdale and Wagner Mining Districts or co-use recreational areas, archaeological resources could potentially be subject to adverse effects such as vandalism and erosion from increased access.

Cultural resources under the airspace outside of NAFR boundaries would not experience any change in impacts or NRHP eligibility under Alternative 1B. Two NRHP districts and 106 NRHP-eligible sites are within ROI Three.

4.9.4.2 ARCHITECTURAL RESOURCES

There may be as many as 15 historic mining sites and complexes, and a historic railbed within ROI Two that retain excellent integrity and meet eligibility requirements for the NRHP. Under Alternative 1B, any cultural resources in nonrenewal land or subject to co-use access have a greater potential for impact. Under the airspace outside the NAFR boundaries, there is one NRHP architectural district, four NRHP properties, and 109 NRHP-eligible architectural sites within ROI Three. Because no changes are proposed for the use of airspace, there would be no effect on historic architectural resources under Alternative 1B.

4.9.4.3 TRADITIONAL CULTURAL RESOURCES

As part of the NAIP, the Air Force is working with members of the CGTO to collect information on traditional cultural resources throughout NAFR. This information is confidential and still being compiled. The results of studies so far indicate that there are numerous traditional cultural resources throughout the military land withdrawal that is NAFR. These include a wide variety of resources and site types, as described in sections 4.9.1.3 and 3.9.5.

For traditional cultural resources on most of NAFR that remain under the jurisdiction of the Air Force under Alternative 1B, potential impacts would be the same as described for Alternative 1A.

Changes in land status through non-renewal of a portion of land or co-use could also affect traditional cultural resources. If any specific land is not renewed, such as the Clarkdale Mining District, traditional cultural resources that might be in this area would no longer be protected by restricted access, and would be exposed to a greater potential for vandalism or other forms

of disturbance. BLM is committed by philosophy, as well as obligated by law, to the preservation of traditional cultural resources. However, BLM is generally responsible for multiple uses on lands under its jurisdiction. Cultural resources in other areas that might be opened to recreation could be subject to vandalism or unintentional disturbance by recreational users of the area. Finally, for lands that would continue to have restricted access, changing jurisdiction from the Air Force to another federal agency (e.g., DOE) might require that the CGTO establish a relationship with the new agency to gain access to traditional cultural resources.

Members of the CGTO feel that Air Force military actions adversely affect traditional cultural resources, that Alternative 1B would continue to adversely impact traditional cultural resources, and that damage would increase and spread through continued ground disturbance, noise, vibrations, and visual intrusions (AIWS 1997).

Beneath the airspace beyond the NAFR boundaries, impacts to traditional cultural resources under Alternative 1B would continue to be caused by noise and visual intrusions, but the impacts from Air Force activities would be no greater than baseline conditions.

4.9.5 Alternative 2A — 25-Year Withdrawal

Under this alternative, the Air Force would continue to operate the NAFR as it has since 1986. Existing MOUs between the Air Force and other agencies with whom the Air Force shares jurisdiction would remain in force. The Air Force would continue to fulfill its Section 110 obligation for existing lands, and would complete the Section 106 process as part of environmental documentation as the need arises. This configuration would continue for 25 years, at which time the range renewal process would be repeated.

With the exception of the military land withdrawal expiring in 25 years instead of extending for an indefinite period, Alternative 2A is the same as Alternative 1A. Archaeological, architectural, and traditional cultural resources within the military withdrawal that have been undisturbed for the past 50 years would probably continue to be undisturbed. Some of the resources in areas intensively used by the military prior to the institution of environmental laws may no longer have the potential to be eligible for nomination to the NRHP. The NRHP eligibility of any archaeological resources under the airspace outside the NAFR boundaries would not change because of Air Force activities under this alternative.

4.9.6 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

This alternative is the same as 1B except that it proposes a 25-year withdrawal. The Air Force would continue to operate the NAFR as it has since 1986. However, as under Alternative 1B, there could be some nonrenewal of land in portions of the Clarkdale and Wagner Mining Districts to the BLM. Existing MOUs between the Air Force and other agencies with whom the Air Force shares jurisdiction (i.e., DOE, USFWS) could be revised, and jurisdiction and land

management issues would be resolved with agencies that now share responsibility for environmental compliance within the range. The Air Force would continue to fulfill its Section 110 obligation for existing lands for which it is responsible, and would complete the Section 106 process as part of environmental documentation as the need arises (cf. Air Force 1997c). This configuration would continue for 25 years, at which time the range renewal process would be repeated.

ARCHAEOLOGICAL RESOURCES

Environmental consequences to archaeological, architectural, and traditional cultural resources would essentially be the same as those described for Alternative 1B.

4.9.7 No-Action Alternative

Under this alternative, NAFR would close and all military ground activity would cease. In some cases, effects on cultural resources directly related to the cessation of activity could be considered either non-adverse or positive, although some effects could be considered ambiguous. In particular, ground-disturbing activities stemming from military activities, such as use and maintenance of facilities, including targets, roads, and utility lines, would no longer occur, and access to most cultural resources would no longer be restricted.

Balancing these beneficial or ambiguous effects are the potential adverse effects from losing exclusion and transferring jurisdictional responsibilities to other agencies. These agencies, including BLM, USFWS and DOE, operate under the same federal laws and regulations protecting cultural resources as other federal agencies and are equally committed to complying with Sections 106 and 110 of the NHPA.

Under the No-Action Alternative the following effects could occur:

- Access to cultural resources might be improved, possibly allowing American Indians unrestricted use of some traditional cultural resources and providing educational opportunities to the public.

- Opening access to areas throughout the existing military land withdrawal would increase the potential for cultural resources to be looted, vandalized, or affected by erosion from roads and trails.

- Mining exploration or exploitation, if allowed on BLM-managed land could potentially impact cultural resources, including historic mining sites and complexes.

- Grazing livestock, where permitted by the managing agency, can trample artifacts and cause increased erosion, both of which may damage cultural resources.

- Plowing or other mechanical activities associated with agriculture can disturb the surface and subsurface deposits of a cultural resource.

- Recreation, including rockhounding, hunting, and hiking, could expose cultural resources to damage from inadvertent trampling, erosion from roads and trails, and vandalism.

- Traffic, including recreational vehicles and vehicles used in mining or ranching, could cause visual and noise intrusions.

- Cultural resources would still be subject to noise, vibration and visual intrusion from aircraft overflights, although overflights under the No-Action Alternative are expected to be approximately 50 percent of the typical annual 1986 to 1995 levels (see Appendix A).

- Military resources less than 50 years old and of special significance (e.g., Cold War-related) might require documentation and monitoring in compliance with the NHPA.

- Cleanup of explosive and other possible hazardous materials required in some locations could potentially damage cultural resources.

4.9.7.1 ARCHAEOLOGICAL RESOURCES

The No-Action Alternative has the potential to affect all significant archaeological resources present in the NRC. Some effects might be considered neutral, while others may be adverse, beneficial, or a combination of both. Under ROIs One and Two, there are an estimated 1,800 known cultural resources on the 3 percent of NAFR that has been surveyed for cultural resources. This includes one that is listed on the National Register and 16 that are eligible. The majority of the remainder have not been evaluated for NRHP eligibility. Under the airspace of ROI Three, there are two NRHP districts, and an unknown number of archaeological resources that may be eligible for nomination to the NRHP.

Access. Removing restricted access to as much as 3 million acres within ROI Two could have an adverse effect on archaeological resources. Sites that have been undisturbed for more than 50 years could be exposed to a variety of impacts. Because of improved public access, deliberate vandalism at some sites could potentially be the most significant adverse effect that might result. Looters can destroy any archaeological site in a few hours. People ignorant of the law, who collect surface artifacts, also damage sites. Other adverse effects could arise from less intentional damage, including driving or walking across a site or erosion of a site caused indirectly by roads or trails nearby.

A potential benefit to lifting access restrictions on this large area would be possible opportunities to add to the public's knowledge of the history of southern Nevada. These opportunities could arise from research done as part of agency compliance with environmental laws invoked by a proposed undertaking.

Alterations in Land Status. Many archaeological resources within ROIs One and Two would be affected by the alteration in land status under the No-Action Alternative. However, if the

responsibility for compliance with Sections 106 and 110 reverts to the BLM or to another federal agency, the resources would still be protected by federal laws (in the case of DNWR, the USFWS already has Section 110 responsibilities). Transfer of jurisdiction would not be an adverse effect. However, as discussed in section 4.9.1, protection by policy and law does not afford the same protection from vandalism as restricted access.

Modifications in Land Management Policy. Although archaeological resources would retain protection under federal laws regardless of the federal agency controlling them, the resources could be exposed to adverse effects resulting from the multiple uses allowed on the land. Recreation, mining exploration, agriculture, and grazing could all expose archaeological cultural resources to adverse effects.

Ground Disturbance. Various future activities could cause ground disturbance on archaeological sites. However, any future undertakings requiring federal permits would also require compliance with the appropriate environmental laws and regulations, including the NHPA and the ARPA, probably with the BLM or USFWS as the lead agencies. Compliance would probably include mitigation of impacts to significant cultural resources. These undertakings could include grazing, mining, cleanup and removal of Air Force facilities, construction of transmission corridors, or construction of agency facilities (e.g., BLM or USFWS). Activities that do not generally require specific permits, such as off-highway vehicle use, and other recreational activities, could potentially disturb archaeological sites without requiring the mitigation of adverse effects.

Noise, Vibrations, and Visual Impacts. The No-Action Alternative would not affect the existence of special use airspace in southern Nevada. Archaeological resources could still be subject to noise, vibrations, and visual impacts from military aircraft overflights. The Air Force would no longer use roads or facilities within what was NAFR and any noise or vibrations from this use would cease. However, depending on the specific land-use policies and recreation plans of the BLM and USFWS, the archaeological resources could still be subject to noise from commercial or public use of the existing road network and nearby land. Off-road vehicles, mining activities, construction, and use of BLM facilities could also all contribute noise and visual impacts. As was discussed in section 4.9.1, how these impacts would affect the NRHP eligibility of archaeological sites would depend on the individual resource's characteristics. In general, noise, visual and vibration effects do not adversely impact the NRHP status of archeological resources.

4.9.7.2 ARCHITECTURAL RESOURCES

The No-Action Alternative would affect architectural resources within the NRC. On ROI One and ROI Two, as many as 15 historic mining sites and complexes and the LV&T railbed could be subject to effects related to access and changes in land status as well as land management policy. Historic mining structures in areas that may be reopened for further exploration and mining could be damaged by modern mining practices, although some of those adverse effects could be mitigated when the agency complies with Section 106 of NHPA. Access by

recreational users, including rockhounders and recreational miners, could also damage historic architectural resources through vandalism, erosion, or inadvertent disturbance.

Architectural resources within ROI Three could experience a decrease in noise, vibration and visual intrusion from military overflights. This would be a neutral or beneficial effect from the No-Action Alternative.

4.9.7.3 TRADITIONAL CULTURAL RESOURCES

There are numerous traditional cultural resource areas throughout NAFR (section 3.9.5). As part of the NAIP, the Air Force is working with members of the CGTO to collect information on traditional cultural resources throughout NAFR. This information is confidential, and still being compiled.

The No-Action Alternative has the potential to adversely affect traditional cultural resources. As with other cultural resources, the effects could be mixed. American Indians and others would probably have free access to most of the former military land withdrawal. American Indians could use traditional areas at their own discretion. However, increased access by non-Indian people could lead to intentional or unintentional physical damage to traditional cultural resources. In addition, public or commercial access could result in loss of privacy during American Indian religious ceremonies or other special occasions .

Traditional cultural resources would remain under federal laws and regulations, but non-exclusive use could mean these resources might not receive the same level of protection. BLM and USFWS are obligated by law to the preservation of traditional cultural resources, but neither agency has the exclusive use requirement of the Air Force.

While the Air Force would no longer be the source of ground disturbance, disturbance could still result from multiple uses. The lands that would become the sole responsibility of DNWR (USFWS) would probably still have access restrictions in line with the purpose of the wildlife refuge, but these would be less restrictive than under the Air Force / DNWR joint management. In addition, the Air Force could still use the existing MOA and redesignated airspace, contributing to noise, vibrations and visual impacts. Because the Air Force would still be at Nellis AFB, the NAIP would continue and the Air Force would continue to consider the needs of American Indians while carrying out its mission.

4.9.8 American Indian Concerns

4.9.8.1 OUTREACH PROCESS

The Nellis Environmental Management Directorate has initiated a NAIP that solicits information from Indian people who have concerns about the NAFR and Nellis AFB lands. Since 1996, American Indians from the CGTO have been closely involved in inventory, documentation and discussions of traditional cultural resources. The primary goal of the alliance is the preservation of traditional cultural resources.

4.9.8.2 ISSUES

In the NARD (AIWS 1997), produced as part of the EIAP for the NAFR land withdrawal renewal LEIS, the CGTO outlined a series of issues and concerns. These are briefly listed below.

- *Centrality and Continuity*. The NAFR comprises a portion of lands seen by the CGTO as traditionally central to the functioning of American Indians from as far away as southern California.

- *Usurpation of All Resources*. The CGTO sees the military land withdrawal as a continuation of the process that began with moving American Indians onto reservations and off the land, thereby causing a complete disruption of their way of life.

- *Air Pollution and Radiation*. The CGTO has argued that certain activities on Air Force withdrawn lands may have adversely affected air, the land, and rocks, making food or other resources gathered from those areas unusable.

- *Environmental Justice*. According to the CGTO, Air Force activities on Nellis constitute sacred land violations and cultural survival violations (see section 4.14).

- *Socioeconomic Issues*. The NARD (AIWS 1997) identified socioeconomic issues as being relevant to the NAFR. The following list is discussed in more detail in the NARD (AIWS 1997):

  - American Indian region of influence;
  - American Indian education;
  - farming and ranching;
  - mining;
  - political integration and community cohesion; and
  - transportation and tribal enterprises.

- *Programs*. Certain Air Force programs are of special concern to American Indians, specifically:

  - EC programs;
  - hazardous materials and waste; and
  - environmental restoration programs (ERPs).

4.9.8.3 TRADITIONAL CULTURAL RESOURCES

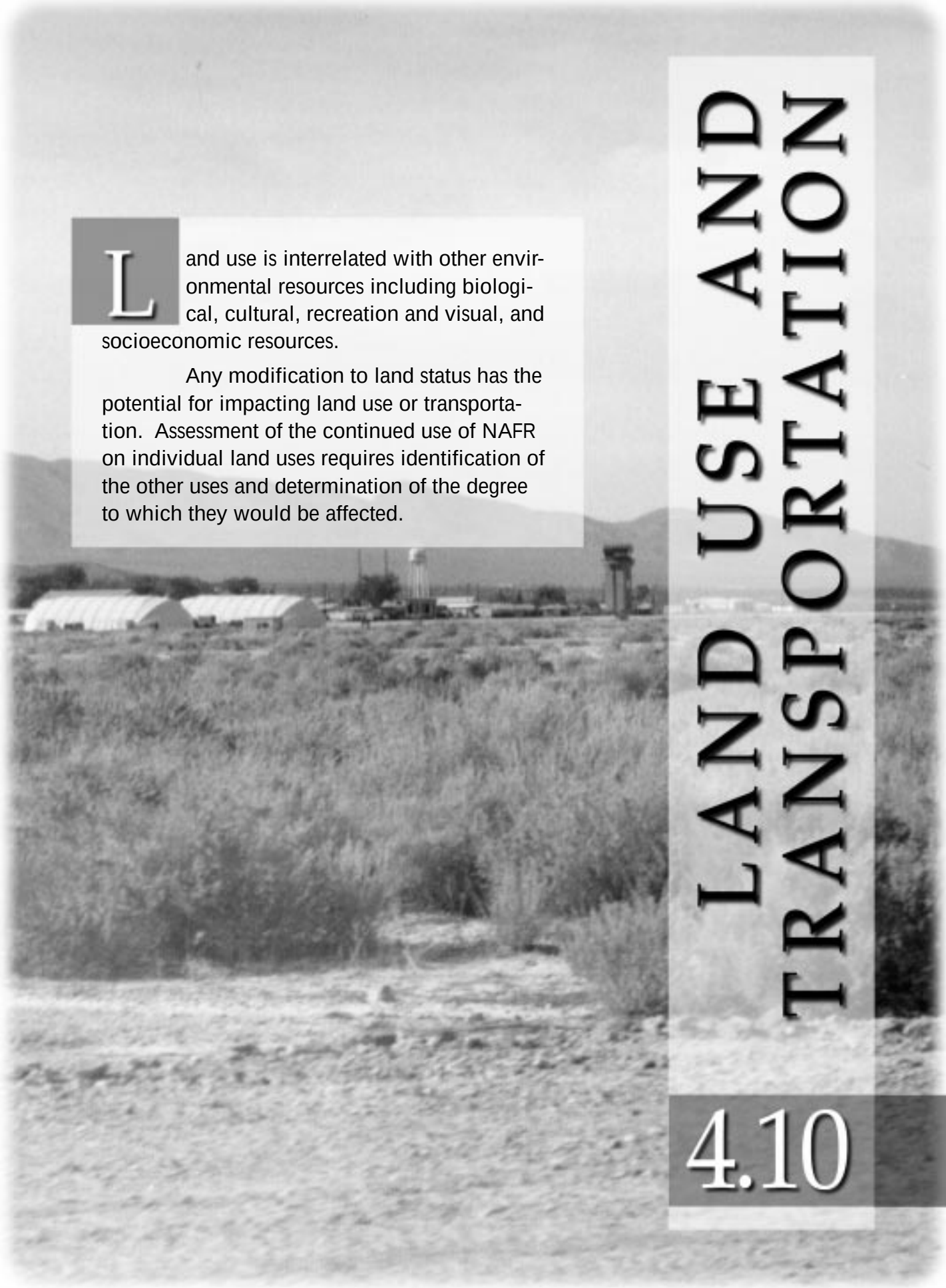
The NARD (AIWS 1997) suggests an approach to continued Air Force jurisdiction under Alternatives 1A, 1B, 2A, or 2B. The document does not provide an alternative approach if the No-Action Alternative were to be selected.

The essence of the suggested approach is an MOU between CGTO and the Air Force that reflects the mission of the Air Force at Nellis while incorporating culturally sensitive approaches used to further expand the focus and long-term functioning of the NAIP. As presented by the CGTO (AIWS 1997), the program would include systematic studies of American Indians; inclusion of American Indian monitors; and the identification, evaluation and monitoring of cultural resources, sacred sites, and traditional cultural resources located on NAFR.

Roles and responsibilities for stewardship of cultural resources would be spelled out in the MOU. In some cases, important cultural or ceremonial areas could be set aside and protected, to be used exclusively by Indian people from the CGTO to conduct ceremonies, collect foods and medicines, and to serve as an educational vehicle necessary for perpetuating American Indian culture. No military training exercises or ground disturbing activities would be permitted within the protected area, and the Air Force would initiate protective measures to avoid further disturbance to these and other culturally sensitive areas. American Indians would also be included in environmental restoration programs, including revegetation and reclamation programs.

4.9.8.4 ACCESS

Two aspects of access are of concern to the CGTO (AIWS 1997). First, many American Indians do not want restrictions placed on their access to traditional cultural resources. Visiting traditional cultural resources is an important part of some American Indian religious activities. Although the Air Force is committed to working with the CGTO, it must find a balance between the requirements of its mission and the traditional concerns of the CGTO. Second, members of the CGTO are concerned that improved roads and the lifting of access restrictions in some locations may cause increased visitation to sensitive locations by non-Indians. This could lead to vandalism and to interference with ceremonies. The CGTO recognizes the conflicting aspects of this issue: their desire for unlimited access and the protection provided by restricted access.



4.10 LAND USE AND TRANSPORTATION

Land use is interrelated with other environmental resources including biological, cultural, recreation and visual, and socioeconomic resources.

Any modification to land status has the potential for impacting land use or transportation. Assessment of the continued use of NAFR on individual land uses requires identification of the other uses and determination of the degree to which they would be affected.

Under Alternatives 1A and 2A, land use and land status would remain unchanged. Land status and military activities would continue on the withdrawn lands. Land management plans would remain unchanged. Overlapping withdrawals of NAFR and DNWR lands would remain, and special use areas would continue to be managed under the appropriate land management plan. Access to NAFR would continue at the same level and general transportation activity in the region as well as jurisdiction of roads would remain unchanged.



Under No-Action, selected areas, including live target areas on the South Range, would have limitations to access until all safety issues were resolved.

Under Alternatives 1B and 2B, land status and land use would potentially be selectively altered. The Air Force would not withdraw up to 50 percent of the Nevada Senate Joint Resolution 25 mining district or approximately 30,000 to 35,000 acres of land along the western border of NAFR. These changes would permit BLM multiple use management to open areas for mining, recreation, or other land uses. Alternatives 1B or 2B could also adjust DOD and DOE jurisdiction in specific areas. Such adjustments could have a minimal impact on existing land use patterns.

Alternatives 1B or 2B could also execute an administrative realignment of specific areas between the Air Force and DOE. Under these alternatives, those Air Force lands described as Pahute Mesa would transfer to DOE; the land withdrawn by PLO 1662 would transfer from DOE to the Air Force and be included in NAFR.

Under the No-Action Alternative, up to 3 million acres would be returned to DOI administration and management. The Air Force would cease all military-related land use, including enforcement of access restriction in most areas. Access to some areas may continue to be restricted for health and safety reasons until such areas are cleared of health risks. Uses consistent with BLM management policies would likely predominate, including grazing, mining, and recreation. These changes to land status and land use would be expected to impact nearly all other environmental resources that have been essentially isolated from access for 50 years.



Access to NAFR is limited for safety and security reasons to escorted specific-objective travel. This would continue under any action alternative.

4.10 LAND USE AND TRANSPORTATION

This section focuses on the consequences of the proposed action and alternatives on land ownership or land status, general land use patterns, land management plans, and special use areas, including roads. The land withdrawal renewal action alternatives do not have any increase of land withdrawn for military purposes. As described in section 2.2, land areas have been identified that could be returned to BLM for multiple use and that could be used for recreational co-use with certain Air Force mission constraints.

Any modification to land ownership or status is considered for possible impact. Assessment of the withdrawal impacts on individual land uses requires identification of the other uses and determination of the degree to which they would be affected. Similarly, modification of use or management of these lands is analyzed for impact.

Within BLM resource areas lie special use areas with unique management objectives including Areas of Critical Environmental Concern (ACECs), Special Recreation Management Areas (SRMAs), and others, as discussed in section 3.10.3. Impacts on management and status of these areas are considered. Impacts to Wilderness Study Area (WSAs) are discussed in section 4.11. Effects on users of recreation areas are discussed in section 4.12. Overflight impacts on wildlife are discussed in section 4.8, Biological Resources.

The Air Force has a series of MOUs with the USFWS to address management concerns regarding overlapping withdrawal of portions of the DNWR. These MOUs include Air Force operational actions to support DNWR responsibilities (see section 2.4).

4.10.1 Alternative 1A — Indefinite Withdrawal

Under Alternative 1A, land use and land status would remain unchanged and would be as described for baseline conditions in section 3.10.

Military activities would continue on the withdrawn lands. Land management plans would remain unchanged. Overlapping withdrawals of NAFR and DNWR lands would remain, and special use areas would continue to be managed under the appropriate land management plan as described in section 3.10. Access to NAFR would continue at the same level and general transportation activity in the region as well as jurisdiction of roads would remain unchanged.

Aircraft test and training activity over lands under the NRC, including WSAs and other special use areas, would continue at historic levels. No change in overflights or change in land use is anticipated. No change in vehicular or general aviation transportation is proposed.

4.10.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

4.10.2.1 LAND STATUS AND LAND USE PATTERNS

Under Alternative 1B, land status would be altered in specific locations. The Air Force would withdraw approximately 3 million acres, resulting in the non-renewal of a portion of the Clarkdale and Wagner Mining Districts and approximately 30,000 to 35,000 acres of land along the western border of the current NAFR.

Establishment of this alternative would have a localized impact on existing land use patterns. Although some lands would no longer be used for military purposes, they would most likely assume the land uses of the surrounding area. These uses include livestock grazing, mining, and recreation.

This alternative also provides for short-term co-use for mission-compatible, environmental resource management, American Indian religious or cultural activities, recreation, and other uses in certain areas. Each of these activities would be planned on an annual basis and would be subject to change based on safety and security requirements. Mud Lake, Kawich Range or EC South have been identified as co-use locations. The activities associated with these areas would be recreational in nature.

The lands described as Pahute Mesa, and other lands subject to the MOU between the Air Force and DOE (PLO 1662), could be realigned or withdrawn as part of this Congressional action.

4.10.2.2 LAND MANAGEMENT PLANS

Land management plans of the BLM would be reviewed for co-use management under this alternative. Appropriate amendments to the land management plans and agreements between the Air Force and BLM would be prepared to accommodate the potential co-use of portions of NAFR. Additional MOUs and associated planning documents would likely be entered into between the Air Force and the USFWS for coordination near DNWR.

A series of administrative changes would be required to implement co-use of certain areas. The Air Force and other key agencies would function as part of the Five-Party Cooperative Agreement for information exchange and advice on environmental management issues on NAFR and adjacent areas.

4.10.2.3 SPECIAL USE AREAS

Special use areas within associated airspace would be largely unaffected by this alternative. General transportation activity in the region, as well as the jurisdiction of roads, would remain unchanged. Co-use areas that would be accessible to the public as discussed above, would be accessible on existing roads. Anticipated vehicular use levels would remain near their current levels.

4.10.3 Alternative 2A — 25-Year Withdrawal

Under Alternative 2A, the effects on land use and status, land management plans, and special use areas would be as described in section 4.10.1. This alternative differs from Alternative 1A only in the duration of the withdrawal.

4.10.4 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

Under Alternative 2B, the effects on land use and status, land management plans, and special use areas would be as described in section 4.10.2. This alternative differs from Alternative 1B only in the duration of the withdrawal.

4.10.5 No-Action Alternative

Under the No-Action Alternative, Congressional action would close NAFR and result in no land withdrawal for military purposes. The Air Force would anticipate continuing the use of the special use airspace for air-to-air operations. This would result in no air-to-ground activities on what was NAFR.

4.10.5.1 LAND STATUS AND LAND USE PATTERNS

Under this alternative, land status would be altered substantially. Approximately 3 million acres would be returned to DOI administration and management. BLM would have jurisdiction over land use on the North Range and USFWS would have sole jurisdiction over most of the South Range. DOE and Air Force activities for decontamination are expected to continue on some lands. On most of the former NAFR, other uses consistent with BLM or USFWS management policies would predominate. On BLM lands, these uses may include grazing, mining, and recreation.

4.10.5.2 LAND MANAGEMENT PLANS

Impacts to land management plans would include an extensive amendment to the Caliente Management Framework Plan to recognize the additional land area within the BLM's jurisdiction. Uses, policies, and programs would need to be developed and a plan amendment would be processed in accordance with federal regulations (43 CFR Part 1600). These regulations establish a process for the development, approval, maintenance, amendment and revision of BLM plans, consistent with FLPMA.

Some adjustment to DNWR plans would likely be required to allow for the change from restricted access and to address the valley areas on the South Range currently managed by the Air Force.

4.10.5.3 SPECIAL USE AREAS

Special use areas would remain unchanged by this alternative. The majority of the DNWR would continue to be managed as a de facto wilderness.

4.10.5.4 TRANSPORTATION

Under this alternative, changes to vehicular use levels within the region are anticipated. Currently access within the withdrawn area is restricted. The total number of vehicles should not change, but the purpose of vehicles will change from military employment to other uses such as industrial and recreational. Construction of new roads is not anticipated although the BLM may determine that modifications to access are required.

4.10.6 American Indian Issues Concerning Land Use and Transportation

The CGTO considers the issue of access to have two aspects in the context of the proposed action and alternatives:

- Increased access to cultural resource locations by non-Indian people under the No Action Alternative;
- Limited access by Indian people to resource locations under any action alternative.

The CGTO recognizes the conflicting aspects of this issue: their desire for unlimited access and the protection provided by restricted access.

4.11 WILDERNESS AND WILDERNESS STUDY AREAS

The proposed NAFR land withdrawal renewal is not projected to change use of NAFR as a test and training range for aircrews and high performance military aircraft. No change in the NRC boundary is projected.

The NRC covers a vast area. Much of the area outside NAFR is open to the public and is managed by the BLM for multiple use. The DNWR, which is within the NRC, is managed by the USFWS primarily for wildlife, not multiple use. One U.S. Forest Service (USFS) Wilderness Area is south of the NRC and two USFS Wilderness Areas are under or partially under the NRC airspace. WSAs on BLM or USFWS lands are managed to retain the primitive nature of the land. The lands that constitute NAFR have been used for test and training of high performance military aircraft for over 50 years. The WSAs identified by BLM and the USFWS were overflown by military aircraft prior to their being identified as potentially part of the National Wilderness Preservation System.

The Air Force has an agreement with the USFWS to recognize management goals for the DNWR. In addition, the Air Force's exclusive use of NAFR for test and training activities has served to protect surface and subsurface natural resources on portions of BLM and USFWS-managed lands. In 1979 the DOI and BLM issued the Public Land Withdrawal EIS that recognized Air Force past and continuing use and acknowledged that the wilderness designation of DNWR would not affect the Air Force's use of NAFR for continued military use.



Roads, targets, and other structures on NAFR within the DNWR are not compatible with a wilderness designation. Such areas with targets and access roads have been excluded from the DNWR Wilderness Recommendation.

The continuing use of NAFR for military test and training operations under the action alternatives will be consistent with the past 50 years. No change in environmental consequences is anticipated that could affect wilderness designations of land within the NAFR or under the NRC. Under the No-Action Alternative, military ground operations would be terminated. Overflights would continue, although at a reduced level.

Since no NAFR military ground activities exist in designated Wilderness Areas or WSAs, no change in impacts to those areas is expected under either an action or a no-action alternative.



Continuing use of NAFR is not projected to affect wilderness quality in areas that meet national wilderness criteria.

4.11 WILDERNESS AND WILDERNESS STUDY AREAS

This section considers the consequences of the proposed renewal of NAFR and alternatives on wilderness and WSAs. These special use areas have unique management objectives. The potential for environmental consequences that could affect management and status of these areas are considered.

Effects on users of recreation areas are discussed in section 4.12, Recreation and Visual Resources. Overflight impacts on wildlife are discussed in section 4.8, Biological Resources. Additional details on Air Force MOUs and SOPs designed to reduce environmental consequences in specific sensitive habitats are provided in section 4.8.1.2.

4.11.1 Alternative 1A — Indefinite Withdrawal

Under Alternative 1A, NAFR land use and land status would remain unchanged and would be as described for baseline conditions in section 3.11. Military activities would continue on the withdrawn lands. Overlapping withdrawals of NAFR and DNWR lands would remain, and WSAs and wilderness areas under the NRC would continue to be managed under the appropriate land management plan as described in section 3.11.

Military test and training activity over lands under the NRC, including WSAs and wilderness areas, would continue at historic levels. No change in annual overflights or in land use is anticipated. Activities that may cause ground disturbance (i.e., road use, munitions use) would continue at existing levels. As stated in section 4.3, if there is an aircraft mishap, the Air Force closely coordinates cleanup efforts with the agency responsible for that land.

Two factors were considered to evaluate potential indirect environmental consequences from aircraft overflights and training over WSAs in the region: 1) the extent to which these activities may affect the attributes that render an area suitable for preservation as Wilderness; and 2) whether the activities would conflict with management policies designated to ensure that the suitability of WSAs not be impaired until Congress has acted on them.

The attributes evaluated to determine wilderness qualities of these WSAs include naturalness, special features, and opportunities for solitude or primitive and unconfined recreation. The types of activities generally considered to affect naturalness are physical intrusions within the WSA, including transmission lines, fences, wells, and mine scars. Similarly, special features such as geologic and cultural resources are affected when activities disturb or alter the features or physical resources of the area.

Although aircraft activity and noise may be perceived by recreationalists as conflicting with opportunities for solitude and primitive recreation in a natural environment, Congress has determined that military overflight is not incompatible with wilderness areas (California Desert Protection Act 1992). The environmental documentation prepared by the BLM supporting WSA recommendations indicates that military overflights are not a reason to consider the areas

inappropriate for future Wilderness Area designation. The *Nevada BLM Statewide Wilderness Report* noted that military overflights over three WSAs formed part of the existing conditions in these areas. The effects of these overflights were not considered sufficient to preclude recommending the areas for wilderness status.

With respect to management policies for WSAs, overflights fall within the nonimpairment criteria of the Integrated Management Plan (IMP), which require that impacts be temporary, reclaimable, and not constrain Congress's decision on wilderness designation.

Congress will decide the ultimate disposition of WSAs. Factors likely to influence Congress's decisions include the report and suitability recommendations by the BLM provided in the *Nevada BLM Statewide Wilderness Report*, as well as current and projected military activities. In the past, Congress has concluded that, due to their transitory nature, aircraft overflights do not impair the natural and solitude qualities associated with wilderness designation. The noise levels and associated aircraft overflight effects are by nature temporary and reversible, leaving no permanent evidence of human use.

4.11.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

Under Alternative 1B, the effects on wilderness and WSAs would be as described in section 4.11.1. Neither the non-renewal area nor the co-use areas have been designated as WSAs by the BLM. These lands may be inventoried by the BLM in order to evaluate their wilderness suitability.

4.11.3 Alternative 2A — 25-Year Withdrawal

Under Alternative 2A, the effects on wilderness and WSAs would be as described in section 4.11.1. This alternative differs from Alternative 1A only in the duration of the withdrawal.

4.11.4 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

Under Alternative 2B, the effects on wilderness and WSAs would be as described in section 4.11.1. This alternative differs from Alternative 1B only in the duration of the withdrawal.

4.11.5 No-Action Alternative

The No-Action Alternative would result in no land withdrawal for military purposes and close NAFR. This would result in no military ground activities on what was NAFR. The Air Force would be expected to continue the use of the special use airspace for air-to-air operations.

Under the No-Action Alternative, land status would be altered substantially. Up to 3 million acres would be returned to DOI administration and management. Although some activities for decontamination and national security could continue on some lands, other uses consistent

with BLM management policies (such as grazing, mining, and recreation) would likely predominate on lands not within the DNWR. Lands within DNWR would continue to be managed under the appropriate land management plan as described in section 3.11.

It is anticipated that an extensive amendment to the Caliente Management Framework Plan would be required to recognize the additional land area within the BLM's jurisdiction. Uses, policies, and programs would need to be developed and a plan amendment would be processed in accordance with federal regulations (43 CFR Part 1600).

It is possible that the plan amendment process would yield recommendations regarding potential WSAs. The longstanding military withdrawal status has resulted in the generally undisturbed nature of the NAFR resources. Under the No-Action Alternative the BLM would inventory NAFR Lands for suitability as wilderness.

Multiple use of what was NAFR for mineral exploration, off-highway vehicle (OHV) recreation, potential transmission or transportation corridors, or other uses could affect the potential wilderness value of what was the NAFR North Range and any accessible parts of the South Range outside of the DNWR. Unrestricted OHV and related recreational uses has the potential for greater environmental consequences to potential wilderness resources on what was NAFR than 50 years of use as a military test and training range.

The loss of Air Force security on NAFR under a No-Action Alternative would likely necessitate rapid review of the North Range, especially to determine the wilderness environmental qualities and to protect those qualities from recreation that may have the potential to impact cultural or traditional American Indian areas or natural areas.

4.11.6 American Indian Issues Concerning Wilderness

The CGTO has concerns regarding access under No-Action wilderness areas on NAFR. Non-Indian recreationalists could disturb traditional resources or intrude on American Indian resources or intrude on American Indian ceremonies in sacred areas. The CGTO also has stated that visual intrusion of aircraft, as well as noise, could impact wilderness resources important to Indian people. The CGTO wants limited access for Indian people to resource locations under any action alternative.

4.12 RECREATIONAL AND VISUAL RESOURCES

Primary issues and concerns raised at scoping meetings regarding recreation and visual resource included general access, noise, public land management, and access for mining.





If recreationists were to have access to NAFR, the continued visual effects of low-flying aircraft may affect the sense of solitude and naturalness for individuals seeking a primitive experience.

Military aircraft overflights are transitory, and would continue under both action alternatives. The nature of the impact depends on access to view the overflight, the sensitivity of the resource affected, the distance from which it is viewed, and the length of time it is visible.

Under any action alternative, there would be no change in visual intrusions from towers, buildings, roadways, or other facilities.

The No-Action Alternative would result in removal of DOD facilities and open lands not currently available for recreation. This has the benefit of increasing recreational opportunities on BLM land that has been previously inaccessible. An increase in recreation also has the potential for an increase in vandalism to cultural sites and off-road vehicle damage to the fragile arid environment. Conflicts could arise between visitors seeking isolated areas and those who operate vehicles as a recreational activity in those areas. Recreationists could also compete for space with other resource users such as mining companies. Opportunities for solitude would potentially increase as military overflights are expected to decrease by at least half.



Under the No-Action Alternative, the visual quality of NAFR lands would be subject to and managed by BLM policies and guidelines such as Visual Resource Management (VRM).

4.12 RECREATION AND VISUAL RESOURCES

Issues and concerns regarding recreation and visual resources primarily focused on increased access for recreation. In addition to a desire for increased access, scoping commentors were desirous of a decrease in the noise environment, a change to public land management, and a change in the visual environment.

The methodology for determining impacts on recreation resources focuses on (1) determining existing users, (2) determining the noise and visual impacts on recreational use due to any change in overflights, (3) identifying changes in recreational opportunities and access due to a change in management, and (4) identifying a change in the Recreation Opportunity Spectrum (ROS).

The methodology for determining impacts to visual resources involved review of the visual resources management (VRM) guidelines used by the BLM in some areas of the ROI. Where VRM is not used, scenic or specifically designated areas were identified. VRM is used by the BLM to identify the existing visual character of the landscape and define the allowable extent and type of development or modification that should be permitted in a given landscape. The VRM system is an expression of scenic quality, sensitivity, and remoteness (viewing distance from travel corridors). VRM guidelines range from the most sensitive (VRM Class I) to the least sensitive (VRM Class IV).

4.12.1 Alternative 1A — Indefinite Withdrawal

4.12.1.1 RECREATION USE

Under this alternative, current access restrictions on NAFR would remain. Existing use and activities were identified in section 3.12. Limited hunting, as permitted through existing MOUs would continue to be coordinated with the NDOW and USFWS. No other routine recreational use would be anticipated.

Access for recreational use on lands under the NRC outside NAFR would remain the same as under current conditions. There would be no limitations or restrictions to recreation sites or their use, except by the governing land management agency. Therefore, current access would not be impacted as a result of continued withdrawal of NAFR.

The noise levels on lands under the associated airspace (ROI Three) are not expected to change under this alternative. Therefore, no impact as a result of noise under this alternative is expected. Refer to section 4.2 for a discussion of the noise environment.

The ROS, where applicable, is expected to remain the same and no impact is expected. The non-renewal area would require review by DOI to determine the VRM for this area.

4.12.1.2 VISUAL RESOURCES

Under this alternative, those areas managed by the BLM using VRM guidelines would continue to be managed as such and not change. Some visual changes will likely occur with continuing improvement of systems and target reconfiguration. Changes such as the planned replacement of Air Combat Maneuvering Instrumentation (ACMI) towers with a visually lower Global Positioning System (GPS)- based tracking system will have a minor positive effect on visual resources. No visual impacts to federal management of land are expected.

Impacts from aircraft overflights on the visual environment of an area are difficult to quantify. This difficulty stems from the inability to separate visual impacts from the noise of the aircraft overflight. Aircraft overflight is usually noticed primarily because of accompanying noise.

Military aircraft are transitory fixtures above a landscape. The nature of the impact depends on the sensitivity of the resource affected, the distance from which it is viewed, and the length of time it is visible. Altitude relative to the viewer also plays a key role in determining impacts from aircraft overflights. People's eyes are typically drawn to the horizon more than overhead and they are therefore less likely to notice aircraft at higher altitudes. Within highly vegetated mountainous areas, views would tend to be screened or extremely brief. In such areas, the lower the altitude, the more likely it is that views of passing aircraft would be screened.

In the broad valley areas, aircraft could be briefly visible. The most prevalent aircraft using the MOAs are F-16s. An F-16 traveling at an average speed of 480 knots true airspeed travels 1.5 miles in 10 seconds, 4.6 miles in 30 seconds, and 9.2 miles in one minute. At these high speeds, the visual impact of an aircraft is transitory. Military aircraft are also painted muted colors so as to be very difficult to pick out against a blue or gray sky.

The most visually sensitive areas in ROI Three include state parks and wildlife refuges. Most of these areas are avoided for safety purposes. Where the terrain is hilly or undulating, views are of short duration. In areas of flat terrain, however, the views can be expansive, and military aircraft can be detected.

In the wide open valleys where vegetation is low and visibility unimpaired, the visual effects of low-flying aircraft may also affect the sense of solitude and naturalness for individuals seeking a primitive recreation experience. However, these effects are usually very short (from seconds to a few minutes). No change is projected in visual resources from selection of continued withdrawal of NAFR.

4.12.2 Alternative 1B — Indefinite Withdrawal/Modification of Lands and/or Administration

4.12.2.1 RECREATION USE AND OPPORTUNITIES

Under this alternative, approximately 62,400 acres would be made available for public access short-term co-use (based on the range schedule) for mission-compatible, environmental resources management, including BLM-permitted recreation. Recreational access to this total of

62,400 acres would be subject to change, based on Air Force mission, security, and / or safety requirements. Those activities that conflict with Air Force mission, security, and / or safety requirements would not be approved.

These areas include the following:

- *Mud Lake.* Recreation activities, such as off-highway driving, land sailing, could occur on approximately 3,200 acres south of the northwestern corner of NAFR.

- *Kawich Range.* Recreation activities such as hiking and nature viewing could occur on approximately 3,200 acres north and east of the Kawich Range ridgeline in the northeastern corner of NAFR. National security interests would preclude access to the ridgeline.

- *EC South.* Recreational activities such as hiking, nature viewing, and rock-hounding could occur on approximately 56,000 acres in the southern portion of this range, south of Timber Mountain.

Future unknown or undefined changes to Air Force mission, security, and / or safety requirements could negatively or positively affect the amount of land available for co-use. Should future Air Force requirements change, co-use of some or all of the three potential co-use areas may become inconsistent with Air Force mission, security, and / or safety requirements. Should that occur, co-use of that particular area could be further restricted or terminated. Changes to future Air Force requirements could also increase the size of the three potential co-use areas and / or make other locations of the range available for possible co-use.

This alternative would also not renew approximately 30,000 to 35,000 acres of land along the western border of the current NAFR not supported by special use airspace. This could potentially open the area in the west to BLM multiple use, including recreational activities. The non-renewed area would include a portion of a mining district as defined in the Nevada State Senate Joint Resolution 25. In a part of the area, access would be determined under BLM regulations of this mining district.

Improved recreational opportunities in the co-use and non-renewed areas are directly responsive to public and agency concerns expressed during scoping for this LEIS. These improved recreational opportunities represent a positive, beneficial environmental consequence. The potential negative aspects of such access to other environmental resources are described in section 4.8 for biology and section 4.9 for cultural resources.

Except for those areas noted above, the environmental consequences for Alternative 1B are the same as for Alternative 1A.

4.12.2.2 VISUAL RESOURCES

As noted in section 4.12.2.1, some areas would become multiple or co-use areas. Should mining or extensive OHV use be permitted in the non-renewed area or extensive OHV use be permitted in the co-use areas, some degradation in visual quality could occur. In general, however, visual resources would not be expected to have a change in impacts within this alternative. Except for that noted above, the impact analysis for visual resources is the same as for Alternative 1A.

4.12.3 Alternative 2A — 25-Year Withdrawal

4.12.3.1 RECREATION USE AND OPPORTUNITIES

The duration of this alternative would not result in any difference from the environmental consequences.

4.12.3.2 VISUAL RESOURCES

Because this has only a duration change, the environmental consequences are the same as discussed for Alternative 1A.

4.12.4 Alternative 2B — 25-Year Withdrawal/Modification of Lands and/or Administration

4.12.4.1 RECREATION USE AND OPPORTUNITIES

The duration of this alternative would result in the same environmental consequences as discussed under Alternative 1B.

4.12.4.2 VISUAL RESOURCES

There would be no change from the environmental consequences discussed under Alternative 1B.

4.12.5 No-Action Alternative

4.12.5.1 RECREATION USE AND OPPORTUNITIES

Recreation activities such as off-highway vehicle use, hunting, camping, hiking, nature viewing, land sailing, etc. would increase. The No-Action Alternative would provide access to lands not currently available for recreation. This increase in access and activities could have both a positive and negative affect. An increase in land available would create more recreation opportunities and potentially shift recreation from surrounding areas.

While only a few recreation sites under the airspace require special management due to use, with the current growth of Las Vegas, more people would presumably be drawn to this area.

An area used only by the military would presumably draw curious public interested in areas few people have used for many years. This attraction could draw visitors away from other areas, thus alleviating overcrowding. Newly opened areas could also be developed for a specific recreational use or activity. These activities would require coordination through the appropriate management agency. For example, hunting would be available but must be coordinated with Nevada Department of Fish and Game to determine types of hunts, hunting units, seasons, etc. while the actual management of the land resources would be coordinated through the BLM.

With initial intense recreational use, the newly opened lands could also have the potential for overuse or damage to significant cultural, biological, geological, and/or botanical resources. For example, archaeological sites currently protected by the no-access policy could be subjected to vandalism, or sensitive habitats could be destroyed by recreation visitors and off-highway vehicles.

With the large increase in land available, conflicts between visitors would initially likely be minimal. However, as knowledge and familiarity of the area increases, overcrowding and user conflicts could occur. In addition, recreational visitors could compete for space with other resource users such as mining companies, transmission corridors, and agriculture.

Opportunities for solitude would potentially increase as military overflights are expected to decrease by at least half, thus resulting in a decrease in noise of approximately 4 dB L_{dn}. Air-to-air military operations would continue, however. Therefore, military aircraft would continue to be a part of the surrounding viewshed.

While this alternative would allow access to the former NAFR, some areas on what was NAFR would be temporarily or permanently closed to the public due to unexploded ordnance or hazardous materials. DOE and the Air Force would work with DOI to reduce permanent closures to a minimum. What was NAFR would be expected to be open initially to primitive or ORV recreation subject to BLM resources to develop future recreation opportunities. Some archaeological, architectural, biological, or traditional resources could become quickly exhausted by recreationalists who may take advantage of a No-Action decision to access previously undisturbed locations.

4.12.5.2 VISUAL RESOURCES

As discussed above, sortie levels would decrease over NAFR, but air-to-air operations would continue. As these sortie levels would decrease by about half, potential intrusions by aircraft would similarly decrease.

As the areas surrounding NAFR provide scenic vistas, there are many areas on the NAFR that contain vistas of similar scenic quality. The visual quality would be subject to and managed by BLM policies and guidelines such as the VRM.

4.12.6 American Indian Issues Concerning Recreation and Visual Resources

The CGTO considers the issue of access (including access for recreation) to have two aspects:

- Increased access to cultural resource locations by non-Indian recreationists under the No-Action Alternative. These individuals could disturb cultural resources or intrude on ceremonies; and

- Limited access by Indian people to resource locations under any action alternative.

The CGTO recognizes the conflicting aspects of this issue: their desire for unlimited access and the protection provided by restricting access for recreation.

Under either an action alternative or the No-Action Alternative, visual intrusions could impact resources important to American Indians. The NARD reports:

- All land forms within the NAFR have high sensitivity levels for American Indians. The ability to see the land without the distraction of buildings, towers, cables, roads, and other objects is essential for the spiritual interaction between Indian people and their traditional lands. Landscape modifications should be done in consultation with American Indians. [AIWS 1997]

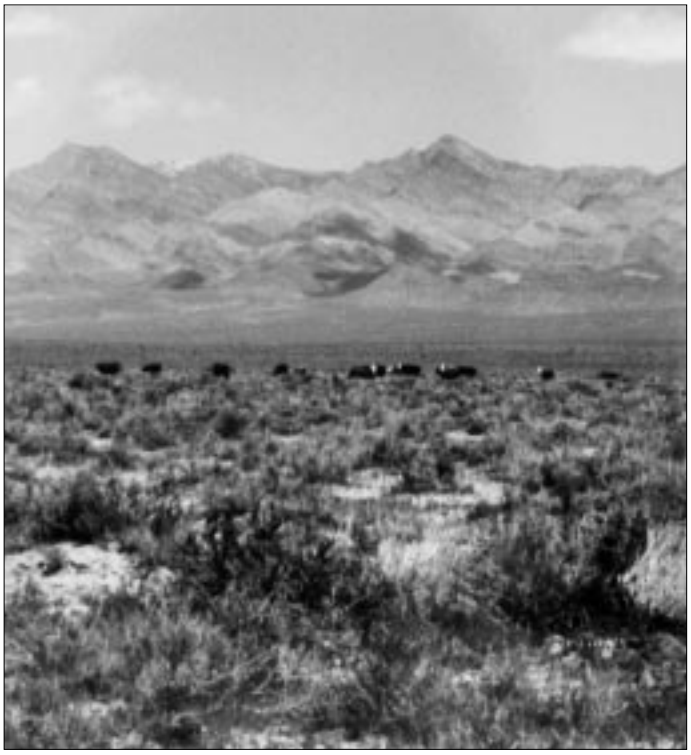
SOCIOECONOMICS

4.13

Continuation of NAFR as an exclusive-use Air Force test and training range under either Alternatives 1A or 2A would not have a discernible socioeconomic impact. Under Alternatives 1B and 2B the Air Force would relinquish a portion of the Clark-dale and Wagner Mining Districts and approxi-mately 30,000 to 35,000 acres of land along the western border of the current NAFR. Neither alternative would present significant added potential for private economic development, although there could be limited development. None of the four action alternatives would af-fect Air Force operations on the range in a way that could cause an economic impact on the ROI.

Alternatives 1B and 2B potentially provide for greater access to NAFR lands for Native American religious ceremonies than Alternatives 1A and 2A. Under Alternatives 1B and 2B, co-use would be permitted within the Mud Lake, Kawich Range, and EC South areas of the North Range. In addition, approximately 60 square miles of land would not be with-drawn and would be returned to the BLM for public use.

The No-Action Alternative would po-tentially provide the greatest access to NAFR lands, since military activities on the range would cease and lands would be managed for multiple use by BLM. Hazardous areas on the former NAFR would still be excluded to ensure public safety. Air-to-air operations by the Air Force would still continue in special use air-space.



The greatest socioeconomic impact would be associated with the No-Action Alternative. A 390-job increase in Nye County, primarily in grazing and mining, would be offset by a loss of over 7,100 jobs in Clark County.

Under the No-Action Alternative, all Air Force ground activities at NAFR would be discontinued and the lands currently withdrawn for use by the Air Force would be returned to the BLM. Implementation of the No-Action Alternative would stop ground activities at NAFR and reduce many missions and support personnel at Nellis AFB. Subject to BLM approval, there could be mining, grazing, and production of irrigated crops, especially in Nye and Lincoln counties. The greatest absolute economic effects would be those of a negative nature experienced at Nellis AFB in Clark County, followed by those in Nye County. Some positive economic effects would be experienced in Nye County.

Although the total socioeconomic impacts are low relative to the ROI's employment base, the selection of the No-Action Alternative would be expected to have an impact on employment and on minority populations in Clark County.



Under the No-Action Alternative, Air Force ground operations would end at TTR, Indian Springs, and all target maintenance locations.

4.13 SOCIOECONOMICS

4.13.1 Impact Analysis Method

Economic effects of continued operation of NAFR or cessation of operation at NAFR are the driving factors behind the social and economic effects addressed in this section. The regional economic effects include employment and purchases by the Air Force in support of activities dependent on NAFR. Two economic models were used to quantify the economic consequences of the alternatives.

4.13.1.1 REGIONAL ECONOMIC MODELS, INC. (REMI)

A customized version of the Regional Economic Models, Inc. (REMI) (1996) model has been used to develop employment, income, and population projections for the State of Nevada and the three-county ROI for the period 1996 to 2026. The REMI model that was used to produce the population forecasts is a four-area model that integrates an input-output model, a structural econometric model, and a demographic model. Its four areas are (1) Clark, (2) Nye, and (3) Lincoln counties and (4) the rest of Nevada.

4.13.1.2 REGIONAL INPUT-OUTPUT MODELING SYSTEM (RIMS II)

The regional input-output modeling system (RIMS II), developed and maintained by the U.S. Bureau of Economic Analysis (BEA), was used to estimate the secondary economic effects of the alternative actions. The RIMS II modeling system has been used widely in socioeconomic impact analysis in a variety of studies, including DOD environmental impact statements of military base realignments, evaluations of effects of increasing expenditures by tourists, and studies of the socioeconomic impacts of industrial changes.

Input-output modeling depends on the observation that every industry and household buys goods and services from other industries and households. As a result of the interconnectedness of industries and households, economic changes (such as job and expenditure changes) that are a direct result of an action, lead to further changes in employment and spending. The further changes are known as secondary effects of the action. RIMS II computes secondary economic effects using a regionalized national input-output matrix for each county or collection of counties for which the model has been generated. The input-output matrix represents the buying and selling relationships among industries and households. The RIMS II system includes a household sector of the economy so that reductions in personal income are appropriately transmitted to the rest of the economy.

4.13.1.3 PROJECTED ECONOMIC DEVELOPMENT ASSUMING A RENEWAL OF NAFR

The REMI model projects economic development by estimating population growth within each region using the cohort component method that uses net migration plus births minus deaths. REMI considers two types of migration: economic and noneconomic. Economic migration is

driven within the model by changes in expected income in each region relative to that in the United States. Noneconomic migration, which REMI defines as flows of retired migrants, former military personnel and their dependents reentering civilian life, and international migrants, is based on historical patterns. The model applies a mathematical model to the year-by-year age distribution to project births, deaths, and other changes in the age distribution. REMI's yearly projected total population for a region is the yearly sum of all the age cohorts for the region.

Several adjustments were made to the 1996 REMI model, for which 1994 is the last year of historical data. The model incorporates Clark County employment growth data (1994-1995) from the Nevada Department of Employment, Training, and Rehabilitation. Net migration rates for retirees are also adjusted to incorporate cohort-component models of populations in Clark, Nye, and Lincoln counties between 1980 and 1990. Growth by county in each industry sector of the REMI model is driven by a United States economic forecast according to an estimated historical relationship between growth in each county and growth in the United States as a whole. Increments above the ordinarily predicted growth in hotel and transportation sectors were added as a result of projected hotel construction data from the Las Vegas Convention and Visitors Authority (LVCVA) through 1999. The resulting adjusted REMI population forecast for Clark County compares favorably with other Clark County forecasts, including those of the Southern Nevada Water Authority (1996), Southwest Gas (1997), the Regional Transportation Commission (1997), and the Nevada State Demographer (Figure 4.13-1).

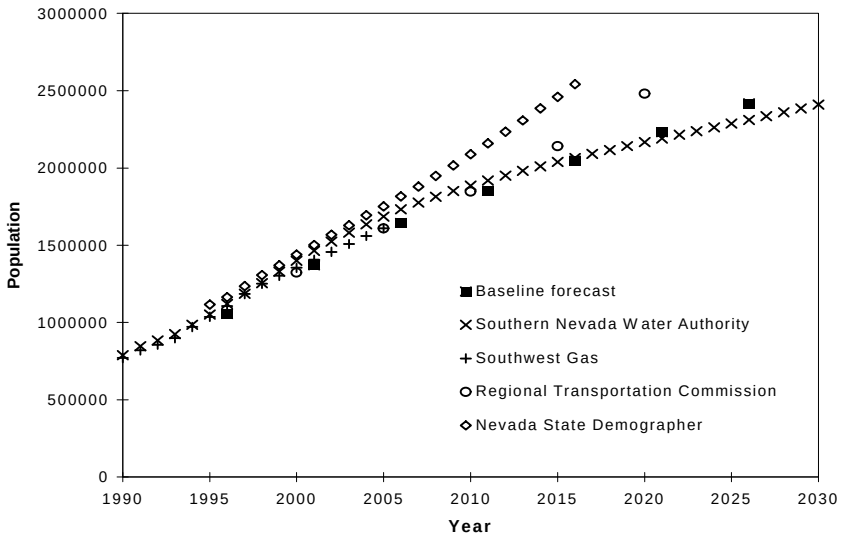


Figure 4.13-1 Clark County Population Forecasts

Projected additional local transportation expenditures by visitors were estimated based on corresponding increases in hotel inventory by 1999. Data on annual visitor room-nights, average length of stay, and average daily transportation expenditures were provided by the LVCVA. According to a 1996 survey conducted by the LVCVA, visitors spent an average of 1.27 days in the area for every night they stayed, and they spent $8.16 per day for local transportation. Aggregated over a year, visitors spend on local transportation an estimated $3,640 per hotel room. The LVCVA has data on other expenditures, that is, restaurants, shopping, and shows, but the extent to which such expenditures are made outside the hotel sector is unknown. Counting these expenditures at their full value would amount to double counting. Leaving them out constitutes undercounting. These expenditures were not included in this analysis.

4.13.1.4 PROJECTED EMPLOYMENT ASSUMING A RENEWAL OF NAFR

Over the forecast period from 1996 to 2026, the REMI forecast projects employment growth by place of employment in Nevada of approximately 560,000 jobs, or 56 percent over the 1996 level. Clark County alone is forecast to gain 440,000, or 80 percent of the new jobs created in the state (Table 4.13-1). Nye County is forecast to gain only 6,000 jobs or 1 percent of the new jobs created in the state (Table 4.13-2). Lincoln County is forecast to account for a still smaller number of new jobs, forecast to be approximately 800, which is just over 0.1 percent of the total (Table 4.13-3). Approximately 19 percent of the state's new jobs are projected to be created outside the three county ROI.

Nevada's services sector is forecast to grow by about 403,000 jobs from 1996 to 2026, which is 72 percent of the new jobs to be created in Nevada. Most of those jobs are projected to be created in Clark County, whose services sector is forecast to create approximately 300,000 jobs or 74 percent of Nevada services sector jobs and 54 percent of the total number of jobs created in Nevada over the period. The services sector in Nye County is forecast to produce a gain of nearly 5,000 jobs, which constitutes a growth of 75 percent over Nye County's 1996 figure, but only 1 percent of the statewide service-sector growth. Lincoln County is also expected to see proportionally large gains in service-sector employment, about 750 jobs, which is 92 percent of total job growth in Lincoln County, but only 0.2 percent of service-sector jobs statewide.

The number of state and local government employees in Nevada and each of the counties of the ROI is forecast to follow population growth. The forecast projects that the state overall will employ nearly twice the number of state and local government employees in 2026 (160,000 employees) as it did in 1996 (85,000 employees). Clark County, with the largest expected population growth, is forecast to employ more than twice the number of state and local government employees in 2026, that is, almost 106,000 employees, compared to 47,000 in 1996. By 2026, Nye County will employ approximately an additional 900 state and local government employees, which represent an increase of 74 percent over the 1996 figure. Lincoln County, with its smaller population and smaller growth rate, is forecast to employ an additional 100

Table 4.13-1. Projected Employment Characteristics for Clark County, 1996-2026

Clark County Employment	*1996*	*2001*	*2006*	*2011*	*2016*	*2021*	*2026*
Total Jobs	648,581	762,561	843,870	923,102	984,904	1,036,265	1,090,337
Farm	417	372	333	317	301	286	272
Nonfarm	648,164	762,189	843,537	922,785	984,603	1,035,979	1,090,065
Private	583,842	685,221	753,865	822,601	876,649	921,488	968,541
Ag. Services, Forestry, Fishing & Other	5,836	6,925	7,877	8,881	9,755	10,566	11,453
Mining	1,041	962	900	817	730	647	578
Construction	56,353	61,826	65,242	69,431	72,697	75,830	79,994
Manufacturing	17,798	17,237	17,016	16,842	16,323	15,595	14,895
Transportation & Public Utilities	29,859	33,252	34,851	35,210	34,899	34,247	33,715
Wholesale Trade	19,677	21,061	21,685	22,394	22,494	22,198	21,853
Retail Trade	101,128	114,754	122,381	130,628	135,532	138,833	142,699
Finance, Insurance, and Real Estate	45,005	49,633	52,426	54,591	55,506	55,871	56,495
Services	307,145	379,571	431,487	483,807	528,713	567,701	606,859
Govt. and Govt. Enterprises	64,321	76,968	89,672	100,184	107,953	114,489	121,523
Federal Civilian	7,557	6,876	6,595	6,718	6,717	6,658	6,611
Federal Military	9,554	8,536	8,411	8,703	8,859	8,943	9,056
State and Local	47,210	61,557	74,667	84,763	92,378	98,888	105,856

Source: Adjusted Regional Economic Models, Incorporated 1996-model baseline forecast

state and local government employees by 2026, which represents a growth of 20 percent over 1996.

The baseline forecast predicts a decline in federal military employment (including reserves) in Nevada of about 600 jobs from 1996 to 2026, or 5 percent of the 1996 figure. Clark County, the location of Nellis AFB, is forecast to experience a decline in federal military employment of over 1,000 jobs between 1996 and 2001 in proportion to projected reductions nationwide, and to gradually regain about half of the lost jobs by 2026. A stable level of federal military employment is forecast for Nye and Lincoln counties through 2026.

4.13.2 Alternatives 1A or 1B — Indefinite Withdrawal or Withdrawal/Modification of Lands and/or Administration

Under Alternative 1A or 1B, the Air Force would continue, indefinitely into the future, to have NAFR as a safe and secure test and training range. Cost savings associated with an indefinite withdrawal are expected from not having to undertake the analysis and reporting required for periodic land withdrawal renewal. Environmental resources would be planned to be managed for stewardship and public information activities above the levels required by law, regulation, or other agreement.

Table 4.13-2. Projected Employment Characteristics for Nye County, 1996-2026

Nye County Employment	*1996*	*2001*	*2006*	*2011*	*2016*	*2021*	*2026*
Total Jobs	11,463	12,883	14,028	15,156	15,904	16,498	17,147
Farm	174	155	139	132	125	119	113
Nonfarm	11,289	12,728	13,889	15,024	15,779	16,379	17,034
Private	9,858	11,149	12,137	13,111	13,733	14,219	14,755
Ag. Services, Forestry, Fishing & Other	80	99	116	130	141	151	161
Mining	1,083	953	857	755	657	572	504
Construction	533	605	661	705	730	752	783
Manufacturing	206	252	280	282	274	261	249
Transportation & Public Utilities	255	295	323	330	324	314	304
Wholesale Trade	102	112	117	120	118	114	110
Retail Trade	1,237	1,441	1,552	1,636	1,655	1,651	1,648
Finance, Insurance, and Real Estate	348	378	399	427	442	454	467
Services	6,014	7,014	7,832	8,726	9,392	9,950	10,529
Govt. and Govt. Enterprises	1,431	1,579	1,752	1,914	2,045	2,159	2,279
Federal Civilian	195	177	170	173	173	172	171
Federal Military	55	49	48	50	51	52	52
State and Local	1,181	1,352	1,533	1,691	1,820	1,935	2,056

Source: Adjusted Regional Economic Models, Incorporated 1996-model baseline forecast.

For Alternative 1A, the proposed action denotes a continuation of withdrawal of lands currently withdrawn for military use and a continuation of baseline conditions described in section 3.13. Under Alternative 1B, the Air Force would not renew a portion of the Clarkdale and Wagner Mining Districts and approximately 30,000 to 35,000 acres of land along the western border of the current NAFR. Limited mining activity could occur in the non-renewed area if permitted by BLM. If such mining were to occur within an estimated 10 year permitting period, it could somewhat increase employment in Nye County over what exists.

Alternative 1B also includes co-use for recreation consistent with Air Force mission, security, and safety of approximately 62,400 acres. This co-use has the potential for increased economic activity in recreation supply businesses in southern Nevada and in smaller communities on the western and southwestern sides of NAFR North Range. This increase is expected to be localized and small from a regional perspective since most recreation in these areas would be expected to represent a substitute for other southern Nevada recreation destinations. In less primitive southern Nevada locations, between approximately 50 percent and 90 percent of the recreationalists were from Nevada.

Table 4.13-3. Projected Employment Characteristics for Lincoln County, 1996-2026

Lincoln County Employment	*1996*	*2001*	*2006*	*2011*	*2016*	*2021*	*2026*
Total Jobs	2,413	2,622	2,773	2,935	3,039	3,123	3,225
Farm	130	116	103	98	93	89	85
Nonfarm	2,283	2,506	2,670	2,837	2,946	3,034	3,140
Private	1,702	1,940	2,090	2,225	2,305	2,373	2,459
Ag. Services, Forestry, Fishing & Other	26	29	32	35	37	39	42
Mining	15	14	12	11	9	8	7
Construction	29	30	32	33	34	36	37
Manufacturing	0	0	0	0	0	0	0
Transportation & Public Utilities	110	112	108	98	86	76	67
Wholesale Trade	5	6	6	5	5	5	5
Retail Trade	269	301	312	318	316	312	312
Finance, Insurance, and Real Estate	72	73	71	69	67	63	61
Services	1,177	1,375	1,517	1,656	1,751	1,834	1,928
Govt. and Govt. Enterprises	582	568	581	611	640	661	682
Federal Civilian	39	35	34	35	35	34	34
Federal Military	8	7	7	7	7	7	8
State and Local	535	526	540	569	598	620	641

Source: Adjusted Regional Economic Models, Incorporated 1996-model baseline forecast.

Despite the potential under Alternative 1B of some economic growth, neither Alternative 1A nor 1B is estimated to result in significant regional economic development or to impact regional social or economic resources. NAFR land withdrawal renewal action alternatives constitute a request to continue military use of land that has been primarily used for military test and training activities for over 50 years. This is a sufficient duration so that individual and regional economic activities are fully adapted to the existing military use. The socioeconomic consequences that Air Force control of the range has on the three county ROI would continue as before. The proposed renewal would have negligible socioeconomic impact. There would be negligible projected deviation from the baseline forecast described in section 3.13.

4.13.3 Alternatives 2A and 2B — 25-Year Withdrawal and 25-Year Withdrawal/Modification of Lands and/or Administration

Alternatives 2A and 2B would continue the withdrawal as in Alternatives 1A and 1B. Prior to the end of the 25-year period, Alternatives 2A and 2B would require the Air Force to provide analysis and prepare reports according to the requirements of the FLPMA and the Engle Act.

The only difference between Alternatives 1 and 2 in the period before 2026 is due to a slightly higher administrative cost for Alternative 2. Under Alternative 2, the Air Force would not realize cost savings that would allow it to plan for resources for environmental enhancements and public information activities above the levels required by law, regulation, or other agreement. There would be a small change in the distribution of Air Force expenditures, but the economic influence of NAFR on the ROI would continue virtually unchanged.

Alternative 2B would allow BLM to permit mining operations that could have a limited effect on employment in Nye County. Relative to the baseline that has been adopted for this LEIS, Alternative 2B would have negligible socioeconomic impact, that is, there would be no identifiable deviation from the baseline forecast described in section 3.13.

4.13.4 No-Action Alternative

Under the No-Action Alternative, all air-to-ground activities at NAFR would be discontinued and ROI Two, the lands currently withdrawn for use by the Air Force, would be returned to the BLM or to jurisdiction by the USFWS. Implementation of this alternative would have the effect of reducing activities at both the NAFR (where military ground activities would cease completely) and Nellis AFB (where missions and support personnel would no longer be able to perform test or training activities from Nellis AFB).

Environmental clean-up of portions of what was NAFR would create construction-type employment for an indeterminate period. Neither the degree of nor scheduled clean-up required of DOE or the Air Force on NAFR lands under the No-Action Alternative is known. This socioeconomic analysis focuses on the known economic conditions prior to a No-Action decision and after the consequences of that decision have been felt in the region.

For the purpose of this No-Action Alternative, mining and agriculture (grazing of cattle and production of irrigated crops) are projected to be permitted by DOI and BLM, especially in Nye and Lincoln counties within 10 years after the closure of NAFR. The greatest short-term absolute economic effects would be those of a negative nature experienced in Clark County (the location of Nellis AFB), followed by those in Nye County. No discernible economic effects would be experienced in Lincoln County.

4.13.4.1 ECONOMIC CONSEQUENCES OF NO-ACTION ALTERNATIVE

Decreased levels of Air Force activity at NAFR and Nellis AFB would lead to lower employment than otherwise would be the case in Clark and Nye counties. Employment effects are of a direct and secondary nature. The direct effects include changes in the number of Air Force personnel (active duty, civilian, and contractor) associated with activities that will be discontinued at NAFR and support of those activities conducted at Nellis AFB. Secondary employment effects are the result of the multiplier effects on the surrounding ROI economy that are attributable to reduced expenditures by the Air Force for payroll and purchases of goods and services from the private sector.

It is assumed that reductions in activity levels at both NAFR and Nellis AFB would take place rapidly over a two-year period under the No-Action Alternative. It is assumed that one quarter of the total direct effect attributable to implementation of the No-Action Alternative would occur in the first year (2002) with the remainder taking place in the year 2003. The exception to this reduction is for temporary duty (TDY) expenditures related to NAFR activities, which are assumed to cease during the first year. A description of these Air Force-related direct effects are shown in Table 4.13-4. These changes include the loss (over the two-year period) of 3,090 active-duty military and 855 federal civilian personnel assigned to Nellis AFB and 800 contractor personnel (584 located in Clark County and 216 in Nye County). There would also be a reduction in TDY expenditures, purchases (by the Commissary / BX for other services and materials), and less construction activity.

It is estimated that secondary employment associated with Nellis AFB economic activity related to Air Force activities at NAFR numbers 2,667 jobs. Virtually all these jobs are in Clark County. Table 4.13-5 presents the number of secondary jobs associated with the different types of direct Air Force expenditures in fiscal year (FY) 2001.

The largest contribution (1,746 jobs and 40 percent of total secondary employment) is made by procurement in the local economy of goods and services, followed by active-duty military payroll expenditures (1,557 jobs and 36 percent of the total). If the No-Action Alternative were implemented, by FY2003, the level of secondary employment supported by economic activity at the NAFR and Nellis AFB would fall to 1,661 jobs. Secondary employment would be reduced by 2,677 jobs between FY2001 and FY2003.

The reduction in total employment (direct plus secondary) in the three-county ROI by the end of FY2003 would be 7,422 jobs. This total reduction would be comprised of the following components: 3,090 active-duty military, 855 federal civilian personnel assigned to Nellis AFB, 800 contractor personnel (584 located in Clark County and 216 in Nye County), and 2,677 secondary employment jobs (see Table 4.13-5.)

It is assumed that activities currently performed by employees of Sandia National Laboratory (and non-government employees under contract) at the Tonopah Test Range (TTR) would cease under the No-Action Alternative. Information concerning the level of activity at TTR is available for FY1998 and indicates the presence of 21 government employees and 77 contractor employees. One of the government employees and all contractor employees are assumed to reside in Nye County with the remainder living in Clark County. Annual salaries paid to all workers total $4,960,000, purchases of goods and services in the local (Nye County) economy total $700,000 annually and TDY expenditures (also made in Nye County) amount to $22,400 annually.

The total Nellis AFB, NAFR, and TTR direct and secondary regional employment loss resulting from selection of No-Action Alternative is projected to be 7,531 jobs by 2003.

Table 4.13-4. Quantifiable Direct Economic Changes Associated with Termination of NAFR

		CUMULATIVE IMPACT	
Location	*Type of Effect*	*FY2002*	*FY2003*
Clark County	Loss of Personnel		
	Range Contractor	- 584	- 584
	Active Duty Military	- 773	- 3,090
	Federal Civilian / Contractor	- 214	- 855
	Federal Civilian (TTR)	-5	-20
	Loss of Payroll (FY $95)		
	Active Duty Military Personnel	- $28,544.765	- $114,105,204
	Federal Civilian Personnel	- $6,471,416	- $25,870,332
	Reduced TDY Expenditures (FY $95)		
	Lodgings	- $24,309,000	- $24,309,000
	Eating	- $12,483,000	- $12,483,000
	Reduction of Procurements (FY $95)		
	Construction (FY 95$)	- $1,576,920	- $6,302,887
	Commissary / BX (FY 95$)	- $342,253	- $1,368,128
	Education (FY 95$)	- $67,089	- $268,181
	Range Contractor Services (FY 95$)	- $58,400,000	- $58,400,000
	Other Materials (FY 95$)	- $3,724,494	- $14,886,655
Nye County	Loss of Personnel		
	Range Contractor	- 216	- 216
	Federal Civilian (TTR)	0	-1
	Contractor (TTR)	-19	-77
	Reduction of Procurements		
	Range Contractor Services (FY 95$)	- $21,600,000	- $21,600,000
Regional Total	Personnel	-1,811	-4,843
	Expenditures	-$157,518,937	-$279,593,387

Source: SAIC 1998

Table 4.13-5. Secondary Employment Effects in the ROI of the No-Action Alternative, by Fiscal Year

Associated with Expenditures Category	*Baseline FY2001*	*FY2002*	*FY2003*	*Change FY2001-FY2003*
Payroll				
Active Duty	1,557	1,390	890	–667
Federal Civilian	353	315	201	–152
TTR	7	0	0	-7
TDY	682	68	68	–614
Procurements	1,746	688	502	–1,244
Total	4,338	2,461	1,661	–2,677

The secondary employment effect associated with activities at TTR would amount to a total of 11 jobs, 7 in Clark County and 4 in Nye County, bringing total employment associated with activities at TTR to 109 jobs. By the year 2002, this employment level is estimated to drop to 82 jobs (62 in Nye County and 20 in Clark County) and to zero by 2003.

Following the transfer of NAFR land to the BLM under the No-Action Alternative, increased mining and agricultural activities could occur. For this analysis, it is assumed that the mining activity would be confined to Nye County and the additional agricultural activities would occur in equal amounts in both Nye and Lincoln counties.

Field studies and sampling results reported in the "Mineral and Energy Resource Assessment of the Nellis Air Force Range" published in 1996 by the Nevada Bureau of Mines and Geology suggests that, other than sand and gravel, hypothetical mines on former NAFR lands would be limited to precious metals. The report does not, however, address the economic feasibility of such mining activity. The analysis here assumes that mining activity will be primarily focused on gold with silver recovered as a by-product. Details of the analysis are contained in the Economic Impact Report.

Employment in mining is based on the assumption that the ratio of the price of gold to the cost of mining achieves a long-term ratio of 1.2:1. In mid 1998 the estimated ratio was 0.92:1. If the world price of gold were to sustain a value 30 percent higher than the current price and production costs stayed constant, total employment in the three-county ROI associated with these additional activities could reach 820 jobs (720 mining jobs, nine agricultural jobs, and 91 jobs in other sectors of the economies) by the year 2011.

It is not possible to predict precisely where Lincoln or Nye counties potential future mining operations may occur. Nor is it possible to identify which communities would economically benefit from hypothetical mining operations. The most likely communities to benefit would be Tonopah and Beatty in Nye County and Goldfield in Esmeralda County.

For purposes of analysis it is assumed that total employment will peak at about 720 mining operation jobs for a 25-year period. If future employment in mining were based on that evident in 1995, virtually all mining activity would occur in Nye County (the position taken here). The result would be virtually identical if the share were based on historical quantities of gold recovered historically as described in section 3.5 Earth Resources, Table 3.5-1. However, if the share were based on the amount of silver recovered historically, the share would be allocated almost equally between Lincoln and Nye counties.

EARNINGS

In addition to changes in personnel levels, direct effects include reductions in procurements, reduced levels of activity at the Commissary and Base Exchange, and lower TDY expenditures. The loss of payroll expenditures associated with personnel reductions, by the year FY2003,

would total over $140 million (Table 4.13-4). The greatest share of this is attributable to the loss of active-duty military payroll ($114 million and 82 percent of total payroll loss). Reductions in other spending by the base by FY2003 would total $140 million, the largest share of which ($36.8 million and 26.4 percent) is associated with TDY expenditures. Contributions to this reduction also include $80 million by services (57.3 percent of all spending), $6.3 million (4.5 percent of the total) by construction, and $14.9 million (10.7 percent of the total) by other materials.

If the assumptions associated with mining above were to be achieved, levels of activity in the mining and agricultural sectors of the economy following closure of NAFR could result in increases in personal income in Lincoln and Nye counties. During the 2015 peak employment year, mining and agriculture personal income could increase by $65 million in Nye County and $10 million in Lincoln County (in FY1995 dollars). This could partially offset the nearly $22 million reduction in Nye County and the over $250 million reduction in Clark County resulting from the adoption of the No-Action Alternative (again in 1995 dollars).

POPULATION

Projected population changes for the State of Nevada and each of the three counties contained in the ROI are presented in Table 4.13-6.

Table 4.13-6. Population Projections in the State of Nevada and Clark, Lincoln, and Nye Counties in Nevada for 1996 to 2026

	1996	*2001*	*2006*	*2011*	*2016*	*2021*	*2026*
State of Nevada	1,596,093	1,957,354	2,259,587	2,525,818	2,763,475	2,990,152	3,218,472
Clark County	1,056,378	1,370,209	1,629,075	1,852,472	2,047,913	2,231,314	2,416,537
Lincoln County	3,727	3,641	3,669	3,873	4,127	4,351	4,552
Nye County	23,176	26,383	29,324	32,395	35,382	38,286	41,153

The reduction in total employment in the three-county ROI by the end of FY2003 would be 7,422 jobs. This total would be comprised of the following components: 3,090 active-duty military, 855 federal civilian personnel assigned to Nellis AFB, 800 contractor personnel (584 located in Clark County and 216 in Nye County), and 2,677 secondary employment jobs.

It is difficult to estimate the population impacts of the No-Action Alternative due to the rapid continuing growth projected for the Las Vegas metropolitan area. It is anticipated that a portion of the job-holders (and their families) displaced by a No-Action decision will leave the ROI. It is assumed that 90 percent of the active-duty military personnel will leave, as will 50 percent of the federal civilian personnel, 50 percent of contractor personnel working and residing in Nye County, and 50 percent of the secondary workers in Nye County. The remaining contractor personnel and secondary workers located in Clark County are assumed to remain in the ROI. Assuming average family sizes of 2.54 for civilians and 2.0 for military personnel, the out-migration of workers and their families implies the following population losses relative to the forecast: (1) 5,562 military personnel and dependents, (2) 1,080 federal

civilian employees and dependents, (3) 742 contractor employees and dependents from Clark County, (4) 274 contractor employees and dependents from Nye County, and (5) 90 secondary employees and dependents from Nye County. In sum, under the No-Action Alternative, it is anticipated that 7,390 people will leave Clark County and 364 people will leave Nye County. These numbers represent 0.5 percent and 1.4 percent, respectively, of the projected 2001 populations of Clark and Nye counties (Table 4.13-6).

The potential out-migration represents only a fraction of the average number of in-migrants entering each of the counties annually over the period 1990-1995. For Clark County, the average annual net in-migration during the period from 1990-1995 (inclusive) was 46,436 per year and for Nye County, 864 per year (see Table 3.13-17). Thus, the projected consequences of out-migration from Clark and Nye counties under the No-Action Alternative over the two-year period (2002-2003) represent 16 percent of the average annual net in-migration to Clark County and 42 percent of the average annual net in-migration to Nye County. The potential out-migration from Nye County could eventually be offset if increased employment due to the additional mining and agricultural activities were to occur within 10 years after a No-Action decision.

HOUSING

The number of persons per housing unit in Southern Nevada dropped between 1970 and 1980 but leveled off between 1980 and 1990. It is assumed that population per household unit will remain relatively constant for the foreseeable future. The current population estimates and projections, as provided by REMI, are divided by the assumed population per household values in each county, thereby providing estimates and projections of the housing stock for each county.

The use of this forecast method results in a projected growth of housing stock in Nevada from approximately 694,000 in 1996 to approximately 1,308,200 in 2026 (see Table 4.13-7). It is projected that Clark County will continue to constitute a large portion of this stock in the year 2026, growing from an estimated 450,742 units in 1996 to approximately 946,800 units. Nye County's housing stock is forecast to grow substantially as well, increasing from an estimated 11,039 units in 1996 to a forecast 17,412 units in 2026. The growth of Lincoln County's housing stock can be expected to be consistent with the moderate forecast rate of growth of population.

Of the active-duty military who are projected to leave Nellis AFB under a No-Action decision, a proportion occupy on-base military family housing. The remainder reside in surrounding communities. Assuming a scenario in which military on-base housing would be filled by remaining military personnel, all military personnel who would be leaving the ROI would impact housing off base. Assuming one housing unit vacated per migrating worker, the following number of housing units would be vacated by out-migrating military personnel, federal civilian employees, contractor employees, and secondary employees and their families: 3,463 housing units (3,209 in Clark County and 254 in Nye County). These levels correspond to

Table 4.13-7. Forecast of Housing Units Based on the Housing Unit Method [1]

	1996	*2001*	*2006*	*2011*	*2016*	*2021*	*2026*
State of Nevada	694,194	815,874	927,171	1,030,346	1,124,591	1,215,907	1,308,158
Clark County	450,742	551,413	621,353	726,880	802,095	873,932	946,756
Lincoln County	1,908	1,817	1,810	1,899	2,019	2,126	2,221
Nye County	11,039	11,999	13,028	14,177	15,283	16,354	17,412

Note: 1. Assuming the following persons per housing unit:
State of Nevada: 2.27
Clark County: 2.30
Lincoln County: 1.94
Nye County: 2.06

Source: Population from Regional Economic Models, Inc. (see Table 3.13-5)
Population per household values are estimates

1.1 percent of the total number of housing units in Clark County in 1990 and 3.8 percent of those in Nye County (Table 3.13-18).

Given the projected population net in-migration rates, it is not anticipated that the projected number of vacated housing units (whether owned or rented) entering the housing market over a two-year period would cause a noticeable disruption in that market.

PUBLIC SERVICES AND FACILITIES

The selected public services and facilities considered below (health care, public schools, law enforcement, and fire protection) can be expected to respond to changes in the population contained within their respective service areas. To project such potential changes, it is necessary to forecast anticipated changes in both direct and secondary employment (with the number of family dependents) by place of residence. This level of spatial resolution is not available and, thus, detailed assessment by specific service area is not presented.

HEALTH CARE

It is not anticipated that the out-migration of people from the ROI over the period 2002 to 2003 will noticeably affect health care services and facilities. The loss of people attributable to implementation of the No-Action Alternative would be more than offset by the continued strong in-migration to the growing economy of the region.

PUBLIC SCHOOLS

The potential out-migration of families having dependents who attend local schools would result in reduced enrollment in selected schools and reductions in federal impact aid funds to certain school districts. The most probable schools affected by out-migration would be those that accommodate the dependents of off-base active-duty military personnel at Nellis AFB. The

back-filling of on-base housing by personnel transfers would result in reductions in students in off-base housing. This consequence would directly impact a limited number of local schools. As with housing, described above, projected population in-migration would be expected to negate these impacts within 1 to 2 academic years.

LAW ENFORCEMENT

It is not anticipated that the out-migration of people from the ROI over the period 2002 to 2003 will noticeably affect law enforcement services. The loss of people attributable to implementation of the No-Action Alternative would be more than offset by the projected continued in-migration to the growing economy of the region.

FIRE PROTECTION

It is not anticipated that the out-migration of people from the ROI over the period 2002 to 2003 will noticeably affect fire protection services. The loss of Air Force equipment supporting NAFR would result in local shortfalls of emergency services and could result in the need for additional equipment and personnel by local fire departments.

PUBLIC FINANCE

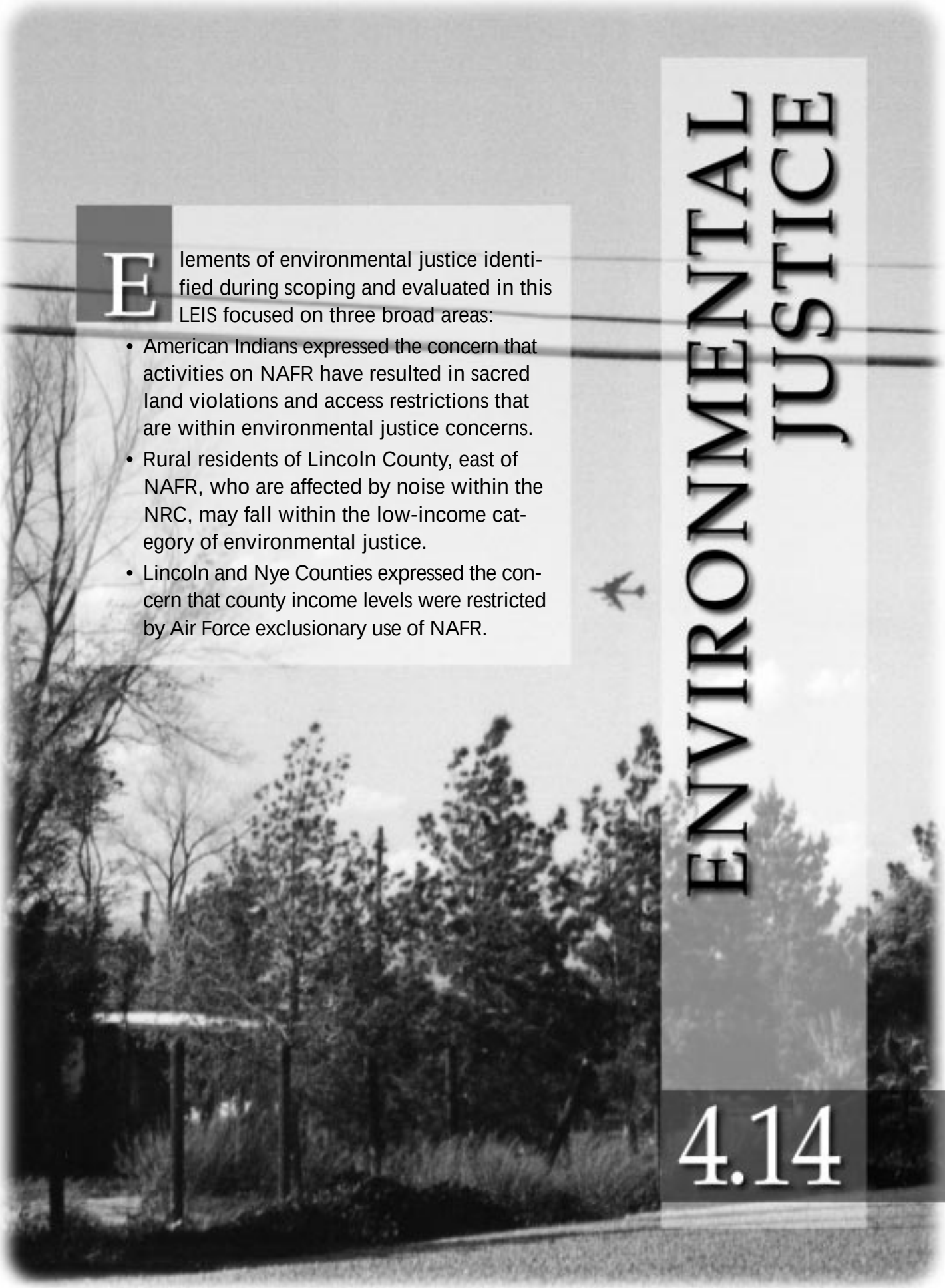
It is not anticipated that the out-migration of people from the ROI over the period 2002 to 2003 will noticeably affect the finances of local government entities, other than in the increased lands, to backfill services that had been supported by Air Force cooperative agreements.

4.13.5 American Indian Issues Concerning Socioeconomics

The CGTO is concerned that benefits and losses from NAFR be distributed equally among Indian and non-Indian populations.

The CGTO is interested in striking a balance between wages paid at NAFR and cost of living on the nearby reservations (AIWS 1997). Their goal is to encourage Indian people to continue to live on the reservations. They see this as a matter of cultural survival, as when people move away from their neighborhoods and families, children lose the cultural context important for raising the next generation of Indians.

The CGTO is concerned that the transportation of hazardous materials across reservations could cause potential businesses and investors to look elsewhere for locations. This concern is based on the potential disruption of business should there be an accident or other reason for a road closure stemming from some military activity.



4.14 ENVIRONMENTAL JUSTICE

Elements of environmental justice identified during scoping and evaluated in this LEIS focused on three broad areas:

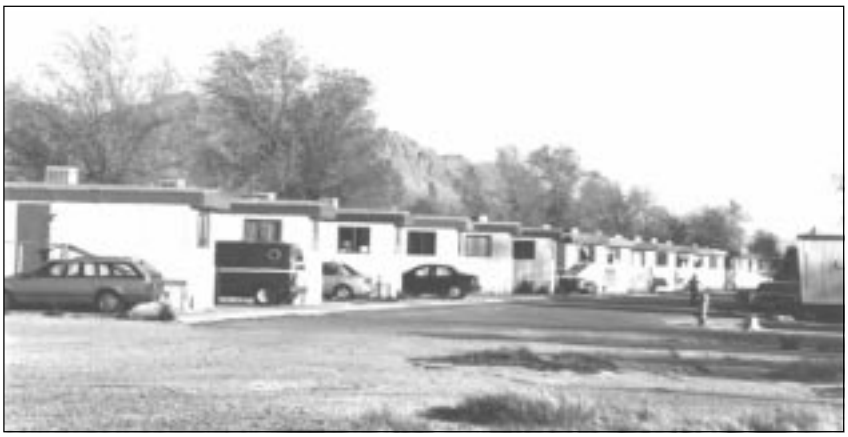
- American Indians expressed the concern that activities on NAFR have resulted in sacred land violations and access restrictions that are within environmental justice concerns.
- Rural residents of Lincoln County, east of NAFR, who are affected by noise within the NRC, may fall within the low-income category of environmental justice.
- Lincoln and Nye Counties expressed the concern that county income levels were restricted by Air Force exclusionary use of NAFR.



Within the socioeconomic ROI, Clark County has a greater population of minorities than Nye or Lincoln counties.

The American Indian Writers Subgroup of the CGTO prepared a separate Native American Resource Reference Document as input to the land withdrawal process to provide decisionmakers with the significance of traditional cultural resources on NAFR.

Under the No-Action Alternative, Clark County, which is 24.5 percent minority, would lose approximately 7,200 jobs, of which approximately 1,770 would be expected to be minority jobs. Nye County, which is 12.0 percent minority, would lose approximately 300 jobs that could be offset by a gain of 720, primarily mining and agriculture jobs. The net effect could be an increase of 50 minority jobs. Lincoln County, which is 8.2 percent minority, would have no substantive change in employment.



Changes in employment from the No-Action Alternative would be felt most heavily in Clark County, followed by Nye County.

4.14 ENVIRONMENTAL JUSTICE

The environmental justice analysis is included in this LEIS in response to EO 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, and Air Force guidance. Section 3.14 of this LEIS describes the environmental justice executive order and presents baseline information on minority or low-income populations living within the range of comparison (ROC) for the NAFR complex. This section examines potential environmental justice effects. The discussion below includes a description of the public participation program that is being conducted by the Air Force to ensure awareness of the proposal to renew NAFR and a discussion of environmental justice concerns associated with the alternatives.

4.14.1 Public Participation Program

A public participation program was conducted by the Air Force to ensure that members of the public living in the area affected by NAFR are aware of the LEIS and have opportunities to participate. The Air Force held six public scoping meetings in June of 1996 in the communities of Las Vegas and Indian Springs in Clark County, the community of Caliente in Lincoln County, the communities of Beatty and Tonopah in Nye County, and in Reno. The Air Force has initiated government-to-government consultation with 18 American Indian groups. The Air Force public participation program also includes publication of newsletters and operation of a web site that contains information about NAFR and the LEIS process. The Air Force received approximately 320 written and verbal comments during the scoping meetings and scoping comment period on a variety of issues. Comments focused on biological and cultural resources and resource management; public land uses such as mining and grazing and returning unused land for recreational purposes; airspace management, noise, and supersonic flight; and preservation and protection of American Indian artifacts. Scoping comments addressing environmental justice issues included those involving American Indian resources and those dealing with noise in the relatively lower per-capita income communities east of NAFR.

As part of EO 12898, the Air Force has initiated consultation with 18 American Indian groups. The AIWS of the CGTO has prepared the NARD (AIWS 1997), which discusses the significance of traditional cultural properties on NAFR and environmental justice concerns.

4.14.2 Alternatives 1A and 1B—Indefinite Withdrawal and Indefinite Withdrawal/Modification of Lands and/or Administration

Alternatives 1A and 1B both provide for indefinite withdrawal of NAFR lands. Alternative 1B provides for greater access than 1A, since co-use could be permitted within the Mud Lake, Kawich Range, or EC South areas of the North Range. In addition, approximately 38,400 acres of land would not be withdrawn under Alternative 1B and would be returned to the BLM for public use.

No significant adverse effects on human health or the environment have been identified for Alternatives 1A and 1B in sections 4.1 through 4.14 in this LEIS. Therefore, no disproportionately high and adverse effects on minority and low-income populations would result from these alternatives.

Specific environmental justice concerns were expressed during the scoping and consultation process for the LEIS. These concerns relate to socioeconomics and impacts to American Indian tribes and to communities surrounding NAFR.

LOCAL COUNTY CONCERNS

Nye County officials submitted comments at the June 25, 1996 scoping meeting in Tonopah regarding a variety of issues affecting the county, including environmental justice. The county indicated that it should be given special consideration, opportunity for participation, and mitigations because it qualifies as a rural, low-income area under EO 12898. Lincoln County officials have expressed similar concerns.

The Draft Council on Environmental Quality (CEQ) Guidelines for Implementation of EO 12898 (CEQ 1997) indicate that poverty thresholds should be utilized to measure low-income status of populations that may be subject to disproportionately high environmental and health effects. Based on data from the 1990 Census of Population and Housing, 10.4 percent of persons living within the three-county area containing NAFR (Nye, Lincoln, and Clark counties) were living below the poverty threshold ($12,674 for a family of four in 1989, and varying by number of persons in the household). By comparison, 10.3 percent of the population of Nye County was living below the poverty level, an approximately equal percentage. The comparable figures for Lincoln and Clark counties are 13.1 percent and 10.3 percent of persons below poverty, respectively. Thus, the population of Nye County, when compared to the general population that would potentially be affected by the project, does not have a measurably greater percent of low-income persons than the general population.

Under Alternatives 1A and 1B, employment and earnings effects of continued withdrawal would be similar to current levels and there would be no significant adverse socioeconomic effects. Therefore, socioeconomic effects of the proposed alternatives would not result in disproportionately high health and environmental effects on low-income populations.

Lincoln County has a higher percentage of persons living below poverty (13.1 percent), compared to 10.3 percent in Clark County, 10.3 percent in Nye County, and 10.4 percent in the three counties. Baseline subsonic noise levels in Lincoln County communities such as Caliente, Pioche and Panaca, located east of NAFR within the NRC, are approximately 54-56 L_{dnmr}. This noise level is substantially below 65 dB and is not considered to have a significant impact upon Lincoln County residents. Use of noise restriction cylinders (i.e., no-fly zones designed to reduce noise) decreases noise levels.

Areas of the associated airspace that are authorized for supersonic activity within Lincoln County are located in the Elgin and Coyote subdivisions of the Desert MOA. Baseline sonic

boom levels are less than 56 L_{CDN} in the Elgin subdivision and less than 50 L_{CDN} in the Coyote subdivision. L_{CDN} is the day-night average C-weighted sound level, which takes into consideration impulsive sounds by C-weighting the L_{DN} value.

The Moapa Indian Reservation is located southwest of the Town of Moapa in Clark County, approximately 10 miles south of the Nellis Range Complex. Baseline subsonic noise levels at the closest point within the Nellis Range Complex are approximately 46-47 L_{DN}. Baseline supersonic noise levels north of the reservation's northern boundary are 56 L_{CDN} with 1-2 sonic booms per day.

Projected future noise levels from the alternatives are similar to baseline conditions. There would be no disproportionately high and adverse effects from noise on low-income or minority populations from these alternatives.

AMERICAN INDIAN CONCERNS

The following discussion addresses American Indian concerns in the areas of consultations and participation and the effects of past NAFR and TTR operations on American Indian sacred lands, cultural survival, restricted access, and vandalism. Section 4.9 addresses traditional cultural resources and American Indian concerns.

The Air Force has initiated consultation with 18 American Indian groups. In addition, it is complying with all other legislation and regulations designed to protect cultural and traditional cultural resources. The Air Force is respectful of tribal relations and sovereignty. Through its on-going NAIP for NAFR, the Air Force has worked closely with American Indian tribes and organizations in the CGTO to identify issues of concern, to provide a full opportunity for participation in the LEIS process, and to collect information on traditional cultural resources throughout NAFR. As part of this program, the Air Force has funded the preparation of the NARD by the AIWS.

The Air Force currently makes every effort to support access to NAFR lands for American Indian religious ceremonies where such access would not affect training schedules, public safety, or security. In addition, scheduled limited access for American Indian groups consistent with test and training missions is included in all action alternatives. Access would be planned on an annual basis, subject to change based on safety and security requirements. Full and unlimited access to NAFR conflicts with existing Air Force mission requirements, safety, and security and is not considered feasible.

Alternative 1B potentially provides for greater access than Alternative 1A. Under Alternative 1B, co-use could be permitted within the Mud Lake, Kawich Range, or EC South areas of the North Range. In addition, approximately 38,400 acres of land would not be withdrawn and would be returned to the BLM.

NAFR includes the TTR, which is within its northern boundary. The TTR consists of approximately 336,665 acres and is operated by Sandia National Labs for DOE. Activities on

the TTR include projectile firings, rocket testing, missile flights, explosion effects tests, earth penetration tests, and many activities requiring a remote range for non-nuclear DOE Research and Development projects, or for other safety and security reasons. Operations on the TTR also include a single airfield run by the Air Force, associated facilities, and personnel housing.

Section 4.9 of the LEIS discusses impacts on cultural resources and American Indian traditional resources within NAFR from the withdrawal alternatives. Continued effects would occur to American Indian groups desiring increased access to cultural and traditional resources, as well as impacts from ground disturbance and visual and noise intrusions from overflights. No significant adverse impacts have been identified.

Effects of DOE operations on the TTR are addressed in the *Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada* (DOE 1996a). Information provided by the AIWS is included in the NTS LEIS and the document includes a section addressing environmental justice issues.

4.14.3 Alternatives 2A and 2B — 25-Year Withdrawal and 25-Year Withdrawal/Modification of Lands and/or Administration

No significant adverse effects on human health or the environment have been identified for Alternatives 2A and 2B for resources addressed in sections 4.1 through 4.14 in this LEIS. Therefore, no disproportionately high and adverse effects on minority and low-income populations would result. Discussions related to socioeconomics, American Indian concerns, and noise levels contained in section 4.14.2 above (for Alternatives 1A and 1B) would also apply to these alternatives; however, the time frame would be 25 years rather than an indefinite withdrawal period.

4.14.4 No-Action Alternative

The No-Action Alternative would potentially provide the greatest opportunity for access to NAFR lands, since military activities on the range would cease and lands would be managed for multiple use by BLM. Hazardous areas on the former NAFR would still be excluded to ensure public safety. Air-to-air operations by the Air Force would still continue in the special use airspace in the NRC.

As described in section 4.9, potentially significant impacts could occur under the No-Action Alternative to preserved cultural and American Indian traditional resources. Potential access-related impacts include increased vandalism because alteration to land status could mean that cultural resource protection would be reduced. Multiple use management policies that expose cultural and American Indian traditional resources to impacts from consumptive and non-consumptive uses would also increase. Because of these effects, there is a potential for disproportionately high and adverse effects on American Indian populations.

With the exception of the above impacts, no significant adverse effects on human health or the environment have been identified for the No-Action Alternative. Therefore, no

disproportionately high and adverse effects on minority and low-income populations would result. The discussion below addresses environmental justice concerns related to socioeconomic issues that were expressed during the scoping and public participation process for the LEIS and that are listed in section 3.1.3.

Sections 4.13.1 through 4.13.4 of this LEIS (Socioeconomics) discuss potential economic impacts on Nye, Lincoln, and Clark counties, including employment, income, and related effects of the LEIS alternatives. Under the No-Action Alternative, Clark County, which is 24.5 percent minority, would lose approximately 7,100 jobs, of which approximately 1,740 would be expected to be minority jobs. Nye County, which is 12.0 percent minority, could eventually have a net gain of 390 jobs, primarily in mining. Lincoln County, which is 8.2 percent minority, could eventually have no substantive change in employment.

Under the No-Action Alternative, Nye County would potentially lose jobs and related procurements and personal income, by 2002, related to the loss of contractor employment at NAFR. However, there could potentially be increases in mining employment resulting in a net gain of 390 jobs by 2015 if mining access to former NAFR lands were permitted by BLM and the long-term price of gold sustained a 30 percent increase over mid-1998 values.

Potential population out-migration resulting from the No-Action Alternative would likely be offset by projected continued baseline population growth in the county. The increased costs of providing public services to the in-migrating populations could continue to strain public finances at the county level and require other forms of revenue or reductions in services.

Under the No-Action Alternative, Clark County employment related to NAFR would potentially be reduced by 7,100 jobs. This potential reduction in jobs would not constitute a significant adverse effect given projected baseline job growth in Clark County of 81,309 jobs between the year 2001 and 2006. The population of Clark County is 24.5 percent minority compared to 8.2 percent minority in Lincoln County, 12.0 percent in Nye County, and 24.1 percent in the three counties. Clark County's much larger population relative to the other two counties heavily weights the three-county value. The minority population of the State of Nevada comprises 21.2 percent of the total state population. Relative to its total population, Clark County's minority population is 2.9 percentage points higher than the State of Nevada's, not a meaningfully higher value.

Minority job losses are calculated to be approximately 1,700 in Clark County. This absolute loss from a No-Action decision would impact individuals but would not have disproportionately high or adverse socioeconomic effects on minority and low-income populations in the region.

4.14.5 American Indian Issues Concerning Environmental Justice

The following concerns about environmental justice have been raised by the CGTO.

- Centrality and Continuity. Because the CGTO considers NAFR to comprise a portion of their traditional lands, NAFR is central to the functioning of American Indians from the surrounding region.

- Usurpation of All Resources. The CGTO sees the military land withdrawal as a continuation of the process that began with moving American Indians onto reservations and off the land, thereby causing a complete disruption of their way of life.

According to the CGTO, Air Force activities on Nellis constitute sacred land violations, perceived risks from radiation (in some areas) and cultural survival violations.

Although the Air Force and the CGTO are working together through the NAIP to provide access to portions of NAFR that are not dangerous and during time that will not conflict with training exercises, the CGTO has stated that "land disturbance and irreparable damage of cultural landscapes, traditional cultural properties and cultural resources may render certain locations unusable" (AIWS 1997).

5.0 IRREVERSIBLE / IRRETRIEVABLE COMMITMENT OF RESOURCES AND CUMULATIVE IMPACTS

This chapter summarizes the cumulative impacts and the irreversible and irretrievable commitment of resources associated with continued use of NAFR. The National Environmental Policy Act (NEPA) requires that environmental analysis include identification of "...any irreversible and irretrievable commitment of resources which would be involved in the proposed action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations.

- Irreversible effects primarily result from use or destruction of a specific resource, such as energy and minerals that cannot be replaced within a reasonable time frame. The Nellis withdrawal action does not use any minerals except aggregate for roads. Mineral extraction is precluded from NAFR.
- Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action, such as disturbance of a cultural site. For 50 years, biological and cultural resources have been generally protected from the impacts of human use under multiple use by NAFR. However, military use of these lands has resulted in some limited impact from the construction of roads, simulated military targets, communications facilities and other facilities to support the testing and training mission. Other impacts have occurred as a result of the use of these lands for military testing and training. These impacts are generally limited to the areas delineated in the MOU between the USFWS and Air Force (see new figure). Inadvertent or errant munitions releases have resulted in infrequent impacts to other lands and resources outside of the areas delineated in the MOU.

NAFR has resulted in few direct and indirect commitments of resources. Most resource commitments are related to construction or operation of the range components. Most impacts are short term and temporary. Those resources that may have a possible irreversible or irretrievable commitment are discussed in this chapter.



Resources committed as targets are designed to be used as long as possible and then recycled. These concrete targets of personnel and a vehicle are examples of the existing commitments of resources.

Cumulative analysis considers other activities that potentially could affect ROI Three and the region. These activities include test and evaluation for the F-22, DOE projects including Yucca Mountain, and nearby mining activities.



Most irreversible commitments of resources occur at permanent facilities such as Indian Springs, pictured here.

5.0 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES AND CUMULATIVE IMPACTS

5.1 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

The National Environmental Policy Act (NEPA) requires that environmental analysis include identification of "… any irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented." Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that the use of these resources have on future generations. Irreversible effects primarily result from the use or destruction of a specific resource, e.g., energy and minerals, that cannot be replaced in a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action, e.g., the extinction of a threatened or endangered species or the disturbance of a cultural site.

The continuation of activities at Nellis Air Force Range (NAFR) as described under Alternative 1 or Alternative 2 would, for most resources, neither irreversibly nor irretrievably commit resources. As in the past, activities that have the potential to produce ground disturbance also have the potential to impact water resources, air quality, biological resources, and cultural resources. However, management policies and practices in place and proposed to continue are designed to minimize potential impacts to these resources.

Construction and maintenance of targets and other facilities on NAFR would require the consumption of limited quantities of aggregate, steel, concrete, petroleum, oil, and lubricants. The commitment of these resources would apply under all action alternatives.

Use of training ordnance during operations would involve the commitment of certain quantities of resources; however, none of these resources are considered rare and their long-term commitment would not have a substantial effect on their future availability.

All alternatives, including the No-Action Alternative, would involve fuel use by aircraft and some by surface vehicles. Training activities would continue under all alternatives (although to a lesser degree under the No-Action Alternative).

Changing world situations and shifts in the strategies for national defense defined by the President and Congress dictate the training activities and support needs for all armed services. In the future, should such changes and shifts alter the training requirements, the Air Force would evaluate possible options to fulfill these requirements. Such changes could mean a removal or reduction of a range. If a range were no longer needed in the future for training, the Air Force would relinquish the withdrawn land to Bureau of Land Management (BLM) or

U.S. Fish and Wildlife Service (USFWS). The Federal Land Policy Management Act (FLPMA) describes the process for such relinquishment, including any appropriate site restoration, in accordance with the Resource Management Plan (RMP).

5.2 CUMULATIVE IMPACTS

5.2.1 Definition of Cumulative Impacts

This section provides (1) a definition of cumulative impacts, (2) a listing of plans and projects used to evaluate cumulative impacts, and (3) a resource-specific evaluation of cumulative impacts associated with renewed withdrawal of the NAFR.

The Council of Environmental Quality (CEQ) regulations stipulate that the cumulative impact analysis within an environmental impact statement (EIS) should include the anticipated impacts to the environment resulting from "the incremental impacts of the action when added to other past, present and reasonably foreseeable future action regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 Code of Federal Regulations [CFR] 1508.7). Therefore, a cumulative impact analysis is based on a series of assumptions concerning future plans and/or projects and information about their character and timing. Cumulative impacts are examined by combining the impacts of the proposed project alternatives with the impacts of other past, present and reasonably foreseeable activities in a region of influence. The extent of the region of influence can vary widely from resource to resource. For the purposes of this analysis, public documents prepared by federal, state and local governmental agencies (including resource management plans and economic and demographic projections) are the primary sources of information regarding reasonably foreseeable projects. Actions planned by private persons are assumed to be captured in the information provided by these agencies.

In its determination of impacts associated with other projects, the cumulative impact analysis methodology uses assessments of environmental impacts contained in resource management plans. It is against these collective impacts that the impacts associated with implementation of the plans described in this document are compared. This approach is used rather than one that employs a compilation of specific future projects anticipated to occur in the region of influence. The geographical and temporal extent of this Legislative Environmental Impact Statement (LEIS) make it infeasible to achieve a project-by-project aggregation.

The resource management plans and economic and demographic projections developed by public agencies present a comprehensive picture of activities that are projected to occur in areas surrounding NAFR. In general terms the respective resource management plans apply to the large areas of relatively undeveloped land under federal ownership in Nye and Lincoln counties. The economic and demographic projections apply to the more urbanized areas of Clark and Nye counties. The resource management plans and economic and demographic projections utilized in this analysis include the following:

- Bureau of Land Management — Tonopah Resource Area;
- Bureau of Land Management — Stateline Resource Area;
- Bureau of Land Management and U.S. Air Force — Nellis Air Force Range; and
- Economic and Demographic Projections for Clark, Lincoln, and Nye counties.

Resource management plans, and associated EISs, have been prepared by the BLM for the NAFR Complex (BLM 1990b) and the Stateline and Tonopah Resource Areas (BLM 1994a; 1994b). These plans identify objectives for each area, management directions designed to attain these objectives and restricted land use designations associated with management directions. The environmental resources commonly considered in these plans include air quality, soils, water, vegetation, wildlife, forestry, livestock and grazing, wild horses and burros, cultural and archaeological resources, natural areas, wilderness, minerals, fire management, socioeconomic values, land use, and visual resources.

As directed by Public Law (PL) 99-606, as amended, branches of the Department of Defense (DOD) are evaluating their need and impacts of the various military ranges covered in this Act. These include the following:

- Bravo-20 Bombing Range, Department of the Navy in Churchill County, Nevada;
- Nellis Air Force Range, Department of the Air Force, in Nye, Clark, and Lincoln counties, Nevada;
- Barry M. Goldwater Air Force Range, Department of the Air Force, in Maricopa, Pima, and Yuma counties, Arizona;
- McGregor Range, Department of the Army, in Otero County, New Mexico;
- Fort Greely Maneuver Area and Fort Greely Air Drop Zone, Department of the Army, in the Big Delta and Granite Creek Areas, Alaska; and
- Fort Wainwright Maneuver Area, Department of the Army, in the Fourth Judicial District, Alaska.

Other land withdrawal renewal activities under PL 99-606, as amended, outside of Nevada were not included here in the analysis of cumulative impacts since the regions of influence would not be expected to overlap.

5.2.2 Reasonable Foreseeable Future Actions

Federal Actions

Actions of agencies of the federal government include those of the Air Force, U. S. Navy, Department of Energy (DOE), and Department of the Interior (DOI) (BLM and USFWS). It is expected that these agencies would continue to use the resources available to them and proceed with approved plans for the management and/or development of these resources.

DEPARTMENT OF DEFENSE

The DOD, in cooperation with the Federal Aviation Administration (FAA), has established various special-use airspaces near NAFR including military operations areas (MOAs), military training routes (MTRs), and alert areas. The use of Nellis Range Complex (NRC) airspace by aircraft not associated with the NAFR is included in the projected 200,000 to 300,000 sortie-operations evaluated in this LEIS. Table 5.2-1 lists the MTRs that are near or within the NRC airspace that are not associated with the operation of the NAFR.

Table 5.2-1 MTRs Within or Adjacent to NAFR

MTR	*Scheduling Agency*	*NAFR Airspace Accessed*	*Annual Sorties*[1]
IR 286	Nellis AFB	Final segments in Desert MOAR-4807A	21
IR 234	Edwards AFB	First segment exits Reveille MOA	0
IR 235	Edwards AFB	Last segment enters Reveille MOA (reverse of IR 234)	0
IR 237	Edwards AFB	Last segment enters Reveille MOA	0
IR 238	Edwards AFB	First segment exits Reveille MOA (reverse of IR 237)	0
IR 425	Edwards AFB	Traverses Reveille and Desert MOAs	5
IR 285	Offutt AFB	First segment exits north Desert MOA	3
IR 310	Offutt AFB	Last segment enters north Desert MOA (reverse of IR 285)	3
VR 1406	Nellis AFB	None	2
VR 1252	NAS Lemoore	None	66
VR 1253	NAS Lemoore	Traverses Desert MOA	15
VR 1259	NAS Lemoore	Traverses Reveille and Desert MOAs	113
VR 1260	NAS Lemoore	First and last segments in Reveille MOA	7
VR 208	NAS Lemoore	None	441
VR 209	NAS Lemoore	Traverses Reveille and Desert MOAs	79
IR 200	Point Mugu	Traverses Reveille and Desert MOAs (reverse of IR 425)	100
IR 206	Point Mugu	None	5

Note: 1. Approximate number of sorties based on best available data.

AIR FORCE

Nellis Air Force Base (AFB) is one of the key test and training bases in the nation. As such, Nellis AFB missions and mission activities on NAFR undergo near continuous updating and revisions to ensure that aircrews equipment are ready when required by national policy. The overall scope of analysis in this LEIS is designed to capture the expected levels of test and training activity into the indefinite future. Two representative test and training activities that are reasonably foreseeable are (1) the establishment of F-22 Operational Test and Evaluation (OT&E) and Fighter Weapons School at Nellis AFB with flight activity over NAFR and (2) the resumption of use of depleted uranium (DU) rounds at NAFR Target 63-10.

The planned F-22 activity consists of the introduction of seventeen F-22A aircraft at Nellis AFB starting in 2003 for OT&E and Fighter Weapons School. The role of the F-22 will be similar to that of the F-15C. These aircraft would use NAFR and the NRC in a similar manner to the existing F-15, flying the air superiority mission. This LEIS cumulative analysis assumes that F-22 aircraft will be tested and train similarly to the way F-15 aircraft fly. This is a reasonable assumption since:

- the F-22 has similar physical characteristics to the F-15 (single pilot, twin engine supersonic flight capabilities, air superiority mission); and
- the F-22 would be required to perform similar mission profiles with limited air-to-ground requirements.

Cumulative impacts of this project on NAFR would be primarily due to differences between the noise characteristics of the F-22 and F-15, and not due to differences in utilization.

The resumption of limited DU rounds fired from A/OA-10 aircraft on Target 63-10 would occur during 25 annual sorties. This activity would fill a critical need for instructor training, testing, evaluation of associated tactics, and software development. Target 63-10 is the only remaining air-to-ground gunnery range in the United States licensed for DU use. A cumulative increase of hazardous materials and waste would occur at the target.

U.S. NAVY

The Navy has proposed to modify their existing training ranges near Naval Air Station (NAS) Fallon to include an expansion to accommodate new mission requirements (resulting from realignments) and to enhance public safety. The expansion could entail the withdrawal of approximately 127,365 acres to augment the current 56,499 acres. This action would result in some ground disturbance and between 20 and 30 percent of the withdrawn land would have exclusive use by the Navy. Some special use airspace supporting training would be changed from MOAs to restricted airspace. The total special use airspace is not expected to increase.

Under PL 99-606, as amended, the Navy is also preparing an analysis of the renewal of lands within the Bravo-20 Range. This action would renew the withdrawal of approximately 21,500

acres of land in Churchill County, Nevada. No additional lands would be disturbed. Special use airspace would not be changed. If approved, this land would continue to be reserved for military training.

DEPARTMENT OF ENERGY

The DOE recently completed an evaluation of potential site-wide impacts of future development of the Nevada Test Site (NTS) and other associated sites in Nevada. This evaluation included analysis of four development alternatives (current operations, discontinue operations, expand operations, alternative uses) with respect to its five major programs (defense, waste management, environmental restoration, non-defense research and development, and work for others). The framework for a NTS resource management plan was also presented in the site-wide EIS. The Record of Decision (ROD) identified an expanded use of the NTS pending other DOE decisions. If fully implemented, this decision would result in a multipurpose, multi-program use of lands withdrawn by DOE. Much of the NTS would remain in exclusive use. DOE will pursue diversification of interagency, private industry and public education use while meeting the mission requirements of the NTS and other Nevada sites.

Site characterization studies at Yucca Mountain in Nye County are ongoing and designed to determine whether the site is suitable for disposal of high-level radioactive materials and spent nuclear fuel. The DOE anticipates making a recommendation to the President on the suitability of the Yucca Mountain site for this purpose in 2001. If suitable, following Nuclear Regulatory Commission review and approval, construction could be completed and operations could commence by 2010. On August 7, 1995, DOE announced its intent to prepare an EIS for a geologic repository for the disposal of spent nuclear fuel and high level radioactive waste at Yucca Mountain, Nye County, Nevada.

The DOE proposes that low-level nuclear waste (LLW) be transported from a number of DOE/NV-approved LLW generators to a disposal site located on the NTS utilizing rail and truck transportation modes and an intermodal transfer facility. The use of rail and truck modes and alternative routes could reduce radiological risk, improve safety, and reduce costs for transporting LLW from generator sites to the NTS. LLW would be shipped via rail to an intermodal facility near the NTS where the cargo would be transferred to trucks for delivery to waste disposal sites at the NTS. The proposed action and alternatives address routes that would avoid the Las Vegas Valley and Hoover Dam.

Locations for the proposed intermodal facility are (1) an existing intermodal facility in Barstow, California operated by the Burlington Northern Santa Fe Railroad, (2) a facility proposed by the City of Caliente, Nevada (at either of two potential locations), and (3) an existing intermodal facility at the rail terminal of the Yermo Annex operated by the U.S. Army MCLB Barstow in Yermo, California.

BUREAU OF LAND MANAGEMENT

The Stateline resource area (now part of the Las Vegas District) comprises approximately 3.7 million acres of public land in Clark and Nye counties. The resource area is bordered by the Caliente resource area, the USFWS Desert National Wildlife Range (DNWR), NAFR and the NTS. The Stateline *Resource Management Plan* (BLM 1992b) characterizes five alternative management plans (Alternatives A through D and the No-Action). Alternative D was the BLM's preferred alternative. An additional management alternative (Alternative E) was developed following public and agency review. The Supplemental EIS (BLM 1994a) evaluated the following alternative management actions:

- No-Action — a continuation of the current management direction within the present laws, regulation and other agreements;
- Alternative A — provides for the full spectrum of public land use. Consumptive and non-consumptive uses would be balanced;
- Alternative B — provides for the maximum opportunities for land-based growth and development while providing for multiple-use and sustained yield of the public lands;
- Alternative C — provides for the management of land on an ecosystem basis, with an emphasis on maintaining or enhancing biodiversity, nonconsumptive use and protection of the desert tortoise;
- Alternative D — provides for the multiple-use of public lands, permits maximum flexibility in the disposal of lands and the protection of the desert tortoise; and
- Alternative E — provides for the management of lands for multiple use and sustained yield, while emphasizing biodiversity and the protection of the desert tortoise.

The potential environmental consequences in each resource area were assessed for each alternative. For example, the total area potentially disturbed would reach approximately 197,000 acres. The effects attributable to these reasonable foreseeable actions are identified in the *Supplement to the Stateline Draft Resource Management Plan and EIS* (BLM 1994a).

The Tonopah Resource Area (now divided between the Las Vegas and Ely districts) includes approximately 6.1 million acres of land in Nye and Esmeralda counties. *The Tonopah Resource Management Plan and EIS* addressed four alternatives including No-Action in an effort to resolve issues concerning the following six major environmental topics (BLM 1994b).

1. Wild horse and burro management
2. Special management areas
3. Off-highway vehicle use

4. Management of released wilderness study areas (WSAs)

5. Utility corridor routing

6. Locatable and fluid minerals

The total area potentially disturbed from these alternatives could reach approximately 26,800 acres in Nye County.

U.S. FISH AND WILDLIFE SERVICE

DESERT NATIONAL WILDLIFE RANGE

The USFWS withdrawal of the DNWR continues the limited access and single use of these lands and is not expected to increase the area of disturbance. Management of the DNWR resources, including occasional reintroductions and restricted hunting, will continue.

Non-Federal Actions

This section contains information for the following geographical areas: Clark County, Nye County, and Lincoln County.

CLARK COUNTY

The Regional Transportation Plan for Clark County (Regional Transportation Commission 1994) estimates an average annual growth rate from 1980 to 1990 of 5.2 percent for population and 5.7 percent for employment. Growth rates are projected to decrease to 3.9 and 4.6 (population and employment, respectively) for the 1990 to 2000 period and to 2.5 percent for each parameter for the period of 2000 to 2015. Such growth would result in a Clark County population of approximately 1.2 to 1.4 million persons by 2005. It is further projected that approximately 58,000 acres of undeveloped land in the Las Vegas Valley would be converted to urban uses in the same period.

The *Clark County Desert Conservation Plan* (Regional Environmental Consultants 1995) was prepared to support discussion with the USFWS regarding the desert tortoise and to develop a strategy to address the conservation and protection of habitats necessary to preserve plant and wildlife resources. It addresses these issues on approximately 525,000 acres of non-federal land in Clark County and about 2,900 acres of desert tortoise habitat associated with Nevada Department of Transportation (NDOT) activities in Clark, Esmeralda, Lincoln, and Nye counties.

An incidental take permit for desert tortoises was issued by the USFWS based on this and other analyses. It estimates that approximately 111,000 acres of Clark County and about 2,900 acres of NDOT lands will be developed in the next 30 years. The permit also establishes the Desert

Tortoise Recovery Plan with land use constraints and a mitigation fee on development projects in the permit area.

NYE COUNTY

Key economic and development forces that influence future private activities and the character of Nye County and its communities include federal activities at the NTS, NAFR, mining and tourist activity, migration and commuting patterns and the local service sector activity. Population projections for Nye County (Nye County Board of Commissioners 1993) indicate an average annual growth of 4.6 percent from 1990 to 2010. However, much of this growth is expected to be fueled by economic growth in the Las Vegas valley and the availability of low cost land and housing in the Pahrump area of Nye County. This area is expected to grow at approximately 7.6 percent per year during the same period. This would be expected to result in the conversion of approximately 2,000 acres of undeveloped land to urban uses by 2005.

LINCOLN COUNTY

Lincoln County is projected to retain a rural agriculture-based economy. Based on demographic projections prepared as part of this document, the population of Lincoln County is forecast to increase from 3,727 in 1996 to 4,552 in the year 2026.

American Indian Actions

The Las Vegas Paiute Tribe has developed plans for a destination resort including a 450-room hotel and four championship golf courses. This would be constructed on approximately 150 acres of land on the east side of U.S. Highway 95. A 300-acre theme park is under consideration immediately adjacent to this development. On the west side of the reservation, the tribe has plans for 200 single family homes for tribal members, a solar energy park, and other industrial facilities. The Bureau of Indian Affairs has prepared an environmental assessment for the construction of the golf courses.

5.2.3 Cumulative Resource Analysis

A summary of the potential impacts, on a resource-specific basis, associated with each of the alternatives and scenarios for the renewal of the NAFR withdrawal and the No-Action Alternative is presented in Table 2-3. This table describes the overall impacts of the withdrawal renewal within the area (1) disturbed by past and projected military activities (Region of influence [ROI] One), (2) associated with the access restrictions within the withdrawn lands (ROI Two), and (3) within the associated airspace used by aircraft which utilize NAFR land-based infrastructure (ROI Three).

5.2.3.1 AIRSPACE

Discussions with FAA and State of Nevada air traffic and airspace representatives indicate that aviation activities within the Las Vegas region are projected to continue to increase in the

foreseeable future. No changes in the volume of airspace activities are expected to significantly affect NAFR airspace use. If any activities, such as airport expansion or greater than planned increase in aircraft operations, were to be proposed for this region, the FAA would review these activities to determine any potential cumulative impacts such growth may have on the compatible use of airspace by all military and civil aviation interests. Under the No-Action Alternative, military aircraft operations would be reduced resulting in lower cumulative regional demand for airspace.

5.2.3.2 NOISE

The primary cumulative contribution to noise would be introduction of the F-22.

SUBSONIC NOISE CHARACTERISTICS OF THE F-22

Comprehensive in-flight noise measurements have not yet been conducted on the F-22. However, noise data have been collected in ground runup tests (Downing 1997), and differences between the F-22 and F-15 can be estimated.

Ground runup measurements at idle power and full military power have shown that the overall sound pressure level of the F-22 is approximately 1 decibel (dB) lower than that of the F-15. The frequency characteristics of the F-22 are considerably different, with the highest levels being around 1,000 Hz, as opposed to the 300 to 350 Hz range for the F-15. This corresponds to the A-weighted noise level for the F-22 being about 4 dB higher than that of the F-15.

That higher noise level corresponds to a measurement about 40 feet from the aircraft, with the aircraft stationary. Noise from an F-22 operating in the NRC and over NAFR will differ in two ways. First, the F-22 is expected to operate at higher minimum altitudes than the F-15. Sound is attenuated as it propagates through the atmosphere, with high frequencies attenuated more than low. The higher-pitched F-22 engine noise will therefore fall off more rapidly than that of the F-15, and the difference between the two will diminish at larger distances.

The second factor is that at the high speeds on the range the engines are one of two major noise components. The second component is airframe noise. Because of its cleaner aerodynamic shape, airframe noise from the F-22 is expected to be no more than that of the F-15, and most likely less. For purposes of this cumulative assessment, the F-22, under range operating conditions, is estimated to be 2 dB (A-weighted) louder than the F-15. This is a conservative estimate, assuming that half of the near-field engine noise difference persists into the far field, and ignoring the dilution by airframe noise.

The F-22 has two subsonic performance characteristics that could, in principle, affect its average noise. One is that it has higher performance than the F-15. It is less likely to employ its afterburner, which reduces noise. The second is that it is capable of very low speed high angle of attack flight — virtually "standing on its tail." This flight mode would result in higher local noise levels. This capability is not, however, expected to be used routinely or for extended periods. When used, it would be during air combat maneuvering, which takes place at high

altitudes. Low speed high angle of attack flight will therefore not occur often enough or low enough to affect cumulative noise at the ground.

Tables 5.2-2 and 5.2-3 show maximum sound level (L_{max}) and sound exposure level (SEL) for several aircraft, including the F-22. They are the same data as shown earlier in Tables 4.2-1 and 4.2-2, but with the F-22 (estimated to be 2 dB louder than the F-15) added.

Table 5.2-2. Aircraft Maximum A-weighted Sound Levels (dB) at Various Altitudes Above Ground Level[1]

	ALTITUDE IN FEET					
Aircraft Type	*500*	*1,000*	*2,000*	*5,000*	*10,000*	*20,000*
B-1B	113	106	98	86	75	61
F-15	114	107	98	86	73	57
F-16	104	97	89	76	64	48
A-10	94	87	78	65	54	43
C-130	91	84	76	66	56	46
F-22[2]	116	109	100	88	75	59

1. Level flights, steady high-speed conditions
2. Projected

Table 5.2-3. Sound Exposure Levels in dB at Various Altitudes Above Ground Level[1]

	ALTITUDE IN FEET					
Aircraft Type	*500*	*1,000*	*2,000*	*5,000*	*10,000*	*20,000*
B-1B	112	107	101	92	82	69
F-15	112	107	101	90	80	65
F-16	103	98	91	81	70	56
A-10	95	89	82	72	63	53
C-130	96	91	85	77	69	61
F-22[2]	114	109	103	92	82	67

1. Level flights, steady high-speed conditions
2. Projected

SONIC BOOM CHARACTERISTICS OF THE F-22

Sonic boom depends on an aircraft's size, weight and geometry, and its flight altitude, Mach number, and maneuvering. When comparing the sonic boom from two aircraft, differences in boom are related to differences in size, weight and geometry.

Carlson (1978) has shown that the effect of aircraft geometry can be accounted for via a "shape factor," which is a function of aircraft type. Both the F-15 and F-22 are modern fixed-wing fighters, and have a similar shape. The length of the F-22 is approximately 2 feet shorter than the F-15; this is not a significant difference for sonic booms. Nominal weight (average of empty weight and maximum takeoff weight) is also close enough so as to be a negligible difference. A sonic boom from the F-22 will therefore be essentially the same as from the F-15.

The F-22 is expected to be supersonic more often than the F-15. Because of its higher acceleration capability and cleaner aerodynamics, it will reach supersonic speeds more quickly when accelerating from a setup point toward an engagement in approved airspace. Random excursions during engagement are likely to be more frequent. It has been estimated by the F-22 System Management Office that during air combat maneuvering, the F-22 will be supersonic approximately 10 percent of the time. This is more often than the 7.5 percent documented for F-15s on the Nellis Range (Frampton et al. 1993).

Sonic booms would be expected to increase by more than just the ratio of 10 to 7.5. Not all supersonic excursions will cause a boom at the ground; the aircraft must exceed the "cutoff" Mach number. Because the F-22 supersonic events will be longer in duration, a greater percentage will exceed cutoff conditions. F-22s engaged in air combat maneuvers (ACM) could generate up to twice as many booms per sortie as F-15s. F-22 parameters in BOOMAP have been adjusted to account for this increase. Table 5.2-4 presents the projected cumulative sonic boom consequences with the F-22 operations.

Table 5.2-4. Sonic Boom Levels and Numbers per Day - Cumulative Operations

	200,000 SORTIE-OPERATIONS			300,000 SORTIE-OPERATIONS	
Airspace	*LCdn*	*Number/Day*	F-22	*LCdn*	*Number/Day*
Elgin	55	1.2	1:1	57	1.7
Coyote	51	0.5	1:5	52	0.6
Reveille	45	0.1	<1:10	45	0.1
EC East	46	0.1	<1:10	46	0.1
R-74	46	0.1	<1:10	46	0.1
All Others	<45	<0.1		<45	<0.1

CUMULATIVE NOISE CONSEQUENCES

The proposed renewal of NAFR (Alternative 1A, 1B, 2A, or 2B) with the cumulative effects of the F-22 would not generate a noticeable change to noise levels to lands beneath the NRC overlying airspace. The result of the No-Action Alternative would be to noticeably (4 dB) decrease the noise levels from aircraft but could permit localized multiple use noise-generating activity including mineral extraction and processing and off-highway vehicle recreation. It is unlikely that the implementation of any foreseeable plans and projects (with the exception of the F-22 OT&E project discussed above) would change the overall noise levels within the lands withdrawn for NAFR.

5.2.3.3 SAFETY

NAFR permits the Air Force to provide a realistic testing and training environment for aircraft, weapons systems, and aircrews in an environment that safeguards national security interests and affords protection and safety to the public. Military operations on NAFR are conducted under strict safety criteria. Additionally, there are some other activities occurring in the region that have safety considerations.

The U.S. Navy has proposed to expand training ranges at Naval Air Station (NAS) Fallon, and to renew the withdrawal of approximately 21,500 acres of land in Churchill County, Nevada. The expansion at NAS Fallon to support additional mission requirements, and the continuance of operations on their Bravo 20 Range, may result in additional ground activities that would result in increased exposure to ground safety and fire risks. The use of ordnance on these ranges also contributes to explosive safety considerations. However, since mission requirements at NAS Fallon are expanding, the added land area serves to enhance and expand safety buffers between military activity and the public.

The DOE's proposals regarding the NTS could result in an expansion of operations. Any expansion of operations could lead to increased potential for exposure to ionizing radiation. Although under current technology such exposure risk is very slight, the potential still results in DOE industrial safety and human health policies and practices to ensure safety.

The BLM is considering several proposals regarding some management areas that would involve improved access to the land. The expansion of the scope of recreational opportunities available would most likely result in increased human presence. This would have the potential to increase fire and accident risk in the region.

Although there is other military training airspace in the region that is additional to that overlying NAFR, overall use of the airspace is not projected to change from current activities. It is unlikely that any significant risk of Class A mishaps will arise even considering cumulative operations.

There are 16 MTRs in the immediate vicinity of the NAFR. Some short segments of some of these routes interact with some of NAFR airspace, usually affording access to a MOA or range. However, use of these routes is low. Aircraft that may use these MTRs but not be scheduled on NAFR are in NAFR airspace for such brief periods that any flight risk associated with those aircraft is inconsequential.

In summary, while some ongoing and proposed activities in the region have some fire, ground, flight, and explosive safety considerations associated with them, none create any significant adverse cumulative safety impacts. Under the No-Action Alternative, activities conducted by the Air Force having safety implications would be reduced in number. However, increased access by the public could increase the risk of accidents.

5.2.3.4 HAZARDOUS MATERIALS AND SOLID WASTE MANAGEMENT

The proposal to continue withdrawal of NAFR is not expected to increase the volume or management of hazardous materials or solid waste. Depleted uranium (DU) fragments at Target 63-10 are normally concentrated in a 300- to 400-foot radius around the target with small amounts of materials extending 1,000 feet from the target. No cumulative or significant impacts to any environmental resource is anticipated from resumption of DU rounds on the licensed target.

Although increased population in Las Vegas and the surrounding region is expected to increase the generation of wastes, this change is not related to continuing NAFR land withdrawal. Cumulative impacts to hazardous materials or solid waste management are not expected. Implementation of the No-Action Alternative could reduce Nellis AFB fuel requirements, but is not expected to change cumulatively the amounts or management of hazardous materials or solid wastes.

5.2.3.5 EARTH RESOURCES

The cumulative impact of other plans would result in the disturbance of approximately 240,000 acres of land. Approximately 58,000 acres of this land disturbance would be a result of urban development in the Las Vegas Valley. Such development, as well as DOE environmental restoration and waste management activities on the NTS, would impact soil and construction materials (primarily sand and gravel). Erosion could increase impacts to air quality but no cumulative change in impacts is anticipated for these earth resources under any NAFR action or No-Action alternative.

The continued restriction of access to NAFR and the NTS for mining activities could result in the delay of extraction of potentially recoverable resources if economics made such recovery feasible. DOD and DOE activities would not be expected to prevent the physical recovery of these resources under the No-Action Alternative, although costs of permitting mineral extraction in specific locations could be substantially increased. Most mineral extraction is determined more by global market conditions than by any other single factor. In the absence of

increased worldwide demand for mineral resources, little additional activity would be expected to take place at NAFR under the No-Action Alternative.

5.2.3.6 WATER RESOURCES

As a result of their isolation and ephemeral nature, use of surface water resources on NAFR would not be expected to have a cumulative effect on water resources within any of the ROIs. Most surface drainage within NAFR terminates within alluvial valleys and playas within the boundaries of the range. Approximately 96 percent of the annual runoff is lost to evapotranspiration while 4 percent infiltrates into the shallow groundwater system (Eakin et al. 1976). Further, surface water appropriations held by the DOE are not used for mission-related activities on NAFR.

Groundwater resources would generally be preserved similar to existing conditions under Alternatives 1 and 2. Groundwater resources within and adjacent to the NAFR are generally recharged by regional precipitation events. The average annual recharge of the subsurface aquifers beneath NAFR is approximately 84,000 AFY (Air Force 1998b). Current groundwater use at NAFR is below appropriated amounts and below estimated perennial yield. Because groundwater use is anticipated to remain similar to existing conditions under Alternatives 1 and 2, impacts associated with incremental groundwater use, with respect to other projects outside the range, are not considered significant.

Water resources are expected to be needed by the growing population in Las Vegas and southern Clark County as well as to support American Indian developments along Highway 95. Potential new land uses could change the demand on water resources. Under the No-Action Alternative, existing groundwater appropriations on the range could be available for use by other public or private entities pending State of Nevada approval. The cumulative effects of groundwater extraction could potentially result in accelerated migration of groundwater potentially contaminated by historic DOE test activities. Any appropriations or permits for such groundwater extraction would require approval by the State Water Engineer's Office, and separate environmental documentation and decisions by the USFWS and BLM.

Water quality impacts associated with past underground testing would remain similar to existing conditions under Alternatives 1 and 2 and the No-Action Alternative. The results of resource management plans, other DOD activities, and economic and demographic projections developed for actions in areas surrounding NAFR would have little or no cumulative impact on existing adverse water quality conditions on the Pahute Mesa portion of NAFR.

Potential non-federal water development in the region that is outside the purview of the State Engineer (private, domestic wells) could alter groundwater flow paths, travel times, and could include the flow of contaminants thereby adversely affecting groundwater resources. However, given the average annual recharge of potentially affected groundwater basins, the widely distributed nature of wells, and the total water extraction, it is unlikely that there would be cumulative impacts to water resources.

5.2.3.7 AIR QUALITY

The primary source of regional air quality impacts is the economic activity within Clark County. NAFR land withdrawal would not be a significant contributor to cumulative air quality impacts associated with growth in the Las Vegas Valley. Emissions produced by ground-based activities and aircraft flights under Alternatives 1 and 2 would remain essentially unchanged from baseline conditions. The ground-based activity emissions would primarily impact the area within the NAFR and would not overlap with emissions from any other reasonably foreseeable project anticipated to occur outside of the range. Likewise, NAFR flight activity emissions under Alternatives 1 and 2 would be released primarily above the mixing layer and would be prevented from downward transport and mixing with emissions from other known or proposed projects. Therefore, ambient air quality standards would not be exceeded by the cumulative impact of project-related emissions with emissions from other past, present, or reasonably foreseeable projects.

Cumulative impacts directly associated with the No-Action Alternative would also be insignificant. Potential reduction in emissions at Nellis AFB in conjunction with a no-action decision are not projected to substantially affect emissions in Clark County. No emission-producing activities are identified to occur within NAFR as a result of a decision to not renew the land withdrawal. Unless substantial emitters, such as mining operations, were to occur, the emissions from recreational activities would probably be offset by emission decreases associated with the loss of Air Force ground-based activities. Off-highway vehicle (OHV) use could have a marginal increase in emissions, but would primarily impact the area of the range and would not overlap with emissions from other projects outside of the range. Construction and operational cleanup activity emissions that would occur in the range subsequent to a No-Action decision would be regulated under the applicable local, state, and federal air pollution control rules.

5.2.3.8 BIOLOGICAL RESOURCES

Under any of the action alternatives (1A, 1B, 2A, or 2B), activities on NAFR would contribute very little to regional cumulative impacts on biological resources. The most serious cumulative impacts region-wide are associated with continuing population growth and land development in Clark and Nye Counties and the Las Vegas Valley in particular. This growth results in the loss and degradation of Mojave Desert scrub habitats in southern Nevada. Continuing use of NAFR as projected under any of the four action alternatives would have beneficial cumulative impacts insofar as it would tend to protect regional vegetation, wildlife, and habitat resources from the impacts associated with increasing urbanization and related non-military land uses.

Under the No-Action Alternative, cumulative impacts of habitat loss and degradation could occur. No-Action would be expected to expose currently restricted access lands to a variety of public and private uses. These uses and users could, in general, result in greater disturbance of habitat, vegetation, and wildlife than occurs at present under Air Force use.

5.2.3.9 CULTURAL RESOURCES

The cumulative effect on cultural resources of foreseeable actions in southern Nevada is tied to the degree of protection those resources receive. The foreseeable actions in southern Nevada identified by the federal agencies noted in section 5.2, or by other federal entities, would be considered federal undertakings. The identification and evaluation of cultural resources, as described in Section 106 of the National Historic Preservation Act (NHPA), would be required, and appropriate measures to avoid or mitigate adverse effects would be implemented. The individual elements of these actions would not be expected to contribute to the cumulative impact on archaeological and architectural resources.

Continued use of facilities under the proposed action and alternatives has the potential to impact cultural resources, although all such undertakings would be subject to compliance with Section 106 to NHPA. In addition, there would be ongoing inventory of NAFR lands in compliance with Section 110 of NHPA. The latter inventory would allow the Air Force to plan undertakings in areas where the impact to cultural resources would be minimized. The draft Nellis AFB CRMP (Air Force 1997c) discusses procedures for mitigating impacts to significant cultural resources, whether the impact has already occurred and is recognized through inventory, or the impact is possible because of a proposed undertaking. These procedures include development of a research design to identify the significance criteria met, and a plan for data recovery to be developed in consultation with the SHPO. The CGTO will be included in the consultation to develop the plans if the cultural resource is a TCP, an American Indian site, or if it is deemed appropriate.

The effect of development activities planned by non-federal agencies or private interests would depend, in part, on the source of funding, required permits or land ownership. Local and state agencies that may use federal funds, permits or land, such as departments of transportation or housing agencies, may be required to comply with Section 106 of the NHPA. Adverse impacts to archaeological or architectural resources protected by NHPA could be avoided or mitigated through appropriate actions, including consultation with the State Historic Preservation Office (SHPO). However, archaeological or architectural resources affected by actions not requiring compliance with Section 106 may not receive the same level of protection under local or state laws.

The current restricted access to NAFR for safety and security also serves to protect cultural and traditional resources. The cumulative effect of a No-Action decision that does not renew the NAFR withdrawal, combined with projected other projects could be expected to contribute to the loss of cultural resources from the total of such resources in southern Nevada. The No-Action Alternative has the potential for having an adverse cumulative effect on cultural resources.

In the *Native American Resource Document* (NARD) (AIWS 1997), American Indians have expressed concern about all aspects of development in southern Nevada. Any action not initiated by members of the Consolidated Group of Tribes and Organizations (CGTO) and

affecting lands they consider theirs by tradition and heritage could potentially adversely affect traditional cultural properties. Thus, continued urban development and growth, actions by state and local agencies or private interests, as well as federal actions could contribute to the cumulative adverse effect to traditional cultural properties. Federal regulations include consultation provisions designed to reduce the potential for such impacts on lands under federal agency jurisdiction.

5.2.3.10 LAND USE AND TRANSPORTATION

Cumulative impacts to land use and transportation at NAFR are not anticipated. The DOE Cross NAFR Transportation Alternative is not considered compatible with Air Force test and training. Foreseeable future actions would be consistent with current activities within the area and would not precipitate changes in land use patterns, ownership, or management practices. Increased growth in the Las Vegas area is expected to continue to have an impact on regional traffic flow. Cumulative actions and delays or changes in the level of service in the Las Vegas area and southern Clark County road arterials are projected to occur. The decision to continue withdrawal of NAFR for test and training activities will not contribute to the expected cumulative impacts. These cumulative impacts from changes in land use patterns and traffic volume and plans will continue under either an action or No-Action Alternative.

5.2.3.11 WILDERNESS AND WILDERNESS STUDY AREAS

The proposed renewal of the NAFR land withdrawal would continue the 200,000 to 300,000 annual average sortie operations. The cumulative consequences of introduction of the F-22 would be to somewhat increase noise levels in airspace subdivisions. These increases are not expected to be discernible. The cumulative consequences are expected to include an increase in supersonic flight of from 7.5 percent of maneuvering time for an F-15 to 10.0 percent for an F-22. This will result in approximately twice the number of sonic booms currently created by F-15 aircraft and some increase in the total number of sonic booms.

The F-22 contribution to cumulative noise in the NRC that could include flights over wilderness areas or WSAs is not expected to alter the value of these lands as wilderness. The lands were designated as WSAs or wilderness areas while 200,000 to 300,000 annual sortie operations were occurring in the NRC. These sortie operations included supersonic flights. The cumulative consequences of military activities with the F-22 are not expected to change the number of sortie operations or to result in any but transitory environmental consequences over wilderness resources.

5.2.3.12 RECREATION AND VISUAL RESOURCES

Access to NAFR lands for recreational purposes is prohibited for reasons of safety and national security. The impact analysis in section 4.12 accounts for the past and present cumulative effects of the proposed range renewal. Impacts associated with future foreseeable actions are described below.

The proposed land withdrawal renewal would not contribute to a cumulative impact as it relates to recreation and visual resources from federally proposed actions. Increased demand for non-urban recreation opportunities from population growth in the Las Vegas area and southern Clark County is expected to cumulatively impact regional recreational resources. This would especially be the case under the No-Action Alternative.

BLM land management plans have assessed visual and recreation resources on public lands surrounding NAFR. These plans are expected to continue to address recreation and visual resources managed for this area. Cumulative impacts as a result of the proposed action are not expected to lands administered by BLM under management plans.

5.2.3.13 SOCIOECONOMICS

Continued withdrawal of NAFR under any action alternative will not contribute measurably to regional cumulative socioeconomic impacts. The high cumulative growth scenario for southern Nevada is presented in section 4.13, Socioeconomics. The REMI model forecasts include the economic growth in each sector of the economy (for example, the growth in resort development in the services sector) and non-economic growth from activities such as retirement in-migration. The results of this cumulative growth are reflected in the population projections for the three counties through the year 2026 shown on Table 4.13-6. The cumulative employment forecasts for each of the three counties through the year 2026 are portrayed in Tables 4.13-1, 4.13-2, and 4.13-3 in section 4.13, Socioeconomics.

The No-Action Alternative results in a reduction in economic activity associated with the loss of air-to-ground activities on NAFR that substantially reduce Nellis AFB test and training-based activities and remove Tonopah Test Range (TTR) and Indian Springs Air Force Auxiliary Field (ISAFAF). These activities would slightly reduce the economic growth occurring from other on-going activities in the three-county economy. The highest cumulative growth impacts occur under Alternatives 1 and 2, where the employment associated with currently existing air-to ground activities on NAFR are included with other on-going activities in the ROI.

Under No Action, over 7,200 jobs (both direct and secondary) are calculated to be lost in Clark County by the end of 2003. This reduction will decrease the growth in employment that would be expected in the county by only a small amount (1.4 percent). This job loss amounts to less than 1.0 percent when compared to the expected level of employment in 2006. The population losses anticipated are smaller.

In Nye County, even though job losses and the out-migration of workers and their dependents involve smaller numbers (a net of 298 jobs), the relative magnitude of the impacts are greater. When the job loss is compared to expected employment levels, the reduction would be 2.5 percent in 2003.

Given the considerable projected cumulative growth of the Clark County economy, decreases of the magnitude described above will not severely impact the ability of county or other local governments to provide adequate public services to their residents. The same is true for Nye

and Lincoln counties; however, the decreases in the population of Nye County may result in impacts to community services when viewed from the perspective of the local communities where some NAFR ground activity-related contractors reside.

5.2.3.14 ENVIRONMENTAL JUSTICE

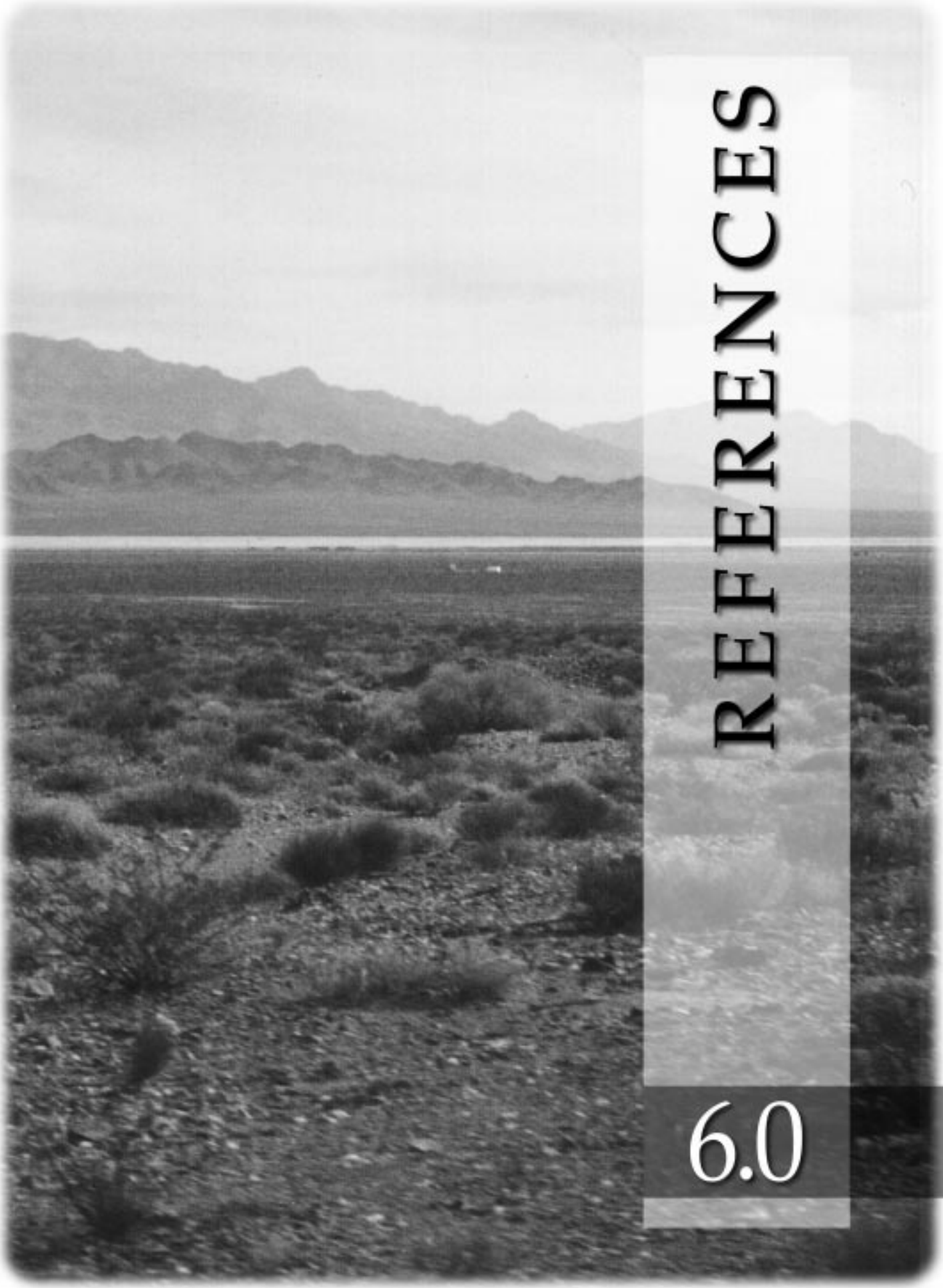
Potential subsonic noise impacts and supersonic noise events from continuation of the existing level of overflights would occur under the Alternatives 1A, 1B, 2A, or 2B but would not disproportionately affect the minority or low-income persons in Lincoln County, and therefore would not contribute to cumulative environmental justice impacts. Potential noise from continuation of the existing level of overflights would not disproportionately affect the Moapa Reservation in Clark County, and therefore would not contribute to cumulative environmental justice impacts.

Environmental justice concerns identified by the CGTO and members of the public regarding effects on American Indians include sacred land violations, perceived risks from radiation, protection of American Indian artifacts, cultural survival, access violations, and a request for government-to-government negotiations. The Air Force has initiated formal consultation with the 18 tribes and American Indian organizations in the CGTO and with the Nevada SHPO. The Air Force is working with these groups to identify cultural and traditional resources on NAFR and to increase participation in the LEIS process through preparation of the NARD by the AIWS (1997) and through other ongoing efforts. Under Alternatives 1A, 1B, 2A, and 2B, continued withdrawal of NAFR would continue to restrict access to American Indians and all personnel to NAFR due to safety and security needs of military training and testing missions, and could affect the sacred nature of the area due to increased land disturbance. American Indians have stated that land withdrawals, test and training activities, and land management activities by federal agencies such as DOD, DOE, the USFWS, U.S. Navy, and other Air Force and BLM actions in the region, may cause further land disturbance and restrictions on access by American Indians. They also believe these activities may create a cumulative impact that falls disproportionately upon them, since their access to use and perceptions of the land and natural resources of the area are critical to their maintaining traditional cultural and historic practices.

Environmental justice concerns raised by Nye and Lincoln counties include a request for special consideration, participation, and mitigation for Nye County as a rural low-income county and concerns about disproportionate noise effects in the communities east of NAFR in Lincoln County. Income levels and minority population numbers in those counties do not demonstrate a disproportionate impact upon minority or low-income populations.

Under the No-Action Alternative, potential loss of contractor and secondary employment jobs would potentially affect Nye County (i.e., short-term effects) and Clark County (i.e., long-term effects), but would not result in cumulative environmental justice impacts. Minority and low-income populations in Nye County would not be disproportionately affected by these job losses. In Clark County, where the majority of potential job losses would occur, minorities represent a higher portion of the population than in Lincoln or Nye counties, but this

percentage is not measurably higher than the statewide percentage. No-Action impacts include the absolute loss of an estimated 1,740 minority jobs. Rapid cumulative job gains in Clark County are projected to offset such losses over time.



REFERENCES

6.0

References listed in this section are those that have been directly used in the development of this LEIS.



6.0 REFERENCES

Ackerman, T.L. 1981. A Survey of Possible Threatened and Endangered Plant Species on the DNWR. Prepared for USFWS.

Advisory Council on Historic Preservation (ACHP) and GSA. 1994. Introduction to Federal Projects and Historic Preservation Law. Participant's Course Book and Participant's Desk Reference. Issued by the Advisory Council on Historic Preservation and the GSA Interagency Training Center. Washington, D.C.: Government Printing Office.

Air Force. See U.S. Department of the Air Force.

American Indian Writers Subgroup (AIWS). 1997. American Indian Perspectives to the Legislative Environmental Impact Statement for the Nellis Air Force Range Renewal, Nevada (Draft). Native American Resource Document. Prepared by AIWS Consolidated Group of Tribes and Organizations.

Armstrong, R.L. 1968. Sevier Orogenic Belt in Nevada and Utah. Geological Society of America Bulletin 79(4): 429-458.

Bancroft, Hubert Howe. 1981. History of Nevada 1540-1888. Reproduction. Originally published 1890. Las Vegas: Nevada Publications.

Bates, R.L. and J.A. Jackson. 1987. Dictionary of Geological Terms. Third Edition. American Geological Institute.

Battis, J.C. 1988. The Effect of Low Flying Aircraft on Archaeological Sites, Kayenta, Arizona. AFGL Technical Memorandum No. 146.

_____. 1983. Seismo-Acoustic Effects of Sonic Booms on Archaeological Sites, Valentine Military Operations Area. Air Force Geophysical Laboratory, Report AFGL-TR-83-0304.

Beatley, J.C. 1976. Vascular Plants of the Nevada Test Site and Central-Southern Nevada: Ecologic and Geographic Distributions. Technical Information Center, Office of Technical Information, Energy Research and Development Administration.

Best, M.G. and E.H. Christiansen. 1991. Limited Extension during Peak Tertiary Volcanism, Great Basin of Nevada and Utah. Journal of Geophysical Research B8: 13,509-13,528.

Best, M.G., E.H. Christiansen, and R.H. Blank, Jr. 1989. Oligocene Caldera Complex and Calc-Alkaline Tuffs and Lavas of the Indian Peak Volcanic Field, Nevada and Utah. Geological Society of American Bulletin 101: 1076-1090.

Biological Resources Research Center (BRRC). 1998. University of Nevada, Reno. Information available via Internet at www.brrc.unr.edu.

Black, B.B., M.W. Collopy, H.F. Percival, A.A. Tiller, and P.G. Bohall. 1984. Effects of Low-Level Military Training Flights on Wading Bird Colonies in Florida. Technical Report No. 7, Florida Cooperative Fish and Wildlife Reserve Unit, School of Forestry Research and Conservation, University of Florida.

Bohn, H.L., B.L. McNeal, and G.A. O'Connor. 1979. Soil Chemistry. New York: Wiley Interscience.

Bureau of Land Management (BLM). BLM Mission statement, BLM home page, www.blm.gov

_____. 1997. Recreation Management Information System. Sites: Visits; Sites: Activities; Sites: Information Details. Fiscal Year 1996.

_____. 1995. Caliente Management Framework Plan and Nellis Air Force Range Resource Plan, White Sides Land Withdrawal Amendment and Environmental Assessment, March.

_____ . 1994a. Stateline Resource Management Plan and Supplement to the Draft Environmental Impact Statement. U.S. Department of the Interior, Las Vegas, Nevada.

_____ . 1994b. Tonopah Resource Management Plan and Supplement to the Final Environmental Impact Statement. U.S. Department of the Interior, Tonopah, Nevada.

_____ . 1992a. Determination regarding Opening of Nellis Air Force Range Withdrawn Land to Mineral Exploration and Development.

_____ . 1992b. Stateline Resource Management Plan and Draft Environmental Impact Statement. U.S. Department of the Interior, Las Vegas, Nevada.

_____ . 1992c. Nellis Air Force Range Resource Plan and Record of Decision.

_____ . 1991a. Idaho Wilderness Study Report.

_____ . 1991b. Nevada Progress Report.

_____ . 1991c. Nevada Statewide Wilderness Report.

_____ . 1990a. Draft Environmental Impact Statement, Flood Control Master Plan Clark County Regional Flood Control District. Prepared for Clark County Regional Flood Control District, in cooperation with the U.S. Army Corps of Engineers, Sacramento District. Prepared by Dames & Moore, Las Vegas.

_____ . 1990b. Nellis Air Force Range Proposed Resource Plan and Final Environmental Impact Statement. U.S. Department of the Interior, Las Vegas, Nevada.

_____ . 1989. Nellis Air Force Range Resource Plan and Environmental Impact Statement. U.S. Department of the Interior, Las Vegas District.

_____. 1981. Final Environmental Impact Statement, Proposed Public Land Withdrawal Nellis Air Force Bombing Range, Nye, Clark, and Lincoln Counties.

_____. 1980. Caliente Management Framework Plan. Nevada.

_____. 1979. Domestic Livestock Grazing Management Program.

Brown, D.E. (ed.). 1982. Biotic Communities of the American Southwest-United States and Mexico. Special Issue of Desert Plants (Vol. 4).

Burt, W.H. and R.P. Grossenheider. 1980. A Field Guide to the Mammals of North America; Peterson Guide. New York: Houghton Mifflin Company.

Byers, F.M. Jr., W.J. Carr, and P.P. Orkild. 1989. Volcanic Centers of Southwestern Nevada: Evolution of Understanding, 1960-1988. Journal of Geophysical Research 94(B5): 5908-5924.

Byers, F.M. Jr., W.J. Carr, P.P. Orkild, W.D. Quinlivan, and K.A. Sargent. 1976. Volcanic Suites and Related Cauldrons of the Timber Mountain-Oasis Valley Caldera Complex, Southern Nevada. U.S. Geological Survey, Professional Paper 919, Washington, D.C.

Carlson, H.W. 1978. Simplified Sonic Boom Prediction. NASA Technical Paper 1122.

Caskey, S.J. and R.A. Schweickerty. 1992. Mesozoic Deformation in the Nevada Test Site and Vicinity: Implications for the Structural Framework of the Cordilleran Fold and Thrust Belt and Tertiary Extension North of Las Vegas Valley. Tectonics 11(6): 1314-1331.

Chapman, J.B., and B.F. Lyles. 1993. Groundwater Chemistry at the Nevada Test Site: Data and Preliminary Interpretations. Submitted to DOE Nevada Operations Office, U.S. Department of Energy. Publication No. 45100.

Christiansen, R.L. and P.W. Lipman. 1972. Cenozoic Volcanism and Plate-Tectonics Evolution of the Western United States; Part II, Late Cenozoic. Philosophical Transactions of the Royal Society of London, Ser. A 271: 249-284.

Clark County Board of Commissioners. 1997. Draft PM (PM_{10}) Air Quality Implementation Plan for the Las Vegas Valley Nonattainment Area, Clark County, Nevada.

_____. 1995. CO Air Quality Implementation Plan for the Las Vegas Valley Nonattainment Area, Clark County, Nevada.

Clark County School District (USD). 1994. Master Plan 1993-94.

Cornwall, H.R. 1972. Geology and Mineral Deposits of Southern Nye County, Nevada. Nevada Bureau of Mines and Geology Bulletin 77, University of Nevada, Reno.

Cronquist, A., A.H. Holmgren, N.H. Holmgren, and J.L. Reveal. 1972. Intermountain Flora, Volume I. New York Botanical Garden.

Crowe, B.M., K.H. Wohletz, D.T. Vaniman, E. Gladney, and N. Bower. 1986. Status of Volcanic Hazard Studies for the Nevada Nuclear Waste Storage Investigations, LA-9325-MS, Vol. II, Los Alamos National Laboratory, New Mexico.

Dames & Moore. 1996. Biological Resources Technical Memorandum in Support of the Nellis Air Force Base, Nevada, Indian Springs Air Force Auxiliary Field Regional Training Area Environmental Assessment.

_____. 1995. Nevada Archaeological Relocation and Re-recordation Survey, Nellis Range Complex. Las Vegas, Nevada.

Daniels, J.I., L.R. Anspaugh, K.T. Bogen, D.W. Layton, T. Straume, R. Andricevic, R.L. Jacobson, A.F. Meinhold, S. Holtzman, S.D. Morris, and L.D. Hamilton. 1993. Pilot Study Risk Assessment for Selected Problems at the Nevada Test Site, UCRL-LR-113891, Lawrence Livermore National Laboratory, June.

Department of Defense Instruction (DODI) 6055.1 1995. Exposure to Radiofrequency Energy.

Dettinger, M.D. 1992. Geohydrology of Areas being considered for Exploratory Drilling and Development of the Carbonate-Rock Aquifers in Southern Nevada – Preliminary Assessment. U.S. Geological Survey Water Resources Investigations Report 90-4077.

DOE. See U.S. Department of Energy.

DOI. See U.S. Department of the Interior.

Downing, J.M. 1997. Report on Preliminary Near-Field Noise Measurements. Memorandum. USAF Armstrong Laboratory Noise Effects Branch.

Eakin, T.E., D. Price, and J.R. Harrill. 1976. Summary Appraisals of the Nation's Ground Water Resources — Great Basin Region. U.S. Geological Survey Professional Paper 813-G.

Ekren, E.B. 1968. Geologic Setting of Nevada Test Site and Nellis Air Force Range in Eckel, E.B., Nevada Test Site: Geological Society of America Memoir 110, p. 11-19.

Ekren, E.B., R.E. Anderson, P.O. Orkild, and E.N. Hinrichs. 1971. Geology of Northern Nellis Air Force Base Bombing and Gunnery Range, Nye County, Nevada. U.S. Geological Survey Professional Paper 651.

Elliot, R.R. 1987. History of Nevada. Second Edition, Revised, with the assistance of William D. Rowley. Lincoln: University of Nebraska Press.

Ellis, D.H. 1981. Responses of Raptorial Birds to Low-Level Military Jets and Sonic Booms. Results of the Joint USAF-USFWS Study. NTIS ADA108-778, Springfield, VA.

Ellis, D.H., C.H. Ellis, and D.P. Mindell. 1991. Raptor Responses to Low-level Jet Aircraft and Sonic Booms. Environmental Pollution 74:53-83.

EPA. See U.S. Environmental Protection Agency.

ERDA. 1977. Final Environmental Impact Statement, Nevada Test Site, Nye County, Nevada.

Federal Facility Agreement and Consent Order (FFACO). 1996. Prepared by the State of Nevada Department of Conservation and Natural Resources, Division of Environmental Protection; the United States Department of Energy; and the United States Department of Defense in the matter of: Federal Facility Agreement and Consent Order (FFACO), March 15, 1996 (as revised January 1998).

Federal Interagency Committee on Noise (FICON). 1992. Federal Agency Review of Selected Airport Noise Analysis Issues. August.

Fidell, S., T. Schultz, and D.M. Green. 1991. Updating a Dosage-Effect Relationship for the Prevalence of Annoyance due to General Transportation Noise. J. Acoust. Soc. Am. 89.

_____. 1988. A Theoretical Interpretation of the Prevalence Rate of Noise-Induced Annoyance in Residential Populations. Journal of the Acoustical Society of America. 84(6).

Fields, J.M., and C.A. Powell. 1985. A Community Survey of Helicopter Noise Annoyance Conducted under Controlled Noise Exposure Conditions. NASA TM-86400.

Finegold, L.S., C.S. Harris, and H.E. von Gierke. 1994. Community Annoyance and Sleep Disturbance: Updated Criteria for Assessing the Impacts of General Transportation Noise on People. Noise Control Engineering Journal 42(1).

Frampton, K., M. Lucas, and B. Cook. 1993. Modeling Sonic Boom Noise Environment in Military Operating Areas.

Frizzell, V.A. Jr., and J. Shulters, compilers 1990. Geologic Map of the Nevada Test Site, Southern Nevada: U.S. Geological Survey Miscellaneous Investigations Series I-2046, scale: 1:100,000.

Garrelick, J. and K. Martini. 1997. Report U-2422-397. Prepared for Department of the Air Force, AL/OEBN, Wright-Patterson Air Force Base, Ohio.

Gladwin, D.N. D.A. Asherin, and K.M. Manci. 1987. Effects of Aircraft Noise and Sonic Booms on Fish and Wildlife: Results of a Survey of U.S. Fish and Wildlife Service Endangered Species and Ecological Services Field Offices, Refuges, Hatcheries, and Research Centers. NERC-88/30. U.S. Fish and Wildlife Service, National Ecology Research Center, Fort Collins, CO.

GRW Engineers. 1990. Nellis Air Force Base Comprehensive Plan. Lexington, KY.

Guth, P.L. 1981. Tertiary Extension North of the Las Vegas Valley Shear Zone, Sheep and Desert Ranges, Clark County, Nevada. Geological Society of America Bulletin Part I, 92(10): 763-771.

Hall, E. R. 1981. Mammals of North America. New York: John Wiley and Sons.

_____ . 1946. Mammals of Nevada. Berkeley: University of California Press.

Hamilton, W.B. 1988. Detachment Faulting in the Death Valley Region, California and Nevada, Geologic and Hydrologic Investigations of a Potential Nuclear Waste Disposal Site at Yucca Mountain, Southern Nevada. Carr, M.D. and Yount, J.C. (eds.). U.S. Geological Survey Bulletin 1790, Washington, D.C.

Harris, A.G., B.R. Warlaw, C.C. Rust, and G.K. Merrill. 1980. Maps for Assessing Thermal Maturity Conodont Color Alteration Index Maps. In Ordovician through Triassic Rocks in Nevada, Utah, and Adjacent Parts of Idaho and California. Miscellaneous Investigations Series Map I-1249, U.S. Geological Survey, Denver, Colorado.

Hendee, J.C., G.H. Stanley, and R.C. Lucas. 1990. Wilderness Management. Second Edition, Revised. North American Press, Golden, Colorado.

Holzworth, G.C. 1972. Mixing Heights, Wind Speeds, and Potential of Urban Air Pollution Throughout the Contiguous United States. Environmental Protection Agency. Office of Air Programs. Research Triangle Park, North Carolina.

Houghton, J.G., C.M. Sakamoto, and R.O. Gifford. 1975. Nevada's Weather and Climate. Special Publication 2. Nevada Bureau of Mines and Geology.

Hubbs, C.L., R.R. Miller, and L.C. Hubbs. 1974. Hydrographic History and Relict Fishes of the North-Central Great Basin. Memoirs of the California Academy of Sciences (Vol. VII). San Francisco.

Huber, N.K. 1988. Late Cenozoic Evolution of the Upper Amargosa River Drainage System, Southwestern Great Basin, Nevada and California. U.S. Geological Survey, Open File Report 87-617, Menlo Park, California.

International Conference of Building Officials (ICBO). 1991. Uniform Building Code. Whittier, California.

Kelly, I.T., and C.S. Fowler. 1986. Southern Paiute. In Handbook of North American Indians Vol. 11. Great Basin. W.C. Sturtevant, editor. Washington D.C.: Smithsonian Institution.

King, W. Kenneth, David L. Carver, and David M. Worley. 1988. Vibration Investigation of the Museum Building at White Sands National Monument, New Mexico. U.S. Department of the Interior, Geological Survey. Open-File Report 88-544.

Kleinhampl, F.J., and J.I. Ziony. 1985. Geology of Northern Nye County, Nevada. Nevada Bureau of Mines and Geology Bulletin 99A, University of Nevada, Reno.

Lamp, R.E. 1989. Monitoring the Effects of Military Operations at Naval Air Station Fallon on the Biota of Nevada. Nevada Department of Wildlife.

Lei, S.A. 1997. Variation in Germination Response to Temperature and Water Availability in Blackbrush (*Coleogyne ramosissima*) and its Ecological Significance. Great Basin Naturalist.

Leslie, M., G.K. Meffe, J.L. Hardesty, and D.L. Adams. 1996. Conserving Biodiversity on Military Lands: A Handbook for Natural Resource Managers. Arlington, VA: The Nature Conservancy.

Lockheed Martin. 1995. Nellis AFB Range 63 Depleted Uranium Limited Site Assessment. Las Vegas, NV.

Longwell, C.R., E.H. Pampeyan, B. Bowyer, and R.J. Roberts. 1965. Geology and Mineral Resources of Clark County, Nevada. Nevada Bureau of Mines Bulletin 62, Reno.

Lowe, J.A., L.E. Rhodes, and K.J. Roxlau. 1994. Nellis Air Force Base Cold War Material Culture Inventory. Prepared for U.S. Army Corps of Engineers, Fort Worth District, Contract No. DACA 63-92-D-0011. Mariah Associates, Albuquerque.

Lucas, M.J., and P.T. Calamia. 1996. Military Operations Area and Range Noise Model: MR NMAP User's Manual. Final. Wright-Patterson AFB, Ohio: AAMRL. Al/OE-MN-1996-0001.

Miller, W.R. 1983. Uto-Aztecan Languages. In Handbook of North American Indians Vol. 10 Southwest. W.C. Sturtevant, editor. Smithsonian Institution, Washington D.C.

Minnich, R. 1995. Fire Ecology of Exotic Grasses in the California Desert. P. 61 in J. Lovich, J. Randall, and M. Kelly (eds.), Proceedings of the California Exotic Plant Pest Council Symposium '95.

Mozingo, H.N. and M. Williams. 1980. Threatened and Endangered Plants of Nevada. U.S. Fish and Wildlife Service and Bureau of Land Management.

National Oceanic and Atmospheric Administration (NOAA). 1980. Local Climatological Data. National Climatic Center, Asheville, North Carolina.

National Register of Historic Places. 1996. List of National Register of Historic Places for Nevada. Provided by Harry Reid Center for Environmental Studies, Las Vegas, Nevada.

Nevada Bureau of Mines and Geology (NBMG). 1997. Mineral and Energy Resource Assessment of the Nellis Air Force Range, Volumes I and II. Prepared for Nellis Air Force Base, Nevada Environmental Management, and U.S. Army Corps of Engineers, compiled in association with Mariah Associates, Inc. University of Nevada, Reno. November.

Nevada Department of Education. 1996.

Nevada Department of Transportation (NDOT). 1995. Nevada State Airport System Plan.

Nevada Division of Wildlife (NDOW). 1997a. Cactus Range/Tolicha Peak/Stonewall Mountain/Pahute Mesa Survey Report.

_____ . 1997b. Game Harvest Statistics.

_____ . 1996 Big Game Hunting Regulations plus Management Area and Unit Boundary Descriptions. Nevada Division of Wildlife, Reno.

_____ . 1995. Stonewall Mountain/Pahute Mesa/Tolicha Peak Survey Report. January 27.

Nevada, State of. 1995. Nevada Statistical Abstract. Department of Administration, Carson City.

_____ . 1991. Nevada Crop and Livestock Reporting Service. Nevada Agricultural Statistics. 1991.

Nickens, P.R., Larralde, S.L., and Tucker, G.C., Jr. 1981. A Survey of Vandalism to Archaeological Resources in Southwestern Colorado. Cultural Resources Series No. 11.

Noble, D.C., S.I. Weiss, and E.H. McKee. 1991. Magmatic and Hydrothermal Activity, Caldera Geology, and Regional Extension in the Western Part of the Southwestern Nevada Volcanic Field, in Raines, G.L., Lisle, R.E., Shafer, R.W., and Wilkinson, W., eds., Geology and Ore Deposits of the Great Basin: Symposium Proceedings, Geological Society of Nevada, p. 913-934.

North American Treaty Organization (NATO). 1994. Effects of Topography on Propagation of Noise in the Vicinity of Airfields. Field Report of the NATO/CCMS. Working Group Study Number 200.

Nye County Board of Commissioners. 1993. Baseline Economic and Demographic Projections: 1990-2010 Nye County and Nye County Communities. Prepared by Planning Information Corporation, Denver, Colorado.

Quade, J., M.D. Mifflin, W.L. Pratt, W. McCoy, and L. Burckle. 1995. Fossil Spring Deposits in the Southern Great Basin and Their Implications for Changes in Water-Table Levels near Yucca Mountain, Nevada, during Quaternary Time. Geological Society of America Bulletin 107: 213-230.

Page, J.A., B.D. Schantz, R. Brown, K.J. Plotkin, and C.L. Moulton. 1994. Measurements of Sonic Booms due to ACM Training in R2301 W of the Barry Goldwater Air Force Range. Wyle Research Report WR 94-11.

Plotkin, K.J. 1996. PCBoom3 Sonic Boom Prediction Model: Version 1.0c. Wyle Research Report WR 95-22C. May.

Plotkin, K.J., C.L. Moulton, V.R. Desai, and M.J. Lucas. 1992. Sonic Boom Environment under a Super Sonic Military Operations Area. Journal of Aircraft 29(6): 1069-1072.

Plotkin, K.J., C.L. Moulton, and R.A. Lee. 1993. Incorporation of Topography Effects in Aircraft Noise Modeling. NOISE-CON 93 Proceedings, pp. 595-600. May.

Plotkin, K.J., K.A. Bradley, J.A. Molino, and D.S. Fischer. 1991. The Effect of Onset Rate on Aircraft Noise Annoyance. Volume 1: Laboratory Experiments. Wyle Laboratories Research Report WR 91-19.

Plotkin, K.J., V.R. Desai, C.L. Moulton, M.J. Lucas, and R. Brown. 1989. Measurements of Sonic Booms due to ACM Training at White Sands Missile Range. Wyle Research Report WR 89-18.

Plotkin, K.J., L.C. Sutherland, and J.A. Molino. 1987. Environmental Noise Assessment for Military Aircraft Training Routes. Volume II: Recommended Noise Metric. Wyle Research Report WR 86-21.

Radian International LLC (Radian). 1997. 1995 Air Emissions Inventory, Tonopah Test Range. White Road, New Mexico. March.

_____. 1996. Draft 1995 Air Emissions Inventory, Nellis AFB.

_____. 1995. Nellis Air Force Base 1993 Air Emissions Inventory Report.

Regional Economic Models, Inc. (REMI). 1996. Model Documentation for the REMI EDFS-53 Forecasting and Simulation Model. REMI Reference Set Vol. I, Amherst, Massachusetts.

Regional Environmental Consultants. 1995. Clark County Desert Conservation Plan. San Diego, California.

Regional Transportation Commission. 1994. Regional Transportation Plan, 1995-2015. Prepared for Clark County. Las Vegas, Nevada.

Rush, F.E. 1968. Index of Hydrographic Areas in Nevada: Nevada Division of Water Resources. Information Report 6.

Sawyer, D.A., R.J. Fleck, M.A. Lanphere, R.G. Warren, and D.E. Croxton. 1990. Episodic Volcanism in the Southwest Nevada Volcanic Field: New 40-Ar/39-Ar Geochronological Results. EOS Transactions, AGU 71(43): 1290 and 1296.

Sawyer, D.A., R.J. Fleck, M.A. Lanphere, R.G. Warren, D.E. Broxton, and M.R. Hudson. 1994. Episodic Caldera Volcanism in the Miocene Southwestern Nevada Volcanic Field: Revised Stratigraphic Framework, 40-Ar/39-Ar Geochronology, and Implications for Magmatism and Extension. Geological Society of America Bulletin 106: 1304-1318.

Schultz, T.J. 1978. Synthesis of Social Surveys on Noise Annoyance. Journal of the Acoustical Society of America 64: 377-405.

Shreve, F. 1942. The Desert Vegetation of North America. Botanical Review 8(4):195-246.

Sinnock, S. 1982. Geology of the Nevada Test Site and Nearby Areas, Southern Nevada. SAND82-2207, Sandia National Laboratories, Albuquerque, New Mexico.

Spaulding, W.G. 1990. Vegetational and Climatic Development of the Mojave Desert: the Last Glacial Maximum to the Present. Pages 166-199 in Betancourt, J.L., P.S. Martin, and T.R. Van Devender (eds.) Packrat Middens: The Last 40,000 Years of Biotic Change. Tucson: University of Arizona Press.

_____. 1985. Vegetation and Climates of the Last 45,000 Years in the Vicinity of the Nevada Test Site, South-Central Nevada. USGS, Professional Paper 1329.

Steward, Julian. 1938. Basin-Plateau Aboriginal Sociopolitical Groups. Smithsonian Institution Bureau of American Ethnology Bulletin 120. U.S. Government Printing Office, Washington 1938. Reprint 1970. Salt Lake City: University of Utah Press.

Stewart, J.H. 1980. Geology of Nevada, SP-4. Nevada Bureau of Mines, Reno.

Stewart, K.M. 1983. Mohave. In Handbook of North American Indians Vol. 10 Southwest. W.C. Sturtevant, editor. Smithsonian Institution, Washington D.C.

Stoffle, R.W., D. B. Halmo, and D.E. Austin. 1996. Cultural Landscapes and Traditional Cultural Properties, a Southern Paiute View of the Grand Canyon and Colorado River. Bureau of Applied Research in Anthropology. Tucson: University of Arizona.

Stusnick, E., K.A. Bradley, J.A. Molino, and G. DeMiranda. 1992. The Effect of Onset Rate on Aircraft Noise Annoyance. Volume 2: Renter Own-Home Experiment. Wyle Laboratories Research Report WR 92-3®.

Stusnick, E., K.A. Bradley, M.A. Bossi, and D.G. Rickert. 1993. The Effect of Onset Rate on Aircraft Noise Annoyance. Volume 3: Hybrid Own-Home Experiment. Wyle Laboratories Research Report WR 93-222.

Sutherland, L.C. 1990. Assessment of Potential Structural Damage from Low Altitude Subsonic Aircraft.

The Nature Conservancy (TNC). 1994, 1995, 1996, 1997. An Inventory for Rare, Threatened, Endangered, and Endemic Plants and Unique Communities on Nellis Air Force Bombing and Gunnery Range, Clark, Lincoln and Nye Counties (Vols. I-IV). Prepared for Nellis Air Force Bombing and Gunnery Range, 554th Contracting Squadron, Nellis Air Force Base for Legacy Resource Management Program Support Agreement FB4852-94200-071.

Tschanz, C.M., and E.H. Pampeyan. 1970. Geology and Mineral Deposits of Lincoln County, Nevada. Nevada Bureau of Mines and Geology Bulletin 73, Mackay School of Mines, University of Nevada, Reno.

Turner, R.M. 1982. Cold-Temperate Desertlands / Warm-Temperate Desertlands. Pages 144-168 in David E. Brown (ed.), Biotic Communities of the American Southwest — United States and Mexico. Desert Plants 4. Tucson: University of Arizona. 343 p.

U.S. Army Corps of Engineers 1992. Off-road Vehicle Impacts to Archeological Sites. Archeological Sites Protection and Preservation Notebook Technical Notes.

U.S. Department of Agriculture (USDA). 1993. Letter describing soil series within NAFR from Leon Lato, Project Leader, Soil Conservation Service.

U.S. Department of the Air Force (Air Force). n.d. Air Force Manual 91-201. Explosive Safety.

_____. 1998a. Enhanced Training in Idaho, Final Environmental Impact Statement. January.

_____. 1998b. Water Requirement Study of the Nellis Air Force Range. September.

_____. 1997a. Bat Survey Report. Nellis Air Force Base and Range, Environmental Management Directorate, Natural Resources. Air Force Project No. RKXF956140. April.

_____. 1997b. Bird Survey Report. Summary of Bird Surveys Nellis Air Force Range. January 1996 — October 1996. Air Force Project No. RKXF956145. March.

_____. 1997c. Cultural Resources Management Plan (Internal EM Working Draft). Prepared by Keith Myhrer, Nellis Archaeologist / Cultural Resources Manager and Lynn Hatzenbuehler, Assistant Archaeologist for U.S. Air Force, Air Combat Command.

_____. 1997d. Environmental Effects of Self Protection, Chaff and Flares. Final Report, Headquarters Air Combat Command, Langley Air Force Base, Virginia.

_____. 1997e. Final Contamination Report for the Nellis Air Force Range Land Withdrawal Environmental Impact Statement, Nellis Air Force Range, Nevada, February.

_____. 1997f. Final Floodplain Inventory Report, Nellis Air Force Range, Nevada. June.

_____ . 1997g. Integrated Natural Resources Management Plan, Nellis Air Force Base / Nellis Air Force Range. 99th Air Base Wing, Environmental Management Directorate, Nellis Air Force Base, Nevada. March.

_____ . 1997h. Interim Guide for Environmental Justice Analysis with the Environmental Impact Analysis Process.

_____ . 1997i. Land Use Study. Nellis Air Force Range, Nevada. (Final updated 1998.)

_____ . 1996a. Radioisotope Committee.

_____ . 1996b. Surface Soil Sampling Report for Ten Representative Nellis Air Force Range Bombing Targets, Nellis Air Force Base, Nevada. December.

_____ . 1996c. Wetlands Survey Draft Report, Nellis Air Force Range. Prepared for Air Force and USACE by Baker Environmental, Inc. and Dames & Moore. July.

_____ . 1996d. 57th Wing Inflight Guide, 15 October.

_____ . 1994a. Environmental Assessment for Supersonic Flight over the Nellis Range Complex, Nellis Air Force Base, Nevada.

_____ . 1994b. Brief History of Nellis Air Force Base, Nevada (Air Combat Command). Office of History, USAF Weapons and Tactics Center.

_____ . 1981. M-X / MPS Preliminary FEIS: Deployment Area Selection and Land Withdrawal / Acquisition FEIS (incl. Appendices). Prepared by Henningson, Durham & Richardson, Santa Barbara, California.

U.S. Department of the Air Force (Air Force), Navy, and DOI. 1991. Special Nevada Report, September 23, 1991. Prepared by SAIC, Desert Research Institute. Available through NTIS. DE-AC08-88NV10715.

U.S. Department of Commerce. 1997. Regional Economic Information System (REIS) CD-ROM. Bureau of Economic Analysis 1969-1995. August.

_____ . 1992. 1990 Census of Population and Housing Summary Tape File 3A, Nevada, CD90-3A-15. U.S. Bureau of the Census, Washington, D.C.

_____ . 1991. 1990 Census of Population and Housing Summary Tape File 1A Mountain Division — Nevada, CD90-1A-8. U.S. Bureau of the Census, Washington, D.C.

_____ . 1990a. 1990 Census of Population and Housing, Summary Population and Housing Characteristics, Nevada. Economics and Statistics Administration, Washington, D.C.

_____. 1990b. TIGER/Line Precensus Files, 1990 Nevada Wyoming, CDRM 296300. U.S. Department of the Census, Washington, D.C.

_____. 1980. 1980 Census of Population and Housing, Summary Population and Housing Characteristics, Nevada. U.S. Bureau of the Census, Washington, D.C.

_____. 1970. 1970 Census of Population and Housing, Summary Population and Housing Characteristics, Nevada. U.S. Bureau of the Census, Washington, D.C.

U.S. Department of Energy (DOE). 1996a. Final Environmental Impact Statement for the Nevada Test Site and Off-Site Locations in the State of Nevada, DOE/EIS-0243. Nevada Operations Office, Las Vegas. August.

_____. 1996b. Environmental Assessment for Double Tracks Test Site, DOE/EA-1136. Nevada Operations Office, Las Vegas. April.

_____. 1995. Cost/Risk/Benefit Analysis of Alternative Cleanup Requirements for Plutonium-Contaminated Soils On and Near the Nevada Test Site, DOE/NV-399 UC-700. Nevada Operations Office, Las Vegas. May.

_____. 1994. United States Nuclear Tests, July 1945 through September 1992, DOE/NV-209 (Rev. 14), Nevada Operations Office, Las Vegas.

U.S. Department of the Interior (DOI). 1989. Draft Nellis Air Force Range Resource Management Plan and Environmental Impact Statement, Caliente Resource Area, Caliente, Nevada. Prepared by the BLM, Las Vegas District.

U.S. Environmental Protection Agency (USEPA). 1995. AP-42, Compilation of Air Pollutant Emission Factors, Volume I, Stationary Point and Area Sources, Office of Air Quality Planning and Standards, Research Triangle Park, North Carolina.

_____. 1972. Information on Levels of Environmental Noise Requisite to Protect the Public Health and Welfare with an Adequate Margin of Safety. EPA-550/9-74-004. Washington, D.C.

U.S. Fish and Wildlife Service (USFWS). 1998. Letter to Mr. Alton Chavis. Comments on the Preliminary Draft Legislative Environmental Impact Statement (PDLEIS) for Proposed Renewal of the Nellis Air Force Range Land Withdrawal. June 17.

_____.1997. Biological Opinion on the Reinitiation of Formal Consultation for Continuing Current Weapons Testing and Training on U.S. Department of the Air Force's Weapons and Tactics Center Range Complex. Letter to W.J. Donegan, Director Environmental Management NAFB from C.H. Mendoza, State Supervisor. File Nos. 1-5-96-F-278R, 1-5-94-F-162.AMD3.

_____ . 1994. Desert Tortoise (Mojave Population) Recovery Plan. U.S. Fish and Wildlife Service, Portland, Oregon.

U.S. Forest Service (USFS). 1992. Overview, Report to Congress, Potential Impacts of Aircraft Overflights of National Forest System Wilderness. Report to Congress. Prepared pursuant to Section 5, Public Law 100-91, National Park Overflights Act of 1987.

_____ . 1985. Humboldt National Forest Land and Resource Management Plan, Final Environmental Impact Statement. Elko, Nevada.

U.S. Geological Survey. 1998. Major Water Issues in Nevada. Internet WWW page, at URL:<http://wwwnv.wr.usgs.gov/activities/actrpt92/majwatis.html>(version current as of 1/31/98).

_____ . 1997. Ground Water Atlas of the United States — Segment 1, California and Nevada. Internet WWW page, at URL:<http://water.wr.usgs.gov/gwatlas> (version current as of 4/22/97.

_____ . 1996. Summary of Hydrogeologic Controls on Ground-Water Flow at the Nevada Test Site, Nye County, Nevada. 1996.

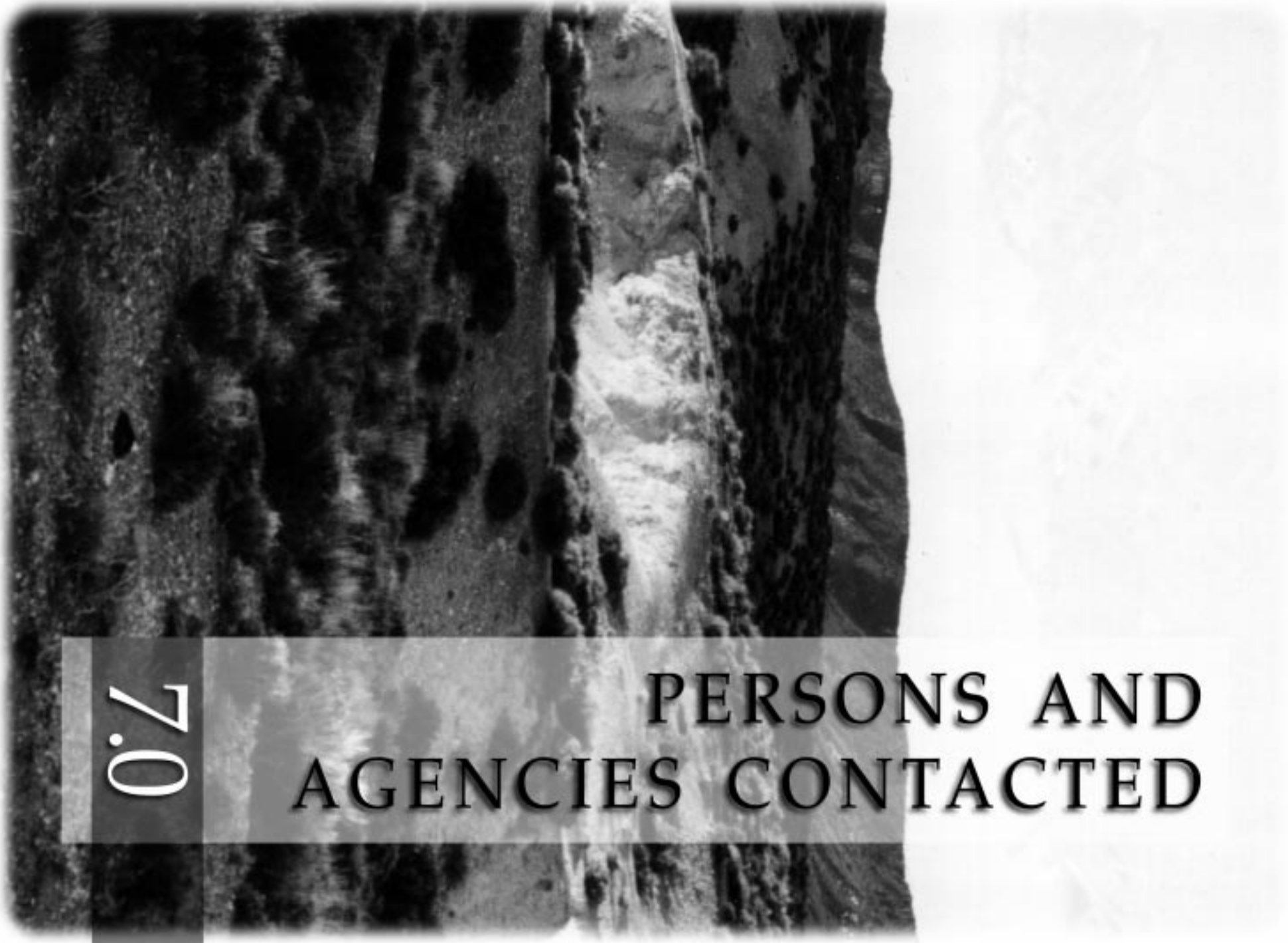
U.S. Geological Survey (USGS) and U.S. Bureau of Mines. 1978. Mineral Resources of the Nellis Air Force Base and the Nellis Bombing and Gunnery Range, Clark, Lincoln, and Nye Counties, Nevada. Prepared for Department of Air Force.

Warren, C.N. and R.H. Crabtree. 1986. Prehistory of the Southwestern Area. In Great Basin, edited by Warren L. D'Azevedo, pp. 183-193. Handbook of North American Indians, vol. 11, W.C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Wernicke, B., G.J. Axen, and J.K. Snow. 1988. Basin and Range Extensional Tectonics at the Latitude of Las Vegas. Geological Society of America Bulletin 100: 1738-1757.

Worldwide Bird-Aircraft Strike Hazard [BASH] Conference. 1990. Worldwide Bird-Aircraft Strike Hazard Conference Report. April 10-12. Little Rock, Arkansas.

Young, J. 1995. Cheatgrass and Wildfires in the Intermountain West. J. Lovich, J. Randall, and M. Kelly (eds.), Proceedings of the California Exotic Plant Pest Council Symposium '95. pp. 6-8.



7.0 PERSONS AND AGENCIES CONTACTED

7.0 PERSONS AND AGENCIES CONTACTED

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06

CONSULTATION

9.0 CONSULTATION

As part of the environmental impact analysis process (EIAP), consultation and correspondence were performed with federal, state, and local agencies, listed below. Copies of the correspondence are included as part of this section.

- **Department of Energy (DOE)**
  - Memorandum of Understanding from 99 ABW/CC to Nevada Operations Office, Department of Energy: July 21, 1997
  - Letter from Department of Conservation and Natural Resources Division of Environmental Protection to Environmental Protection Division of Energy Nevada Operations Office: October 24, 1996
- **DOE, Las Vegas Operations Office**
  - Personal Contact from Science Applications International Corporation (SAIC), Las Vegas, Nevada with DOE Las Vegas Operations Office: May 29, 1997
- **U.S. Fish and Wildlife Service (USFWS)**
  - Memorandum of Understanding from U.S. Air Force, Air Combat Command and the USFWS: December 22, 1997
- **Nevada Division of Environmental Protection (NDEP)**
  - Letter from Department of Conservation and Natural Resources Division of Environmental Protection to 99 ABW/EM: August 18, 1997
  - Letter from 99 ABW/EM to DOD Branch, Bureau of Federal Facilities Division of Environmental Protection: October 21, 1997
  - Letter from Department of the Air Force HQ USAF WTC/EV to DOD Branch, Bureau of Federal Facilities Division of Environmental Protection: March 23, 1994
- **Native American Consultations**
  - Letter from Western Shoshone Resources Inc. U.S. Air Force: June 26, 1996
- **Beatty Town Advisory Board**
  - Letter from Beatty Town Advisory Board to the Secretary of Defense: January 14, 1998
  - Letter from Department of the Air Force (HQ USAF/XO) to the Beatty Town Advisory Board: February 3, 1998

- **Esmeralda and Nye Counties**

  - Memorandum of Understanding from 99 ABW/CC to Lincoln County, Nevada: May 21, 1997

  - Letter from Economic Development Authority, Esmeralda and Nye Counties, Nevada to Secretary of Defense: December 4, 1997

  - Memorandum of Understanding from 99 ABW/CC to Nye County, Nevada: July 8, 1997

- **Consolidated Group of Tribes and Organizations**

  - Consultations included several working groups, formal meetings, and discussions concerning the LEIS process.

  - Created Ethrographic and Ethnohistoric Overview in 1977.

  - Created American Indian Perspectives to the LEIS under the American Indian Writer's subgroup, in 1997. Information from this report was used to supplement each chapter of the LEIS.

  - Discussions at General meeting at NAFB (scoping): May 1996.

  - Discussion at General Meeting at NAFB for Draft LEIS: November 1998.

  - In association with the LEIS process in the NAIP program, trips were made to several sensitive sites on the NAFR.

Memorandum of Understanding Between Nellis Air Force Base and the Nevada Operations Office, Department of Energy

July 21, 1997

MEMORANDUM OF UNDERSTANDING

DE-GM08-97NV13208

I. PARTIES TO THE AGREEMENT

This Memorandum of Understanding (hereinafter "Agreement") is made by and between Nellis Air Force Base (hereinafter "Nellis") and the Nevada Operations Office, Department of Energy (hereinafter "DOE") to accomplish a legislative environmental impact statement (hereinafter "LEIS), consistent with the land management plan, as a joint document for the Nellis Air Force Range (hereinafter "NAFR") for submission along with Bureau of Land Management (hereinafter "BLM") findings and recommendations to the Secretary of the Interior and to participate in the extension of the NAFR withdrawal pursuant to the Military Lands Withdrawal Act of 1986, Public Law (P.L.) 99-606, *as amended.*

II. PREAMBLE

WHEREAS NAFR lands were withdrawn from all forms of appropriation under the public land laws by P.L. 99-606, *as amended,* and by Public Land Order 7131; and

WHEREAS Nellis has a continuing need to train aircrews in the state of Nevada in order to maintain mission ready status in their assigned aircraft and to participate in large force integrated air missions; and

WHEREAS Nellis has announced its intention to seek an extension of the congressional withdrawal of NAFR; and

WHEREAS Nellis is the lead agency (40 C.F.R., Section 1501.5) and the DOE is a cooperating agency (40 C.F.R., Section 1501.6) in the extension of the NAFR withdrawal; and

WHEREAS the BLM is responsible for processing the extension of a withdrawal application from other federal agencies and is responsible for submitting preliminary findings and recommendations on the application to the Secretary of the Interior in accordance with 43 C.F.R. Section 2300 et seq., 43 C.F.R. Section 1701 et seq., and 43 C.F.R. Section 155 et seq.; and

WHEREAS Nellis and the DOE recognize the importance of government-to-government relations with Native Americans and the participation of Native Americans in the extension ot the withdrawal of NAFR; and

WHEREAS the Economy Act, 31 U.S.C., Section 1535, *as amended,* allows a federal agency to enter into an agreement with another federal agency for services; and

NOW, THEREFORE, the parties agree to work cooperatively in the following manner:

III. AUTHORITY FOR ENTERING INTO THIS AGREEMENT

The parties enter into this Agreement as authorized by § 307 of the Federal Land Policy and Management Act of 1976 (43 U.S.C. § 1737), and 10 U.S.C. § 8013.

IV. PURPOSE

The purpose of this agreement is to facilitate the preparation of the NAFR LEIS as a joint document that meets the requirements of the National Environmental Policy Act (hereinafter "NEPA"), Federal Land Policy Management Act (hereinafter "FLPMA"), and to develop BLM findings and recommendations to submit to the Secretary of the Interior on the extension of the withdrawal of NAFR, and to complete the extension of the withdrawal of NAFR.

V. RESPONSIBILITIES

1. Nellis and the DOE together will:

    a. Follow BLM procedures.

    b. Inform one another of the date, time, location, and purpose of major meetings involving a designated representative and a third party to discuss issues and independent studies relating to the NAFR EIS and, in the event one party to this Agreement cannot attend, provide the absentee with a meeting summary.

2. Nellis will:

    a. Communicate the execution of this Agreement to the appropriate installation, range, major command, and headquarters offices of the Department of the Air Force; and

    b. Designate a point of contact for the NAFR LEIS; and

    c. Chair a NAFR EIS Technical Working Group (hereinafter "Working Group") that:

        i. Meets as needed to monitor the Project Management Plan (hereinafter "PMP"); and

        ii. Gives action officers from the lead and cooperating agencies -- Nellis, DOE, BLM, and U.S. Fish and Wildlife Service, an opportunity to participate in the Working Group; and

iii. Invites action officers from other agencies/organizations (Native Americans, U.S. Army Corps of Engineers, State Historic Preservation Office, Nevada Governor's Office, Nevada Department of Fish and Game, Clark County, Lincoln County, and Nye County) to participate in the Working Group as appropriate; and

iv. Reviews alternatives for inclusion in the NAFR LEIS; and

v. Makes recommendations to the lead and cooperating agencies.

d. Prepare typed minutes of all meetings of the Working Group and provide a copy of the minutes to each Group member for review and comment; and

e. Provide DOE with a copy of all public comments during the scoping process and on the Draft LEIS in accordance with the PMP.

3. The DOE will:

a. Communicate the execution of this Agreement to the appropriate offices of the Department of Energy; and

b. Designate a point of contact for the NAFR LEIS, public land withdrawal process, and the Working Group; and

c. Provide Nellis with information that may be helpful in the NAFR LEIS; and

d. Review proposed methods and procedures in support of the NAFR LEIS prior to, and during, field work; and

e. Review results of field work for the NAFR LEIS and any reports prepared as a result of the field work prior to release of the information to the public.

VI. FINANCIAL ADMINISTRATION

This agreement shall not be used to obligate or commit funds or as the basis for the transfer of funds. Each agency shall use its own funds to support this agreement.

VII. DISPUTE RESOLUTION

1. Conflicting scientific evidence of the parties will be discussed in the NAFR LEIS as long as such views are supported by credible scientific evidence.

2. Designated representatives for Nellis and DOE will make all reasonable efforts to informally resolve disputes relating to the NAFR LEIS.

3. If disputes cannot be resolved after 15 days following initiation of dispute resolution, either party may request elevation for dispute resolution by issuing a written statement of dispute.

VIII. CONDITIONS

1. Nellis and DOE both understand, and agree, that:

   a. Implementation of this Agreement is of mutual benefit;

   b. The DOE will not undertake any activities at the expense of Nellis in advance of the complete execution of necessary funding documents;

   c. This agreement does not constitute a commitment of funds, and that performance under this agreement by either party is dependent upon lawful appropriation, availability, and allocation of funds by proper authorities;

   d. This agreement may be modified or amended only by mutual agreement of the parties in writing and signed by each of the parties hereto;

   e. Nellis and DOE shall execute separate subagreements for any services beyond the scope of this Agreement;

   f. Any documents or data exchanged between the parties to this Agreement will not be released to a third party unless the designated representative of the party that generated the document or data approves the release;

   g. Nothing herein contained shall be construed as limiting or affecting in any way the vested or delegated authority of Nellis or the DOE; and

   h. This agreement becomes effective when signed by all parties and shall remain in full force and effect until the last item of the mutually agreed upon Project Plan is

completed or the project is canceled, but may be terminated by either party upon 45 days notice, in writing, given to the other party.

17 July 97
Date

JOHN D. LADIEU
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99th Air Base Wing Commander
Nellis Air Force Base

6/6/97
Date

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DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL PROTECTION

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October 24, 1996

Kenneth A. Hoar, Director
Environmental Protection Division
U.S. Department of Energy
Nevada Operations Office
P. O. Box 98518
Las Vegas, NV 89193-8518

RE: Closure and Remediation Plan for Underground Storage Tanks and Area 9 Spill Sites Located at the Tonopah Test Range

Dear Mr. Hoar:

The Nevada Division of Environmental Protection has received your response to our letter dated August 13, 1996 regarding the above referenced sites. DOE must provide complete original EPA 7531-1 forms to NDEP requesting changes to the UST database. Incomplete, partial or faxed copies are not acceptable. DOE must provide these forms to NDEP in the Carson City office by November 15, 1996.

NDEP will not concur with closure of sites that contain contamination above action levels until DOE provides documentation as follows:

1) Land use restriction for the impacted areas must be recorded in the land deed or withdrawal documents which identify the type and extent of contamination that is still present and the limits this places on the future use of this property.

2) The US Air Force acknowledges it will discuss and identify this contamination in the EIS that is currently being prepared for the entire range complex. This identifies US Air Force as formally accepting responsibility for the contamination that is being left in place including any post closure care.

In the September 18, 1996 response from DOE to NDEP, DOE has stated that soils that are contaminated with TPH at TTR are not going to be moved to the NTS based on costs associated with this type of transfer. It should be noted that hydrocarbon contaminated soils have been moved from TTR to the NTS as late as September 24, 1996 through projects being managed by DOE/ER. DOE should be making cost determinations on a site wide basis to ensure that one program is not spending excessive funds on an activity while another program is utilizing an option to reduce costs associated with the same type of activity.

If you have any questions, please call Karen K. Beckley at 687-4670 extension 3033.

Sincerely,

Paul J. Liebendorfer, P.E.
Chief
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Colonel M.F. Fukey, NAFB
Colonel Walter J. Donegan, NAFB

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE U.S. AIR FORCE, AIR COMBAT COMMAND

AND

THE DEPARTMENT OF THE INTERIOR, U.S. FISH AND WILDLIFE SERVICE

PARTIES

This Memorandum of Understanding (MOU) is made and entered into between the U. S. Fish and Wildlife Service, an executive agency of the United States Department of Interior hereinafter referred to as the "Service," and the Air Combat Command, a branch of the United States Air Force hereinafter referred to as the "Air Force."

AUTHORITY

This MOU applies only to that portion of the Nellis Air Force Range (NAFR), hereinafter referred to as the "Range," that is located within the Desert National Wildlife Range, hereinafter referred to as the "Refuge." The Refuge was established on May 20, 1936 by Executive Order 7373. The Range was established on October 29, 1940 by Executive Order 8578, which states:

> The withdrawal made by this order shall take precedence over, but shall not rescind or revoke as to any of the land affected thereby in the above-described area the withdrawal made by Executive Order No. 6918 of November 26, 1934, as amended, and Executive Order No. 7373 of May 20, 1936, withdrawing certain lands for wildlife and other purposes.

The Service enters into this MOU pursuant to the authority provided by the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd - 669ee). The Service is the federal agency primarily responsible for the welfare and management of the land, wildlife and other natural resources, and for protection of cultural and archeological resources, and for research thereon in the Refuge. The Service is also the federal agency with specific responsibilities for protection of threatened and endangered species and management of desert bighorn sheep, desert tortoises, and migratory birds.

One million, three hundred twenty-two thousand, nine hundred (1,322,900) acres of the Refuge have been proposed for inclusion in the National Preservation System, under the Wilderness Act of 1964 (16 U.S.C. 1131 - 1136). The Service shall manage those lands in accordance with the provisions of that act.

The Air Force enters into this MOU pursuant to authority provided by Public Law (P. L.) 99-606, the Military Lands Withdrawal Act of 1986. Under P. L. 99-606, the lands affected by this MOU were reserved for use by the Secretary of the Air Force (subject to Service management of the land and resources under the National Wildlife Refuge Administration Act) as an armament and high hazard testing area and for training for aerial gunnery, bombing, rocketry, electronic warfare, and for tactical maneuvering and air support.

The Air Force controls access to the areas affected by this MOU under the Internal Security Act of 1950 (50 United States Code [U.S.C.] 797, implemented by Department of Defense Directive 5200.8 and Air Force Instruction [AFI] 31-209) and the Wilderness Act of 1964. The Air Force has designated the land affected by this MOU as "controlled area" in accordance with AFI 31-209. The Air Force controls the restricted airspace above the land affected by this MOU under Federal Aviation Administration (FAA) regulations.

APPLICABLE LAW

The Military Lands Withdrawal Act of 1986 (P.L. 99-606), the Sikes Act of 1960 (42 U.S.C. 670a - 670m), The National Refuge System Administration Act of 1966 (16 U.S.C. 668dd - 668ee), the National Environmental Policy Act of 1969 (42 U.S.C. 4321, 4331 - 4335, and 4341 -4347), the Endangered Species Act of 1973 (16 U.S.C. 1531 - 1544), the Archeological and Historic Preservation Act of 1974 (16 U.S.C. 469 - 469c), the National Historic Preservation Act of 1966 (16 U.S.C. 470 - 470b and 470c - 470n), the Federal Land Policy and Management Act of 1976 (43 U.S.C. 1701 - 1771 and other U.S.C. sections), the Refuge Recreation Act of 1962 (16 U.S.C. 460k - 460k-4), The Wilderness Act of 1964 (16 U.S.C. 1131 - 1136), and the Internal Security Act of 1950, Chapter 1024, §21 (50 U.S.C. 797).

AFFECTED LAND

The land affected by this MOU is delineated on the attached map hereinafter "affected land" and is described as:

T9S - R59E, R58E, R57E, R56E, R55 1/2E, R55E to Nye County Line.

T10S - R59E, R58E, R57E, R56E, R55 1/2E, R55E to Nye County Line.

T11S - R59E, R58E, R57E, R56E, R55 1/2E, R55E to Nye County Line.

T12S - R59E, R58E, R57E, R56E, R55 1/2E, R55E to Nye County Line.

T13S - R59E, R58E, R57E, R56E, R55 1/2E, R55E, R54E to Nye County Line

T14S - R59E West 1/2, R58E, R57E, R56E, R55 1/2E, R55E, R54E to Nye County Line

T15S - R58E, R57E, R56E, R55 1/2E, (All of Sections within 1, 2, 11, 12, 13, 14 and 23, 24, 25, 26, 35 and 36).

T16S - R58E (All of Sections 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15 16, 17, 18, 19, 20, 21, 22, 27 and 34).
R57E (All of Sections 1, 2, 3, 4, 5, 6, 8, 9, 10, 11, 12, and NE 1/4 of Section 7).

T18S - R62E (South 1/2 of Sections 33, 34, and 35 and all of Section 36) (Known as the Nellis Small Arms Range).

A total of +/- approximately eight hundred forty five thousand, seven hundred eighty seven (845,787) acres.

PURPOSE

The parties enter into this MOU to provide a framework for cooperation between them, with the mutual goals of enhancing the ability of each to accomplish its mission, minimizing conflicts between those missions. This MOU replaces the MOU between the parties dated March 11, 1976, which expired on March 11, 1991 and was extended indefinitely by letter of agreement dated March 15, 1991.

AGREEMENT

1. Airspace overlying the land affected by this MOU have flight or altitude restrictions as defined in AFI 13-212, Vol 2/NAFB SUP 1. Exceptions to this rule are listed as follows and are made to alleviate undue conflicts with resident wildlife and to promote aircraft and pilot safety:

a. All live air-to-air gunnery operations will be conducted above an elevation of ten thousand (10,000) feet Mean Sea Level (MSL) within air-to-air gunnery areas in R-4806W as described in the Nellis Air Force Base (NAFB) supplement to AFI 13-212.

b. Helicopters shall operate at or above 500 feet Above Ground Level (AGL), unless conducting tactical training in accordance with approved mission profiles. Low level training within the joint-use area, as described in the NAFB supplement to AFI 13-212, shall be limited to the absolute minimum required to meet approved training needs.

c. Tactical mission profiles will be developed to avoid the following wildlife watering points by 2000' AGL, within 0.5 nautical miles (NM), to the maximum extent possible:

NAME	LOCATION
Chuckawalla Guzzler	115° 20' 30" W X 36° 55' 60" N
White Sage Catchment	115° 22' W X 36° 43' N
Indian Canyon Catchment	115° 32' 30" W X 36° 56' 50" N
Quartz Spring Catchment	115° 36' 10" W X 36° 59' N
Gravel Canyon Guzzler	115° 35' W X 36° 53' 30" N
DeJesus Spring	115° 34' 30" W X 36° 52' 20" N
Tim Spring	115° 34' 35" W X 36° 50' 50" N
Sand Spring	115° 33' 50" W X 36° 49' 45" N
Spotted Range #2 Catchment	115° 39' 50" W X 36° 50' 20" N
Spotted Range #1 Catchment	115° 41' W X 36° 49' N
Foggy Catchment	115° 40' 35" W X 36° 48' 05" N
Patches Catchment	115° 40' 50" W X 36° 46' 25" N
Dain Peak Catchment	115° 31' 35" W X 36° 42' 30" N
Heaven's Well	115° 33' 20" W X 36° 40' 30" N

d. There will be no overflight of Corn Creek field station (36° 26' N, 115° 22' W below 8000 feet MSL when within one NM of the station).

e. In accordance with Air Force and FAA regulations, fixed and rotary wing aircraft flying visual flight rules (VFR) may deviate from these restrictions in order to remain clear of clouds and maintain VFR flight, or to maintain safety of flight. Aircraft that are unable to safely reach or maintain the appropriate altitude will fly at the highest altitude possible while continuing to maintain safety of flight. Course deviations to avoid obstructions are also deemed necessary for the safety of flight.

2. Normal maintenance of existing facilities, road right-of-ways and targets within the area described

in the NAFB supplement to AFI 13-212, is accomplished by annual maintenance plans which incorporate environmental concerns (such as the current Service Biological Opinion for desert tortoise). The construction or relocation of any road, trail, target, target area or military facility on the refuge will not commence without proper environmental analyses, and consultation with the Service.

3. The Air Force, with Service concurrence, has established training and testing facilities in the following areas:

a. Indian Springs Valley: (85,851 acres). All lands within the Indian Springs Valley below the thirty-six hundred (3600) feet (1097 meters) elevation contour line as shown on the attached map.

b. Three Lakes Valley: (136,758 acres). All lands within the Three Lakes Valley below the four thousand (4000) foot (1219 meters) elevation contour line as shown on the attached map. The transition from thirty-six hundred (3600) foot contour line of Indian Springs Valley to the four thousand (4000) foot contour line of Three Lakes Valley will begin in the center of Section 20, T15S, R57E.

c. Spotted Range (old - Nellis Close Air Support Range): (24,541 acres). Commencing at the southwest corner of T13S, R56E; thence west to the southwest corner of T13S, R55 1/2E; thence north five miles to the Lincoln and Clark County line; thence west two miles along said county line; thence south approximately six miles to the Spotted Range Road; thence along Spotted Range Road to the point where it intercepts the military reservation boundary at the southwest corner of Section 35, T14S, R55E; thence east along the military reservation boundary to where it intercepts the R55 1/2E and R56E division line; thence north along as line to the point of origin. Plus T14S-R55E, The portions of the E 1/2 Section 21 and the NW 1/4 Section 22 lying westerly of Spotted Range Road.

d. Tikaboo Valley (old - Desert Valley) Impact Area: (640 acres). In T9S, R59E consisting of Section 19.

4. Within the above described areas, delivery of air-to-ground ordnance shall be confined to impact areas as listed below, as shown on the attached map, approximately 111,527 acres.

a. Indian Springs Valley: (38,168 acres).

South Area (23,333 acres)

T14S - R56E S1/2
T15S - R56E N 1/2

North Area (14,835 acres)

T12S - R56E Sections 12, 13, 24, 25, 36
T12S - R57E Sections 7, W 1/2 of 17, 18, 19, W 1/2 of 20, W 1/2 of 29, 30, 31 and W 1/2 of 32
T13S - R56E Sections 1, 2, 11, 12, 13, 14, 23, 24, 25, 26, 35 and 36

b. Three Lakes Valley (48,178 acres):

South Area (15,723 acres)

T15S - R57E Sections E 1/2 of 1, SE 1/4 of 11, Section 12 except the NW 1/4, 13, E 1/2 of 14, E 1/2 of 23, Sections 24, 25, 26, excluding the NW 1/4 Section 26, section 34 excluding the NW 1/4 Section 34, 35, 36
T16S - R57E Sections 1, 2, 3, 10, 11 and 12
T15S - R58E Sections 6, 7, 18, 19, 30, 31
T16S - R58E Sections 6, 7, 18, 19

North Area (32,455 acres)

T11S - R58E Sections 25, excluding the NE 1/4, Sections 26, 27, 34, 35, 36
T12S - R58E E 1/2
T12S - R59E, Sections 18 and N 1/2 of 19
T13S - R58E Sections 3, 4, 5, 8, 9, 10, 15, 16, 17, 20, 21, 22, 27, 28, 29, 32, 33 and 34
T14S - R58E Sections 3, 4, 5, 8, 9, 10, 15, 16 and 17

c. Nellis Close Air Support Range (24,541 acres):

All land that lies within this area.

d. Desert Valley Impact Area (640 acres):

All land that lies within this area.

5. The type of munitions deployed on specific targets is outlined in AFI 13-212, Vol 2/NAFB SUP 1. Input from the Service for annual revisions will be submitted to 99th Range Squadron Commander. The Air Force has access to and use of FAC Hill, T15S-R55E, Section 11 for use by Forward Air Controllers (FAC).

6. An Air Combat Maneuvering Instrumentation (ACMI) Range was installed during 1975-76 within Refuge, consisting of seven (7) instrumented sites, serviced and maintained by the Air Force. The ACMI equipment was withdrawn in 1988. The Air Force has retained an option to reopen the former ACMI sites. Should the Air Force reactivate these sites, access and service will be coordinated with the Refuge Manager. Environmental regulations in effect at the time of reactivating will apply.

7. During the Air Force occupancy and use of Desert National Wildlife Refuge (DNWR), target debris, ordnance residue and facilities no longer needed or abandoned by the Air Force will be gathered to central holding areas and removed from Refuge expeditiously as possible and IAW AFI 13-212 and its supplements.

8. The Air Force agrees to appoint a military liaison officer in 99th Range Group, responsible for range management who will work cooperatively with the Refuge Manager or designated representative. The liaison officer shall be responsible for dealing with all problems relating to Air

Force activities on the Refuge. The liaison officer shall assist the Service in securing necessary range clearances in 4806W in order for the Service to conduct wildlife/resource management activities. The Service and the liaison officer shall meet on a regular basis for updates and to resolve immediate issues or problems. Also, to foster a better understanding between both agencies, Air Force and Service should provide the other party copies of natural resource studies/surveys accomplished on the DNWR.

9. Service personnel shall have access to the lands of Refuge described in the NAFB supplement to AFI 13-212 for the purposes of wildlife inventory, law enforcement, water development, public hunting, facility maintenance, and other management activities during periods of Air Force inactivity, provided the necessary range clearances have been received by the Refuge Manager from the liaison officer or designated representative.

a. Access on the Refuge north of latitude 37 degrees and west of longitude 115 degrees, 35 minutes will be coordinated through the USAF/DOE Liaison Office.

b. Access to joint-use area within NAFR will be controlled by the Air Force. Entry/exit requirements are stated in the local NAFB regulation. Permanent party DOI/Refuge personnel will be given controlled area badges with escort privileges for DOI sponsored personnel.

10. The Air Force will make available a period of not less than fourteen (14) consecutive days annually during the months of December and/or January when the service will have uninterrupted use and access to the lands described in the NAFB supplement to AFI 13-212 to conduct a bighorn sheep hunt. The fourteen (14) day period shall be mutually agreed upon by the Commander, Air Warfare Center, Nellis Air Force Base and the Refuge Manager. The Service shall ensure all hunters sign a hold-harmless agreement provided by the Air Force. The Refuge Manager will retain completed forms for a period of three years, unless otherwise directed by the Air Force. The Air Force, in conjunction with the Service, will provide to the hunters a Range Safety Briefing (to include explosives safety hazard awareness) as well as a Natural/Cultural Resource Briefing. The Air Force will also provide cleared and marked entry/exit routes for each valley and designate camping areas for hunting parties within the authorized hunt areas. Access will be controlled in accordance with Nellis Air Force Base range entry/exit regulations. Hunters will be allowed unescorted access after attending explosive ordnance disposal, safety, security, and natural/cultural resource briefings. Access north of latitude 37 degrees north and west of longitude 115 degrees 30 minutes west is restricted. The Air Force, in coordination with the Service shall supply maps delineating access for the hunt. The maps will show the confines of authorized, restricted, and hazardous areas.

11. Air Force personnel and personnel of their contractor(s) designated for law enforcement and security purposes may possess firearms only while on official duty on those joint-use lands described in the NAFB supplement to AFI 13-212. Service personnel with Federal law enforcement credentials are required to carry firearms when conducting Federal law enforcement duties. Special permitted hunters (reference item 10) will be authorized to possess a sporting arm for the hunting of bighorn sheep, during the period set aside for bighorn sheep hunting only. The Air Force has the right, at its convenience, to conduct ground patrols (on designated roads) or air patrols, for the surveillance of unauthorized entry on those lands described in the NAFB supplement to AFI 13-212. Off-road vehicle travel is prohibited unless expressly authorized by the Refuge Manager or the 99th Range Squadron Commander. The liaison officer will report any observations of illegal entry or use of lands

within Refuge boundaries to a Refuge Officer.

12. The Service agrees to the use of its facilities by the Air Force and the cooperation of its personnel to aid in the recovery of downed aircraft and aircrew. The Air Force shall immediately notify the Refuge Manager IAW OPLAN 6 whenever any military aircraft crashes within the boundaries of the Refuge. When feasible, the designated search and rescue coordinator and the officer in charge of the crash investigation and recovery of aircraft wreckage shall consult with the Refuge Manager as to the best route to reach the crash site. Off-road vehicle travel will be coordinated with Service to ensure minimum damage to the land and environment of the Refuge. Recovery of aircraft wreckage from lands designated or proposed as wilderness areas will be conducted with special care to minimize impact on wilderness values. Consideration will be given to alternatives to using off-road vehicles to retrieve wreckage, to include use of helicopters, or not removing wreckage when doing so would be more detrimental to the area than leaving it. The Air Force will make efforts to mitigate damage to Refuge lands resulting from military activity. Such mitigation shall be jointly agreed upon by the Refuge Manager and the designated Installation Commander of Nellis AFB.

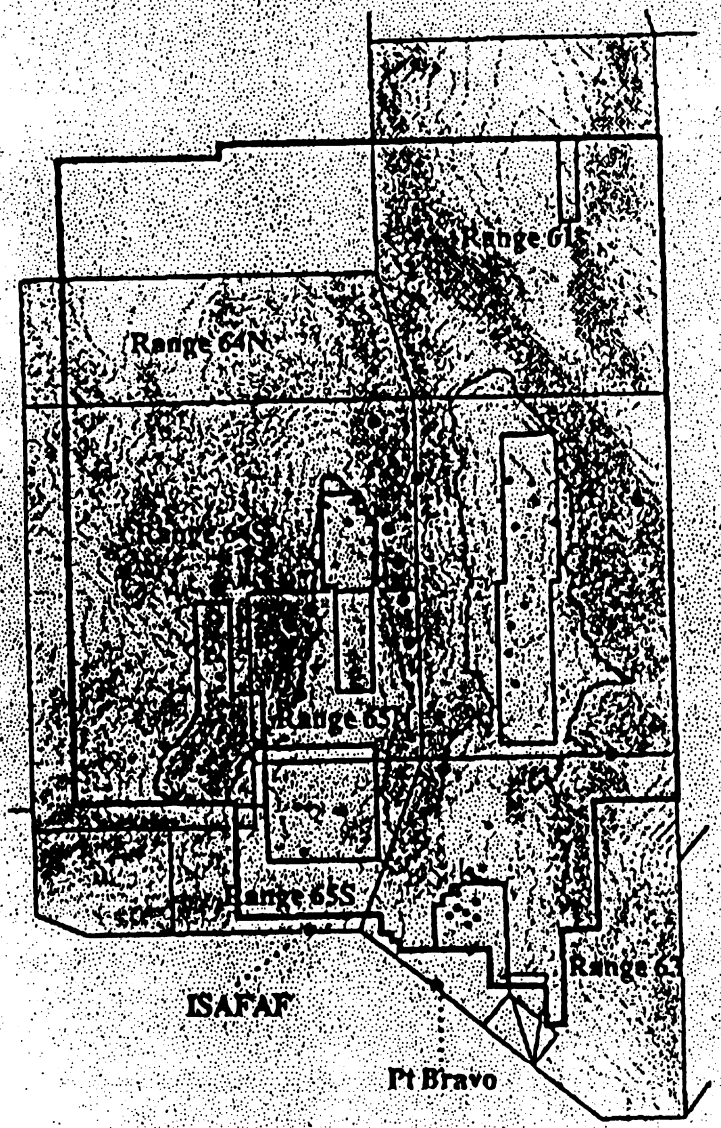
13. To facilitate management of the range and minimize the time required for management, the Air Force agrees to furnish the Service a minimum of twenty (20) hours of aircraft support annually, and if available, other support equipment with operating personnel as negotiated on a case-by-case basis for the purposes of aerial patrol, search and rescue, maintenance of the Wildlife Range, wildlife inventory, water hole inspection, and other wildlife management practices on the Refuge.

14. The Air Force shall bear all the costs of suppressing and reporting wildfires on the Refuge when such fires are the result of Air Force activities. The Service is responsible for pre-suppression fire costs of lands in the withdrawal. Fire suppression will be provided by the Bureau of Land Management (BLM) for all range fires within the area described in the NAFB supplement to AFI 13-212. A separate agreement between Nellis AFB and BLM covers fire fighting operations on the Refuge.

15. The duration of the MOU shall begin with the date of signing of this agreement and end with the expiration date of PL 99-606, which is November 6, 2001. A semi-annual meeting shall be scheduled (target months of April and October) to include representatives of the Service, the 99 RANG, the 57th and 53rd Wings and 99ABW/EM. The purpose of these meetings is to provide mutual updates and to discuss any pending issues Terms of this MOU may be negotiated, renewed and/or amended as necessary at the mutual consent of both signatory parties.

16. The signatory parties agree that the MOU dated March 11, 1986, was extended by letter of agreement dated March 15, 1991, to the effective date of this MOU. Satisfaction of the terms of this MOU will constitute full compliance with Air Force obligations under any prior agreements, and shall extinguish all current, continuing, and future obligations of the Air Force under those agreements.

1976 MOU



Nellis Southern Ranges

Legend

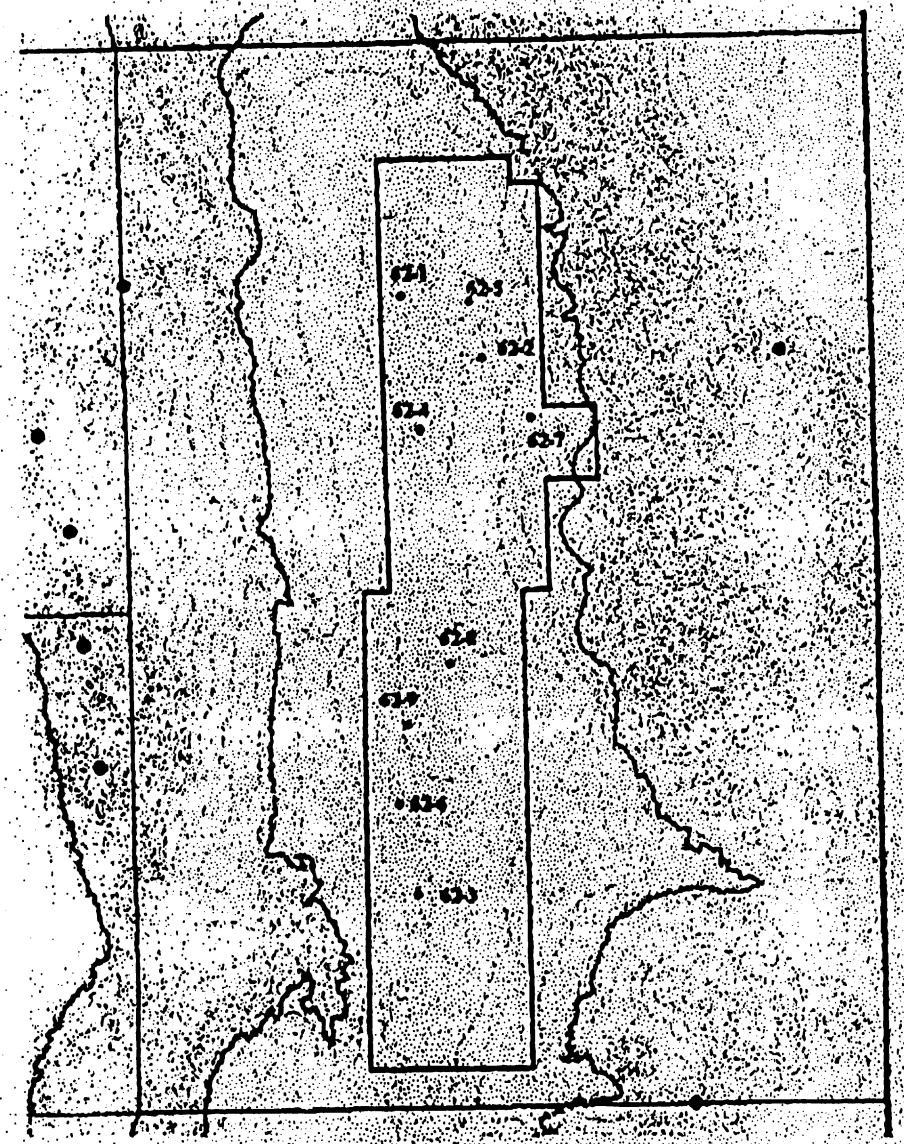
- Water Catchments (Blue)
- Targets (Red)
- Range Airspace Boundary (Black)
- USFWS Refuge Boundary (Green)
- Test/Training Boundary (Brown)
- Impact Boundary (Purple)
- Contours (Gray)
- Airfield/Complexes (Orange)

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Nellis Southern Ranges
Legend
Water Catchments (Blue)
Targets (Red)
Range Airspace Boundary (Black)
USFWS Refuge Boundary (Green)
Test/Training Boundary (Brown)
Impact Boundary (Purple)
Contours (Gray)
Airfield/Complexes (Orange)
Range 61
Range 62
Range 63
Range 64N
Range 64S
Range 65
Range 65A
Range 67
Range 67A
Range 68
Range 68A
Range 69
Range 70
Range 71
Range 72
Range 73
Range 74
Range 75
Range 76
Range 77
Range 78
Range 79
Range 80
Range 81
Range 82
Range 83
Range 84
Range 85
Range 86
Range 87
Range 88
Range

Range 61

Nellis Southern Ranges
Legend
Water Catchments (Blue)
Targets (Red)
Range Airspace Boundary (Black)
USFWS Refuge Boundary (Green)
TestTraining Boundary (Brown)
Impact Boundary (Purple)
Contours (Gray)
Airfield/Complexes (Orange)



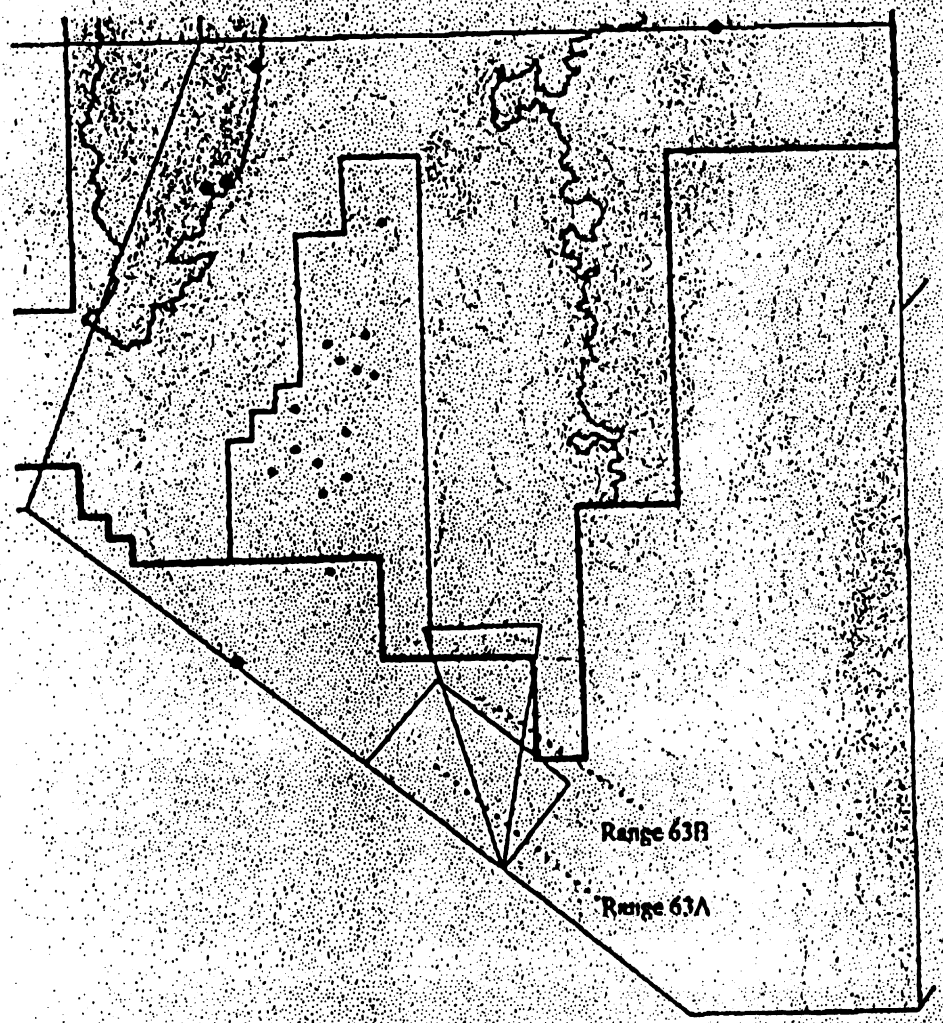
Range 62

Nellis Southern Ranges

Legend

- Water Catchments (Blue)
- Targets (Red)
- Range Airspace Boundary (Black)
- USFWS Refuge Boundary (Green)
- Test/Training Boundary (Brown)
- Impact Boundary (Purple)
- Contours (Gray)
- Airfield/Complexes (Orange)

350



Range 63

Nellis Southern Ranges

Legend

- Water Catchments (Blue)
- Targets (Red)
- Range Airspace Boundary (Black)
- USFWS Refuge Boundary (Green)
- Test/Training Boundary (Brown)
- Impact Boundary (Purple)
- Contours (Gray)
- Airfield/Complexes (Orange)

659

Range 64

Nellis Southern Ranges
Legend
Water Catchments (Blue)
Targets (Red)
Range Airspace Boundary (Black)
USFWS Refuge Boundary (Green)
Test/Training Boundary (Brown)
Impact Boundary (Purple)
Contours (Gray)
Airfield/Complexes (Orange)

Range 65

Nellis Southern Ranges
Legend
Water Catchments (Blue)
Targets (Red)
Range Airspace Boundary (Black)
USFWS Refuge Boundary (Green)
Test/Training Boundary (Brown)
Impact Boundary (Purple)
Contours (Grey)
Airfield/Complexes (Orange)

MOU Between
the U.S. Air Force, Air Combat Command
and
the Department of the Interior

Signature Page

IN WITNESS THEREOF, the signatures have been affixed hereto on the respective dates herein indicated.

FOR THE U.S. AIR FORCE, AIR COMBAT COMMAND

12 DEC 1997
Date

RUSSELL T. BOLT
Colonel, USAF
Commander, 99th Air Base Wing

FOR THE DEPARTMENT OF THE INTERIOR,
U.S. FISH AND WILDLIFE SERVICE

DEC 22 1997
Date

for MIKE SPEAR
Regional Director, Region 1
U.S. Fish and Wildlife Service

PETER G. MORROS, Director
L.H. DODGION, *Administrator*
'702) 687-4670
)D 687-4678
Administration
Mining Regulation and Reclamation
Water Pollution Control
Facsimile 687-5856

STATE OF NEVADA
BOB MILLER
Governor

Waste Management
Corrective Actions
Federal Facilities
Facsimile 885-0868
Air Quality
Water Quality Planning
Facsimile 687-6396

DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES

DIVISION OF ENVIRONMENTAL PROTECTION

333 W. Nye Lane, Room 138
Carson City, Nevada 89706-0866

August 18, 1997

Mr. Dan Schickler
99 ABW/EM
4349 Duffer Drive, Suite 1601
Nellis AFB NV 89191-7007

SUBJECT: Response to written correspondence From Colonel Michael F. Fukey to Mr. Dennis La Prairie dated June 6, 1997

Dear Mr. Schickler:

The Nevada Division of Environmental Protection (NDEP) has received and evaluated your written correspondence to Mr. Dennis La Prairie dated June 6, 1997 regarding your request to bury concrete target debris in the craters left by bombs at various target sites located on the Nellis Range Complex. This office has the following comments and concerns:

Mr. Dennis La Prairie of the NDEP Bureau of Waste Management, Solid Waste Branch is your point of contact and has Solid Waste authority in this case. However, this office requests clarification of the following:

1) Per the attached letter from Ms. Eloisa V. Hopper to me, dated March 23, 1994, the burial of concrete debris appears to be inconsistent with the AFR 5046 five year surface debris removal plan. This office has not received the written plan referenced. Please provide a written plan.

2) Please provide documentation that this disposal practice is consistent with and will be identified in the Environmental Impact Statement (EIS) that is currently be drafted for the Nellis Range Complex.

3) This office is concerned that burial of debris without appropriate surveying and monument installation may cause confusion during future hazardous waste reconnaissance and investigation on the range complex. Please provide a plan that addresses this concern and is consistent with Installation Restoration Program

(IRP) sites that have been monumented and closed by this office.

4) Please provide clarification if other target debris of a non-hazardous nature is to be buried also.

Accordingly, please provide the information requested. This information must be received by this office not later than September 18, 1997. Further review of your request will not proceed until all requested information has been received by this office.

Should you have any questions or if I can be of any assistance, please do not hesitate to contact me at 702-687-4670 Extension 3032 (FAX 702-687-6396). All future correspondence regarding this subject should be addressed to the undersigned.

Sincerely,

Arthur G. Gravenstein
Environmental Scientist
Department of Defense Branch
Bureau of Federal Facilities

cc: Mr. Paul Liebendorfer, NDEP
Mr. Dennis La Prairie, NDEP
Mr. Dave Minedew NDEP
Mr. Kenneth W. Voget, Project Leader, Desert Refuge Complex, USDI, U.S. Fish and Wildlife Service, 1500 North Decatur Blvd., Las Vegas, NV 89108
Mr. Stan Wiemeyer, USDI, U.S. Fish and Wildlife Service, 4600 Kietzke Lane, Building C-125, Reno, Nevada 89502
Mr. William Offutt, Nye County Manager, P.O. Box 153, Tonopah, Nevada 89049
Mr. Robert S.Nelson, Emergency Management Supervisor, Office of Emergency Management, P.O. Box 153, Tonopah, NV 89049
Mr. Alan Tinney, Nevada Health Protection Services, 505 King St. Carson City, NV 89710

Enclosures: (1)
Written Correspondence from Ms. Eloisa V. Hopper to Mr. Arthur Gravenstein, dated March 23, 1994

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS 99TH AIR BASE WING (ACC)
NELLIS AIR FORCE BASE, NEVADA

21 OCT 1997

99 ABW/EM
4349 Duffer Drive, Suite 1601
Nellis AFB NV 89191-7007

Mr. Arthur G. Gravenstein
Environmental Scientist
Bureau of Federal Facilities
Nevada Division of Environmental Protection
333 W. Nye Lane
Carson City NV 89706-0866

Dear Mr. Gravenstein

The following comments are provided in response to concerns with burying concrete target debris at the target sites on the Nellis Air Force Base Range Complex.

Since our letter of March 23, 1994, Air Force Regulation (AFR) 50-46 has been replaced by Air Force Instruction (AFI) 13-212. Target debris, other than concrete rubble, remaining after test/training missions is cleared from the target areas according to AFI 13-212, Nellis Supplement 1, Chapter 6. A copy of this chapter is attached for your records. Each target site is cleaned and rebuilt annually with a more extensive cleanup on a five year rotation. The instruction is very general and only refers to the "unusable target debris", not specifically concrete target debris, in section 6.4.2.

All correspondence in regard to this subject has been forwarded to the Environmental Impact Statement (EIS) team. The EIS team will document and analyze any action or foreseeable actions regarding this request. If you have any questions concerning the relationship of this issue to the EIS, please contact Major Jeff Shea at (702) 652-4354.

It would be difficult to maintain a monument at the target site since the targets would remain operational. In addition, since the concrete rubble would be buried within the target site, the covered rubble could possibly be hit during a future mission and the previously buried rubble could be destroyed. This process would require extensive and costly surveying and record keeping which may outweigh any benefit from burying the rubble at the target sites. The Range Squadron does however maintain records which show the limits of the target sites. These records could be used during any future investigations to show the overall limits of the burial areas. The blocks are generally destroyed by the bombing. The larger pieces that remain are reused when possible, however some fragments cannot be reused. Using these pieces to backfill the bomb craters which must be filled to provide access to the target sites and rebuild the targets reduces the amount of fill and cover material required to maintain the sites.

The concrete blocks used to construct the targets do have steel lifting rings embedded in the concrete. This steel would remain in some pieces of the concrete rubble we propose to bury. There would be no other target debris buried at the target sites.

Request your consideration of the above clarifications. If you have any questions, please contact Mr. Dan Schickler at (702) 652-2072.

Sincerely

Michael F Fukey

MICHAEL F. FUKEY
Colonel, USAF
Director, Environmental Management

Attachment:
AFI 13-212, Nellis Supplement 1, Chapter 6

Chapter 6

RANGE DECONTAMINATION AND MAINTENANCE

6.1. Range Decontamination. Range decontamination includes the removal or disposal of unexploded ordnance, classified ordnance, inert ordnance residue, training projectile (TP) ammunition, and other range material. Explosive ordnance disposal (EOD) personnel inspect ordnance residue, and render safe unexploded ordnance by detonation or burning (where allowed). Non-EOD range or contractor personnel may then remove safe or inert ordnance residue, TP ammunition, and other range material. EOD personnel must brief the range clearance personnel on the possible hazards and the safe handling of debris. Dispose of safe ordnance debris according to appropriate Defense Reutilization and Marketing Office (DRMO) directives.

6.2. Decontamination Responsibility. Each MAJCOM is responsible for decontaminating active, inactive and excess ranges under its control. MAJCOMs are responsible for ensuring non-specialized equipment is available for decontamination. The operating agency is responsible for funding and scheduling all range decontamination. A "straw-man" schedule will be published in the local comprehensive range plan. This plan must address Air Force, federal, state, local, and host nation requirements and standards for land management and pollution abatement. The ROO or range manager/QAE may temporarily postpone decontamination on a case-by-case basis for severe weather or other circumstances that warrant delays. In addition to decontamination, periodic despecularization must be accomplished on those ranges used for laser training (see paragraph 6.7).

6.3. Decontamination Types and Requirements. An aggressive program to clear and dispose of surface hazards on the range is essential for the safety of personnel and efficient use of the ranges. For this reason, a chronological history of all ordnance used on the range should be maintained. Range decontamination is categorized as active, inactive or excess depending on the status of the range concerned. It is Air Force policy to decontaminate and issue certificates of clearance for excess ranges or ranges converted to other uses but remaining on the installation property inventory. Active range decontamination is limited to the range surface, and specific munitions detected by probing techniques. Subsurface range decontamination is done only with equipment designed for such operation.

6.4. Active Ranges. An active range or in-use target area programmed for continued use is periodically decontaminated. The frequency of decontamination is established by the FAC or QAE, based on the type of range and specific circumstances surrounding its use, but will not be less frequent than that listed below. Specific target areas used for testing live munitions containing extremely hazardous fuzing are identified as "Contaminated Target Areas." These target areas are decontaminated IAW guidance in paragraph 6.5.1.1.

6.4.1. Partial Clearance.

6.4.1.1. Class A/Test Ranges. Every two months or 50 Use-Days. The area surrounding the targets used for missile, rockets and bomb training/testing is cleared of all unexploded

ordnance and inert residue to a radius of 152 meters (500 feet). This requirement does not apply to the ANG. NOTE: Strafe targets are hand-policed daily and more detailed maintenance is performed every week or six use-days.

6.4.1.2. Class A Ranges. Each Year. The area surrounding the targets used for missile, rocket and bomb training is cleared IAW AFI 91-201 of all unexploded ordnance and inert residue to a radius of 610 meters (2,000 feet). Nuclear training target areas are cleared to a radius of 1,220 meters (4,000 feet). The ANG requirement is to perform EOD on any target that has had 20,000 bombs dropped on it or all targets each year, whichever occurs first, as prescribed above.

6.4.1.3. Class B and C Ranges. Each year. All unexploded ordnance and inert residue are cleared to a radius of 305 meters (1,000 feet) from each tactical target. The access ways into the tactical targets and 30.5 meters (100 feet) on either side of the access ways are also cleared each year. When targets are being relocated, access ways and new target areas are cleared according to the annual clearance requirement.

6.4.2. Complete Clearance. Five Year. A one-time complete clearance, within the hazard area, must be completed on each existing range. This clearance includes inspection, removal and disposal of munitions and unusable target debris. After completing this one-time clearance, the criteria for subsequent clearance may be reduced to an area of one nautical mile (NM) surrounding each target, or until a density factor of five complete ordnance items per acre is reached, whichever is farther from the target. This clearance should be completed every five years. Also, ten percent of the area between the clearance boundaries, defined by the reduced criteria, and the permanent range boundaries will be sampled on an annual basis. These sampled areas will be cleared when an ordnance density factor of six complete ordnance items per acre is found. For conventional ranges and targets with restricted attack headings, sampling should be concentrated in areas most likely to be contaminated, which can be determined by the safety footprints or through use of the Hazard program. For tactical targets which permit random attack headings, random sampling around the target should be performed. Existing ranges that have not had completed boundary-to-boundary clearance may not use the reduced clearance criteria but must use the full boundary-to-boundary clearance criteria. New ranges may use the reduced clearance criteria. Boundary-to-boundary clearances accomplished before the publication of this instruction are valid, provided it is documented.

6.5. Inactive Range Decontamination. An active range which is no longer used as a weapons range, but remains on an installation's property inventory for other purposes, is decontaminated when it becomes inactive. Decontamination consists of searching for and clearing all explosive ordnance and ordnance residue reasonably possible to detect.

6.6. Excess Range Decontamination. Excess range decontamination is performed when range property is no longer required for military purposes. Requests for decontamination are submitted through the owning base and MAJCOM Real Property channels IAW AFI 32-9004. The following certificates are required when range property has been declared an excess range:

6.6.1. Declaration of Excess Property.

6.6.2. Notice of Contamination.

6.6.3. Land Use Determination.

6.7. Despecularization. Despecularization is the name given to a special type of decontamination on ranges where laser training occurs. A periodic despecularization of the hazard zone surrounding the targets must be accomplished as outlined in AFOSH Standard 161-10. Despecularization consists of removing any highly reflective materials (broken glass, polished metal, etc.) from the range so that laser energy is safely contained within the projected footprint area.

6.8. Useful Equipment. The type of equipment used for range maintenance will depend on location and surface of the range. Some ranges are on desert soil while others may be on swamp land. The following are suggested ideas for ranges constructed on normal soil.

6.8.1. Practice Ordnance Targets. Equipment used to maintain and decontaminate these types of targets are normally standard vehicles found at any military base. Primary vehicles will be a front end loader and a dump truck. The front end loader "bucket" should be placed at a height so that workers have to reach up to drop debris into it. This will help protect the workers if any of the practice munitions go off as they are placed into the bucket. As the bucket is filled, it will be emptied into the dump truck for transport to an appropriate site. If reclamation/salvage operations are also being conducted, a heavy duty all terrain vehicle (ATV) pulling a modified utility trailer, containing skid boxes for separating scrap, is also very useful. ATVs with trailers are also useful when doing the complete range clearance described in paragraph 6.5.2.

6.8.2. Strafe Pits. For strafe pit maintenance, a heavy tractor pulling a chisel plow or scarifying plow should be used to loosen the soil. A disc-harrow may be used to supplement the process but should not be used as the primary device as it has a tendency to compress and harden the soil. After the chisel plow and/or disc-harrow is used, the strafe impact area should be swept with a magnetic sweeper equipped with wide tires to avoid settling into the soft soil. A digger strainer should be used periodically, when soil moisture content permits, to remove subsurface debris and rocks from the plowed soil. The digger strainer works well in loose soil and effectively "super-cleans" the strafe bed to a depth of 8 to 10 inches.

6.8.3. Live and Heavy Inert Ordnance. After these items have been declared safe or inert by the EOD supervisor, various equipment may be used to extract, load and transport them to salvage processing or disposal areas. Chains for dragging ordnance out, front end loaders, tractors, trailers, dump trucks and other equipment may be used as required, depending on what is available.

6.9. Request for Assistance. Requests for partial and complete range decontamination assistance must be sent to the EOD flight responsible for that range. If manning assistance is required, the EOD flight will forward a request to MAJCOM EOD functional management office at least 90 days before the proposed start of the operation. This request should include:

6.9.1. Periods of required assistance (days, weeks, etc.);

6.9.2. Number of personnel required.

6.9.3. Names and telephone numbers of the operating agency point of contact.

6.10. Ensuring Safety.

6.10.1. Training. Extreme caution must be exercised when working within weapon impact areas to preclude inadvertent detonation of exploded ordnance. Ground and explosive safety briefings will be given to all non-EOD personnel engaged in range decontamination operations. They must be briefed on the markings used for practice and inert ordnance, on ordnance rendered safe, and the hazards they may encounter. The non-EOD personnel may assist in removing training ordnance and other inert ordnance that has been inspected and marked for removal by EOD personnel.

6.10.1.1. WARNING - At no time will non-EOD personnel attempt to move munitions (except training projectile gun ammunition) until the munitions have been examined by EOD personnel and found to be safe or inert. Disposal of hazardous items must be handled only by EOD technicians.

6.11. Safety Requirements. During decontamination of Class A, B, and C ranges, specific arrangements must be made to ensure that aircraft operations do not pose a hazard to ground personnel. Each working team must have a signaling device for use in the event an uninformed flight crew attempts to use the range. In addition, all ground personnel must maintain two-way communications with the range control tower or range office while engaged in decontamination operations.

6.11.1. Class A Range. Maintenance and decontamination can be conducted on one side of a dual Class A range (except behind strafe targets) while the RCO is controlling aircrew training missions on the other side of the range.

6.11.2. Class B and C Ranges. Normally, a Class B or C range is closed during decontamination and maintenance. However, if several Class B and C ranges are located together, or if the range is of sufficient size, decontamination can occur on a portion of the range while the remainder is being used. The operating agency must ensure that aircrews are briefed concerning the location of ground personnel and that no ordnance is released until target identification is certain.

6.11.3. Overflight. Overflight of areas or portions of ranges which are in the process of being decontaminated is not authorized below 10,000 feet AGL. This not only ensures the protection of ground personnel but also ensures aircraft will not be damaged by fragments from demolition operations. Overflight of these areas is permitted below 10,000 feet AGL but no lower than 3000 feet AGL when no drop/no laser flights are prescheduled. Overflight is also permitted before and after posted decontamination hours. Specific overflight of the decontamination area(s) must be obtained from the RCO on Class A ranges.

6.12. Certificate of Clearance. A Certificate of Clearance is the official document verifying that the cleared range land was carefully searched and cleared. It certifies that all dangerous

and explosive materials reasonably possible to detect have been removed. The certificate must be dated and must have a range decontamination report attached. The decontaminated areas must be identified in red cross-hatch on a map and annotated in the map legend.

6.12.1. Active Range. A Certificate of Clearance is not usually required for active range decontamination.

6.12.2. Inactive Range. The range decontamination project officer prepares a Certificate of Clearance if the range is not converted to another use, but stays on the installation proper inventory and in the base comprehensive range plan. The range decontamination report is attached to the Certificate of Clearance.

6.12.3. Excess Range. The range decontamination project officer prepares the Certificate of Clearance and the range decontamination report and submits them as outlined in AFI 32-9004.

6.13. Range Decontamination Report. A range decontamination report is a record of events involved in decontamination of a range. It must include the number of people, amount of money, and material required to do the work. The report indicates the precise legal boundaries of the areas that have been decontaminated, including legal land descriptions of known ordnance impact areas, and explosive and chemical burial sites. A range decontamination report is not a Certificate of Clearance, nor is it to be used as one.

6.13.1. Active Range. Decontamination activities are reported IAW AFI 32-30 and TO 6OA-2-1-13.

6.13.2. Inactive ranges. A range decontamination report is required when inactive ranges are decontaminated and serves as a supporting document to the Certificate of Clearance if the range is declared excess. Documentation will be in appropriate tabs of the base comprehensive range plan required by AFI 32-7062 and this instruction. Two copies of the report are given to the installation responsible for the range. The original copy is filed with the real estate records maintained by the base civil engineer.

6.13.3. Excess Range. Range decontamination reports for excess ranges are processed according to AFI 32-9004.

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS USAF WEAPONS AND TACTICS CENTER (ACC)
NELLIS AIR FORCE BASE, NEVADA

MAR 2 3 1994

USAFWTC/EV
4551 Devlin Dr
Nellis AFB NV 89191-6546

Mr Arthur Gravenstein
Environmental Management Specialist
DoD Branch, Bureau of Federal Facilities
Division of Environmental Protection
333 West Nye Lane
Carson City NV 89710

Dear Mr. Gravenstein

As per your February 24, 1994, letter requesting additional information on surface debris in the vicinity of Nellis Range Complex (NRC) Installation Restoration Program (IRP) sites, please find below answers to each concern.

a. In our February 14, 1994, letter, all reference to "subsurface" should be replaced with "surface". All surface debris located on or around IRP sites will be removed and then either recycled or disposed in an approved landfill. It will not be buried or remain at NRC.

b. In accordance with AFR 5046, all NRC surface debris (targets have top priority) will be removed on a five year cycle. Ideally, this process will clean up 1/5 of the NRC every year; however, due to changing mission requirements, target size and type, access, and funding, area and quantity of debris removed will vary. Currently, a specific written plan depicting exact quantities and areas of surface debris to be removed/recycled for each year doesn't exist. However, with close coordination with 554 RANS, Captain Schofield, we are in the process of developing one. Our estimated completion date is April 8, 1994.

If you have any questions or require additional information, please contact Mr. Douglas Fitzpatrick at (702) 652-3568.

Sincerely

Eloisa V. Hopper

ELOISA V. HOPPER, GM-14
Director, Environmental Management

cc:
Ken Voget
554 RANS/RXF

Global Power for America

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Western Shoshone Resources Inc.

ORR
ESQN
ENNIS M. CHARLEY
VICE-CHAIRPERSON
TERRY L. HUNT
SECRETARY
ARA J. CULBERTSON
TREASURER
ALTER SAM MARSH
PARLIAMENTARIAN

Col. Michael Fukey,
Nellis Air Force Base
Box 9919
Las Vegas, Nevada 89191

26 June 1996

RE: Bombing Range EIS and NAIP

Col. Fukey:

As you are aware a letter from the Western Shoshone National Council, was sent to Col. Donegan on 1 January 1996, in regard to the formation of a 16 Tribe Native American Inter-Action Program. This letter informed you of our rights under the "Treaty of Ruby Valley of 1863" and that The United States Air Force is in direct violation of that treaty. You chose to ignore our legal rights under this treaty.

The Western Shoshone Resources Inc., wishes to express its support of the position taken by the Western Shoshone National Council.

We also wish to take to task your effort to degradate our title to our National Territory. The "Treaty of Ruby Valley of 1863" did not ceed any lands. The Treaty has not been modified and has not been changed by any court decree nor congressional action and is still in full force and effect.

At this very moment the 9th Circuit Court of Appeals is deciding our position in relation to the US vs Nye County Court Case and that issue has yet to determine the so-called U.S. ownership of any land belonging to the Western Shoshone Nation.

Your Government has caused a quiet invasion of our lands through manipulation of your own laws and under the guise of your National Security while violating ours.

You are attempting to further lessen our territorial rights by creating a Native American Inter-Action Program. You have created a paid panel of individual Indian Persons to justify your entering our lands with the intent to rape our National Heritage. You have invited IRA (Indian Re-Organization Act) Reservation Tribal Government representatives to be a part of NAIAP. The Government of the Western Shoshone Nation does not recognise the authority of these persons outside of their respective reservation boundaries. You have also invited Native American Tribes other than Western Shoshone to participate and to enter upon our lands as if it was their right to do so. We have been at peace with neighboring Nations for some centuries, but you hope to now disturb that peace. You should know that we have defended our boundaries against all intruders including you for centuries. We will continue to do so.

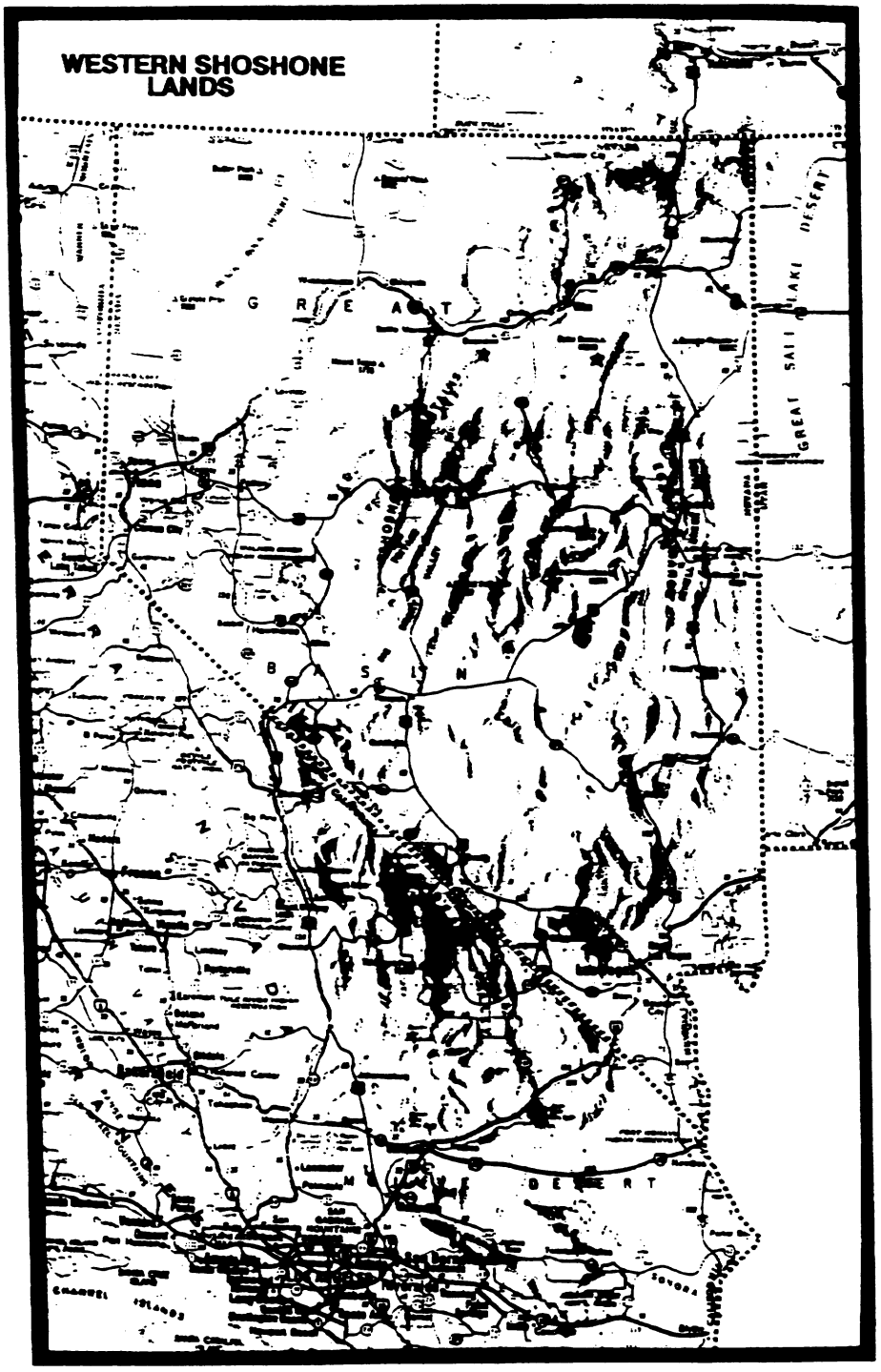
P.O.Box 21479 Reno,Nevada 89515-1479 USA Tele/Fax (702) 324-5899

We resent the idea that you claim to protect our sites better even than the BLM or any other U.S. Governmental entity. Because of your claim, we must ask why have the artifacts disappeared that were in the Pint water Cave and why have our sacred petroglyphs been shot full of holes by your war machines?

You are doing our Nation and our peoples a great disservice by your presence and continued activity within the boundaries of the Western Shoshone Natien. You are not welcome there and should be viewed as a hostile intruder by other civilized nations.

Jack C. Orr

Jack C. Orr
Chairman,
W.S.R.I.


WESTERN SHOSHONE
LANDS
GREAT
BASIN
DESERT

Beatty Town Advisory Board

P.O. Box 837
Beatty, Nevada 89003
Phone/Fax: (702) 553-2050

OFFICE OF THE SECRETARY OF DEFENSE
98 JAN 21 PM 3:49

January 14, 1998

The Honorable William Cohen
Secretary of Defense
1000 Defense, The Pentagon
Washington, D.C. 20301-1000

Dear Secretary Cohen.

Enclosed is the Beatty Town Advisory Board Resolution No. 98-01 urging opening of the western border of the Nellis Air Force Gunnery Range to mining of precious and industrial minerals.

Esmerald and Nye Counties encompass an area of 22,000 square miles. Ninety Seven (97) percent of Esmeralda County and Ninety three (93) percent of Nye County is Federally owned, much of which is controlled either by the Department of Defense or Department of Energy. These two counties have been adversely impacted by these Federal reservations for many years; a majority of the Federal and contractor employees reside in Clark County and commute here; spending no money locally. Federal agencies and contractors purchase goods and services primarily from Clark County with little spent locally. Federal agencies and contractors are minimally involved with the local governments and other organizations. No support is given to economic development activities by any organization involved with the Department of Defense.

Opening of these lands to mineral exploration and development will greatly offset the adverse impact of Federal operations in this area and potentially save several communities from their current state of near-depression.

We cannot express strongly enough our feeling of urgency in this matter and thank you for your consideration.

Sincerely,

Laurance Gray

Laurance Gray, Chairman

Beatty Town Advisory Board
P.O. Box 837
Beatty, Nevada 89003
Phone/Fax: (702) 553-2050

Resolution 98-01
BEATTY TOWN ADVISORY BOARD

BEATTY TOWN ADVISORY BOARD
COUNTY OF NYE, STATE OF NEVADA

Resolution urging the Secretary of Defense and the Secretary of the Interior to make Certain Areas of the Nellis Air Force Range Available for use by the Public.

WHEREAS, the Nellis Air Force Range (Range) is located in south-central and southern Nevada, and it was established in 1940 on public land and originally called the Las Vegas Bombing and Gunnery Range; and

WHEREAS, soon after the creation of the Range its lands were made unavailable to the public for multiple use and were reserved exclusively for military use: and

WHEREAS, the Range currently consists of approximately 3,100,000 acres, and prior to the establishment of the range its lands were used for various purposes, including prospecting, mining and recreation; and

WHEREAS, prospecting and mining within the area now known as the Range began in the late 1860's and continued until terminated by the Federal Government in the early 1940s; and

WHEREAS, evidence of prospecting and mining activities can be seen throughout the Range, and most mining taking place in the western and northern part of the area now known as the Range; and

WHEREAS, all or part of some 25 major mining districts are located in the western and northern part of the Range, and precious metals were mined in these districts, and

WHEREAS, pursuant to the Military Lands Withdrawal Act of 1986 (Public Law 99-606) a recent mineral resource assessment was conducted, and this assessment shows areas in the Range with good potential for precious metals development, particularly certain mining districts located on the western and northern boundaries of the Range; and

WHEREAS, the Military Lands Withdrawal Act of 1986 reserves the Range for only military purposes to the year 2001, unless certain areas of the Range are found suitable for opening now to the operation of U.S. mining laws pursuant to Section 12 of the Act; and

WHEREAS, the communities adjacent to the Range suffer from poor economical conditions as well as continuing to suffer the adverse economic impact caused by the Range, both of which would

Beatty Town Advisory Board
P.O. Box 837
Beatty, Nevada 89003
Phone/Fax: (702) 553-2050

be partially offset by precious and industrial metal development, and

WHEREAS, the Department of Defense (U.S. Air Force) is currently preparing documents (e.g., the mineral resource assessment, draft environmental impact statement, etc.) To support a request to Congress to renew the withdrawal, in perpetuity, for all or most of the lands associated with the Range for one purpose, continued military activities; and

WHEREAS, The U.S. Air Force is aware of the significant non-military values of certain areas in the Range, and is considering relinquishing some of these areas back to the Department of the Interior for the purpose of opening them to the public for multiple use; and

WHEREAS, this relinquishment can occur by way of the anticipated Year 2001 Congressional order to renew the withdrawal of all or most of the lands in the Range for military purposes or pursuant to Section 12 or the Military Land Withdrawal Act of 1986, the Secretary of the Interior can determine, with the concurrence of the Secretary of the Air Force, which public lands in the Range are suitable for opening now to the operation of U.S. mining laws, subject to listing said lands in the Federal Register.

NOW THEREFORE, it is hereby resolved as follows:

1. The Beatty Town Advisory Board urges the Secretary of Defense to release to the Department of the Interior, as soon as possible, those areas of the Range identified as having good potential for precious metals development located on the western and northern boundaries of the Range(see attachments 1 and 2) and having a total area of approximately 127,000 acres.

2. The Beatty Town Advisory Board urges the Secretary of the Interior to support this resolution and also make the determination that certain public lands in the Range are suitable for opening now to the operation of U. S. mining laws, pursuant to Section 12 of the Act.

3. The Beatty Town Advisory Board urges each member of the Nevada Congressional Delegation, the Governor of the State of Nevada, The Nevada Legislature, the Nevada Association of Counties and the Nevada League of Cities to support this resolution.

4. The Beatty Town Advisory Board is to prepare and transmit a copy of this resolution to the Secretary of Defense, the Secretary of the Interior, each member of the Nevada Congressional Delegation, Esmeralda and Nye County Commissioners, the Governor of the State of Nevada, each member of the Nevada

Beatty Town Advisory Board

P.O. Box 837
Beatty, Nevada 89003
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Legislature, the Nevada Association of Counties and the Nevada League of Cities.

DATED this 13Th day of January, 1998.

Beatty Town Advisory Board

BY: Laurence Gray, Chairman

BY: Harmon B. Forsyth Jr., Sec-Treas

BY: Johnnie Jarvis, Member

BY: Jeff Taguchi, Member

BY: Jerry Adcox, Member

ATTEST:

Mary Ball
Mary Ball, Notary

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS UNITED STATES AIR FORCE

U.S. AIR FORCE 50 1947 - 1997

3 February 1998

HQ USAF/XO
1680 Air Force Pentagon
Washington, DC 20330-1480

Mr. Laurence Gray, Chairman
Beatty Town Advisory Board
P.O. Box 837
Beatty, Nevada 89003

Dear Mr. Gray

Thank you for your interest in the western border of the Nellis Range and the possibility of mineral exploration. As required by Public Law 99-606, every five years, the Secretary of the Interior, with concurrence of the Air Force, determines which withdrawn lands are suitable for opening to the Mining Law of 1872. The Air Force and the Department of the Interior have determined that military operations, public safety, and national security require the closure of public access to the range for mining. We will continue to assess this need, and will inform the public of any changes in policy.

Your input on this matter will be made an official part of our administrative record for the Nellis Range Renewal proposal. It will be addressed as part of the procedures followed by the Air Force in preparation of the Range Renewal draft Legislative Environmental Impact Statement (LEIS), in accordance with Public Law 99-606 and the National Environmental Policy Act (NEPA).

The NEPA requirement for public input ensures the consistent consideration of public concerns and allows us to provide for the widest possible dissemination, including Congress, of responses to these concerns. One option the Air Force is proposing in the LEIS is to not renew the withdrawal of approximately 38,000 acres along the western border of the range. Any decision regarding this proposal will be made by Congress, after thorough investigation and public comment.

Thank you for the opportunity to discuss this issue with you. The Air Force has benefited from a long-standing, supportive relationship with the citizens and government agencies in Nevada, and we will continue to take whatever steps we can to preserve that relationship.

Sincerely,

PATRICK K. GAMBLE, Lt Gen, USAF
Deputy Chief of Staff
Air & Space Operations

Golden Legacy, Boundless Future... Your Nation's Air Force

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MEMORANDUM OF UNDERSTANDING

BETWEEN

NELLIS AIR FORCE BASE

AND

LINCOLN COUNTY, NEVADA

I. PREFACE

WHEREAS, the United States Air Force trains aircrews in the state of Nevada to maintain mission ready status in their assigned aircraft and to participate in large force integrated air missions; and

WHEREAS, the Nellis Air Force Range (hereinafter "NAFR") lands were withdrawn from all forms of appropriation under the public land laws of P.L. 99-606, *as amended,* and by Public Land Order 7131; and

WHEREAS, the Air Force has announced its intention to seek an extension of the congressional withdrawal (hereinafter "renewal") of the NAFR; and

WHEREAS, the Air Force is the lead agency (40 C.F.R. § 1501.5) and the Bureau of Land Management, United States Fish and Wildlife Service, and the Department of Energy are cooperating agencies pursuant to 40 C.F.R. § 1501.6 in the NAFR renewal; and

WHEREAS, Nellis Air Force Base (hereinafter "Nellis") and Lincoln County (hereinafter "Lincoln") recognize the importance of working together in an effort to keep local government involved in the legislative environmental impact statement (hereinafter "LEIS") process.

NOW, THEREFORE, the parties agree, in order to facilitate the implementation of their cooperative efforts, agree to the following:

II. PURPOSE

The purpose of this agreement is to establish the terms and conditions of a cooperative working relationship between Nellis and Lincoln in the preparation of the LEIS for the NAFR renewal.

III. AUTHORITY

National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321-4370d, *as amended,* (hereinafter "NEPA"); Federal Land Policy Management Act of 1976, 43 U.S.C. §§ 1701-84 (hereinafter "FLPMA"); Military Lands Withdrawal Act of 1986, P.L. 99-606, (hereinafter "MLWA"); Intergovernmental Cooperation Act of 1968; Executive Order 12372 (Intergovernmental Review of Federal Programs); Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA, 40 C.F.R. Parts 1500-1508 (hereinafter "CEQ Regulations"); Department of Defense Instruction (DoDI) 4000.19 (Interservice and Intergovernmental Support); and Air Force Instruction (AFI) 250201 (Support Agreements Procedures).

IV. GENERAL

This Memorandum of Understanding (hereinafter "MOU") establishes the framework and guidance, and also documents the agreement by and between Nellis and Lincoln for a coorperative relationship during the preparation of the LEIS for the NAFR renewal pursuant to the MLWA and applicable Department of Interior regulations.

V. RESPONSIBILITIES

1. Nellis and Lincoln agree to:

   a. Follow any and all applicable federal statutory or regulatory laws and procedures.

   b. Inform each other of the date, time, location, and purpose of quarterly NAFR LEIS meetings attended by all cooperating agencies, and in the event either party is unable to attend, the attending party will provide the absentee with a meeting summary.

   c. Meet at the request of either party at mutually agreed upon dates, times, and locations to discuss Lincoln County LEIS-related concerns.

   d. Provide Lincoln with applicable portions of information and analysis bearing on Lincoln issues or concerns.

2. Nellis will:

   a. Communicate the execution of this MOU to the appropriate installation, range, major command, and headquarters offices; and

   b. Designate a point of contact for the NAFR LEIS.

3. Lincoln will:

a. Communicate the execution of this MOU to the appropriate Lincoln officials; and

b. Designate a point of contact for the NAFR LEIS; and

c. Provide Nellis with any and all relevant Lincoln information that may be helpful in the preparation of the NAFR LEIS.

FURTHERMORE, both parties understand and mutually agree that:

4. Implementation of this MOU is of mutual benefit and any costs incurred by either party shall be at that party's expense;

5. This MOU may be modified or amended only by mutual agreement of the parties in writing and signed by each of the parties hereto;

6. Any documents or data exchanged between the parties to this MOU will not be released to any third party unless the designated representative of the party that generated the document or data approves the release, in writing;

7. Nothing in this MOU shall be construed as a commitment of funds by either party;

8. Nothing herein contained shall be construed as limiting or affecting, in any way, the vested or delegated authority of the United States Air Force, Nellis, or Lincoln;

9. This MOU becomes effective when signed by all parties and shall remain in full force and effect until the Final LEIS is completed or the project is canceled, but may be terminated by either party upon 45 days notice, in writing, given to the other party.

John D Ladieu 21 May 97
JOHN D. LADIEU
Colonel, USAF
99ABW/CC
Date

Edward E Wright 7 Apr 1997
EDWARD E. WRIGHT
Lincoln County Commissioners
Date

ECONOMIC DEVELOPMENT AUTHORITY
ESMERALDA / NYE
EDEN

The Honorable William Cohen
Secretary of Defense
1000 Defense, The Pentagon
Washington, D.C. 20301-1000

December 4, 1997

Sandy Harmon
Executive Director
Dawn L. Ellis
Administrative Assistant
Board of Directors
Virginia Ridgway
Chairman
R.M. Cameron, C.P.M.
Vice Chairman
Linda Beaver
Sue Boyer
Alphonse Bruton
Ron Hunsinger
Michele Parreous
Bob Revert
Trish Ripple
Tony Valdez
Alternates
Wade Barton
Robb Durrant
Joni Eastley
Norman Payton
Ralph Ross
Marilyn Anderson
Ira "Bud" Capeto
Silver Benefactors
• Bashful Nevada
• Carson Investment Company
• Citizen's Telecom
• Dr. Roderick Myers
• Goldfield Chamber of Commerce
• Hammett Exploration Company
• Longstreet / Santa Fe Station
• Nevada Business Service
• Patrump Valley Cattle
• Round Mountain Gold
• Tonopah Chamber of Commerce
• Western Pacific Development Corporation
Gold Benefactor
• Nevada State Bank

Dear Secretary Cohen:

I am pleased to present to you the enclosed EDEN resolution No. 97-2 urging opening of the western border of the Nellis Airforce Gunnery Range to mining of precious and industrial minerals.

EDEN is the Economic Development Authority for Esmeralda and Nye Counties, encompassing an area of 22,000 square miles. Ninety Seven per cent of Esmeralda County is federally owned. Ninety 93 percent of Nye county is federally owned, much of which is controlled either by the Department of Defense or Department of Energy. Our two counties have been adversely impacted by these federal reservations for many years; a majority of the federal and contractor employees reside in Clark county and commute [illegible], spending no money locally, federal agencies and contractors purchase goods and services primarily from Clark county with little spent locally, federal agencies and contractors are minimally involved with local governments and other organizations. No support is given to economic development activities by any organization involved with the Department of Defense.

Opening of these lands to mineral exploration and development will greatly offset the adverse impact of federal operations in this area and potentially save several communities from their current state of near-depression.

We cannot express strongly enough our feeling of urgency in this matter and thank you for your consideration.

Sincerely,

(Mr.) Sandy Harmon
Executive Director

We're [illegible] tempting !
P. O. Box 153, Tonopah, NV 89049 / Phone (702) 482-8139 / Fax (702) 482-7369
E-mail: nveden@aol.com / URL = http://members.aol.com/nveden/index.htm

Resolution No. 97-02
ECONOMIC DEVELOPMENT AUTHORITY
ESMERALDA/NYE COUNTIES

EXECUTIVE BOARD OF THE ECONOMIC DEVELOPMENT AUTHORITY
ESMERALDA/NYE COUNTIES (EDEN)

Resolution urging the Secretary of Defense and the Secretary of the Interior to make certain areas of the Nellis Air Force Range available for use by the public

WHEREAS, the Nellis Air Force Range (Range) is located in south-central and southern Nevada, and it was established in 1940 on public land and originally called the Las Vegas Bombing and Gunnery Range; and

WHEREAS, soon after the creation of the Range its lands were made unavailable to the public for multiple use and were reserved exclusively for military use; and

WHEREAS, the Range currently consists of approximately 3,100,000 acres, and prior to the establishment of the Range its lands were used for various purposes, including prospecting, mining and recreation; and

WHEREAS, prospecting and mining within the area now known as the Range began in the late 1860s and continued until terminated by the federal government in the early 1940s; and

WHEREAS, evidence of prospecting and mining activities can be seen throughout the Range, and most mining taking place in the western and northern part of the area now known as the Range, and

WHEREAS, all or part of some 25 major mining districts are located in the western and northern part of the Range, and precious metals were mined in these districts, and

WHEREAS, pursuant to the Military Lands Withdrawal Act of 1986 (Public Law 99-606) a recent mineral resource assessment was conducted, and this assessment shows areas in the Range with good potential for precious metals development, particularly certain mining districts located on the western and northern boundaries of the Range; and

WHEREAS, the Military Lands Withdrawal Act of 1986 reserves the Range for only military purposes to the Year 2001, unless certain areas of the Range are found suitable for opening now to the operation of U.S. mining laws pursuant to Section 12 of the Act; and

WHEREAS, the communities adjacent to the Range suffer from poor economic conditions as

well as continuing to suffer the adverse economic impact caused by the Range, both of which would be partially offset by precious and industrial metal development; and

WHEREAS, the Department of Defense (U.S. Air Force) is currently preparing documents (e.g., the mineral resource assessment, draft environmental impact statement, etc.) To support a request to Congress to renew the withdrawal, in perpetuity, for all or most of the lands associated with the Range for one purpose, continued military activities; and

WHEREAS, the U.S. Air Force is aware of the significant non-military values of certain areas in the Range, and is considering relinquishing some of these areas back to the Department of the Interior for the purpose of opening them to the public for multiple use; and

WHEREAS, this relinquishment can occur by way of the anticipated Year 2001 Congressional order to renew the withdrawal of all or most of the lands in the Range for military purposes or pursuant to Section 12 of the Military Land Withdrawal Act of 1986, the Secretary of the Interior can determine, with the concurrence of the Secretary of the Air Force, which public lands in the Range are suitable for opening now to the operation of U.S. mining laws, subject to listing said lands in the Federal Register.

NOW THEREFORE, it is hereby resolved as follows:

1. The Economic Development Authority Nye/Esmeralda Counties urges the Secretary of Defense to release to the Department of the Interior, as soon as possible, those areas of the Range identified as having good potential for precious metals development located on the western and northern boundaries of the Range (see Attachments 1 and 2) and having a total area of approximately 127,000 acres.

2. The Economic Development Authority Nye/Esmeralda Counties urges the Secretary of the Interior to support this resolution and also make the determination that certain public lands in the Range are suitable for opening now to the operation of U.S. mining laws, pursuant to Section 12 of the Act.

3. The Economic Development Authority Nye/Esmeralda Counties urges each member of the Nevada Congressional Delegation, the Governor of the State of Nevada, the Nevada Legislature, the Nevada Association of Counties and the Nevada League of Cities to support this resolution.

4. The Economic Development Authority Nye/Esmeralda Counties Staff is to prepare and transmit a copy of this resolution to the Secretary of Defense, the Secretary of the Interior, each member of the Nevada Congressional Delegation, Esmeralda and Nye County Commissions, the Governor of the State of Nevada, each member of the Nevada Legislature, the Nevada Association of Counties and the Nevada League of Cities.

DATED this 20th day of November, 1997.

PROPOSED on the 20th day of November, 1997, by the Executive Board of the Economic Development Authority Esmeralda/Nye Counties.

VOTE: AYES [illegible]

NAYS: None

ABSENT: None

EFFECTIVE this 20th day of November, 1997.

EXECUTIVE BOARD OF THE ECONOMIC DEVELOPMENT AUTHORITY ESMERALDA/NYE COUNTIES

By: [signature]
Executive Board Chairman

ATTEST:

[signature]
K. R. "Sandy" Harmon, Executive Director

ROUND MOUNTAIN TOWN BOARD
COUNTY OF NYE, STATE OF NEVADA

Resolution urging the Secretary of Defense and the Secretary of the Interior to make certain areas of the Nellis Air Force Range available for use by the public

WHEREAS, the Nellis Air Force Range (Range) is located in south-central and southern Nevada, and it was established in 1940 on public land and originally called the Las Vegas Bombing and Gunnery Range; and

WHEREAS, soon after the creation of the Range its lands were made unavailable to the public for multiple use and were reserved exclusively for military use; and

WHEREAS, the Range currently consists of approximately 3,100,000 acres, and prior to the establishing of the Range its lands were used for various purposes, including prospecting, mining and recreation; and

WHEREAS, evidence of prospecting and mining activities can be seen throughout the Range, with most mining taking place in the northern part of the area now known as the Range; and

WHEREAS, all or part of some 25 major mining districts are located in the northern part of the Range, and precious metals were mined in these districts; and

WHEREAS, pursuant to the Military Lands Withdrawal Act of 1986 (Public Law 99-606) a recent mineral resource assessment was conducted, and this assessment shows areas in the Range with good potential for precious metals development, particularly certain mining districts located on the western and northern boundaries of the Range; and

WHEREAS, the Military Lands Withdrawal Act of 1986 reserves the Range for only military purposes to the Year 2001, unless certain areas of the Range are found suitable for opening now to the operation of U.S. mining laws pursuant to Section 12 of the Act, and

WHEREAS, the Department of Defense (U.S. Air Force) is currently preparing documents (e.g., the mineral resource assessment, draft environmental impact statement, etc.) to support a request to Congress to renew the withdrawal, in perpetuity, for all or most of the lands associated with the Range for one purpose, continued military activities; and

WHEREAS, the U.S. Air Force is aware of the significant non-military values of certain areas in the Range, and is considering relinquishing some of these areas back to the Department of the Interior for the purpose of opening them to the public for multiple use; and

WHEREAS, this relinquishment can occur by way of the anticipated Year 2001 Congressional order to renew the withdrawal of all or most of the lands in the Range for military purposes or pursuant to Section 12 of the Military Land Withdrawal Act of 1986, the Secretary of the Interior can determine, with the concurrence of the Secretary of the Air Force, which public lands in the Range are suitable for opening now to the operation of U.S. mining laws, subject to listing said lands in the Federal Register,

NOW THEREFORE, it is hereby resolved as follows:

1. The Round Mountain Town Board urges the Secretary of Defense to release to the Department of the Interior, as soon as possible, those areas of the Range identified as having good potential for precious metals development located on the western and northern boundaries of the Range (see Attachments 1 and 2) and having a total area of approximately 127,000 acres.

2. The Round Mountain Town Board urges the Secretary of the Interior to support this resolution and also make the determination that certain public lands in the Range are suitable for opening now to the operation of U.S. mining laws, pursuant to Section 12 of the Act.

3. The Round Mountain Town Board urges each member of the Nevada Congressional Delegation, the Governor of the State of Nevada, the Nevada Legislature, the Nevada Association of Counties, and the Nevada League of Cities to support this resolution.

4. The Town Administrative Supervisor is to prepare and transmit a copy of this resolution to the Secretary of Defense, the Secretary of the Interior, each member of the Nevada Congressional Delegation, the Governor of the State of Nevada, each member of the Nevada Legislature, the Nevada Association of Counties and the Nevada League of Cities.

Dated this 25 day of November, 1997.

PROPOSED on the 25 day of November, 1997 by the Round Mountain Town Board.

VOTE: AYES: Stephen Summerdell, Jorii Eastley, [illegible], Marianne Firebaugh, _____ Nayes: Johnny Archuleta, _____, _____, _____, _____

ABSTENTIONS: None ABSENT: None

EFFECTIVE this 25 day of November, 1997.

ROUND MOUNTAIN TOWN BOARD
COUNTY OF NYE, STATE OF NEVADA

By: Jorii Eastley
Jorii L. Eastley, Chairperson

ATTEST:

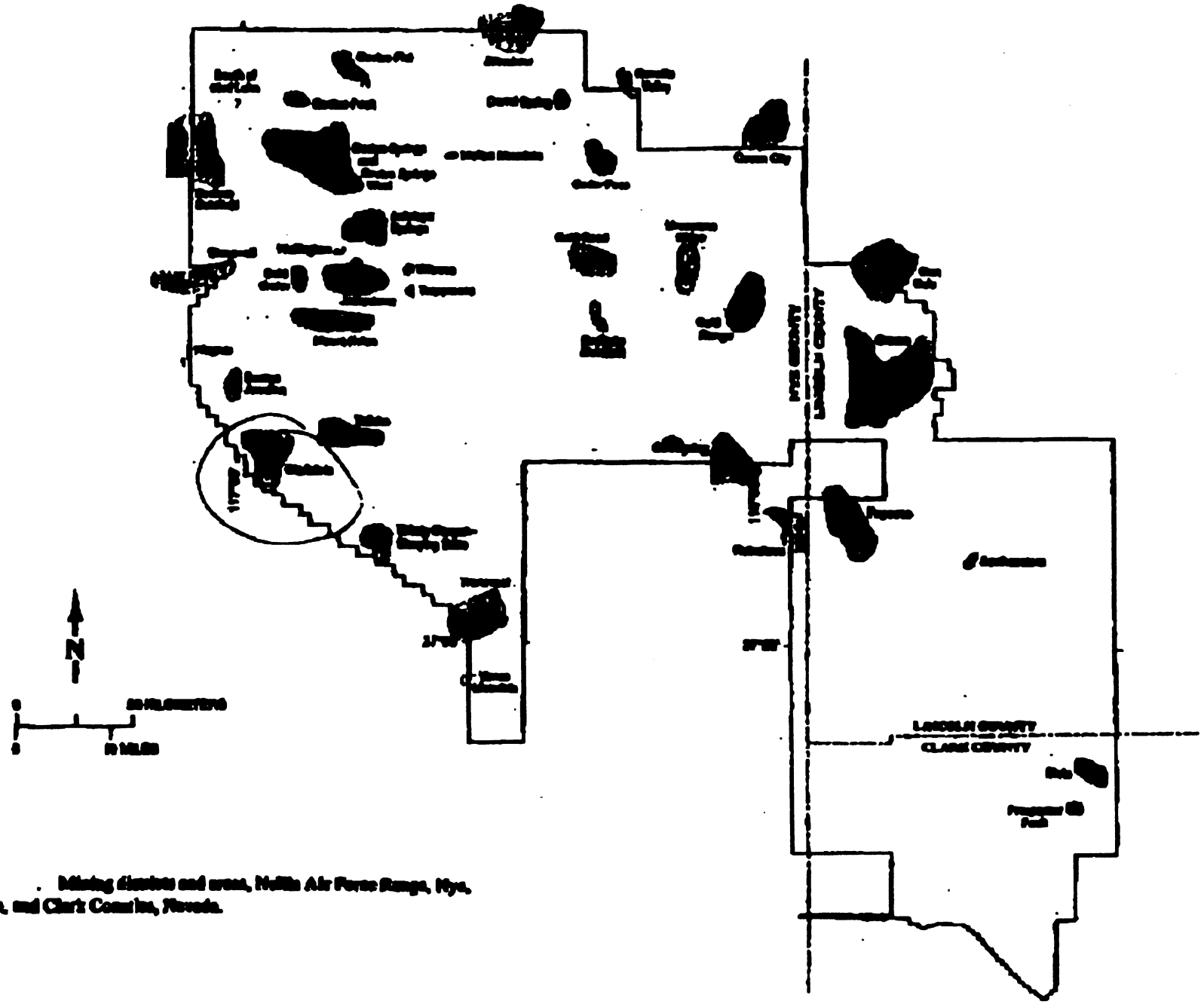
Marianne Firebaugh
Marianne Firebaugh, Town Clerk

MINING DISTRICTS OF INTEREST ALONG FRINGES OF NELLIS RANGE

APPROXIMATE LOCATION AND ACRE

BY WALT LOMBARDO, NEVADA DIVISION OF MINERALS

REVEILLE VALLEY -	T.2S., R.51E., SEC. 1,2,11,12 (Unsurveyed)	2,560 ACRES
CORRAL SPRINGS -	T.2S., R.50E., SEC. 1 - 4, 9 - 12 (Unsurveyed)	5,120 ACRES
SILVERBOW -	T.1S., R.49E., SEC. 1 - 12 (Unsurveyed)	7,680 ACRES
CACTUS FLAT -	T.1N., R.48E., SEC. 13 - 36 (Unsurveyed) T.2N., R.48E., SEC. 1 - 24 (Unsurveyed)	30,720 ACRES
CACTUS PEAK -	T.1S., R.45E., SEC. 33 - 36 (Unsurveyed) T.1S., R.46E., SEC. 31 - 33 (Unsurveyed) T.2S., R.45E., SEC. 1 - 4, 9 - 16, 21 - 24 (Unsurveyed) T.2S., R.46E., SEC. 4 - 9, 16 - 21 (Unsurveyed)	22,400 ACRES
SOUTH OF MUD LAKE -	T.2S., R.44E., SEC. 1 - 12 (Unsurveyed)	7,680 ACRES
EASTERN GOLDFIELD -	T.2S., R.44E., SEC. 16 - 21, 28 - 33 (Unsurveyed) T.3S., R.44E., SEC. 3 - 10, 15 - 18 (Unsurveyed)	15,360 ACRES
GOLD CRATER -	T.4S., R.45E., SEC. 36 (Unsurveyed) T.4S., R.46E., SEC. 31 (Unsurveyed) T.5S., R.45E., SEC. 1, 12 (Unsurveyed) T.5S., R.46E., SEC. 6, 7 (Unsurveyed)	3,840 ACRES
WAGNER -	T.6S., R.44E., SEC.18, 19, 30 (Unsurveyed)	1,920 ACRES
CLARKDALE -	T.7S., R.45E., SEC.34 -35 (Unsurveyed) T.8S., R.45E., SEC.2, 3, 9 - 11, 15, 16, 21, 22 (Unsurveyed)	7,040 ACRES
THIRSTY CANYON -	T.9S., R.47E., SEC. 13 - 30, 32 - 36 (Unsurveyed) T.10S., R.47E., SEC. 1, 2, 12 (Unsurveyed)	16,640 ACRES
TRANSVAAL -	T.10S., R.48E., SEC. 25, 26, 36 (Unsurveyed) T.10S., R.49E., SEC. 30 - 33 (Unsurveyed) T.11S., R.49E., SEC. 4 - 6 (Unsurveyed)	6,400 ACRES
		127,360 acres



Mining districts and areas, Nellis Air Force Range, Nye, Lincoln, and Clark Counties, Nevada.

MEMORANDUM OF UNDERSTANDING

BETWEEN

NELLIS AIR FORCE BASE

AND

NYE COUNTY, NEVADA

I. PREFACE

WHEREAS, the United States Air Force trains aircrews in the state of Nevada to maintain mission ready status in their assigned aircraft and to participate in large force integrated air missions; and

WHEREAS, the Nellis Air Force Range (hereinafter "NAFR") lands were withdrawn from all forms of appropriation under the public land laws of P.L. 99-606, *as amended,* and by Public Land Order 7131; and

WHEREAS, the Air Force has announced its intention to seek an extension of the congressional withdrawal (hereinafter "renewal") of the NAFR; and

WHEREAS, the Air Force is the lead agency (40 C.F.R. § 1501.5) and the Bureau of Land Management, United States Fish and Wildlife Service, and the Department of Energy are cooperating agencies pursuant to 40 C.F.R. § 1501.6 in the NAFR renewal; and

WHEREAS, Nellis Air Force Base (hereinafter "Nellis") and Nye County (hereinafter "Nye") recognize the importance of working together in an effort to keep local government involved in the legislative environmental impact statement (hereinafter "LEIS") process.

NOW, THEREFORE, the parties, in order to facilitate the implementation of their cooperative efforts, agree to the following:

II. PURPOSE

The purpose of this agreement is to establish the terms and conditions of a cooperative working relationship between Nellis and Nye in the preparation of the LEIS for the NAFR renewal.

III. AUTHORITY

National Environmental Policy Act of 1969, 42 U.S.C. §§ 4321-4370d, *as amended,* (hereinafter "NEPA"); Federal Land Policy Management Act of 1976, 43 U.S.C. §§ 1701-84 (hereinafter "FLPMA"); Military Lands Withdrawal Act of 1986, P.L. 99-606, (hereinafter "MLWA"); Intergovernmental Cooperation Act of 1968; Executive Order 12372 (Intergovernmental Review of Federal Programs); Council on Environmental Quality Regulations for Implementing the Procedural Provisions of the NEPA, 40 C.F.R. Parts 1500-1508 (hereinafter "CEQ Regulations"); Department of Defense Instruction (DoDI) 4000.19 (Interservice and Intergovernmental Support); and Air Force Instruction (AFI) 250201 (Support Agreements Procedures).

IV. GENERAL

This Memorandum of Understanding (hereinafter "MOU") establishes the framework and guidance, and also documents the agreement by and between Nellis and Nye for a cooperative relationship during the preparation of the LEIS for the NAFR renewal pursuant to the MLWA and applicable Department of Interior regulations.

V. RESPONSIBILITIES

1. Nellis and Nye agree to:

   a. Follow any and all applicable federal statutory or regulatory laws and procedures.

   b. Inform each other of the date, time, location, and purpose of quarterly NAFR LEIS meetings attended by all cooperating agencies, and in the event either party is unable to attend, the attending party will provide the absentee with a meeting summary.

   c. Meet at the request of either party at mutually agreed upon dates, times, and locations to discuss Nye County LEIS-related concerns.

   d. Provide Nye with applicable portions of information and analysis bearing on Nye issues or concerns.

2. Nellis will:

   a. Communicate the execution of this MOU to the appropriate installation, range, major command, and headquarters offices; and

   b. Designate a point of contact for the NAFR LEIS.

3. Nye will:

a. Communicate the execution of this MOU to the appropriate Nye officials; and

b. Designate a point of contact for the NAFR LEIS; and

c. Provide Nellis with any and all relevant Nye information that may be helpful in the preparation of the NAFR LEIS.

FURTHERMORE, both parties understand and mutually agree that:

4. Implementation of this MOU is of mutual benefit and any costs incurred by either party shall be at that party's expense;

5. This MOU may be modified or amended only by mutual agreement of the parties in writing and signed by each of the parties hereto;

6. Any documents or data exchanged between the parties to this MOU will not be released to any third party unless the designated representative of the party that generated the document or data approves the release, in writing;

7. Nothing in this MOU shall be construed as a commitment of funds by either party;

8. Nothing herein contained shall be construed as limiting or affecting, in any way, the vested or delegated authority of the United States Air Force, Nellis, or Nye;

9. This MOU becomes effective when signed by all parties and shall remain in full force and effect until the Final LEIS is completed or the project is canceled, but may be terminated by either party upon 45 days notice, in writing, given to the other party.

JOHN D. LADIEU
Colonel, USAF
99ABW/CC

8 July 97
Date

RICHARD CARVER
Chairman
Nye County Commissioners

6-3-97
Date

LIST OF REPOSITORIES

10.0

10.0 LIST OF REPOSITORIES

Alamo Branch Library
Box 239
Alamo, NV 89001

Beatty Library
4th and Ward Streets
Beatty, NV 89003

Boulder City Library
813 Arizona
Boulder City, NV 89005

Carson City Library
900 N. Roop Street
Carson, City, NV 89701

Clark County Library
1401 E. Flamingo Rd.
Las Vegas, NV 89119

Community College of Southern Nevada Library
3200 E. Cheyenne Ave.
North Las Vegas, NV 89030

Henderson District Public Library
280 S. Water St.
Henderson, NV 89015

Indian Springs Library
715 W. Gretta Lane
Indian Springs, NV 89018

Las Vegas Library
833 North Las Vegas Boulevard
Las Vegas, NV 89101

Lincoln City Library - Pioche
15 Main Street
Pioche, NV 89043

Lincoln County Library - Caliente
100 Depot Street
Caliente, NV 89008

North Las Vegas Library District
2300 Civic Center Dr.
North Las Vegas, NV 89030

Nye County Commissioners Office
101 Radar Road
Tonopah, NV 89049

Pahrump Community Library
2101 E. Calvada Blvd.
Pahrump, NV 89041

Tonopah Public Library
171 Central St.
Tonopah, NV 89049

University of Nevada at Las Vegas
James Dickinson Library
4505 South Maryland Parkway
Las Vegas, NV 89156

University of Nevada, Reno Libraries
Business and Government Information Center
1664 N. Virginia Street
Reno, NV 89557-004

Washoe County Library
301 S. Center Street
Reno, NV 89505

White Pine County Public Library
950 Campton
Ely, NV 89301

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ACRONYMS & ABBREVIATIONS

AAA	anti-aircraft artillery
ACC	Air Combat Command
ACEC	Areas of Critical Environmental Concern
ACHP	Advisory Council on Historic Preservation
ACM	air combat maneuvers
ACMI	Air Combat Maneuvering Instrumentation
AEC	Atomic Energy Commission
AFB	Air Force Base
AFI	Air Force Instruction
AFM	Air Force Manual
AFOSH	Air Force Occupational Health and Safety
AFR	Air Force Regulation
AFY	acre-feet per year
A/G	air-to-ground
AGL	above ground level
AIRFA	American Indian Religious Freedom Act
AIWS	American Indian Writers Subgroup
AML	Appropriate Management Level
AMSL	above mean sea level
API	armor-piercing incendiary
APIT	armor-piercing incendiary tracer
AR	aerial refueling
ARPA	Archaeological Resource and Protection Act
ARTCC	Air Route Traffic Control Center
AST	above-ground storage tanks
ATC	air traffic control
ATCAA	Air Traffic Control Assigned Airspace
AWACS	Airborne Warning and Control System
AWFC	Air Warfare Center
BASH	Bird-Aircraft Strike Hazard
BEA	U.S. Bureau of Economic Analysis
BLM	Bureau of Land Management
BNA	block numbering area
B.P.	[years] before present
BWPC	Bureau of Water Permits and Compliance
C^2	command and control
C^3	command, control, and communications
C^3I	command, control, and communication interface
CAA	Clean Air Act of 1969
CAAA	1990 Clean Air Act Amendments
CAU	corrective action unit
CBU	cluster bomb unit
CCAPCD	Clark County Air Pollution Control District
CCSD	Clark County School District
CDP	Census Designated Place
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensations, and Liability Act
CFR	Code of Federal Regulations
CFT	combined forces training
CGTO	Consolidated Group of Tribes and Organizations
CO	carbon monoxide
CRMP	Cultural Resources Management Plan
CSEL	"C-weighted" sound exposure level
CWA	Clean Water Act
DAC	derived air concentrations
dB	decibel
dBP	decibel pressure
DD	Decision Documents
DNWR	Desert National Wildlife Range
DOD	Department of Defense
DODI	Department of Defense Instruction
DOE	Department of Energy
DOI	Department of the Interior
DRMO	Defense Reutilization and Marketing Office
DTRA	Defense Threat Reduction Agency
DU	depleted uranium
DT&E	developmental test and evaluation
EC	electronic combat
ECAMP	environmental compliance assessment and management
ECM	electronic countermeasures
ECR	electronic combat range
EIAP	environmental impact analysis process
EIS	Environmental Impact Statement
EO	Executive Order
EOD	explosive ordnance disposal
EPCRA	Emergency Planning and Community Right-to-Know Act
EPU	Emergency Power Unit
ERP	Environmental Restoration Program
ER/CP	Emergency Response/Contingency Plans
FAA	Federal Aviation Administration
FAC	Forward Air Controller
FFACO	Federal Facility Agreement and Consent Order
FICON	Federal Interagency Committee on Noise
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FL	flight level
FLPMA	Federal Land Policy and Management Act
FY	fiscal year
GBU	glide bomb unit
GIS	Geographic Information System
GPS	Global Positioning System
H2S	hydrogen sulfide
HAP	High Accident Potential
HE	high explosives
HEI	high explosive incendiary
HMA	Wild Horse Management Area
HWAP	Hazardous waste accumulation point
Hz	herz

IFR	instrument flight rules
IMP	Interim Management Policy
INRMP	Integrated Natural Resources Management Plan
IR	instrument route
IRP	Installation Restoration Program
ISAFAF	Indian Springs Air Force Auxiliary Field
JASSM	Joint Air-to-Surface Standoff Missile
JDAM	Joint Direct Attack Munitions
JSF	Joint Strike Fighter
JSOW	Joint Standoff Weapon
J-STARS	Joint Surveillance and Target Attack Radar System
kg	kilograms
L	sound level
LCdn	C-Weighted Day-Night Sound Level
Lmax	maximum sound level
Ldn	Day-Night Average Sound Level
Ldnmr	Onset Rate Adjusted Monthly Day-Night Average Sound Level
LADAR	laser detection and ranging
LANTIRN	low-altitude navigation targeting infrared for night
LATN	Low Altitude Tactical Navigation
LEIS	legislative environmental impact statement
LLW	low level nuclear waste
LOA	letter of agreement
LOCAAS	Low-Cost Autonomous Attack System
LPN	licensed practical nurse
LTO	landing and takeoff
LV&T	Las Vegas & Tonopah Railroad
LVCVA	Las Vegas Convention and Visitors Authority
MCL	maximum contaminant level
µg/m^3	micrograms per cubic meter
mg	milligrams
Mil	military power
MLWA	Military Lands Withdrawal Act
mm	millimeters
MOA	military operations area
MoM	Measure of Merit
MOU	memorandum of understanding
mph	miles per hour
MRTFB	major range and test facility base
MR_NMAP	MOA Range Noise Map computer program
MTR	military training route
mw/cm2	milliwatts/square centimeter
NAAQS	National Ambient Air Quality Standards
NAC	Nevada Administrative Code
NAFR	Nellis Air Force Range
NAGPRA	Native American Graves Protection and Repatriation Act
NAIP	Native American Interaction Program
NAPS	Noise Assessment Prediction System
NARD	Native American Resource Document
NAS	Naval Air Station
nCi/g	nanoCuries/gram
NEPA	National Environmental Policy Act
NDEM	Nevada Division of Emergency Management
NDEP	Nevada Division of Environmental Protection
NDOT	Nevada Department of Transportation
NDOW	Nevada Division of Wildlife
NFA	no further action
NHPA	National Historic Preservation Act
NHWAP	Nonhazardous waste accumulation point
NM	nautical mile
NO2	nitrogen dioxide
NOI	Notice of Intent
NOTAM	Notice to Airmen
NPDES	National Pollutant Discharge Elimination System
NRC	Nellis Range Complex
NRHP	National Register of Historic Places
NRS	Nevada Revised Statute
NTS	Nevada Test Site
NTTR	Nevada Test & Training Range
NV	Nevada
NVSWEO	Nevada State Water Engineer's Office
NWHR	Nevada Wild Horse Range
NWR	National Wildlife Refuge
O3	ozone
O&M	operations and maintenance
OAR	open air range
ORV	off-road vehicle
ORM	Operational Risk Management
OSHA	Occupational Safety and Health Administration
OT&E	operational test and evaluation
PA	preliminary assessment
PAH	polynuclear aromatic hydrcarbons
Pb	lead
PCB	polychlorinated biphenyl
pCi/g	picoCuries/gram
PEL	permissible exposure limit
PILT	payment-in-lieu-of-taxes
PL	Public Law
PLO	Public Land Order
PL 99-606	Land Withdrawal Act of 1986
PM$_{2.5}$	particulate matter less than 2.5 microns in diameter
PM$_{10}$	particulate matter less than 10 microns in diameter
POL	petroleum oil liquids
ppm	parts per million
PRG	Preliminary Remediation Goals
psf	pounds per square foot
RCRA	Resource Conservation and Recovery Act
REMI	Regional Economic Models, Inc.
RF	radio frequency
RFA	RCRA Facility Assessment

RFMDS	Red Flag Measurement and Debriefing System
RIMS II	regional input-output modeling system
RMP	Resource Management Plan
ROC	region of comparison
ROI	region of influence
ROS	Recreation Opportunity Spectrum
RP	Resource Plan
SAM	surface-to-air missile
SCCRT	Supplemental City-County Relief Taxes
SEAD	suppression of enemy air defense
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SI	Site Investigation
SIP	State Implementation Plan
Smokey SAM	simulated surface-to-air missile
SO2	sulfur dioxide
SOP	standard operating procedures
SPCC	Spill Prevention, Control, and Countermeasures
SPLA&SL	San Pedro, Los Angeles & Salt Lake City Railroad
SRMA	Special Recreation Management Areas
STOVL	short take-off and vertical landing
SVOC	semi-volatile organic compounds
SWDA	Solid Waste Disposal Act
SWMU	Solid Waste Management Units
T&E	Test and Evlauation
TCP	traditional cultural property
TDS	total dissolved solids
TDY	temporary duty
TECR	Tonopah EC Range
TGO	touch-and-go
TNC	The Nature Conservancy
TPECR	Tolicha Peak EC Range
TRPH	Total recoverable petroleum hydrocarbons
TSCA	Toxic Substance Control Act
TSD	Technical Support Document
TTR	Tonopah Test Range
UAV	unmanned aerial vehicle
UCAV	Uninhabited Combat Aerial Vehicles
UNLV	University of Nevada, Las Vegas
US	United States
USC	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground storage tanks
UTTR	Utah Test and Training Range
UXO	Unexploded ordnance
VFR	visual flight rules
VOC	volatile organic compounds
VR	visual route
VRM	visual resources management
WCMD	wind corrected munition dispenser
WMA	Wildlife Management Area
WSA	Wilderness Study Area